The Interplay between Technology, Tactics and Organisation in the First AIF

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Abstract

The purpose of this thesis is to investigate the interplay between the technology, tactics and organisation of the First AIF.

Warfare in the twentieth warfare is characterised by the presence of certain technologies that give it a distinctive nature and which first appeared in the Great War. It was in the Great War that the highly dispersed form of tactics that we know today emerged. Thus, it is a natural starting point not only for the examination of warfare in the era of technology but for considering the nature of technological change itself. My Australian perspective enabled issues to be looked at to a depth that would not be possible in a work of this length with a broader view.

I have argued that the Great War was characterised by the problem of trench warfare, and I have traced the progress of tactical, technological and organisational developments that ultimately supplied the solutions. I have also shown how the Great War was not only a war of technology in which new technologies were introduced and developed, but also one which saw the spread of new ways of thinking about military technology.

In preparing this thesis, I have inspected the actual battlefields in France, Belgium and Turkey. I have drawn on a broad range of published material, but the thesis is largely based upon the primary documents found in the Australian War Memorial and Australian National Archives.
Preface

A number of people deserve special mention for their help in the preparation of this thesis.

First and foremost among them is my supervisor, Professor Jeffrey Grey, whose assistance have been beyond price. He was instrumental in getting this thesis underway, in keeping it on track, and in ensuring that it eventually got completed. His comments at every stage have been constructive, insightful and valuable.

Lindley Walter-Smith served as a sounding board for many of the ideas contained herein. A wonderful person and a brilliant intellect, she has been my inspiration throughout. Major Garry Thompson and Captain Noel Mungovan have been immense sources of information. Noel can not only explain the pros and cons of various forms of barbed wire, but he arranged for me to attend an "Executive Stretch" at Ingleburn, NSW, where I was able to discuss various ideas with a number of officers and soldiers of the Regular Army and Army Reserve.

Various people have taken the time to explain various aspects of the thesis with me. Professor S. F. Wise spoke to me about the Western Front from a Canadian perspective. Peter Burness of the Australian War Memorial helped with the weapons and equipment of the Army in 1914. Dirk Bockman explained the intricacies of signals before the invention of transistors. My father, Ron Mallett, besides providing a great deal of encouragement, went into the details of old time mechanical transport for me. Jessica Eckhardt contributed to my knowledge of the care and upkeep of horses. Adam Begley proofread most of the drafts for me.

I must also thank Professor Peter Dennis, for his encouragement, especially of the Order of Battle, which he found disk space for. I am also indebted to Ross Glare for his help with JavaScript for the web pages.
Introduction

Warfare in the twentieth century is characterised by the presence of certain technologies that give it a distinctive nature. The Great War is a natural starting point not only for the examination of warfare in this era of technology but for considering the nature of technological change itself. This thesis will examine the technologies of modern warfare and their impact on the tactics and organisation of the Australian Army. This Australian perspective enables issues to be looked at to a depth that would not be possible in a work of this length with a broader view. Furthermore, the Canadian historian Bill Rawling has produced an excellent account of technology in the Great War from a Canadian perspective.¹ I hope that this thesis will provide an Australian counterpart to his work and thereby enhance our understanding of technology and the Great War. As we shall see, the Australian experience of the war was broadly similar to that of the Canadian, but remarkably different in many respects.

While accepting the continuity of both history and technology, it is my contention that the Great War represents a watershed in military history. For thousands of years, the battlefield had been a place where men fought shoulder to shoulder, often in close formations. The increased firepower of small arms made such formations obsolete in the 19th century but it was in the Great War that the highly dispersed form of tactics that we know today emerged. The Great War was above all a war of technology in which new technologies were introduced and developed and old ones revived, reevaluated and reconsidered. Not only would new technologies be introduced, but also new ways of thinking about technology.

Tactics may be defined as procedures for carrying out tasks in a manner that maximises benefits to one's own side while minimising those to the enemy.² They may be considered to involve four aspects: (1) location, the finding of targets on the battlefield, (2) communication, the conveying of that information to tactical elements, (3) acquisition, the bringing of weapons to bear on a target, whether that be through range or movement and (4) destruction, the use of these weapons to destroy the target. These aspects are interdependent and in most practical cases may be considered constraints, because, for example, the deployment of a tactical asset so that it has acquisition is likely to expose it to the risk location, acquisition and destruction by the enemy. Each aspect has both positive and negative aspects; preventing the enemy from achieving

¹ Rawling, Bill, Surviving Trench Warfare. Technology and the Canadian Corps 1914-1918, Toronto, University of Toronto Press, 1992
² This is my definition, not the current Australian Army doctrine, for which see The Fundamentals of Land Warfare, Georges Heights, NSW, Southwood Press, 1993, p. 23
location, communication, acquisition and destruction is a part of most tactical systems. In the 20th century, tactics invariably are also technics, which is to say, skills and methods for employing technologies, due to the pervasiveness of technology.

Tactics are also memes, which are defined as living ideas capable of evolution through natural selection. A meme is both a replicator and a unit of cultural transmission. Just as genes propagate in the gene pool by leaping from body to body via sperms and eggs, so memes leap from brain to brain by a process of imitation. Tunes, catch phrases and fashions are all forms of memes. Over time, inferior tactics are abandoned in favour of better ones through this process. The battlefield forms an excellent environment for natural selection, because inferior tactics can result in the death of the proponent. Two memes may both contain truth, but natural selection may still favour one over another, for a diverse number of reasons. I shall trace this process as it occurred for tactical memes during the Great War.

In postmodern terms we might say that tactics are the software and weaponry and equipment the hardware. Technology is normally thought of as including both elements. There is also a symbiotic relationship between them. Tactics necessarily involve making optimal use of the available technologies. However, over time technologies can be developed or adapted in conformance to our tactical doctrine. This is the normal pattern of events and the source of the general rule that form follows function, or in this case, technology follows tactics. However, it is also possible for technologies to be developed that alter the tactical environment to the extent that it now favours different memes. It is my contention that this situation did indeed occur in the Great War. The result constitutes the core of this thesis.

That such a situation can arise may sound odd for, after all, have not the technologies been constructed in conformance with the original memes? However, like cities, technological artifices are not only man made but inhabited by people as well and are not capable of rapid reconstruction. Moreover, the avoidance of undesirable and potentially disastrous consequences is not necessarily an aspect of the meme. Rather, it is natural selection that must take care of killing off degenerate memes. Thus, in the short term, technology can appear to be out of control. It must be emphasised that what is critical is not the physical environment but the perception of it, the reaction of the memes to the situation.

Doctrine is a set of fundamental principles by which military forces guide their actions. Doctrine should not be confused with dogma, which is doctrine proclaimed by authority to be true. Military doctrine is authoritative, but requires judgement in application. Tactical doctrine is that part of doctrine devoted to tactics. In discussing both tactics and doctrine, one must not lose sight of the fact that we are talking about memes. In seeking to understand them, we seek an understanding of the way that people thought, not a simple matter even for a period of history not so long ago and a culture still very much alive.

In 1914, doctrine was in the hands of the General Staff, and was copied from the British Army. Officially, there was no such thing as British doctrine because the British Army rejected the very notion. In practice, a semi-official one emerged in the form of the Field Service Regulations, which Major General W. T. Bridges memorably described as being "as useful to most Australian militia officers as the cuneiform inscription on a Babylonian brick". For others, the Field Service Regulations were gospel, to be memorised chapter and verse. What the Field Service Regulations actually were was a collection of advice for commanders garnered from Britain's 19th century colonial wars.

Central to British doctrine was the notion that offensive posture was intrinsically stronger than defensive:

> Decisive success in battle can be gained only by a vigorous offensive... Superior numbers on the battlefield are an undoubted advantage, but skill, better organisation, and training, and above all a firmer determination in all ranks to conquer at any cost, are the chief factors of success.

> Half hearted measures never attain success in war, and lack of determination is the most fruitful source of defeat.

Defensive posture was something that "must only be assumed in order to await or create a favourable opportunity for decisive offensive action". Cavalry was crucial: "a successful cavalry will retain for a commander the initiative he has gained or regain it for him if it has been lost", but artillery was ancillary to the infantry: "the object of their fire is to assist the infantry advance". Seeking the decisive battle was the object...

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4 The Fundamentals of Land Warfare, p. 7
5 Bean, C.E.W., The Official History of Australia in the War of 1914-1918 Volume V: The AIF In France During the Main German Offensive 1918, Sydney, Angus and Robertson, 1933, p. 522
7 Field Service Regulations, p. 108. Emphasis original.
8 Field Service Regulations, p. 109
of a military campaign. The battle was considered to consist of three parts: the advance to the battlefield, the struggle for superiority of fire, and the infantry assault.10

This doctrine was the result of a long process of military thinking. The principal weapon of the infantryman in the 18th and early 19th centuries was the bayonet rather than the rifle or musket. Muskets had a smooth bore, were not very accurate, couldn't fire lethally very far and were muzzle loaded, which meant that besides being single shot, reloading was a complex operation that could not be carried out quickly. Tactics were built around the limitations of the weapon. Men massed together in order to get enough firepower; reloaded together by numbers, so no one jammed his weapon or accidentally shot one of his mates; and fired in volleys from as close to the enemy as possible, the weapon being most accurate at about 200 metres. If the enemy got much closer than that, then reloading was impossible and recourse would be made to the bayonet, an edged weapon dating back to the 17th century. It was disciplined bayonet charges rather than firepower that usually carried the day for European armies in the colonial wars of the 18th century.11

This gradually changed during the 19th century as a result of several technological developments. Cartridges made the rifle quicker to load and more reliable. Conoidal bullets flew faster and truer than musket balls. Rifling - the cutting of spiral grooves inside the barrel - increased the range and accuracy of the weapon. This had been developed in the 16th century but handmade rifled muskets were slow and costly to manufacture and the need for accuracy was not apparent when the target was a mass of infantry 150 metres away.12

The Industrial Revolution affected the economics of manufacture and the effect was dramatic. During the 18th Century, some 40% of casualties were caused by small arms; by the American Civil War (1861-1865), thanks to the rifled musket and conoidal bullet, the proportion had shot up to 75%.13 Further developments were already underway. Breech loading sped up the reloading and firing cycle. The bolt action allowed the firer to fire faster still, reinserting a bullet into the breech from the magazine with a simple action. Putting all these together, the Prussians came up with the Needle Gun, a true modern rifle. As a result of this weapon and other rifles such as the Chassepot that

10 Field Service Regulations, pp. 110-112, 117-119
inevitably followed, the proportion of casualties caused by small arms during the Franco-German War (1870-1871) was 90%.14

In this, these early industrial wars would prove to be very different from the Great War, where artillery played a far more important role. Yet no revolutionary change occurred. Rather, there was a long period of steady, incremental technological improvement. One change was the introduction of smokeless powder. The British Army adopted Cordite, a mixture of 58% nitroglycerine, 37% gun cotton and 5% Vaseline, which served to make it waterproof. The name comes from the fact that originally it was made in cords but by 1914 tubes had replaced cords to give a more regular ignition and complete combustion. The result was to increase still further the range of the weapon while lowering its trajectory and thus increasing its lethality.15

The Russo-Japanese war of 1904-5 demonstrated that massing infantry in drill formations was no longer possible but left open the question of whether it was still possible for a trench to be "rushed". Experiments in 1908 showed that 18 per cent of shots fired from the hip by men advancing at double time against men showing head and shoulders over a trench would be hits at between 50 and 150 metres range. By 1914, more powerful sights and ammunition had extended the lethal range of rifles and machine guns from 600 to 800 metres.16 In the 1902 Field Service Regulations, the concept of the bayonet charge had been dropped but in field exercises the struggle for "superiority of fire" tended to degenerate into a drawn out firefight. The feeling was that eventually the infantry would have to take their chances:

Troops under cover, unless enfiladed, can seldom be forced to retire by fire alone; a decision by fire, even if possible, takes long to obtain. To drive an enemy from the field assault, or the immediate threat of it, is almost always a necessity.17

Thus, British thinking started to follow that of the French, who had given up on the idea of winning superiority of fire before getting on with the assault. That such a battlefield would be a dangerous place had not escaped notice. The response of British tacticians like Brigadier General R.C.B. Haking was that the infantry (and artillery) must be prepared psychologically for heavy casualties. Thus, the human factor was considered to be as important as ever and "moral power in war predominates over physical as greatly

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17 *Field Service Regulations*, p. 17
as formerly". This was a well-established meme and it flourished in an environment where it was easier to effect social changes than technological ones. In the 20th century when one piece of technology could do the work of many, it was regressive.

The meme that heavy casualties were inevitable had other negative aspects as well, for a general who anticipates heavy casualties is less likely to take every possible step to prevent them. This kind of self-fulfillment is frequently a characteristic of successful memes, for it simultaneously reinforces their logic and discourages searching for alternatives, which may lead to a preference for another meme.

In the case of this particular meme, the environmental problem is that technology is capable of order of magnitude improvement, far in excess of anything that can be accomplished with human factors. So far from being paramount, technological change can render human factors like morale and courage marginal. Worse, it could actually render them negative qualities that were more likely to get the brave - those who persist in the face of danger and fear - killed.

One such technology in 1914 was the machine gun. This weapon dates back to the 18th century but the first practical models appeared in the late 19th century as a result of the work of an American inventor, Hiram Maxim. Between 1882 and 1885 Maxim, working from his laboratory in London, systematically studied and patented every practical way to create a machine gun. By 1885 he had produced a gun powered by its own recoil that could fire 600 rounds per minute.

The machine gun is a good example of the problems encountered by a new weapon. In the early years, the machine gun was heavy, requiring a wheeled mounting. It had problems with reliability and breakdowns were frequent. The reliability of a machine gun could not equal that of a rifle even with the most careful handling of gun and ammunition. An extensive tool kit was carried. Maxim would spend the next years working on this problem. Because the machine gun had to be sited before battle, it was considered a defensive weapon. In 1888 the gun was used in action for the first time by a British punitive expedition in Gambia under the command of Brigadier General F. de Winton. With the General himself operating the gun, the expedition opened fire on the small fortified town of Robari, apparently making quite an impression on the natives.

Thus, it was shown that the machine gun could also be used offensively. Still, by 1901 a

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20 Hogg, The Machine Gun, p. 16
British War Office Committee concluded its "tactical role was not well understood".21 This is fairly common for a radically new technology because a revolutionary technology requires correspondingly revolutionary technics and a correspondingly large organisational adjustment.

What the British Army really wanted was a machine gun that could be carried by an infantryman like a rifle - an automatic rifle - and by 1910 theorists were openly calling for one. Incredibly, in January 1914 the Committee on Automatic Rifles, after testing several, submitted a final report concluding that the automatic rifle was still years away, although automatic rifles like the Danish Madsen and American Lewis were already on the market.22

What might have been surprising earlier in the 19th century was that serious, scientific thought was being applied to the infantry arm. By contrast, the artillery had always been considered a technical arm. But throughout the 19th Century, the artillery arm had been in decline. In the 18th Century, 40 per cent of casualties had been inflicted by artillery;23 by the 1870s it had fallen to just 9 per cent.24 Then a technological breakthrough came in 1897 when the French introduced the Soixante-Quinze, a 75mm Quick Firing gun. The gun incorporated a hydrostatic buffer, which absorbed the recoil, and a recuperator to restore the firing position. In earlier field guns the whole gun had been blown back by the recoil and had to be repositioned. What the hydrostatic buffer meant was that the next round fired would land roughly at the same place as the previous one without any further action by the gunners. This allowed the gun to be fired as fast as it could be reloaded. Ammunition was fixed, meaning that propellent and projectile were contained in a single shell. This meant that loading was also quick. The gun could fire six rounds per minute normally, and up to twenty rounds per minute in a crisis. By contrast, the earlier guns of the 19th century could fire no more than 8 or 9 rounds per minute.25

There are two ways of firing on a target. The first is called direct fire. This means that the gun layer can observe the target through his gun sight. Of course, this probably also means that the target can observe the gun. To stop the enemy infantry from picking off the gunners with their rifles, a gun shield was added to the front of the gun, a distinctive feature of guns of the first half of the 20th Century. Prior to the invention of the Quick Firing gun, the gun lurched back each time it was fired, so the gunners had to stand

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21 Travers, The Killing Ground, p. 64
22 Travers, The Killing Ground, p. 65
23 Dyer, War, p. 63
clear, and no shield was possible. The gun shield enabled the gun to be deployed from
gun pits in forward locations.

The other method is indirect fire. In this case the target is not visible to gun layers,
probably because the gun is hidden behind a hill. However, it may be visible to a spotter
who is in communication with the battery. The gunners set the range and point the gun
in the correct direction and fire. The spotter notes where the shot lands and adjusts the
fire of the gun until the shot falls on target. Indirect fire can be a much slower process
than direct fire but is much safer for the battery, which, being completely out of sight, is
harder for the enemy to locate and fire upon. Alternatively, one can dispense with the
spotter and fire off the map, setting the elevation according to the range and direction
according to the compass.

There was some controversy as to which method of fire was the better one. Clearly,
indirect fire was safer but the infantry wanted direct, visible support from the artillery in
the attack. In particular they wanted the artillery to take out the enemy artillery, either by
firing on it or by making themselves the prime target. The wisdom of this was subject
to debate.

The third of the three traditional arms, cavalry, had also been in visible decline and there
had been a great deal of controversy about the future of cavalry or lack thereof in both
Britain and Australia. On the one hand, many felt that cavalry was obsolete given the
vulnerability of horses to modern weapons. On the other, there was a vocal school of
thought which held that this vulnerability had been exaggerated; horses are not as
vulnerable to bullets as men and unless a bullet strikes a leg bone or major organ it is
unlikely to bring down a horse. They therefore argued that even traditional cavalry
armed with solely with edged weapons still had a role to play on the battlefield. This
point of view was reflected in the Field Service Regulations and represented an
important doctrinal difference between Britain and Australia. While the British Army
went much further than other European armies in that its cavalry were trained for both
mounted and dismounted action, it did not go as far as the Australian and abolish the
edged weapons for mounted action entirely. 26

26 Badsey, Stephen, "Cavalry and the Development of Breakthrough Doctrine", British Fighting Methods in the
One organ for the showcase and dissemination of Australian ideas was the Commonwealth Military Journal, published by the Training Branch of the General Staff in Melbourne. By and large it reprinted articles by British thinkers like Kiggell and Haking from British journals. However, from the first they published at least one Australian article in each issue, even if they had to write it themselves. The Journal deliberately canvassed as many and varied topics as possible. All articles were written by officers, except one by a woman. The most common topics were training and the compulsory service scheme. There was a fascination with new technologies, particularly those capable of cutting the Australian continent down to size, such as radio, motor vehicles, motorcycles and aviation.

Defence planning was in terms of the home defence of Australia, fighting off an invasion or at least holding out until help arrived from overseas. With Australia as the battlefield under consideration, thinking was in terms of defending an immense land area with relatively small numbers of troops. The conclusion was that due to these factors, the next war would be a highly mobile one.
Perhaps due to this defensive strategic posture, British (and French) ideas of the offensive seem to have been lost in translation. Great emphasis was placed on the power of entrenchments. If an attack could not be delivered because superiority of fire could not be achieved, fine. If the enemy got up and charged, even better. In a pair of articles on the lessons of the Wilderness Campaign of the American Civil War, published in the Commonwealth Military Journal (April and May 1912), Colonel John Monash (who won first prize for his article) and Major F.A. Dove discussed this, amongst other issues. Both gave the "cult of the offensive" the short shift. According to Monash:

It was abundantly demonstrated that direct assaults by troops of whose courage and élan there could be no question, with all the assistance of covering fire, and concentration of artillery fire, were impotent against field fortifications of the character in question when manned by troops of equal calibre but only one half in numbers.27

Dove went further:

A point that should be kept in view in the training of our troops is that they will have to meet men who will undoubtedly be taught that a resolute bayonet charge is sure to give them victory... But if troops who are about to be attacked with the bayonet be good shots, and not hopelessly outnumbered, I consider that no infantry could get near enough to them to use the bayonet...28

Because the Australian Army was assumed to be the one on the defensive, this was not considered to be a problem. In any case, direct assault on well-fortified positions seemed hardly necessary in the vast, open spaces of Australia, where there would always be ample room for manoeuvre. Both men placed great confidence in the attributes of the Australian soldier, particularly his independent attitude, Monash perceptively noting that it was "the utility of that independent local initiative... to which may be attributed, more than any other circumstance, the success of the German arms in the [1870] war with France".29

Thus, the tactics and organisation of 1914 had been carefully considered. There were, it is true, a number of theorists such as I. S. Bloch who, writing around the turn of the century, argued that the next war would be a stalemate fought between entrenched armies.30 Many people questioned the continued value of cavalry and edged weapons. In retrospect, the trend in this direction is clear but cavalry continued to function on the battlefield and bayonet charges continued to occur. Most thinkers did not believe that

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30 Bloch, I. S., Is War Now Impossible?, London, Grant Richards, 1899
incremental developments could trigger revolutionary changes. Such a phenomenon is rare in military history but it is well known in the history of technology.

A bewildering array of technologies is available in twentieth century warfare. Tactical doctrine therefore needs to derive scales of organisation and equipment that strike some balance between their needs to be transported and sustained and the needs of probable missions. It is of course possible to restructure and re-equip to meet the specific needs of the situation, and I shall trace how this was done during the Great War.\(^\text{31}\)

\[^{31}\text{An Order of Battle is a useful adjunct to the comprehension of the organisation of the AIF but none has been published. The author has compiled one but it was too large to include in this thesis as an appendix, so it has been made available on the World Wide Web on the ADFA web site at:}\]

http://www.adfa.edu.au/~rmallett/
1. Going to War

At 9am on 5 August 1914 Britain's ultimatum to Germany expired and a state of war was declared in Australia.\(^1\) A precautionary stage alert had already been declared, involving the manning of the coastal batteries and searchlights. That afternoon the German steamer *Pfalz*, attempting to flee Port Phillip Bay, was fired on by the Garrison Artillery and forced to return.

A cabinet meeting on 3 August 1914 had been devoted to the issue of despatching troops to Europe. Major C.B.B. White, acting Chief of the General Staff, advised Cabinet of plans for the formation and dispatch of an expeditionary force in cooperation with New Zealand. Australia's contribution was to be two thirds of a division, some 12,000 men, with New Zealand contributing the rest but a false report had reached Australia that Canada had offered to raise a force of 30,000 men. Since the population of Canada in 1914 (7,758,000) was just over half as large again as that of Australia (4,972,000), an appropriate contribution would therefore be 20,000 men and the Army's most senior officer, Brigadier General W. T. Bridges, was instructed to draw up a plan for an expeditionary force of this size.\(^2\) Bridges and his staff worked quickly, using the old war plans as a basis. On 7 August 1914, he presented the Defence Minister, Senator E.D. Millen, with new plans for an expeditionary force organised as an infantry division and a light horse brigade.\(^3\) The division was both the smallest formation that contained units from all arms and the largest for which an Australian establishment existed in 1914. Under the 1914 establishment it consisted of 18,027 men while a light horse brigade (including support units) had 1,967, a total of 19,994 men in all, unsurprisingly close to the figure laid down by the Prime Minister.\(^4\)

The Australian Military Forces (AMF) were incompletely prepared for war in 1914.\(^5\) In 1911 Australia had adopted peacetime conscription for the first time. Devised by Colonel J. G. Legge, the Universal Training Scheme of 1909 replaced the old state militias with a national Army capable of defending against a major European or Asian enemy. It also provided a vehicle for Australian nationalism and welded the recently created Federation together. Australia was still very much part of the British Empire and strongly influenced by Britain but:

\(^1\) 2300 Zulu on 4 August 1914 being 0900 on 5 August 1914 Australian Eastern Standard Time (AEST).


\(^3\) “Mobilisation”, AWM25 495/1, p. 33

\(^4\) GS AIF, "Table showing allotment and distribution of troops", 23 September 1914, AWM25 839/15

\(^5\) The present day term "Australian Army" is frequently used throughout this thesis in preference to the World War One era term "Australian Military Forces" which can be confusing when used in a broader historical context. Today, the Australian Army claims the lineage and battle honours of both AMF and AIF.
The pattern of defence relations in the decade and a half before the Great War qualifies this view; the self governing dominions enjoyed the right of control of their own armed forces and in the years following Federation the government of the Commonwealth of Australia gradually established and armed these forces, in a manner which was at times contrary to British views and which did not always follow British patterns.\(^6\)

The national service scheme obliged men aged 18 to 25 to serve in the militia for drills equivalent to 16 whole days per year, including 8 days in an annual camp; artillery, engineers and the Navy served the equivalent of 25 days annually, 17 in camp.\(^7\) This time did not even rate compared with the two or three years full time service of a German conscript.\(^8\) Nonetheless, the experience of both the conscripts and the earlier volunteer militia would still prove valuable. The first draftees began training in 1912 and in 1914 the militia had 51,195 men.\(^9\) No divisional structure existed, but officers gained experience in command of units up to brigade level.

There were two problems with the Militia in 1914. The first was that it was comprised of 18, 19 and 20 year olds. The former were not eligible to serve in the new expeditionary force, which Bridges soon named the Australian Imperial Force (AIF), while the latter could not serve without parental consent until 6 May 1918.\(^10\) The second was that under the terms of the Defence Act (1903) it could not serve overseas unless the men individually volunteered to serve. The regular army was very small and only one unit of the AIF, the 1st Field Artillery Battery, was formed from it in 1914. Bridges hoped that militia units would volunteer \textit{en masse}. Some did. When Major A.J. Bessell-Browne asked for volunteers from the Perth based 37th Field Artillery Battery, "the whole parade stepped forward" and the battery became the core of the AIF's 8th Field Artillery Battery.\(^11\)

Each AIF unit was allotted a set of training areas. In the 7th Infantry Battalion, for example, each company was formed from a battalion of the militia:

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8 Bidwell, \textit{Firepower}, pp. 41, 299
11 Bean I: \textit{The Story of Anzac}, p.58. Not all of the battery was eligible to serve, as many did not meet the AIF's minimum age of 19 or other requirements.
7th Battalion formation (1914)\textsuperscript{12}

<table>
<thead>
<tr>
<th>Company</th>
<th>Militia battalion</th>
<th>Training Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>59th</td>
<td>Brunswick, Coburg</td>
</tr>
<tr>
<td>B</td>
<td>60th</td>
<td>North Carlton and Parkville</td>
</tr>
<tr>
<td>C</td>
<td>57th</td>
<td>North-Eastern Victoria and the Goulbourn Valley</td>
</tr>
<tr>
<td>D</td>
<td>58th</td>
<td>Essendon and Moonee Ponds</td>
</tr>
<tr>
<td>E</td>
<td>65th</td>
<td>Footscray, Spotswood and Bacchus Marsh</td>
</tr>
<tr>
<td>F</td>
<td>66th</td>
<td>Castlemaine and Kyneton</td>
</tr>
<tr>
<td>G</td>
<td>68th</td>
<td>Bendigo</td>
</tr>
<tr>
<td>H</td>
<td>-</td>
<td>Murray Valley, Echuca, Inglewood and Charleton</td>
</tr>
</tbody>
</table>

Bridges was probably disappointed by the response. He had hoped that the militia would form at least half of the AIF, which would have required about 1 in 5 militiamen to volunteer, but had to settle for considerably less: something more like 1 in 10.\textsuperscript{13}

Prior Military experience of the 1st Division  
(Other Ranks) (1914)\textsuperscript{14}

<table>
<thead>
<tr>
<th>Experience</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trainee militia (19-20 year olds)</td>
<td>2,263</td>
<td>15.4</td>
</tr>
<tr>
<td>Older militia</td>
<td>1,555</td>
<td>10.6</td>
</tr>
<tr>
<td>Former militia</td>
<td>2,460</td>
<td>16.7</td>
</tr>
<tr>
<td>Former British Regulars</td>
<td>1,308</td>
<td>8.9</td>
</tr>
<tr>
<td>Former British Territorials</td>
<td>1,009</td>
<td>6.9</td>
</tr>
<tr>
<td>No previous service</td>
<td>6,098</td>
<td>41.5</td>
</tr>
<tr>
<td>Total</td>
<td>14,693</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Some 104 officers (16.5 per cent) had seen active service in the Boer War (1899-1902) or in other wars. This figure was much higher for the senior officers, including as it did Bridges himself, 6 of his 11 colonels, 22 of his 52 lieutenant colonels and 32 of his 100 majors.\textsuperscript{15}

\textsuperscript{13} Bean I: \textit{The Story of Anzac}, p.60
\textsuperscript{14} Bean I: \textit{The Story of Anzac}, p.60
\textsuperscript{15} AIF Staff, Regimental and Gradation Lists of Officers, 6th December 1914
The division staff was divided into a General Staff Branch that handled operations and an Adjutant and Quartermaster General's Branch that handled administration and supply. For the former, Bridges chose Major C.B.B. White and Captain T. Griffiths, for the latter, Colonel V.C. Sellheim and Lieutenant Colonel W.G. Patterson. All were Regular Army officers.16

The appalling quality of its staff work during the Crimean War (1854-1856) caused the British Army to establish a Staff College at Camberley, England, in 1858, although there was subsequent criticism of the course on the grounds that it was too academic and not practical enough. While entrance was nominally by examination there were quotas for the various corps of the army which favoured infantry and cavalry officers, many of whom entered through being appointed to the college rather than by passing the exam. The biggest defect in the system was the small number of officers graduated each year, just 32 in 1899, for example, too few to fill all the staff posts even in peacetime. The Boer War (1899-1902) revealed continuing and glaring deficiencies in staff work and a 1904 Royal Commission recommended sweeping reforms, one of which was that all staff appointments be held by Staff College graduates. The number of students at Camberley was boosted and Lord Kitchener created a second campus of the Staff College at Quetta, India in 1904.17

Another of the reforms was the opening up of Staff College places at both Camberley and Quetta to Australian officers. By the outbreak of war in 1914, six Australian officers had graduated: Majors C.H. Foott, E.F. Harrison, E.H. Reynolds and C.B.B. White and Captains T.A. Blamey and J.D. Lavarack, while four of the British Army's 447 graduates were on secondment in Australia.18 There was also John Gellibrand, who had attended Camberley with White in 1906-7 while serving in the British Army.19 Gellibrand had resigned from the British Army in 1912 and returned to his native Tasmania to grow apples.20 With only eleven staff college graduates available, it was impossible to fill all staff appointments with them, nor could Bridges take them all, for some were still required in Australia. In the event, he chose White, Blamey, Gellibrand and a British staff college graduate, Major D.J. Glasfurd, for his headquarters.

16 GOC AIF to Minister of Defence, 8 August 1914, AWM25 495/1
17 Marshall-Cornwall, James, "Staff Officer", War Monthly, No 42, 1977, pp. 9-11
19 Bean Two Men I Knew, p. 84
Although the Regular Army was small, Regular officers and NCOs shaped the AIF and held key positions. Both Regular and Militia officers were dedicated men. The leadership of the AIF was representative of the best the Australian Army had to offer and would stand comparison with the British Army.

The army was divided into units, each with a type and a number. For each type there was an establishment, tables of organisation and equipment which detailed the composition of the unit, how many men it had, and how many and what kind of tools, vehicles and weapons it had. Ideally, establishments were based on technological, logistical, tactical and strategic requirements. The benefits of this were administrative. For a given unit type, one could calculate how much food it would need, how many trucks were required to transport it, how many huts were required to house it. One unit could be replaced by another of the same type in the knowledge that it had the same number of men and the same equipment. The Australian Army's tables of organisation and equipment followed those of the British Army with but minor differences. This standardisation was necessary if the two armies were to fight together, with units of one army relieving those of the other.

In 1914, the smallest infantry sub-unit was the section. Two sections made up a rifle company. Each battalion had eight rifle companies, a headquarters and a machine gun section armed with two machine guns. Four infantry battalions and a 25 man headquarters made up an infantry brigade; a division had three, each under the command of a colonel, assisted by a staff officer known as the brigade major.

**Organisation of an Infantry Brigade (1914)**

<table>
<thead>
<tr>
<th></th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters</td>
<td>4</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>4 x Infantry Battalions</td>
<td>128</td>
<td>3,964</td>
<td>4,092</td>
</tr>
<tr>
<td>Each: Headquarters</td>
<td>7</td>
<td>46</td>
<td>53</td>
</tr>
<tr>
<td>Machine gun Section</td>
<td>1</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>8 x Rifle Companies</td>
<td>24</td>
<td>928</td>
<td>952</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32</td>
<td>991</td>
<td>1,023</td>
</tr>
<tr>
<td>TOTAL</td>
<td>132</td>
<td>3,985</td>
<td>4,117</td>
</tr>
</tbody>
</table>

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21 *War Establishments of the Australian Military Forces 1912*, Government Printer, Melbourne, 1912; GS AIF, "Table showing allotment and distribution of troops", 23 September 1914, AWM25 839/15
While the division had many different kinds of tools and pieces of equipment, its fighting power was built around just four weapons: the SMLE rifle, the sword bayonet, the Maxim machine gun and the 18 pounder quick firing gun. Considering the variety of weapons developed over the centuries, it is quite remarkable that so few were considered necessary in the early 20th century. No less remarkable is how recent they all were. The army before the war had embraced new technologies and the concentration on just a few indicates a high degree of faith in these new technologies.

In matters of equipment and organisation, as in doctrine, the Army had decided to standardise on British weapons. The logic and wisdom of this decision is incontestable. The ability to plug into the British Army's supply system was essential for the maintenance of a field army overseas. The regular resupply of parts and ammunition over such a distance would have been problematical even in the case of the small arms that were manufactured in Australia and impossible in the case of the artillery, for which neither guns nor ammunition were produced locally. The decision was made easier by the fact that these weapons were equal to or better than anything else available.

The standard Australian infantry weapon in 1914 was the British .303 inch Short Magazine Lee-Enfield (SMLE) Mark III rifle. This was an excellent weapon that had first entered service with the British Army in 1907. The SMLE rifle could be fired at up to 15 rounds per minute and was effective at up to 800 metres. When war broke out in August 1914, Australia had 87,240 of them on hand. Another 17,500 were on order in the UK but the British government commandeered these. Australia’s situation in this regard compared favourably with that of Britain, which had 795,000 rifles (only 475,000 of which were of the latest pattern) to equip an army that numbered 725,000 men on mobilisation in 1914. The criticality of this will be appreciated if we consider that each division at the front engaged in combat would require another 2,000 rifles per month to replace wastage. What this meant for Australia was that no additional rifles could be expected from Britain for some time to come.

Into the breach stepped the Government Small Arms Factory at Lithgow, New South Wales, with its capacity of 15,000 rifles per year. This was still inadequate, forcing

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24 This was one of four armaments factories that had been established in April 1910, the others being an explosives factory at Maribynong, Victoria, a clothing factory in South Melbourne, Victoria and a leather goods factory at Clifton Hill, Victoria. In 1914 a fifth factory was established at Geelong, Victoria to manufacture woollen goods
the army to take rifles from the militia to equip reinforcements. By early 1915 it was estimated that even these stocks would be exhausted by the end of the year. Double shifts were instituted at Lithgow and production increased to 2,000 rifles per month, but by then 5,000 per month was required. The crisis ended when British rifles finally became available from October 1915 onwards but the role that Lithgow played in keeping the AIF in the field was an important one. Eventually one quarter of all Australian troops sent overseas would do so carrying a Lithgow rifle. When first used in action, there were some complaints about the bolt action being a bit tight, which was remedied.25

In 1914 the British Army was still in the process of changing over to the high velocity Mark VII ammunition which had been introduced in 1911. The Australian Army used the older Mark VI ammunition, which was produced at the Cordite Factory at Maribynong, Victoria. The SMLE Mark III itself could use either ammunition but the rifle had to be resighted when changing from one to the other. Some 15 million rounds were sent overseas with the troops in 1914.26

Each infantry battalion and light horse regiment had a machine gun section armed with two Maxim machine guns. By 1905 the Australian Army had thirty two .303 inch Maxim guns, five of the older .45 inch Maxims and eight air-cooled .303 inch Colts.27 More of the newest model Maxim guns were purchased from 1909 on and some of the old guns were apparently rebuilt. In the AIF, the newest guns were allocated to the infantry while the Light Horse got the older models. The Maxim was water-cooled, a problem in the Australian outback. A condenser enabled the water to be recycled after it boiled off. It weighed 30 kg and could fire 600 rounds per minute. Range was about 4,000 metres.28 The ammunition was the same Mark VI .303 inch ammunition used in the rifle, in 250 round belts. Like the rifle, the Maxim could also fire Mark VII ammunition, but this was frowned upon as it increased the heat in the barrel and therefore the wear on the weapon. Belts were not pre-filled at the factory so the machine gun section had to belt the ammunition themselves.29

25 Bean I: *The Story of Anzac*, p.62; Scott XI: *Australia During the War*, p.261
26 Cable, DOD to Secretary War Office, 20 August 1914, AWM25 495/1
Since a skilled rifleman could fire 15 rounds per minute, a machine gun was worth about forty of them. Thus the 18 man machine gun section was actually quite economical because it had the firepower of 80 rifle men and could reach that level of proficiency with just two weeks training. Nonetheless, rifles outnumbered machine guns 500 to 1 in an infantry battalion, so the guns only amounted to about 8 per cent of its firepower.30

The machine gun was most effective when fired in "enfilade", that is, from the flank. The bullets fall in a long narrow elliptical pattern, a "beaten zone" which forms but a part of the "deadly zone" in which bullets can strike an opponent. An enfilading machine gun creates a barrier with its deadly zone akin to an invisible wall. A series of machine guns can set up a system of interlocking lines of fire, with each gun defended by a second gun firing in at right angles to the line of fire of the first, thus enfilading the ground in front. Tests showed that two guns could inflict 60 per cent casualties on men advancing at two paces interval at a distance of 600 to 800 metres, in just one minute.31

In considering the allocation of just two Maxim guns per battalion, it must be born in mind that the organisation was intended for open warfare. The Maxim's weight, bulk and requirement to be positioned limited its use in this context and two guns was considered to be adequate for the purpose.

The numerically next largest arm in the division was the artillery. In 1911 the Royal Australian Artillery had been divided into the Royal Australian Field Artillery, which manned mobile guns in support of field formations, and the Royal Australian Garrison Artillery, which manned coastal defences.32 This followed the British Army, which had split its artillery in 1899.33 The split was unfortunate because the nature of the war ahead would be more suited to the training of the Garrison Artillery who, for the moment at least, were occupied defending ports.

Four guns formed a battery and three batteries together with an ammunition column made up a brigade. Each brigade had an armaments artificer attached to it to perform repairs on the guns. Brigade headquarters had two fitters or wheelers, as did each battery and ammunition column. Each battery and ammunition column had two saddlers, a Farrier Sergeant, a Shoeing Smith Corporal and two Shoeing Smiths (three in the ammunition column). The division had three field artillery brigades and a small

30 Bidwell, Firepower, p. 28
31 Bidwell, Firepower, p. 29
33 Bidwell, Firepower, p. 153
artillery headquarters to control them plus other artillery that might be attached to the division for a particular mission. The artillery commander was graded a colonel, the same as the infantry brigade commanders. Like them, he was assigned a brigade major as a chief of staff.

**Organisation of Divisional Artillery (1914)**  

<table>
<thead>
<tr>
<th></th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters</td>
<td>4</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>3 x Brigades</td>
<td>78</td>
<td>2100</td>
<td>2178</td>
</tr>
<tr>
<td>Each: Headquarters</td>
<td>6</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>3 x Batteries</td>
<td>15</td>
<td>420</td>
<td>435</td>
</tr>
<tr>
<td>Brigade Ammunition Column</td>
<td>5</td>
<td>242</td>
<td>247</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26</td>
<td>700</td>
<td>726</td>
</tr>
<tr>
<td>Division Ammunition Column</td>
<td>19</td>
<td>564</td>
<td>583</td>
</tr>
<tr>
<td>TOTAL</td>
<td>101</td>
<td>2682</td>
<td>2783</td>
</tr>
</tbody>
</table>

The British Army had developed its own quick firing guns. The 18 pounder was an excellent weapon designed with experience in the Boer War in mind. The British Army chose it over a 15 pounder like the *Soixante-Quinze* because it felt that weight of shell was the decisive factor. It could fire up to twenty 18 pound rounds per minute. Maximum range was 6,000 metres and muzzle velocity was 500 metres per second. Being a gun, its maximum elevation was just 16 degrees. The panoramic gun sight on the 18 pounder, the No. 7 Dial Sight, was a superb piece of equipment destined to outlive the 18 pounder, being incorporated into its successor, the 25 pounder, and later still into the 5.5 inch gun that entered service with the Australian Army in 1942 and remained in service until 1983. Australia purchased its first two dozen 18 pounders in 1906. With the expansion of the Army due to the compulsory service scheme, 16 new guns were purchased each year and by 1914 the army had 116 18 pounders available. Equipping the 1st Division required 36 guns, almost a third.

Two types of ammunition were available. Common shell filled with Lyddite (picric acid or trinitrophenol) was provided for use against fortifications and entrenchments. A percussion fuse exploded the shell after it hit the ground. It was therefore of little use against infantry in the open. For this purpose, shrapnel shells were provided. The 18

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34 GS AIF, "Table showing allotment and distribution of troops", 23 September 1914, AWM25 839/15  
35 Bidwell, *Firepower*, p. 13  
pounder shrapnel shell contained 375 lead/antimony balls packed in trinitrotoluene (TNT), as Lyddite cannot be used with lead balls because it causes the formation of lead picrate, an unstable explosive. Such shells were exploded with a time fuse so that they fired the shrapnel balls forward like an airborne shotgun.\textsuperscript{38} Unfortunately, neither type of ammunition was produced in Australia.

The Australian Division was undergunned compared with its British counterpart, which had nine batteries of 6 guns, three of 6 howitzers and a heavy battery of four 60 pounders, a total of 76 barrels as compared to 36 for the Australian, but the British Army would soon adopt the four gun battery and with over half the British Army's available guns taken to France by the British Expeditionary Force, new British units trained with whatever was available.\textsuperscript{39} However, there were only sufficient stocks of 18 pounder ammunition to send 40,000 rounds with the expeditionary force,\textsuperscript{40} somewhat lower than the 1,500 rounds per gun recommended by the British Army Council.\textsuperscript{41}

The prewar tables of organisation also provided for a battery of howitzers or heavy guns for each division. In artillery parlance, a "gun" is a weapon that fires a projectile with a high speed and a low trajectory, whereas a "howitzer" fires a projectile at medium speed and high or low trajectories. In other words, a gun generally fires straight at a target whereas a howitzer drops its projectile on top of it. The only howitzers available in Australia were a battery of five obsolete 5 inch howitzers. Despite representations from the battery commander, Major Charles Rosenthal, it was decided to omit the howitzers from the division on the grounds that the ammunition would probably not be available.\textsuperscript{42} There was a training problem if the only such guns in the country were sent overseas. This was a pity because, as it turned out, ammunition was available and howitzers would have been useful in the hilly country of the Gallipoli Peninsula. Nor was a heavy battery sent for the same reason: Australia had only a single heavy battery of four old 4.7 inch guns.

While the AIF soon found that just four weapons did not meet all its needs on the battlefield, they were neither defective nor inadequate and only the Maxim would be replaced in the course of the war. The others would serve to the end of the war and beyond.

\textsuperscript{38} Gower, \textit{Guns of the Regiment}, p. 49  
\textsuperscript{39} Simkins, \textit{Kitzener's Armies}, p. 283  
\textsuperscript{40} Cable, DOD to Secretary War Office, 20 August 1914, AWM25 495/1  
\textsuperscript{41} Cable, Secretary of State for Colonies to DOD, 9 August 1914, AWM25 495/1  
The third combat arm in the division, and the most prestigious, was the light horse. Light horse were not cavalry, which is properly the term given to soldiers who fight on horseback, nor mounted infantry, who are infantry that would ride to battle on horseback, dismount and fight on foot, but a cross between the two. The light horse would fight on foot like infantry, but while mounted could also carry out many of the traditional roles of the cavalry, such as patrolling, scouting and raiding. Light horse were not equipped with swords or lances but with the same rifles and bayonets as the infantry. This was made easier because the standard Lee-Enfield rifle used by the infantry had been adapted for mounted use by the British cavalry. The shortening of the rifle to allow it to double as a carbine also produced a rifle better suited to trench warfare. Until 1918, only officers and warrant officers were equipped with swords.

Organisation of a Light Horse Brigade (1914)
(including * attached support units) 43

<table>
<thead>
<tr>
<th></th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters</td>
<td>8</td>
<td>27</td>
<td>35</td>
</tr>
<tr>
<td>3 x Regiments</td>
<td>75</td>
<td>1533</td>
<td>1608</td>
</tr>
<tr>
<td>Each: Headquarters</td>
<td>6</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>3 Squadrons</td>
<td>18</td>
<td>444</td>
<td>462</td>
</tr>
<tr>
<td>Machine gun section</td>
<td>1</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>TOTAL</td>
<td>25</td>
<td>511</td>
<td>536</td>
</tr>
<tr>
<td>* Signal Troop</td>
<td>1</td>
<td>42</td>
<td>43</td>
</tr>
<tr>
<td>* Brigade Train</td>
<td>7</td>
<td>153</td>
<td>160</td>
</tr>
<tr>
<td>* Field Ambulance</td>
<td>6</td>
<td>112</td>
<td>118</td>
</tr>
<tr>
<td>* Chaplains</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td>1867</td>
<td>1967</td>
</tr>
</tbody>
</table>

Light horse were mounted on Australian stockhorses, known as "walers". A typical waler was about 14 to 15 hands high, sired by a thoroughbred out of a part draft horse dam with perhaps a dash of Timor pony or brumby. Because they did not have to carry soldiers about the battlefield, they were smaller than cavalry horses, which meant that they ate and drank less. They could carry heavy loads (130 kg or more) over long

43 GS AIF, "Table showing allotment and distribution of troops", 23 September 1914, AWM25 839/15
44 Despite the name, walers were not restricted to New South Wales but were bred in all states. By the early 20th century, economic pressures had shifted the centre of horse breeding industry away from New South Wales and Victoria to the cheaper pastures of central Queensland. See Yarwood, A.T., Walers: Australian Horses Abroad, Carlton, Victoria, University of Melbourne Press, 1989, p. 21
45 Yarwood, Walers, p. 17
distances (80 km in a day) and rarely collapsed from exhaustion.\textsuperscript{46} The Australian Army placed great stock on mobility and the confidence that it had in the light horse was reflected in the fact that in 1914 there were 23 light horse regiments established throughout rural Australia.\textsuperscript{47}

Although much smaller than an infantry battalion, the light horse regiment had as many machine guns and a generous allocation of tools and explosives. The tables of organisation provided for two squadrons of light horse per division, each 154 strong, but Bridges chose to upgrade the divisional light horse to an entire regiment.

Attached to the division, but not part of it, was an entire light horse brigade, consisting of three light horse regiments. The possibility of constructing a light horse division (one built around light horse regiments rather than infantry battalions) does not seem to have been considered by the General Staff before the war despite the emphasis on mobile formations.

Saddlery and harnesses for the light horse regiments came from the Government Harness Factory at Clifton Hill, Victoria, one of the factories established under the 1910 initiative. Each light horse regiment had a Saddler Sergeant and a Saddletree maker and each squadron had its own saddler. To keep the horses shod, each regiment had a Farrier Quartermaster Sergeant and each squadron a Farrier Sergeant, a Shoeing Smith Corporal and three Shoeing Smiths.

Straddling the boundary between the combat arms and the support services were the engineers. In 1914, there were two types of engineers: field engineers and signal engineers. From 1906 to 1912 signallers had been part of a separate corps, but on 1 July 1912 they were merged with the Engineers in conformity with the British Army. The two continued to maintain more or less separate identities although their relationship was closer in the Australian Army than in the British, so much so that a signals officer, Major J.P.L. McCall, could be appointed to command one of the 1st Division's field companies.\textsuperscript{48} In 1925 the signallers would regain their own corps. A division had a signal company responsible for communications between division headquarters, the brigades and superior headquarters if there was one. The signal company had no radios although the signal troop attached to the light horse brigade did. Communications were

\textsuperscript{46} Jones, Ian, \textit{The Australian Light Horse}, North Sydney, NSW, Time-Life, 1987, p. 21
\textsuperscript{47} Jones, \textit{The Australian Light Horse}, p. 18
\textsuperscript{48} McNicoll, R.R., \textit{The Royal Australian Engineers 1902 to 1919 Making and Breaking}, Netley, SA, Corps Committee of the Royal Australian Engineers, 1979, pp. 5, 13, 20
visual, by semaphore flags or heliograph (a kind of mirror for reflecting sunlight) or by telephone or telegraph.

Field engineers are often called "sappers and miners" (or just sappers). In classical siege warfare a "sap" is a trench running towards a fortification, a "mine" is a tunnel under the fortification. This reflected the field engineers' orientation towards siege warfare while the rest of the army, except for the Garrison Artillery, concentrated on open warfare.

Organisation of Divisional Engineers (1914) 49

<table>
<thead>
<tr>
<th></th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headquarters</td>
<td>3</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>3 x Field Companies</td>
<td>18</td>
<td>600</td>
<td>618</td>
</tr>
<tr>
<td>Signal Company</td>
<td>7</td>
<td>157</td>
<td>164</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>28</strong></td>
<td><strong>767</strong></td>
<td><strong>795</strong></td>
</tr>
</tbody>
</table>

The basic unit was the engineer field company. The prewar tables of organisation called for a division to have two field companies but Bridges gave his division three, one per brigade. He seems to have been aware of the latest thinking in Europe, that the ratio of sappers to infantrymen should be 6:100 or more.50 It was to prove an excellent decision. While normally officers of the rank of captain commanded infantry companies and light horse squadrons, majors commanded the engineer companies and artillery batteries. Like the divisional artillery, a divisional engineers headquarters was provided to control all signal and construction activity in the divisional area of responsibility.

For its construction role, the field company contained a large number of tradesmen such as carpenters, bricklayers, plasterers and miners and a large quantity of tools. The field company was capable of building simple fortifications and bridges. In practice, they would be asked to build whatever the division needed and a great deal of ingenuity would be called for. There were no power tools, compressors or mechanical earthmoving equipment, technologies that would revolutionise military engineering a generation later.

49 GS AIF, "Table showing allotment and distribution of troops", 23 September 1914, AWM25 839/15
50 Bloch, *Is War Now Impossible?*, p. 333
Tools carried by various units (1914)\textsuperscript{51}

<table>
<thead>
<tr>
<th>Tools</th>
<th>Light Horse Regiment</th>
<th>Field Artillery Brigade</th>
<th>Engineer Field Company</th>
<th>Infantry Battalion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shovels</td>
<td>160</td>
<td>128</td>
<td>111</td>
<td>110</td>
</tr>
<tr>
<td>Spades</td>
<td>0</td>
<td>112</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Picks</td>
<td>80</td>
<td>128</td>
<td>107</td>
<td>76</td>
</tr>
<tr>
<td>Axes, felling</td>
<td>51</td>
<td>16</td>
<td>47</td>
<td>16</td>
</tr>
<tr>
<td>Axes, hand</td>
<td>5</td>
<td>0</td>
<td>28</td>
<td>8</td>
</tr>
<tr>
<td>Bill hooks</td>
<td>30</td>
<td>64</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>Hand saws</td>
<td>5</td>
<td>96</td>
<td>27</td>
<td>1</td>
</tr>
<tr>
<td>Crosscut saws</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Reaping hooks</td>
<td>4</td>
<td>48</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Folding saws</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Crowbars</td>
<td>4</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Guncotton (kg)</td>
<td>210</td>
<td>0</td>
<td>258</td>
<td>0</td>
</tr>
<tr>
<td>Sandbags</td>
<td>200</td>
<td>0</td>
<td>852</td>
<td>0</td>
</tr>
</tbody>
</table>

Demolition was accomplished with explosives. The standard ones were ammonal and guncotton. Ammonal is a mixture of 75% ammonium nitrate, 20% aluminium and 5% carbon. It is strongly hydroscopic and liquefies when exposed to air. Each field company was allocated 258 kg of guncotton, packed damp in 22 kg tin-lined boxes. In each slab of guncotton there was a hole in which a dry guncotton primer could be inserted. The primer in turn had a hole for a detonator.\textsuperscript{52}

Numerically the largest of the service branches within the division was the Medical Corps. A division had three company sized medical corps units known as field ambulances. This organisation had been introduced in the British Army in 1906 in the wake of the Boer War. It combined the stretcher bearers with a field hospital in the hope that this would provide greater cooperation between them. The field ambulance was not intended to provide any kind of long-term treatment of the sick or wounded. Its role was their safe evacuation from the divisional area. As such it was equipped to provide first aid and emergency surgery. Casualties requiring hospitalisation or complex surgery would be transported to a hospital.

\textsuperscript{51} War Establishments of the Australian Military Forces 1912, p. 117

\textsuperscript{52} McNicoll, Making and Breaking, p. 195
Supply and transport were the responsibility of the Australian Army Service Corps. Four Service Corps companies were assigned to a division, one acting as a headquarters company. Divisional transport was entirely horse drawn which reflected contemporary Australian and British Army practice and also Australian society. The army had considered the idea of mechanising the division but it was felt that Australian roads were so poor and mechanical transportation technology so immature and unreliable that animal transport was still superior.

Organisation of an Infantry Division (1914)\textsuperscript{53}

<table>
<thead>
<tr>
<th></th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infantry</td>
<td>396</td>
<td>11,955</td>
<td>12,351</td>
</tr>
<tr>
<td>Artillery</td>
<td>101</td>
<td>2,682</td>
<td>2,783</td>
</tr>
<tr>
<td>Engineers</td>
<td>28</td>
<td>767</td>
<td>795</td>
</tr>
<tr>
<td>Medical</td>
<td>30</td>
<td>732</td>
<td>762</td>
</tr>
<tr>
<td>Service Corps</td>
<td>30</td>
<td>667</td>
<td>697</td>
</tr>
<tr>
<td>Light Horse</td>
<td>25</td>
<td>511</td>
<td>536</td>
</tr>
<tr>
<td>Headquarters Staff</td>
<td>21</td>
<td>67</td>
<td>88</td>
</tr>
<tr>
<td>Chaplains</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Ordnance</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>641</td>
<td>17,386</td>
<td>18,027</td>
</tr>
</tbody>
</table>

Bridges was constrained by the 20,000 man ceiling on the expeditionary force that the Government had set for political reasons, and by the need for standardisation.\textsuperscript{54} Forming new units or restructuring old ones could have thrown the mobilisation process into chaos, as it did in Canada.\textsuperscript{55} In this, the Canadians had an advantage over the Australians in that they were able to assemble an entire division prior to departure whereas the First Division was not complete until it arrived in Egypt. An orderly mobilisation required adherence to the tables of organisation and equipment. Moreover, the division would have to serve alongside British Army divisions and radical departures could cause problems. Conforming to the British standard as closely as possible would minimise these. Such changes as he did make in the organisation were minor, the addition or subtraction of whole units.

\textsuperscript{53} GS AIF, “Table showing allotment and distribution of troops”, 23 September 1914, AWM25 839/15
\textsuperscript{54} A problem shared by his counterparts in the Vietnam War. See McNeill, Ian, \textit{To Long Tan}, St Leonards, NSW, Allen & Unwin, 1993, pp. 190, 203
A division required certain supply units. A depot unit of supply could support around 4,000 men and 1000 animals; a division needed five of them. A field bakery and field butchery was capable of feeding 22,500 men: a division required one of each. Hauling supplies over any distance required mechanical transport and a division had none. Nor, for that matter, did the Australian Army. To care for the horses each infantry battalion, artillery brigade and light horse squadron had an attached veterinary officer, just as it had an attached medical officer, but there were no veterinary units in the division.

The field ambulance could not, and was never intended to, treat all the casualties of a division engaged in battle. This required a Clearing Hospital, which had 200 beds, two Stationary Hospitals with 200 beds each and two general hospitals with 520 beds each. The Clearing Hospital would be set up at the head of the lines of communication, probably a railhead. It would receive casualties from the field ambulances and forward them to the Stationary Hospital further back that which in turn would forward men to a General Hospital. In the event of an invasion of Australia, the Army intended to use civilian hospitals as General Hospitals. Under the British system, each medical unit was theoretically capable of treating any casualty.

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56 GS AIF, “Table showing allotment and distribution of troops”, 23 September 1914, AWM25 839/15
57 Butler I: Gallipoli, Palestine and New Guinea, p. 13
When, at the end of August, the government lifted the size of the expeditionary force to 30,000, these were the first new units that Bridges ordered formed. Since the hospitals included nurses, this meant that women could now join the AIF. Bridges also added three more formations, the 4th Infantry Brigade and the 2nd and 3rd Light Horse Brigades. The additional major units meant that there still was not enough line of communications units. The monthly reinforcements for this force were calculated at 3,000 men and 2,000 horses.

Clothing Issued to the Australian Soldier (1914-18)\textsuperscript{58}

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badge, copper, large (for hat)</td>
<td>1</td>
</tr>
<tr>
<td>Badge, copper, small (for collar and Field Service cap)</td>
<td>3</td>
</tr>
<tr>
<td>Badge, copper, shoulder strap, corps letters, pair</td>
<td>1</td>
</tr>
<tr>
<td>Badge, copper, shoulder strap, &quot;Australia&quot;, pair</td>
<td>1</td>
</tr>
<tr>
<td>Boots, ankle, brown, pairs</td>
<td>2</td>
</tr>
<tr>
<td>Breeches, cord, CP, woollen, pairs, dismounted style OR</td>
<td>2</td>
</tr>
<tr>
<td>Breeches, cord, CP, woollen, pairs, mounted style</td>
<td>2</td>
</tr>
<tr>
<td>Belt, abdominal</td>
<td>2</td>
</tr>
<tr>
<td>Cap, field service</td>
<td>1</td>
</tr>
<tr>
<td>Drawers, cotton, pair</td>
<td>2</td>
</tr>
<tr>
<td>Greatcoat, dismounted style OR Greatcoat, mounted style</td>
<td>1</td>
</tr>
<tr>
<td>Hat, felt, CP</td>
<td>1</td>
</tr>
<tr>
<td>Jacket, service dress</td>
<td>2</td>
</tr>
<tr>
<td>Jersey (later Jacket, cardigan)</td>
<td>1</td>
</tr>
<tr>
<td>Laces for boots, spare</td>
<td>1</td>
</tr>
<tr>
<td>Leggings, brown, CP OR Puttees, pair</td>
<td>1</td>
</tr>
<tr>
<td>Shirts, flannel</td>
<td>2</td>
</tr>
<tr>
<td>Singlets</td>
<td>2</td>
</tr>
<tr>
<td>Spurs, jack, ordinary, pair (mounted units only)</td>
<td>1</td>
</tr>
<tr>
<td>Straps, chin</td>
<td>1</td>
</tr>
</tbody>
</table>

\textsuperscript{58} QMG DOD, "Instructions in Regard to Clothing of the Expeditionary Force, Australian Military Forces (Exclusive of Permanent Staff)", 12 August 1914, AWM25 187/5
To equip the AIF, the Quartermaster Branch recalled the weapons and stores of militia units. Some items were retrieved from storage, some purchased and others had to be manufactured hurriedly. As with weapons, the ability to equip the AIF completely in
Australia was critical, as little help could be expected from Britain in the immediate future.

