

5. Messines and Third Ypres

For the BEF, most of the second half of 1917 would be consumed in an attempt to drive to 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

¹ British Second Army G288, 21 April 1916, AWM51 53, pp. 1,6,57

² Monash Papers, 8 May 1917, AWM 3DRL2316/24

³ British Second Army Magnum Opus Circulars No. 19 "Water Supply", No. 26 "Burial of the Dead", No. 36 "Anti-Aircraft", No. 40 "Tanks", May 1917, AWM26 193/29

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.¹¹ 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.¹² 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.¹³

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.¹⁴

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.¹⁵ 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.¹⁶

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.¹⁷ 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

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

¹⁸ CMGO II Anzac Corps, "Report on the Actions of Machine Guns in the Attack on Messines Ridge", 20 June 1917, AWM26 193/4

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 Messines²⁸

1 to 12 June 1917

	Strengths		Casualties		Percentage Casualties	
	Officers	ORs	Officers	ORs	Officers	ORs
1 to 6 June						
Field Artillery	3,065	82,558	78	591	2.5%	0.7%
Heavy Artillery	1,270	32,870	32	363	2.5%	1.1%
Machine Guns	462	7,185	6	77	1.3%	1.1%
Infantry	6,095	150,470	90	1,621	1.4%	1.1%
Other	n/a	n/a	11	240	n/a	n/a
7 to 12 June						
Field Artillery	3,212	86,514	79	667	2.4%	0.8%
Heavy Artillery	1,336	34,578	18	454	1.3%	1.3%
Machine Guns	407	6,558	78	689	19.1%	10.5%
Infantry	5,980	148,506	803	17,543	13.4%	11.8%
Other	n/a	n/a	12	297	n/a	n/a

In creating an Australian version of Vimy Ridge, the 3rd Division lost 4,122 men and the 4th Division 2,677.²⁹ 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.³⁰ 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.

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.³¹ 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.³² 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

³¹ Lupfer, Leavenworth Papers No. 4, "The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War", pp. 12-13

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.³³ I Anzac Corps, then resting and practicing open warfare after Bullecourt, was not available to spearhead the attack.³⁴ 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.³⁵

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.³⁶ 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.³⁷

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.³⁸ The worry for Haig was whether the object of the campaign could be achieved with such small advances.³⁹ 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

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: *The AIF in France: 1917*, pp. 702-703

⁴¹ Nursing Sisters Dorothy Gwendolen Cawood, Clare Deacon and Alice Ross-King and Staff Nurse Mary Janes Derrer. Bassett, Jan, *Guns and Brooches: Australian Army Nursing from the Boer War to the Gulf War*, Oxford University Press, South Melbourne, 1997

⁴² Butler, II: *The Western Front*, p. 188; Bean, IV: *The AIF in France: 1917*, p. 704.

⁴³ Bean, IV: *The AIF in France: 1917*, p. 681; Bassett, *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, *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.⁴⁵ 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.⁴⁶

Wagon drivers were shelled on the well-known roads and tracks they used to bring ammunition up to the batteries.⁴⁷ 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.⁴⁸

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.⁴⁹ The barrage was a textbook one; dense, and regular and capable of being followed