Kit issued to the Australian Soldier (1914-18)\textsuperscript{59}

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bag, kit, universal</td>
<td>1</td>
</tr>
<tr>
<td>Blankets, GS</td>
<td>2</td>
</tr>
<tr>
<td>Bottle, water, enamelled</td>
<td>1</td>
</tr>
<tr>
<td>Brush, hair</td>
<td>1</td>
</tr>
<tr>
<td>Brush, shaving</td>
<td>1</td>
</tr>
<tr>
<td>Brush, tooth</td>
<td>1</td>
</tr>
<tr>
<td>Cap, comforter</td>
<td>1</td>
</tr>
<tr>
<td>Carrier, water bottle, with shoulder strap OR Infantry equipment set</td>
<td>1</td>
</tr>
<tr>
<td>Comb</td>
<td>1</td>
</tr>
<tr>
<td>Disc, identity</td>
<td>1</td>
</tr>
<tr>
<td>Dressing, field</td>
<td>1</td>
</tr>
<tr>
<td>Fork</td>
<td>1</td>
</tr>
<tr>
<td>Holdall</td>
<td>1</td>
</tr>
<tr>
<td>Housewife (a small sewing kit)</td>
<td>1</td>
</tr>
<tr>
<td>Jersey (later Jacket, cardigan)</td>
<td>1</td>
</tr>
<tr>
<td>Knife</td>
<td>1</td>
</tr>
<tr>
<td>Knife clasp with marline spike, tin opener and lanyard</td>
<td>1</td>
</tr>
<tr>
<td>Razor (in case)</td>
<td>1</td>
</tr>
<tr>
<td>Sheets, ground</td>
<td>1</td>
</tr>
<tr>
<td>Soap, piece</td>
<td>1</td>
</tr>
<tr>
<td>Socks, pairs</td>
<td>3</td>
</tr>
<tr>
<td>Spoon</td>
<td>1</td>
</tr>
<tr>
<td>Tins, mess (mounted style) OR (dismounted style)</td>
<td>2</td>
</tr>
<tr>
<td>Towels</td>
<td>2</td>
</tr>
</tbody>
</table>

\textsuperscript{59} “Instructions in Regard to Clothing of the Expeditionary Force, Australian Military Forces (Exclusive of Permanent Staff)”, 12 August 1914, AWM25 187/5
The Australian Army had adopted a uniform based on its experiences in the Boer War, which had shown the benefits of camouflage and concealment now that the rifle was effective at ranges of up to a mile. A pea soup colour was chosen, with oxidised brass buttons that did not reflect sunlight.60 The jacket, made of pure Australian wool, was loose fitting so that it was comfortable and did not restrict the arms, chest or the neck. It contained four large outside pockets and an inside pocket. A pleat down the back allowed it to be let out. Officers were permitted to buy additional items like silk ties with a clothing allowance. This standard Australian Army uniform, manufactured by the Government Clothing Factory in South Melbourne, was adopted by the AIF on 12 August 1914 and remained unchanged throughout the war.

The most distinctive item of the Australian soldier's apparel was the slouch hat, chosen because it was more practical in the hot Australian sun than the British pith helmet or peaked cap. The hat was identical to the British Army's felt hat but the Australian version proved more durable than the British, which soon lost its shape, faded and turned purple.61 It was generally worn with the left-hand side brim turned up and the cap badge on the upturned underside of the brim but many units wore their hats with the brims turned down and the badge on the front. The men were also supposed to have

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60  Bean I: The Story of Anzac, p.60
61  HQ 9th Infantry Brigade, 9 July 1917, AWM25 389/4
been issued with peaked field service caps but initially there were not enough to go around and most men were not issued with them until they arrived in Egypt. The Prime Minister, Andrew Fisher, granted Queensland light horse regiments the right to wear emu feathers in their hats, a distinction later extended to other light horse units. The 6th Light Horse wore wallaby fur around their hats.

All ranks of the AIF wore the famous "rising sun" badge, which had been worn by the Administrative and Instructional Corps since 1904. Small rising suns were worn on each collar and the word "Australia" on each shoulder strap. Informally, some men continued to wear their pre-war cap badges and some units unofficially created their own, but the only units officially permitted to wear a distinctive badge were the siege artillery batteries, which wore that of the Royal Australian Artillery: an oxidised copper badge with the stylised initials "RAA" and the motto Consensu Stabiles (Strong by Agreement).

In 1915 a distinctive system of colour patches was introduced. Worn on the sleeve, the shape of the patch eventually came to indicate the wearer's division while the colours denoted the battalion or regiment and brigade. In 1917, men who served at Gallipoli were authorised to wear a brass letter "A" for Anzac over the colour patch.

For the infantryman, the most important accoutrement was the boot. Australian boots were brown, lightweight and superbly adapted for hard use in a dry climate. They provided excellent service during the campaigns in the Middle East, but in the waterlogged conditions in France, they sometimes gave trouble. Lieutenant Colonel E. T. Leane, ordered to investigate the matter in 1917, noted that Brigadier General John Paton was still wearing a pair of boots issued to him in New Guinea in 1914, and one of his staff officers a pair issued to him in Australia in September 1914. Leane publicly blamed the problems on men polishing their boots, especially those who used petrol to remove the oils in order to give a better shine and recommended that polishing boots should be considered a serious offence. Privately, Leane blamed private contractors not adhering absolutely to the pattern, for unlike clothing, the boots were manufactured by twenty private firms which together delivered 100,000 pairs per month. The problems with the soles corrected, Leane believed that the Australian boot was superior to any worn in France. Moreover, they were cheaper, costing only 14/6 a pair as compared

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62 OC 2nd Light Horse Brigade, 21 March 1915, AWM25 389/1
63 OC 7th Light Horse Regiment, 22 March 1915, AWM25 389/1
64 AIF Order No. 1098; Cox, Cox, Reginald H.W., Military badges of the British Empire, 1914-18, London, Benn, 1982, pp. 16, 18
65 AIF Order No. 937
66 Scott XI: Australia During the War, p. 259
with 23/- for British boots. In response to these problems, the sole of the boot was thickened and the tongue lengthened. Because the Australian soldier apparently had larger feet than his British counterpart, the requirement for the larger sizes was underestimated, leading to periodic shortages.

Webbing equipment was standard issue for all infantrymen although shortages initially prevented it from being issued to the other arms. Webbing had been invented in the late

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67 HQ 3rd Division, 15 September 1917, AWM25 121/1
68 ADOS AIF, “Report on Boots CP”, 17 September 1917, AWM25 121/1
69 HQ 1st Division Base Depot, 5 September 1917, AWM25 121/1
19th century by an American Army officer, Captain Anson Mills, who had patented it as a method of carrying ammunition superior to leather, since the latter could sweat and thereby corrode brass cartridges. The Australian infantryman's belt, ammunition pouches, braces, pack, haversack, bayonet frog and water bottle carrier were all made of webbing.70 One of the infantryman's first challenges was assembling his webbing:

Web equipment, that ingenious tangle of canvas straps and bags with which the British Infantryman envelops himself. Displayed deftly before the recruit by an instructor, who has probably spent years of his life mastering its intricacies, it looks sublimely simple. Later the innocent rookie is handed some fourteen or fifteen pieces and ordered to put it together. The average platoon could have the entire Sahara Desert to lay the web out on and still emerge a sweating swearing mass to find that besides having assembled it altogether wrongly, each one had either taken some of the next man's part or in some devilish inexplicable way had buckled their kits on to his. The inventor probably died insane...71

### Infantry Equipment Set (1914-18)72

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haversack, General Service</td>
<td>1</td>
</tr>
<tr>
<td>Webbing belt, Pattern 1908</td>
<td>1</td>
</tr>
<tr>
<td>Braces, with buckle</td>
<td>2</td>
</tr>
<tr>
<td>Carrier, cartridges, 75 rounds, left</td>
<td>1</td>
</tr>
<tr>
<td>Carrier, cartridges, 75 rounds, right</td>
<td>1</td>
</tr>
<tr>
<td>Carrier, water bottle</td>
<td>1</td>
</tr>
<tr>
<td>Pack</td>
<td>1</td>
</tr>
<tr>
<td>Straps, supporting</td>
<td>2</td>
</tr>
</tbody>
</table>

The cost of fitting out an Australian soldier was estimated at between £40 and £50, with maintenance costed at £12 per annum. This was a very large sum of money for the time, when the basic wage was 8/6 a day.73

Prior to the war, the training issue of the day was "how do I pack the maximum amount of training into a few night parades and a one week annual camp?" Men like Colonel John Monash of the 13th Brigade could pack it in very tightly. In December 1913 he ran

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70 Simkins, *Kitchener’s Armies*, pp. 268-9  
71 Keown, A.W., *Forward With the Fifth: the story of five years’ war service, Fifth Infantry Battalion, A.I.F*, Melbourne, Specialty Press, 1921, p. 25  
72 "Instructions in Regard to Clothing of the Expeditionary Force, Australian Military Forces (Exclusive of Permanent Staff)", 12 August 1914, AWM25 187/5  
73 Scott XI: *Australia During the War*, pp. 255, 663
his company and battalion commanders through a Tactical Exercise Without Troops (TEWT), a military exercise in which troop movements are reckoned off maps. Monash always included logistical problems with his TEWTs, in this case the road and rail transport required to move the brigade to its annual camp site at Lilydale, Victoria, and keep it in the field. The results were then carried out at the camp itself in February 1914, so that they could see how their ideas actually worked in practice. The climax of the camp was a two-day brigade exercise in which four battalions attacked a position held by a fifth entrenched on Mount Mary. This kind of operation was typical of the training regimens of the day of both the British and Australian armies, which always ended with an assault, which was always successful.

AIF units began forming from 17 August 1914 on, concentrating at camps within 30 kilometres of the state capitals: the Randwick Racecourse and Kensington, New South Wales; Broadmeadows, Victoria; Enoggera, Queensland; Blackboy Hill, Western Australia; Morphettville, South Australia; and Pontville, Tasmania. Bridges did not intend that units would carry out all, or even significant amounts, of their training in these camps. If he had, he might have selected training areas upstate. He divided the training program into three phases. First phase was in the camps prior to embarkation, estimated at being about three weeks. Second phase was on board ships bound for England, estimated to take about six weeks. The third phase was training after disembarkation in England, where the majority of training would be carried out. Given the limited time available in Australia, training was to concentrate on the individual. Each infantryman would become familiar with his rifle and each gun crew with their gun but only the Western Australian battery, the 8th, actually conducted a live firing exercise before embarkation.

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76 Bean I: *The Story of Anzac*, p. 82
77 Horner, *The Gunners*, p. 81
Units formed in 1914

<table>
<thead>
<tr>
<th>Unit</th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Division</td>
<td>641</td>
<td>17,386</td>
<td>18,027</td>
</tr>
<tr>
<td>1st Light Horse Brigade</td>
<td>100</td>
<td>1,867</td>
<td>1,967</td>
</tr>
<tr>
<td>Line of Communications Units</td>
<td>98</td>
<td>1,868</td>
<td>1,966</td>
</tr>
<tr>
<td>2nd and 3rd Light Horse Brigades</td>
<td>184</td>
<td>3,740</td>
<td>3,924</td>
</tr>
<tr>
<td>4th Infantry Brigade</td>
<td>148</td>
<td>4,391</td>
<td>4,539</td>
</tr>
<tr>
<td>1st Reinforcements</td>
<td>24</td>
<td>1,888</td>
<td>1,912</td>
</tr>
<tr>
<td>2nd Reinforcements</td>
<td>10</td>
<td>898</td>
<td>908</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,205</strong></td>
<td><strong>32,038</strong></td>
<td><strong>33,243</strong></td>
</tr>
</tbody>
</table>

Sending an army of 20,000 men and 7,500 horses with their baggage, equipment and stores to Europe was no small order. The Royal Australian Navy requisitioned vessels and refitted them as troop transports. In all 28 ships totalling 237,885 tons were selected for conversion. The provisioning of the ships was an administrative achievement, involving staff work of a high order.79

The AIF did not simply spring up when Bridges stamped his foot. Its rapid creation was the culmination of years of hard work. The AIF had leadership that was apparently of a high standard with a considerable number of regular and battle tested officers, drawn from a relatively large peacetime army. Its equipment, except in the matter of artillery, was the equal of, or identical to, that of the British Regular Army. The so-called Kitchener or New Armies that Britain began raising shortly after the outbreak of war would not be equipped to the AIF's standard for months to come.80 The AIF's organisation and tactics were modern, conventional, and quite similar to that of the British Army. The AIF also had a preponderance of combat troops over logistical units.

On 1 November 1914, the AIF sailed for Europe.81 How well its leadership, its technology, its tactics and its organisation adapted to the challenges of new form of warfare that it encountered there is the subject of the following chapters.

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78 GS AIF, "Table showing allotment and distribution of troops", 23 September 1914, AWM25 839/15
79 Scott XI: Australia During the War, pp. 221-224
80 Simkins, Kitchener's Armies, p. 31
81 Bean I: The Story of Anzac, p. 98
2. Gallipoli

While the AIF convoy was crossing the Indian Ocean, Colonel H. G. Chauvel, the Australian representative at the War Office, and the High Commissioner in London, Sir George Reid, arranged with the British Secretary of State for War, Field Marshal Lord Kitchener, for its diversion to Egypt.¹ Egypt had advantages over England as a training area. The milder climate permitted training to be carried out all day and every day, whereas in the 123 days that the Canadians spent training in England it rained on 89, causing training to be disrupted or cancelled.² Nor was there the competition for training areas or restrictions on their use in Egypt. Furthermore, accommodation on the Salisbury Plain was at a premium and it was clear that sufficient hutment would not be available for winter. Wintering in tents in Egypt was a much more pleasant prospect.

The strategic situation there had been changed by Britain's declaration of war on the Ottoman (or Turkish) Empire on 2 November 1914. Though nominally still part of the Ottoman Empire, Egypt had been occupied by the British since 1882. The Australians were deployed around Cairo in case there was trouble. Despite or perhaps because of all the precautions there was no disturbance in Egypt.³

Most of the Australians in Egypt soon became part of the Australian and New Zealand Army Corps (ANZAC) under the command of Lieutenant General Sir W. R. Birdwood. Corps headquarters was a British unit consisting of only 10 officers and 10 other ranks that Birdwood had formed in India and brought with him from Bombay on 12 December 1914.⁴ The headquarters was incomplete, and Birdwood particularly felt the lack of an artillery officer, noting that:

Both Australian and New Zealand artillery are very backward indeed and need all the help they can get.⁵

Nonetheless, this request remained outstanding until 5 February 1915, when Colonel C. Cunliffe Owen was appointed. ⁶

Birdwood created a second division, the New Zealand and Australian Division, under the command of Major General Sir A. J. Godley, from the New Zealanders, 1st Light

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² Rawling, Surviving Trench Warfare, p. 21
⁴ Telegram, GOC Cairo to GOC Aden dated 12 December 1914, AWM4 1/28/13 Microfilm Roll 783
⁵ Telegram, GOC ANZAC to War Office dated 12 December 1914, AWM4 1/28/13 Microfilm Roll 783
⁶ Telegram, GOC Cairo to War Office dated 5 February 1915, AWM4 1/28/13 Microfilm Roll 783
Horse and 4th Infantry Brigades. This was intended as a temporary arrangement pending the creation of full strength infantry and mounted divisions.\footnote{Bean, I: \textit{The Story of Anzac}, pp. 117-118}

There was a difference in training between the two divisions. Major General W. T. Bridges of the 1st Division concentrated on small unit tactics, with battalion and brigade exercises beginning in February, and he never did get around to exercising his division as such whereas Godley immediately started division exercises. Infantry training generally involved route marches through the soft sand in full kit, entrenching and advancing by rushes. Units practiced staged withdrawals and night attacks.

Although Bridges toyed with modifications to the division's organisation tables for a campaign in the Middle East, there was only one change at this time. Infantry battalions were reorganised on 29 December 1914.\footnote{War Diary of GS 1st Division, dated 29 December 1914, AWM4 1/42/1 Microfilm Roll 803} Their size was unchanged but now there were four platoons per company and only four companies per battalion instead of eight. This change had been made in the British Army just before the war and brought it into line with continental armies. The AIF had been formed on the old establishment because the modern textbooks were not available in Australia.\footnote{Bean, I: \textit{The Story of Anzac}, pp. 135-136} That the platoon was a better tactical unit than the company and the new organisation superior to the old was not yet apparent, as tactics remained battalion based.

Many wars have been fought for possession of the Straits of Çanakkale (also known as the Dardanelles and the Hellespont), including the famous Trojan War (1194-1184 BC).\footnote{The straits have successfully been forced by ships at least three times: in 326 by a Roman Fleet under the 17 year old admiral Crispus, in 1654 by a Venetian Fleet, and in 1807 by a British fleet under Vice Admiral Sir John Duckworth. See Cook, Stanley A., Adcock, Frank, Charlesworth, M. P., \textit{The Imperial Crisis and Recovery, AD 193-324}, Cambridge, Cambridge University Press, 1939; Clowes, William Laird, \textit{The Royal Navy. A History from the Earliest Times to the Present. Volume V}, London, Sampson, Low, Marston and Company, 1900, pp. 218-230} In 1915, the straits had been fortified with guns, minefields and searchlights and an attempt by a British and French fleet to force the straits on 18 March 1915 met serious defeat with three ships sunk and three damaged by mines and shore batteries. The newly appointed Commander in Chief of the British Mediterranean Expeditionary Force (MEF), General Sir Ian Hamilton, was requested to devise a land campaign to capture the straits.\footnote{Hamilton, \textit{Gallipoli Diary}, Volume I, pp. 21, 37, 41-42}

The beaches of the Gallipoli Peninsula are well suited to amphibious operations, perhaps the most tactically and technically complex of military operations. There are
no tides in the Aegean and no current off the west coast of the peninsula although the one in the straits affects the beaches around Cape Helles. The grade of the beaches is steep enough for boats to beach close to the shoreline. They were, however, poorly surveyed so some risk of encountering shoal water or submerged rocks had to be accepted. The only available map of the Peninsula was so full of errors that it caused serious difficulties both ashore and afloat. Aerial photography was still in its infancy but efforts began on 4 April 1915 and gradually maps were assembled from hundreds of aerial photographs.\textsuperscript{12} Thus, while the topographical information was poor, the military information was often surprisingly accurate.\textsuperscript{13} They revealed that all beaches on the peninsula south of Gaba Tepe had extensive belts of barbed wire along the water's edge and some below the waterline as well. Some of the Cape Helles beaches were also mined.\textsuperscript{14} Not until 19 May 1915, when the Australians obtained an excellent recently issued large scale Turkish map from a mortally wounded Turkish officer and copies were made in Egypt was a reliable map available.\textsuperscript{15}

Studying the situation prior to Hamilton's arrival, the French General Albert d'Amade and his staff considered the Asiatic shore to be the best option.\textsuperscript{16} There are good beaches and by creating space through forcing the dispersion of fighting men over a broad front, mobility would have become theoretically possible. Hamilton was against the idea because his forces did not have sufficient motor or animal transport to undertake the advance, the Asiatic side dominates the straits but not the Gallipoli Peninsula and the War Office and Admiralty had agreed on the peninsula.\textsuperscript{17} Hamilton therefore sought battle with the enemy. This may seem unsound but it was in accord with two key memes; the meme that numbers were less important than morale and the meme that the decisive battle was the central and desirable objective of the campaign.

The enemy commander, General Liman von Sanders, concentrated the majority of his troops inland, holding the beaches thinly. The idea that concentrated reserves and a vigorous counterattack was the best possible form of defence was German doctrine but it seriously underestimated the superiority of a defensive posture. The best chance of destroying a landing was at the water's edge. The guns of the navy would have had little effect against entrenched positions, reserves could have come up from other

\textsuperscript{12} Jones, H.A., \textit{The War in the Air}, Volume II, Oxford, Oxford University Press, 1928, p. 28
\textsuperscript{13} Bean, C.E.W., \textit{Gallipoli Mission}, Sydney, ABC Enterprises, 1990, p. 150
\textsuperscript{14} "Report on Landing Facilities Between Gaba Tepe and Cape Helles", AWM25 367/121
\textsuperscript{15} Bean, C.E.W., \textit{The Official History of Australia in the War of 1914-1918. Volume II: The Story of Anzac}, Sydney, Angus and Robertson, 1924, p. 164
\textsuperscript{17} Hamilton \textit{Gallipoli Diary}, Volume I, pp. 9, 24, 72, 87-88
beaches fairly easily and once entrenched themselves the allies would be hard to shift.\textsuperscript{18}

Hamilton was aware that the Royal Navy had developed landing craft for a proposed Baltic Sea operation that were armoured, had a shallow draft for beaching, were large enough to carry five hundred men and were propelled by their own engines. He requested that 20 to 30 be sent out but none arrived in time to take part in the landings.\textsuperscript{19} Instead, the ANZAC troops were landed at Gaba Tepe by 12 tows, each consisting of a picket boat, a steam launch or pinnace, a cutter and a lifeboat, and capable of carrying 120-160 men.\textsuperscript{20} The troops used rope Jacob's ladders to board them. The steam launch would carry them as close to shore as possible; the cutters would row from there. There was not enough craft to land more than two divisions and subsequent waves would have to reuse the same boats.\textsuperscript{21} Rehearsals of the landing were carried out on Lemnos from 15 to 18 April.\textsuperscript{22}

Without landing ships, ocean going vessels that could have been laden in Alexandria, sailed direct to the Peninsula and discharged directly over the beaches, supplies had to be unloaded at Mudros and transshipped to the Peninsula in smaller vessels of 1,500 tons or less as there were no deep water berths for full sized ships on the Peninsula. There was one attempt to improvise a landing ship. A collier, the River Clyde, which could carry 2,000 men and drew only 2 metres of water empty, was converted into a landing ship by cutting openings in its sides and adding gangplanks. Eleven Maxim guns were mounted in the bow behind steel plates and sandbags - which turned out to be the difference between victory and defeat on a beach at Cape Helles rightly considered a deathtrap. River Clyde also served as a small arms ammunition depot, water condensing plant, dressing station and a breakwater.\textsuperscript{23} The lack of landing ships forced the first waves of ANZAC at Gaba Tepe to use warships to carry the tows, the first wave being carried in battleships and the second wave in destroyers. Subsequent waves were carried in transports.


\textsuperscript{19} Hamilton, Gallipoli Diary, Volume I, p. 44

\textsuperscript{20} Captain C.G. Dix, "Anzac: Impressions of the landing and 14 weeks on the beach", undated, AWM25 367/5

\textsuperscript{21} Hamilton, Gallipoli Diary, Volume I, p. 100

\textsuperscript{22} War Diary of GS 1st Division, dated 15 to 18 April 1915, AWM4 1/42/1 Microfilm Roll 803

\textsuperscript{23} Aspinall-Oglander, Gallipoli, Volume I, pp. 132-133; Corbett, Naval Operations, Volume II pp. 313-314
Hamilton decided to make his main landing at five beaches around Cape Helles with the British 29th Division. Because the beaches there were so constricted it was estimated that it would take two and a half days to disembark the entire division. ANZAC would land north of Gaba Tepe while the French made a diversionary landing at Kum Kale and the Royal Navy Division a faint at Bulair. The total strength of the MEF was about 75,000 men, somewhat less than the enemy. Hamilton intended to defeat the enemy in detail but the scattered nature of his landings made the reverse seem more likely.

Landings at Helles could be supported by land based air from Tenedos but Gaba Tepe was out of their effective range. Air cover for the operation was a naval responsibility. The navy sent the British 3rd Naval Air Squadron under Commander Samson. This squadron possessed 18 aircraft but only two BE2s and three Maurice Farmans were suitable for bombing and spotting work. *Ark Royal*’s crew cleared a vineyard on Tenedos to create a 600 metre long airstrip and anti-aircraft guns were emplaced around it. Samson estimated that the campaign would require a minimum of 30 good two seaters and 24 fighters. "So equipped", noted Hamilton, "he reckons he could take the Peninsula by himself and save us all a vast lot of trouble".

This would later prove to be utterly improbable but even at this stage of the war aircraft had an aura of *deus ex machina* that certain new technologies attract from their enthusiasts. This phenomenon is partially a symptom of the enthusiasm of the convert, without which they would probably give up in the face of inevitable early setbacks, and partially a reaction to the sceptics.

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The submarine threat soon forced *Ark Royal* to return to Kephalos where she served as an aircraft depot ship. On 12 June 1915 a newer, faster carrier, the *Ben-My-Chree* arrived, carrying two scout and three Short seaplanes. The Shorts were equipped as torpedo bombers and on 12 August 1915 a 5,000 tonne supply ship became the first victim of an aerial torpedo. During the Gallipoli campaign, seventy air attacks were made on enemy shipping, including five with torpedoes, and 1,155 bombs, weighing 27 tonnes, were dropped.26

On 4 March 1915, Birdwood asked Kitchener for a kite balloon, the use of which was proposed in the *Field Service Regulations*.27 The kite balloon had been developed by a pair of German pioneers, August von Parseval and Bartsch von Sigsfield, in the 1890s. Earlier tethered (or captive) balloons had proved inoperable when the wind was blowing because the car would rock violently. Von Parseval and von Sigsfield used air pressure to stabilise the balloon by inclining it at 30 to 40 degrees into the wind. An air sack at the rear acted as a rudder and kept the balloon pointed into the wind. It could be used at heights of up to 1,000 metres and in a 65 kph wind. A kite balloon had considerable advantages over an airplane in 1915: it could remain aloft all day, communication with the mother ship was continuous and reliable, and the observer could devote all his time to spotting. The drawback was the vulnerability of a hydrogen balloon, especially to air attack.28 The tramp steamer *Manica* was taken up from carrying manure on the Manchester Canal and outfitted with a kite balloon. The experiment was so successful that the Admiralty ordered six more ships to be similarly fitted out and on 9 July 1915 a second kite balloon ship, the *Hector*, joined the campaign. A third, the *Canning*, replaced *Manica* in October.29 Hamilton placed great faith in the ability of naval guns to clear the way for his men, faith not justified by their performance thus far in the campaign.30

Birdwood favoured landing at night and dispensing with a preliminary bombardment. As it turned out, the beach defences were so weak that it would have been useless, and the landing was at dawn due to the postponement to 25 April 1915 which meant a later moonset.31 The 3rd Infantry Brigade landed 1.5 kilometres north of the intended

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26 Jones, *The War in the Air*, Volume II, pp. 52, 56, 64-65, 72  
27 *Field Service Regulations*, p. 34  
31 Aspinall-Oglander, *Gallipoli*, Volume I, p. 170
Given the confusion that inevitably results from any landing, especially one on the wrong beach, things went ahead relentlessly, ship to shore movement and unloading being controlled by a naval beach party, as per British doctrine. Turnaround time of the tows was slower than anticipated. The principle cause of delay was enemy fire from Turkish field guns behind Gaba Tepe. The Navy attempted to silence them but they continued to fire and seaplanes were unable to locate them because they were too well concealed and withheld their fire when seaplanes came near. Birdwood accordingly asked for them to fly up and down the lines, suppressing the Turkish fire that way.

There is a legend that the Australians pushed "too far, too fast". On the contrary, they did not push far enough nor fast enough. The terrain over which ANZAC had to pass was indeed formidable, but not impassible in the time allowed. Still, only the fastest moving parties made it to the Third Ridge ahead of the Turks. Much of the credit for this has to be given to the Turks, who made good use of entrenchments, concealment and the terrain. They did not lose cohesion in the close country and in this battle proved themselves more than a match for the Australians. Repeatedly the Australians occupied key positions like Baby 700 only to be driven off by Turkish fire. Some of this was from Turkish machine guns and artillery overlooking their positions, but Turkish infantry working their way around exposed flanks and picking off the defenders with rifle fire played an important part.

Many of the tactical errors the Australians made could be traced to their training: the mistaken idea from the Field Service Regulations that the enemy mined his own trenches, the leaving of picks and shovels behind on the beach and the occupation of crests rather than reverse slopes. The need for concealment was learnt from the Turks, who concealed their machine guns well and were quick to locate the Australian guns. Discipline was good; men followed their officers and random firing was not in evidence during the day. Initiative was less in evidence. Too many units without...

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32 Brighton Beach, just south of Anzac Cove. CGS MEF, "Instructions for ANZAC", 14 April 1915, AWM4 1/25/1 Microfilm Roll 777
33 The naval Beach Party consisted of 18 officers and 96 men under the command of Captain V. Vyvyan, RN. See Appendix 1(9) to War Diary, GS ANZAC, AWM4 1/25/1 Microfilm Roll 777
34 Corbett, Naval Operations, Volume II, p. 323; Bean, I: The Story of Anzac, pp. 279, 544; Jones The War in the Air, Volume II, 44-46
35 Memoir of Private AA. Barber, undated, 3DRL5035; Letter, Private R.G. Hamilton, dated 19 May 1915, PR85/151
36 Field Service Regulations, p. 150
37 Bean, I: The Story of Anzac, p. 260
38 However Birdwood was forced to issue a warning concerning desultory fire during the night. War Diary of GS 1st Division, dated 26 April 1915, AWM4 1/42/1 Microfilm Roll 803
orders did nothing. An early start on digging in would have helped greatly at positions like Lone Pine that could have been held but were not.\textsuperscript{39}

Given that nowhere had the day's objectives been achieved, there was practically no chance of capturing them with the troops available, no substantial reinforcements could be expected and a major Turkish counterattack was probable, Bridges and Godley recommended withdrawal. Advised by the navy that evacuation would be impossible owing to losses in small craft and the dispersal of transports due to shellfire, Hamilton ordered them to dig in and hold their small beachhead.\textsuperscript{40} The rugged terrain now became their friend. In particular, in Anzac Cove they had the only beach on the coast not under direct Turkish observation, although the southern tip is visible from Suvla and the tip of Ari Burnu is visible from Gaba Tepe.\textsuperscript{41} Anzac Cove was also blessed with an excellent grade, and boats drawing 1.5 metres could approach to within 10 metres of the shore for most of its extent.\textsuperscript{42}

The first step in carrying out Hamilton's directive was the digging of individual weapon pits or foxholes during the night. These were later joined up to form a continuous trench line. The quickest way to dig a trench is by entrenching, in which a line of men with spades dig simultaneously, but it requires access to the surface. In more dangerous localities, trenches were initially dug by the slower but safer process of sapping, in which the trench is dug below ground level by extending a sap. Tunnelling was a new technic developed by the 12th Infantry Battalion in late April to connect foxholes, in which a trench is dug just below the surface. It is even safer than sapping because the enemy is unaware that anything is afoot until the work is complete and it suddenly breaks the surface. From 6 June 1915, ANZAC extended all its trench systems in this manner.

Trenches were dug deep enough that soldiers could stand without their heads appearing above ground and with traverses interposed so that the enemy could not fire straight down the trench. Spoil, loose or in sandbags, was used to build up the front on the trench (the parapet) and the back (the parados). Some trenches were deliberately built without parapet or parados to conceal their location from the enemy. Because a trench was deeper than a man was tall, fire steps were provided for men to stand on in order to fire over the parapet. Standing orders required six men for every

\begin{footnotes}
\item[39] Bean, II: The Story of Anzac, pp. 61, 289, 293
\item[40] Hamilton, Gallipoli Diary, Volume I, pp. 142-145
\item[41] GOC ANZAC to CGS MEF, 8 May 1915, AWM25 367/234. From now on, the term "ANZAC" will be used for the corps and "Anzac" for its beachhead.
\item[42] Captain C.G. Dix, "Anzac: Impressions of the landing and 14 weeks on the beach", undated, AWM25 367/5
\end{footnotes}
twelve metres of trench.\textsuperscript{43} The trenches at Quinn's Post, the most dangerous point of the whole line where the Turks were in places only 15 metres away were, on Birdwood's order, deliberately left shallow so that the defenders could man the parapet in an instant, which was found to be an error. A trench from which men shoot is called a fire trench. Other trenches, known as communications trenches, led to the rear. The soil at Gallipoli is sandy and once the scrub is cleared away it is easy to shift with an entrenching tool, the small combination pick and shovel issued to every man. Initially the Australians tried to get as close to the Turks as possible but the disadvantages of this were realised and a line at Lone Pine 30 metres from the enemy trenches was turned into a barbed wire trap.\textsuperscript{44}

From this it is but a short step to mining, a classical form of siege warfare in which the attacker attempts to destroy the defender's position from below. This form of warfare only becomes possible when the front line moves slower than a man can dig. Initially, Australian mining was limited to listening holes owing to shortages of timber and iron. On 29 May, the Turks blew up part of Quinn's Post, killing all the men in part of the front trench and the miners in a nearby tunnel. They occupied part of the post and were only driven out after a furious five hour bomb fight.\textsuperscript{45} This incident gave considerable impetus to Australian mining efforts and Birdwood ordered special mining units to be formed from 200 men with mining experience in civilian life. These men immediately set to work and their skill slowly turned the tables in the underground war. Working round the clock in eight hour shifts they constructed a series of defensive tunnels. Sappers or skilled miners worked singly or in pairs at the mine face with picks and entrenching tools while others hauled away the spoil in sand bags. Depending on the soil, a standard two metre high, one metre wide tunnel could be driven forward five to seven metres per day. Other men were engaged in listening. Three experienced miners per brigade determined the location and direction of enemy mining activity from the sound of their digging. Camouflets (counteroffensive mines) were exploded to destroy the enemy mines approaching Quinn's Post and on 24 June the miners exploded their first offensive mine. On 29 June, the Turks employed a device that emulated the sounds of digging to disguise their tamping of a mine and killed two listeners, but the listeners soon learned to distinguish this from true digging. The underground war continued without let up to the very end of the campaign, which concluded with the firing of 16 mines, each

\textsuperscript{43} GOC 1st Division, "Operation Memorandum No. 8", 13 June 1915, AWM25 367/13
\textsuperscript{44} Bean, I: The Story of Anzac, pp. 614-617; Bean, II: The Story of Anzac, pp. 58, 95, 261-262, 341
\textsuperscript{45} GS NZ&A Division, "Report on Action at Quinn's Post on 30 May to 1 June 1915", undated, AWM25 367/229
charged with between a quarter of a tonne and 3 tonnes of explosive. Long before, the miners had gained a complete ascendancy over their Turkish opponents.46

Guns Available to ANZAC
May - November 191547

<table>
<thead>
<tr>
<th>Gun</th>
<th>1 May 1915</th>
<th>15 July 1915</th>
<th>1 November 1915</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 pounder AA</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>10 pounder</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>12 pounder AA</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>18 pounder</td>
<td>28</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>4 inch gun</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4.7 inch gun</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.5 inch howitzer</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5 inch howitzer</td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>6 inch howitzer</td>
<td></td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>44</td>
<td>68</td>
<td>105</td>
</tr>
</tbody>
</table>

To damage the enemy's trenches, the infantry turned to the artillery but perhaps no branch found the conditions at Anzac more frustrating. First of all, ANZAC was short of guns. The two divisions had just five Australian and two New Zealand 18 pounder batteries and one New Zealand 4.5 inch howitzer battery between them, as five Australian batteries had been diverted to Helles where they spent the next few months supporting the British.48 On 24 June these guns became the first Australian artillery to fire directed by aircraft.49 Corps artillery consisted of two Indian mountain batteries, each equipped with six 10-pounder mountain guns. ANZAC therefore had only 44 barrels.50

ANZAC was short of ammunition because the supply had not been calculated on the basis of a prolonged campaign. By May Hamilton was down to his last few thousand rounds of 18 pounder ammunition and was anxiously negotiating with the War office for resupply to be sent from Marseilles instead of England. On 20 May he limited the normal daily expenditure to 2 rounds per gun per day. Initially, the only available

48 Bean, II: *The Story of Anzac*, p. 60
49 Horner, *The Gunners*, p. 102
50 Bean, II: *The Story of Anzac*, p. 57
ammunition was shrapnel. The first high explosive shells reached Anzac on 20 June in small quantities and by 2 August, 150 high explosive rounds were provided per 18-pounder battery. Without them, the artillery could not damage enemy entrenchments.

Keeping the guns working was a challenge, for replacement guns and spare parts were both in short supply. Repair crews often resorted to "cannibalism" - the practice of taking spare parts from one gun to repair another.

Another problem was the terrain. The rugged terrain made it hard to move guns around the beachhead and the flat trajectory of the 18 pounders made them doubly hard to site. The guns simply had difficulty clearing the crests of the ridges. Moreover, because the Turks were often just on the other side of the ridge, the shrapnel shells exploded forwards or even upwards instead of downwards, much reducing their effect. The howitzers too had difficulties because the target was so near the top of a gun or howitzer's arc of fire that their shells did not have the momentum to explode on impact.

By no means the least of the artillery's problems was the Turkish artillery, which put top priority on engaging its opposition. Any exposed gun position drew prompt and accurate artillery fire. For cases where guns had to be exposed for one reason or another, the guns of another battery would provided cover by keeping an eye on the Turkish battery from which counterbattery fire was expected, opening on it if it replied. Some batteries kept a gun loaded, manned and trained on the Turkish position that was their responsibility round the clock.

By May the mountain batteries were positioned on high but "dead" ground – ground that cannot be observed by the enemy, thus denying them location, and as such was prime real estate at Anzac. Gradually, as the field engineers constructed gun positions and roads, it became possible for 18 pounders to join the mountain guns. Field artillery brigades became responsible for that part of the line immediately in front of their positions, locating their headquarters near the infantry brigades holding their sector. This was in conformity with the Australian prewar practice by which field artillery brigades were assigned to infantry brigades.

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51 Aspinall-Oglander, Gallipoli, Volume II, p. 30; Hamilton, Gallipoli Diary, Volume II, 197-204, 297
52 Aspinall-Oglander, Gallipoli, Volume II, p. 393; Bean, II: The Story of Anzac, pp. 82-83
53 Bean, II: The Story of Anzac, p. 83
To the infantry, the failure of the guns to halt construction of Turkish earthworks was baffling. On 5 May, Bridges had two guns of the 8th Field Artillery Battery hauled up the front line to fire at the Turkish trenches like giant shotguns. The operation was repeated twice the next day but only proved that shrapnel had no effect on earthworks and was only dangerous to the defenders if fired along the trench line rather than at it. This was precisely what a Turkish gun was doing to the Australian trenches at Lone
Pine and it was in the effort to suppress it that the ultimate solution was discovered. A New Zealand forward observer on Russell’s Top located the gun. The New Zealand howitzers beneath Ari Burnu found they could range on the gun, but had insufficient ammunition to suppress it. The New Zealand 1st Field Artillery Battery and Indian 26th Mountain Battery moved up to Russell's Top and were able to silence it temporarily from there.\textsuperscript{54}

Thus it was realised that the answer was for the guns of the 1st Division to support the troops of the New Zealand and Australian Division and vice-versa. This seemingly simple idea involved a complete revision of the corps command and control arrangements.\textsuperscript{55} The signallers set to work splicing the two communications nets together and ultimately constructed a communications net from signal cable that came to connect every post. As the cables were largely unburied, much of their campaign was spent repairing breaks.

Command proved a more difficult problem. The man who could have resolved it by establishing a centralised artillery command, the Corps Artillery Commander, Brigadier General C. Cunliffe Owen, made no attempt to do so. Widely regarded as a dud round, Cunliffe Owen left coordination up to the divisional artillery staffs. The problem was British doctrine that called for artillery to be controlled at the divisional or brigade level. No thought had been given to control at corps level and it was unclear whether the corps artillery officer was meant to command the artillery or was simply an adviser to the corps commander, a problem shared by the engineer and medical officers. The result was excessive delays in responding to fire calls. On one occasion a request for artillery fire on a Turkish working party took overnight to reach the appropriate forward observer.\textsuperscript{56}

Fortunately, the Turks shared a problem with the British: a critical shortage of artillery ammunition, particularly high explosive. Ammunition quality was also a problem and there was a high percentage of dud rounds. Turkey was physically isolated from Germany by neutral countries, which would not allow the carriage of ammunition across their borders. Turkish artillery ammunition therefore came from factories in Istanbul, which even with German assistance, could not deliver the

\textsuperscript{54} Bean, II: The Story of Anzac, p. 68-69
\textsuperscript{55} This was thrashed out in a conference on 11 May. War Diary of GS 1st Division, dated 11 May 1915, AWM4 1/42/1 Microfilm Roll 803
\textsuperscript{56} Bean, II: The Story of Anzac, p. 73
required ammunition in the quantity or quality required.\textsuperscript{57} This fact was duly discovered by the codebreakers and made known to senior British commanders.\textsuperscript{58}

Had the Turks had ample ammunition, Anzac could have been rendered untenable by shelling Anzac Cove. Their first attempts to shell the beach foundered on the angle required to clear the ridges and still hit the beach. Shells either landed out to sea or struck Plugg's Plateau, while high shrapnel bursts had little effect, piles of boxes containing rations, ammunition and stores, and bales of fodder providing sufficient protection for men and animals to continue working under fire. The solution was to avoid the ridges entirely by firing from the south. On 6 May, "Beachy Bill" began shelling the beach. A dud round retrieved from the beach was found to have its fuze set for 5900 metres, which placed the gun that fired it in the olive (actually oak) grove south of Asmak Dere. Artillery and naval guns continually attempted to silence them but the Olive Grove guns continued to fire daily for the rest of the campaign, causing over 1000 casualties on the beach alone, which became one of the most dangerous places. They were not averse to firing on small craft operating off the beach either, often sinking trawlers and barges. The Turks' biggest mistake was in not concentrating all their scarce ammunition on the beach, where every round was bound to hit something.\textsuperscript{59}

On 14 July 1915 the 1st Heavy Artillery Battery was formed with two old 6 inch howitzers and a 4.7 inch naval gun.\textsuperscript{60} These guns represented a considerable increase in firepower. The 4.7 inch gun could lob a 20 kg shell 10,000 metres - almost twice as far as an 18 pounder.\textsuperscript{61} Within days the battery was answering the fire of the Olive Grove guns. By the end of the campaign, the two 6 inch guns had fired 1,726 rounds and the 4.7 inch gun, 513 - a total of 2,239 rounds or 14.8 per day on average, much of it at the Olive Grove guns.\textsuperscript{62}

Artillery did not dominate the Gallipoli battlefield. Shortages of ammunition severely cramped the style of gunners on both sides. The Australian artillery learned the importance of camouflage; the value of counterbattery fire; the use of aerial observation; the relative merits of high explosive and shrapnel; and, most important of all, the need for centralised command and control of the guns. Artillery landed as

\textsuperscript{57} Aspinall-Oglander, \textit{Gallipoli}, Volume II, p. 485; Liman von Sanders, \textit{Five Years in Turkey}, p. 75
\textsuperscript{58} CGS MEF 8 July 1915, AWM25 367/157; GOC ANZAC 17 July 1915 AWM25 367/157
\textsuperscript{59} Bean, II: \textit{The Story of Anzac}, pp. 72-82, 356-360
\textsuperscript{60} The first 6 inch howitzer had arrived on 16 May. GS 1st Division, dated 16 May 1915, AWM4 1/42/1 Microfilm Roll 777
\textsuperscript{61} Gower, \textit{Guns of the Regiment}, pp. 164-167
\textsuperscript{62} OC 1st Heavy Battery, Record of rounds fired for December 1915, AWM25 367/131
an adjunct to the infantry and left as an independent arm. But there were still many technical and tactical problems yet to be solved. The artillery's war within a war at Anzac had been a draw, with neither side curtailing the guns of the other.

A similar situation prevailed in the air. Enemy air activity was slight throughout the campaign but with such a small beachhead any enemy observation was dangerous and liable to bring down accurate fire from Turkish artillery and naval guns. Since ANZAC had no antiaircraft guns at first, special emplacements were constructed to allow 18 pounders to shoot at aircraft. The method was simple: a hole was dug in the ground and the trail of the gun lowered into it so the muzzle pointed up in the air. In late August three 3 pounder Hotchkiss antiaircraft guns arrived. All the manuals were in Japanese but a Japanese speaking digger was found to translate the manuals and produce range tables.63

After being buzzed by a low flying German airplane on 9 September 1915, Godley fired off a request to Hamilton for aircraft and guns to defend Anzac from aerial interlopers. Hamilton had no aircraft to spare but did send a 12 pounder naval antiaircraft gun. A coordinated antiaircraft defence with machine guns was organised. Each of the four divisions then holding the line around Anzac Cove designated two machine guns for antiaircraft use, emplacing them so as to cover the entire position.64 Despite the effort, no enemy aircraft were shot down by antiaircraft fire over Anzac.

This was not a unique occurrence of established technologies being turned to a different purpose. The failure of the technologies with which they were equipped soon led to a search for new technologies and reevaluation of old ones. The ability of the Australians to obtain them at Gallipoli was limited, however.

The hand grenade was unfamiliar to Australian soldiers although its use in siege warfare was recommended in the Field Service Regulations where it warned that hand grenades should only be given to troops trained in their use.65 The first experience for many was from the enemy who were equipped with iron German fragmentation grenades. These were also the first hand grenades used by the Australians. On 30 April 1915, in response to an urgent request from Quinn's Post for hand grenades, the chief engineer of the 1st Division brought up some captured grenades. Three were thrown but the results were disappointing in that they did not deter the enemy from

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63 Hamilton Gallipoli Diary, II, p. 296; Horner, The Gunners, p. 107
64 “Type of Machineguns Selected for Dealing with Hostile Airplanes”, AWM25 31/1
65 Field Service Regulations, pp. 148, 155
tunnelling and sapping. The Australians found themselves the targets of bombing to which they could not retaliate in kind, which is the worst possible tactical situation. They were often forced to remain silent in their positions since any noise could attract a Turkish bomb. The bombing not only caused casualties but damage to the trench system itself. If a bomb landed in a trench the men could clear the trench, if there was time. They could try throwing the bomb back if they were quick enough but the Turks could retaliate by shortening their fuses. Alternatively, they could try to smother the explosion with a great coat or partly filled sandbag. This method proved quite successful but was still dangerous. It was possible only because the early bombs contained insufficient explosive, the technology still being in the trial and error stage. Later bombs could not be smothered in this way. Eventually, wire mesh screens were erected on wooden frames in front of the trenches most susceptible to enemy bombing.

Sappers of the 2nd and 3rd Field Companies began manufacturing bombs on the beach around the end of April. The famous "jam tin" bomb consisted of an empty tin can filled with guncotton and a few pebbles or enemy shrapnel balls; a detonator was inserted and a fuse attached. A bomb factory was established there and by July it was producing over 200 bombs daily, rising to 4,000 per day in August.

Another type of bomb made on the beach was the Lotbinière or "hairbrush" bomb. This consisted of a wooden paddle the size of a rounders bat with a slab of guncotton with wire fastened to the flat part of the paddle, with a primer, detonator and fuse attached. This weapon was developed in response to a need for a more powerful device to destroy trenches, and was probably inspired by the damage done to the crude trenches at Quinn's Post by bombs, but the destruction of the timbered Turkish trench lines by this means proved impractical.

By August, both types of bombs were manufactured in Alexandria and Malta in quantities sufficient to cause the British War Office to protest that supplying the materials for grenades to these places was hindering the manufacture of bona fide hand grenades. In return for an end to their manufacture at these places, the War

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66 Daily Summary, HQ 1st Division Engineers, 30 May 1915, AWM25 367/184; Bean, I: The Story of Anzac, p. 580
67 Bean, II: The Story of Anzac, pp. 118, 119, 127, 252, 552, 556, 557
68 Daily Summary, HQ 1st Division Engineers, 15 May 1915, AWM25 367/203
69 Lawrence, Cyril, The Gallipoli Diary of Sergeant Lawrence of the Australian Engineers 1st AIF 1915, Carlton, Victoria, Melbourne University Press, 1981, pp. 39, 72
70 GOC 1st Division, "Operation Memorandum No. 32", 10 September 1915, AWM25 367/13

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Office promised to ship Hamilton 30,000 to 40,000 grenades weekly. But manufacture on the beach at Anzac Cove continued to the end of the campaign.

The first Jam Tin bombs to reach Quinn's Post were a pair brought up by Major Quinn himself on 7 May. One was thrown that night, and it was Jam Tin bombs in quantity that allowed the Anzacs to turn the tide against the Turkish bombers. On 13 June, the New Zealanders (who had relieved the Australians at Quinn's) threw 170 bombs and 212 more the next day. Soon 300 or more was not unusual and eventually bombing rendered enemy bombing positions untenable, earning Quinn's Post its Turkish name, Bomba Sirt (Bomb Spur) in the process.

Another rediscovered technology was the mortar. The close proximity of the ANZAC and Turkish positions in several places made ideal targets for mortars - small, muzzle-loading artillery pieces that fire at high trajectories. Neither the British nor the Turkish Armies had any in 1914, mortars having disappeared from the arsenals long before. The first Turkish mortars deployed were literally museum pieces over fifty years old with designs dating back to the 18th century and which fired a large iron shell. In July the Turks also began using improvised rockets but fortunately they were never supplied with an effective mortar during the Gallipoli Campaign.

Most of the mortars supplied to the Anzacs were of a crude type known as the "Garland", which first appeared on 12 May. The Garland consisted of little more than a length of tubing that had to be propped up to the required angle. The bombs were a variant of the jam tin grenades with bags of black gunpowder for propellant. A better type arrived on 20 May, four Japanese trench mortars, two per division. This type fired a high explosive bomb 10cm in diameter, weighing about 14 kg and with a metal rod attached that was inserted into the barrel while the bomb rested outside. This type of mortar is known as a spigot mortar. The bombs had a considerable effect on the Turks, causing casualties whether they exploded in the air or on the ground, one causing 80 casualties. They also had some success driving away nearby Turkish artillery such as the Lone Pine Gun. As a countermeasure, the Turks roofed over their trenches in the forward zone with timber. Unfortunately, their use became strictly rationed by ANZAC when it was discovered that the total supply of bombs was just 2,000 and that any further numbers would have to be specially manufactured in

71 Hamilton Gallipoli Diary, Volume II, p. 157
72 Bean, II: The Story of Anzac, pp.95-96, 249, 252
73 Fewster, Kevin, Basarin, Vecihi and Basarin, Hatice Hurmuz, A Turkish View of Gallipoli: Çanakkale, Richmond, Victoria, Hodja, 1985; Bean, II: The Story of Anzac, p.290
74 HQ 1st Division to HQ ANZAC, 9 September 1915, AWM25 973/21; Bean, II: The Story of Anzac, p. 62
75 War Diary of GS 1st Division, dated 20 May 1915, AWM4 1/42/1 Microfilm Roll 803
Japan. A small number of 3.7 inch light mortars were acquired later in the campaign. On 2 October, the 1st Division had seven Garlands, one 3.7 inch and two Japanese trench mortars with 6460, 200 and zero rounds of ammunition respectively.

Terrain, rifle and machine gun defined trench warfare conditions at Anzac. The three northernmost positions on the Second Ridge - Quinn's, Courtney's and Steele's Posts - occupied spurs on the far side of Monash Valley. Supplies had to travel up Monash Valley, the western side of which was under Turkish observation from Baby 700 while the Turks could also view the slopes below Quinn's Post. The position was far from ideal; it had little depth and internal communications were under enemy observation. Attempts to improve it by capturing Turkish posts were bloodily repulsed.

The security of Quinn's Post depended not so much on its garrison as on the overwhelming firepower of the 20 or more enfilading machine guns at nearby posts. Machine guns were arranged so that its neighbours protected each post. The arrival of light horse regiments, machine gun sections first, almost doubled the number of guns available. A practice became established whereby units would share a post. Units on Pope's Hill relieved each other on a weekly basis, and those on Quinn's Post and Lone Pine every 48 hours. The machine guns would remain in the line and each regiment and battalion doubled the size of its machine gun section, although the number of guns was not immediately increased. Due to the restricted space available around Anzac Cove, training of new gunners was undertaken in gullies behind the front lines. The massing of machine guns was frowned on by the *Field Service Regulations*, which said that massed machine guns would only attract hostile artillery fire.

The conditions provided an ideal opportunity for snipers. Initially the snipers concentrated on the frontline posts. Fatigue parties working in Monash Valley carrying water, ammunition and rations up the dry creek bed that served as a road at first ignored the snipers, who nonetheless killed or wounded a few of them each day. But as the situation settled into trench warfare, targets became scarce up front and the snipers switched their attention to them. By early May they were losing twenty to

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76 GOC ANZAC to CGS MEF, 18 September 1915, AWM25 973/21; GOC ANZAC to CGS MEF, 19 September 1915, AWM25 973/21; Bean, II: *The Story of Anzac*, pp. 288-290
77 “Ammunition Supply and Expenditure ANZAC Gallipoli 1915”, AWM25 21/2
78 Bean, II: *The Story of Anzac*, pp. 153, 250, 201, 810
79 “Machinegun notes”, AWM25 385/5
80 *Field Service Regulations*, p. 17
thirty men a day. The 2nd Field Company constructed a series of traverses of sandbags and sand filled boxes 1.5 metres thick, alternately on the left and right side of the Valley. Stretches between were camouflaged with brushwood hanging from wires, but the route was still very dangerous. On 15 May, a sniper shot Major General Bridges in Monash Valley, severing his femoral artery and vein. Despite prompt first aid he died on board the hospital ship Gascon on 18 May. On 19 May, Private J.S. Kirkpatrick of the 3rd Field Ambulance, better known as "Simpson", was shot at the same place and killed instantly.81

A communication trench was dug the length of the valley but even before it was complete, another solution to the problem was at hand. Colonel H. G. Chauvel organised the snipers in Monash Valley. Working in pairs with an observer who watched an assigned sector with a telescope and a sniper who lay nearby with his rifle, the snipers achieved a complete ascendancy over their Turkish counterparts. One sniper, Private W. E. Sing, was credited with shooting 250 Turks.82 The enemy snipers became quiet, resorting to blind harassing fire at night, when they could not be located.

In the final months of the campaign the ANZAC snipers were provided with two more technologies that made them even deadlier: the telescope rifle and the silencer. The former increased their already high accuracy, while the latter made it more difficult for the Turk to spot a sniper. A local invention was the Wallaby sniping cage, a device for locking a rifle in place. Once a sniper had fired a shot into a fixed target like a loophole, he could lock the rifle in place and then fire another shot at the exact same spot, without taking aim.83

The sniper problem led to another device being produced locally, the periscope. The need for this device became apparent early, the original method of observing the enemy's lines by raising one's head over the parapet proving extremely dangerous. The 2nd Field Company began making periscopes on 27 April and, by the end of May, over 3,000 had been produced.84 The periscopes were very simple: two pieces of mirror on a piece of wood.85 The top one would be held above the parapet and the observer could watch through the bottom one.

81 Bean, II: The Story of Anzac, pp.86-87, 127-129; Lawrence, The Gallipoli Diary of Sergeant Lawrence, p. 143
82 Bean, C.E.W. and Gullett, H. S., The Official History of Australia in the War of 1914-1918. Volume XII: The Photographic Record of the War, Sydney, Angus and Robertson, 1938, plate 91
83 Bean, II: The Story of Anzac, p. 811
84 Daily Summary, HQ 1st Division Engineers, 30 May 1915, AWM25 367/184; Bean, II: The Story of Anzac, p. 358
85 Lawrence The Gallipoli Diary of Sergeant Lawrence, p. 21
Loss and breakage rates were high because the periscopes themselves became targets for snipers. In July the 1st Division was losing 30 periscopes a day and division headquarters appealed for the return of wooden parts of damaged periscopes. The men learned not to expose them for more than a few seconds as this could result not only in the loss of the periscope but serious eye injuries from glass splinters. On 14 May, Birdwood himself was struck by a bullet while looking through a periscope and knocked senseless. Once Jam Tin bombs became plentiful, the Australians started responding to a periscope with a bomb, a practice that ended the use of Turkish periscopes within bombing range.

The Turks tried to avoid location by camouflaging the periscopes to look like part of the sandbag parapet but it did not fool the snipers. They tried smaller mirrors and mirrors on slender sticks to prevent acquisition, but hit they still were. Metal casings failed to stop destruction of the periscope. Fake periscopes had more success. This stratagem involved getting the snipers to shoot at a fake while a real periscope elsewhere located the snipers, who soon learned to leave the decoys alone.

A further refinement, the periscope rifle, was invented by Lance Corporal W.C.B. Beech of the 2nd Infantry Battalion. A staff officer from division headquarters, Major T.A. Blamey, saw one in use on 19 May near Lone Pine, was impressed by its potential, and had Beech set up a factory on the beach to manufacture periscope rifles. The periscope rifle restored firepower to those posts where one dared not show one's face through a loophole, let alone one's head over the parapet. The Turks copied the weapon, although they did not make as much use of it.

The widespread improvisation of items was a symptom of a larger problem with the supply system at Gallipoli. The whole campaign was characterised by scarcity of resources caused by shortages and incompetent administration. Official correspondent C.E.W. Bean noted that:

> There existed a tradition - largely inherited from the old professional army - that the best quartermaster was one who, by slyness in manoeuvring within the regulations, could obtain for his unit more than its fair share.

86 "Routine Orders - Divisional Orders - 1915", AWM25 707/3
87 GOC 1st Division, "Operation Memorandum No. 5", 7 June 1915, AWM25 367/13
88 Hamilton Gallipoli Diary, 1, p. 228-229
89 Bean, II: The Story of Anzac, p. 253, 285-286
90 Bean, II: The Story of Anzac, pp. 250-251
91 Bean, II: The Story of Anzac, pp. 82-83, 361
This practice is known as scrounging. Given the general atmosphere of scarcity, it should hardly come as a surprise that units scrounged, hoarded supplies, cannibalised equipment, stole from dumps and other units and even traded with the enemy.92

During the landing, the assault troops carried "iron rations": a bag of biscuits, tin of bully beef, and some tea and sugar. Thereafter, rations were delivered from supply ships to the 1st and 2nd Depot Units of Supply on the beach. The British Army's standard ration was used, which was not well suited to a hot climate and to Australian tastes was monotonous, salty and lacking in fresh fruits, meat and vegetables. In Egypt Australians had supplemented their rations with local purchases but this was impossible at Anzac although from 9 June the 1st Field Bakery supplied fresh bread from Imbros that was gratefully consumed. Although adequate in calories, the ration was deficient in vitamins B1 (Thiamine) and C, resulting in cases of beriberi and scurvy respectively.93

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<th>Army Standard Ration - Anzac 191594</th>
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<td>Preserved Meat</td>
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Fresh water was also a problem at Gallipoli. For the assault, water was supplied in petrol tins. By the second day sappers had sunk 20 shallow wells yielding 90,000 litres per day. During June the wells started to dry up and had to be supplemented by barges from Egypt which could be delayed by weather or enemy action, one being

94 "Routine Orders - Divisional Orders - 1915", AWM25 707/3
sunk on 22 June.95 The Field Service Regulations set one gallon (4.5 litres) per man per day as being sufficient for cooking and drinking, but even this was not met.96 At Quinn's Post, men received a third of it, at Pope's only a quarter. In July steel tanks were constructed and water piped to them from water lighters lying off beach but the pumping engine was old and unreliable. Problems continued to the end. On 8 October the pipes were damaged by a storm and on 30 November they froze and burst.97

A major project for improving the supply situation at Anzac was the construction of Watson's Pier, undertaken by the 1st Signal and 2nd Field Companies. Seventy metres long and 5 metres wide, the first nine bays were trestled and the remainder on piles. An unexploded Turkish 8 inch shell was emptied, refilled with shrapnel balls and used as a drop hammer in an improvised pile driver. The pier was completed on 27 June and was followed by four more. The piers allowed tugs to relieve steamboats of some of their work, but due to the fire of the Olive Grove Guns, only small craft could use the piers, and only by night.98

The other major logistical difficulty at Gallipoli concerned the medical arrangements. The MEF General Staff made inadequate provision for the numbers of casualties expected and failed to coordinate adequately evacuation arrangements. This debacle exposed some serious doctrinal problems. Medical arrangements were in the hands of the General or Administrative Staff. Indeed, ANZAC headquarters had no medical officer. For formations that did, it was unclear whether they were in charge of medical arrangements or merely to advise on them. Another problem, reflected in the organisation of medical units, was that British medical doctrine did not adequately address triage - the sorting of the wounded. Thus, hospital ships ("white ships") received many lightly wounded cases while too many seriously wounded cases were put on board transports ("black ships") which lacked the facilities to care for them.

However, the most serious medical problem of the campaign was that of sanitation and disease control. Shallow pit latrines as specified in the Field Service Regulations proved inadequate, and its warning about the danger of flies was ignored.99 Animal manure pits provided an excellent breeding ground for flies and by June Anzac was the centre of a fly plague. Due to the water shortage, mess tins frequently went unwashed. The packaging of the tinned rations, such as jam, also contributed. This set

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95 Captain C.G. Dix, "Anzac: Impressions of the landing and 14 weeks on the beach", undated, AWM25 367/5
96 Field Service Regulations, p. 70
99 Field Service Regulations, pp. 71, 73
up a cycle whereby flies conveyed disease from the latrines to the men, who returned it back again. The result was a spectacular sickness rate. By September, 7.5 per cent of men at Anzac were being evacuated sick each week. The average stay in hospital was 52 days for the wounded, 46 days for dysentery and 29 for all sicknesses. Of the men still holding the trenches, 77 per cent were emaciated, 78 per cent had diarrhoea and 64 per cent had skin ulcers, known to the diggers as "Barcoo rot".100 Efforts to combat the problem by installing fly proof latrines were not complete until November by which time the problem had eased because the weather had become too cold for flies.101

Thus, the Gallipoli campaign was a logistical nightmare. There were also major tactical difficulties as well. Major and minor attacks at Gallipoli tended to confirm the inadequacy of offensive technology and tactics at the time.

One of the first of these after the landing was at Krithia on 8 May. The 2nd Infantry Brigade made a daylight advance under fire. As on 25 April, the British command favoured a daylight attack over a night one. In this they were simply going by the book, which said that:

A night attack may be justified as the only possible solution of a difficult situation, but when the conditions of the fire fight are likely to be favourable it will probably be better to accept the inevitable casualties that must result from a struggle for fire supremacy in preference to the undoubted hazards of a night attack.102

The chief lesson of this Australian version of the Charge of the Light Brigade was that such advances should be carried out at night when the enemy's capacity for location is diminished. A secondary lesson was the value of adequate preparation. The tactical issue, though, was that the offensive posture was under the prevailing conditions demonstrably inferior to the defensive even where there was manoeuvre room. At Krithia and even more spectacularly at the Nek in August, where two regiments of light horse were annihilated in an ill-advised charge, bravery served merely to run up a higher death toll.

On 19 May, von Sanders launched a major counterattack. He assembled 42,000 men to attack what he correctly estimated to be 15-20,000 Anzacs. His artillery was weak and ammunition short, so he relied on surprise. This was not achieved. The arrival of a fresh division was noted by the aviators even as it disembarked and it was bombed

100 Memoir of Corporal C. Smith, undated, AWM 2DRL0030, p. 22; Butler, I: Gallipoli, Palestine and New Guinea, pp. 228-240, 346-358, 375
101 AA&QMG 1st Division, "Operation Memorandum No. 6", 19 November 1915, AWM25 367/13
102 Field Service Regulations p. 163. Emphasis original.
that afternoon. Word was passed down to the 1st Division.\textsuperscript{103} The result was one of the most one-sided battles in Australian history: 10,000 Turks killed or wounded while Australian casualties were 160 killed and 468 wounded. During the night 18 pounders expended 1,361 rounds, the howitzers 143, mountain guns 1,410 but the real damage was done by the rifles and machine guns, which fired 948,000 rounds.\textsuperscript{104} Such an enormous expenditure of ammunition relative to the number of casualties inflicted on the enemy was to become a feature of the new form of warfare.

A key part of the August Offensive was the attack on Lone Pine on 6 August. This attack was larger, more ambitious and more carefully planned than previous assaults. Maps of the enemy trenches were constructed from aerial photographs. A three day artillery bombardment was intended to cut barbed wire and damage the trenches but due to the shortage of shells only 28 guns were actually shelling Lone Pine, at most eight of them at any given time. However, the bombardment was surprisingly effective because the trenches were overcrowded in anticipation of the Australian attack and the overhead cover for protection against grenades and mortars increased the effect of howitzer shells.

The infantry attacked in waves from "secret saps" and the front fire trenches. Some units occupied the first Turkish trenches they came to while others pushed on to their final objective. The key role of Jam Tin bombs was recognised and a large supply taken, but not enough. Their use was not taught to reinforcements in Australia or Egypt and only 10 men per company were trained as bomb throwers.\textsuperscript{105} Three communications trenches were dug during the night that allowed prisoners and casualties to be evacuated and the position reinforced after dawn. The 4th Infantry Battalion sent its machine guns forward. Three were lost crossing No Man's Land but one opened on a communications trench packed with enemy troops, firing 700 rounds before it was silenced by a Turkish field gun. Turkish counterattacks caused heavy casualties due to overcrowding of the trenches, since a single bomb could take out an entire bay.\textsuperscript{106}

The attack at Lone Pine cost the Turks 7,000 and the Australians 2,267 casualties. There was no technological difference between the Australian and Turkish Armies; both were equipped on a similar scale, with similar weapons. Based upon the battles

\begin{itemize}
\item War Diary of GS 1st Division, dated 18 May 1915, AWM4 1/42/1 Microfilm Roll 803
\item von Sanders, Liman, \textit{Five Years in Turkey}, Annapolis, Maryland, United States Naval Institute, 1927, pp. 71, 76; Bean, II: \textit{The Story of Anzac}, pp. 134-138, 162; Jones, \textit{The War in the Air}, Volume II, p. 28
\item GOC 1st Division, "Operation Memorandum No. 6", 8 June 1915, AWM25 367/13
\item Bean, II: \textit{The Story of Anzac}, pp. 514-515, 531-532, 539, 556
\end{itemize}
of 19 May 1915 and Lone Pine - chosen on the basis of the availability of casualty information for both sides - a clear qualitative difference in effectiveness existed between the two sides, of about 4:1 in favour of the Australians. As to the problem of carrying through an attack under trench warfare conditions, it was clear that unless new technics and technologies were developed, trench warfare was going to be very costly and protracted.

Bulgaria's entry into the war on 14 October 1915 on the side of Germany and Austria opened land communications between them and Turkey. The first troops to arrive from Central Europe were an Austrian 24cm mortar battery on 15 November while the arrival of ammunition from Germany was first felt during an intense bombardment of the Lone Pine position on 29 November 1915. As the Anzac position had no depth, it seemed probable that overwhelming artillery fire, with or without an attack, would render the position untenable.

The evacuation of Anzac was the most thoroughly and carefully planned operation of the entire campaign and by far the most successful. An elaborate deception plan prevented the enemy from realising that anything was amiss until the mines were exploded. Turkish units then occupied the craters and some Turks entered the Australian trenches to find them empty. Only at this point did the Turks discover the evacuation. Many tacticians then and since have pondered what the Turks could have done had they discovered that an evacuation was in progress. The defence of a position was no longer to be measured in men but in bullets and shells and right up until the last minute the firepower of the forward trenches was undiminished. The best response would have been to disrupt the evacuation by bombarding the beaches.

Gallipoli had been a school of modern warfare. New technologies had been introduced but none on a scale sufficient to have a major impact. Technics therefore continued to lag behind. Much had been learned but some things had not been learned well enough and much remained to be learned. In particular, despite Lone Pine, there were still no technics that could guarantee a successful attack on a fortified position. Next, would come the University of the Western Front.

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107 This is crudely calculated using casualties inflicted as the defender, on the grounds that it is less distorted by the effect of entrenchments. On 19 May, 20,000 Australians inflicted some 10,000 Turkish casualties, giving a ratio of 0.5. At Lone Pine, 20,000 Turks inflicted some 2,200 Australian casualties, giving a ratio of 0.11. 0.5/0.11 = approximately 4.5. A similar but slightly lower result is obtained from DuPuy's Quantum Judgemental Model as described in DuPuy, *Attrition*. This is understandable as it too is derived from casualty ratios and most of the other factors this more complex model incorporates fall to around 1. Casualty ratios tend to be a fair measure of effectiveness and have a high correlation with other metrics. Chapter 8 contains some examples of these. That the Australians were more effective than the Turks is apparent; it is only the magnitude of this difference that is questionable.

108 Liman von Sanders, *Five Years in Turkey*, p. 96; Bean, II: *The Story of Anzac*, pp. 848-850
3. The Western Front

On return to Egypt after the Gallipoli campaign, the AIF underwent a major reorganisation prior to moving to join the British Expeditionary Force (BEF) on the Western Front. At this stage, ANZAC consisted of three divisions: the original 1st Division, the New Zealand and Australian Division, and the 2nd Division, which had taken part in the latter phases of the campaign. This force would now be doubled in size. Three new infantry divisions would be formed, the 3rd Division in Australia and the 4th and 5th in Egypt. The 1st, 2nd and 3rd Light Horse Brigades and New Zealand Mounted Rifles Brigade were consolidated to form an Anzac Mounted Division and the other New Zealand elements used to form a New Zealand Division. Another corps headquarters was raised and the two became I and II Anzac Corps, under the command of Lieutenant Generals Sir W.R. Birdwood and Sir A.J. Godley respectively. At this stage of the war, a corps normally consisted of three divisions.

To form the 4th and 5th Divisions, the original sixteen infantry battalions were split in two to create sixteen new battalions for four more brigades. All eight brigades were then brought up to strength with reinforcements from the depot in Cairo. The 4th Infantry Brigade (from the New Zealand and Australian Division) was assigned to the 4th Division and the 8th Infantry Brigade to the 5th Division. In this way, the infantry of the new divisions instantly became as experienced as that of the 1st Division. The most experienced division now became the 2nd Division, to which this reorganisation did not apply.\(^1\)

At the same time, the establishment of the divisions was altered to conform to the "New Armies" establishment of British divisions on the Western Front. This involved the creation of some new types of units. The largest of these were the pioneer battalions, one per division, organised along the same lines as infantry battalions. They were intended to carry out mundane construction tasks such as digging trenches and repairing roads, which did not require special engineering expertise or equipment. In practice, the Pioneer Battalions were often expected to perform the duties of engineer units. In a pinch, they could also be used as infantry and were, notably during the campaigns of 1918. To provide a kernel of tradesmen for each battalion, Birdwood intended to break up the Mining Corps, a special unit raised for underground warfare.\(^2\) The Department of

\(^1\) "Organisation of Fourth and Fifth Divisions", Australian Archives CRS B539 AIF264/1/176
\(^2\) Cable, Governor General to Secretary of State for Colonies, 8 September 1915, Australian Archives CRS B539 AIF143/2/1
Defence refused permission for this and tradesmen were transferred from infantry units instead.³

Birdwood intended to make two departures from the New Armies establishment. The first was that the artillery would remain on the old establishment of three brigades each of three batteries of four 18 pounders, as in the 1st and 2nd Divisions. The British War Office did not agree with this and ordered full conformance with the New Armies establishment of three brigades of four batteries of four 18 pounders and a brigade of three batteries of 4.5 inch howitzers.⁴ This meant expanding the field artillery of the AIF from 18 batteries to 75. Priority was given to getting the 1st and 2nd Divisions ready, leaving the artillery of the 4th and 5th Divisions, composed mainly of former infantry and light horse reinforcements, dangerously inexperienced. Live shoots were conducted before leaving for France, all 18 pounder batteries firing 150 rounds and all howitzer batteries firing 120.⁵ Shortly after arriving on the Western Front, the artillery was reorganised, with the howitzer batteries being redistributed so that each division had three brigades of 12 guns and 4 howitzers and one with 12 guns only.

The second variation was for each division to have a regiment of light horse rather than a squadron. The immediate result was that the 11th and 12th Light Horse Regiments were reformed at Heliopolis,⁶ but in the end this change too was dropped and the 4th and 5th Divisions were each assigned a squadron of the 13th Light Horse Regiment instead. Shortly after I Anzac Corps arrived on the Western Front, the divisional light horse squadrons were consolidated to form a corps mounted regiment, the 1st Anzac Mounted Regiment, consisting of a squadron each from the 4th and 13th Light Horse Regiments and the New Zealand Otago Mounted Rifles. When II Anzac Corps was ordered to France, the opportunity was taken to reform the 13th Light Horse Regiment. The headquarters and machine gun sections were reformed at Tel El Kebir and accompanied the 5th Division to France.⁷ A 2nd Anzac Mounted Regiment was formed for II Anzac Corps, with B and D Squadrons of the 4th Light Horse Regiment. The cyclists too were consolidated to form the 1st and 2nd Anzac Cyclist Battalions. This change was made in anticipation of a breakthrough into open country, which would provide scope for the deployment of mounted troops.

³ Cable, GOC AIF to DOD 11 March 1916, Australian Archives CRS B539 AIF24/7/2
⁴ Cable, GOC AIF to DOD 6 March 1916, Australian Archives CRS B539 AIF24/7/2
⁵ "Extracts from GHQ MEF file no GS113. Australian and New Zealand Formations Egypt 1916", AWM45 31/3
⁶ BG DA&QMG ANZAC, 24 February 1917, AWM25 455/30
⁷ War Office to DOD, 15 May 1916, Australian Archives CRS B539 AIF264/1/233
Each infantry brigade now had a machine gun company, formed from the four battalion machine gun sections in the brigade. These were reequipped with 16 new Vickers machine guns. The Vickers was the British Navy's redesign of the Maxim and involved turning the toggle upside down and the lightening of various parts by judicious calculation of stresses and the substitution of lighter materials. Water-cooled, it weighed 18 kg, 40 per cent less than the Maxim, and could fire 450 to 550 rounds per minute. Vickers eventually managed to increase production to 1000 guns per week.8

The infantry battalions reformed their machine gun sections, which were in turn given four Lewis guns each. The Lewis gun was invented by an American, Samuel MacLean, and developed by two other Americans, O.M. Lissak and I. N. Lewis. It weighed 12.7 kg and had a cyclic rate of fire of 500-600 rounds per minute. It was ingeniously air cooled, using the gas blast to set up air currents and aluminium components to dissipate heat. Notably, it could be disassembled with the one item guaranteed to be available: a .303 cartridge. The British Army adopted the Lewis gun as an aircraft observers' gun in August 1914 and as a ground gun in November 1914. Some infantrymen were not entirely impressed with the new weapon. The 47 round drum magazine could be fired off in seconds and the 2 kg drums were awkward and, round for round, heavier than the Maxim's 250 round belts. The tactical implications of a lighter weapon would gradually become apparent. What was more important for the moment was that a Lewis gun could be made for one fifth of the time and materials of a Vickers by the Birmingham Small Arms Company, which increased production from 30 per week in 1914 to 2,000 per week in 1918, or by the Savage Arms Company in Utica, New York, which produced 400 per week in 1917 and 1,200 per week in October 1918.9

The use of jam tin bombs was discontinued and the diggers were informed that materials for constructing them would no longer be supplied. Henceforth, the Mills Grenade would be the standard grenade of the AIF.10 This weapon was invented by Belgian Captain Leon Roland and developed by a British Engineer, William Mills. The Mills grenade was egg shaped, about 10 cm long and 20 cm in circumference. Releasing a lever that holds a spring-loaded hammer in place inside activates the bomb. The hammer strikes a detonating cap, which sets off a fuse that, after a 5 second time interval, sets off the detonator. The rest of the inside is filled with ammonal and this explodes, shattering the chocolate bar shaped 5 mm steel casing. A ring pull pin is provided as a safety

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10 QMG I ANZAC, QMG Staff Circular No. 1, "SAA, Grenades and Trench Mortar Ammunition", 23 April 1916, AWM25 21/10
device. Pulling the pin does not activate the grenade; only releasing the lever does that. Most of the development effort went into improving the reliability and safety of the weapon, which caused large numbers of fatal accidents in its early days.11 Australian soldiers had mixed experiences with small numbers of early models of the Mills in the latter part of the Gallipoli campaign, one digger taking his complaints direct to Birdwood and almost killing them both when the grenade duly exploded as designed.12 By mid-1916 the weapon had become both more reliable and more easily manufactured. The diggers were fascinated by the weapon and frequently attempted to take it with them on leave. Some Gallipoli hands, accustomed to shortages, were apprehensive about the fact that bomb making materials would no longer be issued. Fears about availability proved groundless, the weekly supply of Mills bombs to the Western Front rising to 1.4 million during 1916.13

Trench Mortar Units (1916)14

<table>
<thead>
<tr>
<th></th>
<th>Officers</th>
<th>Other Ranks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Trench Mortar Battery</td>
<td>4</td>
<td>46</td>
<td>50</td>
</tr>
<tr>
<td>Medium Trench Mortar Battery</td>
<td>2</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>Heavy Trench Mortar Battery</td>
<td>3</td>
<td>66</td>
<td>69</td>
</tr>
</tbody>
</table>

Another source of firepower available to the infantry on the Western Front was the trench mortar, which occupied a niche between bombs and artillery. On arrival on the Western Front, each infantry brigade of the 1st and 2nd Divisions was ordered to create two 25-man light trench mortar batteries, which were initially armed with four of the old 3.7 or 4 inch mortars. But a better weapon was at hand: the 3 inch Stokes mortar. Named for its inventor, British engineer F. William Stokes, the weapon consisted of a smooth bore barrel, round base plate and a bipod. To operate, one removed the safety pin and dropped the bomb down the muzzle. Because it was simple and cheap to make, it could be mass-produced by firms with little or no experience in munitions.15 It was capable of firing 6 rounds per minute or more, but BEF General Headquarters (GHQ) ordered that the rate of fire of the older mortars not be exceeded except under special circumstances so as to preserve this secret for as long as possible. The Stokes could be broken down and carried, but the barrel weighed 22 kg. Each division received a couple

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14 "Establishments - Divisional Headquarters", AWM25 327/3
in April and by June the supply was sufficient to allow light trench mortar batteries to re-equip completely with the Stokes. At the same time, the two batteries were amalgamated to form a single eight gun light trench mortar battery.\textsuperscript{16}

Characteristics of Trench Mortars (1916-18)\textsuperscript{17}

<table>
<thead>
<tr>
<th>Mortar</th>
<th>Bomb Weight (kg)</th>
<th>Charge Weight (kg)</th>
<th>Range (minimum) (metres)</th>
<th>Range (maximum) (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inch Stokes</td>
<td>5</td>
<td>1.1</td>
<td>155</td>
<td>395</td>
</tr>
<tr>
<td>6 inch Newton</td>
<td>23</td>
<td>4.5</td>
<td>60</td>
<td>460</td>
</tr>
<tr>
<td>2 inch Vickers</td>
<td>23</td>
<td>5.7</td>
<td>90</td>
<td>524</td>
</tr>
<tr>
<td>9.45 inch &quot;Flying Pig&quot;</td>
<td>69</td>
<td>27.2</td>
<td>460</td>
<td>950</td>
</tr>
</tbody>
</table>

Each division also created three medium trench mortar batteries. These were manned by artillerymen (although the rank and file were transferred from the infantry), under the control of the Division Trench Mortar Officer (DTMO), who in turn reported to the Brigadier General, Royal Artillery (BGRA). Medium batteries were equipped with four 2 inch Vickers "Plum Pudding" or "Toffee Apple" spigot mortars. In June, each division also formed a heavy battery were equipped with four 9.45 inch mortars, known as "Flying Pigs" after the size of their round, which was roughly the size of a small pig.

I Anzac Corps, consisting of the 1st and 2nd Divisions and the New Zealand Division, moved into the line in April 1916, occupying the Armentieres sector just south of the border between France and Belgium. This sector was known as the "nursery" because both sides used it to train units new to the Western Front. The Anzacs travelled by ship from Alexandria to Marseilles, luckily avoiding loss to U-boats although one ship was torpedoed and sunk on the way back. From there they took the train to their railhead and trucks or buses to within a few miles of the front line, and made their way to the trenches on foot in groups too small to draw German artillery fire.

The 1st Division indented for 14,000 helmets immediately upon arrival in France and all troops in the front line area were issued with them, although several months would pass

\textsuperscript{16} GS I ANZAC, GS Circular No. 2, "Circular Memorandum and Notes on Trench Mortar Batteries - 1916", 16 April 1916, AWM25 973/2;

\textsuperscript{17} GS 2nd Division, "Instructions regarding the use of Light Trench Mortars", 25 May 1916, AWM25 973/4

Commandant of the Trench Mortar School, "Syllabus of Lectures to Senior Officers ", 1917, AWM25 973/48
before every Australian soldier had one. Helmets and armour had been standard military equipment since ancient times but had gone out of fashion during the early modern period. This is conventionally attributed to improvements in firearm technology but this is only partly true. The main reasons for the move away from armour were tactical: increasing the mobility of armies by reducing their weight. In 1915 the French army introduced the Adrien helmet which, despite its flaws, was credited with reducing casualties by between 2 and 5 per cent. The British followed suit the next year, adopting a design notable for its ease of manufacture, since it could be pressed cold out of a 720g sheet of manganese steel that could stop a bullet travelling at 250 metres per second. However, the helmet was heavy and uncomfortable because the leather and felt liner did not follow the shape of the head and it did not protect the back of the head or the neck. Some 70,000 tonnes of steel went into the manufacture of between 7 and 8 million of these helmets, which were adopted by all English speaking armies. Some 50,000 suits of body armour were also produced from manganese steel. Body armour being heavy, its use was restricted to trench duties for relatively immobile jobs, such as snipers and observers.

When the 1st Division arrived, it was reunited with its mechanical transport. Back in September 1914, the Army had decided to supply mechanical transport for the 1st Division by activating the 8th Service Company in New South Wales as an ammunition sub-park and the 9th Service Company in Victoria as a supply column. These were the first ever mechanical transport units in the Australian Army. Some 135 trucks and 35 other vehicles were purchased and the two units departed Melbourne for Egypt on 22 December 1914. Unfortunately, vehicles over 5 tons were prohibited in Cairo as most bridges could not hold their weight, whereas the companies possessed vehicles weighing up to 7 tons. It was therefore arranged for them to proceed to England where they arrived on 15 February 1915. There they lived in tents on Salisbury Plain and hauled gravel for roads before being alerted for service in France in June 1915. As spare parts for some of the vehicles they had brought from Australia were hard to obtain, they

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19 Dyer, *War*, p. 61
21 DMTS AIF, "Motor Transport Board's Report", 18 May 1915, Australian Archives CRS B539 AIF378/2/552
22 Telegrams, War Office to GOC Egypt dated 29 December 1914, GOC Egypt to GOC ANZAC dated 1 January 1915, War Office to GOC Egypt dated 17 January 1915, AWM4 1/28/13 Microfilm Roll 783
23 The truck drivers were not the first Australians to serve in France, although they were the first units of the AIF. An Australian Volunteer Hospital had been formed in England in August 1914 from Australian expatriates. All medical practitioners in the unit were Australians and although women were not allowed to serve as doctors, Australian nurses were gratefully accepted. The unit left for France in August 1914 and from October was based at Wimereux, where the 2nd General Hospital joined it in June 1916. In July 1916, the Australian Volunteer Hospital was absorbed into the British Army. See Ray, Pam, "A Photographic Record of an Australian Nursing Sister", *Journal of the Australian War Memorial* No. 18, July 1991, pp. 63-65
exchanged them for standard types on 10 June; 87 Peerless 3 ton trucks for the 8th Service Company and 46 Peerless 3 ton trucks and 14 Daimler 30 cwt trucks for the 9th Service Company.24

Another group of Australians had arrived in France in advance of I Anzac. In June 1915, the 1st Siege Artillery Brigade was formed under the command of Lieutenant Colonel W. A. Coxen, the Australian Army's Director of Artillery, for service on the Western Front.25 About half the men in the unit were permanent gunners of the Garrison Artillery.26 The brigade departed Melbourne for England on 17 July 1915 and landed in France on 27 February 1916.27 The delay in England was necessitated because heavy artillery pieces were in short supply. Eventually the 54th Siege Battery was equipped with 8 inch howitzers and the 55th Siege Battery with 9.2 inch howitzers. An emergency response to the need for more long range artillery, early model 8 inch howitzers were adaptations of naval guns. Later models were purpose built by Vickers and fired a 90.7 kg shell up to 9,600 metres. The largest artillery piece ever operated by the Australian Army, the 9.2 inch howitzer was also one of the most unusual. Weighing in at a hefty 16.5 tonnes, it could fire a 132 kg shell up to 12,740 metres. Its carriage bed consisted of two large rectangular box girders. To prevent the gun lifting, a box on the front of the carriage had to be filled with at least 9 tonnes of dirt. It was transported broken up into three loads, hauled by caterpillar tractors. A notable feature was the air recuperator, which later became standard on most guns.28

Due to the low-lying nature of the ground around Armentieres, elaborate drainage was required. Extensive use was made of duckboards, 2 metre long ladder-like wooden footways consisting of two beams with boards nailed to them. These were often set upon pairs of "A frames", wooden frames shaped like an inverted letter "A". This allowed water to drain away beneath the duckboards. The parapets of the fire trenches were 3 to 4 metres wide and built high, so that much of the trench was above ground level. Beyond the parapet lay the wire entanglements, listening posts and No Man's Land. The Anzacs were disappointed with the condition and quality of the trenches but impressed with the cornucopia of trench stores like barbed wire, sandbags, timber, iron "cork screw" posts for hanging barbed wire on and thick corrugated iron sheets known as

25 DOD order 3 June 1915, Australian Archives CRS B539 AIF24/4/59
26 Horner, The Gunners, pp. 81-82
27 "The Australian Siege Brigade in the Great War", AWM224 MSS686
28 Gower, Guns of the Regiment, pp. 54-55, 172-177
"elephant iron" for constructing shelters. Tramways had been constructed to bring stores forward and fresh water was piped direct to the trenches.29

Special positions were provided for snipers. In Egypt, each battalion had formed a thirty-man scout platoon under the command of the battalion intelligence officer. These men were hand picked, the selection guideline calling for men who were country bred, intelligent and well educated, first class shots and of good physique. The whole platoon was equipped with telescope rifles. They were exempt from fatigues and carried out the sniping, observing and patrolling tasks, leaving the ordinary infantryman with little to do. The Australian soldier did not agree with this arrangement and all were soon on the lookout for targets. To cope with this, it was found necessary to construct additional loopholes and upgrade the existing ones. The German sniper, equipped with armour piercing bullets with a solid steel core for dealing with inadequately protected loopholes, was initially "top dog". Although the Australian sniper soon asserted himself, no supremacy of the kind achieved over the Turkish snipers at Anzac was ever attained.30

At Anzac, patrolling had been largely the responsibility of the light horse and confined to the flanks and the area captured around Suvla in the August offensive but because No Man's land was much wider on the Western Front, there was more scope for patrolling. Patrols from both sides were active after dark, reconnoitring enemy positions and inspecting the condition of their own and the enemy's barbed wire. Initially the Germans had the advantage of local knowledge and small unit experience, and the Australian patrols were comparatively few and timid. As they became more experienced, however, the Australian scouts became more aggressive and began cutting off German patrols and attacking them. As with sniping, the digger was unwilling to leave the job to the specialists, six man detachments of the scout platoon. In an effort to capture a German prisoner in May the 6th Infantry Battalion had up to 100 men in No Man's Land nightly. As at Gallipoli, the Australian soldier preferred not to use flares or illumination at night. The Germans on the other hand made extensive use of flares and firing one was often their first reaction to sighting a patrol. Because the flare was moving it produced moving shadows, so if a patrol lay very still it could still escape detection. The Germans also made use of searchlights. If caught by one, a digger had little option but to play dead and hope for the best.31

29 Bean, III: The AIF in France: 1916, pp. 69, 73, 97-99, 104, 128
Each battalion formed a bombing platoon of 33 men from graduates of a short bombing course, under the command of an officer. In France, training courses were conducted on all manner of technologies and technics. Each company had an equal number of trained bombers, and increasingly these too were organised as a bombing platoon. Gradually the number of bombers was increased to 128 per battalion, or 8 per platoon.\(^\text{32}\) The Mills also came in a rifle grenade version. This consisted of a Mills on a rod which was inserted into the rifle barrel and fired with a blank cartridge. It became increasingly popular but initially only the bombers were trained to use it. On 14 June 1916, Australian bombers fired 30 rifle grenades in order to provoke German mine throwers into retaliating and thereby giving away their position.\(^\text{33}\)

Each battalion also had a Lewis gun platoon. On reaching the Western Front, the number of Lewis guns per battalion was gradually increased to six and then eight. Two Lewis guns were then assigned to each company and the former commander of the battalion machine gun section became the battalion Lewis Gun Officer (LGO), and responsible for the training of Lewis gunners and technical advice on their use to the battalion and company commanders. In July the allocation of Lewis guns was increased to twelve. Normally two would be assigned to each company and the remaining four held as a battalion reserve under the LGO.\(^\text{34}\) Pioneer battalions remained on two Lewis Guns per company "in view of the difficulty experienced by Pioneer battalions in providing trained Lewis Gun detachments owing to the demands on their time". Cyclist Battalions also stayed on two guns per company.\(^\text{35}\)

The administration of the scouting, bombing and Lewis gun platoons was initially informal, with each company contributing a section that lived and took their meals with their company. Gradually, these platoons became permanent. This marked the emergence of the platoon as a tactical unit.\(^\text{36}\)

Unlike on Gallipoli, there was little contact between the miners and the infantry. Systematic destruction of frontline areas by trench mortars and artillery made mining from the front trenches impossible. Instead, long inclines were constructed to allow access to mine systems from the support lines and sometimes even further back and the frontline entrances were sealed up. On 3 August 1916, the Mining Corps was split up

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\(^{32}\) GOC 1st Division, 14 August 1916, AWM26 51/25

\(^{33}\) Bean, III: *The AIF in France: 1916*, p. 104, 210

\(^{34}\) BGGS I Anzac Corps, "Organisation of Lewis Gun Detachments", 31 July 1916, AWM26 50/14; "Lectures (by Military Officers) Machine Guns including Lewis Guns", AWM25 385/4

\(^{35}\) BGGS I Anzac Corps General Staff Circular No. 30, 10 November 1916. AWM26 114/25

\(^{36}\) Rule, E.J., *Jacka's Mob*, Sydney, Angus & Robertson, 1933, p. 87-88

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into three tunnelling companies, which worked different parts of the system. The headquarters company was formed into the Australian Electrical and Mechanical Mining and Boring Company (AEMMBC). The first unit of its kind to serve on the Western Front and one of the most technologically advanced units there, its role was to keep the tunnel systems clear of water and to supply electricity for tools and lighting for the frontline area. It did this with 220 and 440V generators. Even tramways and dugouts were supplied with electric lighting and the services of the "Alphabet Company", as it was colloquially known, were much in demand. From its workshops in Hazebrouck, the company maintained all electrical pumps and generators in the British First and Second Army areas. The company also employed the Wombat boring machine that it had brought from Australia. A giant drill, this device was used for drilling horizontal bores for demolitions and ventilation.

The capability of artillery during the Gallipoli campaign had been severely limited by, amongst other things, shortage of ammunition. This was only partly due to the low priority accorded to the theatre; it also reflected a worldwide shortage. The need for High Explosive (HE) shell had been particularly underestimated because of the assumption that open warfare would prevail, in which shrapnel would be more important. Trench warfare involved far more use of artillery ammunition in general and HE in particular due to the requirement for destruction of trench systems and other field fortifications.

Little TNT had been manufactured in the UK before the war. The standard process of manufacture involved treatment of toluene (methyl benzene) with nitric acid and oleum (a solution of sulphur trioxide in sulphuric acid). The process was not easily scalable and the oleum was imported from Germany. A process for making TNT without oleum was devised by Professor W.R. Hodgkinson at the Woolwich Arsenal, where production began on 17 January 1915. By the end of the war 30 factories in the UK were producing 1,000 tonnes of TNT per week. TNT was poured into a shell in a molten state. As it contracts while it cools, the shell would be two thirds filled and then left to cool until a crust formed. The crust would then be broken and the shell would then be filled up, filling any cavities that had formed.

Amatol was an 80/20 mix of Ammonium Nitrate and TNT which was easier to handle than pure TNT and manufacture in Britain required just 1.5 tonnes of imported materials.
per tonne produced as opposed to 7.5 tonnes per tonne of pure TNT. In testing it was found to be a satisfactory high explosive and it was adopted as the standard shell filling by the BEF in December 1916. Thus, a technological solution was employed on a strategic problem, the shortage of shipping caused by U-boat attacks.

Initially, shells were filled with cold Amatol that was pressed into the required density. This process was fraught with danger, both of explosion and of an unacceptable percentage of dud rounds. A new process was devised in which the shell was filled with hot but not molten Amatol, in which form it could easily and more safely be compressed. At first this was done by hand but an extruding machine was invented to automate the process, leaving behind a neat hole for the tetryl booster.41 In this case, technology was employed to overcome an industrial problem.

While the primary ingredients of Cordite - nitroglycerine, nitrocellulose and vaseline - were readily available in the UK, the same could not be said for acetone, the solvent needed for gelatinising the mixture. Acetone was imported from the United States and was also vital for making the dope used to treat the fabric of aircraft wings. To economise on acetone, a new process was devised which used alcohol, produced by distilleries, as a solvent. As a result, Scotch whisky became scarce in the UK. Here, technology was employed to solve an economic problem. In Australia, the economic situation was different and old processes continued, an acetone factory being established on the Brisbane River to produce it from waste molasses. By June 1918 it was being exported to ammunition factories in India.42

Throughout 1915 and 1916, existing factories were expanded and new ones constructed on an unprecedented scale. There was a growing army of munitions workers: 2,871,000 in the UK alone in 1918, of whom over 6,000 were Australian war workers sent to assist British industry. Some 200 Australian war workers served in France. The full effects, however, would not be felt until 1917. In the meantime, ammunition was being hoarded for the upcoming offensive on the Western Front and was therefore rationed to 3 rounds per gun per day.43

In the event of a German attack, however, company commanders could request artillery support. Artillery arrangements on the Western Front were more orthodox than at Anzac, with each battery assigned to defend a particular sector. The company

41 Crowell and Wilson, The Armies of Industry, pp. 170-172, 184-186; Hartcup, The War of Invention, pp. 45-49
42 Crowell and Wilson, The Armies of Industry, pp. 340-342; Hartcup, The War of Invention, pp. 50-52;
Scott, XI: Australia During the War, pp. 260-261
43 DeWar, The Great Munition Feat 1914-1918, p. 14; Scott, XI: Australia During the War, pp. 265-276;
Bean, III: The AIF in France: 1916, p. 123
commander need only send the message "SOS" and the number of his trench and the artillery would respond with a pre-registered barrage on the enemy trench and other key positions. Response time was reported to division headquarters. By day, artillery observers and flying corps aircraft closely watched the front. At night, the artillery could also be summoned by firing the SOS rocket, a firework made of grey paper with a stick at one end, which burst in a prearranged colour. One problem with this signalling mechanism was that the SOS rocket always seemed to get wet and would not fire half the time. Later a version was provided that was similar to a rifle grenade, and operated in the same way except that it was fired perpendicularly. Another problem was that the Germans often accidentally or deliberately sent up fireworks of the same colour. The Germans solved this problem with a more elaborate firework that changed colours in sequence. I Anzac Corps would not be equipped with a similar technology until January 1917.44

Conditions on the Western Front did not favour visual signalling. The terrain was flat, the weather frequently misty or rainy, and the battlefield often smoky. Dry cell battery powered electric lamps and flashlights were utilised. Large sheets known as Popham Panels were used for communication with aircraft, which would immediately return to an airstrip from which the message could be relayed to the appropriate destination. Smoke was also used to signal aircraft at times. Audible signalling was used for some purposes. Klaxon horns and gongs were used to warn of a gas attack and whistles were used extensively by raiders as a signal to return to the trenches.45

Carrier pigeons were widely used on the Western Front. I Anzac Corps established its own pigeon lofts and a carrier pigeon station was attached to each brigade. Special lightweight message forms were provided but in a pinch anything that could fit into the container attached to the pigeon's leg would do. The advantage of this form of communication was that diagrams and maps could be sent as well as written messages. Pigeons could only be used by day, in reasonably calm weather and - for security reasons - when there was no strong westerly wind blowing. Predators, shellfire and gas were all hazards but pigeons delivered 95 per cent of their messages successfully. At Mouquet Farm, a request for heavy artillery support sent by pigeon was received by the pigeon loft, telephoned to the batteries and acted upon within twenty minutes of the pigeon being released.46

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45 Bean, III: The AIF in France: 1916, pp. 108, 250, 636
46 Bean, III: The AIF in France: 1916, pp. 90, 749; Barker, Signals, pp. 67-68; Crowell and Wilson, The Armies of Industry, pp. 584-586
Sometimes the only other way that messages could be sent was by runner. This was work for heroes:

Yet when, during these barrages, the battalion staff called for a runner, the next messenger on the list would come forward and, receiving his message, climb the dugout stairs and issue in the face of the storm. Fifteen or twenty minutes later, emerging from between the shell bursts which shovelled in the trenches, he might, if he lived, tumble exhausted, strained almost to speechlessness, down the stairs of some headquarters to deliver his message, and then curl himself up in the corner like a dog until he was called upon to return with another communication.47

The most important means of communication was by cable. The requirement for signal wire, or more precisely cable, electric D1 and D3 single, was enormous, exceeding all expectations. The technology was convenient and allowed direct conversation between a commander and subordinate units. However, there were problems with maintenance, especially the vulnerability of the lines to shellfire, with reliability, particularly when inexperienced personnel were involved, and with security. The last was particularly serious since it was found that the line could act as a giant antenna and the enemy could listen in. One solution to this was devised by a British officer, Major A. C. Fuller. Since the alternating current sent out by telephones was so easy to detect, Fuller devised a means of using a weak direct current instead. Known as the Fullerphone, it could be used on the same lines as telephones. The only problem was that there were never enough of them. Some 15,000 sets were eventually supplied to the British and US Armies but for the moment they were still in short supply.48 Roughly from divisional headquarters back, telegraph poles were used to carry the cable. Forward of this, the cables were buried five feet underground. On a typical night's work, each man would dig 3 metres of trench, and later refill it after the cable had been laid by the signal engineers. By the end of June 1916, the 1st Division alone had dug 29 kilometres of trench. Ladder like layouts were used to increase survivability to shelling.49

A feature of the Western Front at this time was trench raids. The first of these had been carried out on the night of 9/10 November 1914 by Indian troops, the 1st and 2nd Battalions of the 39th Garhwal Rifles. The idea gradually spread to other armies. Trench raids were carried out for a multiplicity of purposes: identification of enemy units, distracting the enemy's attention away from other sectors, training new troops, building up offensive spirit, inflicting loss on the enemy, and damaging enemy morale. Only the identification and training reasons seem convincing today, but by May 1916 BEF GHQ

47 Bean, III: *The AIF in France: 1916*, p. 729
49 Bean, III: *The AIF in France: 1916*, p. 129
was requiring a certain number of raids be carried out in each sector as part of a deliberate policy.\textsuperscript{50}

A trench raid was an elaborate affair. The Canadians were regarded as the experts so two Canadian officers were sent to assist in training the Australians. Raiding parties were composed of volunteers, often from two or more units, and each man was assigned a particular role. Replicas of the enemy trenches were constructed from aerial photographs and the raiders rehearsed the assault by day and by night until they could carry it out in silence in the dark. The raiders wore special clothing with badges and other distinguishing marks removed so as not to provide the enemy with identification if they were killed or captured. White armbands were worn to enable the raiders to distinguish themselves from the enemy once the shooting started. Until then, they were covered with black cloth. Faces and hands were blackened. Bayonets were painted black and the raiders wore sand shoes, dyed black. Instead of rifles, many soldiers carried grenades, revolvers or "life preservers" - lumps of four by two with a steel bolt through one end. Whistles and flares were used to signal the moment of withdrawal and tapes were laid to guide the raiders back. A trench raid could be "quiet", entry to the enemy trenches being made in silence, relying on the element of surprise or "noisy", following an artillery barrage. In both cases, an artillery barrage covered the withdrawal. The Australians preferred the silent method, although the first raid was noisy. Even in a noisy raid, the Australian bombardment was shorter than that used by the Germans.\textsuperscript{51}

The first raids on the Anzac front were carried out by the Germans on 5 and 30 May 1916. In both instances, Australian casualties were 131 men while German losses were light, 19 in the first raid and 8 in the second. Both raids followed the same pattern of an annihilating bombardment followed by a German entry into the Australian trenches, protected from neighbouring units by a box barrage. Overcrowding the trenches had caused the excessive casualties. For this, Birdwood and his chief of staff, Brigadier General C.B.B. White, were responsible. They had ordered the trenches held on the scale of Gallipoli but the Turks did not have the same artillery resources as the Germans. Considerable embarrassment was caused in the first raid in that the Germans not only captured two of the new still-secret Stokes mortars but by the fact that the British Second Army Headquarters found out about it from the German daily communiqué.

\textsuperscript{50} Bean, III: The AIF in France: 1916, pp. 257-259, 284-287; Gudmundsson, Bruce I., Stormtroop Tactics, New York, Praeger, 1989, p. 80; Griffith, Battle Tactics of the Western Front, pp. 60-61; Rawling, Surviving Trench Warfare, pp. 47-48

\textsuperscript{51} Bean, III: The AIF in France: 1916, pp. 203, 212, 245, 248; Griffith, Battle Tactics of the Western Front, pp. 61-62
Defensive tactics were revised and commanders were instructed to retire to the flank and to counterattack vigorously when the barrage lifted and the Germans advanced. This proved impossible because the German box barrage prevented any withdrawal to the flanks and did not lift when they advanced but only after they had retired. Thus, no counterattack was possible. The only solution was to reduce the size of the garrison. More disturbing was that the artillery's response was confused by German pyrotechnics, slow, dispersed over too wide an area, failed to suppress the German artillery and caused no German casualties. Like the infantry, it was slow to modify its tactics to the new circumstances, in this case the abundance of ammunition.

Australian raids began on 6 June. In the lead up to the Somme operation, I Anzac Corps was ordered to stage a raid every night from 25 June. Most raids involved 60-70 men but the later raids in the series used entire companies. Enemy trench lines were occupied but rarely for more than 30 minutes. Enemy losses were usually much higher than those of the raiders but the increased activity on the Armentieres front saw Australian casualties climb from 282 in April to 874 in May and 1,228 in June. The Australian artillery allowance was trebled. Many important tactical lessons were learned, particularly concerning the coordination of all arms. Some items used in the early trench raids, such as the sandshoes and knobkerries, were found to be impractical and discarded. As time went by, the enemy became more wary and raids became more difficult but the AIF was well on the way to developing its own techniques. The final raid in the series was conducted by the 4th Brigade of the incoming 4th Division on the night of 2/3 July.52

Some 160 Allied divisions faced about 120 German divisions on the Western Front. The ability to concentrate troops in such enormous numbers depended on a modern industrial transportation infrastructure. Of the British Expeditionary Force's daily requirements, only a few items - mainly coal, timber, bricks, gravel and stone - were procured locally. Everything else had to be shipped in. Australia supplied the AIF’s requirements for clothing, footwear and saddlery. Other war supplies sent from Australia to Europe included beef, lamb, rabbit, pork, butter, condensed milk, canned and dried fruits, wool, wheat, tallow and metals. As the war went on and the shipping situation became critical, Britain was forced to cut imports from Australia drastically. By 1918, AIF reinforcements were disembarking in Italy and taking the train from there to save shipping.53

53 Scott, XI: Australia During the War, pp. 523-545
Six French ports operated by the British handled 96 per cent of the BEF's requirements: Dunkirk, Calais, Dieppe, Boulogne, Rouen and Le Havre, where the AIF's depot units of supply were located. From the ports, supplies moved by rail or barge to regulating points where they were sorted before being forwarded. The supply system might be described as "semiautomatic". Certain supplies for which demand was invariant, such as fodder and rations, were sent daily without requisition in division sized "packs" consisting of two railway trucks of bread, two of groceries, one of meat, four of hay, five of oats and one of petrol, a total of 15 trucks. Each pack was earmarked for a particular division and would be delivered to its railhead. Supplies for which there was variable demand, such as reinforcements, remounts, ammunition and engineering stores, had to be indented, and were sent by the railway truckload. A typical train would consist of 40 trucks: two packs and 10 other trucks. Each division drew its supplies from a single railhead, although it might share it with other divisions.  

Mechanical transport was used for hauling supplies from the railheads to the refilling points, whence the supplies were hauled away by horse transport. Due to the narrow roads through French towns, circular one way traffic routes were preferred. Where there was little enemy air or artillery activity against the lines of communication, forward railheads were used where the railhead was also the refilling point, which reduced handling and wear and tear on both trucks and roads. Control of transport tended to drift to higher levels to provide flexibility and economy. The mechanical transport was reassigned to corps control and the brigade ammunition columns were consolidated with the divisional ammunition columns to economise on horses, whose fodder required scarce shipping space. The resulting division ammunition column had 1,040 horses. The French and Canadians had made a start on construction of tramways to connect forward dumps with refilling points, but this method was still under-utilised by the British Army in mid 1916.  

The war on the Western Front had settled into a stalemate with the Germans on the defensive while seeking a decision against Russia. Allied leaders agreed on a major offensive on the Western Front in 1916. The Australians were originally intended to spearhead the British attack but the month's delay imposed by the reorganisation in Egypt had led to their replacement by British troops. A 40 km sector of the front between the Somme and Ancre Rivers was chosen as the site for the offensive because it was where the British front joined the French, enabling the two allies to attack side by side. Ground in this sector had no strategic value as the Germans could afford to

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55 Henniker, *Transportation on the Western Front*, pp. 149-156
withdraw should a breakthrough occur; destruction of enemy forces was far more important than the capture of any locality. The area was far from an ideal place for a major offensive. The water supply was inadequate and the capacity of the two railway lines that approached the front fell below the estimated requirements. No tramways existed, policy being at the time to put resources into improving and extended the railways. Of course, supplies could be hauled by truck from Arras or Amiens but the area was rural, the main roads not suitable for heavy traffic and stone for road repair was omitted to save rail capacity.56

Huge numbers of troops coupled with the increased frontage that could be covered with modern weapons meant that both sides had more than enough men to cover the entire Western Front from the North Sea to the Swiss border, so there were no gaps or open flanks. Envelopment was therefore impossible; any assault had to be a frontal one. What the British Army desperately needed was tactics for dealing with this situation. Two general approaches to the problem were developed using the *Field Service Regulations* as a philosophical framework.

Reading through the *Field Service Regulations* some British officers concluded that the Western Front was a gigantic siege. For this, the regulations prescribed "a series of independent frontal assaults on a well defined and limited frontage".57 A couple of hours before dark was suggested as the best time for an assault. The storming parties would consist of infantry with fixed bayonets and hand grenades accompanied by carrying parties and engineers. As soon as a position was captured, the attackers would entrench and construct field fortifications with sandbags.58 The *Field Service Regulations* warned that "a bombardment should rarely precede the delivery of the assault except when the course of the previous operations has been such that a bombardment will not serve as a warning to the enemy" and suggested dusk as the best time for an attack.59

The other meme held that the offensive was a battle. For this the *Field Service Regulations* had some interesting advice:

> To concentrate superior power at the decisive point, a portion of the force must be held in readiness to deliver the decisive attack, while the remainder is employed to develop the attack and to wear down the enemy's power of resistance.60

57 *Field Service Regulations*, p. 146
58 *Field Service Regulations*, pp. 147-8
59 *Field Service Regulations*, p. 147
60 *Field Service Regulations*, p. 112
When it came to wearing down the enemy,

*The general principle is that the enemy must be engaged in sufficient strength to pin him to his ground, and to wear down his power of resistance while the force allotted to the decisive attack must be as strong as possible. The higher the fighting qualities of the enemy are estimated, the more closely he must be engaged.* 61

For a general strategy, the Field Service Regulations recommended envelopment, on its great morale effect.62 In general, this was the favoured meme, but the two were not entirely incompatible.

British efforts at developing offensive tactics had not been very successful thus far. The main shift in thinking since 1914 was therefore that while the battle was still seen as beginning with a struggle for superiority of fire and ending with a bayonet assault, now it was entirely up to the artillery to achieve that superiority of fire. At Neuve Chapelle in March 1915, a short but intense artillery bombardment had allowed a British advance of 1,000 metres on a 2,000 metre front at a cost of 12,000 casualties.63 Lieutenant General Sir H.S. Rawlinson commented that,

*The lessons we have learned at Neuve Chapelle are... that it is always possible by careful preparation and adequate artillery support by heavy howitzers to pierce the enemy's line provided that his wire entanglements can be cut by the fire of our field guns, and it can always be so cut if it is visible and not protected by earthworks.* 64

The lesson drawn from this battle by the Germans was somewhat different: the need for shellproof defences in depth. Improved defences showed their value in subsequent offensives in 1915 but the shell shortage led to failures being blamed on inadequate artillery preparation.

The British concentrated 164 battalions against an estimated 32 German battalions, a 5:1 superiority which conventional wisdom held would ensure success. As at Gallipoli, superiority of numbers proved meaningless in the face of the capabilities of modern weapons. The attacking infantry were not wanting in courage or enthusiasm, but such human factors were to little avail so long as they lacked appropriate technologies and tactics.65 In just one day's fighting the British Army lost 60,000 men but it was not so much the enormous casualty list that disturbed the British commanders as the lack of

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61 *Field Service Regulations*, pp. 113-114. Emphasis original.
62 *Field Service Regulations*, p. 112.
64 Letter, Rawlinson to Kitchener, 15 March 1915, Prior and Wilson, *Command on the Western Front*, p. 77
65 Prior and Wilson, *Command on the Western Front*, p. 323
commensurate results. The AIF was originally supposed to spearhead the attack but the reorganisation in Egypt had forced a change of plans. Now it had just three weeks to come up with some answers.

One formation would not even get that. The 5th Division, the last to arrive on the Western Front, having relieved the 4th Division only on 11 July, and the British 61st Division, recently arrived from England, were placed under the command of the British XI Corps and ordered to attack on either side of a concreted complex known as the Sugar Loaf on a 4000 metre front south of Armentieres. Here the width of No Man's Land ranged between 100 metres on the left flank to 400 metres on the right, near the Sugar Loaf. Once the bombardment lifted the Germans could emerge from their dugouts, set up their machine guns and engage the attacking infantry unless they had already reached the trenches, so they advanced in four waves, intending to approach to within 200 metres of the Sugar Loaf five minutes beforehand and then to rush it when the moment it lifted.

Artillery at Fromelles

<table>
<thead>
<tr>
<th>Guns</th>
<th>Number of Guns</th>
<th>Rounds available</th>
<th>kgs per round</th>
<th>Total kgs</th>
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<tr>
<td>18 pounder</td>
<td>210</td>
<td>200,000</td>
<td>8.39</td>
<td>1,677,950</td>
</tr>
<tr>
<td>4.5 inch howitzer</td>
<td>48</td>
<td>15,000</td>
<td>15.87</td>
<td>238,087</td>
</tr>
<tr>
<td>60 pounder</td>
<td>36</td>
<td>4,440</td>
<td>27.21</td>
<td>120,812</td>
</tr>
<tr>
<td>6 inch howitzer</td>
<td>20</td>
<td>180</td>
<td>45.35</td>
<td>8,163</td>
</tr>
<tr>
<td>9.2 inch howitzer</td>
<td>8</td>
<td>30</td>
<td>131.52</td>
<td>3,945</td>
</tr>
<tr>
<td>TOTAL</td>
<td>322</td>
<td>219,650</td>
<td></td>
<td>2,048,958</td>
</tr>
</tbody>
</table>

The bombardment was completely inadequate, so instead of cowering in their bunkers the German machine gunners were able to fire through the barrage. The diggers encountered fierce artillery fire even before the attack began. Except around the Sugar Loaf, they still succeeded in overrunning the German front line and pushed on to their objective, which proved to be non-existent due to poor British staff work. It is hard to recover from an error like this one. Some units fell back to the old German front line. Others set up in drains and filled their sandbags with mud. Throughout the night the

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66 Bean, III: *The AIF in France: 1916*, p. 242
67 "Employment of ANZAC in Somme Offensive 1916", AWM45 31/5
68 Bean, III: *The AIF in France: 1916*, pp. 334-341
Germans counterattacked, pushing along their old trench line and cutting off the Australians. By daylight, the last diggers had been forced to return.

There were six real reasons for the failure: (1) a well trained and well led German division, (2) incompetent leadership and staff work by the British XI Corps and, to a lesser extent, 5th Division, that, amongst other things, set an objective that turned out to be non-existent, (3) an ineffective barrage that failed to suppress the German machine guns, (4) German observation of the battlefield from Aubers ridge, aided by a start time before dark, that probably would have rendered ground captured untenable in any case, (5) ineffective counter battery fire and (6) a shortage of ammunition and grenades.

The Battle of Fromelles cost the 5th Division 1,917 dead, 470 captured and 3,146 wounded, a total of 5,533 casualties. Tragically, as at the Nek at Gallipoli, the bravery and resolution of the diggers and junior leaders of the AIF only served to run up an even higher casualty list. Lieutenant General Sir R.C.B. Haking, commander of the British XI Corps, blamed the failure on inadequate infantry training and felt that this had done the division "a great deal of good". In this he was still subject to the meme, enshrined in prewar doctrine, that human factors were paramount.

In this case, this meme was no doubt aided by cognitive dissonance, Haking's willingness to place the blame on his men rather than admit to being an incompetent general, but it is worth considering how this meme came to exercise such a hold on the British regular army, who after all, were generally supportive of technological innovation. The reason is that if technology, and therefore tactics, is constant, as it is in the short term, then the human dimension still provides scope for improvement, and this became the main role of regular army officers. From here, it was but a short distance to the meme that the human dimension was the more important one.

On arrival in the Somme sector, the 1st Division came under the direct command of the British Reserve Army, under General Sir H. de la P. Gough. Up to this point it had been preparing for semi-open warfare, exploiting a breakthrough made by the British. Gough gave it the job of taking the fortified town of Pozieres, a key position that had already been attacked three times without success by the British Army. Repeating attacks battering ram style was a feature of this campaign. Although I Anzac Corps consisted of three divisions, the 1st, 2nd and 4th, only part of one would be in the line at a time during this campaign. This tended to render corps a superfluous level of command and Gough frequently bypassed it. He gave the 1st Division's commander,

70 Bean, III: *The AIF in France: 1916*, pp. 442-447
71 Notes on 1st Division conference, 13 July 1916, AWM26 51/24
Major General H. B. Walker, the option of attacking from the southeast or southwest. Either option would leave a flank exposed, but after reconnoitring the ground Walker realised that on the southeast approach the Pozieres Heights would shield his right flank so this was therefore selected, although it meant a more difficult assembly.\textsuperscript{72}

Australian commanders and staffs pumped their British counterparts for ideas and pored over memoranda circulated by GHQ and Reserve Army.\textsuperscript{73} Tactics were modified, and practiced in the fields and downs of the billeting areas.\textsuperscript{74} To prevent another Fromelles, the barrage was strengthened and the infantry were enjoined to creep as close to the enemy line as the barrage would permit; 100 metres or less. This would enable them to reach the German deep dugouts before the occupants could emerge. To reduce enemy observation, the attack would be delivered at 12:30am in moonless darkness. Instead of moving forward in big lifts, the barrage would shift on to an objective close enough in front to provide continuous cover. By the end of the campaign this technic would be further refined by the British Army into the "creeping barrage", in which the barrage moved forward by short increments at regular intervals.

The infantry would still attack in waves but now each wave would have its own objective which it would capture and consolidate - a process known as "leap frogging" because the next wave would pass over the one before. The first objective would be the German trenches in front of Pozieres; the second, a new trench just on the outskirts of town; the third, the main road through the town itself. Engineers, pioneers, trench mortars and Vickers guns would follow the assault waves closely and the Lewis guns would travel with them. Special "jumping off" trenches were dug by the 1st Pioneer Battalion in order to reduce the distance the infantry would have to attack over to 200 metres, the lack of which was considered one reason for failure at the Sugar Loaf.\textsuperscript{75}

Consolidation involved refitting an enemy position, moving sandbags from the parados to the parapet and cutting loopholes and fire steps. Letting the remaining Germans know their position had been captured was called "mopping up". The British had discovered that simply tossing a couple of bombs into a dugout would not necessarily take care of the inhabitants.\textsuperscript{76} A technological fix was applied in the form of a new weapon, the phosphorus No. 27 grenade or "P bomb". A tin canister filled with Red Phosphorus, the

\textsuperscript{72} Bean, III: The AIF in France: 1916, pp. 468-470
\textsuperscript{73} BGGS I Anzac Corps, 17 July 1916, AWM26 50/12; GS 1st Division GS Memorandum No. 54, 14 July 1916, AWM26 51/24. Officers of the British 7th and 19th Divisions were the 1st Division's primary sources of information.
\textsuperscript{74} Bean, III: The AIF in France: 1916, pp. 453-454
\textsuperscript{75} GS 2nd Division, "Tactical Notes", 19 July 1916, AWM26 56/2; GS 1st Division Order No. 31, 21 July 1916
\textsuperscript{76} Griffith, Battle Tactics of the Western Front, pp. 113-114; Edmonds, Military Operations in France and Belgium 1916, Volume I, p. 291
P bomb scattered burning phosphorus in a circle 4 to 10 metres in diameter and burned strongly for 3 to 4 minutes. It could be used for signalling or creating smoke screens.\textsuperscript{77} Each man was given a P bomb and two Mills bombs.\textsuperscript{78}

The attack near Pozieres on 23 July was the AIF's first truly successful attack since Lone Pine. All objectives were attained and consolidated and the inevitable German counterattack was beaten off. Small parties of diggers began "prospecting" in Pozieres - searching the town for Germans and souvenirs. Lewis guns were turned on German snipers. Cellars were attacked with phosphorus grenades and a steady stream of prisoners was brought out. The German artillery withheld its fire because it was unsure of where the German and Australian positions were but they were fairly accurately reported by the Royal Flying Corps (RFC) and Gough, suspecting that Pozieres had been abandoned, it being hard to spot Germans in the rubble from the air, ordered patrols to seize the remainder of the town. Diggers who had been shot at from the town all day regarded this as a bit of an insult, but the order was complied with. A ten man patrol attacked a German concrete pillbox called Gibraltar just south of the town and captured 26 men and 3 machine guns. By dawn most of Pozieres had been occupied.\textsuperscript{79}

The Commander in Chief of the BEF, General Sir Douglas Haig, decided to continue the Australian offensive at Pozieres but not as part of any general attack. Piecemeal attacks would be made in the hope of engaging and wearing down the enemy. This allowed the enemy guns to concentrate on the Australians. At this time I Anzac Corps Heavy Artillery\textsuperscript{80} consisted of a Heavy Artillery Group with four batteries (the 54th, 55th and two British batteries) equipped with 8 inch, 9.2 inch and 6 inch howitzers, and one with four British 60 pounder batteries which were used mainly for counterbattery fire. This allocation was inadequate to deal with the heavy concentration of German guns in this sector and the infantry suffered terribly from the incessant enemy shelling.

The 2nd Division replaced the 1st and its commander, Major General J. G. Legge, was ordered to take the Pozieres heights, the not so high ground north of the town. Before this happened, his 5th Infantry Brigade bought into a twelve hour bomb fight started by the British troops on their flank attempting to capture a German trench by bombing. British and Australian bombers threw some 15,000 bombs and almost all the brigade's regimental bombers became casualties. In bomb fighting the Germans had the advantage.

\textsuperscript{77} HQ British Third Army, "Smoke Production by Infantry", 10 April 1917, AWM25 97/5
\textsuperscript{78} Bean, III: \textit{The AIF in France: 1916}, p. 493
\textsuperscript{79} Bean, III: \textit{The AIF in France: 1916}, pp. 514-516, 532-535
\textsuperscript{80} I Anzac Corps Heavy Artillery had been formed on 4 April 1916. It was a headquarters for controlling heavy artillery assigned to the corps, and was subordinate to I Anzac Corps Artillery. It was commanded throughout the war by a British Royal Garrison Artillery officer, Brigadier General L. D. Fraser.
because their "egg" bombs could be thrown further than the Mills while their "stick" grenades were more devastating at short range. The sheer inefficiency of bombing as a tactic for capturing a trench when the enemy had anything approaching equal numbers was amply demonstrated. The I Anzac Corps staff recommended that a British "egg" grenade be adopted but none ever was.

The 2nd Division's attack on the night of 28 July 1916 was a failure. Much of the German wire was uncut, jumping off trenches had not been dug and German artillery was turned on the infantry while they were crossing No Man's Land. I Anzac Corps ordered a repeat of the attack the next night but fortunately this was postponed. Legge introduced a new practice, a series of conferences in which the details of the attack were discussed among those involved. An elaborate artillery program was worked out involving working over the German trenches, wire cutting and heavy bombardments that looked like attacks. Patrols checked the condition of the enemy wire to determine that it had been sufficiently cut. Digging the jumping off trenches proved extremely hard on the infantry, engineers and pioneers as the barrages caused German retaliation that inflicted casualties and damaged the works. Many at the front believed that the jumping off trenches that the corps chief of staff, Brigadier General C. B. B. White, insisted be dug were unnecessary and could be replaced by a simple tape line on which the infantry could line up without letting the enemy know an attack was impending. This technic was adopted for all subsequent operations. Legge was able to get the job done by persuading corps artillery to cut back. On the night of 4 August the attack was delivered and was successful.

After this the 4th Division swept north over the rise to the outskirts of Mouquet Farm, where the wheels fell off the Australian war machine. Over the next weeks each division would return for a second tour of Pozieres, but little progress was made in the course of seven attacks on very narrow 2 or 3 battalion fronts in a salient that only became more pronounced. Because of the terrible bombardment which gradually obliterated the trench systems, buried the infantry and caused enormous casualties, efforts were made to hold the forward area as lightly as possible, relying on the firepower of the Lewis guns to make up for numbers. Birdwood experimented with the use of much lighter forces in the attack as well, while beefing up the artillery support, in the hope of reducing infantry

81 Bean, III: The AIF in France: 1916, pp. 607-613
82 BGGS I Anzac Corps to British Fourth Army 21 November 1916, AWM26 114/25
83 GSO1 2nd Division, 29 July 1916, AWM26 56/5
84 GOC 2nd Division, "Preparations for the attack of 4/5 August", 14 August 1916, AWM26 56/5
85 GS 2nd Division "Extracts from Patrol Reports 31 July/ 1 August", 2 August 1916, AWM26 56/5
86 GOC 2nd Division, 6 August 1916, AWM26 50/15
87 GOC 2nd Division, "Preparations for the attack of 4/5 August", 14 August 1916, AWM26 56/5
casualties. This failed because the infantry were unable to overwhelm the objective as they had done during the capture of Pozieres, and came under attack from Germans who had not been mopped up.

The tactic was making a virtue of a necessity because many battalions had taken very heavy losses in their first tour of Pozieres and not only had they been unable to absorb sufficient reinforcements in time to restore them to full strength, but orders were issued that not more than 20 officers per battalion should accompany infantry units in an attack and 15 per cent of NCOs should also be left behind in order to form a "nucleus" from which the battalion could be rebuilt after the battle. The leaving of a number of officers behind with the transport had already been practiced by the 1st Division in the first assault on Pozieres, but from now this would be doctrine throughout the BEF. As a consequence, a battalion that was 25 per cent under strength would have only about 240 men available for the actual assault.

One promising new technic in these operations was the machine gun barrage, a technic learned from the British at Armentieres. From 4 August onwards, the machine gun barrage was a standard part of every action. During the attack on 21 August, the 3rd Machine Gun Company had all of its fourteen guns firing over the heads of the infantry, expending some 36,500 rounds in three hours and 14,500 more during the night. In this they were taking advantage of the tremendous stamina of the Vickers gun. How effective the machine gun barrage was is open to question. During a counterattack on 6 August, the 7th Machine Gun Company reported that the enemy was moving through the barrage and their fire had to be beefed up with field artillery.

The Somme battles cost Australia dearly. In just seven weeks of fighting, the AIF had more casualties than in the entire seven month Gallipoli campaign. For this terrible cost, a few hundred metres of ground had been captured and losses had been inflicted on the enemy that were less than, but comparable to, those of the Australians. The story was the same across the whole BEF. Total losses on the Somme came to about 410,000 in return for 180,000 German casualties - an average of 2.3 BEF soldiers per German.

88 BGGS I Anzac Corps, 10 August 1916, AWM26 56/6
89 Bean, III: *The AIF in France: 1916*, pp. 803-805
90 GS 1st Division, 14 August 1916, AWM26 51/25
91 GS 1st Division, GS Memorandum No. 54, 14 July 1916, AWM26 51/24. This memorandum noted that this was the practice of certain British units.
92 GOC 1st Division, 14 August 1916, AWM26 51/25
94 Bean, III: *The AIF in France: 1916*, pp. 713, 797
95 Bean, III: *The AIF in France: 1916*, pp. 862-863, 944-945
AIF Casualties in the Somme Campaign
19 July 1916 - 5 September 191696

<table>
<thead>
<tr>
<th>Division</th>
<th>Dead</th>
<th>Wounded</th>
<th>Captured</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Division</td>
<td>2,364</td>
<td>6,147</td>
<td>70</td>
<td>8,581</td>
</tr>
<tr>
<td>2nd Division</td>
<td>2,340</td>
<td>5,825</td>
<td>152</td>
<td>8,317</td>
</tr>
<tr>
<td>4th Division</td>
<td>2,025</td>
<td>5,002</td>
<td>167</td>
<td>7,194</td>
</tr>
<tr>
<td>5th Division</td>
<td>1,917</td>
<td>3,146</td>
<td>470</td>
<td>5,533</td>
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<td>Corps Troops</td>
<td>12</td>
<td>35</td>
<td>0</td>
<td>47</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8,658</td>
<td>20,155</td>
<td>859</td>
<td>29,672</td>
</tr>
</tbody>
</table>

(Note: Dead includes killed in action, died of wounds and died of gas.)

In order to understand what went wrong, we need to start right back at the factories in Britain and North America, which did not reach full production in 1916. This made itself felt particularly in the matter of guns. In the first nine months of 1916, 7,908 guns were supposed to have been delivered, but only 4,314 actually reached the troops during the whole of 1916. In attempts to meet their quotas, the manufacturers put completion of new guns ahead of shipping spare parts. The 18 pounder had a hydraulic buffer to absorb recoil and keep the gun in one place on its platform but used springs to return the gun mass into position. However the heat caused by constant firing resulted in the hydraulic oil losing its effectiveness and in turn placed excessive stresses on the springs, which soon lost their resiliency. The guns then had to be run back into firing position by hand. Replacement springs became impossible to get. The result was guns deadlined for want of parts. Frantically, the Ordnance Corps attempted to improvise them.97

The planners had hoped for practically unlimited numbers of shells and the requested numbers were delivered for all but the larger calibres. But there were severe problems with quality control. Hairline cracks in 9.2 inch howitzer shells caused explosions in the bore or muzzle. The 4.5 inch howitzers had similar problems owing to defective charges and fuzes. Loose copper driving bands on the 18 pounders caused erratic shooting.98 Drop shorts became so common that gun pits were constructed with sandbagged rearward cover to protect them from their own shells.99 On 20 July, the 1st Infantry Brigade complained that their own artillery had shelled them six times that day.100 Other

96 Butler II: *The Western Front*, pp. 48, 73
99 Horner, *The Gunners*, p. 132
100 1st Infantry Brigade, wire sent 3:50pm, AWM26 51/28

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weapons with serious manufacturing defects included Mills bombs, P grenades and Stokes mortar rounds.\textsuperscript{101}

The overall effect of faulty weapons and ammunition was a requirement for still more ammunition when it was already being fired off faster than it could be delivered. From the beginning of the Somme bombardment on 24 June until 23 July, 148,000 tons of ammunition had been fired but only 101,771 tons were landed, the difference being made up by depleting stockpiles. In August the British government appointed Sir Eric Geddes, an industrialist with extensive experience in railways and shipping,\textsuperscript{102} to investigate the situation. He discovered that the maximum port discharge in a week was 138,987 tons against projected requirements for 248,327 tons to sustain an offensive. Vigorous measures were proposed to increase capacity and decrease turn around time. As the U-boat offensive began to bite, the British could no longer afford to have shipping idle awaiting discharge. On 22 September, Haig appointed Geddes as his Director General of Transport (DGT) at BEF GHQ, responsible for all forms of transportation. Cross channel ferries were used to shift bulky cargoes like railway locomotives and rolling stock. Wharves were cleared and stores moved out of transit sheds to inland dumps to free up quay space. The ports had 92 French cranes. To increase capacity, 29 British cranes were installed by December 1916. By December 1918, 215 British cranes were in action and the number of metres of quay space per crane had fallen from 62 to 28. Work practices were overhauled. The net result was an average weekly discharge of 224,000 tons by May 1917.\textsuperscript{103}

Had the ports been able to deliver the required tonnage, the railway system would probably have collapsed. There were chronic shortages of both locomotives and rolling stock. Repair facilities were inadequate and were extended. Maintenance on the lines had been neglected and was starting to put them out of commission. Estimates of requirements ran to 112,000 tons of construction materials. By the end of 1916, 62 British locomotives had been imported; this had grown to 753 a year later and 1,205 by the end of 1918, by which time 54,000 wagons had been imported.\textsuperscript{104} The railway system was improved and extended in 1917, with 1270 kilometres of new track being laid in 1917. Geddes realised that part of the answer was to exploit alternative means of transport, and the capacity of the inland waterways was increased from 76,000 to 110,000 tons per week. Light railways were developed to move supplies forward from

\textsuperscript{101} Edmonds, \textit{Military Operations in France and Belgium 1916}, Volume I, pp. 123-124
\textsuperscript{103} Edmonds, \textit{Military Operations in France and Belgium 1916}, Volume I, pp. 121-122; Henniker, \textit{Transportation on the Western Front}, pp. 185, 233-238
\textsuperscript{104} Henniker, \textit{Transportation on the Western Front}, pp. 251-262
the railheads and relieve pressure on the roads and by May 1917, 80 kilometres of light rail track were being laid every week. 105

The road transportation situation was also very bad. The road metal in the Somme region was eight centimetres thick on a foundation of chalk and if the surface was broken, water could turn it into a morass. Minor roads were unsealed tracks and road bridges needed work. In all, making the road system fit for intensive round the clock military usage was found to be beyond the labour and resources available in 1916, and as a result thousands of Indian, Chinese and Egyptian labourers would be brought in during 1917.106

The logistical planners regarded it as fortunate in many ways that no major advance occurred. The only bright spot was that the French and British flying corps had suppressed the enemy's air patrols and the rear areas, except for certain crossroads that the Germans shelled blind, were generally safe.107 Most German air raids occurred at night. A taste of what could happen occurred at Audruicq on the night of 20 July 1916 when an air raid set an ammunition dump alight and explosions continued for 48 hours. The dump was completely destroyed and the nearby Nord main railway line was cut. 108

Thus, logistical difficulties prevented Haig from maintaining a broad front offensive. Instead, a series of narrow front operations was carried out, which were estimated to cost 40 per cent more casualties than those undertaken on a broad front to achieve the same results. Using the AIF in this manner was particularly wasteful because it contained a high proportion of experienced troops.

Shortages of new weapons such as Lewis guns, rifle grenades, tanks and heavy artillery pieces slowed the development of new tactics built around them. During the Somme fighting, both infantry and artillery tactics were still primitive, with high casualties once again the result. Casualties in the Somme campaign fell almost entirely on units forward of brigade, particularly the infantry, who accounted for 93 per cent of casualties, mainly caused by shellfire from unsuppressed German artillery. Excessive casualties among the engineers were the result of sending them forward with the infantry in attacks as per the Field Service Regulations,109 where they were subject to artillery fire, became separated

105 Grieves, Sir Eric Geddes: Business and government in war and peace, pp. 33-34
106 Edmonds, Military Operations in France and Belgium 1916, Volume I, p. 278
107 Bean, III: The AIF in France: 1916, p. 482
108 Henniker, Transportation on the Western Front, pp. 314-315
109 Field Service Regulations, pp. 147-8
and generally performed no useful engineering work. It was gradually realised that engineers were better utilised on the line of communications.

Casualties in the Somme Campaign
First tours of divisions
19 July 1916 - 15 August 1916

<table>
<thead>
<tr>
<th>Division</th>
<th>Infantry</th>
<th>Engineers</th>
<th>Pioneers</th>
<th>Artillery</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Division</td>
<td>4,937 (93%)</td>
<td>113</td>
<td>180</td>
<td>30</td>
<td>5,285</td>
</tr>
<tr>
<td>2nd Division</td>
<td>6,361 (92%)</td>
<td>167</td>
<td>203</td>
<td>72</td>
<td>6,846</td>
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<tr>
<td>4th Division</td>
<td>4,236 (91%)</td>
<td>57</td>
<td>224</td>
<td>79</td>
<td>4,649</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15,534 (92%)</td>
<td>337</td>
<td>607</td>
<td>181</td>
<td>16,780</td>
</tr>
</tbody>
</table>

British generals continued to issue orders for positions to be captured "at all costs", as per the Field Service Regulations, and in one case,

through some process of mind extremely difficult to understand, the British Fourth Army ordered an attack to be repeated even though four efforts had failed and no vital objective was to be gained.

To someone using a mechanistic model of tactics, a mode of thinking that is itself a product of technology, it would come as no surprise, and indeed might even be reassuring that,

It is doubtful if there exists in the records of the AIF one instance in which, after one attacking party had been signally defeated, a second, sent after it, succeeded without some radical change having been effected in the plan or conditions.

However, the process of mind can be understood in the light of the meme which emphasised the primacy of the human factor, as enshrined in the Field Service Regulations. Under this meme, repeating the attempt is quite understandable. In the new technological environment, mechanistic memes had a marked competitive advantage.

The notion that more clever generalship could have saved Australian lives on the Somme is whimsical because win, lose or draw, divisions were kept at it until they were exhausted, costing men that Australia and the Empire would soon need badly. What better generalship would have yielded was results more in line with the expense. As an attrition battle, the Somme was uneconomical, because it expended men at twice the rate of the enemy, though nowhere did the Field Service Regulations say anything about

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110 Bean, III: The AIF in France: 1916, pp. 593, 724, 770
111 Field Service Regulations, p. 116
112 Bean, III: The AIF in France: 1916, p. 917
113 Bean, II: The Story of Anzac, p. 631
keeping losses down below the enemy's. As a breakthrough battle it was a failure, for no such breakthrough occurred. Surprisingly, the tacticians had devoted little thought to the problems of open warfare and, no less than the logisticians, were quite unprepared for it. Although the outlook for 1917 was bleak, the new technologies being deployed gave hope of new tactics and technics and the possibility of an improved situation.


4. Semi Open Warfare

Over the winter of 1916/17 I Anzac Corps, now consisting of four divisions, the 1st, 2nd, 4th and 5th, languished in the mud of the old Somme battlefield, fighting the cold and trench foot more than the Germans, with whom they conducted informal truces.¹ In this static trench warfare, the light trench mortar was a popular weapon and many infantry battalions formed additional unauthorised trench mortar batteries.²

In November 1916 the 3rd Division arrived in France and moved into the line near Armentieres, the "nursery" sector where the other four divisions had spent their first weeks in France. This brought the total strength of the AIF in France on 31 January 1917 to 117,681 including 481 nurses.³ Meanwhile, a new division, the 6th Division, began forming in England in February 1917.

One new unit of note was the I Anzac Corps School, which was formed in France on 11 November 1916. The school ran courses on subjects such as bombing, Lewis guns, trench mortars and signalling. All corps and armies of the BEF had their own schools but the Australian school was more influential than most because the corps always consisted of the same divisions, allowing for a great deal of continuity and conformity of procedures, and because the corps commander, Lieutenant General Sir W. R. Birdwood, was also GOC AIF, and so was responsible for training and doctrine throughout the AIF.

Important tactical and organisational developments occurred in over the winter. One major tactical and organisational change was in the organisation of the infantry. As we have already seen, the original allocation of Lewis guns of four per battalion was gradually increased to twelve at the end of July 1916.⁴ This organisation, while fairly successful from a tactical point of view, had some administrative drawbacks because the Lewis guns in the battalion section were administered differently to the others, and the LGO could not devote sufficient time to training Lewis gunners and providing technical

¹ Letter, Brigadier General H.E. Elliott to Captain C.E.W. Bean 15 May 1929 describes one such truce, 1DRL264/1B: "When we took over, the 58th Battalion was told by the Guards Division whom they relieved that they had come to a tacit understanding with the enemy not to fire on each other since if they did neither side could get food up. The next day after the relief General Birdwood met a slightly wounded man of the 58th and asked him if he had met any Germans. His reply was he saw dozens of them but was not allowed to shoot at them. Birdwood came to my HQ in a furious rage and asked me how I dared to issue such an order. Of course, I denied doing so and made inquiries which elicited the truth and no more was heard of the complaint. But in consequence of General Birdwood's action the truce was declared off and every Hun seen was fired on. This naturally brought retaliation and we had the worst of the deal owing to the long carry."

² I Anzac Corps General Staff Circular No. 31, 13 November 1916. AWM26 114/25

³ Australian Imperial Force. Statistics of Casualties, etc., Records Section, AIF HQ, London, 1919, p. 22

⁴ BGGS I Anzac Corps, GS Circular No. 14, 31 July 1916 AWM26 50/14; GS 2nd Division, 19 July 1916, AWM26 56/2

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advice when he had his own section to look after. In December, enough Lewis guns became available to give each infantry battalion sixteen guns and BEF GHQ decided to allocate one to each platoon while still allowing for them to be pooled at company level if need be.

The platoon was now confirmed as the primary tactical unit. Bombing and scouting platoons were broken up so that each platoon now had a Lewis gun section, a bombing section, a rifle grenade section and a scouting section. The platoon now contained all the weapons available to the infantry except the light trench mortar, and so could operate independently. It therefore became the primary tactical unit instead of the company. The infantry battalion not only contained more firepower than ever before, it could be dispersed over a greater area, because control was delegated to its platoon leaders.5

A Lewis gun section consisted of nine fully trained Lewis gunners, although there was only one Lewis gun. The section leader was a sergeant or corporal. He allotted fields of fire, arranged reliefs, and recorded ammunition expenditure and breakages. Any damage that put the gun out of action had to be reported to the platoon commander. Each squad had a gunner, the man who carried the gun into action and fired it. The gunner carried a satchel over his shoulder with a wallet containing the smaller spare parts inside. The diggers improvised a sling for the Lewis gun from two rifle slings, which enabled the gun to be fired on the move from the hip.

An assistant stuck close to the gunner, ready to replace the gunner if he was hit and helping the gunner in any way possible with loading and breakages. The assistant carried four Lewis gun magazines, each of which contained 47 rounds. The spare parts of the Lewis were so numerous that they were divided between the gunner and the assistant. The assistant carried the spare barrel, cylinder, and piston rod with cleaning rods for both barrel and cylinder and both gunner and assistant carried oil. They were both equipped with revolvers as a secondary weapon. In action, the assistant lay beside the gunner because he was more likely to attract attention if he was continually running over to the gun. From this position, he could also provide the gunner with moral support and take over more quickly if the gunner became a casualty.

The rest of the team were riflemen doubling as ammunition carriers, scouts and observers. Each rifleman carried 50 rounds of rifle ammunition. One rifleman carried four to eight Lewis gun magazines and maintained close touch with the gunner and assistant, ready to replace the assistant if either the assistant or the gunner became a casualty.

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5 BGGS I Anzac Corps, GS Circular No. 38, "Organisation, Training and Fighting of Infantry Battalions", AWM26 114/27
casualty. Two were lightly loaded scouts, moving ahead of the gun, locating targets and observing for the gun when necessary while the second scout could be used as a messenger when the gun was in position. The remaining three were ammunition carriers with six magazines each. The practice was for each man to have an even number of magazines since an evenly distributed load is easier to carry. The handcarts originally issued to transport the Lewis gun and its ammunition were found to be unsuitable and were replaced in January 1917 by one General Service cart per company.

Lewis gun magazines could not be carried in the standard rifle ammunition pouches, while the tin cases holding eight magazines in canvas carriers in which Lewis gun magazines were delivered to the front line were good for preventing damage in transit but too awkward to carry into action. Various units developed or acquired different pouches for carrying the magazines in action and no standard pattern was insisted upon. A Canadian invention, the Yukon pack, was widely used by carrying parties but was too conspicuous in battle, leading to the loss of the carrier and most likely the ammunition as well if it could not be recovered. The Lewis gun sections preferred smaller, more easily concealed pouches. All up the section carried 35 full Lewis gun magazines and 300 spare rounds each. If the Lewis gun magazines ran out, each of the riflemen could contribute 10 or 20 rounds to reload some of the Lewis gun magazines.

In addition to the Lewis guns, the number of Vickers machine guns per division was increased 16 to 64 with the addition of a fourth machine gun company, one assigned directly to division rather than brigade. The fourth company had the same establishment as the three brigade machine gun companies, but was commanded by a major who was also designated the Divisional Machine Gun Officer (DMGO). To assist him in performing these duties, a captain was added to the establishment of the fourth company. Five new companies were formed in England in January 1917. The 21st and 22nd Machine gun Companies joined the 1st and 2nd Divisions respectively in March 1917 but the 23rd and 24th Machine Gun Companies were reassigned to newly formed brigade of the 6th Division and, with the 25th Machine Gun Company, did not move to France until September 1917. On arrival, each was inspected by its division commander, except for the 23rd, which was inspected by the BEF commander, Field Marshal Sir Douglas Haig himself.

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6 BGGS I Anzac Corps, General Staff Circular No. 41 “Transport for Lewis Guns” 1 January 1917, AWM26 114/28
7 “Lectures (By Military Officers) Machine Guns including Lewis Guns”, AWM25 385/4
8 “Quick Thinks”, AWM25 987/4
9 OB/407, Appendix VI. 68. to GHQ Summary of 17 June 1917, AWM26 185/3
10 War Diary, 21st Machine Gun Company, AWM4 Roll 450; War Diary, 22nd Machine Gun Company, AWM4 Roll 451; War Diary, 23rd Machine Gun Company, AWM4 Roll 452; War Diary, 24th Machine Gun Company, AWM4 Roll 453; War Diary, 25th Machine Gun Company, AWM4 Roll 454

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which had already seen responsibility moved from battalion to brigade, now continued in favour of division. Already, however, a position of Corps Machine Gun Officer (CMGO) had been created and training and coordination functions relating to machine guns had moved to corps control.  

The reasons behind the control of medium machine guns by higher echelons were tactical, as the weight required them to set up in advance and the new barrage tactics involved the massing of large numbers of machine guns so division and sometimes corps control was required. Increasingly, the division was becoming its infantry plus spare parts. Divisions at the front would be augmented by corps. But corps had few units to give, so it obtained resources like additional artillery, engineers and machine guns by stripping the divisions not in the line. With four divisions, two would normally be in the line and two in reserve.

Another organisational change was the reorganisation of the field artillery from four to six guns per battery to economise on brigade and battery commanders. Each division would now have two brigades of 18 guns and 6 howitzers. The number of field artillery brigades in the AIF was thereby reduced from 20 to 13 and field batteries from 80 to 52. The divisions were now allocated two field artillery brigades each, each with three 18 pounder batteries and one 4.5 inch howitzer battery. Three brigades, the 3rd, 6th and 12th, were designated "Army" brigades and placed under I Anzac Corps control. These units were supplied with their own mechanical transport, the 3rd, 6th and 12th Park Sections. The reorganisation was tricky because brigades were still in the line when it occurred.

The major tactical change however concerned counterbattery fire. The idea of counterbattery fire had been in disfavour before the war because experiments had shown that it required a mountain of ammunition to destroy an enemy field gun. However, shortly before the war, a French meme appeared that held that this was unnecessary. Rather than seeking physical destruction of the enemy artillery, it was mooted that simply preventing the enemy artillery from firing, that is preventing acquisition and thereby taking it out of the battle, would be worthwhile. This was logical given that so much of the enemy's firepower came from artillery. It also turned out to be much easier.

11 OB/407, Appendix VI. 68. to GHQ Summary of 17 June 1917, AWM26 185/3
12 The Reserve Artillery Brigade in England had already been reorganised in December 1916. The 18 pounder batteries were reorganised in January. Because the divisions were each a howitzer battery short, the reorganisation of howitzer batteries had to await the arrival of the new 116th, 117th, 118th, 119th and 120th Field Artillery (Howitzer) Batteries in March. These were then disbanded, and the last of the howitzer batteries reorganised by 2 April 1917. Special AIF Order, 20 January 1917, Australian Archives CRS B539 AIF264/1/259; BGGS I Anzac, GS Circular No. 62 "Reorganisation of howitzer batteries", 25 March 1917, AWM26 152/6; AIF Order 566
to do, since a direct hit was no longer required. The French term for this was taken directly into English: neutralisation. In artillery parlance, guns are suppressed if they stop firing; they are neutralised if they remain that way for more than a short period of time after the fire upon them lifts.

At Gallipoli, when the Olive Grove guns opened up, the artillery had serious problems with all four parts of our tactical model. They could not locate the guns, communication between different posts was poor, the guns were out of range, making acquisition impossible, and shrapnel could not destroy them. These problems were only partially solved in 1916 and persisted into 1917, but by that stage solutions to them all were at hand.

The problem of acquisition was the simplest, involving the provision of more heavy guns, and the number of heavy guns in the BEF rose from 761 in July 1916 to 1,157 in early 1917. This represented a qualitative as well as quantitative increase, with new models replacing older guns, while procedures were put in place to allow inaccurate guns to be replaced. A third Australian siege battery, the 338th, began forming in England on 20 December 1916. Originally, it was intended to equip it with 6 inch guns but in July 1917 it was decided to increase the size of siege batteries from four to six howitzers, like the field batteries, and the 338th Siege Battery was broken up to provide the additional personnel required.

When it came to destruction, the ability to destroy a target having hit it, biggest problem was ammunition quality, which still left something to be desired but was steadily improving. Efforts were made to sort ammunition by lots and to keep fuzes from the same manufacturer together, while lots found to be defective were recalled. Accuracy was also improving. Special screens enabled muzzle velocities to be calculated. The screens were placed a set distance apart, the gun set to an angle and a shell fired through the screens. From this the velocity could be calculated, since a higher velocity produced a higher trajectory. There was increased understanding of how wear and tear on the barrel affects flight. During the latter part of the Somme campaign the BEF's Meteorological Section, which had originally been established to provide weather information to the RFC, began circulating its data to the artillery, and in February 1917

14 DuPuy, Understanding War, pp. 251-252
15 Falls, Military Operations in France and Belgium 1917, Volume I, p. 11
16 GHQ QMG, 22 November 1917, AWM26 104/24
17 "The Australian Siege Brigade in the Great War", Australian War Memorial MSS 686, p. 4; AIF Order 410
18 QMG BEF, "Sorting of 18 pounder shrapnel", AWM26 180/1 part 1
19 QMG BEF, "Do not issue any of this 18 pounder ammunition", AWM26 183/1
instructions were circulated explaining how to adjust for changes in wind, temperature and barometric pressure.\textsuperscript{20}

The biggest problem was that of location, and an enormous amount of ingenuity went into solving it. The first thing required was some decent maps and the British Army formed field survey companies, one per Army, to provide them. In 1917 corps topographical sections were added as well. On 3 July 1915 a small Australian Army Survey Corps numbering 20 men had been raised for the task of surveying and mapping Australia for military purposes. In 1917 they were permitted to enlist in the AIF, and fifteen did so; three were detained in Egypt and served in Palestine while the others went on to the Western Front where seven were assigned to British survey units and five helped form the new I Anzac Corps Topographical Section, whose mission was to provide up-to-date, accurate and detailed maps for front line units.\textsuperscript{21} This unit eventually had one officer and 15 other ranks.\textsuperscript{22} The Topographical Section produced 2,267 copies of 24 different maps in April, 65 different maps and diagrams in September and 82 more in October. Birdwood commented that:

\begin{quote}
It was unanimously agreed that the Corps Topographical Section had proved its worth. On several occasions the General Staff of the Corps asked themselves in my presence how they had ever managed efficiently without one.\textsuperscript{23}
\end{quote}

Three technologies were developed for locating enemy artillery. The first was flash spotting. When an Observation Post (OP) equipped with special optical instruments spotted the flash of an enemy gun firing, it sent a signal back to the headquarters of the Army Field Survey Company that would cause a lamp on a switchboard to light up and buzzers to go off at both the headquarters and other OPs. Headquarters would get a bearing from the posts and would attempt to obtain a fix on the flash. The main difficulty was getting everyone to fix on the same gun when many were firing. Once at least three OPs had bearings that indicated the same target, its location could be noted. Flash spotting could also be used on one's own artillery rounds. In this way, even blind off-the-map shoots could be verified as on target.\textsuperscript{24} Naturally, the technic worked best at night but its usefulness began to decline in 1917 as the Germans introduced flashless propellants.

\begin{flushright}
\textsuperscript{20} Falls, Cyril, \textit{Military Operations: France and Belgium, 1917, the German retreat to the Hindenburg Line and the Battles of Arras}, London, MacMillan, 1940, p. 14
\textsuperscript{21} McNicoll, \textit{Making and Breaking}, pp. 54-55, 77-78
\textsuperscript{22} Field Returns, Topographical Section I Anzac Corps, February - December 1917, AWM25 861/2
\textsuperscript{23} War Diary of I Anzac Corps Topographical Section, AWM26 229/12, AWM26 229/13
\textsuperscript{24} Hemming, "Flash Spotting and the Work of the Observation Groups", \textit{Artillery Survey in the First World War}, Elstree, Field Survey Association, 1971, pp. 22-30
\end{flushright}
The second location technology was sound ranging. This was a technologically innovative method by which the location of enemy guns could be determined from the sound of the gun firing. Getting this idea to work involved considerable ingenuity on the part of Lieutenant W. L. Bragg, an Australian scientist serving in the British Army, and others.

In October 1915, Bragg was ordered to collect a sound ranging outfit in Paris and experiment with it at the front. Two French inventors there, Lucien Bull and Charles Nordmann, had constructed a device for recording the sound of guns firing on photographic film with an error of less than 0.01 seconds. The major drawback of the Bull recorder was the need to develop the film, which took about five minutes.

Bragg found that all sound ranging systems suffered from a serious technological difficulty. When an artillery piece is fired in your direction, you hear first a loud crack, then a faint rumble, and finally an explosion. The first is often mistaken for the sound of the gun report, but is in fact the shell wave, a sonic boom caused when it exceeds the speed of sound well into the trajectory of the shell. The low rumble is the true gun report. The final sound is the shell exploding. Timing it with a stopwatch produces too great an error so it was necessary to record and automatically time the reports, hence the development of the Bull mechanism. Unfortunately, normal microphones are sensitive to high frequency noises like people talking or dogs barking rather than the low frequency sound of a gun report. In particular, they were sensitive to the shell wave. A British Corporal, W. S. Tucker, invented a new kind of microphone which was not only sensitive to low frequency noises but gave a faithful transcript of the sounds which Bragg was able to integrate into the first working sound ranging system. Camouflage netting was used to protect the Tucker microphones from air turbulence and they were arranged in the shape of an arc of a circle to make it easier to match up the reports. The system was calibrated by setting off an explosion at a predetermined point. During the Somme campaign, about two thirds of batteries located were reported by sound ranging.

Sound ranging was sensitive to atmospheric effects, particularly wind, but under ideal conditions the location of a gun could be determined to the metre. Under normal conditions, 25 to 50 metres was more like it. Sound Ranging was not affected by fog, rain or darkness but could be impacted by wind, especially one blowing towards the

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25 Bragg was a brilliant young scientist who in 1915, at the age of 25, became the youngest ever Nobel Prize winner for his work on X-rays.

enemy. Rapid changes of temperature, such as occur when the sun comes out on a foggy morning, also produced poor results. Thus results obtained from sound ranging were best checked against those obtained by other methods. Like flash spotting it could also be used for ranging one's own artillery. In the case of counter battery work, no adjustments were required for wind, air pressure or temperature as the friendly and hostile shells were fired under the same conditions. In this case it was found that the position of the friendly bursts relative to the hostile gun would be within 5 metres for line and 20 metres for range. Moreover, sound ranging could do one thing that other technologies could not: identify the calibre of the gun fired. The gun report alone gave a rough guide; the flight time also gave information. Since the position of the shell burst was known, it was also possible to examine the crater. Most sound ranging reports specified the calibre, number of guns, location of the guns and the target they were firing at.27

The third location technology was aerial observation. Aerial photography was now routine and every corps flying squadron had its own photographic section. As photographs became more plentiful, the art of interpreting them became more sophisticated. In many ways, this was the most effective technology but aircraft were limited to daylight and good weather. Thus the three technologies were complimentary. Aircraft and sound ranging were increasingly used in combination, an aircraft noting the flash of an enemy gun but unable for some reason to give its position accurately, could radio the sound rangers to watch for it.28

The technology of communication was also improving. Radios became more widely available, and a wireless section had been created under Corps control.29 In June 1917 Army wireless signal companies were abolished and wireless sub-sections were incorporated into the divisional signal companies.30 Ground antennae sets with a range of 1000 to 1500 metres were recommended for work forward of battalion. For communication between battalion and brigade, the new Loops sets were provided; these had limited range but were very portable.31 In the air, improvements in radio technology allowed one aircraft with radio per 1,000 metres without the signals clashing - twice what had been possible before the Somme battle and aerial tactics were altered to take

27 Bragg, "Sound Ranging", Artillery Survey in the First World War, pp. 31-40; Hartcup, The War of Invention, pp. 68-73; General Staff (Intelligence), GHQ, "Notes on Sound Ranging" 28 November 1916, AWM26 104/9
29 GS Circular, 23 September 1916, AWM26 184/8
30 OB/242 17 June 1917, AWM26 185/3
31 BGGS I Anzac Corps, GS Circular No. 61 "Trench Wireless sets", 21 March 1917 AWM26 152/6
advantage of the strengths of radio.\(^{32}\) Radio technology was still immature and not as good as telephones but showed great promise.

Allocation of Radios to Signal Companies (1917)\(^{33}\)

<table>
<thead>
<tr>
<th></th>
<th>Army</th>
<th>Corps</th>
<th>Division</th>
</tr>
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<tbody>
<tr>
<td>Wilson Sets</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Trench Sets</td>
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<td>3</td>
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<tr>
<td>Tuners, Receiving</td>
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<td>-</td>
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<td>Power Buzzers</td>
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<td>6</td>
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</tr>
<tr>
<td>Loop Sets</td>
<td>6</td>
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<td>10</td>
</tr>
<tr>
<td>Ground Antennae Sets</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
</tbody>
</table>

Another new form of communication was the power buzzer. This device produced electrical impulses that could be picked up as a high pitched buzz by one of the low frequency amplifiers used to eavesdrop on the enemy's telephone conversations. This allowed messages to be sent in Morse code. Like the radio, it required no wires and was much smaller, although it also needed a supply of bulky rechargeable cells. It was therefore suitable for sending one-way messages from the assault troops back to brigade headquarters.\(^{34}\)

Artillery command arrangements were officially revised on 8 December 1916, with the army Major General, Royal Artillery (MGRA) granted executive control of the Army artillery with the title of General Officer Commanding Royal Artillery (GOCRA). Similarly, the corps BGRA became the corps GOCRA, with executive command of all artillery in the corps - siege, field and divisional. The corps GOCRA also gained the right to deal directly with the corps Royal Flying Corps (RFC) commander.\(^{35}\) Birdwood, drawing on the experience at Gallipoli, proposed an even more radical idea, suggesting the placement of all heavy and siege artillery under army control. He felt that the corps sectors were too narrow and restricted the heavy guns to frontal fire whereas broader frontages would permit more effective enfilading fire. The proposal was not accepted.\(^{36}\)


\(^{33}\) GHQ Director (Signals), "Communications by Wireless", AWM26 185/25

\(^{34}\) BGGS I Anzac Corps, GS Circular No. 56, "Power Buzzer Working", 14 March 1917, AWM26 152/6; Rawling, *Surviving Trench Warfare*, pp. 126-127

\(^{35}\) BGGS I Anzac Corps, "Command and Organisation of Artillery", 8 December 1916. AWM26 114/27

\(^{36}\) GOC I Anzac Corps, "Heavy Artillery Organisation", 8 December 1916. AWM26 114/27
Although each division now had fewer guns assigned, the practice was for divisions in the line to be reinforced with army brigades and the artillery of resting divisions.

As technologies for location improved, an organisational structure grew up around counterbattery fire. The first step was the creation of the post of Artillery Intelligence Officer at I Anzac Corps Heavy Artillery Headquarters on 14 April 1916. This was an Intelligence Corps officer charged with the responsibility for obtaining information from observers, particularly aerial observers. Lieutenant J.R.C. Bodley was appointed to the post on 10 June 1916 but he was too junior to coordinate the counterbattery effort that was now the prime role of the artillery.37

In December 1916, a Royal Garrison Artillery officer, Lieutenant Colonel C. S. Pritchard, was appointed Counterbattery Staff Officer (CBSO) at I Anzac Corps Heavy Artillery headquarters with the task of collecting counterbattery intelligence and forwarding weekly summaries to Army headquarters. Certain heavy groups were permanently assigned to counterbattery missions and the CBSO was empowered to order groups to fire on such targets as he might designate. Pritchard was in fact senior to the heavy artillery group commanders and commanded the Heavy Artillery in the absence of the BGHA.

The Artillery Intelligence Officer prepared maps showing the location of all known enemy batteries in the corps area and sent copies to the CBSO and CBSOs of adjacent corps, the corps GOCRA, BGGS and BGHA, the division BGRAs, the commanders of all heavy artillery groups detailed for counterbattery missions, the commander of the corps flying squadron, and that of the Army field survey company, which included both flash spotters and sound rangers.38

The first test of the new organisation would be a completely unexpected one. On 22 February 1917 the German forces opposite I Anzac Corps did something completely unexpected: they began a series of fighting withdrawals to a shorter, prepared position which the Allies called the Hindenburg Line. It proved impossible to prevent the enemy from slipping away just as the Allies had done at Gallipoli. Indeed, delayed response to patrol reports gave them a good 48 hours head start and contact was therefore lost. After two years of unremitting trench warfare the BEF was slow to respond to the rapidly changing requirements of open warfare.

37 MGGS British Second Army, 10 June 1916, AWM25 75/29
38 Counterbattery Orders CB73 and CB84, AWM26 117/10; MGGS British Fifth Army, "Artillery Intelligence", 21 March 1917, AWM25 75/29
To pursue the retreating Germans, General Sir H. de la P. Gough, commander of the British Fifth Army, of which I Anzac Corps was a part, employed something much discussed and practiced before the war but not yet used: brigade groups, all arms formations of brigade size. They were not advance guards in the sense described by the *Field Service Regulations*, for the main body was not advancing behind them but was held back, partly in case of a counterattack, but mainly because of the difficulties

39 BM 6th Infantry Brigade, “2nd Australian Division Advance Guard Order No. 1”, 17 March 1917, AWM26 167/2; GOC 15th Infantry Brigade, ”Advanced Guards Operation Order No. 1”, 17 March 1917, AWM26 177/2

40 “Notes of Corps Commanders' Conference”, 26 February 1917, AWM26 180/1

41 *Field Service Regulations*, pp. 78-81
maintaining larger forces further forward. Gough's use of columns to pursue the enemy were in contrast to the more cautious tactics of General Sir H. S. Rawlinson, commander of the neighbouring British Fourth Army, who used only cavalry to keep contact.

In addition to the ground elements, each column had a flying squadron detailed to fly air cover for it. Normally the entire corps had but one squadron, so this represented both a huge increase and an innovative experiment in the use of aviation technology. Unfortunately, they were hampered by the poor weather, which was both cold and wet.

Bad weather and the state of the battlefield area, which was a devastated quagmire, slowed the pursuit. In the area beyond, towns had been burned, railways torn up, bridges systematically demolished and roads blocked by fallen trees or rubble. Supplying water for men and animals was always tricky in the Somme region, but was made more difficult by pipes being damaged, wells fouled by human excreta and horse manure, and ponds being rendered unfit for drinking by dumping chemicals like Westphalite explosive in them. These problems were tackled with the usual ingenuity by the water supply units.

There was insufficient labour and materials to repair the roads and railways. On 26 February 1917 I Anzac Corps engineers opened the Albert-Pozieres-Le Sars main road to traffic but estimated that it would require 2,500 tonnes of road metal per mile to keep it open, whereas only 300 tonnes were on hand. I Anzac Light Railways, a new unit formed on 28 December 1916 to operate and maintain the tramways, an increasingly important form of transport in the forward area, set to work extending the network. Owing to the muddy ground, especially where it had been extensively shelled, the normal 7.2 and 9.5 kg rails were found to be inadequate unless heavily ballasted, which required more time, materials and manpower than was available, so heavy section 14 to 34 kg rails were scrounged or salvaged and laid on full sized sleepers. By May I Anzac Light Railways was hauling 558 tonnes daily. The corresponding strain on horses was great because with the roads out of commission, only animal transport could keep up with the columns. To keep its guns firing, the 54th Field Artillery Battery used a mule.

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42 Letter, Major General C.B.B. White to Major Generals J.J.T. Hobbs and N.M. Smythe, 18 March 1917, AWM26 152/6
43 Minutes of Army Commanders' Conference, 24 March 1917, AWM51 52, p. 110
44 GS Circular 65, "Corps RFC Organisation", AWM26 152/6
45 "Notes on points of Interest in Recent Operations", AWM26 152/8
46 Extracts from War Diary, I Anzac Corps Water Supply Officer, AWM26 182/3 part 2
47 Report, Chief Engineer I Anzac Corps to HQ I Anzac Corps 26 February 1917, AWM26 156/18
48 Letter, Lieutenant General Birdwood to HQ British Fifth Army 2 March 1917, AWM26 152/5
49 "Anzac Light Railways Report" 16 May 1917, AWM26 182/1 part 1
train of 140 mules. Not only was the BEF short of horses but many horses had been diverted to other purposes over the winter and their sudden withdrawal back to their nominal duties caused some disruption. At the same time, the GHQ was considering ways to economise on horses, because remounts and fodder were taking up scarce shipping space. Field Marshal Haig was unwilling to reduce the number of cavalry divisions but economies of 26,300 horses were effected across the BEF.

As a means of forcing the pursuit to move more slowly and cautiously, the Germans made widespread use of booby traps. These could be activated mechanically, electrically or by using a timer. Considerable ingenuity went into these devices. A shovel stuck in the side of a dugout between the timbers, a stove with the stove pipe nearby, cap badges or other tempting souvenirs, a nail sticking out of a board, a book on a table or a lump of coal, all could be deadly booby traps. In addition, hand grenades were left in trenches in a condition where they could explode at any moment, and roads were mined. The worst incident was the explosion of a delayed action mine in the Bapaume Town Hall on 25 March 1917, killing 24 Australians.

The two Australian columns both advanced faster than the British forces on their flanks, compelling Brigadier General H.E. Elliott's column to occupy some positions in a neighbouring sector. Elliott's column was spearheaded by the 13th Light Horse Regiment, which proved that mounted troops were still both mobile and survivable, able to pass through small arms and artillery fire which might have stopped infantry. However Elliott felt that their usefulness was limited by their lack of automatic weapons. A vanguard of infantry then followed, accompanied by engineers and machine gunners. The infantry generally moved in artillery or "diamond" formation with the platoons of each company disposed in a diamond pattern, and the sections of each platoon disposed the same way. The new infantry organisation proved ideal for the conditions of semi open warfare, as it had more firepower and flexibility than the 1914 platoon. Fire and movement was used when confronted by the enemy, with one unit providing cover while another advanced.

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50 Major J. D. Lavarack, "Notes on the work of field artillery during the recent advance of I Anzac Corps", AWM26 182/2
51 "Notes on Recent Operations of Fourth Army" by General H. S. Rawlinson, 3DRL2316/24
52 OB 1859 British Second Army 9 May 1917, AWM26 183/1 part 2
53 Minuted Field Marshal Haig to War Office, 6 June 1917, AWM26 185/3
54 "German Ruses", GHQ Summary of 8 April 1917, AWM25 45/144/3
55 Bean, C.E.W., The Official History of Australia in the War of 1914-1918, Volume IV: The AIF In France 1917, Sydney, Angus and Robertson, 1929, pp. 205-206
56 "Notes on points of Interest in Recent Operations", undated, AWM26 152/8
57 GOC 15th Infantry Brigade, "Advanced Guards Operation Order No. 1", 17 March 1917, AWM26 177/2
58 Bean, IV: The AIF in France: 1917, pp. 163-165
Firing Lewis guns from the hip became standard procedure. In the 15th Infantry Brigade, slings were attached to the radiator with copper wire, enabling the Lewis to be fired even when it became red hot, the gunner holding the sling with his left hand. Towns were cleared by Lewis guns firing down the streets while bombers cleared the houses on both sides. A general criticism of the infantry was that they had become too used to using the bomb and bayonet and were not using their rifles to maximum effect.\(^5\) This of course was a hangover from trench warfare, where all infantry fighting was done at close ranges with bombs and bayonet. Many infantrymen had simply forgotten the capabilities of the rifle.

Another departure from trench warfare was in signalling. In the trenches, posts had been connected up by telephone. This could not be laid quickly enough to keep up with the advance, nor could wire that had been laid be retrieved fast enough. Signal wire soon ran short. Units were enjoined to exercise economy in its use and expenditure on lines of no tactical importance was prohibited.\(^6\) Units were encouraged to make greater use of radios as an alternative means of communication.\(^7\) All arms, but particularly the

\(^5\) “Notes on points of Interest in Recent Operations” undated, AWM26 152/8
\(^6\) Minute from BGGS I Anzac 21 May 1917, AWM26 181/1 part 1
\(^7\) General Staff Circular No. 61 "Trench Wireless Sets" 21 March 1917, AWM26 181/1 part 1
artillery, rediscovered visual signalling. 62 The use of smoke was now easier as the workshops had modified P bombs to be fired as rifle grenades. 63

This was no pursuit of a demoralised and defeated enemy, but a deliberate, planned, fighting withdrawal. A typical rear guard consisted of three detachments of 112 hand picked men, three platoons of 40 storm troopers, six mounted patrols of six mean each, 12 machine guns and 6 field guns. 64 Such a force had the firepower to hold up one of the columns. The rear guards used the textbook tactic of holding strong points with intervals between them. Australian tactics were to avoid the strong points, outflanking or enveloping them where possible and in most cases the Germans withdrew rather than allow themselves to be surrounded. 65 The capture of the towns of Fremicourt and Beumetz by double envelopment was a personal vindication for Elliott, whose advocacy of such tactics before the war had been deprecated by the same Major C.B.B. White who was now the Corps chief of staff. 66 In his handling of his column, Elliott favoured advancing as fast as possible to keep the enemy off balance. He was still at tactical odds with White, who favoured a systematic approach with columns halting on preset lines and the cavalry patrolling forward. 67 White seemed not to grasp how frustrating, absurd and costly this would have seemed to the men in the front line.

The enemy was quite capable of launching surprise counterattacks. Lewis guns, bombs and bayonets defeated two such counterattacks on the town of Beumetz, held by Elliott's column, on 23 and 24 March 1917 with disproportionate losses inflicted on the enemy. 68 Counterattacks against the 15th Infantry Brigade were often defeated before they developed by the air/artillery team, using wireless and a zone call system. This involved the aircraft communicating a location or "zone" from a pre-arranged signal and the artillery opening fire on it. The fall of shot would then be adjusted as required. 69

The Germans completed their withdrawal to the Hindenburg Line by the end of March but held the villages in front of it as an outpost line. These were systematically attacked. Normally the town was cut off by single or double envelopment followed closely by an assault on the village itself, thus pinning the defenders in place. When the envelopment

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62 "Notes on Recent Operations of Fourth Army" by General H. S. Rawlinson, 3DRL2316/24
63 MGGS British Fifth Army 26 February 1917, AWM26 180/1
64 "Notes on Captured Orders of 1st Guards Reserve Division", Annex to GHQ Summary of 15 March 1917, AWM25 45/144/2
65 Letter, Brigadier General H.E. Elliott to Captain C.E.W. Bean, 29 August 1927, AWM26 3DRL606/260/1
66 Note, Major C.B.B. White to Lieutenant Colonel H.E. Elliott, 1912, AWM38 3DRL606/260/1
67 Letter, Major General C.B.B. White to Major Generals J.J.T. Hobbs and N.M. Smythe, 18 March 1917, AWM26 152/6
68 "Operations - 5th Division" 26 March 1917, AWM26 152/6
69 "Notes on points of Interest in Recent Operations" undated, AWM26 152/8
went ahead swiftly, most of the garrison was captured. None of the attacks used extensive artillery support and some were successful without any, a development made possible by the increased firepower of the infantry. However, all required excellent staff work, initiative, resolution and timing on the part of the infantry. Notably, one of these attacks, the double envelopment of the town of Hermies by the 2nd and 3rd Infantry Battalions, was the first major attack in the history of the AIF to go exactly according to plan.70

In support of the upcoming British and Canadian attack at Arras scheduled for 8 April 1917, Gough wished to launch an attack on the Hindenburg Line itself. It was an extraordinarily strong position. Trenches were sited on reverse slopes where they could not be observed from the ground and there was extensive barbed wire, two to four belts strictly parallel, about 5 metres apart, the width of each belt varying from 10 to 15 metres. Some were sunken, some in a serrated pattern, constructed so as to be covered by machine guns firing in perfect enfilade. There were no anti-tank gun positions.71

Cutting barbed wire had long been a serious tactical problem and a number of techniques had been tried, the most simple being cutting it by hand with wire cutters. This was effective, but costly if it had to be done under fire. Another technique was to use artillery fire. It was discovered that neither shrapnel nor high explosive shells were very efficient at cutting wire. In 1915, the French produced a new kind of fuze they called the Fusée Instantée Allongée (elongated instantaneous fuze), which contained a brass tape that unwound during flight. Once unwound, it freed the hammer. When the shell hit the ground, this struck the mercury fulminate detonator, which set off the primer and exploded the shell. British inventors made some changes to improve its safety, reliability and suitability for mass production resulting in Type 106 percussion fuze.72 The result was a shell that exploded on impact with all but the softest ground. The explosion produced no crater, but deadly steel splinters were sprayed over the ground at high speed and could kill a man 800 metres away and hence the infantry called them "ground shrapnel" or "daisy cutters". This new fuze promised to be very efficient against wire. The first Australians to see them demonstrated were the Siege Brigade on 20 September 1916.73 The British Fifth Army, of which I Anzac Corps was a part, was

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70 Bean, IV: The AIF in France: 1917, pp. 250-251
71 "Notes on the Hindenburg Line in the Neighbourhood of Bullecourt", AWM26 152/7
72 Hartcup, The War of Invention, pp. 57-59
73 "The Australian Siege Brigade in the Great War", AWM224 MSS686, p. 4; Bean, IV: The AIF in France: 1917, p. 99
allocated 5,100 Type 106 fuzes on 9 February 1917,74 and some were used by I Anzac Corps in a minor attack on 1 March, fired by a British siege battery.75

There had not yet been time to cut the Hindenburg Line's wire. Only with the capture of Noreuil, the last of the outpost villages opposite Bullecourt, on 2 April could the field artillery be brought within range. Even then, ammunition supply still posed a problem. The broad gauge railway network only reached Bapaume on 6 April and the road system was not yet able to handle fully laden trucks.76

Accordingly, the task fell on the I Anzac Corps Heavy Artillery. The 60 pounders and 6 inch howitzers had proven themselves sufficiently mobile to keep up with the advance, which Gough considered to be the outstanding tactical lesson of the campaign.77 On 2 April, they were ordered to begin the bombardment of the Hindenburg Line.78 But sufficient ammunition to cut the wire had not yet been brought up owing to the higher priority given to road making material.79 Using a mix of 6 inch, 8 inch and 9.2 inch howitzers,80 two bombardment groups fired some 12,346 shells between 5 and 8 April while two counterbattery groups fired another 11,235 shells.81 Only a small proportion had 106 fuzes, of which only 12,000 - all I Anzac Corps had - had been expended by 15 April.82 When they ran out, wire cutting was carried out by the 4.5 inch howitzers of the field artillery using HE.83

Gough's response to the problems of artillery, ammunition and wire was a technological and tactical innovation. From the beginning, 12 tanks had been earmarked to support the attack.84 Tank officers put forward a proposal to have the tanks advance in front of the infantry instead of behind, tearing up the barbed wire and suppressing the enemy machine guns while the artillery concentrated on neutralising their German counterparts.85 While tanks had been in use on the Western Front since September 1916, Australian soldiers knew them only as wrecks on the old Somme battlefield.

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74 Minutes of Army Commanders’ Conference, 24 March 1917, AWM51 52, p. 62
75 Falls, Cyril, *Military Operations: France and Belgium, 1917, the German retreat to the Hindenburg Line and the Battles of Arras*, London, MacMillan, 1940, p. 103
76 Bean, IV: *The AIF in France: 1917*, pp. 259-267
77 MGGS Fifth Army to I Anzac Corps 23 March 1917, AWM26 180/2
78 BGGS to BGHA S1874, 2 April 1917, AWM26 152/7
79 Bean, IV: *The AIF in France: 1917*, p. 261
80 "Wire Cutting on Anzac Front", 2 April 1917, AWM26 152/6
81 I Anzac Heavy Artillery War Diary, AWM26 152/6
82 "Wire Cutting on Anzac Front", 2 April 1917, AWM26 152/6
83 Bean, IV: *The AIF in France: 1917*, pp. 259-267
84 BGGS I Anzac Corps, "Preliminary Instructions for Next Operations", 2 April 1917, AWM26 152/7
85 Bean, IV: *The AIF in France: 1917*, pp. 272-274
The night of 10 April 1917 found the men of the 4th Division waiting out in the snow for the tanks to arrive. Just after daybreak, word came that the tanks had not arrived and the stunt was off and the diggers got up and walked back across the open, shielded from German observation by a snowstorm. Gough ordered the operation to be repeated the next night. This time, the infantry were to attack even if the tanks failed to arrive. The I Anzac Corps staff showed little appreciation of the capabilities of the new technology. The timing of the operation was off because they failed to realise that the tanks could not advance at fast as the infantry, and the instructions from Gough regarding the drowning out of their approach noise by machine guns had not been implemented.

The result was a frontal attack on the Hindenburg Line without the benefit of a barrage and with precious little armoured support, which in any case followed the infantry. Captain Albert Jacka, who had won the Victoria Cross at Gallipoli, submitted a scathing report in which he labelled tanks "worse than useless", roundly criticising the crews' lack of punctuality, reliability, professionalism, organisation, leadership, efficiency and courage. In conclusion, he stated that:

In my opinion, manned by the bravest crews and placed directly under the infantry officers concerned, tanks would be of great help but they should never be relied on as the sole means of support.

To stop them, the Germans used artillery, trench mortars and machine guns firing steel tipped armour-piercing bullets.

Two enemy aircraft which were neither engaged by antiaircraft guns nor intercepted by friendly aircraft observed the field batteries firing in the Noreuil Valley, where they were packed close together with little cover, and brought down heavy counterbattery fire from guns of all calibres for 48 hours. The German batteries firing were not located and the counterbattery fire was largely ineffective. Reports of the Forward Observation Officers (FOOs) were inaccurate all day. They frequently could not tell Australian soldiers from the enemy and caused problems with the protective barrage when it was needed most.
The amazing thing was that the infantry of both attacking brigades were able to capture parts of the Hindenburg Line. In this they were aided by the poor visibility, the fact that enough of the wire had indeed been cut to allow some units to get through, albeit with heavy casualties, the new platoon organisation, which gave the infantry the firepower to fight back, and superb leadership. This was not enough to hold the position, however, and the two brigades were bombed out. The Australians had brought 16 Vickers machine guns forward but they were useless against bombing attacks and 14 were lost.93

In withdrawing to the Hindenburg Line, the Germans not only reduced the length of their front line, they also held it more thinly, thus building up a large reserve. Haig responded by thinning out his lines as well and as a result, the 1st Division found itself occupying 12,000 metres of front. It was distributed in depth according to British doctrine, except that in some cases the line was held so thinly that sentry posts were strung out between the piquets rather than in front of them, making the support line the true piquets.94

93 DMGO 2nd Division to CMGO I Anzac Corps, 27 April 1917, AWM26 184/1
94 First Division G1905 13 April 1917, AWM26 157/4
Defence in Depth (March 1917)\textsuperscript{95}

<table>
<thead>
<tr>
<th>Line</th>
<th>Where</th>
<th>Strength</th>
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<tbody>
<tr>
<td>Sentry Posts</td>
<td>Section (4-7 men)</td>
<td></td>
</tr>
<tr>
<td>Front Line (Piquets)</td>
<td>Outposts in front of the villages of Noreuil, Lagnicourt, Boursies, Demicourt and Hermies</td>
<td>Platoon (15-20 men with a Lewis gun)</td>
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<tr>
<td>Supports</td>
<td>400 to 1,000 metres back</td>
<td>Remaining platoons of forward companies</td>
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<tr>
<td>Reserve</td>
<td>1,000 metres back</td>
<td>Remaining companies of forward battalions</td>
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<tr>
<td>Second Line</td>
<td>2.5 to 3.5 kilometres back</td>
<td>Remaining battalions of forward brigades</td>
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<tr>
<td>Corps Main Line</td>
<td>5 to 8 kilometres back</td>
<td>Remaining brigades of forward divisions</td>
</tr>
<tr>
<td>Corps Reserve Line</td>
<td>9 to 11 kilometres back</td>
<td>Forward units of Corps Reserve division</td>
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</table>

In typical British fashion, orders were to hold the forward line "at all costs" although the value of doing so was slight. The Defence Scheme also called for special attention to be paid to barbed wire entanglements,\textsuperscript{96} but the diggers felt that barbed wire gave away the location of their camouflaged positions and would only erect it if under strict orders to do so.\textsuperscript{97}

\textsuperscript{95}Bean, IV: \textit{The AIF in France: 1917}, pp. 356-358
\textsuperscript{96}HQ I Anzac Corps, "Defence Schemes", 24 November 1916, AWM26  114/26
\textsuperscript{97}Brigadier General C. Rosenthal, "Notes Re German Attack April 15th", 19 April 1917, AWM26  170/12
### Left Sector
1st, 2nd and 4th Divisional Artilleries and
12th (Army) Field Artillery Brigade

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<thead>
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<th>Rounds</th>
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<th>Total Weight (tonnes)</th>
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### Right Sector
5th Divisional Artillery and 3rd (Army) Field Artillery Brigade
(approximate figures only)

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### Heavy Artillery

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On 15 April 1917 the Germans launched a counter attack against the 1st and 2nd Divisions near Lagnicourt. The piquets fought back hard with rifles, grenades and Lewis guns and a surprisingly large number actually drove off the enemy. Others held out until

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98 Brigadier General C. Rosenthal, "War Lessons", 19 April 1917, AWM26 170/12
they ran out of ammunition, then fell back if they were able or surrendered if surrounded. In most places the line was driven back to the supports where the Germans encountered the Vickers machine guns. Only at one point did they break through, recapturing Lagnicourt, behind which were the guns of the 2nd Field Artillery Brigade. To defend itself, each battery had only 10 rifles although the establishment provided for 36, but rifles were still in short supply and some had been left behind in the wagon lines.99 This being completely inadequate the brigade commander, Lieutenant Colonel G.I. Stevenson, ordered his men to remove their gun sights and breech blocks and abandon the guns.100 Other batteries continued firing, but prepared to pull out.

Meanwhile, I Anzac Corps Heavy Artillery had opened up. By mid-morning reserve battalions were successfully counterattacking and the artillery ceased fire at 1000.101 All told, the field artillery fired 21,135 shrapnel and 13,264 high explosive shells, and the heavies fired 8,243 - a total of 43,263 shells.102 Although 21 guns and howitzers had been in German hands for two hours, only 4 18-pounders and a 4.5 inch howitzer had been destroyed.103

Defeating this attack cost I Anzac Corps 1,010 men, of whom over 300 were prisoners. The Germans lost 2,313 of whom 362 were captured.104 The efficacy of the Defence Scheme was affirmed although it was about to be superseded. There was some soul searching about the loss of guns, which could have been much worse. However, the fact was that in order to be tactically useful, the field artillery had to be deployed forward, often in the zone of another division and there were only so many areas where the guns could be located. The provision of adequate guards for the guns was not an efficient use of infantry and so, in the end, the matter was dropped.

Inevitably, another attack on the Hindenburg Line at Bullecourt was ordered. A new technic was used to clear paths through the wire; twenty Bangalore torpedoes - long steel tubes filled with ammonal - were exploded.105 The heavy artillery was increased to 31 batteries. Counterbattery groups hammered the German gun positions while the rest of the artillery pounded the Hindenburg Line and cut the wire. This was not accomplished without loss. The Germans knew where the artillery was now and vigorously shelled the area. They now had percussion fuzes too and used them and gas

99 Brigadier General C. Rosenthal, "Notes Re German Attack April 15th", 19 April 1917, AWM26 170/12
100 "Proceedings of a Court of Enquiry held in the field on 16 April 1917", AWM26 157/5
101 Brigadier General C. Rosenthal, "Notes Re German Attack April 15th", 19 April 1917, AWM26 170/12
102 Bean, IV: The AIF in France: 1917, p. 403
103 Brigadier General C. Rosenthal, "War Lessons", 19 April 1917, AWM26 170/12
104 Bean, IV: The AIF in France: 1917, pp. 356-358
105 I Anzac Corps GS, "Summary of Operations for week ended Friday 27 April 1917", AWM26 153/1
shells to devastating effect. Over the period from 1 April to 13 May the field artillery lost 5 18-pounders and 6 4.5 inch howitzers to enemy shellfire. Personnel losses were also severe: 112 killed, 319 wounded and 20 missing, which represented 25% of the artillerymen engaged.

This time, the infantry were provided with a creeping barrage advancing at a rate of 90 yards in three minutes. To keep German infantry and machine guns behind the Hindenburg Line at bay, searching fire was laid down. A barrage moved back and forth up to 300 yards from the standing barrage. This was found to be not far enough and Rosenthal recommended that in future operations the searching fire should range out to 800 yards. FOOs were provided with power buzzers that proved very successful, but they needed more training in their use. Maps of the barrage were produced and 300 copies were lithographed by the I Anzac Corps Topographical Section. A machine gun barrage was incorporated into the plan. The Corps Machine Gun Officer, Lieutenant Colonel L.F.S. Hore, added the 5th Division's 8th and 14th Machine Gun Companies to the 2nd Division's four organic companies bringing the total number of Vickers machine guns in support to 96. Steps were taken to make sure that the attackers had plenty of ammunition and bombs. To avoid the enemy barrage, the infantry waves bunched up at the jumping off point so that the enemy SOS barrage would fall behind them. This ploy was entirely successful. The infantry rehearsed the attack over an area similar to the target by day and night, the one on 30 April being supervised by Gough and Birdwood. As at Gallipoli, Birdwood hoped to attack at night but British units involved in other attacks that day wanted daylight. Haig set the starting time at 0345, 15 minutes after moonset and 40 before sunrise.

However good the plan looked on paper, it still had serious flaws, ones that should have been picked up. Despite all efforts, some of the wire was still not cut and the enfilading machine guns were not suppressed, or even targeted, which spelt disaster for troops attacking on the right, nor was the line of approach chosen with due consideration of the ground.

Nonetheless, the 6th Infantry Brigade managed to capture part of the Hindenburg Line and hang on. In the fighting, the tendency of the diggers to use the bomb and bayonet in preference to the bullet was again noted. The rifle grenade was also extensively used.

106 Bean, IV: *The AIF in France: 1917*, pp. 359-360, 414
107 Brigadier General C. Rosenthal, “War Lessons”, 19 April 1917, AWM26 170/12
108 Brigadier General C. Rosenthal, “Lessons Learnt in the Recent Fighting”, 7 May 1917, AWM26 181/1 part 4
109 Bean, IV: *The AIF in France: 1917*, pp. 422-426
some units expending twice as many rifle grenades as ordinary hand grenades. Over the next weeks, the Hindenburg Line around Bullecourt would be the scene of brutal fighting as the British and Australian armies clawed a chunk out of the Hindenburg Line. The 1st Division and then the 5th was committed to hold the gains against furious German counterattacks. The effort cost 7,481 casualties. Afterwards, I Anzac Corps was withdrawn from the line for a well-deserved rest.

Meanwhile, the major effort of the year was about to begin. It is to this that we now turn.

110 “Lessons from fighting of 1st and 2nd Division at Bullecourt”, AWM26 182/3
111 Bean, IV: The AIF in France: 1917, pp. 543-544
5. Messines and Third Ypres

For the BEF, most of the second half of 1917 would be consumed in an attempt to drive Germans from the North Sea coast. In this the Australian forces in France and Belgium, numbering 121,682 on 30 June 1917, would play an important part.

The first stage of the Flanders Plan was a long time in gestation, first being discussed in March 1916 while the British Second Army, responsible for the Flanders sector, submitted its first draft of the battle plan on 21 April 1916. On 18 March 1917, its commander, General Sir H.C.O. Plumer, was ordered to put the plan into effect.1

Aptly codenamed "Magnum Opus", the Messines Plan called for an attack by three corps on the enemy salient around Messines and Wytschaete. The II Anzac Corps, consisting of a British division, the New Zealand Division and the 3rd Division would make the southern prong of the attack. When Haig enlarged the plan somewhat to take in the whole objective in one day, the 4th Division was added to capture the final objective. Major General John Monash, the commander of the 3rd Division, carefully studied reports on the German withdrawal, the Bullecourt fighting and, in particular, the Canadian attack on Vimy Ridge. On 8 May he paid the Canadian Corps a visit to find out more about why this operation had been so successful. Monash noted a great many things, including the use of type 106 fuzes for wire cutting, the counterbattery fire arrangements, the value of the new platoon organisation, the machine gun barrage, ammunition supply arrangements and more.2

The Messines plan was thrashed out in a series of conferences. At Monash's divisional conferences, the heads of all branches were required to attend and no detail was apparently too small to be discussed. Circulars were issued covering matters as diverse as "Water Supply", "Burial of the Dead", "Anti-Aircraft" and "Tanks".3

Enough aerial photographs were produced to allow every battalion commander to have his own set of photographs of the battlefield and they were expected to show them to at least their company commanders.4 The 3rd Pioneer Battalion constructed a contour model on the scale of 1:100 horizontal and 1:26 vertical, showing the ground to be

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1 British Second Army G288, 21 April 1916, AWM51 53, pp. 1,6,57
2 Monash Papers, 8 May 1917, AWM 3DRL2316/24
4 Notes from Corps Commanders' Conference 9 May 1917, AWM26 193/28
captured and features such as the enemy trench systems, ditches, hedges, ruins, roads, trench tramways and wire obstacles, and all personnel were encouraged to study it.\(^5\)

The engineers made extensive preparations for the attack. Camouflaged artillery positions were constructed with platforms for the 6 inch and 9.2 inch howitzers, shell proof command posts and tram lines for ammunition supply. Shell proof shelters for the artillery group headquarters were constructed from elephant iron and sand bags. Engineers also constructed roads and tramways.\(^6\)

By far the greatest engineering feat was that of the tunnellers. Underground warfare had been active in this sector since 1915 and the long lead time for the operation gave ample opportunity for tunnelling. In July 1916 Canadian tunnellers had charged a mine under Hill 60 in the northern part of the Messines salient with 24 tonnes of ammonal and tamped it, that is filled the gallery leading to it with bags of earth brought from another mine further south under a feature called the Caterpillar. In October 1916, that mine too was charged with 32 tonnes of ammonal and tamped. For the next six months the miners of the 1st Tunnelling Company, who relieved the Canadians in November 1916, waged a private war underground to protect the two big mines. Camouflets were blown to destroy German mines but sometimes these came within metres of the Australian tunnels. In the end, they were successful and their efforts were rewarded when the two great mines were finally blown on 7 June 1917, making craters 80 and 100 metres wide and killing 687 Germans.\(^7\)

The artillery plan was the most detailed yet. Wire cutting began on 21 May using 18 pounders, 2 inch medium trench mortars and 6 inch howitzers with 106 fuses, of which 200,000 were provided for this operation, 6,000 for the use of the 3rd Division alone.\(^8\) The field artillery assigned to the 3rd Division was increased to 120 18 pounders and 30 4.5 inch howitzers while its medium and heavy trench mortars were increased to 40 and 8 respectively.\(^9\) The artillery was completely reorganised, with the 4.5 inch howitzers being formed into separate groups. On 28 May the barrage was intensified. The enemy guns responded. As the batteries were packed close together, boxed ammunition was stored close by and the whole covered in inflammable camouflage, some quick thinking was required of the gunners at times to prevent serious loss.\(^10\)

\(^5\) Minute, 3rd Division to Brigades, 20 May 1917, AWM26 193/29
\(^6\) GHQ Engineer in Chief "Extracts and Reports by Chief Engineers and CREs Who Took Part in the Operations of the Second Army at Messines Ridge", undated, AWM26 185/20
\(^7\) Bean, IV: The AIF in France: 1917, pp. 949-959
\(^8\) Notes from Corps Commanders' Conference of 9 May 1917, AWM26 193/28
\(^9\) II Anzac Corps, "Magnum Opus - Artillery Instructions for the Attack, 25 May 1917, AWM26 191/4
\(^10\) Lieutenant Colonel W.L.H. Burgess, L Group Artillery Report, undated, AWM26 191/1
Counterbattery fire was given a high priority and over the next ten days, II Anzac Corps artillery allotted 52 heavy howitzers to counterbattery and 116 to bombardment, carried out 124 destructive shoots on enemy batteries and claimed to have neutralised enemy batteries 587 times. Practice barrages, duplicating that of the attack, were carried out on 3 and 5 June. Throughout, harassing fire was kept up on enemy light railways, roads, billets and headquarters. On Zero Day the protective barrage of 18 pounders firing one round per minute started 300 metres ahead and moved back and forth. The guns and howitzers of the standing barrage fired only on the SOS signal. Gas was also a feature of the plan. On the days leading up to Zero Day, a mixture of gas and smoke was fired. On Zero Day smoke only was fired, in the hope that the enemy would put on their gas masks anyway, thus further restricting their vision and movement.

Like the artillery, the medical units were completely reorganised, with the tent subdivisions of the six field ambulances of the 3rd and 4th Divisions grouped into two collecting stations and an advanced dressing station while the bearer subdivisions were grouped together. Wounded were evacuated to the corps main dressing station and the 1st and 2nd Casualty Clearing Stations.

Telephone communications were extensive and critical. The signallers worried about the safety of the exchanges, on which everything depended, which were not underground and which often had ammunition stockpiled nearby. Increased use was made of wireless communications by the flying corps. Wireless intelligence was also widely used. Listening stations plotted the German field stations and the heavy artillery was turned on them. German aircraft were also tracked by the listening stations, which alerted the anti-aircraft guns and the vectored aircraft to intercept.

One of the lessons of the Vimy Ridge battle in April 1917 was the value of the machine gun barrage, and forty of the 3rd Division's 64 Vickers Machine Guns were assigned to the barrage. The gunners were carefully trained in barrage work and the Corps Machine Gun Officer (CMGO) supervised practice barrages, from emplacements other than those to be used in the battle, and directed against targets other than those to be

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11 MGGS British Second Army, "The Battle of Messines", 18 July 1917, AWM26 187/11
12 II Anzac Corps, "Magnum Opus - Artillery Instructions for the Attack, 25 May 1917, AWM26 191/4
13 Proceedings of Corps Commander's Conference, 5 June 1917, AWM26 191/4
14 Bean IV: The AIF in France 1917, p. 681
15 Lieutenant Colonel W.L.H. Burgess, L Group Artillery Report, undated, AWM26 191/1
16 British Second Army Intelligence, "The Operation of Wireless Intelligence" - Battle of Messines June 1917, undated, AWM26 205/1
17 II Anzac Corps Instructions No. 2, "Machine Guns", 28 May 1917, AWM26 191/4
engaged. The life of a gun barrel was calculated at 25,000 rounds but for barrage work it was reckoned as being safe only for 15,000. As 15,000 rounds were estimated to be one day's firing, the CMGO endeavoured to supply every gun with two spare barrels. This was not possible however. In all, machine gunners of the 3rd Division fired 264,000 rounds before Zero day, 656,000 rounds in the barrage and 920,000 rounds in response to SOS calls - a whopping 1,840,000 rounds in total.18

Supplies were moved forward first by broad gauge rail, light rail and trench tramways. Captain R.W. Dawson of the 3rd Divisional Train was appointed Divisional Pack Transport Officer and a mule train of four Pack Troops was placed under his command, one for each brigade and one for the division. Each troop consisted of twelve Pack Transport Sections with 7 men and 12 mules each. The mule trains would bring up water, ammunition and rations, including hot meals, sometimes right to the front line.19 Contingency plans were made to cover possible disruptions to trench tramway system.20

Water Supply for the assault troops was provided in 1600 petrol tins while plans were made to lay pipe lines,21 although the pipes proved vulnerable to enemy artillery fire. Each Lewis gun team carried 50 Lewis gun drums, each rifle grenadier carried 6 rifle grenades and 8 hand grenades, each bomber carried 14 hand grenades and two P bombs and each rifleman carried 4 hand grenades. Riflemen carried 170 rounds of small arms ammunition while Lewis gunners, rifle grenadiers, bombers and runners carried 50, giving a 40 man platoon a total of 3,560 rounds.22 Each assault battalion had attached to it a platoon from a reserve battalion as a carrying party, each carrying 224 Lewis Gun magazines.23 Yukon Packs, a Canadian invention, were used for carrying, which enabled a man to carry 20 kg, or 30 kg over short distances.24

Efforts were made to conceal the approach from enemy aircraft and the 3rd Division painted their bayonets black to prevent them gleaming in the moonlight. Experience at Vimy Ridge had shown that such a severe bombardment would leave the ground so pock marked with craters that the enemy fire and communications trenches would be obliterated with the result that enemy dugouts might appear in unexpected places. The solution was to have mopping up parties systematically search all the shell holes as each

19 Bean, IV: The AIF in France: 1917, p. 680
20 British Second Army Magnum Opus Circulars No. 17 "Supply", AWM26 194/5
21 British Second Army Magnum Opus Circulars No. 19 "Water Supply", AWM26 194/5
22 3rd Division "Fighting Strength of an Average Battalion", 17 May 1917, AWM26 194/5
23 "Lectures (By Military Officers) Machine Guns including Lewis Guns", AWM25 385/4
24 GHQ Engineer in Chief "Extracts and Reports by Chief Engineers and CREs who took part in the Operations of the Second Army at Messines Ridge", undated, AWM26 185/20
could potentially contain snipers or machine guns.²⁵ Mopping up parties had been utilised on the Somme in 1916 by British units, but now their use was doctrine throughout the BEF, and far more formalised. German counterattacks were expected. The immediate counterattacks would have to be dealt with by the assaulting troops and the reserves behind them. The idea was to overwhelm the immediately available reserves. The more dangerous counterattacks organised in depth, would be dealt with by not allowing the advance to continue beyond the range of the artillery. Such counterattacks would then run straight into the standing and protective barrages.

The detailed planning paid off on Zero Day, 7 June. Few battles went so far according to plan as this one. The bombardment, barrages and explosion of the mines dazed the enemy and resistance was weak. The artillery easily dealt with the only counterattack. A number of allied casualties at this stage resulted from the line being held too heavily, because casualties in the initial stages were lower than expected. The afternoon advance to the final objective was tougher. For the first time "leap frogging" was done with divisions, the 4th Division passing through the New Zealand Division. This arrangement would complicate the defence plan no end over the next few days but worked fine on Zero Day. The 12th Infantry Brigade made good use of three tanks, one of which facilitated the capture of 120 prisoners.

Because of the low-lying nature of the ground, the enemy made extensive use of concrete blockhouses. A layer of water bearing sand 20 feet below the surface made the construction of deep dugouts impossible, so steel reinforced concrete was used. By trial and error, the Germans found that the best results were obtained from the use of steel reinforcing rods rather than beams, and having layers of reinforcement at the top and bottom with a broad slab of concrete in the middle. Difficulties in constructing these caused the Germans to develop the technology of ferro-concrete blocks with holes in them for steel rods. Due to the weight of the blocks, these structures could only be built near tramways.²⁶ Some of these had loopholes for machine guns and were therefore true pillboxes; others were merely concrete shelters from which the crew would have to emerge and set up their machine guns. In the forward zone, heavy howitzers broke them up and then the 4.5 and 6 inch howitzers finished the job. The German fall back position, the Oosttaverne Line, also contained a number of them. The new platoon organisation introduced into the AIF proved excellent for pillbox fighting. The platoons were able to mask the loopholes with Lewis gun fire and grenades so that they could approach to a range from which grenades could be tossed through an aperture.²⁷

²⁵ British Second Army Magnum Opus Circular No. 9 "Moppers Up", 10 May 1917, AWM26 193/29.
²⁶ GHQ E-in-C Field Works Notes No. 31, 27 August 1917, 3DRL2316 25
²⁷ Bean, IV: The AIF in France: 1917, pp. 620-627
### Casualties of British Second Army at Messines

1 to 12 June 1917

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<td><strong>7 to 12 June</strong></td>
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In creating an Australian version of Vimy Ridge, the 3rd Division lost 4,122 men and the 4th Division 2,677. Once again, the infantry took the worst of the casualties, but at a much lower rate than on the Somme, whereas the artillery casualty rate had increased dramatically, especially among officers. The trend was a disturbing one, because the monthly reinforcements were fixed at 15% of the infantry but only 3% of the artillery. If this trend continued, the absolute strength of the artillery would inevitably begin to decline.

At last, the BEF had realised its boast that it had the technics to crack any German defensive system, however strong. The advance could be made a matter of scientific precision, but only with all available technologies utilised to the fullest and employed in cooperation. That the high quality of staff work required was actually achieved was a hopeful sign for the future. However, the concentration on the technics of the set piece battle, as the meticulously planned assault came to be called, overshadowed another significant outcome of the new technologies. In fighting their way through the Oosttaverne Line, the infantry of the 3rd and 4th Divisions had demonstrated the increased capabilities of the new platoon organisation and the new technologies. While brave men were still getting killed, they were becoming increasingly effective.

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28 GS British Second Army, undated, AWM25 51/53
29 Bean, IV: The AIF in France: 1917, p. 682
30 Bean, III: The AIF in France: 1916, p. 867
The battles of 1916 and 1917 influenced the tactics of the enemy too. For some time, the German Army had been rethinking its doctrine based on its experience in the Somme campaign. What had impressed the Germans most was the awesome firepower of the allied artillery. Previously they had used first trenches and then deep dugouts to prevent destruction. The Australians had countered this by following the barrage so closely that the defenders became trapped in the dugouts and were wiped out with P bombs. At the same time, increasingly strong allied artillery was obliterating the front line systems and making survival in the forward area in anything less than deep dugouts problematic. The British were increasingly able to achieve observation, acquisition and destruction.

The Germans sought to prevent acquisition by thinning out the front line and moving as many defenders as possible back out of range of the Allied artillery. Trench lines were dispensed with. For defensive purposes, there would be an Outpost Zone, a Battle Zone and a Rear Zone. The allied forces would then be counterattacked. This had always been a key part of German doctrine, but had not been successful on the Somme because the counterattacks had to often been shattered by allied artillery. The idea now was to counterattack in the Battle Zone, where the artillery would be out of range or unsure of the German positions. The Germans classified counterattacks into three types. Immediate counterattacks were those made as soon as the trench system was penetrated by assault detachments of the troops in the line and battalion reserves. The second type was counterattacks organised in depth, which were carried out by reserve battalions accompanied by annihilating artillery fire. It was this kind of counterattack which had thrown the 4th Division out of the Hindenburg Line. The final type was the methodical counterattack, which was a counterattack carried out by fresh divisions supported by a heavy concentration of artillery fire. The BEF would spend the rest of the year working on counter measures to the new German doctrine.

On 31 July the BEF launched the next phase of the Flanders Plan. In this campaign, tactics would drive strategy. From experience of the Somme and Arras, it had become clear that breaking through the German front was next to impossible. However, Arras and Messines had shown that an advance of 2,000 metres could be counted on and one of 4,000 metres was certainly possible, so a succession of such advances might well drive the Germans from the North Sea coast. The British Fifth Army staff was fully aware of the new German tactics of a thinly held front line and strong counterattacks by

32 Annexe to GHQ Summary of 29 July 1917, “German Instructions for a Counterattack Organised in Depth”, AWM26 185/10
reserves under local commanders. However, they rejected the idea that infantry advances should be restricted to the range of the field guns, believing that all would be well if mobile field guns were provided to follow the infantry, the heavy artillery continued to give support and sufficient fresh troops were available to meet the inevitable counterattack. I Anzac Corps, then resting and practicing open warfare after Bullecourt, was not available to spearhead the attack. The general feeling was that:

There is nothing in the new German tactics that we cannot overcome as easily as we have overcome the old. In fact this class of fighting should be exactly suited to our temperament and the independence of action which is characteristic of Australians.

The result was an advance of over 3,000 metres, capturing some 47 square kilometres at a cost of 27,000 casualties. The 3rd Division used Varley bombs, a smoke bomb invented for the Stokes Mortar by Lieutenant Varley of the 9th Light Trench Mortar Battery, to create a smoke screen behind which they attacked. The Australian attack was completely successful but some British divisions ran into strong counterattacks in depth and some ground gained was subsequently lost, the infantry retreating back within range of the barrage.

In the light of this, Haig reconsidered his tactics, soliciting advice from his army commanders. There was consensus in favour of a "bite and hold" approach, a series of steps each no more than 2,000 metres, this being about the range of the field artillery. Enemy counterattacks would then run straight into the protective barrage. Plumer was an advocate of the most conservative form of "step by step" tactics, in which advances (steps) went no further than 1500 metres, in three stages of 700, 500 and 300 metres with long pauses. The worry for Haig was whether the object of the campaign could be achieved with such small advances. For now, the "bite and hold" meme held sway.

Haig placed Plumer in charge of the next stage and brought I Anzac Corps in to spearhead it. When the Australian gunners arrived in the Ypres salient, they found their gun positions were on the crowded Ypres flats, completely open to observation from a great semicircle of high ground held by the enemy. The enemy's guns were in the main on the other side of these heights, concealed from direct British observation. The lighter...

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33 GHQ OB 492, 3 April 1918, AWM26 345/4
34 I Anzac Corps, "Lessons", undated, AWM26 220/10
35 7th Infantry Brigade circular memorandum, undated, AWM25 923/1
36 Bean, IV: The AIF in France: 1917, p. 718; GS 3rd Division, 4 July 1917, AWM25 97/5
37 Prior and Wilson, Passchendaele, the Untold Story, pp. 92-96
38 Captain R.H. Osbourne for BGGS I Anzac, 5 September 1917, AWM26 193/11
39 GHQ OB 2089, 7 August 1917; replies from Horne (British First Army) 10 August 1917, Byng (British Third Army) 10 August 1917, Rawlinson (British Fourth Army) 9 August 1917 and Plumer (British Second Army) 12 August 1917, AWM252 A244
calibre German guns frequently moved positions and alternate positions were constantly being constructed. Some guns would only fire from temporary positions while others would fire only at night or when operations were in progress. The German guns preferred firing in enfilade, made easy by the salient, which caused difficulties for the British with communication, as the guns were in the neighbouring corps' zone. The weather went bad in August, with heavy rains. Flanders is low lying and the drainage system had fallen into disrepair during the war. In the front line area, shelling had completely destroyed it and the area started to revert to a swamp. Heavy rains, mists and low clouds all meant poor visibility, which grounded aircraft and made spotting from the ground and the air harder. The Sound Rangers also had adverse conditions to cope with. To top it off, the allies had lost the air superiority they once held and German aircraft were again able to observe and raid.\(^{40}\)

From the point of view of the infantry, the result was a more equitable distribution of the costs and burdens of war and service units started receiving decorations normally associated with front line troops. Although not themselves targets, the casualty clearing stations were sometimes poorly located near heavy guns and ammunition dumps and no less than six AIF nurses were awarded the Military Medal for bravery under fire in this campaign. On 22 July 1917, the 2nd Casualty Clearing Station was bombed, and four AIF nurses received the Military Medal for their actions in chaos that followed.\(^{41}\) On 22 August, the 3rd Casualty Clearing Station was shelled and bombed and Sister Alicia Mary Kelly won the medal. The station then was ordered back, much against the wish of the nurses.\(^{42}\) On 1 September, Sister Rachel Pratt of the 1st Casualty Clearing Station, was wounded by bomb splinters and won a sixth Military Medal.\(^{43}\)

Another group who saw rather more action than the recruiters may have led them to believe they would was the light railwaymen. The vast expansion of railway operations since the Somme Campaign had required the additional trains to be manned by the BEF as the French had no manpower to spare with every available man serving in the French Army. The British Army formed 280 railway units in 1916 and 1917,\(^{44}\) and the War Office also turned to Australia for assistance. An appeal was made through the

\(^{40}\) CBSO I Anzac Corps, "An Appreciation of the Location and Calibre of the Hostile Guns in this Counter Battery Area", 10 September 1917, AWM26 224/10; War Diary of GOCRA I Anzac Corps, AWM4 13/4/1; Bean, IV: \textit{The AIF in France: 1917}, pp. 702-703

\(^{41}\) Nursing Sisters Dorothy Gwendolen Carwood, Clare Deacon and Alice Ross-King and Staff Nurse Mary Janes Derrer. Bassett, Jan, \textit{Guns and Brooches: Australian Army Nursing from the Boer War to the Gulf War}, Oxford University Press, South Melbourne, 1997

\(^{42}\) Butler, II: \textit{The Western Front}, p. 188; Bean, IV: \textit{The AIF in France: 1917}, p. 704.

\(^{43}\) Bean, IV: \textit{The AIF in France: 1917}, p. 681; Bassett, \textit{Guns and Brooches}, p. 65. Staff Nurse Elizabeth Pearl Corkhill also won the award in 1918, bringing the AANS' total for the war to seven. See http://www.tip.net.au/~astaunto/MM.htm

\(^{44}\) Henniker, \textit{Transportation on the Western Front}, p. 162
newspapers and various government agencies for railwaymen who were not necessarily fit or young enough to serve otherwise in the AIF. The response was good and five railway sections each of 3 officers and 255 other ranks, were formed in December 1916 and January and February 1917. Later they were redesignated Railway Operating Companies. A sixth company was formed from the AIF in France. Three companies were designated as light railway operating companies and three as broad gauge. At Third Ypres, they had to operate their trains under appalling conditions. Trains could not be left unmanned no matter how heavy the shelling and the sound of the locomotive masked that of the gas shells. The 3rd Railway Light Operating Company alone earned two Distinguished Conduct Medals and five Military Medals in 1917. Driver Danks of the 1st Light Railway Operating Company won the Military Medal for sticking to his post after his train had been set on fire by an enemy shell. Company Sergeant Major Fraillon won the medal for a similar exploit later in the month.

Wagon drivers were shelled on the well-known roads and tracks they used to bring ammunition up to the batteries. Truck drivers found themselves under fire at Hellfire Corner. But the artillery suffered worse, casualties for the first three weeks in August being equivalent to three months worth of losses on the Somme in 1916 and by 24 August, the MGRA at GHQ, Major General Noel Birch, was warning of dire consequences if this continued.

The artillery was greatly increased for this operation with each attacking division supported by the field artillery and heavy and medium trench mortars of two divisions and 46½ heavy and siege batteries were assigned to I Anzac Corps Heavy Artillery, including the 54th Siege Battery. The barrage was a textbook one; dense, and regular and capable of being followed closely. It started 150 yards in front of the front line, stayed there for three minutes and then moved on, advancing 200 yards at a rate of 100 yards in 4 minutes. Then it slowed, moving the rest of the way to the first objective at 100 yards in 6 minutes. The barrage paused there for 45 minutes, then moved on to the second objective at 100 yards in 8 minutes where it halted for two hours before it moved on to the final objective at 100 yards in 8 minutes. The final objective, being only a line on the map, was marked with smoke. There was also the usual searching and back

45 AWM224 Items MSS81, MSS82
46 McNicol, Making and Breaking, p. 173
47 Bean, IV: The AIF in France: 1917, p. 729
48 MGRA to CGS, 24 August 1917, AWM26 179/1
49 GOCRA I Anzac Corps, "Artillery Instructions No. 118", 9 September 1917, and Appendix 8, War Diary of GOCRA I Anzac Corps, AWM4 13/4/1
50 I Anzac Corps, "Lessons", undated, AWM26 220/10
51 British Second Army, 10 September 1917, AWM45 39/4
barrages, the searching barrage ranging out up to 1,000 yards and SOS barrages for defeating German counterattacks. The I Anzac Corps Topographical Section prepared a scale model of the corps front and produced plots of the barrages on "ladder diagrams". These showed the time down one side and the distance down another. Dots were plotted to indicate where fire was to be directed at a given time. Colours were used to indicate which type of gun would be firing. In this way increasingly complex barrage schemes could be simply described and easily comprehended. The technics of the artillery barrage had achieved the state of a fine art.

Machine gun barrages would again be a feature of the operation but this time the command arrangements would be more streamlined. Eight machine gun companies - two per division - were removed from their divisions for the barrage and placed directly under the Corps Machine Gun Officer, Lieutenant Colonel L.F.S. Hore, thus continuing the pattern by which control of the machine guns drifted to higher formations. The two attacking divisions, the 1st and 2nd, were left with two machine gun companies each. The infantry later praised the work of the machine gunners, having found dead Germans who had evidently been killed by the machine gun barrage.

The operation went well. Assaulting battalions advanced on four company fronts. In the 2nd Division, each company had a first wave platoon in two lines 15 to 20 metres apart. The second platoon followed in "worms", with each section in single file. The third platoon were "moppers up" and moved in an extended line like the first platoon. The fourth platoon were "carriers" and moved in section columns like the second platoon. With the slow barrage, mopping up was generally carried out by the advanced troops. So long as the diggers could follow a good barrage, the pill boxes, most of which were merely shelters with no loop holes, were no less death traps than the deep dugouts had proven to be, and were captured by infantry rushing them from the flanks.

Light Horse patrols were used for reconnaissance during battle under the direction of the division commanders. The patrols were kept forward but their commanders were stationed at Division Headquarters so that they could receive orders as events occurred. The individual commander was able to move rapidly forward along the congested roads even though a patrol might have found it difficult. They were able to carry out the role on horseback successfully and the First Division commander felt that they had helped to

52 2nd Division, "Operation of 20 September 1917", undated, AWM26 220/10
53 Order of Battle I Anzac, 20 September 1917, AWM26 221/1
54 I Anzac Corps, "Lessons", undated, AWM26 220/10
55 Second Division, "Operation of 20 September 1917", undated, AWM26 220/10
56 I Anzac Corps, "Lessons", undated, AWM26 220/10
clarify some doubtful situations on two occasions. However, they did not prove that mounted troops were the most effective arm in this role as equally accurate information came to hand quicker from other sources.

The Battle of Menin Road, judged a complete success at the time, was a hard fought battle which cost the 1st and 2nd Divisions 5,013 casualties. This was mainly due to overcrowding the forward zone as Plumer employed a troop density almost twice that of his predecessor, General Sir H de la P. Gough. Many of these troops were employed in manning defence lines against counterattacks which never came, or which were defeated by the artillery. In retrospect Plumer's grand tactics remind one of the focus on the battle and the frontal assault which had failed so badly at Gallipoli. An advance of 1,500 metres was too shallow to dislocate the German defence arrangements, let alone capture the guns, which in any case were located on the flanks rather than straight ahead. The necessary pause between steps gave the enemy time to rotate front line divisions and consolidate the new front. Each step was equally hard for the front line troops and harder for the service troops who had negotiate a lengthening, devastated zone in an ever more pronounced salient. In this sense, Passchendaele was Pozieres on a grander scale.

The engineering plan called for roads, railways, tramways, mule and foot tracks, water pipelines and even a monorail, although the latter was subsequently found to be impractical. Light railways were rapidly pushed forward but were vulnerable to enemy shellfire. From 25 September, the Light Railways began publishing daily figures on how many breaks had occurred; over the next 30 days there was an average of 40 breaks totalling 375 metres of track per day, for a total of 1207 breaks totally 36,923 metres of track.

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57 Major General H.B. Walker, 23 September 1917, AWM26 220/10
58 Bean, IV: The AIF in France: 1917, p. 779
59 Bean, IV: The AIF in France: 1917, pp. 743, 789
60 British Second Army Light Railways Reports on Breakages, 24 September 1917 through 23 October 1917, AWM26 Items 211/7, 211/8, 211/9
Roads and water supply pipelines were constantly cut and required an ever larger percentage of the available men to repair them. Dislocation of the light railway system resulted in more calls upon the motor transport. On 11 September, I Anzac Corps had to obtain an additional 75 trucks from other corps. Such heavy demand meant that both drivers and trucks were working long hours. I Anzac Corps Heavy Artillery noted that between 3 and 11 October light rail carried 53 per cent of its ammunition while motor transport hauled 47 per cent.

The biggest effort was the construction of plank roads. Every day a special train arrived at 1400 at a siding 7 kilometres east of Ypres carrying 240 tonnes of 3 metre long elm or beech planks. There it was met by 80 trucks that took three tonnes of planks each. They drove through Ypres at dusk and down the Menin Road to Hellfire Corner where they unloaded the planks by the road side. From there, 120 horse drawn carts picked them up and brought them up to the work parties. Each cart made two trips a night down narrow one way roads. If the road became blocked or was shelled the drivers had to remain atop their carts, controlling their horses. The experience of the engineers, pioneers and tunnellers was even worse. I Anzac Corps Troops constructed a total of 13 three metre plank roads totalling 17 km. These had to be kept repaired, as 40-50 shell holes per day were dug daily.
was not unusual. The Corps Troops also reclaimed 5,200 metres of roads and maintained 11,200 metres.\(^{67}\) On 29 September, a German aircraft attacked a platoon of the 2nd Pioneer Battalion, dropping a bomb on a platoon waiting for coffee at a comforts stall on Menin Road, killing 18 men and wounding 10.\(^{68}\)

Completion of the plank roads enabled the field artillery to move forward for the next step on 26 September. However, owing to difficulties in bringing forward enough guns and ammunition in time, the attack was scaled down in both depth and width so that the density of guns remained the same. Even so, it was almost dislocated by a German methodical counterattack on 25 September against the 5th Division and a neighbouring British division. The Australians managed to hold their ground and establish a defensive flank facing where the British had been driven back. Nonetheless, the attack went forward. That it could not be modified was a problem with the mechanistic technics that the BEF was now employing. The 5th Division made their scheduled advance and Brigadier General H.E. Elliott of the 15th Infantry Brigade formed a special force and placed it under a trusted subordinate, Lieutenant Colonel Norman Marshall. He charged Marshall with the job of cooperating with the British in attaining their objectives. Marshall's force turned southward, rolling up the ground that was to be gained by the British without a barrage.\(^{69}\) In this savage fight, the 5th Division's attainment of its objectives demonstrated aggressive leadership from the front. That there was scope for this was in large part due to the new technologies and tactics. The more open battlefield created by the thinning out of the front line caused by the devastating firepower of the artillery, provided an opportunity for leadership, but only from the front, as the immature state of communications technology still precluded control from the rear.\(^{70}\)

This battle cost 5,478 Australian casualties, a little more than Menin Road.\(^{71}\) Slowly the effort was winding down. There was a feeling however that the enemy had been rattled by defeats at Menin Road and Polygon Wood and this was not far wrong. The Germans lost confidence in their defence in depth scheme and reverted to a policy of holding the front line strongly. The battalions of the front line regiments were concentrated in the forward zone and each regiment was backed up by a battalion from a reserve division in place of the reserve battalion. The Germans were uncertain about the value of counterattacks. They seemed to fail most of the time, but they did force the British to keep their forward areas heavily manned where they were subject to acquisition by the

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\(^{67}\) Letter, CRE I Anzac Corps Troops to CRE I Anzac Corps, 7 November 1917, AWM26 226/17

\(^{68}\) Bean, IV: *The AIF in France: 1917*, p. 931

\(^{69}\) Bean, IV: *The AIF in France: 1917*, pp. 792-832

\(^{70}\) British Second Army, "Operations on 25th and 26th September 1917", AWM26 274/4

\(^{71}\) British Second Army, "Second Army Summary of Operations During Period 27th September to 4th October 1917", AWM26 274/5; Bean, IV: *The AIF in France: 1917*, pp. 842-848, 876
German artillery. Machine guns were concentrated in the forward zone in batteries of 4 to 8 guns every 250 metres. This new arrangement was therefore an attempt to trade acquisition, exposing more of their own men to fire in order to increase loss to the enemy. Since allied firepower covered the entire front, it was a disastrous error.\textsuperscript{72}

For the third step, both Anzac Corps were put into the line so that the 1st, 2nd, 3rd and New Zealand Divisions would be fighting side by side. The plan was broadly similar to that for Menin Road, except that the attack was made in just two stages, a concession to the terrain. Intelligence had discovered that the Germans knew whether an attack was the real thing or not by the presence of the machine gun barrage so the machine guns did not open until 7 minutes after zero.\textsuperscript{73}

While waiting out in drizzling rain in No Man's land for the barrage to begin, the 1st and 2nd Divisions came under fire from a German barrage and the rear waves began to take heavy casualties. At 0600 the thin Australian barrage began and the German barrage stopped. The diggers rose from their shell holes and started to move forward. Ahead were waves of Germans with bayonets fixed. Incredibly, both sides had chosen to attack at the same place and the same time. The diggers used their firepower, especially that of their Lewis guns, to break up the attack. The ground ahead was a major defensive position studded with pillboxes and there was hard fighting but almost all the objectives were attained. The Battle of Broodeseinde was a fine achievement but cost the three Australian divisions involved 6,432 men. In return, 4,158 German prisoners were processed by the corps cages and casualty clearing stations.\textsuperscript{74}

After a long spell of fine weather, rain fell on eight days out of ten between 4 and 13 October, turning the ground into a quagmire.\textsuperscript{75} The 3rd Division Artillery was forced to set up alongside short lengths of plank road far from their intended position, which could not be reached under the conditions.\textsuperscript{76} The heavy howitzers also needed to move forward and I Anzac Corps Heavy Artillery had to rely almost entirely on the light rail system because the caterpillar tracks on the tractors had an overhang of 23 cm and in several places the bends in the road were too sharp for them to negotiate, but siege guns loaded on 6 October were still not in position a week later.\textsuperscript{77} I Anzac Corps Heavy Artillery did carry out an unusual experiment in having twelve 60 pounders towed into

\textsuperscript{72} Wynne, G.C., "The Development of the German Defensive Battle in 1917 and its Influence on British Defence Tactics", \textit{Army Quarterly}, Volume 34, April 1937, pp. 28-30

\textsuperscript{73} BGGS II Anzac Corps, "II Anzac Instructions for the Offensive, No. 4", 3 October 1917, AWM26 229/21

\textsuperscript{74} Bean, IV: \textit{The AIF in France: 1917}, p. 831

\textsuperscript{75} Rain fell on 4, 5, 8, 9, 10, 11, 12 and 13 October 1917. War Diary, SMTO I Anzac Corps, AWM26 227/23 and 227/24

\textsuperscript{76} Bean, IV: \textit{The AIF in France: 1917}, p. 903

\textsuperscript{77} BGHA I Anzac Corps to GOCRA I Anzac Corps, 13 October 1917, AWM26 224/14

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position by tanks. Ammunition, no less a problem, became coated with mud and unusable until cleaned. It had to be hauled up by mule trains, which now "saved the situation for supplies", hauling up all the rations, water, small arms and field artillery ammunition and even some engineering stores. Even the infantry now had trouble getting forward, relying on duckboard tracks.

Moreover, the artillery was running short of guns. In September the I Anzac Corps GOCRA, Brigadier General W.J. Napier, had ordered the 1st and 5th Division Artilleries to each surrender six 18 pounders, three 4.5 inch howitzers and a number of spare parts including five No. 7 dial sights and five clinometers to form a pool of spares controlled by the ordnance mobile workshops. He hoped that the pool would enable ordnance to keep the batteries up to strength, but on 12 October, Brigadier General W.L.H. Burgess, commander of the 4th Division Artillery, reported that only 87 (80 per cent) of their 18 pounders and 27 (75 per cent) of their 4.5 inch howitzers of the 1st, 2nd and 4th Division Artilleries were serviceable, the rest being out of action or stuck in the mud somewhere, and when the Canadians took over two weeks later, they found only 220 of the 360 field guns taken over from the Australians in working condition.

A disturbing development was the increased employment of gas technology by the Germans. The AIF had been fairly lucky in that it had not been involved in intensive gas warfare earlier. Conditions at Pozières had been unfavourable for gas and only 230 gas casualties were suffered by the AIF in the whole of 1916, of which 18 were fatal. The bombarding of the Noreuil Valley with over 5,000 gas shells in April 1917 caused only 5 casualties. The 5th Division suffered 150 gas casualties at Bullecourt in May 1917 and the 3rd Division took 425 in the Battle of Messines.

Then the enemy started to employ a new gas. Initially known as "Yellow Cross" from the markings on the shell, the chemists quickly identified it as dichloroethylsulphide, a chemical discovered by the English chemist, Frederick Guthrie, in 1860 and developed by Victor Meyer in 1886 and H.T. Clarke in 1912. A colourless, oily liquid, it had...
properties that made it ideal for military purposes. It had only a faint smell, some said like mustard, from which the troops derived its name. It produced no immediate signs of discomfit but nonetheless was as toxic as phosgene. Although the Standard Box Respirator was sufficient protection against the gas, soldiers might not realise and allow themselves to be fatally gassed. To spread Mustard Gas effectively, the Germans devised a new shell which combined Mustard Gas with High Explosive. Not only did this spread the gas more efficiently, it got rid of the telltale "plop" sound of a gas shell. Mustard shells sounded just like high explosive. Mustard Gas was also a blistering agent that even in low concentrations could blister the skin, blind the eyes and damage the lungs. It reacted strongly with water and sweat could draw it out of the air and onto the skin, while it could remain on the ground, poisonous and dangerous for up to 72 hours. This made it ideal for neutralisation tasks, as a whole battery position could be contaminated. The Germans estimated that the Allies would have the gas within six months but it was to be a whole year before the British had it in operational quantities due to production problems. The first use against Australian troops was against the Siege Brigade on 10 July 1917.

Used in the same operation was Blue Cross, the name also being taken from the marking on the shell, which the troops called "Sneezing Gas". This took longer for the chemists to identify, being a combination of diphenylchlorarsine, diphenylecyanarsine and ethyldichlorarsine. The Standard Box Respirator was not proof against Blue Cross and the irritant could become so acute that a digger might take off his mask and thereby expose himself to deadly Green Cross (phosgene). For maximum effect an explosion just above the ground was necessary, but the proximity fuse was not developed before the war ended. Once again, production problems prevented the British from retaliating for over a year.

Largely as a result of Yellow Cross, Australian gas casualties suddenly soared to 1,675 in October 1917 and 1,086 in November 1917. Of these 501 and 526 respectively were in the artillery. Factors contributing to the large toll included men being splashed with Yellow Cross; stumbling into gas filled shell holes in the dark; failure or inability to remove contaminated clothing; failure to put respirators on quickly enough; and, most importantly, removing them too early. In October 1918 the Corps Chemical Adviser

87 GHQ Central Laboratory, "German Drums with Extensions", 22 March 1918, AWM26 345/5
88 Hartcup, The War of Invention, pp. 106-107, 110
89 GHQ OB 492, 3 April 1918, AWM26 345/4
90 Hartcup, The War of Invention, pp. 107-110
91 Bean, IV: The AIF in France: 1917, p. 962
92 Hartcup, The War of Invention, pp. 110-111
93 HQ 3rd Division, "Narrative of Operations - May", 11 June 1918, AWM26 383/3

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calculated that one Australian casualty was caused for every 15 shells fired, making gas a very efficient form of harassment.\footnote{Chemical Adviser, Australian Corps, 4 October 1918, AWM26 501/8}

The bottom line was that the step by step tactics relied on artillery, which in turn relied on a transportation infrastructure. This infrastructure was slowly whittled away, and it collapsed entirely when the weather went bad. Moreover, the casualties in the Australian artillery were so great that it was barely longer effective by November 1917. Efforts to kick-start the campaign involving the 2nd Division on 9 October and, more spectacularly, the 3rd Division on 12 October were doomed to failure. The infantry found the valleys impassible, the wire uncut, and the barrage too thin.\footnote{British Second Army, "Second Army Summary of Operations During Period 5th October to 12th October 1917", AWM26 274/6} Casualty evacuation was of course no less difficult than resupply and the ratio of killed to wounded increased from 1:4.2 to 1:2.7.\footnote{Butler II: The Western Front, pp. 235-236, 244-245}

As at Mouquet Farm the year before, the Australians were replaced by the Canadians, who went on and took Passchendaele. The high hopes of the campaign had long since vanished and the Allies were left with a muddy salient leading nowhere. All told, the Third Ypres campaign had cost Australia 39,093 casualties.\footnote{Bean, IV: The AIF in France 1917, p. 936}
6. Sinai and Palestine

The Sinai and Palestine theatres witnessed a style of modern warfare that was very different from that of the Western Front, one characterised by highly mobile mounted operations rather than static set piece offensives directed at trench lines, except for a period at Gaza. Three features in particular shaped the nature of warfare in the Sinai and Palestine. The first was that it was not the main theatre of war. No decision could be reached in the Middle East. The best that could be accomplished was to knock Turkey out of the war, which would be useful primarily in that it would free troops for the Western Front. Geographical considerations made a decisive result unlikely and for this reason, the British commitment to the theatre bobbed up and down, dependant on political circumstances and the needs of other theatres.

The second feature of the theatres was the transportation infrastructure. The Western Front was located in the heart of Western Europe with transportation infrastructure second to none in the world, one capable, when extended, of supplying the needs of armies of millions engaged in modern war. This infrastructure was non-existent in the Sinai region, which had no railways, no ports and few roads. Such infrastructure as was necessary to support modern military operations had to be constructed in the course of the campaign.

The third characteristic of the theatre was the geography. The northern Sinai is a sandy desert where water was a major concern. Open water was invariably undrinkable, wells were often filled in or fouled by the Turks and oases were few and far between. The presence of hods, depressions in the sand with date palms, frequently indicated that there was water under the surface.

In military terms, the effect of these factors in combination was to cause great dispersion of forces and hence the possibility of great mobility. Because the first and second features are far more common than the alternatives, the campaign in Sinai and Palestine would in many ways be rather more typical of later wars than the Western Front. However, the technology was the same.

On 13 January 1916, the Commander in Chief, Egyptian Expeditionary Force (EEF), General Sir Archibald Murray, ordered nine divisions to man the Suez Canal defences, based on an estimate that the Turks could push a force of 250,000 men across the Sinai during the winter of 1915-16. This estimate was excessive and at odds with the logistical
reality of supporting a force in the Sinai desert. This was eventually recognised and ten divisions were transferred to other theatres, all but one of them to the Western Front, including all the infantry divisions of the AIF.¹

On returning from Gallipoli, the light horsemen were reunited with their horses. The horses had now had over a year in Egypt in which to acclimatise, getting used to the diet, sand, water and climate of Egypt. The 1st, 2nd and 3rd Light Horse Brigades and New Zealand Mounted Rifles Brigade were consolidated to form an Anzac Mounted Division under the command of Major General H. G. Chauvel.² At first, this was only a paper grouping of the four brigades and their attached support units, and in fact not quite even that, since the 1st Light Horse Brigade had been sent to the Western Desert to take part in the campaign against the Senussi, Libyan Arabs who had been fighting against the Italians since before the war.³ There were no tables of organisation and equipment for a light horse division and it was not until June that some were drawn up, utilising Imperial cavalry tables as a model.⁴

Priority was given to getting the infantry divisions ready for the Western Front. In particular, the expansion of artillery precluded the provision the provision of Australian batteries for the Anzac Mounted Division artillery, so artillery support was provided by four British 18 pounder horse artillery batteries. However, Australia and New Zealand supplied the other organic units of the division, including engineer, signals, ordnance, veterinary, pay and medical.

Murray realised that an alternative to holding the Suez Canal line would be to push out forces into the desert and adopt an active defence.⁵ Light horse patrols began patrolling the desert and destroying water sources while the hods around Romani were occupied, the Anzac Mounted Division forming part of the garrison. To operate in the area, drinking water was required. The equipment initially supplied for construction of wells was made of corrugated iron and timber. These wells took a long time to dig in the Sinai sand, required a lot of engineering material that had to be brought up on camels, and produced wells that were easily fouled. The Anzac Field Squadron, the newly activated engineer unit supporting

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² Chauvel was a regular army officer who commanded the New Zealand and Australian Division from 19 September 1915 and then the 1st Division from 6 November 1915 at Gallipoli.

³ GOC 1st Light Horse Brigade, "Operations Order No. 5", 13 February 1916, AWM25 455/1


the Anzac Mounted Division, experimented with smaller versions of the same well but found that they were no better than the bigger ones.6

A decisive Australian innovation was the spearpoint pump. This was a simple device introduced by Lieutenant Colonel L.C. Wilson, of the 5th Light Horse Regiment, who had seen them used in Queensland before the war. A spearpoint pump was a 2.5-inch (6.35 cm) steel tube with a solid point at one end and a section with holes covered by wire gauze to keep out the sand. The spearpoint was driven into the ground with a sledgehammer or a makeshift pile driver. If the spearpoint was insufficiently long, adding additional lengths of tubing could extend it. Water could be extracted with the spearpoint up to 6 metres down. The spearpoint was particularly useful with wells that had silted up. It could be driven into the bottom and produce water in the few minutes it took to set up canvas troughing. A single horse could easily carry the whole apparatus. It could also be extracted from the sand and reused. Initially the British Army would not supply spearpoint pumps so the light horsemen had them manufactured in Cairo with their own regimental funds. Eventually, they were accepted and produced by the Royal Engineers.7

This allowed light horse patrols to operate in the deep desert in the region just east of the Suez Canal but it was clearly impractical to try to water the entire EEF in this manner. Brackish in character, the water so produced by boiling was unsuitable for boilers and radiators and would not be consumed by animals used to sweet water, although in time they could become accustomed to it. On the other hand, summer temperatures of up to 50°C made consumption of ample water vital.

Another significant feature of the Sinai was its sand. Due to prevailing winds, the dunes run with their steep sides facing north. The steep face of a dune being too hard to climb, a patrol could only move northwards or southwards on a winding course. Moreover, unless there was plenty of moonlight, movement in the dark on horseback was dangerous, because the horse could not see the steep edge. The sand reduced the pace of horses to about 4 kilometres per hour. The habit acquired in this period of moving at walking speed on the march persisted in the light horse long after the Sinai was left behind for firmer ground.8

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6 War Diary, 1st Field Squadron, Appendix November 1916, AWM4 14/36 Microfilm Roll 369
7 Gullett, H. S., The Official History of Australia in the War of 1914-1918, Volume VII: The Australian Imperial Force in Sinai and Palestine, Sydney, Angus and Robertson, 1923, p. 104; McNicoll, Making and Breaking, pp. 80-81
8 GS Australian and New Zealand Mounted Division, "Lessons Learned from Operations of the Australian and New Zealand Mounted Division - Sinai and Palestine", 23 February 1919, AWM25 455/43
To enable guns and wagons to negotiate the Sinai sands, short wooden planks called "pedrails" were attached to the wheels with chains. These distributed the weight over a great area and reduced sinking in the sand. This invention, which allowed the guns of the horse artillery to accompany the light horse, was brought to Chauvel's notice by Major H. J. Cox Taylor of the 2nd Division Ammunition Column. Sand tyres worked on a similar principle. These were 6-inch broad iron rims, originally bolted to the wheel, but because this destroyed the wheel for future use, a method was developed of pressing the tyre onto the wheel.

Water Requirements of Infantry and Mounted Divisions (1916)

<table>
<thead>
<tr>
<th>Division</th>
<th>Men</th>
<th>Horses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounted Division</td>
<td>8,000 men @ 9 litres per man</td>
<td>72,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10,000 horses @ 23 litres each</td>
<td>230,000</td>
<td>302,000</td>
</tr>
<tr>
<td>Infantry Division</td>
<td>20,000 men @ 9 litres per man</td>
<td>180,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,000 horses @ 23 litres each</td>
<td>184,000</td>
<td>364,000</td>
</tr>
</tbody>
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The AIF was fortunate in that the 32 stretcher-bearers of a light horse field ambulance, unlike those of the British cavalry, were fully mounted. Thanks to this foresight, the stretcher-bearers were able to keep up with the light horsemen. The unmounted tent subdivisions however had to stay behind. As on the Western Front, the field ambulance organisation proved unsuitable and had to be modified in the field and a number of different methods were used for transporting the wounded. Sand carts were two wheeled vehicles with wide metal treads. They proved very effective in the Sinai despite numerous defects in early models, resulting in broken wheels and axles. After the Battle of Beersheba in October 1917, 11 out of 27 sand carts in the Anzac Mounted Division had broken axles. Their main defect was that they had no driver's seat, so postilion driving (in which the driver rides the lead horse) was necessary. A second method of carrying the wounded was by camel, in devices known as cacolets. Unfortunately, as the camel moved, the cacolet would be bounced about, sometimes sufficiently to cause the passenger to vomit. For a man with broken bones, a trip in a cacolet was more like a form of torture. A better solution was

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11 Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 11
14 War Diary, 1st Field Squadron, Appendix November 1916, AWM4 14/36 Microfilm Roll 369
the sand sledge. Drawn by two horses, these provided a comfortable means of transport for the seriously wounded.\textsuperscript{15}

To supply the troops in the Sinai, a standard gauge rail line was begun from Kantara, Egypt on 10 March 1916 and reached Romani on 19 May that year. Five trains were run daily from Kantara to Romani, the trip taking two hours.\textsuperscript{16} A 6 inch (15cm) pipeline was laid alongside the rail line to bring sweet water from the Nile, but it did not advance as fast as the railway.\textsuperscript{17} Water was hauled the rest of the way by camel in fantasses, 45 to 70 litre iron tanks, each camel carrying two. Looking at the problem and the requirements of maintaining a force of one mounted and two infantry divisions across the Sinai, the Engineer in Chief ordered 96 km of 12 inch (30cm) pipeline and 48 km of 10 inch (25cm) pipeline, almost enough to stretch across the Sinai.\textsuperscript{18} The first shipment of 5,000 tons of 12-inch pipe arrived from the United States on 24 September 1916. Egyptian labourers rolled the half pipe segments from slow moving trains to the point where they were assembled. Where the pipeline deviated from the railway, they were dragged into place by Holt tractors.\textsuperscript{19}

Due to the impracticality of wheeled transport in the desert, the light horse brigade trains were disbanded, leaving only the supply sections attached to the brigades and camels carried out transport tasks in the forward zone. Although slow, they could traverse heavy sand or mud that could not be negotiated by wheeled transport whether mechanical or horse drawn. Camel Transport Corps (CTC) companies consisted of four sections each of 500 camels under the command of an Australian or Imperial NCO and native Bash Reis, the equivalent of a sergeant.\textsuperscript{20} A shortage of Imperial NCOs had led to drawing NCOs from the AIF and the Cairo District issued a call for volunteers for the CTC on 16 January 1916. The CTC initially consisted of three companies, of which two were Australian.\textsuperscript{21} Each native camel driver led 3 camels. Methods were devised of loading the camels so that loads were evenly balanced. Most items were secured with rope while nets had to be used with some items. Rapid loading of the entire column was accomplished by laying out the supplies in long rows and having the camels knelt beside them, so that the entire company could be

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\textsuperscript{15} Butler, Volume I, \textit{Gallipoli, Palestine and New Guinea}, pp. 562-565
\textsuperscript{16} Major E.B.T. Nicholls, "Ordinance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 10
\textsuperscript{17} MacMunn and Falls, \textit{Military Operations Egypt and Palestine}, Volume I, pp. 160, 170
\textsuperscript{18} E-in-C GHQ EEF, "Note on the Water Supply - Qattara, Romani, El Arish Line", 15 July 1916, AWM45 7/11
\textsuperscript{19} MacMunn and Falls, \textit{Military Operations Egypt and Palestine}, Volume I, pp. 242-243
Lieutenant Colonel W. Stansfield, "Anzac Mounted Division Train", undated, AWM224 MSS 214, pp. 4-5
\textsuperscript{21} DAA&QMG, Cairo District, 16 January 1916, AWM25 157/5
\end{footnotesize}
\end{flushleft}
loaded simultaneously. With practice, it eventually became possible to load 2,000 camels in an hour.\textsuperscript{22} Two companies of the CTC were attached to the Anzac Mounted Division.\textsuperscript{23} The job of running the depots became a burden on the CTC, and on 2 September 1916 the 26th and 27th Depot Units of Supply were formed to take over this duty.\textsuperscript{24}

Feed for the horses and other animals was always a problem in Egypt. Australian horses were normally fed on a mixture of grain and fodder; a convenient mixture for military purposes as it minimises transport. Shortly after arriving in Egypt in 1914, the AIF had made its own arrangements for the local purchase of Egyptian maize and barley.\textsuperscript{25} English oats were available only for a brief time in 1916, although it was much appreciated by both men and beasts. Gram was a split pea grown in Egypt and therefore available in quantity but it was found to heat the animals' blood, so its use was restricted to the cold winter months. Berseem was a kind of Egyptian alfalfa used as a green supplement. The main type of fodder was tibben, a composition of barley straw chopped up into coarse chaff by a horse or oxen driving a set of cutters in a circle. The tibben was separated from the barley by throwing it up in the air, collected, and compressed into bales but due to the process, it also collected a bit of dirt along the way. Egyptian bran, the husks of grain left over after it had been made into flour, was found to be of poor quality. There was also dries, which were dried berseem, and sucrapaille, which was tibben mixed with treacle. Canadian hay was sometimes available and found to be of good quality, but Indian hay was so bad that the horses would not eat it.\textsuperscript{26} The normal ration for horses and camels was about 4.5 kilograms of grain and 6.8 kilograms of tibben per day.

With all the men and horses congregating in the Romani area, a repeat of the fly situation at Gallipoli seemed likely. Fortunately, the newly formed 7th Sanitary Section arrived to coordinate the disposal of refuse, bringing special equipment for its incineration.\textsuperscript{27} The burial of manure was pointless in the sand, which did not have the bacteria to break it down. Desiccation by exposure to the sun was fatal to flies' eggs while flies are not attracted to dry manure so by raking it thin and drying it out it was possible to deny it to flies. This method was then used for making litter roads.\textsuperscript{28}

\begin{thebibliography}{99}
\bibitem{22} Lieutenant Colonel W. Stansfield, "Anzac Mounted Division Train", undated, AWM224 MSS 214, p. 5
\bibitem{23} AA&QMG, No. 3 Section, 11 November 1916, AWM25 157/6
\bibitem{24} Lieutenant Colonel W. Stansfield, "Anzac Mounted Division Train", undated, AWM224 MSS 214, pp. 7, 18
\bibitem{25} Lieutenant Colonel W. Stansfield, "Anzac Mounted Division Train", undated, AWM224 MSS 214, p. 3
\bibitem{26} Lieutenant Colonel W. Stansfield, "War History of the AASC in Egypt", undated, AWM224 MSS 210, p. 6
\bibitem{27} Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 14
\bibitem{28} AA&QMG Desert Column, "Litter Roads", 10 March 1917, AWM25 863/4
\end{thebibliography}
In July 1916 machine gun squadrons were formed from the regimental machine gun sections. Each machine gun squadron consisted of 12 Maxim and Vickers machine guns organised as 6 sections of two guns each, and had a strength of 226 men and 304 horses. The intention was to replace the Maxims with Vickers guns, but these were not immediately available, and none of the light horse brigades had more than six Vickers machine guns. The Maxim guns were old and most had seen service at Gallipoli. As part of the reorganisation, the light horse regiments were equipped with three Lewis guns, one being issued to each light horse squadron.

The first major test of the machine guns came at the Battle of Romani in August, which confirmed that the heavy Maxim was unsuited to light horse work, while the Vickers proved extremely reliable, firing thousands of rounds without changing barrels. The coolant water often boiled quickly in the heat, but condensers were able to cope with the situation. The machine guns were successful at providing both overhead cover and enfilading fire, and due to the good observation available in desert warfare targets were engaged at ranges far greater than that possible on the Western Front. The light horsemen, who positioned them well forward, sweeping dead ground and firing in enfilade where possible, handled the Lewis guns with characteristic boldness.

At Romani, the Turks attempted to turn the Australian flank by making a wide sweep through the dunes beyond it. Their approach was detected by the RFC, but the Turks were aided by the overly regular patrolling habits of the light horse. Knowing the time at which the Australians would retire, the Turks followed them home. The battle became a fight for the sand ridges that formed the allied line. The Turks were unable to capture the ridges and, running out of potable water, were forced to retreat, pursued by the light horse.

The battle was controversial. Command of the force was divided between Chauvel and Major General H.A. Lawrence, the British commander of No. 3 Section of the Suez Canal Defences. The British infantry commanders would not take orders from Chauvel, and

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29 BM 3rd Light Horse Brigade, 6 September 1917, AWM25 721/60
31 Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 38
32 GOC Australian and New Zealand Mounted Division, 9 July 1916, AWM25 721/60
34 Air support at this stage was by the British 14th Flying Squadron, to which a number of Australian pilots of the 1st Flying Squadron were attached.
35 BGGS No. 3 Section, 22 August 1916, AWM45 7/12
36 GOC No. 3 Section, "Report on Operations from 19/7/16 to 12/8/16", undated, AWM45 7/13
Lawrence was too far away to control the battle. Lawrence's dispositions were faulty, with the British infantry located too far away to support the mounted troops and this resulted in the burden of defence falling on the mounted troops and in turn prevented them from counterattacking. The British infantry found the deep sand too heavy going and could not match the speed of the Turk.37

Curiously, entrenchments were an impediment to the defence. Theoretically, these should have allowed the British 52nd Division to hold its sector with fewer troops. In practice, extra troops were wasted garrisoning them, and the troops so disposed were reluctant to leave their trenches. It was noted that:

There is undoubtedly a danger that the lessons of the present war may lead commanders into exactly this error, more especially commanders who have had experience of the campaigns in France and Belgium.38

This constitutes an extreme example of a meme that we have encountered a couple of times already: the one that holds that certain things are constant and unchanging and therefore true under all circumstances. In this case, this meme led men to construct shelters from non-existent shellfire.

The mounted troops failure to rout and destroy the Turks also rankled. Chauvel twice attempted to sweep around the Turkish flank as recommended by the Field Service Regulations,39 but wound up making frontal attacks on the Turkish rearguard. This was not as risky as it looked because the light horse could and did easily break off the attack when the going got too heavy. It was not successful either, though, and Chauvel was beaten off both times.40 However, for the Anzac horsemen, Romani was a clear-cut victory, their first decisive victory, and the turning point of the Sinai campaign.41

In the wake of the victory at Romani, the Chief of the Imperial General Staff in London, General Sir W.R. Robertson, 42 sanctioned an advance across the Sinai as far as El Arish, while affirmed the War Office's strictly defensive policy for Egypt.43 On 23 October 1916, Murray created a new headquarters, Eastern Force, to control the troops in the Sinai and

39 Field Service Regulations, p. 132
41 Letter, General H.G. Chauvel to H.S. Gullett, 18 December 1920, AWM40 97
42 Robertson was promoted to field marshal in March 1920.
43 CIGS to GOC-in-C EEF, 4 October 1916, AWM45 7/1
appointed Lieutenant General Sir C.M. Dobell to command it.\textsuperscript{44} Dobell had broad experience in fighting natives, most recently in the Cameroons and Western Desert,\textsuperscript{45} and the war in the Sinai was viewed by some as a colonial war against a non-European enemy. Coupled with a universal tactical meme, the conclusion was that the British Army had an advantage over the enemy so great that a battle could be won under almost any conditions. Such an outcome was unlikely, in fact, in the absence of a significant technological or tactical disparity.

In addition to those forming part of the Anzac Mounted Division, there were other units in Egypt. Each corps maintained its own training units. The Australian Headquarters, Cairo, handled the administrative work and controlled Pay, Postal, Ordnance, Provost, Records and Remounts units. The longevity and effectiveness of the Australian Waler in the Middle East was a tribute to the work of the remount units who trained all incoming remounts until they were ready for issue. These units contained a large number of outstanding horsemen. Two hospitals were based in Egypt, the 2nd Stationary Hospital, which formed part of the lines of communication in the Sinai until it returned to Moascar in 1917 to serve as the camp hospital for the Australian Training Centre there and the 14th General Hospital, which was based at the Abassia Barracks in Cairo. Australian nurses also served with the British hospitals in Egypt and Salonika. Eight dental units served in the theatre, one each for the five field ambulances, two hospitals and the training centre. An outbreak of cholera led to the formation of the Anzac Field Laboratory. This unit kept a watch on some of the Sinai Desert's smallest and least savoury inhabitants, and was eventually attached to the Anzac Mounted Division from June 1917.\textsuperscript{46}

There were other combat units in the theatre as well. The 11th and 12th Light Horse Regiments had been reformed as divisional light horse regiments for the 4th and 5th Divisions before the establishment was changed and they became surplus. Part of the 4th Light Horse Regiment had also been left behind in Egypt. From April 1916, these regiments were attached for administrative purposes to the 1st, 2nd and 3rd Light Horse Brigades. The need for mounted troops being acute, three double squadrons were formed at Tel El Kebir on 23 May 1916.\textsuperscript{47} For training purposes they were attached to the 3rd Light

\begin{footnotes}
\footnotetext[44]{CGS EEF, "Force Order No. 22", 18 October 1916, AWM45 12/4}
\footnotetext[45]{MacMunn and Falls, \textit{Military Operations Egypt and Palestine}, Volume I, p. 244}
\footnotetext[47]{HQ A&NZ Training Centre Tel El Kebir 24 May 1916}
\end{footnotes}
Horse Brigade, as its commander, Brigadier General J.M. Antill was rated highly by the EEF staff.48

In December 1915 the British Commander in Egypt, Lieutenant General Sir J.G. Maxwell, decided to form a force mounted on camels for the defence of Egypt against the Senussi, and obtained permission from the Australian Government for a call for volunteers from the Australian units in Egypt.49 Four companies were formed in January 1916 from the eight infantry brigades then in Egypt.50 Although many of the men thus obtained had never even seen a camel before, a surprisingly large number of men with camel experience came forward, the Western Australian 28th Infantry Battalion providing two dozen men with camel experience, two of whom could even speak Arabic.51 On 21 June 1916 the EEF requested more Australians for the Camel Corps and five more companies were supplied from light horse reinforcements and the Anzac Mounted Division.52 Due to a shortage of saddlery and trained camels, only one company per month could be equipped. A camel company consisted of four sections with an officer and 40 other ranks, plus a machine gun section equipped with three Lewis Guns, one being a spare.53 Supply was fairly simple as each camel could carry five days supply of food and water for itself and its rider.54 Initially camel companies were deployed in the Western Desert against the Senussi but they were sent to the Sinai in August 1916.

Lieutenant General Birdwood had never been enthusiastic about the camels, and the formation of the ICC had been undertaken before he became GOC AIF.55 When Birdwood found out about the new units, his reaction was immediate:

11th and 12th Light Horse Regiments all dismounted double squadrons light horse all members AIF with Camel Corps Companies and all excess reinforcements... should be sent to England as soon as possible to meet requirements for infantry reinforcements for four divisions in France.56

Murray would not hear of it, cabling that:

Troops referred to are fully employed in defence of Egypt and... Australian and New Zealand Army Corps troops are the keystone of that defence.57

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48 MGGS EEF to GOC No. 2 Section, 17 June 1916, AWM45 7/10
49 GOC BTE to DOD, 9 December 1915 and DOD to GOC BTE 15 December 1915, AWM25 157/8
50 AIF Order No. 52, 6 January 1916
51 "28th Infantry Battalion volunteers for Camel Corps", January 1916, AWM25 157/2
52 CGS EEF, 9 June 1916, AWM25 157/5
53 "Report on Organisation and Formation of the Imperial Camel Corps", 31 December 1916, AWM45 12/36
54 "Employment of the Camel Corps", 11 January 1918, AWM25 157/1
55 GOC Anzac to GOC BTE, 20 and 24 February 1916, AWM25 157/8
56 GOC AIF to DOD, 22 August 1916, Australian Archives CRS B539 AIF112/5/611
57 War Office to DOD, 28 August 1916, Australian Archives CRS B539 AIF112/5/611
Experience in the Sinai soon showed that the camels were best organised in large units and the camel companies were formed into battalions, each of four companies, in October 1916. The battalions were formed into the 1st Imperial Camel Brigade, which also included a British machine gun squadron of eight Vickers machine guns and, by remounting the British 1st Mountain Battery (Hong Kong and Singapore Battery) on camels, a camel battery of six 2.75 inch mountain guns. The AIF also supplied the brigade with medical support in the form of the Camel Field Ambulance that arrived from Australia on 20 June 1916. With the Anzac Mounted Division and the other advanced troops of the Eastern Force, the camels became part of the Desert Column, formed on 22 November 1916. From 7 December 1916 the Desert Column came under the command of Lieutenant General Sir P. W. Chetwode, a noted British cavalryman and tactician whom Murray has specifically requested for the post.

In September it was decided to form still more camel units. The 11th, 12th and 4th Light Horse Regiments were redesignated the 1st, 2nd and 3rd Camel Regiments respectively. The 4th Camel Regiment was formed from the 1st and 2nd Light Horse Double Squadrons. The 3rd Light Horse Double Squadron was disbanded and its personnel transferred to the 3rd Camel Regiment and the Training Centre. The project foundered, however, on the shortage of trained camels and on 15 January 1917 the commander of the 4th Camel Regiment reported that the unit had only 467 camels out of an establishment of 650.

Another form of mobility was provided by armoured cars. These were a new idea when the 1st Armoured Car Section was formed. The Australian Army had no armoured cars, so the unit built them themselves from three donated chasses at the Vulcan Engineering Works in South Melbourne. Armour plating was fitted to a 50 horsepower Daimler, a 60 horsepower Mercedes and a 50 horsepower Minerva. The former two had one Colt machine gun mounted on a revolving turret with a 360° arc of fire. On arrival in Egypt, the section was committed to the campaign in the Western Desert, where their role was long-range patrol and reconnaissance. Running armoured cars across the desert took its toll on both men and machines, and spare parts for the unusual Australian vehicles were hard to obtain. On 3

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58 AIF Cairo to DOD, 2 October 1916, Australian Archives CRS B539 AIF264/1/238
60 Butler, Volume I, *Gallipoli, Palestine and New Guinea*, p. 629
61 BGGS Eastern Force, "Eastern Force Order No. 3", 19 November 1916, AWM45 12/4
62 War Diary, HQ Eastern Force, 7 December 1916, AWM45 12/4
63 C-in-C EEF to CIGS, 21 October 1916, AWM45 7/45
64 AIF Cairo to DOD, 6 September 1916, Australian Archives CRS B539 AIF264/1/229
65 GOC AIF Egypt, Routine Order No. 5, 27 September 1916, AWM25 157/8
66 OC 4th Camel Regiment, 15 January 1917, AWM25 157/7
67 OC 1st Armoured Car Section, 16 August 1916, AWM25 49/10
December 1916 the section was re-equipped with six unarmoured T Model Ford Light Cars, each armed with a Lewis Gun, and became the 1st Light Car Patrol. On 22 May 1917 it too joined the Desert Column.

A unit of a completely different sort set sail from Melbourne on 16 March 1916, the 1st Flying Squadron. This unit of the Australian Flying Corps (AFC) was formed at Laverton, Victoria on 6 January 1916 from pilots and observers who had completed courses at the flying school at Point Cook, Victoria. Organised as a 12 plane squadron, with three flights plus a wireless section, it set out for Egypt without any equipment except for two cars and seven motorcycles. For the first six weeks the squadron was involved in individual training before it was upgraded on 4 June to an 18 plane squadron, equipped with Be2Cs and commenced operations. For the next six months the three flights fought separately, operating from widely separated aerodromes, with A Flight flying against the Senussi and the others over the Sinai. Gradually the flights were brought together until, on 18 December the entire squadron was finally concentrated at the one aerodrome in support of the Desert Column.

The advance across the Sinai Desert was done by the book, with aircraft scouting ahead and the mounted troops forming advance and flank guards. The infantry marched up on wire netting tracks, an innovation used in Australia to make sandy riverbeds passable in the dry season. These were pegged into place and allowed infantry and light motor traffic to pass. The infantry and artillery moved forward in bounds, constructing defensive positions lest the Turks counterattack. The pace of the whole advance was geared to that of the railway and pipeline, which proceeded at a slow pace of about 24 km per month. A feature of the campaign in the Sinai and Palestine was the use of all arms in combination, and the cooperation between them was of a high standard.

On 20 December 1916, the 1st Flying Squadron reported that the Turks had pulled out of El Arish. The Desert Column surrounded and occupied the town the next day. The aviators established that the Turks had fallen back on Maghdaba and Rafa and The Desert Column set out at once to attack Maghdaba, some 37 km to the south east of El Arish. Chauvel made a night approach and encircled the Turkish position. As the light horsemen and

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68 "History of the 1st Armoured Car Section", AWM224 MSS 209, pp. 1-3
69 War Diary, GS Desert Mounted Corps, 22 May 1917, AWM4 1/64/4 Microfilm Roll 864
70 Report on Activities of 1st Flying Squadron, 16 March 1916 to 31 December 1917, AWM224 MSS 515, pp. 1,2,10
71 Field Service Regulations, pp. 76-81
72 Gullett, VII: The AIF in Sinai and Palestine, p. 195
73 Report on Activities of 1st Flying Squadron, 16 March 1916 to 31 December 1917, AWM224 MSS 515, pp. 10-11
cameleers closed in on the strong and well-sited Turkish positions, they came under heavy fire and the advance slowed. Despite the enemy fire, the 1st Light Horse Brigade was able to approach across the open on horseback at the gallop with slight loss.\textsuperscript{74} They then advanced under the cover of machine guns and the fire of the Hong Kong and Singapore Battery.\textsuperscript{75} Faced with the prospect of running out of water if Maghdaba was not taken, Chauvel reluctantly ordered a withdrawal. Fortunately, the order was ignored by his brigade commanders who pressed on, capturing the Turkish redoubts with rifles and bayonets, bringing the battle to a successful conclusion. At a cost of 22 men killed and 124 wounded, Chauvel's men took 1,282 prisoners.\textsuperscript{76}

The victory at Maghdaba was followed up with an attack on Rafa. Exactly the same tactics were used. The 1st Flying Squadron covered the assembly on 8 January 1917. Rafa was approached by a night march and encircled. The light horsemen and cameleers advanced on Turkish positions that were even stronger than those at Maghdaba under the cover of the guns of the horse artillery batteries and Lewis and Vickers machine guns. For the first time in the campaign, radio was used by the 1st Flying Squadron to direct the artillery fire.\textsuperscript{77} No sort of fire superiority was established over the Turks and ammunition started to run low. With the advance stalled everywhere and Turkish reinforcements on the march, Chetwode reluctantly called off the attack. But, as at Maghdaba, at that very moment the Turks started to fold. Rafa was taken at a cost of 71 killed and 415 wounded, and 1,602 Turks were captured.\textsuperscript{78}

These actions showed what experienced, well-led horsemen could do. They also demonstrated that the light horsemen urgently needed more firepower. The artillery, too, had not been effective enough and the need for something heavier than 18 pounders was keenly felt. Finally, there was the understandable order to withdraw. Communications had not been good enough and while the initiative of the brigadiers at the front was commendable, relying on it was unwise.

The capture of Rafa virtually completed the British reoccupation of the Sinai. The remaining Turks in the southern Sinai were mopped up in February by the camels of the 11th Light Horse Regiment. Now, the AIF entered Palestine. Just across the border, for the

\textsuperscript{74} GS Desert Column, "A Note on Recent Cavalry Fighting", 6 April 1917, AWM25 923/27
\textsuperscript{75} GOC 1st Light Horse Brigade, "Report on Operations of 1st Light Horse Brigade at Maghdaba", 24 December 1916, AWM25 455/1
\textsuperscript{76} War Diary, HQ Eastern Force, 24 December 1916, AWM45 12/4
\textsuperscript{77} Report on Activities of 1st Flying Squadron, 16 March 1916 to 31 December 1917, AWM224 MSS 515, p. 11
\textsuperscript{78} War Diary, HQ Eastern Force, 9 January 1917, AWM45 12/4
first time since leaving Australia, the men of the Anzac Mounted Division found fresh grass, and allowed their horses to graze. Sand tyres and pedrails were handed in to the Ordnance depot at Khan Yunis in March 1917. However, it was as hard to find water and fodder in Palestine as in the Sinai, so the advance again halted while the railway was pushed through to Rafa.

Three British mounted brigades were now available and Chetwode proposed that they be grouped with the New Zealand Mounted Rifles Brigade to form a new mounted division, the New Zealanders' place in the Anzac Mounted Division being taken by the 4th Light Horse Brigade. This brigade was reformed from the 4th, 11th and 12th Light Horse Regiments, which were re-horsed on 21 February 1917. The 4th Light Horse Regiment was brought up to strength by disbanding the 4th Camel Regiment. A 4th Machine Gun Squadron was formed from the machine gun sections of the 4th, 11th and 12th Light Horse Regiments while the 4th Signal Troop, 4th Light Horse Field Ambulance and 9th Mobile Veterinary Section were formed from reinforcements. For some reason, Murray decided instead to form the new division, the Imperial Mounted Division, from the 3rd and 4th Light Horse Brigades and two British mounted brigades, while a British mounted brigade took the place of the 3rd Light Horse Brigade in the Anzac Mounted Division. A British regular army officer, Major General Sir H. W. Hodgson was appointed to command, with an all-British staff. The deliberate mixing of Australian and Imperial troops was contrary to the policy of the Australian Government, which soon registered its displeasure.

Air support of the Desert Column was by a wing consisting of only two squadrons, the 1st Flying Squadron and a British squadron. Officially, the 1st Flying Squadron was an "army" squadron, responsible for long range reconnaissance, fighting, bombing and mapping while artillery observation, contact patrols and tactical photography was the job of the "corps" squadron. In practice, there being only two squadrons, they shared all assignments between them. Gradually, the 1st Flying Squadron was re-equipped with better aircraft. Six Be2Es began arriving in December; 6 Martinsydes were delivered in March; and in May, 6 Be12As arrived. However, the Germans still deployed superior aircraft against them but fortunately did so timidly, since replacement pilots and parts were harder for them to obtain.

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79 Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 40
80 GOC Desert Column to GOC Eastern Force, "A Note on Recent Cavalry Fighting", 6 April 1917, AWM25 923/27
81 "History of the 4th Light Horse Brigade", AWM25 455/67
82 CGS EEF, "Force Order No. 31", 12 February 1917, AWM45 12/4
83 Secretary DOD to AHQ AIF London, 21 April 1917, AWM22 236/2/2000
84 Report on Activities of 1st Squadron, 16 March 1916 to 31 December 1917, AWM224 MSS 515, pp. 10,17
The British mounted brigades had priority for new equipment over the veteran light horse brigades. All were fully equipped with Vickers machine guns,85 and on 29 December the British mounted brigades were the first to be issued with the new Hotchkiss machine guns.86 The light horsemen naturally resented the fact that the inexperienced British brigades were receiving equipment in preference to the veteran light horse brigades, but the British cannot be blamed for favouring their own army. Chauvel was given reassurances that Hotchkiss guns for the light horsemen were on the way and he was able to arrange for nine Hotchkiss guns to be withdrawn from two British brigades so that each brigade would have three for training.87 In April they were finally issued to the light horse regiments on a scale of one per troop and the Lewis guns were returned to Ordnance. Training in the use of the new weapon was carried out at Zeitoun, Egypt. The training course lasted ten days and concentrated on the mechanical aspects of the weapon rather than its tactical handling. Men who passed through the course came back and instructed the rest.88

The Hotchkiss was a strip fed, French-designed automatic rifle developed for and adopted by the British cavalry before the war, chambered to British .303 calibre ammunition and manufactured by Enfield.89 The gun section consisted of only four men, two carrying 6 strips of 10 rounds each in special bandoliers, and two equipped with ordinary rifles and equipment. The small section size was made possible by the use of horses; a half-draught packhorse with a special saddle carried the gun, a spare barrel and 900 rounds. Each squadron also had two packhorses as ammunition horses, each carrying 2,400 rounds. It was found possible for a gun horse to advance at the trot over rough ground without hurting its back. With practice, the Hotchkiss gunners found that they could dismount and fire very quickly. It also proved possible to sling the Hotchkiss from the shoulder like an ordinary rifle.90

The Turkish line in southern Palestine was anchored on the coast near the fortress town of Gaza and extended out into the desert around Beersheba. To capture it, Murray had new technologies on the way including heavy howitzers and tanks, but he felt that it was inadvisable to wait for them.91 Dobell proposed to capture Gaza using the tactics that had

85 GOC Anzac Mounted Division to ADOS Desert Column, 2 March 1917, AWM45 7/21
86 War Diary, HQ Eastern Force, 29 December 1916, AWM45 12/4
87 ADOS Desert Column to BQGS Desert Column, 5 March 1917, AWM45 7/21
89 Hogg, The Machine Gun, p. 19
91 C-in-C EEF to CIGS, 5 December 1916, AWM45 7/1
succeeded at Maghdaba and Rafa on a larger scale. Chetwode's Desert Column, with both mounted divisions, the 1st Imperial Camel Brigade and a British infantry division, would sweep about Gaza, surrounding it and screening it from Turkish reinforcements. A reinforced British Division directly under Dobell's command would assault Gaza.

On 26 March 1917 the mounted troops carried out their part exactly as planned but the British division assaulting Gaza was delayed. Accordingly, Chetwode ordered the mounted troops to attack Gaza from the north. Chauvel began the assault at 1600 and despite the barriers of high cactus hedges and strong enemy opposition, Brigadier General Granville Ryrie's 2nd Light Horse and Brigadier General E.W.C. Chaytor's New Zealand Mounted Rifles Brigades entered the town as the sun set. However, Dobell had resolved to call off the attack if it had not succeeded by dark and he ordered the mounted troops to withdraw. This came as something of a shock, but the orders were obeyed, although Ryrie refused to leave Gaza until every one of his men was accounted for, and his brigade did not depart the town until 2215.  

The reason that Ryrie and Chaytor did not disobey the order was simple: because the operation was so large, their view was necessarily restricted and they did not have the information to base such a decision on. As for the British infantry, First Gaza showed them notably deficient in training, initiative and leadership. Both command and communications were defective, and a lost battle was the result.

In his report, Dobell tried to look on the bright side:

> This action has had the result of bringing the enemy to battle and he will now undoubtedly stand with all his available force in order to fight us when we are prepared to attack.

Dobell's philosophy was the pre-war British one of seeking to bring the enemy to battle; the culmination of a meme entrenched in the *Field Service Regulations* that the decisive battle was the object of the military campaign.

Murray ordered Dobell to make another attempt at Gaza. Encirclement having failed, Dobell decided on a frontal assault with three British infantry divisions. The Desert Column, now consisting entirely of the mounted troops, would cover the right flank. New technologies would be introduced to the Palestine theatre. The artillery was beefed up to 150 guns, including six 2.75 inch mountain guns, 104 18 pounders, 24 4.5 inch howitzers, twelve 60 pounders, two 6 inch howitzers and two 8 inch howitzers.  

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94 BGGS Eastern Force, "General Instructions - Artillery", 18 March 1917, AWM45 12/7
an artillery density of roughly 1 gun per 100 metres of front, only a tenth of the recommended density on the Western Front. Only 600 rounds were available per gun and 500 per howitzer, so the gunners were urged to conserve ammunition. Eight tanks were on hand and smoke and poison gas would be used. As the enemy would probably retaliate with poison gases of their own, all troops of the Desert Column had been issued with gas masks in March.95

The operation was carried out on 19 April and was a complete failure. The artillery fire was spread over too wide a front to suppress the Turkish artillery or machine guns, despite firing off most of its ammunition. Instead of approaching in the dark, the tanks had to traverse 2000 to 2500 metres of open country in broad daylight, in full view of enemy artillery which the meagre counter battery fire was completely inadequate to suppress. Three tanks were disabled and one badly damaged. Only one broke down, which was not a bad achievement given that they had to travel 50 to 60 km. The tank officers believed that the frontage was far too wide for only eight tanks, and that they should have been grouped together in order to provide mutual support if the infantry were held up.96 The gas had no noticeable effect. The infantry and mounted troops showed great gallantry but ultimately were unable to capture the position. Accordingly, the attack was called off.

On 21 April Dobell was relieved of his command and was succeeded by Chetwode.97 In turn, Chauvel assumed command of the Desert Column and Chaytor, the Anzac Mounted Division. The same day, Murray reported back to the War Office in London that further progress was impossible without considerable reinforcements. As at Gallipoli, which the Gaza campaign was fast coming to resemble, the British government chose to reinforce failure, sending two more infantry divisions and two mounted brigades to Egypt from the Salonika Front.98 With two more divisions recently raised in Egypt, this brought the EEF to seven infantry divisions.

The Australian government had sent Brigadier General R. M. McC Anderson from London to explain its policy regarding the organisation of the mounted troops to Murray, and an agreement was reached.99 The extra two brigades from Salonika allowed the Desert Column to be increased to three divisions when it was reorganised on a three-brigade basis on 20

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95 Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 40
96 Major N. Nutt to GS Eastern Force, 24 April 1917, AWM224 MSS 507, p. 40
97 War Diary, GS Desert Mounted Corps, 21 April 1917, AWM4 1/64/4 Roll 864
98 MacMunn and Falls, Military Operations Egypt and Palestine, Volume I, pp. 354-357
99 Brigadier General R. M. McC. Anderson to DOD, cable 7 June 1917, AWM22 236/2/2000
June. The British brigade was withdrawn from Anzac Mounted Division and one from the Imperial Mounted Division, now renamed the Australian Mounted Division as part of the agreement. Three British brigades were formed into a new third division, the Yeomanry Mounted Division.\(^{100}\) New tables of organisation were published and the field squadrons and signal troops reorganised in accordance with it but the Australian and New Zealand governments ignored requests to alter the structure of their light horse and mounted rifle regiments.\(^{101}\) The artillery of each division was reduced to a single brigade of three batteries, each of 4 guns.

Starting in May, the light horse re-equipped with new Mark VII ammunition and the old rifles that were sighted for Mark VI ammunition were recalled. This simplified the ammunition situation in the Palestine theatre. The machine gun squadrons were at last supplied with Vickers machine guns to replace the aging and unsuitable Maxim guns.\(^{102}\)

In addition to sending reinforcements and equipment, the British government recalled Murray, replacing him with a British cavalry officer with a distinguished record in France, General E.H.H. Allenby, who took over command of the EEF on 28 June. He also decided to take command of the troops in the field himself and moved most of GHQ from the Savoy Hotel in Cairo to Khan Yunis, north of Rafa.\(^{103}\) Allenby decided to regularise the command set up. Two new corps headquarters were created to control the six infantry divisions and the Desert Column became the Desert Mounted Corps, with the three mounted divisions assigned.\(^{104}\) As a consequence, Chauvel became the first Australian to be promoted to the rank of lieutenant general. On 12 August Eastern Force ceased to exist and GHQ took direct command of the Palestine front.\(^{105}\)

The EEF also had some new tactical ideas courtesy of Chetwode, who wrote a paper analysing options for the capture of the Gaza position. Looking at a frontal attack on Gaza, Chetwode noted:

> If we attack at Gaza, we should attack the enemy at his strongest point. The operation would be prolonged and expensive and we should have to reduce the defences by sheer weight of artillery The

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\(^{100}\) CGS EEF, “Force Order No. 44”, 17 June 1917, AWM22 236/2/2000

\(^{101}\) Major E.B.T. Nicholls, “Ordnance Work - AIF in Egypt”, 15 October 1919, AWM224 MSS 507, p. 52


\(^{104}\) War Diary, HQ Eastern Force, 3 August 1917, AWM45 12/6

\(^{105}\) War Diary, HQ Eastern Force, 12 August 1917, AWM45 12/6
frontage of such an attack would not be less than 10-12,000 yards and we have not and probably
never will have sufficient artillery...106

He went back to the Field Service Regulations' recommendations that in these circumstances,
...it may then be more effective to act deliberately or to aim at manoeuvring an enemy out of a strong
position with a view of forcing him to fight under conditions which admit of more decisive results.107

He therefore recommended an attack at Beersheba, possession of which would force the
enemy to face encirclement or withdraw. He noted the disadvantages of Beersheba, however:

We must also remember that a fight here must be a fight for water as well as for the enemy's position
and that if we merely take the position we shall be tied down to another tedious advance, with the
necessity for providing water mile by mile until we can attack his next position...108

Allenby brought a number of ideas with him from the Western Front, most notably that of
the conference. He adopted Chetwode's plan, but the details were thrashed out in a series of
conferences. It would be up to Chauvel to find enough water to keep his troops in the field,
and he personally reconnoitred the Beersheba area in a light car of the 1st Light Car
Patrol.109 As a result, enough water was discovered by Desert Mounted Corps patrols to
provide the requirements for an advance to and attack on Beersheba.110

Chaytor of the Anzac Mounted Division requested that 13 pounders replace the 18
pounders of his division. The two weapons had about the same range and similar accuracy
but the 13 pounder gun carriage and limber were 356 kilograms lighter, the ammunition
wagon and limber 292 kilograms lighter and the load of ammunition itself 305 kilograms
lighter. This of course affected the pace at which the guns could move. In order to keep up
with the mounted troops, eight-horse teams had to be used, something which the
establishments had never catered for.111 Accordingly, on 9 and 18 September the brigades
supporting the Anzac and Australian Mounted Divisions were re-equipped with 13
pounders.112

106 GOC Eastern Force to CGS EEF, "Notes on the Palestine Operations", 21 June 1917, AWM45 12/7
107 Field Service Regulations, p. 108
108 GOC Eastern Force to CGS EEF, "Notes on the Palestine Operations", 21 June 1917, AWM45 12/7
109 "History of the 1st Armoured Car Section", AWM224 MSS 209, p. 4
110 GOC Desert Mounted Corps to CGS EEF, 27 August 1917, AWM45 7/23
111 GOC Anzac Mounted Division to GOC Desert Column, 8 August 1917, AWM25 383/10
112 War Diary, British 18th Horse Artillery Brigade, 9 September 1917, AWM4 13/23/4 Microfilm Roll 218;
War Diary, British 19th Horse Artillery Brigade, 18 September 1917, AWM45 12/46
The heavy artillery was dramatically reinforced. At the First Battle of Gaza, the only heavy artillery had been twelve 60 pounders. By October the EEF would have twenty eight 60 pounders, fifty 6 inch and twelve 8 inch howitzers and a couple of 6 inch guns. The arrival of new aircraft allowed the formation of two new flying squadrons. New aircraft were provided for all four squadrons, the Be2Es of the 1st Flying Squadron being replaced by RE8s.

Chauvel formed three Australian signals units to support the Desert Mounted Corps, the Cable Section, the Pack Wireless Section and the 3rd Airline Section. He also formed a corps field engineer unit, D Field Troop. D Field Troop and the Anzac Field Squadron, who used caterpillar tractors to haul pairs of 7-ton wagons carrying pumping plant across the desert, developed the ancient wells at Khalasa and Asluj. In a few days the two wells at Khalasa were producing a total of 14,100 litres per hour and the three at Asluj 8,600 litres per hour.

The horses were worked hard throughout this period. On 6 September the Anzac Mounted Division's Assistant Director of Veterinary Services (ADVS) put in a scathing report on the condition of the horses of the division:

These horses are all suffering from debility and at least 75% are eating sand and their own manure. Chaytor believed that the sand eating was largely if not wholly due to the short ration, and in October obtained permission to increase it by 900 grams per day.

The problem of transport was a difficult one. It was generally considered that camels would be too slow for the free wheeling campaign envisaged, and given the existence of roads and the shortage of mechanical transport, it was decided to provide the mounted divisions with horse transport, in spite of experience elsewhere that horse transport was too slow for mounted troops. Accordingly, seven Australian and one New Zealand Service Corps companies were formed at Moascar on 1 August 1917.

A great deal of work was underway in preparation for the next offensive, part of which involved the provision of accurate and detailed maps and in this, three warrant officers of

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113 CGS EEF to GOC Desert Mounted Corps, 16 August 1917, AWM45 7/23
114 "History of the RFC in Sinai and Palestine during 1917", AWM224 MSS 515, p. 1
115 Report on Activities of 1st Flying Squadron, 16 March 1916 to 31 December 1917, AWM224 MSS 515, p. 10
116 "History of the Signal Service AIF Egypt", 24 June 1919, AWM224 MSS 92, pp. C1, W1, £1
117 McNicoll, Making and Breaking, pp. 114-115
118 GOC Anzac Mounted Division, 23 September 1917, AWM25 353/3
119 War Diary, Australian Mounted Division Train, 1 August 1917, AWM4 25/20/1 Microfilm Roll 480
the Australian Survey Corps joined the British surveyors mapping the front line area around Gaza. Another task was the construction of light railways. The Desert Column was asked to provide a company of 100 men with railway construction experience. Two months later, there was another call and a second company was sent.

The Desert Mounted Corps jumped off on its most famous campaign on the night of 30 October. The tactics were similar to those at Rafa and Maghdaba, with the mounted troops making a surprise night march, enveloping the left and rear of the enemy's position at Beersheba and attacking it from the east while the infantry attacked frontally from the south. The fight was a tough one. The Anzac Mounted Division was held up at Tel el Saba, the hill overlooking Beersheba, where the defenders held on until captured by the New Zealanders late in the day.

Once again time was running out and the operation depended on the quick capture of the wells at Beersheba. At his headquarters on a hill overlooking the battlefield, Chauvel discussed his next move with Hodgson and Brigadier General W. Grant of the 4th Light Horse Brigade. In view of the shortness of time, it was decided to attempt a mounted attack on Beersheba. The light horse did not carry swords but Hodgson had ordered their bayonet points sharpened some days before in anticipation of such a tactic. The 4th and 12th Light Horse Regiments formed up with their squadrons in three lines, each line about 300 to 500 metres apart. Wielding their bayonets like swords, they moved forward at a trot.

The 13 pounders of the British Notts Battery suppressed Turkish machine guns. Three Turkish batteries opposed the light horsemen but they moved forward so swiftly that the Turks could not range on them. The light horsemen swarmed over the Turkish positions and swept on into the town, capturing all but two of the seventeen wells before they could be destroyed. By this time there was some 4,000 thirsty animals around Beersheba. The Anzac and Australian Field Squadrons moved in during the night to get the wells into full production. Fortunately a thunderstorm a few days before had created pools south of Beersheba and these were used to slake the thirst of the horses, whose performance in this action was extraordinary. Several light horse regiments went without water for 60 hours.

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120 McNicoll, *Making and Breaking*, pp. 112-113, 117
121 CE Desert Column, 7 June 1917, AWM25 813/1
122 GS Desert Column, 7 August 1917, AWM25 813/1
123 GOC Desert Mounted Corps, 12 December 1917, "Narrative of Operations of Desert Mounted Corps 22 October to 18 November 1917", AWM45 11/7
124 GOC Australian Mounted Division, "Preliminary Instructions No. 1", 26 October 1917, AWM25 455/6
the New Zealand Mounted Rifles for 72 hours and a wagon team of the Cable Section for 84 hours.\footnote{125}{GOC Anzac Mounted Division to HQ Desert Mounted Corps, 31 January 1918 Powles, Charles Guy, The New Zealanders in Sinai and Palestine, Auckland, Whitcombe and Tombs, 1922, pp. 152-153}

### Mounted Actions of the Desert Mounted Corps

(October - November 1917)\footnote{126}{BGGS Desert Mounted Corps, 24 January 1918, AWM25 923/27}

<table>
<thead>
<tr>
<th>Date</th>
<th>Locality</th>
<th>Units</th>
<th>Results</th>
<th>Casualties</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 October 1917</td>
<td>Beersheba</td>
<td>4th and 12th Light Horse Regiments</td>
<td>Beersheba captured; 700 POWs</td>
<td>64</td>
</tr>
<tr>
<td>7 November 1917</td>
<td>Ameidat</td>
<td>1st Light Horse Brigade</td>
<td>383 POWs</td>
<td>very few</td>
</tr>
<tr>
<td>8 November 1917</td>
<td>Huj</td>
<td>10 troops of British 5th Mounted Brigade</td>
<td>30 POWs</td>
<td>about 60</td>
</tr>
<tr>
<td>8 November 1917</td>
<td>Khuweilfeh</td>
<td>2 squadrons of British 8th Mounted Brigade</td>
<td>Objective gained</td>
<td>very few</td>
</tr>
<tr>
<td>13 November 1917</td>
<td>Yebnah</td>
<td>3 squadrons of British 8th Mounted Brigade</td>
<td>Objective gained</td>
<td>very few</td>
</tr>
<tr>
<td>13 November 1917</td>
<td>El Kughar</td>
<td>British 6th Mounted Brigade</td>
<td>1100 POWs</td>
<td>150</td>
</tr>
<tr>
<td>15 November 1917</td>
<td>Abu Shusheh</td>
<td>2 squadrons of British 6th Mounted Brigade</td>
<td>Counter-attack dispersed</td>
<td>very few</td>
</tr>
<tr>
<td>15 November 1917</td>
<td>Ludd</td>
<td>1st Light Horse Regiment</td>
<td>318 POWs</td>
<td>very few</td>
</tr>
</tbody>
</table>

Over the next weeks, the mounted troops carried out a number of mounted actions, with encouraging results. Inevitably, the question of swords came up. The reason for not arming the light horse with swords was that the weight of the weapon was not worth the remote prospects of its use. The sword and scabbard weighed some 2 kilograms and the rifle
bucket on the other side, needed to balance the load on the horse, another 1.4 kilograms not normally needed by the light horse, who slung their rifles on their backs.\(^{127}\) Indeed, consideration had been given to taking the swords off the British cavalry brigades in order to save the weight. Because it took some time for men to become accustomed to carrying their rifles slung, and because of the prospect that swords might be useful, Chetwode had urged that the swords be retained.\(^{128}\) Now the value of mounted action was dramatically demonstrated and the doctrine was questioned. In July 1918 the Australian Mounted Division was re-equipped with swords, becoming true cavalry, but the Anzac Mounted Division remained mounted infantry to the end.\(^{129}\)

The EEF drove the Turks and the *German Asia Corps* back to Jaffa and then to Jerusalem. The mounted troops found the going rough and were dogged by supply problems, particularly of water, that sometimes brought the whole pursuit to a halt. On 3 November an emergency motor water convoy of 30 trucks with 1800 litre tanks was sent to Beersheba.\(^{130}\) Initially, camels and caterpillars of a British mechanical transport company hauled supplies but the caterpillars experienced considerable trouble. They moved at a slow pace of 1.6 kilometres per hour and could only carry 6 tonnes per truck. Each truck required 8 hours of overhaul and the net result was they could only travel 19 km per day when the mounted troops were moving 24 to 32 km per day.\(^{131}\) On 7 November the caterpillars were exchanged for 60 trucks, bringing the total number assigned to the Desert Mounted Corps to 90. The road from Beersheba to Sheria was impassible for motor vehicles, however, and a camel convoy was used to bring up fresh food and water. On 10 November 1917, another 76 trucks joined the corps, bringing the total transport to 166 trucks, 3 Divisional Trains and 3 camel companies. Supplies were hauled from the railhead, which reached Gaza on 20 November 1917 and Deir Sineid on 27 November 1917, to the advanced supply dump by camel, from there to the division refilling points by trucks, and to the brigades by horse. The most difficult task was that of the truck drivers, who had to negotiate narrow camel and donkey tracks carrying 5 tonnes of supplies.\(^{132}\) The EEF was now using 8.2 million litres of petrol, 2.3 million litres of aviation fuel and 2.0 million litres of kerosene per month.\(^{133}\)

\(^{127}\) BGGS Eastern Force, 23 November 1916, AWM45 11/18

\(^{128}\) GOC Desert Column, 9 December 1916, AWM45 11/18

\(^{129}\) Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 100

\(^{130}\) AA&QMG, Desert Mounted Corps, "Treatise on the Supply of Desert Mounted Corps During November 1917", undated, AWM45 11/8

\(^{131}\) Lieutenant Colonel W. Stansfield, "War History of the AASC in Egypt", undated, AWM224 MSS 210, Part II, pp. 1-2

\(^{132}\) AA&QMG, Desert Mounted Corps, "Treatise on the Supply of Desert Mounted Corps During November 1917", undated, AWM45 11/8

\(^{133}\) Lieutenant Colonel W. Stansfield, "War History of the AASC in Egypt", undated, AWM224 MSS 210, Part IV, p. 4
Where possible, enemy positions were taken by manoeuvre. At Latron on 18 November the 3rd Light Horse Brigade enveloped a strong enemy position, forcing the Turks to withdraw. In this, the 13 pounders of a British battery ably supported them, pushing forward as far as the terrain would allow and suppressing the enemy artillery. On 9 December the 10th Light Horse Regiment entered Jerusalem.\textsuperscript{134} From 31 October to 18 November the Desert Mounted Corps had captured 5,720 prisoners.\textsuperscript{135} The victory was not cheap, the EEF reporting 10,361 casualties up to 10 November of which 966 were from the mounted troops.\textsuperscript{136}

With the fall of Jerusalem, the Desert Mounted Corps rested and refitted. After the exertions of the campaign, the horses of the Australian Mounted Division needed ten days rest to recover their form. Boots and clothing were in disrepair and the 13 pounders required overhauling.\textsuperscript{137} A large consignment of Australian clothing arrived in December, and the Anzac Mounted Division was re-equipped in January 1918 and the Australian Mounted Division the following month.\textsuperscript{138} The 1st Light Car Patrol swapped its beaten up old Fords for six new ones on 11 December 1917.\textsuperscript{139} And on 29 December 1917, the 1st Flying Squadron began to re-equip with the Bristol F2B reconnaissance fighter.\textsuperscript{140} One of the finest aircraft of the war, the Bristol Fighter was powered by a Rolls Royce Falcon engine that could achieve speeds of up to 200 kilometres per hour, had one forward firing fixed Vickers and two free Lewis guns and could carry twelve 9 kilogram bombs.\textsuperscript{141} Formerly the 1st Flying Squadron had held its own with inferior aircraft. Now it had the superior machine.

Allenby resolved to undertake a raid into Jordan to destroy the Turkish railway at Amman. In another of his lucid appreciations, Chetwode protested in vain that the Jordan River was in high flood and precluded the use of wheeled vehicles in the Jordan Valley, that the country was unknown and that the enemy, reported at 4,500 strong, would fight every inch of the way and that with only 6,000 men the odds in favour of a quick advance were not good.\textsuperscript{142} Allenby ordered the operation anyway.

\textsuperscript{134} GOC 3rd Light Horse Brigade, 31 January 1918, AWM25 455/27
\textsuperscript{135} GOC Desert Mounted Corps, "Report on Operations of Desert Mounted Corps 22 October 1917 to 18 November 1917", 11 December 1917, AWM45 11/7
\textsuperscript{136} DAG GHQ EEF, "Memorandum on Casualties up to 10 November 1917, 12 November 1917, AWM45 7/26
\textsuperscript{137} GOC Desert Mounted Corps to Advanced HQ EEF, "Readiness for Action", 16 December 1917, AWM45 7/27
\textsuperscript{138} Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 64
\textsuperscript{139} "History of the 1st Armoured Car Section", AWM224 MSS 209, p. 22
\textsuperscript{140} Report on Activities of 1st Flying Squadron, 16 March 1916 to 31 December 1917, AWM224 MSS 515, p. 10
\textsuperscript{141} Cutlack, F. M., \textit{The Official History of Australia in the War of 1914-1918, Volume VIII: The Australian Flying Corps}, Sydney, Angus and Robertson, 1923, p. 406
\textsuperscript{142} GOC British XX Corps to CGS EEF, 18 March 1918, AWM45 7/31
Getting across the Jordan River required the construction of bridges. D Field Troop was alerted on 11 March 1918 for a crossing site selected from aerial photographs. Shortly after midnight on 22 March D Field Troop threw a line across the river and launched a canvas and timber raft to create a "flying bridge". A pontoon bridge was commenced at dawn and was ready for cavalry and vehicles at 0815.143

The weather was wet and the ground very muddy. The 1st Light Car Patrol pushed rapidly along the road to Amman, capturing 30 German trucks it found bogged and abandoned but eventually its own advance was halted when the road became impassable.144 The light horse and camels pressed on to Amman, entering the town on 30 March but they could not capture their objective, the viaduct and railway station, owing to enemy artillery and machine gun fire. The raid cost the Anzac Mounted Division 734 casualties and they captured 328 prisoners.145

The next month another attempt was made, and once again the odds were long. The terrain was mountainous and muddy. Wheeled vehicles could not be used, horses were restricted to tracks and even camels could only move with difficulty. The enemy, although surprised, was not demoralised enough to withdraw from strong positions without a fight and the Desert Mounted Corps withdrew back across the Jordan again on 4 May.146 This time the mounted troops lost 397 men and the whole force captured 942 prisoners.147 Nothing could cover up the fact that the effort was a complete failure.

On 14 July, the Desert Mounted Corps was struck by a strong counterattack spearheaded by the German 702nd, 703rd and 11th Reserve Jäger Battalions of the German Asia Corps.148 This was the first time and only time that German troops were employed as stormtroops in the Palestine campaign. The light horsemen had studied reports on the fighting by their infantry counterparts in France and employed the tactics that had been found effective there. They utilised all the firepower at their command, firing off 19,000 rounds of rifle, 20,000 rounds of Hotchkiss and 30,000 rounds of Vickers machine gun ammunition.

143 GOC AIF Egypt to Secretary DOD, 13 September 1918, AWM22 739/4/103; BGGS Desert Mounted Corps, "Narrative of Operations of Desert Mounted Corps 1 March 1918 to 2 April 1918", 17 April 1918, AWM45 11/8
144 "History of the 1st Armoured Car Section", AWM224 MSS 209, p. 30
145 BGGS Desert Mounted Corps, "Narrative of Operations of Desert Mounted Corps 1 March 1918 to 2 April 1918", 17 April 1918, AWM45 11/8
146 GOC Desert Mounted Corps, "Narrative of Operations of Desert Mounted Corps East of Jordan April to May 1918", 10 May 1918, AWM25 455/69
147 Gullett, VII: The AIF in Sinai and Palestine, p. 635
148 Falls, II: Military Operations in Egypt and Palestine, pp. 437-438
Positions did not give up simply because they were surrounded and the line was restored by local counterattacks. Light horse casualties came to 69, while 425 prisoners were taken, including 358 Germans.149

As a result of the German Offensive that began in France on 23 March, Allenby was ordered to send two infantry divisions to France while a third was readied. The Australian Mounted Division was ordered to embark for France on 4 July to be broken up for infantry reinforcements, but the order was cancelled on 21 June.150 Two Indian divisions from Mesopotamia replaced the two British divisions that had departed. To economise on British manpower, the remaining four British infantry divisions not alerted for France were converted into Indian divisions, with three British battalions being withdrawn from each infantry brigade so that they now contained one British and three Indian infantry battalions. In all, the number of British infantry battalions with the EEF was reduced from 63 to 30 while the number of Indian battalions increased from 22 to 54. Of the 33 British infantry battalions withdrawn, 23 were sent to France and 10 broken up for reinforcements. After the Indian Mutiny of 1857, Indian infantry brigades consisted of three Indian and one British battalion to head off military insurrections. Thus, the affected British divisions were now identical to Indian divisions.151

Allenby had one spare British and one Indian cavalry brigade and formed a fourth cavalry division from them and the 1st Imperial Camel Brigade. Permission was sought from the Australian and New Zealand governments to convert their components of the brigade into horse mounted troops and was obtained on 25 May.152 At first, the formation of a 5th Light Horse Brigade looked fairly simple; the brigade required 98 officers and 1807 other ranks and there were 99 officers and 2,298 other ranks in the three Anzac battalions of the 1st Imperial Camel Brigade and the Camel Field Ambulance.153 But this included New Zealanders, of whom there were enough to form a New Zealand mounted regiment with 104 men left over in addition to 589 New Zealand reinforcements available in the theatre. By contrast, the formation of two light horse regiments would leave only 892 Australian reinforcements for all AIF units in the Middle East.154 This shortage of reinforcements led Chauvel, on 12 June, to request the return of the AIF personnel detached for railway

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149 Gullett, VII: The AIF in Sinai and Palestine, pp. 660-670
150 WO to C-in-C EEF, 12 June 1918, AWM45 7/48; C-in-C EEF to WO, 19 June 1918, AWM45 7/48
151 CGS EEF, 3 May 1918, AWM45 7/47
152 WO to C-in-C EEF, 25 May 1918, AWM45 7/47
153 C-in-C EEF to WO, 11 May 1918, AWM45 7/47
154 C-in-C EEF to WO, 6 July 1918, AWM45 8/7
construction duties. Despite the recommendations of Chauvel and Chaytor that New Zealand supply a regiment, the New Zealand government would not consent to more than a squadron.

Thus, on 25 July the 5th Light Horse Brigade became the last formation of the AIF to be formed in the Great War, with the 14th and 15th Light Horse Regiments and the New Zealand 2nd Machine Gun Squadron assigned. The new light horsemen drew swords, remounts and saddlery and traded in their Lewis guns for the Hotchkiss. The Camel Field Ambulance became the 5th Light Horse Field Ambulance. Brigade headquarters, the 5th Signal Troop and the 10th Mobile Veterinary Section were formed from reinforcements. The French ultimately provided the third cavalry regiment of the brigade, the 1er Regimen Mixte de Marche Cavalerie du Levant, consisting of two squadrons of 1er Regiment Spahis and two of 4e Regiment de Marche Chausseurs d'Afrique. On 8 July the field squadrons of the Anzac and Australian Mounted Divisions were renamed the 1st and 2nd Field Squadrons and the signal squadrons, the 1st and 2nd Signal Squadrons. The British components of the 2nd Signal Squadron were withdrawn and the squadron became wholly Australian by absorbing the Cable Section, Pack Wireless Section and 3rd Airline Section.

The two British cavalry divisions were also converted into Indian divisions and were renamed the Indian 4th and 5th Cavalry Divisions on 23 July. Each cavalry brigade contained one British cavalry regiment and two Indian. The British cavalry regiments thus released were sent to France as four machine gun battalions. Allenby also sent five and a half siege batteries, twenty-three infantry battalions and five machine gun companies. The net effect for the Desert Mounted Corps was that it now had four mounted divisions. Unlike the Indian infantry battalions, the new Indian cavalry regiments were veterans of the Western Front and the impact on efficiency was slight.

The new campaign plan called for deception on a grand scale. The enemy would be deceived into thinking that the main attack would be made by the mounted troops from the

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155 War Diary, DQMG GHQ EEF, 12, 14, 29 June 1918, AWM45 12/8
156 GOC NZEF Egypt to CGS EEF, 5 July 1918, AWM45 8/7;
GOC AIF Egypt to CGS EEF, 5 July 1918, AWM45 8/7
157 C-in-C EEF to WO, 19 July 1918, AWM45 8/7
158 GOC 1st Imperial Camel Brigade, "IC Brigade Reorganisation Order No. 8", 25 July 1918, AWM25 157/1
159 Major E.B.T. Nicholls, "Ordnance Work - AIF in Egypt", 15 October 1919, AWM224 MSS 507, p. 93
160 "History of the Signal Service AIF Egypt", 24 June 1919, AWM224 MSS 92, pp. C1, W13, £10, @l, e1
161 Falls, II: Military Operations in Egypt and Palestine, pp. 413-421. The Indian cavalry had last seen action on the Western Front at Cambrai in November 1917.
Jordan Valley. Instead, it was to be delivered by the infantry along the coast with the Desert Mounted Corps secretly redeploying to exploit any breakthrough. In essence, the plan was the exact opposite of Third Gaza. Allenby aimed to capture the Turkish communication centres and cut off and destroy the entire Turkish Army in Palestine. The ground ahead, the Plain of Sharon, was ideal terrain for cavalry. The elaborate deception plan included the construction of dummy horses in the Jordan Valley, and leaving a residual force built around the Anzac Mounted Division known as "Chaytor's Force".  

The success of the plan was made possible by the air supremacy gained by the Royal Air Force (RAF) and AFC. During one week in June, hostile aircraft crossed the allied lines one hundred times. In the last week in August that number dropped to 18. During the three following weeks of September it dropped further to just four and for several days before the allied attack, there was none at all. Yet, during the two months prior to the attack all 15 enemy machines destroyed and 33 forced down on the Palestine front fell to the Bristol fighters of the 1st Flying Squadron. The squadron also dropped 21 tonnes of bombs and expended 241,000 rounds of ammunition.

Some 385 guns, including 70 heavy, supported the attack on 19 September a density of 1 per 50 metres. Complete surprise was achieved, the Turks crumbled and the allies swept forward. The advance was one of the fastest sustained advances in history, the Desert Mounted Corps moving 167 km in just three days. Pushing through the mountains around Nablus, the 1st Light Car Patrol had difficulty getting through because the 1st Flying Squadron had attacked a column of 200 vehicles and destroyed so many that the road had become blocked. On 26 September Chauvel pronounced the Turkish Seventh and Eighth Armies destroyed and ordered the Desert Mounted Corps to advance on Damascus, which the light horse captured on 30 September. A flying column of armoured cars and light cars, including the 1st Light Car Patrol set out for Aleppo, which fell in turn on 26 October. Meanwhile Chaytor's Force struck out on its own and captured Amman.

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163 Cutlack, VIII: The Australian Flying Corps, pp. 133-134
164 Wavell, The Palestine Campaigns, pp. 205-206
165 Dupuy, Understanding War, pp. 150-153
166 "History of the 1st Armoured Car Section", AWM224 MSS 209, p. 52; Cutlack, VIII: The Australian Flying Corps, pp. 155-156
167 GOC Desert Mounted Corps, 26 September 1918; Falls, II: Military Operations in Egypt and Palestine, p. 723
168 Gullett, VII: The AIF in Sinai and Palestine, pp. 751-775
169 "History of the 1st Armoured Car Section", AWM224 MSS 209, p. 56
final round up, the two mounted divisions captured 38,000 prisoners. On 30 October Turkey surrendered.

Prisoners Captured by the AIF in Sinai, Palestine, Jordan and Syria (1916-1918)

<table>
<thead>
<tr>
<th>Period</th>
<th>Prisoners</th>
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<tbody>
<tr>
<td>Sinai, April to June 1916</td>
<td>30</td>
</tr>
<tr>
<td>Romani, 19 July 1916 to 16 August 1916</td>
<td>4,870</td>
</tr>
<tr>
<td>Mozar and Reconnaissances, September to December 1916</td>
<td>80</td>
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<tr>
<td>Maghdaba</td>
<td>1,280</td>
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<tr>
<td>Rafa</td>
<td>1,600</td>
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<tr>
<td>First Battle of Gaza</td>
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</tr>
<tr>
<td>Second Battle of Gaza</td>
<td>400</td>
</tr>
<tr>
<td>Reconnaissances before Beersheba</td>
<td>100</td>
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<tr>
<td>Beersheba-Jerusalem</td>
<td>3,600</td>
</tr>
<tr>
<td>East of the Jordan</td>
<td>2,500</td>
</tr>
<tr>
<td>Damascus (Australian Mounted Division)</td>
<td>28,000</td>
</tr>
<tr>
<td>Damascus (Anzac Mounted Division)</td>
<td>10,322</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>54,000</strong></td>
</tr>
</tbody>
</table>

The Palestine campaign stands as an example of the role of manoeuvre and mobility and as such differs from of the popular perception of the Great War that is drawn from images of the Western Front. Both campaigns, however, illustrate that in modern warfare tactics are driven by logistics. They also show that the character of modern warfare is determined by a combination of factors, one of which is technology.

Because Palestine was a relative backwater, technological change came slower and certain memes survived longer than on the Western Front. One of these was the notion that a non-white enemy could be defeated under whatever circumstances. The desire to bring about a decisive battle with a frontal assault also survived longer. In trying to transcend the situation in which the EEF found itself, the *Field Service Regulations* provided advice but not the much-needed framework for analysis and decision making. After the war, soldiers

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170 CO No. 1 (EEF) Section, Australian War Records Section to Australian War Records Section, 3 March 1919, AWM25 779/3
171 CO No. 1 (EEF) Section, Australian War Records Section to Australian War Records Section, 3 March 1919, AWM25 779/3
like A. P. Wavell would draw on their experience in the Palestine campaign for the answers.

The lower casualties as compared with the Western Front allowed the light horse to achieve a high standard of training that in turn served to keep casualties down. The readoption of swords may have made them look technologically regressive but it is the integration of all logistically feasible technologies that is the true essence of tactics.

Some observers found it odd that mounted troops should play such a significant part at a time when the mounted arm was demonstrably unable to earn its keep on the Western Front and so clearly passing into obsolescence. The light horse did so by incorporating infantry tactics and firepower. In this, we have an example of a technological phenomenon:

> It is not uncommon that as new technologies threaten to displace older ones, the latter in turn, are improved in some way so that the displacement is never complete or at least is delayed beyond what at first seems reasonable.\(^{172}\)

The true lesson was in the use of technology, not cavalry.

\(^{172}\) Pursell, *The Machine in America*, p.46
7. The German Offensives

The year 1918 saw a gradually worsening military situation following the effective withdrawal of Russia from the war, which allowed the Germans to reinforce the Western Front. Far from being able to renew the Ypres Offensive, the British armies in France found themselves preparing to face a German offensive. Although the final year of the war saw the introduction of fewer new technologies, it saw the proliferation of technologies introduced in earlier years, and tactics to take advantage of them, leading to the final progression from trench warfare into modern semi-open warfare.

As in the previous year, a number of organisational changes occurred over the winter, the most important of which was the consolidation of all five Australian divisions into a single Australian Corps under command of General Sir W.R. Birdwood.\(^1\) The Australian government had been pressing for this since July 1917,\(^2\) but had been refused on the grounds that a corps of five divisions would be unwieldy.\(^3\) This issue was sidestepped for the time being by designating the 4th Division as a depot division.\(^4\) The Australian government also insisted that all command and staff positions be held by Australians. This would take time to effect, but the result would be an Army more thoroughly Australian than ever. And an army it was, it all but name: on 31 March 1918 a staggering 122,426 Australian soldiers, including 483 nurses, were in France.\(^5\)

During 1917 the mechanical transport had gradually been Australianised. The 1st and 3rd Divisions had brought their own transport from Australia. Three auxiliary mechanical transport companies, sent from Australia in December 1916 for the purpose, were broken up to complete the mechanical transport of the 2nd and 5th Divisions. The 4th Division's mechanical transport was finally Australianised by 28 October 1917.\(^6\) On 12 March 1918 Colonel W.H. Tunbridge, the AIF's Director of Mechanical Transport Services, reorganised the mechanical transport, disbanding the Ammunition Sub Parks and Supply Columns and creating six mechanical transport companies available for any kind of hauling.\(^7\) Not only was the new arrangement more flexible, but he also took the opportunity to standardise on just four models of trucks. Two companies were equipped with Peerless, three with Daimlers and one with Thornycrofts. The 3rd, 6th and 12th Field Artillery (Army) Brigade Park Sections were equipped with the Peerless. Enough men were left over to form the 1st and 2nd Siege Battery Ammunition Columns, which

\(^1\) Birdwood had been promoted to the rank of full general on 28 October 1917
\(^2\) Letter, Governor General to Secretary of State for Colonies, 30 July 1917, AWM252 A197
\(^3\) Letter, Secretary of State for Colonies to Governor General, 12 September 1917, AWM252 A197
\(^4\) Letter, Secretary of State for Colonies to Governor General, 13 November 1917, AWM252 A197
\(^5\) *Australian Imperial Force - Statistics of Casualties etc*, p. 22
\(^6\) War Diary, I Anzac Corps SMTO, 28 October 1917, AWM26 227/26
\(^7\) AIF Order 1159, 12 March 1917
were equipped with Albions. Standardisation would henceforth pay dividends in terms of both training and maintenance.8

Trench mortar batteries were also reorganised, on 21 February. The three medium batteries in each division were reorganised as two medium batteries each with six 6 inch Newton Mortars, which had replaced the 2 inch Mortar in 1917. The new 6 inch Newton could fire a 21 kg bomb up to 1,300 metres.9 It could use either the type 105 time fuse or the new type 110 percussion fuse that was extremely effective against wire.10 Retention of the big 9.45 inch heavy mortar was under consideration,11 the commander of the 2nd Division reporting that:

The heavy trench mortar has proved its value under certain conditions. These conditions are very limited. In this division, the only occasions when the 9.45 inch mortar has been really useful were when we held the Ypres salient in September 1916.12

In the end, the divisional heavy trench mortar batteries were disbanded and a single battery of six 9.45 inch mortars was retained under Corps Heavy Artillery control.13 What is noteworthy here is a new meme, a contingency theory of weaponry, under which the usefulness of a weapon or arm depended on the circumstances, was gaining currency. Formerly, there had often been an aspect of traditionalism about weapons. Increasingly, the evaluation of weapons would be devolved to the lowest level, and the task at hand would determine the decision.

Machine guns were also reorganised yet again on 2 March when the four companies in each division were formed into Machine Gun Battalions, each with 64 Vickers medium machine guns under divisional control, while the Division Machine Gun Officer was upgraded to a lieutenant colonel. Although his responsibilities remained mainly training and technical, he could and would control the disposition of machine guns at the front, aided by his own signal section.14

A new sapper unit arrived during the winter, the 1st Army Troops Company. The only unit of its kind in the AIF, it was a general purpose engineering unit a little smaller than a field company. This unit gave the corps troops engineering expertise of their own, without having to borrow field or tunnelling companies. New signal units were formed on 19 February - the Australian Corps Signal Company, the 1st and 2nd Cable Sections,
and the 1st and 2nd Airline Sections - while on 2 April the Australian Corps Wireless Section became an independent unit. The proliferation of wireless technology would be important in controlling open warfare.

Three squadrons of the Australian Flying Corps had been sent to Europe in 1916 for service on the Western Front, the 3rd Flying Squadron arrived in England on 28 December 1916, the 2nd on 30 January 1917 and the 4th on 27 March. On 24 August 1917, the 3rd Flying Squadron, equipped with RE8s, moved to France, with the 2nd followed on 21 September and the 4th on 18 December. The latter two squadrons were trained as fighter squadrons, the 2nd being equipped with the SE5a from January 1918 and the 4th with the legendary Sopwith Camel. On 15 November 1917, the 3rd Flying Squadron became the Corps squadron of I Anzac Corps. A small gesture in itself, this would have a great impact on Australian military thinking. Henceforth the flying squadron commander would attend corps conferences and air and ground operations would be closely coordinated. The down side to this was that most senior officers' acquaintance with the air arm was with the 3rd Flying Squadron (or the 1st in Palestine) and after the war they continued to think of the Air Force as an arm rather than a service.

On 21 January the British Army, short of reinforcements, reduced the divisions on the Western Front from 12 infantry battalions to 9, a step already taken by the German and French Armies. The effect was to increase the ratio of other arms to infantry. The War Office urged the AIF to follow for the sake of uniformity but the AIF, short of reinforcements too but not so badly, elected to defer the decision. The Australians felt strongly that the 12 battalion organisation was superior as it allowed a brigade to have two battalions forward and two in reserve. The Canadian and New Zealand armies likewise remained on the 12 battalion establishment.

The platoon organisation was changed to a Lewis gun section and three rifle sections. In April BEF GHQ decided to increase the number of Lewis guns per infantry battalion, initially to 20 and ultimately, in June, to 32. Army commanders were asked to nominate divisions suitable for the immediate receipt of extra guns. All five Australian divisions were so nominated. For the moment, each company was given an extra Lewis gun, available as a tactical reserve. In addition, each infantry battalion, field company and

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15 AIF Order No. 1124, 19 February 1918; AIF Order No. 1200, 2 April 1918
16 Cutlack, VIII: The Australian Flying Corps, pp. 175-178, 213
17 Wrigley, The Battle Below, p. 41
18 Stephens, "The Odd Couple: Army/Air Force Relations", From Past to Future, p. 143. The Australian Flying Corps became the RAAF in 1921.
19 Letter, War Office to FM C-in-C BEF, 15 February 1917, AWM45 27/8
20 AWM25 721/75 contains the correspondence regarding this matter
21 BGGS Australian Corps, 11 April 1918, AWM26 345/8
field battery was given four, and each tunnelling company two, Lewis guns for antiaircraft purposes.  

Not all technical and tactical ideas were winners. Lieutenant F. Brand of the 7th Light Trench Mortar Battery conducted experiments in the use of the Stokes Mortar as an antiaircraft weapon in November 1917. The Stokes was fired with barrel and base plate only, the number one positioning the mortar by hand, using a sight he improvised. I Anzac Corps School carried out further tests. The general impression of this innovation was summed up by Brigadier General Charles Rosenthal, who felt that, given the lack of a reliable fuze, the variation in range and the slowness of the bomb relative to an aircraft, it was most unlikely that an enemy aircraft could ever be brought down by a Stokes Mortar.

It was a sign of increased antiaircraft precautions, not restricted to units at the front, who were enjoined not to congregate in groups of more than 250, but which extended back to the Australian Corps Schools, the General Base Depot at Le Havre and even the AIF Administrative Headquarters back in London. Low flying aircraft could now expect to be shot at by the ground forces. On 27 April the 7th Infantry Brigade reported that it had 2 Vickers and 26 Lewis guns detailed for antiaircraft duties in its sector. While the number of enemy aircraft shot down by ground fire each month was low (only 6 by antiaircraft guns and 3 by small arms in June by the whole of the BEF), the whole effort was made worthwhile on 21 April when Australian Vickers and Lewis gunners fired on and apparently shot down the legendary Red Baron, Captain Manfred von Richthofen.

The British Army was expecting the Germans to attack, although not necessarily against its front, and had a good idea of the form that the attack would take. The Germans attempted to obtain strategic surprise by quickly deploying large numbers of troops from reserve. Their guns did not fire until the day of the attack and there was minimal registration activity. Instead of a long preliminary bombardment, there was a short one

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22 BGGS Australian Corps, 19 July 1918, AWM26 361/3; BGGS Australian Corps, 22 July 1918, AWM26 361/3; "Organisation of an Infantry Battalion", June 1918, 3DRL2316 28/2
23 OC 7th Light Trench Mortar Battery 5 November 1917; GOC 7th Infantry Brigade 6 November 1917, AWM25 15/16 "Results of Experiments Carried out by I Anzac Corps School in use of Stokes Mortar against low-flying Aircraft"
24 Col GS, 1st Division 12 August 1917; Lt Col GS I Anzac Corps 23 October 1917; Lt Col GS 1st Division 2 November 1917; GOC 1st Division 19 January 1918, AWM25 973/11 "Stokes Mortars vs Aircraft"
25 GS 5th Division, 28 June 1918, AWM26 424/5
26 Lt Col Commandant of Australian Corps Schools 2 August 1918, AWM25 15/1, "General Instructions for Protection from Enemy Bombing"; War Diary of Australian General Base Depot 31 May 1918, AWM25 15/1; "General Instructions for Protection from Enemy Bombing"; Commandant of Australian Corps Schools 22 July 1918, AWM25 15/10 "Enemy Aircraft - Action to be taken in Event of an Air Raid"
27 OC 7th Infantry Brigade 27 April 1918, AWM26 385/5
28 "Summary of Aircraft Destroyed by BEF Ground Forces", AWM26 408/5
29 "Report on Destruction of Baron von Richthofen's Aeroplane" 22 April 1918, AWM26 348/17.
of several hours of extreme violence, making full use of the ability of their trench mortars to deliver a huge volume of explosive in a short time. They also made extensive use of lethal Green Cross. The German artillery attempted to silence the British with counterbattery fire while pioneers cut the wire with wire cutters. The initial attack was made by specially trained assault troops who exploited gaps while avoiding strong points, leaving them for follow up units. The Germans put a great deal of emphasis on the initiative of both junior and senior commanders and expected the offensive to be carried on for 8 kilometres or more.

The British line lay simply where the offensives of 1917 had come to an end and was in no way chosen for defensive value. Particularly vulnerable were the British Fourth Army holding the Ypres salient, and the British Fifth Army holding the long Somme sector recently handed over by the French. The BEF had a lot of work to do. Wire entanglements were laid, blockhouses, dugouts and machine gun and observation posts constructed, and trenches dug. Defences were also prepared against aircraft and tanks, which the enemy was now known to possess. Such work occupied much of the time and greatly hampered training, but by aggressive patrolling of No Man's Land the Australian infantryman got training in the war he would actually have to fight.

The British adopted the German defensive scheme which had earned their grudging respect at Third Ypres. As in 1917, the front was organised in three lines but held much more lightly. The forward zone was a screen of barbed wire covered by machine gun posts. The battle zone was where the main fighting was intended, and this consisted of a series of defended localities. The rear zone was a fall back and rallying line. The doctrine was a good one, but there was too little time to inculcate it into the British Army. The German system relied on junior commanders at the front to launch counterattacks on their own initiative. This meant that the new doctrine had to be promulgated to and thoroughly understood by all levels of the British Army, a tall order. Most commanders continued to hold the forward zone too heavily and spend too much time on it, to the detriment of works in the battle zone. All of which has led some commentators to suggest that the British Army might have been better off with the older, more familiar, system, which had worked well enough for the Australians at Lagnicourt.

30 “Note on Enemy Intentions on Fifth Army front”, 26 February 1918, AWM26 351/4
31 “Notes 25/1/1918 and 8/2/1918 by Ludendorff dealing with Tactics to be employed in the Offensive”, undated, AWM26 440/9
32 Gudmundsson, Stormtroop Tactics, pp. 156-157
33 Bean, V: The AIF in France: During the Main German Offensive 1918, pp. 90-92
34 Bean, V: The AIF in France: During the Main German Offensive 1918, p. 90
35 Bean, V: The AIF in France: During the Main German Offensive 1918, pp. 15-32
36 Wynne, G.C., "The Development of the German Defensive Battle in 1917 and its Influence on British Defence Tactics", pp. 15, 32
On 21 March the German attack fell on the British Third and Fifth Armies. Holding a long front with few reserves, the commander of the British Fifth Army, General Sir H. de la P. Gough, had only one card up his sleeve. Immediately before the attack, the artillery battery positions were changed, thus saving many of his outnumbered guns from destruction or neutralisation. The Germans were soon taking casualties from defensive artillery and machine gun barrages. Because of the broad front of the German attack, however, these were too thin in many sectors and often not timely. A morning mist, normal for the region at that time of year, screened the advance. The defended localities were generally emplaced on higher ground leaving the valleys defended only by fire. Without observation, they became dead ground and infiltrating stormtroopers were able to penetrate the battle zone, bypassing the defended localities. In some cases the mist also prevented the SOS signals from being seen. By nightfall, a general withdrawal was in progress and units fighting rearguard actions for the first time made many tactical errors. Some fought to the finish rather than retreat while others withdrew without a fight. The need to cover the withdrawal with fire was neglected. Too much attention was given to keeping a continuous line, resulting in local penetrations that triggered general withdrawals.

The next day the German advance continued and semi-open warfare resumed on the Western Front. Orders were issued for the destruction of ammunition and the demolition of bridges. During the German withdrawal of 1917 the British Army had found, to its dismay, that it had become rusty at open warfare. This time things were much worse, because whereas in 1917 units could simply opt out of open warfare with a less vigorous pursuit, now the Germans were forcing the pace.

Cooperation with the Royal Air Force soon failed due to lack of communications, in particular the cutting of unburied telephone lines by German artillery. As the front moved there was insufficient time to lay lines, let alone bury them, and the cable sections were unused to their new role in open warfare. As in 1917, units deprived of telephones were slow to switch to visual and wireless communications. No special transport was supplied for the wireless sets and retreating artillery units lost or damaged their radios or did not have the time to erect new radio masts.

37 British Fifth Army War Diary, 21 March 1918, AWM26 351/4
38 GHQ, "Notes on Recent Fighting No. 1", 5 April 1918, AWM26 345/6
39 MGRA British Fourth Army, "Artillery in the Recent Fighting", 21 March 1918, 3DRL2316 27
40 British Fifth Army War Diary, 21 March 1918, AWM26 351/4
41 GHQ, "Notes on Recent Fighting No. 1", 5 April 1918, AWM26 345/6
42 British Fifth Army War Diary, 22 March 1918, AWM26 351/4
43 GHQ, "Notes on recent Fighting No. 8. Signal Communications", 28 April 1918, AWM26 345/11
44 GHQ, "Notes on Recent Fighting No. 5. Artillery", 21 April 1918, AWM26 345/9
The 3rd, 4th and 5th Divisions were ordered to join the battle on 25 March. Corps would not follow until 5 April so for two weeks individual divisions and brigades fought separate battles under different British commands. Brigade groups were thrown into the battle as they arrived and in some cases would spend weeks separated from their divisions. What the AIF brought to the battle was fresh, strong, veteran divisions with training and experience in open warfare from the previous year. The high degree of initiative that it granted to junior leaders would also serve the cause well.

On 9 April the Germans had launched a second offensive on the Lys sector near Armentières, and headed for the major rail junction at Hazebrouck. Australian units that had not yet left for the Somme were thrown in to the fight and the 1st Division, which had only just arrived there, was rushed back. On the Somme, the Australian met an enemy advance that had already halted. On the Lys, the 1st Division helped stop the advance.

The field artillery was out of practice in limbering up quickly. Nor was the heavy artillery mobile enough. Want of tractors, which had been centralised at corps level, caused the unnecessary loss of heavy artillery pieces. In just one week the British Fifth Army lost 601 18 pounders, 44 4.5 inch howitzers and 81 heavy pieces. The cumbersome 8 inch and 9.2 inch howitzers proved completely unsuitable for mobile warfare so the Australian Corps Heavy Artillery concentrated them into a Reserve Brigade. Arrangements were made to place a siege artillery brigade directly under each divisional GOCRA. Both field and heavy artillery found the 6 gun battery unwieldy in open warfare conditions and batteries attached to divisions or designated as a mobile reserve reduced themselves to a four gun establishment by leaving a two gun section behind.

To many arms and branches it must have seemed like a general reversion to the 1914 organisation which had, after all, been tailored to open warfare conditions. The division ammunition columns needed to be broken back down into brigade ammunition columns, and the machine gun battalions back into companies. The machine gunners were deemed to have paid too much attention to indirect fire, neglecting the power of the Vickers gun in direct enfilading fire, so corps headquarters ordered that not more than one fifth of all ammunition for the machine gun should be used for barrage fire.

45 "Australian Corps - Narrative of Operations March 20th to April 30th", undated, AWM26 360/6
46 British Fifth Army War Diary, 22 March 1918, AWM26 351/4
47 GHQ, "Notes on Recent Fighting No. 5. Artillery", 21 April 1918, AWM26 345/9
48 BGHA Australian Corps, "Instructions in the event of Moving Warfare", 19 June 1918, AWM26 364/11; MGRA British Fourth Army, "Artillery in the Recent Fighting", 21 March 1918, 3DRL2316 27
49 MGSA British Fourth Army, "Artillery in the Recent Fighting", 21 March 1918, 3DRL2316 27
50 MGGS British Fourth Army GS14/70 16 April 1918, AWM25 348/15
51 BGGS Australian Corps 8 April 1918, AWM25 360/3
Even the long dormant mounted arm had a brief revival; the 4th Division Artillery used mounted artillerymen to form its own cavalry screen, there being no light horse available, and one of the first orders of the Australian Corps Headquarters when it arrived on the Somme sector was to attach a troop of light horse and a platoon of cyclists to each division.

There was of course no intention of reverting to 1914 tactics or technologies. The Australian tactical conception was "one of stubborn defence coupled with strong counterattacks". On 30 March the Germans made three assaults on the 3rd Division near Morlancourt, assisted by low flying aircraft. Enfilading Vickers guns, Lewis guns, rifles and field artillery repulsed the attacks. The Australians, shielded from view by the morning mist, let the enemy approach to within close range before opening fire. Some field batteries fired over open sights, a new experience for the 3rd Division Artillery. When a German battery attempted to do the same, 60 pounders promptly engaged it. The tactic of letting the Germans get close before opening fire was repeated by the 35th Infantry Battalion near Villers-Bretonneux on 4 April and the 8th Infantry Battalion on the Lys front shortly after midnight on 13 April, when a company of Germans was allowed to march to within 20 metres before the Australians opened up, killing 21 Germans and putting the rest to flight.

The standard German attack formation was to have a light machine gun group up front, followed by the rest of the assault platoon in wave formation, and then the rest of the company or battalion in files. When the British were encountered, the files would redeploy into waves. On 4 April a lone Vickers gun crew of the 15th Machine Gun Company encountered a battalion of Germans marching across fairly open country in a column of fours, engaged the column and dispersed it. In less spectacular form, this became another standard Australian counter-tactic: enfilading attacking German waves with Vickers and Lewis gun fire. The digger supplemented his allotment of automatic weapons with captured weapons, Lewis guns taken from retreating British troops, and weapons salvaged from the battlefield. In a 19 day period, for example, the 13th

52 "Narrative of Operations (B) Field Artillery, Third Period March - September 1918", undated, File AWM25 75/6
53 "Australian Corps - Narrative of Operations March 20th to April 30th", undated, AWM26 360/6
54 BGHA Australian Corps, "Instructions in the event of Moving Warfare", 19 June 1918, AWM26 364/11
55 War Diary, 3rd Division, 30 March 1918, AWM26 387/2
56 Letter, MG Monash to G Birdwood, 30 March 1918, File 3DRL2316 27
57 Monash, The Australian Victories in France, p. 33
58 Bean, V: The AIF in France: During the Main German Offensive 1918, pp. 233, 319, 465
59 "Notes on Recent Fighting No. 13: German Tactics in the Attack", 4 June 1918, AWM26 345/16
60 Letter, Brigadier General H.E. Elliott to Lt Col A.M. Ross, 21 May 1918, AWM26 439/1
61 GOC 7th Infantry Brigade 4 July 1918, AWM26 386/5
62 Bean, V: The AIF in France: During the Main German Offensive 1918, p. 467
63 Bean, V: The AIF in France: During the Main German Offensive 1918, p. 313
Infantry Battalion wore out 10 Lewis gun barrels and fired 200,000 rounds. Thus, the tactical ideas of the diggers were in accord with their leaders in their belief in the value of firepower in general and automatic weapons in particular.

The 4th Division found itself defending a steep embankment overlooking the Ancre River. A forward slope defence would have been difficult to reinforce or recover by counterattack during daylight, troops would have to cross the crest to reach the front line, and if any part of the line was captured the Germans would be able to enfilade the rest from above, but a reverse slope defence would allow the Germans to cross the Ancre unopposed and mass on the other side hidden by the embankment. Therefore, the 4th Division chose to establish outposts on the embankment with the main position on the reverse slope. The Australian artillery, warned of a probable attack on 5 April, fired two counter-preparation shoots and, on the morning of the attack, fired on the SOS lines at a slow rate. German artillery and trench mortars, using a mixture of gas, shrapnel and high explosive, strongly but blindly bombarded the Australian positions. They managed to penetrate the front and pour through, capturing a machine gun section before it could fire a shot, but their penetration was a narrow one and they were engaged by Vickers and Lewis guns, Stokes mortars and rifle fire. At 1700 the infantry made a counterattack in depth. In view of the supporting gunners, the infantry swept forward in one great wave. They were met by a storm of machine gun fire. Nonetheless, the Australians drove the Germans back, the Australian infantry losing about 1,000 men. Meanwhile, the Australian artillery came under fire from German "area" shoots - off the map fire at the place where the Germans knew they had to be - with shells using instantaneous fuzes. They lost 153 men and 5 guns to German shellfire. In reply, the Australian artillery fired some 23,320 rounds of 18 pounder and 5,268 rounds of 4.5 inch howitzer ammunition.

The town of Villers-Bretonneux, strategically important because it dominated the important railway centre of Amiens, was the scene of two counterattacks by Australian troops, the first on 4/5 April. The 9th Infantry Brigade's recent training had been devoted almost entirely to musketry and Lewis gunnery and made superb use of both weapons. One company alone fired 330 Lewis gun magazines and 3,000 rifle rounds. A second, more famous, counterattack was carried out on 25 April 1918 in response to a German attack that captured Villers-Bretonneux from the British. As he had at Polygon Wood,
Brigadier General H.E. Elliott of the 15th Infantry Brigade formed a special counterattacking force and placed it under a trusted subordinate, on this occasion Lieutenant Colonel H.T.C. Layh of the 57th Infantry Battalion, who had distinguished himself at the landing at Gallipoli. Elliott's method of giving complete control to a colonel at the front closely resembled the German system of command and control.71 He gave Layh a troop of the 13th Light Horse Regiment, the 59th Infantry Battalion and a British horse artillery battery and orders to locate the enemy. In the German Army a counterattack in depth would have followed under the cover of the morning mist but Elliott was dealing with the British Army and his superior, Major General J.J.T. Hobbs, the commander of the 5th Division, could not obtain the required permission.

Instead of a quick counterattack in depth, a methodical counterattack had to be made by the 13th and 15th Infantry Brigades that night to recapture Villers-Bretonneux by means of a double envelopment. This allowed the Germans to bring up machine guns and trench mortars and relieve their tired troops with fresh ones. Nor was Elliott placed in overall command, so the two brigades moved independently. The approach involved a long night march in the mist over unfamiliar ground with hollows containing pockets of gas. Lieutenant Colonel Norman Marshall called a halt on the start line to reorganise and wait for the late companies, delaying the start for over an hour.72 A burning building in Villers-Bretonneux provided a landmark to keep direction by, and German units gave away their locations by firing flares that were sometimes confused with the SOS signal, three vertical white lights.73 Enemy seen were fired on by Lewis gunners, shooting from the hip.74 The advance was up a slope and casualties were light as enemy fire tended to be high. Elliott felt that the German machine guns were located too close to Villers-Bretonneux, allowing them to be masked.75 The Australians tended to rush machine guns from the front rather than attempt to work around them, and bayonets were used extensively in the close fighting. As they reached the old British positions, barbed wire caused men to bunch up, which left gaps between units.76 Some men pushed on past the German posts and some attacked them, as there were no designated moppers-up.77 At daybreak, the Australians wished they had more ground flares to signal the "friendly" aircraft that were bombing them and artillery that was shelling them.78

72 Personal Narrative by Lieutenant Colonel N. Marshall, AWM26 438/5
73 Personal Narrative by Captain H.D.G. Ferres, AWM26 438/5
74 "Counter Attack on Villers-Bretonneux - Points Noticed". Personal Narrative by Sergeant H.G. Wilson, AWM26 438/5
75 Letter, BG Elliott to Lt Col A.M. Ross, 21 May 1918, AWM26 439/1
76 "Counter Attack on Villers-Bretonneux - Points Noticed". Personal Narrative by Sergeant H.G. Wilson, AWM26 438/5
77 Personal Narrative by Lieutenant R.D. MacFarlane, AWM26 438/5
78 Personal Narrative by Captain F.C. Dawson, AWM26 438/5; Report on Operations by Lieutenant Colonel N. Marshall, AWM26 438/5
The German Offensives of March and April 1918 cost the British Expeditionary Force 303,000 men. The French, in coming to their rescue, lost 92,000 men, for a total of 395,000 allied casualties. The Germans lost 378,000 men but the degree of disruption to the British Army was far greater that anything suffered by the much larger German Army. Nine of the BEF’s 60 divisions were written off. Australian casualties between 21 March and 7 May came to 15,083. Although light compared with British losses, this caused the 36th, 47th and 52nd Infantry Battalions to be disbanded, reducing the 9th, 12th and 13th Infantry Brigades to the three battalion establishment.79

Organisation of an Infantry Battalion
(Other Ranks only)
(From 22 June 1918)80

<table>
<thead>
<tr>
<th>Battalion Headquarters</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
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<tbody>
<tr>
<td>Fighting Portion</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Sergeant Instructors</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>AA Lewis Gun Section</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Administrative</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>152</strong></td>
<td></td>
</tr>
</tbody>
</table>

| 4 x Company Headquarters | Fighting Portion (23 each) | 92 |
| 16 x Platoon Headquarters | (3 each) | 48 |
| 32 x Rifle Sections      | (7 minimum, 11 maximum) | 224 | 352 |
| 16 x Lewis Gun Sections  | (11 minimum, 15 maximum) | 176 | 240 |
| **TOTAL**                | **448** | **640** |
| **GRAND TOTAL**          | **708** | **900** |

To avoid disbanding more battalions, or even a division, the establishment of other ranks per battalion was reduced (in line with the British Army) from 976 to 900. When the required cadre was left behind at the depot, this meant a fighting strength of 708 other ranks. In addition, each battalion still had an establishment of 38 officers, of whom 17 had to be left behind. The total nominal strength of a battalion in action was

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79 Bean, V: *The AIF in France: During the Main German Offensive 1918*, pp. 656-659
80 "Organisation of an Infantry Battalion", June 1918, 3DRL2316 28/2
therefore 729. This necessitated a new platoon organisation from 22 June 1918 that contained a Lewis Gun Section with 11 men and two 7 man rifle sections.81

Monash believed strongly that the fighting power of the infantry battalion was in its firepower, not its raw numbers. He wrote:

I am convinced that we can carry on successful battle operations so long as we can maintain our battalions at an average of something like 700 or 750.82

However, even these numbers could not be maintained, average numbers of other ranks in the infantry battalions dropping from 706 on 17 August to 653 on 31 August. In September and October 1918 eight more infantry brigades had to be reduced to three battalions, leaving only the original four brigades with four battalions.83

In his firepower philosophy, Monash differed strongly with the BEF's Director of Training, Lieutenant General Sir Ivor Maxse, who held that 900 strong battalion "fire units" were essential. In a conference towards the war's end, Monash told him bluntly:

We can fight with less than 900 per battalion and have done so.84

Monash had arithmetic on his side. Excluding the antiaircraft section and the administrative overhead, and assuming that everyone else but the Lewis gunners and their assistants was carrying rifles, the rifle strength of the 708 strong battalion was about 580. The 16 Lewis gun sections each had the firepower of 80 rifles, so the Lewis guns represented 1,280 rifle fire units, or 68% of the firepower of the battalion. The extra 192 men to bring it up to 900 only increases the firepower by 10%, while increasing the number of soldiers subject to acquisition by 27%. The problem that the AIF encountered with battalions smaller than 700 men was in the ability to carry enough ammunition forward, as the 15 man Lewis gun section carried 64 Lewis gun magazines but the 11 man minimum section carried only 40.

As a result of the German counterattack on Villers-Bretonneux, the Australian Corps took over the entire British Fourth Army front,85 with all four divisions in line.86 For the next three months the AIF waged a war of attrition. Artillery was used for harassment and interdiction shoots. These missions, on which the corps heavy artillery expended an average of over 200 tonnes per day, involved firing on enemy road and rail traffic, work

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81 "Organisation of an Infantry Battalion", June 1918, 3DRL2316 28/2
82 "Organisation of an Infantry Battalion", June 1918, 3DRL2316 28/2
83 GOC Australian Corps, 23 September 1918, AWM25 491/7 for disbandment of the 19th, 21st, 25th, 37th, 42nd, 54th and 60th Battalions; BG DA&QMG Australian Corps, 18 October 1918, AWM25 491/10 for disbandment of the 29th Infantry Battalion
84 Notes of Conference with Australian Corps Commanders 5 November 1918, 3DRL2316 28/2
85 British Fifth Army became British Fourth Army on 2 April 1918. War Diary, GS British Fourth Army 2 April 1918, AWM45 21/8
86 "Australian Corps - Narrative of Operations March 20th to April 30th", undated, AWM26 360/6
parties and generally anything that moved. The objective, to inflict casualties and make maintaining troops in the forward area as difficult as possible, was now standard procedure. However, the daily fog, especially in the Somme and Ancre valleys, hampered aeroplane observation while prevailing westerly winds frustrated the sound rangers, rendering accurate counter battery fire difficult.87

The fluid nature of warfare in April precluded the use of the 8 and 9.2 inch howitzers but as the front settled down it became possible to emplace them again and they rejoined the fight in May. The Corps artillery now included a couple of batteries of 12 inch guns whose enormous range was useful against distant targets. The gunners routinely used type 106 fuzes for all types of missions, ignoring the delayed action fuzes.88 Type 106 fuzes were now used on counter battery missions where possible, in conjunction with lethal and lachrymatory gas.89 Tests found that the 106 fuze was also superior for smoke shell.90 Indeed, serious thought was being given to discontinuing shrapnel altogether.91

At this time, air recuperators began to become available for the 18 pounders, replacing the troublesome springs. The air recuperators were pairs of cylinders, one at high pressure and one at low. On recoil the hydraulic fluid would be forced by a ram (piston) into the high pressure cylinder that was filled with air and hydraulic fluid. When the recoil ceased, the compressed air would force the oil back into the low pressure chamber and restore the gun to its position, hence the name.92 The air recuperator enabled 18 pounders to shoot at ranges up to 9,200 metres and meant that 18 pounders could be used for tasks that formerly required the heavy artillery.93 Unfortunately, there were not enough available to equip all the guns with them. In addition to artillery, aircraft, machine guns, rifle grenades and trench mortars were also used for harassment and interdiction tasks where possible.

87 MGGS British Fourth Army to GOC Australian Corps 30 May 1918, AWM26 349/7; CBSO Australian Corps, "Notes on Counter Battery Work in the Battle of 8/8/18 and the advance from Villers-Bretonneux to the Hindenburg Line", October 1918, AWM26 494/2
88 MGGS British Fourth Army G66/2, AWM26 349/3
89 CBSO Australian Corps, "Counter Battery - Australian Corps Heavy Artillery - Operation Order No. 7", 1 July 1918, AWM26 362/2
90 GOCRA Australian Corps, 13 July 1918, AWM26 365/4
91 GOCRA Australian Corps, 30 May 1918, AWM26 365/10
92 Gower, Guns of the Regiment, p. 44
93 GS 3rd Division, "Increased Range - 18 pounders", undated, AWM26 388/3
Heavy Artillery Ammunition Expenditure (May - July 1918)\textsuperscript{94}

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\textsuperscript{94} Compiled from Australian Corps Heavy Artillery, Daily Tactical Reports, 1 May 1918 through 31 July 1918, AWM26 362/1 to 362/12
Gas was extensively used for both harassment and interdiction and counterbattery work by the 4.5 inch howitzers and the heavies.⁹⁵ Two companies of the British Special (Gas) Brigade worked the Australian Corps front, using Livens projectors. These were 203mm steel tubes 1.22m long. Batteries of 25 were buried at a 45° angle as close together as the base plates would permit and fired electrically, projecting 27.7 kg drums containing 13.6kg of pure phosgene into the enemy lines.⁹⁶ They made 26 gas attacks in June and July in which a total of 5,031 drums of lethal gas were released.⁹⁷

Infantry played a key role in harassing the enemy. One way this was done was by sniping. Confronted by a bare stretch of No Man's Land and shallow trenches, the 2nd Division was at first unable to move by daylight due to enemy snipers. The 6th Infantry Brigade snipers went to work. Between 10 and 28 April they shot 50 enemy soldiers, one man shooting seven in one day.⁹⁸ Not to be outdone, the 7th Infantry Brigade shot 55 Germans between 12 and 30 April.⁹⁹ As at Gallipoli, the snipers went on to shoot down

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⁹⁵ GOCRA Australian Corps War Diary, 30 April 1918, AWM26 365/6
⁹⁶ Foulkes, *Gas!*, pp. 169-171
⁹⁷ Compiled from nightly reports of British H and Z Special Companies, 7 June 1918 to 29 July 1918, AWM26 358/3, 358/4, 358/4A, 358/4B
⁹⁸ War Diary, GS British Fourth Army 28 April 1918, AWM26 349/1
⁹⁹ 7th Infantry Brigade Daily Summaries of Intelligence, 12 to 30 April 1918, AWM26 385/3,4,5,6

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the enemy periscopes as well. The result was a complete cessation of enemy daylight
movement in the 2nd Division sector and the enemy rifles and machine guns fell silent.
Sniping was, of course, not restricted to the 2nd Division; snipers of the 3rd
Division's 9th Infantry Brigade shot 12 Germans on 11 April near Hangard Wood.

Spectacular results were obtained by patrolling. Small groups of diggers spontaneously
began aggressively prowling No Man’s Land. The front line was no shell torn morass
but green leafy woods and tall wheat fields. The German line opposite was very thinly
held in order to keep the maximum number of men in reserve for the next offensive.
There were no continuous trench lines or barbed wire entanglements and harassing fire
from aircraft, artillery and snipers attempted to prevent their establishment. The
Australians found that the high crops enabled them to sneak up on the isolated German
posts and they started attacking and capturing them when opportunity presented. This
form of warfare required a high order of stealth, individual initiative and patience. At
the time prisoners were of enormous value because it allowed GHQ to determine which
units were in the line and which were in reserve for the next offensive. The 3rd Division
was particularly good at it. During its tour of the line from 26 March to 9 May the 3rd
Division contrived to capture Germans on three days out of every five, taking 233
prisoners in all and identifying 41 different German units.

But the AIF tactics went beyond mere aggressive patrolling. On 9 April the 15th Infantry
Brigade began advancing its posts silently during the night by 400 metres at a time. Although the nights were short, they were aided in this move by the morning mist. The
Germans could not locate their posts after such a move, the retaliatory shelling falling to
the rear of the new posts. The process of combining patrolling with silent advances of
the line became known as "peaceful penetration" and it spread from the 5th Division to
the others, including the 1st Division in Flanders, and to the New Zealanders, who
began peaceful penetration on 5 July. Soon there was daily activity on the Australian
front and it became something of an inter-unit competition. Individual heroism was a
quality always present in the AIF, as in most armies, but now it was being harnessed by
the techno-tactical system. A few examples are necessary to show how peaceful
penetration worked in practice.

On 18 May Lieutenant A.W. Irvine, Intelligence Officer of the 18th Infantry Battalion,
found a sector where all the Australians were dozing except for a sentry. It occurred to

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100  7th Infantry Brigade Daily Summary of Intelligence, 15 April 1918, AWM26 385/3
101  War Diary, GS British Fourth Army 28 April 1918, AWM26 349/1
102  War Diary, 9th Infantry Brigade 11 April 1918, AWM26 393/4
103  "Report of Operations of the 3rd Division Astride the Bray-Corbie Road near Sailly-Le-Sec", AWM26 388/1
104  War Diary, HQ 15th Infantry Brigade, 9 April 1918, AWM26 438/1
him that the Germans might also be sleeping by day. The next day was unusually hot and the snipers told him that the only sign of life from a German post opposite was a can thrown out over an hour earlier. Irvine selected a party of eighteen volunteers who, covered by a Lewis gun, walked quietly over to the German post in broad daylight and captured 22 prisoners and a light machine gun without loss to themselves.\textsuperscript{105}

Another daylight action was carried out on 8 July 1918 by a party of the 27th Infantry Battalion under the command of Lieutenant W.R.G. Colman, who used aerial photographs and a personal reconnaissance to locate a route through which his men could approach the German line undetected. They entered an unoccupied stretch of German trench which they followed until they discovered an occupied German post and attacked it with bombs, killing eight Germans and capturing thirteen and a heavy machine gun. Colman reported what had happened to his battalion commander, Lieutenant Colonel F.R. Chalmers, who asked him to clear the rest of the trench. Covered by Lewis guns, Colman took a party and captured four more Germans and a light machine gun.\textsuperscript{106}

At dawn on 11 July on the 1st Division front near Hazebrouck, a four man patrol of the 1st Infantry Battalion under Lieutenant G.E. Gaskell was searching for German outposts in shell holes. They attacked three shell holes, capturing two Germans in one, four in another and eight in a third. In each case the Australians could have wiped out the post with a single bomb, but this would have alerted surrounding posts. When the 14 prisoners reached him, Gaskell's company commander, Captain C.W.H.R. Somerset, ordered the patrol to clear out the other shell holes in the area. This was not as dangerous as it sounds because the sentries had been captured. Eighteen more Germans were found, bringing the patrol’s total to 32 prisoners and 3 machine guns. Meanwhile, another patrol from the same company under Lieutenant C.R. Morley found some dugouts and silently captured 36 prisoners and 4 machine guns. It was then decided to advance the company line. Word spread that the German line was being overrun and other companies and battalions began to get into the act. By afternoon, Brigadier General I. G. Mackay’s 1st Infantry Brigade had taken 1,000 metres of front and captured 120 prisoners and 11 machine guns.\textsuperscript{107}

While these examples are spectacular, there were not isolated. On the Somme, Australian units advanced the line 12 times in May, 6 times in June and 15 times in July.

\textsuperscript{105} Bean, C.E.W., The Official History of Australia in the War of 1914-1918 Volume VI: The AIF In France: During the Allied Offensive, 1918, Sydney, Angus and Robertson, 1942, pp. 104-107
\textsuperscript{106} Bean, VI: The AIF in France: During the Allied Offensive 1918, pp. 349-352; GOC 7th Infantry Brigade, "Report on Minor Operation 8th July 1918", 8 July 1918, AWM26 386/5
\textsuperscript{107} Bean, VI: The AIF in France: During the Allied Offensive 1918, pp. 412-418
On the Flanders front the 1st Division advanced more than 3 kilometres and captured over 1,700 prisoners. The Australians suffered 16,278 battle casualties from all causes in May, June and July, about 35 per division per day.\(^{108}\) As much as any tactical system, Peaceful Penetration involved judicious use of the available technologies.

Peaceful penetration was not the only means by which the line was advanced. There was also formal attack. The first of these was made by the 9th Infantry Brigade at Morlancourt on 6 May. The brigade attacked on a 2,500 metre front and captured 165 prisoners, 15 machine guns and a trench mortar. The attack was notable for its low density of attacking troops as compared with Third Ypres, and for the high number of prisoners compared with advancing the line. On the down side, there were 79 Australian casualties, making it much more costly than Peaceful Penetration but a fraction of the cost of the Third Ypres battles that were, of course, fought against much stronger positions.

The stage was now set for the diggers' greatest achievement.

\(^{108}\) Butler, II: *The Western Front*, p. 865
8. The Final Offensives

On 30 May 1918 Lieutenant General John Monash took over command of the Australian Corps. At the same time, Brigadier General T. A. Blamey became the corps chief of staff. Two other Australian regular army officers held key positions: Brigadier General C. H. Foott as Chief Engineer (CE) and Brigadier General W. A. Coxen as GOCRA. The Australian Corps was now truly Australian. Monash brought with him a new model of the role of technology on the battlefield:

A perfected modern battle plan is like nothing so much as a score for an orchestral composition, where the various arms and units are the instruments, and the tasks they perform their respective musical phrases. Every individual unit must make its entry precisely at the proper moment, and play its phrase in the general harmony. The whole program is controlled by an exact timetable, to which every infantryman, every heavy or light gun, every tank and aeroplane must respond with punctuality; otherwise there will be discords which will impair the success of the operation and increase the cost of it.

It was a thoroughly modern conception. The battle was expressed in terms of its socio-technological elements alone, the goal in terms of technological efficiency. This meme would prove well adapted to 20th century warfare.

A number of weapons were evaluated by the AIF at this time including the French 37mm gun, a demonstration of which was held on 28 May. The response was unfavourable. It was felt that the gun would not be any use against tanks unless armour-piercing ammunition was provided and that it was not mobile enough for open warfare. The Australian officers suggested that, if issued, it should be given to the Light Trench Mortar Batteries. The weapon was not taken up.

Another new weapon was the Mark V tank. On his last day in command of the 3rd Division, Monash attended a demonstration of cooperation between tanks and infantry, and he was impressed with the capabilities of the new tank, which had 50 per cent more horsepower than the Mark IV and was faster, more manoeuvrable and more reliable than the earlier models. The new tanks were now being delivered in numbers and the War Office suggested that the AIF supply 750 men to form an Australian tank battalion but on Birdwood's advice, this was turned down, on account of the shortage of reinforcements.

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2 GS 4th Division, 28 May 1918, AWM26 408/2; War Diary, HQ 15th Infantry Brigade, 28 May 1918, AWM26 439/2
3 War Diary GS 3rd Division, 29 May 1918, AWM26 388/3
4 GS Tank Corps, "Characteristics and Tactics of the Mark V, Mark V One Star and Medium A Tanks", 27 June 1918, AWM26 358/16
5 Admin HQ to DOD, 19 March 1918, AWM10 4311/4/13
Monash invited Brigadier General A. Courage of the British 5th Tank Brigade to submit a plan for a tank attack on the high ground around Hamel. The plan he put forward was one with the tanks leading and the infantry mopping up behind. In subsequent conferences, much discussion focused on tactics, the proper relationship between tanks, infantry and artillery and in particular on whether to employ an artillery barrage and Blamey produced a paper listing the pros and cons. In this careful and open evaluation of armoured technology, the Australian Corps demonstrated a methodical approach capable of application to any new technology.

One method was to use tanks to replace the barrage. In its favour, this had the element of surprise and shock effect. Coupled with the likelihood of encirclement, a high number of prisoners might be captured. The infantry and armour would be mobile and flexible. Because the tank was mobile and had direct observation of targets on the battlefield, it could achieve acquisition and destruction of targets that could not be communicated to the artillery. Potentially, the tank could be an ideal weapon for an attack with unlimited objectives.6

The main argument against the tanks was their unreliability, as evidenced by the disastrous experience of the 4th Division at First Bullecourt in April 1917 and during the counterattacks at Dernancourt and Villers-Bretonneux, where they broke down and put in no-shows.7 This was a condition all too common with immature technologies. Trust and cooperation between infantry and armour could only be built up by training and successful operations.

The more conventional artillery barrage would enable the infantry to move into No Man's Land before Zero hour and escape the enemy counter barrage. Being visible, it could also guide the infantry along, preventing units from getting lost so long as they kept up with it. However, as also demonstrated at Bullecourt, the artillery could not guarantee that wire obstacles would be cut. Nor could it assure the infantry of quick victories over defended localities. It was slower, limited in range and expensive in ammunition.

In the Hamel operation, the critical limitations of the artillery barrage were minimised because the objective was a limited one, wire obstacles were few and ammunition was plentiful. The decision was therefore taken to use an artillery barrage, while assigning

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6 BGGS Australian Corps, "Pros and Cons of Tank Method as compared with Artillery Barrage Method of Supporting attack", undated, AWM26 361/2
7 Bean, V: The AIF in France: During the Main German Offensive 1918, pp. 406;
HQ British Tank Corps, "Report on Operations 24-26 April 1918", AWM45 21/12
the tanks a subsidiary role. The use of tanks in combination with an artillery barrage was an innovation. Unlike at Bullecourt, however, the Corps staff did not leave matters to chance. Experiments were carried out to determine the best time for zero hour, given that the infantry would be on the tapes and in danger of discovery from ground or aerial observation, while the tanks could not operate effectively in the darkness.8

Extraordinary efforts were made to preserve the security of the operation. All vehicle movement in both forward and back areas was forbidden during the day and the 3rd Flying Squadron made a daily patrol to check on this.9 Batteries moved forward during the night to positions which had been previously prepared and camouflaged by the Corps engineers and sited by the British 5th Field Survey Section and the 1st Topographical Section. Of the 61 field and horse artillery batteries, 49 had to move and only one did so on the last night. A section per battery left behind in the old positions maintained the nightly harassing and interdiction fire as normal. 600 rounds of ammunition per 18 pounder and 500 rounds per 4.5 inch howitzer, a total of 132,000 rounds, were dumped at the battery positions by the 4th Division Ammunition Column and the Army Brigade Ammunition Columns. The batteries were forbidden to range, let alone fire, and all movement was forbidden in the battery positions during the day. However the gun crews did check that their gun platforms were level and sound and that their sights, clinometers and range dials were in working order. Wagon lines were concealed in the Somme River Valley and restrictions placed on the watering of horses.10

Security did not inhibit the 1st Topographical Section from producing a full range of maps and giving them wide distribution. Artillery target maps showing the location of all known enemy batteries were issued to all battalions and batteries and an enemy positions map to all company commanders. Aerial photographs were issued two per company and battery, and oblique photographs, which gave more of an infantryman's view, to all NCOs.11

The infantry attacked with ten battalions along a front of 6,000 metres or a density of 1.2 men per metre, considerably less than the densities deployed at Messines (3.8), Broodeseinde (5.4) or Passchendaele (4.1).12 A big difference of course was the lack of

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8 GS 4th Division, 29 June 1918, AWM26 408/5
9 SS218 "Notes Compiled by GS British Fourth Army On the Operations by the Australian Corps against Hamel, Bois de Hamel and Bois de Vaire on 4 July 1918", 3DRL2316 28
10 "General Report on the Action of the Field and Horse Artillery Covering the Attack by the 4th, 6th and 11th Infantry Brigades on Hamel and Vaire Wood and the High Ground to the East on 4 July 1918", 8 July 1918, AWM16 4361/1/4; BMRA 4th Division "Order No. 160", 29 June 1918, AWM26 519/28
11 SS218 "Notes Compiled by GS British Fourth Army On the Operations by the Australian Corps against Hamel, Bois de Hamel and Bois de Vaire on 4 July 1918", July 1918, 3DRL2316 28
12 3rd Division Supplementary Records, AWM26 205/8
enemy pillboxes and extensive wire entanglements. It was hoped that tanks would substitute for the additional infantry. To spread the casualties more evenly, the 4th, 6th and 11th Infantry Brigades of the 4th, 2nd and 3rd Divisions were assigned, together with four companies of Americans from the US 131st and 132nd Infantry Regiments. In terms of depth, the attack was limited to a penetration of 2,500 metres, well within range of the field artillery. Monash, showing his rare, keen sense of the ground, set the objective as just over the next ridge beyond Vaire and Hamel Woods.

On 4 July the Australian and American infantry formed up on the tapes in four waves, with lines closed up. There was no preliminary bombardment, but a harassment shoot was carried out at eight minutes before zero and noisy FE2b night bombers flew low over the tanks in order to drown out the noise of their motors. All 60 tanks reached the start line on time. Over the previous days harassment shoots had been conducted with a mixture of smoke and gas. This time there was smoke only but it was hoped that the enemy would be fooled into donning gas masks, thereby restricting their vision and effectiveness.

At Zero Hour, 0310, the barrage came down at full volume. There were three barrage lines. The first was from 18 pounders firing 60% shrapnel, 30% high explosive and 10% smoke. The 18 pounders were forbidden to use Type 106 fuzes as their greater area of effect would prevent the infantry from following the barrage as closely. The second barrage, 200 yards ahead, consisted of 90% high explosive with Type 106 fuzes and 10% smoke. The third barrage came from 80 6 inch guns and 20 8 inch and 9.2 inch howitzers. Altogether 326 field and 80 heavy artillery pieces were involved in the barrage, a density of 1 gun per 15 metres or about a third of that used at Third Ypres. The barrage was a slow one, 3 rounds per gun and 2 rounds per howitzer per minute, moving at a pace of 100 yards per 3 minutes up to the halt and then 100 yards every 4 minutes to the final objective. The remaining 202 heavy pieces were engaged in counterbattery missions using Type 106 and gas. They succeeded in silencing all but one 77mm battery, although the unregistered barrage inevitably led to a great deal of short

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13 SS218 "Notes Compiled by GS British Fourth Army On the Operations by the Australian Corps against Hamel, Bois de Hamel and Bois de Vaire on 4 July 1918", July 1918, 3DRL2316 28; Jones, The War in the Air, Volume VI, pp. 415-417
14 Extracts from War Diary of British 5th Tank Brigade, 4 July 1918, AWM26 358/17
15 GS 5th Division, 28 June 1918, AWM26 424/5
16 "Preliminary Report on Capture of Hamel and Hamel Ridge by the Australian Corps", AWM26 361/3
17 SS218 "Notes Compiled by GS British Fourth Army On the Operations by the Australian Corps against Hamel, Bois de Hamel and Bois de Vaire on 4 July 1918", July 1918, 3DRL2316 28;
"General Report on the Action of the Field and Horse Artillery Covering the Attack by the 4th, 6th and 11th Infantry Brigades on Hamel and Vaire Wood and the High Ground to the East on 4 July 1918", 8 July 1918, AWM16 4361/1/4
shooting. The infantry reported that the barrage was ragged, caused a number of friendly casualties and prevented them from following the barrage closely.18

Additional smoke screens were provided by 4 inch Stokes mortars of the British 1st Special Company. As it turned out, the dry ground meant that the high explosive kicked up so much dust that the smoke was hardly necessary. To say that it could have been omitted, however, misses the beauty of the Hamel plan, which is that it would have worked under any weather conditions.19 A total of 147 Vickers machines were employed, 36 forward guns divided evenly between the three attacking brigades and 111 on the barrage. All told the forward guns fired 27,000 rounds, the rear guns, 399,000.20

Twenty Stokes mortars were assigned to the operation but the effectiveness of the Stokes had gone into declined due to a defective new propellant which did not explode properly, causing excessive flash, halved of the rate of fire from twenty rounds per minute to ten, and rendered the range charts unreliable.21 This eroded the faith of both the infantry and the mortar crews in the weapon.22 Worse still, because of the pronounced flash, the Stokes mortars attracted more than their fair share of enemy artillery fire.23 Regarding the British response to this problem as inadequate, Monash had special Ordnance personnel shipped from Australia, who became the 1st and 2nd Ordnance Ammunition Units.24

Hamel Village and other targets were bombed by night bombers the night before the attack and a series of enemy bivouacs and dumps were bombed on the day. The 3rd Flying Squadron's RE8s were engaged by the enemy air force 5 times but no Australian aircraft were lost.25 British squadrons supporting the operation lost 5 aircraft, while 5 German airplanes and a balloon were shot down.26

The infantry and armour pushed forward, following the barrage. Once clear of the enemy barrage the first two waves opened out to 50 metres apart while the remainder assumed artillery formation. Ten percent of the infantry was equipped with wire cutters, and in the few places where wire was encountered they used them to cut it, although this

18 "Attack on Hamel and Vaire and Hamel Woods - Notes on Attack", 4 July 1918, AWM26 408/5; GOC 7th Infantry Brigade 4 July 1918, AWM26 386/5
19 "General Report on the Action of the Field and Horse Artillery Covering the Attack by the 4th, 6th and 11th Infantry Brigades on Hamel and Vaire Wood and the High Ground to the East on 4 July 1918", 8 July 1918, AWM16 4361/1/4
20 Extracts from Narrative Machine Gun Operations British Fourth Army, AWM26 349/2
21 GOC 2nd Division 14 June 1918, AWM26 386/3
22 GOC Australian Corps 29 June 1918, AWM26 361/3
23 GOC 7th Infantry Brigade 4 July 1918, AWM26 386/5
24 War Diary, 2nd Ordnance Ammunition Unit, July 1918, AWM4 2/11/1 Microfilm Roll 878
25 Wrigley, The Battle Below, pp. 81-83
26 Jones, The War in the Air, Volume VI, pp. 415-417
caused costly delays in places with the infantry losing the barrage and coming under machine gun fire. When the enemy was encountered, the Lewis gunners, working in pairs, used a version of the pre-war fire and movement tactics. One Lewis gunner firing from the hip would provide cover while the other set up to engage the enemy with aimed fired. Rifle grenades were also used to provide cover. When they closed with the enemy, Mills bombs and bayonets were used, Lance Corporal Thomas Axford of the 16th Infantry Battalion using them to kill 10 of the enemy and capture 6, for which he was awarded the Victoria Cross. When the infantry reached the final objective, they found foxholes already dug for them by the heavy howitzers.

Communications were mainly provided by 96 kilometres of D2 and D3 telephone cable. Despite the best efforts of the 3rd and 4th Pioneer Battalions, which concentrated on cable burying, only a fraction was buried in time. Due to the weak enemy artillery response, there were no breaks and the system worked perfectly, although a full range of alternatives had been provided for. Each FOO station consisted of 2 telephonists, 2 linesmen and 2 signallers and was equipped with 2 D3 telephones, 2 Lucas Lamps, 4 carrier pigeons and 800 metres of D2 cable. The 4th Division had practiced using visual communication daily, and a visual scheme was set up and tested but not used while only two carrier pigeons were released. A radio network was established and used and indeed was reckoned to be the fastest and most reliable means of communication. To save time, messages were sent in clear except for map coordinates.

The value of the armoured support was enormous, and the assistance given by the carrier tanks exceeded all hope. Just four carrier tanks hauled up 5,670 kg of stores, estimated to have been the work of 1,250 men. This represented a saving not just in labour but in casualties as well, since these men were not brought under fire.

Because the 3rd Flying Squadron had its hands full, the RE8s of the British 9th Flying Squadron were assigned to resupply duty. Five dumps for small arms ammunition were established and marked with large white calico N's and eight aircraft delivered ammunition to them. Four aircraft were assigned to resupplying machine gun posts which could request resupply by putting out 'V's. Each aircraft carried two boxes, each containing 1,200 rounds. The battle area was only 30 minutes flying time from their airfield at Argenvillers, enabling aircraft to fly multiple sorties. In all, 93 boxes were dropped containing 11,600 rounds. Not all the boxes could be retrieved, but generally they landed within 100 metres of the target and one box landed within 3 metres of a post.

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27 GS 4th Division, 24 June 1918, AWM26 408/5
of the 6th Machine Gun Company. The effort was not cheap, with two aircraft lost. The utility of the air supply effort was debatable, but the validity of the concept was proven.29

The attack was spectacularly successful. Equipment captured included 2 77mm guns, 32 trench mortars and 177 machine guns and 1,605 prisoners were taken. The Australian and American infantry took 1,380 casualties.30

The Corps staff examined the Battle of Hamel closely looking for lessons and a number of conferences were held to discuss it. The first and most important lesson was that tanks could operate with an artillery barrage. At Hamel, they were able to follow the shrapnel barrage closely with only one tank being knocked out by friendly fire. This meant that in future, tanks could follow the barrage and the infantry would not need to follow it quite so closely, which promised reductions in infantry casualties both from friendly fire and the enemy reaction when the barrage lifted.

The heaviest casualties of the operation were suffered by the 15th Infantry Battalion in an assault on a position known as Pear Trench. Only 200 metres from the infantry jump off line, the tanks had not reached the infantry when the barrage lifted. More work clearly needed to be put into synchronising the infantry and armour as it was apparent in retrospect that the position could have been bypassed and mopped up later, but the infantry on the ground on the day had no way of knowing this.

An important lesson was the benefits of combined training between infantry and tanks. To facilitate this, a demonstration company was formed from the nucleus of the 15th Infantry Brigade.31 All infantry officers and senior NCOs in the corps attended demonstrations that showed how infantry and armour following a shrapnel barrage could attack a trench system, overcoming wire and strong points. The infantry could request assistance from the tanks with a helmet raised on a rifle and indicate strong points with coloured smoke. The tanks used flags to signal the infantry.32 By 8 August nearly every battalion of the 2nd, 3rd, 4th and 5th Divisions had taken part in practice attacks with the British 5th Tank Brigade.33

Hamel was more than just another victory like Menin Road. At Hamel the technologies had been reassembled to produce a new tactical system that showed promise of

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Bean, VI: *The AIF in France: During the Allied Offensive 1918*, pp. 308-310
30 Bean, VI: *The AIF in France: During the Allied Offensive 1918*, pp. 326-327
31 BGGS Australian Corps, "Training in Co-operation between Infantry and Tanks", 17 July 1918, AWM26 361/4
32 BGGS Australian Corps, "Attack on a Trench System", 20 July 1918, AWM26 361/4
33 GOC British 5th Tank Brigade, "Report on Operations with Australian Corps", 23 August 1918, AWM26 480/12
scalability, resulting in a deeper penetration that might yield still more spectacular results.

Before we turn to this extrapolation, it is worth contrasting the Battle of Hamel with the results obtained by peaceful penetration over the next two weeks, bearing in mind that Hamel was necessary precisely because the ground could not be captured by peaceful penetration. Two infantry brigades advanced 1,000 metres on a 4,500 metre front, losing only 437 men, representing about a third of the ground captured at Hamel for about a third of the cost, and indeed just 16 more casualties than the two brigades quietly holding the line near Hamel.34 In Peaceful Penetration, the Australian Corps had developed a second, unique, and in some ways equally devastating, tactical system.

In the wake of the Battle of Hamel, General H. S. Rawlinson, commander of the British Fourth Army, of which the Australian Corps at this time was the major part, saw a window of opportunity.35 The Germans were holding a long line that they had not had the time or the inclination to fortify and their reserves had been consumed in their offensives. Conditions were therefore conducive to a successful offensive and the Australian Corps was obviously an ideal instrument for it. The BEF commander, Field Marshal Sir Douglas Haig, arranged for the Canadian Corps to come down from the Arras sector to spearhead it.36

Monash told Rawlinson that an advance of 8,000 metres would be practical if the Australian Corps line was reduced to a two division front of 7,000 metres.37 This was duly arranged. Such a frontage was still more than double that used at Third Ypres, but shorter than Hamel, and seemed justified given good weather, poor enemy defences and the assistance of tanks. Furthermore, intelligence had located only one enemy reserve division in the path of the Australian Corps.38

Monash broke the problem down into two parts. At Messines, Third Ypres and Hamel, good tactics for capturing even immensely strong positions had been worked out. This made the capture of the first 2,700 metres a familiar task, carried out under the cover of an overwhelming artillery barrage. The second phase would have to be carried out beyond the range of the field artillery under semi-open warfare conditions. The infantry

34 Bean, VI: The AIF in France: During the Allied Offensive 1918, p. 376
35 At this stage, the British Fourth Army consisted of two corps, the British III Corps with two divisions and the Australian Corps with four, the 1st Division still being in the Lys sector. Bean, VI: The AIF in France: During the Allied Offensive 1918, p. 67
36 Bean, VI: The AIF in France: During the Allied Offensive 1918, pp. 465-488
37 Monash, The Australian Victories in France, pp. 69-70, 73
38 BM 15th Infantry Brigade, 6 August 1918, AWM26 572/2
would then have to rely on the mobile firepower of the tanks and their own rifles, Lewis guns and rifle grenades.\textsuperscript{39}

Considering the problem of keeping the infantry fresh over such a long advance, Monash called for leapfrogging by divisions. The 2nd and 3rd Divisions would capture the first objective, the Green Line; the 5th and 4th the second objective, the Red Line and if possible exploit still further to a final objective, known as the Blue Line. The names were taken, as in the 1917 battles, from the colours used to mark them on the maps. Monash recognised that a limiting factor in other operations had been the endurance of the troops detailed for the furthest objectives rather than the nearest, so the troops were disposed in reverse order to that in which they would enter the battle. This gave the first waves the longest march to the front line, but equalised the distance that all units would have to travel.\textsuperscript{40}

There was another crucial difference between this battle plan and those of the Ypres battles of 1917. The bulk of the enemy forward artillery had been located in the Cerisy Valley, and Monash moved the Green Line forward to take it in. More gun positions were known to be behind the Red and Blue Lines, but even during the second stage the enemy would have to do without the support of forward guns.\textsuperscript{41}

Tanks would be used on a lavish scale and the 2nd and 3rd Divisions were each given 27 Mark V tanks. When they had finished supporting those formations, they were to rally in the Cerisy Valley and go on to the final objective in support of the 4th and 5th Divisions, which also each had 18 of the new Mark V* tanks attached.\textsuperscript{42} The 2nd and 3rd Divisions were given three carrier tanks each while the 4th and 5th Divisions were given nine.\textsuperscript{43} The carrier tanks would be carrying a staggering amount of equipment. Monash reckoned each to be equivalent to 200 men.\textsuperscript{44} Moreover, the Mark V* tanks would each carry 15 men with 2 Vickers guns or 4 Lewis guns, or a total 20 Vickers guns, 32 Lewis guns and 270 men in all.\textsuperscript{45} As at Hamel, the noise of the tanks' approach would be drowned out by aircraft. Prisoner interrogations after Hamel had revealed that the harassing artillery fire used on that occasion had in fact alerted the enemy.\textsuperscript{46}

\textsuperscript{39} Monash, \textit{The Australian Victories in France}, pp. 83-85
\textsuperscript{40} Monash, \textit{The Australian Victories in France}, pp. 93-95
\textsuperscript{41} Bean, VI: \textit{The AIF in France: During the Allied Offensive 1918}, pp. 494-495
\textsuperscript{42} Pronounced "mark five star"
\textsuperscript{43} BGGS Australian Corps, Battle Instructions No. 5, 1 August 1918, 3DRL2316
\textsuperscript{44} Monash, \textit{The Australian Victories in France}, pp. 106-107
\textsuperscript{45} GOC British 5th Tank Brigade, "Report on Operations with Australian Corps", 23 August 1918, AWM26 480/12
\textsuperscript{46} "Hamel Offensive. Lessons", undated, AWM26 408/5
To provide artillery support, the GOCRA, Brigadier General W.H. Coxen, had 18 field artillery brigades, 9 heavy artillery brigades and a long range brigade of 6 inch and 12 inch guns.\(^\text{47}\) During the first phase the whole of the artillery would act as in earlier set piece battles. There would be a barrage by 432 field and 30 heavy guns firing according to a detailed scheme while the heavies, two thirds of which were detailed for counter-battery tasks, bombarded the enemy gun positions and other targets. This represented a barrage density of 1 gun per 15 metres, about the same as at Hamel. Compared with the battles of 1917, the barrage was very simple: perfectly straight. It was hoped that this would minimise difficulties, since once again the barrage would be largely unregistered. Arrangements were made to have all guns recalibrated on the Army ranges and battery positions resectoned by the 1st Topographical Company.\(^\text{48}\)

Allocation of support troops to assault divisions  
(8 August 1918)\(^\text{49}\)

<table>
<thead>
<tr>
<th></th>
<th>For First Objective (2nd and 3rd Divisions)</th>
<th>For Second Objective (4th and 5th Divisions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineers</td>
<td>1 field company</td>
<td>2 field companies</td>
</tr>
<tr>
<td></td>
<td>1 tunnelling section</td>
<td>1 tunnelling section</td>
</tr>
<tr>
<td>Field Artillery</td>
<td>9 brigades</td>
<td>6 brigades</td>
</tr>
<tr>
<td>Heavy Artillery</td>
<td></td>
<td>1 60 pounder battery</td>
</tr>
<tr>
<td>Light Horse</td>
<td>1 troop</td>
<td>2 troops</td>
</tr>
<tr>
<td>Pioneers</td>
<td>2 companies</td>
<td>2 companies</td>
</tr>
<tr>
<td>Tanks</td>
<td>27 Mark V</td>
<td>27 Mark V</td>
</tr>
<tr>
<td></td>
<td>3 Carrying</td>
<td>18 Mark V*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 Carrying</td>
</tr>
</tbody>
</table>

On 28 July the direction of the wind changed. Previously it had blown strongly from the west and north west, making sound ranging difficult. Now it swung around, varying from east to south. Working day and night, the sound rangers meticulously recorded the

\(^{47}\) Order of Battle Australian Corps Heavy Artillery, 1 August 1918, AWM26 494/2  
\(^{48}\) BMRA, Artillery Instructions No. 250 "General Instructions Bearing on the Attack Referred to in Artillery Instructions No. 249", 1 August 1918, AWM26 493/4  
\(^{49}\) BGGS Australian Corps, Battle Instructions No. 1, 1 August 1918, 3DRL2316 44
location of every hostile battery. Visibility remained poor but a set of excellent aerial photographs was taken on 3 August.\(^{50}\) The artillery avoided shelling the newly located batteries, pretending that they had not been located. On the day, the heavy artillery opened on them all.\(^{51}\) The infantry noted that the enemy artillery's response to the attack was feeble and that it appeared to cease soon after the battle began.\(^{52}\)

**15th Infantry Brigade attack formation (August 1918)**

![Diagram of 15th Infantry Brigade attack formation]

For the second phase, two batteries of 60 pounders would come under the command of the 4th and 5th Divisions respectively, and would advance with their field artillery. Both field and 60 pounder batteries would carry trench bridges, wire cutters, fascines and hurdles.\(^{54}\) As the infantry advanced to the Green Line and then to the Blue, batteries would start to fall out of range. As this happened, the 60 pounder and 6 inch howitzer

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\(^{50}\) CBSO Australian Corps, "Notes on Counter Battery Work in the Battle of 8/8/18 and the advance from Villers-Bretonneux to the Hindenburg Line", October 1918, AWM26 494/2

\(^{51}\) Monash, *The Australian Victories in France*, p. 112

\(^{52}\) GOC 2nd Division, "Operations Report No. 1 - Preliminary Report on Operations of 2nd Division on 8 August 1918", undated, AWM26 515/1

\(^{53}\) GOC 15th Infantry Brigade to HQ 5th Division 11 August 1918, AWM26 572/2

\(^{54}\) Order of Battle Australian Corps Heavy Artillery, 1 August 1918, AWM26 494/2
batteries of six siege brigades would pack up and move forward, leaving the 8 inch and 9.2 inch howitzers behind, along with 2 guns of any 6 gun battery. In addition, four 6 inch guns would move forward to provide some long range capability.\textsuperscript{55} Because the final objective lay beyond the range of the field artillery, it was arranged for the air force to provide the smoke screens by dropping smoke bombs.\textsuperscript{56}

A high priority was placed on getting roads repaired. Most engineers were pooled at Corps level,\textsuperscript{57} with the divisions cut back to one or two field companies and two pioneer companies. The heavy artillery was forbidden to use delayed action fuzes against the roads to prevent their being damaged. To help the heavy artillery move forward, the CRE, Brigadier General C.H. Foott placed the 1st Army Troops Company at the disposal of the heavy artillery.\textsuperscript{58}

As in 1916, water supply was a major concern. A British army troops company was placed under the Chief Water Supply Officer and tunnellers were made available to repair and retest wells. Each division was allocated a 570 litre water truck, four GS water wagons with 1400 litre tanks, 4 hand pumps for deep wells and 4 windlasses with a bucket and 30 metres of rope,\textsuperscript{59} and every man was issued with an extra water bottle.\textsuperscript{60}

The day of the battle, 8 August, was even foggier than usual. Units were relieved to find their assembly areas marked with lanterns, petrol tins with holes forming the battalion number.\textsuperscript{61} Broad tapes for guiding the tanks helped some units find their way forward and some units had white tapes to guide them to the objective as well, while many units used prismatic compasses to make their approach.\textsuperscript{62} Cooperation with the tanks was difficult during the first phase, because the fog made visual signally difficult.\textsuperscript{63}

Thanks to their recent training, tactics were fairly standardised across the Corps. A feature of the Australian Corps was that responsibility for training lay with the corps, or more precisely with the AIF which was merged with Corps, rather than division, a factor which more than any other explains the uniform quality of the Australian divisions. The

\textsuperscript{55} BMHA, Heavy Artillery Order No. 151 "Orders for the Advance", 5 August 1918, AWM26 494/2
\textsuperscript{56} BGGS Australian Corps, "Battle Instructions No. 16. Aircraft", 4 August 1918, AWM26 488/1
\textsuperscript{57} The 5th, 6th, 9th, 10th, 13th and 15th Field Companies, the British 146th, 238th and 567th Army Troops Companies, the 3rd and 5th Pioneer Battalions and the 1st and 2nd Tunnelling Companies
\textsuperscript{58} CE Australian Corps, Engineer Instructions No. 1, 3 August 1918, 3DRL2316 44
\textsuperscript{59} CE Australian Corps, Engineer Instructions No. 1, 3 August 1918, 3DRL2316 44
\textsuperscript{60} BM 15th Infantry Brigade, "Preliminary Instruction No. 20", undated, AWM26 572/2
\textsuperscript{61} GOC 15th Infantry Brigade to HQ 5th Division 11 August 1918, AWM26 572/2
\textsuperscript{62} Bean, VI: The AIF in France: During the Allied Offensive 1918, pp. 526-528
\textsuperscript{63} GOC 2nd Division. "Operations Report No. 5 - Preliminary Report on Operations of 2nd Division on 8 August 1918 and Succeeding Days", undated, AWM26 515/1
advance was led by scouts, who pointed out obstacles to the tanks which followed them in a line. The companies followed in a square formation, with platoons in single file. Some brigades attacked with three battalions and some with two. Light horse, trench mortars, cyclists and machine guns followed the infantry. As Monash had intended, all the available technologies were deployed, each to play its own part.

When opposition was encountered, usually from enemy machine guns, the tanks would approach the post directly while the infantry worked their way around the flank, and these tactics worked repeatedly. As units reached the Green Line and pushed beyond, they began encountering enemy 77 mm guns and 5.9 inch howitzers which not infrequently fired over open sights. Frontal attacks on enemy guns by tanks tended to be costly, but they were attacked successfully outflanked by teams of infantry and tanks working together.

By 1120 the most successful battle of the war was virtually over. Except on the left flank where the failure of the British had exposed them to fire from heights overlooking the Somme Valley, the entire objective had been captured at a cost of about 2,000

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64 GOC 15th Infantry Brigade to HQ 5th Division 11 August 1918, AWM26 572/2
65 Personal Narrative by Lieutenant W.J. Meara, AWM26 572/3
66 GOC 15th Infantry Brigade to HQ 5th Division 11 August 1918, AWM26 572/2
casualties, with the Australians capturing 7,925 German prisoners and 173 guns.67 This represented half the total captures for the allies for about one tenth of the total casualties. Australian casualties from 7 to 14 August were 5,991,68 which may be contrasted with the Canadian Corps' 6,442 casualties on the first two days alone.69 The vast numbers of enemy guns and ammunition captured from 8 August 1918 onwards naturally led to the idea of firing some of it back at the enemy. The Australian Corps Heavy Artillery formed four special "Hun" batteries, one of which consisted of three 10.5cm howitzers manned by gunners of V Heavy Trench Mortar Battery.70

The only criticism of the Australians was that the advance did not go far enough. Cavalry and armoured cars were able to range beyond the Blue Line, the two divisions which had captured it still had uncommitted brigades, and the 1st Division had returned from the Lys sector. On the afternoon of the battle, Rawlinson ordered the advance to be continued the next day. This advance then took place in broad daylight with no barrage and no preparation and the tanks suffered severely from anti-tank guns and field guns firing direct.71

A spectacular example of the difference which good tactics could make was provided by six men of the 1st Infantry Battalion. Seeing a British battalion held up by German machine guns on the other side of the Somme River, they crossed the river and used fire and movement to outflank the enemy. In the process, they captured 300 Germans.72

The problems with using a natural feature like the Somme River as a corps boundary had now become obvious and Monash was placed in charge on both banks. He formed a new division sized force north of the river called the Liaison Force under the command of Brigadier General E.A. Wisdom, built around the 13th Infantry Brigade and the US 131st Infantry Regiment. The Liaison Force cleared up the Somme Valley by envelopment, cordonning off the peninsulas formed by the meandering Somme River. By now the Corps front had grown to 16,000 metres and rather than reduce it, Rawlinson gave Monash the British 17th Division. The argument that a corps consisting of more than four divisions would be unwieldy was completely forgotten. From now on seven would be normal. The British 17th Division was eventually replaced by the British 32nd Division and it in turn by the two divisions of the US II Corps.73

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67 Bean, VI: The AIF in France: During the Allied Offensive 1918, p. 600
68 Bean, VI: The AIF in France: During the Allied Offensive 1918, p. 684
69 Rawling, Surviving Trench Warfare, p. 203
70 BMHA Australian Corps, 6 September 1918, AWM26 494/4
71 GOC 2nd Division, "Operations Report No. 5 - Preliminary Report on Operations of 2nd Division on 8 August 1918 and Succeeding Days", undated, AWM26 515/1
72 Bean, VI: The AIF in France: During the Allied Offensive 1918, pp. 650-653
73 Monash, The Australian Victories in France, pp. 142-143
Contact with the Canadians brought an interest in Canadian ideas, but not their tactics or their infantry organisation of over strength battalions or even their machine gun units. Surprisingly, the Australians were interested in the organisation of the Canadian Corps' engineering units. In May 1918, the Canadians had disbanded their field companies, pioneer battalions and tunnelling companies and given each division an engineer brigade consisting of three battalions and a pontoon bridging transport section. The engineer battalions were quite large, 37 officers and 1,001 other ranks.74 The idea was to create an engineer arm not dependent upon infantry working parties.

Bridges erected and dismantled in the Australian Corps area (8 August 1918 - 6 October 1918) 75

<table>
<thead>
<tr>
<th>Bridge Type</th>
<th>Dismantled</th>
<th>Erected</th>
</tr>
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<tbody>
<tr>
<td>Foot</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Horse Transport</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Motor Transport, 8 tonnes</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>B Class, 14 tonnes</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>A Class, 17 tonnes</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>AA Class, Tank</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>33</strong></td>
<td><strong>97</strong></td>
</tr>
</tbody>
</table>

In semi-open warfare, much depended on the engineers restoring communications such as roads and railways. On 23 August six bridges were completed.76 There were also new tasks as well: on 2 September a new airfield was constructed for the 3rd Flying Squadron.77 Extensive use was made of captured dumps of German engineer stores.78 Chief Engineer Brigadier General C.H. Foott was very much in favour of reorganising the Australian engineers along Canadian lines and it had been something that the Australian commanders had been thinking about for some time, as the current engineer organisation of field companies and pioneer battalions had not been a success. Changes had not been made because it was thought that the British would not allow such inconsistencies between army organisational structures but given that approval had been given for the Canadians, there seemed to be no reason why approval would not be forthcoming. In the end the proposal died because after dissolving the existing units the

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74 Rawling, *Surviving Trench Warfare*, pp. 176-177
75 BGCE Australian Corps, "Bridges erected and dismantled in the Australian Corps area", during operations between 8 August 1918 and 6 October 1918", undated, AWM26 496/8
76 BGCE Australian Corps to British Fourth Army, 24 August 1918, AWM26 496/3
77 War Diary CE Australian Corps, 2 September 1918, AWM26 496/4
78 BGCE Australian Corps, 10 September 1918, AWM26 496/5
Australian Corps would have been 250 officers and 5,388 short, impossibly large numbers to make up with reinforcements so scarce.79

The Canadian engineers also had their own Mechanical Transport Company. Noting that the engineers were using 90 to 100 trucks per day, AIF Senior Mechanical Transport Officer Lieutenant Colonel W.H. Tunbridge recommended that a similar unit be formed for Australian Corps Troops Engineers.80 The idea had the support of Foott and Monash but also did not proceed, probably due to the cost of the trucks, which had to be paid for by the Commonwealth.81

This is not to say that there was a moratorium on the creation of new units. As already noted, the 1st and 2nd Ordnance Ammunition Units, were formed in July from specialists sent from Australia and specifically charged with the role of investigating defective weapons and ammunition, particularly for the trench mortars.82 The Australian Corps workshops were Australianised. Additional ordnance personnel arrived from Australia in October. For a time, the workshops were double manned but then the British personnel were withdrawn and in November the 1st, 2nd and 3rd Ordnance Mobile Workshops were created, the last units of the First AIF to be formed before the Armistice.83

The Australian Corps pushed forward, switching to peaceful penetration whenever things slowed, and launched a series of set piece attacks. The Germans retreated under pressure, attempting a stand wherever they could. One operation in particular stands out: the capture of Mont St Quentin. In this battle, the 3rd Division seized a minor bridgehead over the Somme. Monash then threw the 2nd Division across and sent it to capture the dominating heights of Mont St Quentin. Without help from tanks or an artillery barrage, the under-strength 60 to 70 strong companies of the 5th Infantry Brigade managed to capture the feature. A German counter-attack threw them off again. Meanwhile, Brigadier General H.E. Elliott of the 15th Infantry Brigade led his men across the Somme at Peronne in person.84 In hard fighting, the 6th Infantry Brigade captured Mont St Quentin and the 15th Infantry Brigade cleared Peronne.85 At a cost of 3,000 casualties, the Australian Corps defeated five German divisions and helped trigger a general withdrawal to the Hindenburg Line on 6 September.86 The battle stands out

79 BGCE Australian Corps, "Reorganisation of Engineer Units", 29 July 1918, AWM25 721/19
80 SMTO Australian Corps, 22 August 1918, AWM26 499/4
81 GOC Australian Corps, 24 August 1918, AWM25 721/19
82 War Diary, 2nd Ordnance Ammunition Unit, July 1918, AWM4 2/11/1 Microfilm Roll 878
83 War Diary, DDOS British Fourth Army, 22 September 1918, AWM26 473/6
84 GOC 15th Infantry Brigade to HQ 5th Division, "Report on Operations as Undertaken by 15th Infantry Brigade near Peronne 1 to 5 September 1918", 8 September 1918, AWM26 573/1
85 War Diary, GS British Fourth Army, 1 to 2 September 1918, AWM26 473/1
86 War Diary, GS British Fourth Army, 6 September 1918, AWM26 473/1
among those of the AIF on the Western Front as one of manoeuvre rather than a set piece and one fought out with infantry weapons, the grenade, rifle grenade, Lewis gun and bayonet.

The role of the Australian Corps in 1918 was indeed a remarkable one. Comprising only 9.5% of the BEF, it captured 18.5% of the German prisoners, 21.5% of the territory and 14% of the guns captured. This represented an effectiveness 1.95, 2.23 and 1.47 times that of the British Army average.\(^87\) These victories came at a cost: 14,116 Australian soldiers became battle casualties on the Western Front in August, the AIF’s third most costly month of the war, 8,348 in September and 3,070 in October for a total of 25,534. This was still considerably less than the 29,843 in the Somme fighting of July and August 1916, or the Passchendaele fighting in September and October 1917 when 32,979 men were lost, or even the fighting at Bullecourt and Messines in April, May and June 1917 when there were 26,495 casualties and the results were immensely greater.\(^88\) The casualties were more or less matched by 25,000 German prisoners taken; that many more Germans were killed or wounded is certain but their numbers are not known. Certainly, some 623 square kilometres of France was recaptured from the enemy.\(^89\)

Bringing the war to this successful conclusion was due in no small part to the successful integration of new technology, organisation and tactics into a combination that could truly breach any defensive system. In this the AIF played a significant part, especially in the final year of war, both in the development of new tactics and technics and in their successful employment on the battlefield.

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\(^{87}\) "Table showing the Proportionate Share of the Australian Corps in the Results of the Allied Offensive on the Western Front 27 March 1918 to 5 October 1918", 25 November 1918, 3DRL2316 30

\(^{88}\) Butler, II: The Western Front, pp. 864-865

\(^{89}\) "Offensive Fighting 8 August 1918 to 4 October 1918", undated, 3DRL2316 30
The Australian Victories in France
(March - October 1918)

<table>
<thead>
<tr>
<th>Action</th>
<th>Divisions</th>
<th>Prisoners</th>
<th>Guns</th>
<th>Frontage (m)</th>
<th>Advance Depth (m)</th>
<th>Area Captured (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 March 1918 to 7 August 1918</td>
<td>2,3,4,5</td>
<td>3,500</td>
<td>-</td>
<td>14,000</td>
<td>2,500</td>
<td>31</td>
</tr>
<tr>
<td>Amiens 8 August 1918</td>
<td>1,2,3,4,5</td>
<td>7,925</td>
<td>173</td>
<td>8,000</td>
<td>11,000</td>
<td>75</td>
</tr>
<tr>
<td>P oyart-Bray 9-22 August 1918</td>
<td>1,3,4,5</td>
<td>1,127</td>
<td>6</td>
<td>11,000</td>
<td>2,500</td>
<td>41</td>
</tr>
<tr>
<td>Chuignes 23 August 1918</td>
<td>1</td>
<td>3,092</td>
<td>21</td>
<td>10,000</td>
<td>3,000</td>
<td>26</td>
</tr>
<tr>
<td>To Peronne 24-29 August 1918</td>
<td>2,3,5</td>
<td>584</td>
<td>5</td>
<td>16,000</td>
<td>13,000</td>
<td>207</td>
</tr>
<tr>
<td>Peronne / Mont St Quentin 30 August 1918 - 4 September 1918</td>
<td>2,5</td>
<td>1,666</td>
<td>6</td>
<td>7,000</td>
<td>4,500</td>
<td>26</td>
</tr>
<tr>
<td>5-17 September 1918 Peronne to the Hindenburg Line</td>
<td>3,5</td>
<td>1,948</td>
<td>-</td>
<td>10,000</td>
<td>17,000</td>
<td>148</td>
</tr>
<tr>
<td>Hindenburg Line 18 September 1918</td>
<td>1,4</td>
<td>4,506</td>
<td>86</td>
<td>8,000</td>
<td>5,000</td>
<td>33</td>
</tr>
<tr>
<td>To Beaurevoir Line 19 September 1918 to 4 October 1918</td>
<td>2,3,5</td>
<td>3,057</td>
<td>35</td>
<td>6,000</td>
<td>12,000</td>
<td>62</td>
</tr>
<tr>
<td>Montbrehain 4 October 1918</td>
<td>2</td>
<td>1,250</td>
<td>-</td>
<td>3,000</td>
<td>2,500</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>28,655</strong></td>
<td><strong>332</strong></td>
<td></td>
<td></td>
<td><strong>654</strong></td>
</tr>
</tbody>
</table>

"Offensive Fighting 8 August 1918 to 4 October 1918", undated, 3DRL2316 30
Conclusions

In many ways the story of the Western Front is one of the quest for the solution to the problem of trench warfare. The interesting point is the perception that trench warfare was a problem, caused by dissonance between warfare as described in the Field Service Regulations and the realities of trench warfare.

Several different approaches were tried to resolve the problem, each indicative of the way in which the problem was conceived. Strategic approaches were considered, shifting the emphasis away from the Western Front. This led to the Gallipoli campaign in which a miniature Western Front was created on the Peninsula. In Palestine a more open form of warfare did emerge but the campaign, although much less costly than the Western Front was still very expensive from a logistical point of view and relatively indecisive. No quick end to the war could be sought in Palestine.

A technological resolution was attempted, developing and employing new technologies. A search for a technological solution invariably starts with a perception that the problem is technological in nature. In accord with the degree of truth in this notion, technological solutions achieved a degree of success. The best known of these were tanks. The diggers’ initial experiences with them, especially at Bullecourt, were unfavourable but improved models and tactics were extremely successful in the final campaigns. The Australian tactical integration of tanks into a combined arms team that also included artillery, infantry and aviation proved a war winning combination at Hamel and Amiens. But tanks were never necessary for diggers to succeed in battle.

If we define a decisive weapon as one without which the result of the war might have been different, then it is hard to make a case for any single weapon as decisive. If we say that a decisive weapon was one that altered the nature of the battlefield, then quick firing artillery, barbed wire, poison gas, trench mortars, hand and rifle grenades and automatic weapons were all decisive. From a logistical point of view, mechanical transport was decisive. Many other, humbler, technologies played vital parts.

Then there were the tactical approaches. In accordance with British doctrine, the notion of the decisive battle was superimposed upon the campaign. With it came the concept of the wearing out battle, of "engaging" the enemy down until the time was ripe for the decisive battle. The term "attrition" is often used for this process, but the meaning gets confused because it is normally considered to be a process of economically trading resources. This was not at all the concept behind the wearing out process, which was
simply to get the enemy to commit his reserves. Under this doctrine, the battles of 1918 were counted, retrospectively, as the decisive battle.

Other British officers concluded that the Western Front most resembled a gigantic siege. This meme was not incompatible with the wearing out battle, but it had serious drawbacks. As it strategy, it offered little hope of any kind of decisive success. As tactics, the advice in the *Field Service Regulations* contained many errors. It led, for example, to the close trench lines at Gallipoli until their folly was realised.

The *Field Service Regulations* helped propagate the meme that held the battle to be the focus and object of the campaign. At Gallipoli and again at Gaza, the British commander sought battle. Since battle requires the enemy to agree to fight, this can normally be achieved only if the enemy is forced to do so or believes himself to have the advantage. Accordingly, some British commanders were for a long time willing to accept battle with the Turks under disadvantageous circumstances. Such a process forms a textbook example of defective decision making. After the war, the primacy of battle, a feature of the thinking of 19th century historians as much as generals, began to be questioned.

One meme held that some things are unchanging and will always be true. This is a common meme in traditional societies. Some officers in the Sinai were seen taking precautions against weapons like heavy artillery that simply were not there based upon experience on the very different Western Front. Others assumed that victories over the Turks were as inevitable as victories over tribesmen with spears.

Another meme held that human factors like morale were so much more important than mechanistic elements that they could overcome machine guns. This meme was related to the previous one, for when technological factors are constant, it is the human dimension that still provides scope for improvement and this became the main role of regular army officers. Continued focus on human issues led to overestimating their importance and consequently to the notion that repeating an operation unchanged but with more determination could result in a more favourable outcome.

Perhaps the meme that caused the greatest degree of dissonance, however, was the value of courage. Due to the dangerous nature of the battlefield, this had always been a military virtue. But under the prevailing tactical conditions of 1915 and 1916, bravery seemed more likely to get a man killed than anything else.
The tactical problem was as easy to define as it was frustratingly difficult to solve. Defensive fortifications consisted of trench lines and barbed wire; they contained infantry armed with rifles, bayonets and machine guns. No Man's land was also swept by artillery.

Cutting barbed wire was initially the more difficult problem. Both high explosive and shrapnel were tried and both were found to be ineffective with the quantities of ammunition available at Gallipoli. In France, more ammunition was available and cutting was successfully carried out at Pozieres. The German response was to use more wire in front of the Hindenburg Line. Destroying such an obstacle proved a challenge but a new technology became available, the percussion fuze. Spraying shell fragments at ground level, it proved effective at destroying barbed wire. In the later campaigns, tanks were employed against wire with great success, and of course, the infantry could cut their way through the wire if enemy artillery and machine guns were suppressed.

The gunners at Gallipoli knew that if they could obtain a good firing position, they could damage trenches with high explosive. This proved hardest at Gallipoli; in the broader, flatter terrain of France, firing positions were easier to find but in the Noreuil Valley, at Passchendaele and at Dernancourt, the gunners still had to cope with less than perfect sites. Armed with plenty of high explosive, they were able to destroy the enemy trench systems, reducing the area to a cratered, lunar landscape in the process.

The German response to this was the construction of deep, shellproof dugouts. While they prevented destruction of the infantry, the Germans inside could not fight from their dugouts; they had no acquisition. At Fromelles, a weak barrage allowed them to emerge during the barrage and even fire through it. The old Anglo-Saxon meme of "more is better" soon took care of this. At Pozieres, it then became a race between the attacking diggers and the defenders to see who could occupy the trenches first when the barrage lifted. A good barrage could be followed closely and the diggers generally won, using Mills bombs and P bombs to clear out the defenders, whose shelters then became death traps.

Throughout 1917, the artillery refined its methods. The new field artillery organisation nominally reduced the guns per division from 64 to 48 but in practice each division in the line normally had the field artillery of two divisions or the equivalent assigned. New technics were introduced. The very concept of a barrage was a new meme, the word barrage, borrowed from the French, meaning "barrier". A simple technic of firing on one place and moving forward by "lifts" was used at Pozieres. At Bullecourt, the 2nd Division was provided with a "creeping" barrage that moved forward at the rate of 90
yards every 3 minutes. This was further refined during Third Ypres to barrages that changed speed and paused on certain lines at certain times. Protective barrages were added to prevent German counterattacks, as was a searching barrage to suppress German machine guns beyond the objective capable of firing on consolidating diggers. The barrage became so complex that special ladder diagrams were developed to depict it. The firepower of the artillery destroyed all but the deepest shelters and ultimately forced the enemy to pull back and disperse, relying on counterattacks.

The Somme campaign revealed serious logistical difficulties with this massive use of artillery, particularly with respect to the transportation system, but these were regarded as technological and administrative difficulties and so were tackled as such and eventually overcome. The diggers too came under devastating artillery fire at Pozieres and Bullecourt and it was clear that the enemy artillery had to be overcome. The heavy artillery had the range for acquisition of the enemy's field and heavy artillery and counterbattery fire became its main role, with at least half of its guns and howitzers engaged in counterbattery missions. The new technologies of flash spotting, sound ranging and aerial observation were deployed to locate the enemy batteries. The heavy artillery now attempted to neutralise the enemy guns. Increasingly, the German guns were forced to hold fire or move constantly for fear of the heavy artillery. Heavy artillery showed spectacular growth from a pathetic three howitzers at Gallipoli:

<table>
<thead>
<tr>
<th>Gun</th>
<th>Pozieres, July 1916</th>
<th>Bullecourt, April 1917</th>
<th>Menin Road, September 1917</th>
<th>Amiens, August 1918</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 pounder</td>
<td>16</td>
<td>12</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>6&quot; howitzer</td>
<td>8</td>
<td>20</td>
<td>80</td>
<td>128</td>
</tr>
<tr>
<td>6&quot; gun</td>
<td></td>
<td>8</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>8&quot; howitzer</td>
<td>4</td>
<td>16</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>9.2&quot; howitzer</td>
<td>4</td>
<td>12</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>12&quot; howitzer</td>
<td></td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>15&quot; howitzer</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>32</td>
<td>60</td>
<td>178</td>
<td>248</td>
</tr>
</tbody>
</table>

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1 Bean III: *The AIF in France 1916*, p. 652; War Diary, I Anzac Heavy Artillery, AWM26 156/6; War Diary, GOCRA I Anzac Corps, AWM4 13/4; MGRA GHQ, "Artillery Resources of Fourth Army", dated 28 August 1918, AWM 26 468/2

Conclusions 202
The brief period of semi-open warfare during the German withdrawal to the Hindenburg Line was an opportunity for the development of new tactics. In the trenches, the infantry had come to rely on bombs and the bayonet and ignore the rifle bullet as a weapon, and they had to unlearn this. On the other hand, they now had more firepower at their disposal than ever, the number of Lewis guns per battalion having risen from four in March 1916 to eight in May, twelve in July and sixteen in December. The platoon became the principal tactical unit, with Lewis gunners and bombers under its control. The new organisation had great flexibility and soon showed its value. At the same time, a diamond shaped formation designed to reduce losses from enfilading machine guns and artillery replaced the wave formation. The infantry also developed the technic of jumping off from a tape laid across No Man's Land.

The best time for an attack remained a problem for a surprisingly long time. The dusk attack, as suggested by the Field Service Regulations, proved disastrous at Fromelles as it made location easier for the enemy artillery. At Pozieres, the 1st Division attacked at 12:30 am, which allowed for a night approach and attack, but forced a night consolidation as well. At Hamel, 3:10 am was chosen so that there would be enough light for tanks but a night assembly for the infantry.

The low-lying ground on the Flanders sector led to the use of above ground fortifications made from steel and concrete. Initially, they were merely shelters but the technic was refined to produce the pillbox, a miniature fort from which the enemy could fire as well as shelter. Most could withstand hits from all but the heavier guns. Tactics were developed to overcome them, their fire being masked by rifle grenades and Lewis guns until Mills bombs could be thrown through the aperture.

In 1917, bite and hold became the standard operational tactic and set piece battles the norm. Objectives strictly limited to the range of the artillery, which provided firepower both for the attack and for defence against German counterattacks. But the attempt to push through the German front at Third Ypres ground to a halt when a vulnerable salient allowed the German artillery to disrupt a supply system strained to the limit by a technologically generated quagmire and the logistical requirements of the bite and hold tactic.

The German offensives provided a test of a different kind for the AIF: stopping German attacks with forces superior in numbers. This advantage was cancelled by the AIF.

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2 "Notes on Lewis Guns - Tactical Lessons 1915-1918", AWM25 385/15; GS 2nd Division, dated 19 July 1916, AWM26 56/2
3 Field Service Regulations, p. 147
employing superior firepower. Once again, all arms had to adapt to a more fluid form of warfare and there was a general reversion to the 1914 style organisation, with the notable exception of the infantry. The increase in the firepower of the infantry as the battalions became smaller is one of the trends of the war:

Automatic weapons in the infantry division
(1914 - 1918)

<table>
<thead>
<tr>
<th></th>
<th>September 1914</th>
<th>September 1915</th>
<th>September 1916</th>
<th>September 1917</th>
<th>September 1918</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine guns</td>
<td>24</td>
<td>48</td>
<td>48</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Lewis guns</td>
<td>-</td>
<td>-</td>
<td>104</td>
<td>200</td>
<td>380</td>
</tr>
</tbody>
</table>

The proportion of the infantry battalion's firepower that came from automatic weapons increased from 8 per cent to 64 per cent. In addition to automatic weapons, the infantry had access to other new weapons, such as rifle grenades, hand grenades and mortars, and they continued to carry their rifles and bayonets.

In the thinly held battlefield that was the residue of the German offensives, the AIF developed its own tactics, peaceful penetration, that utilised the technologies available in a new manner and proved every bit as effective as bite and hold and far less costly. The trench warfare produced by the rifle and machine gun at last gave way to a semi-open battlefield dominated by artillery. Along the way, the fact that infantrymen now fought in small, relatively isolated groups gave great scope for the kind of individual initiative that was always a hallmark of the AIF. The value of bravery was restored, the brave man becoming more likely to survive.

At Hamel, an Australian version of bite and hold was developed that combined with armour and aviation technologies and peaceful penetration tactics. At Amiens, this technic was further extended to allow for a deep, if still limited, advance. Employing all technologies in harmony, the Australian Corps then fought its way forward alternatively with battles of manoeuvre, set pieces, and peaceful penetration.

The Sinai and Palestine theatres witnessed a style of modern warfare that was very different from that of the Western Front, one characterised by highly mobile mounted operations rather than static set piece offensives directed at trench lines, although trench warfare conditions did occur for a period at Gaza. Here the nature of the theatre gave scope for mobility and the use of the mounted arm from the beginning. Here too,
aviation, artillery, armoured cars and light horse were used in synergy, maximising the benefits of available technologies.

The conditions of the Great War were no aberration but the result of the circumstances that created them. Trench warfare will recur whenever the circumstances that created it exist. And herein lies perhaps the lesson that the story of technology teaches. Faced with unforeseen technological circumstances, the diggers of the Great War were ultimately able to transcend their circumstances and transform them into victory.

The prospect of tactics, organisation and technology getting out of step is all too likely in an era of rapid technological change. Should this recur, then it will be up to the army to comprehend the situation and respond appropriately. The issue is whether they are any better equipped to do this than their counterparts in the Great War.
List of Abbreviations

AA Antiaircraft
AFC Australian Flying Corps
AIF Australian Imperial Force
AWM Australian War Memorial
ANZAC Australian and New Zealand Army Corps
A&QMG Adjutant and Quartermaster General
Bdr Bombardier
BEF British Expeditionary Force
BG Brigadier General
BGGS Brigadier General, General Staff
BGRA Brigadier General, Royal Artillery
BL Breech Loading
BM Brigade Major
BMHA Brigade Major, Heavy Artillery
BMRA Brigade Major, Royal Artillery
Capt Captain
CBSO Counterbattery Staff Officer
CE Chief Engineer
CGS Chief of the General Staff
CIGS Chief of the Imperial General Staff
C-in-C Commander in Chief
CMGO Corps Machine Gun Officer
CMTO Corps Mechanical Transport Officer
Col Colonel
CP Commonwealth Pattern
Cpl Corporal
CRA Commander, Royal Artillery
CRE Commander, Royal Engineers
CRS Commonwealth Records Series
CTC Camel Transport Corps
CTE Corps Troops Engineers
cwt Hundredweight
d Pence
DADOS Deputy Assistant Director of Ordnance Services
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>DCM</td>
<td>Distinguished Conduct Medal</td>
</tr>
<tr>
<td>DesCol</td>
<td>Desert Column</td>
</tr>
<tr>
<td>DesCorps</td>
<td>Desert Mounted Corps</td>
</tr>
<tr>
<td>DGT</td>
<td>Director General of Transport</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defence</td>
</tr>
<tr>
<td>DMGO</td>
<td>Division Machine Gun Officer</td>
</tr>
<tr>
<td>DMS</td>
<td>Director of Medical Services</td>
</tr>
<tr>
<td>DSO</td>
<td>Distinguished Service Order</td>
</tr>
<tr>
<td>DTMO</td>
<td>Division Trench Mortar Officer</td>
</tr>
<tr>
<td>DMTS</td>
<td>Director of Mechanical Transport Services</td>
</tr>
<tr>
<td>Dvr</td>
<td>Driver</td>
</tr>
<tr>
<td>EEF</td>
<td>Egyptian Expeditionary Force</td>
</tr>
<tr>
<td>E-in-C</td>
<td>Engineer in Chief</td>
</tr>
<tr>
<td>FM</td>
<td>Field Marshal</td>
</tr>
<tr>
<td>FOO</td>
<td>Forward Observation Officer</td>
</tr>
<tr>
<td>ft</td>
<td>Feet</td>
</tr>
<tr>
<td>g</td>
<td>grams</td>
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<tr>
<td>Genl</td>
<td>General</td>
</tr>
<tr>
<td>GG</td>
<td>Governor General</td>
</tr>
<tr>
<td>GHQ</td>
<td>General Headquarters</td>
</tr>
<tr>
<td>GOC</td>
<td>General Officer Commanding</td>
</tr>
<tr>
<td>GOCRA</td>
<td>General Officer Commanding Royal Artillery</td>
</tr>
<tr>
<td>GS</td>
<td>General Staff</td>
</tr>
<tr>
<td>GSO</td>
<td>General Staff Officer</td>
</tr>
<tr>
<td>Gnr</td>
<td>Gunner</td>
</tr>
<tr>
<td>HAG</td>
<td>Heavy Artillery Group</td>
</tr>
<tr>
<td>HE</td>
<td>High Explosive</td>
</tr>
<tr>
<td>HF</td>
<td>High Frequency</td>
</tr>
<tr>
<td>HQ</td>
<td>Headquarters</td>
</tr>
<tr>
<td>How</td>
<td>Howitzer</td>
</tr>
<tr>
<td>HTM</td>
<td>Heavy Trench Mortar</td>
</tr>
<tr>
<td>in</td>
<td>Inches</td>
</tr>
<tr>
<td>kg</td>
<td>Kilograms</td>
</tr>
<tr>
<td>kph</td>
<td>Kilometres per hour</td>
</tr>
<tr>
<td>lb</td>
<td>Pounds</td>
</tr>
<tr>
<td>L/Cpl</td>
<td>Lance Corporal</td>
</tr>
<tr>
<td>LF</td>
<td>Low Frequency</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Name</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>LG</td>
<td>Lieutenant General</td>
</tr>
<tr>
<td>LGO</td>
<td>Lewis Gun Officer</td>
</tr>
<tr>
<td>LHR</td>
<td>Light Horse Regiment</td>
</tr>
<tr>
<td>LOC</td>
<td>Line of Communications</td>
</tr>
<tr>
<td>Lt</td>
<td>Lieutenant</td>
</tr>
<tr>
<td>LTM</td>
<td>Light Trench Mortar</td>
</tr>
<tr>
<td>m</td>
<td>metres</td>
</tr>
<tr>
<td>Maj</td>
<td>Major</td>
</tr>
<tr>
<td>MC</td>
<td>Military Cross</td>
</tr>
<tr>
<td>MEF</td>
<td>Mediterranean Expeditionary Force</td>
</tr>
<tr>
<td>MG</td>
<td>Machine Gun or Major General</td>
</tr>
<tr>
<td>MGGS</td>
<td>Major General, General Staff</td>
</tr>
<tr>
<td>MM</td>
<td>Military Medal</td>
</tr>
<tr>
<td>MOD</td>
<td>Minister of Defence</td>
</tr>
<tr>
<td>MT</td>
<td>Mechanical Transport</td>
</tr>
<tr>
<td>MTM</td>
<td>Medium Trench Mortar</td>
</tr>
<tr>
<td>OC</td>
<td>Officer Commanding</td>
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<tr>
<td>OP</td>
<td>Observation Post</td>
</tr>
<tr>
<td>oz</td>
<td>Ounces</td>
</tr>
<tr>
<td>psc</td>
<td>Passed Staff College</td>
</tr>
<tr>
<td>Pte</td>
<td>Private</td>
</tr>
<tr>
<td>QF</td>
<td>Quick Firing</td>
</tr>
<tr>
<td>QM</td>
<td>Quartermaster</td>
</tr>
<tr>
<td>QMG</td>
<td>Quartermaster General</td>
</tr>
<tr>
<td>RA</td>
<td>Royal Artillery</td>
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<tr>
<td>RAN</td>
<td>Royal Australian Navy</td>
</tr>
<tr>
<td>RE</td>
<td>Royal Engineers</td>
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<tr>
<td>RFA</td>
<td>Royal Field Artillery</td>
</tr>
<tr>
<td>RFC</td>
<td>Royal Flying Corps</td>
</tr>
<tr>
<td>RGA</td>
<td>Royal Garrison Artillery</td>
</tr>
<tr>
<td>RHA</td>
<td>Royal Horse Artillery</td>
</tr>
<tr>
<td>RN</td>
<td>Royal Navy</td>
</tr>
<tr>
<td>rpg</td>
<td>rounds per gun</td>
</tr>
<tr>
<td>SC</td>
<td>Staff Captain</td>
</tr>
<tr>
<td>Sgt</td>
<td>Staff Sergeant</td>
</tr>
<tr>
<td>SMLE</td>
<td>Short Magazine Lee Enfield</td>
</tr>
</tbody>
</table>
SMTO  Senior Mechanical Transport Officer
SOD    Secretary of Defence
SSC    Secretary of State for Colonies
S/Sgt  Staff Sergeant
t      Tonnes
US     United States of America
VC     Victoria Cross
WO     War Office or Warrant Officer
Bibliography and Sources

Unpublished government records

*Australian Archives Files, Melbourne*

CRS B539   AIF Series Correspondence Files

*Australian War Memorial Files, Canberra*

AWM4      AIF Unit War diaries
AWM10     AIF Headquarters files
AWM16     Australian War Records Section files
AWM25     Written Records, 1914-1918
AWM26     Operation Records, 1914-1918
AWM27     Medical Records, 1914-1918
AWM38     Records of Official Historian C.E.W. Bean
AWM40     Records of Official Historian H.S. Gullett
AWM45     Copies of British War Diaries
AWM51     Confidential Records
AWM224    Manuscripts
**Personal records and papers**

*Australian War Memorial Files, Canberra*

1DRL264  Personal Papers of Major General H.E. Elliott

2DRL030  Personal Account by Corporal C. Smith

2DRL513  Personal Papers of Major General H.E. Elliott

3DRL2316  Personal papers of General John Monash

3DRL5035  Memoir of Private AA. Barber

PR85/151  Letter by Private R.G. Hamilton

**Unpublished works**


**Australian Army publications**

*AIF Orders*  A bound copy of all AIF orders can be found in the Australian War Memorial


*Australian Imperial Force. Staff, Regimental and Graduation Lists of Officers, 22 September 1914*

*Australian Imperial Force. Staff, Regimental and Graduation Lists of Officers, 6 December 1914*

*Field Service Regulations Part I: Operations, 1909*

Staff and Regimental Lists of the Australian Military Forces 1st January 1914

War Establishments of the Australian Military Forces 1912, Government Printer, Melbourne, 1912

British Army Publications

Field Service Regulations, Army Council, War Office, 1912

United States Army publications

Machinegun 7.62mm M60, FM 23-67, 1964
Books


Bassett, Jan, *Guns and Brooches: Australian Army Nursing from the Boer War to the Gulf War*, Oxford University Press, South Melbourne, 1997


Bean, C.E.W., *The Official History of Australia in the War of 1914-1918. Volume IV: The AIF In France 1917*, Sydney, Angus and Robertson, 1929

Bean, C.E.W., *The Official History of Australia in the War of 1914-1918. Volume V: The AIF In France During the Main German Offensive 1918*, Sydney, Angus and Robertson, 1933

Bean, C.E.W., *The Official History of Australia in the War of 1914-1918. Volume VI: The AIF In France: During the Allied Offensive, 1918*, Sydney, Angus and Robertson, 1942


Bean, C.E.W., *Two Men I Knew: William Bridges and Brudenell White Founders of the AIF*, Sydney, Angus and Robertson, 1957


Bloch, I. S., *Is War Now Impossible?*, London, Grant Richards, 1899


Butler, A.G., *The Australian Army Medical Services in the War of 1914-1918. Volume II: The Western Front*, Melbourne, Australian War Memorial, 1940


Crowell, Benedict and Wilson, Robert Forrest, *The Armies of Industry*, Englewood, New Jersey, Yale University Press, 1921


Cutlack, F.M., *The War Letters of General Monash*, Sydney, Angus and Robertson, 1934


Falls, Cyril, *Military Operations: France and Belgium, 1917, the German retreat to the Hindenburg Line and the Battles of Arras*, London, MacMillan, 1940


Halpern, Paul G., *A Naval History of World War I*, Annapolis, Maryland, Naval Institute Press, 1994


Johnson, Hubert C., *Breakthrough! Tactics, Technology and the Search for Victory on the Western Front in World War I*, Novato, California, Presidio, 1994


Joynt, W.D., *Saving the Channel Ports 1918*, North Blackburn, Victoria, Wren, 1975

Joynt, W.D., *Breaking the Road for the Rest*, South Yarra, Victoria, Highland House, 1979

Keown, A.W., *Forward With the Fifth: the story of five years' war service, Fifth Infantry Battalion, A.I.F*, Melbourne, Specialty Press, 1921


Lawrence, Cyril, *Sergeant Lawrence Goes to France*, Carlton, Victoria, Melbourne University Press, 1987
Lindsay, Neville, *Equal to the Task, Volume I: The Royal Australian Army Service Corps*, Kenmore, Queensland, Historia, 1992


Rule, E.J., *Jacka's Mob*, Sydney, Angus & Robertson, 1933


Samuels, Martin, *Doctrine and Dogma: German and British Infantry Tactics in the First World War*, New York, Greenwood Press, 1992

von Sanders, Liman, *Five Years in Turkey*, Annapolis, Maryland, United States Naval Institute, 1927

Scott, Ernest, *The Official History of Australia in the War of 1914-1918. Volume XI: Australia During the War*, Sydney, Angus and Robertson, 1936


Smith, Merritt Roe and Marx, Leo, *Does Technology Drive History? The Dilemma of Technological Determinism*, Cambridge, Massachusetts, Massachusetts Institute of Technology, 1994

Steel, Nigel and Hart, Peter, *Defeat at Gallipoli*, London, MacMillan, 1994


Terraine, John, *The Smoke and the Fire*, London, Leo Cooper, 1992

Travers, Tim, *How the War was Won*, London, Routledge, 1992

Travers, Tim, *The Killing Ground: The British Army, the Western Front and the Emergence of Modern Warfare 1900-1918*, London, Routledge, 1993


Winter, Denis, *25 April 1915: The Inevitable Tragedy*, St Lucia, Queensland, University of Queensland Press, 1992


Articles


Crumlin, Joe, "In the Steps of the 4th Brigade", *Journal of the Australian War Memorial*, No. 16, April 1990, pp. 39-43


Mordike, John, "The Story of Anzac: a New Approach", *Journal of the Australian War Memorial*, No. 16, April 1990, pp. 5-17

Ray, Pam, "A Photographic Record of an Australian Nursing Sister", *Journal of the Australian War Memorial* No. 18, July 1991, pp. 63-65
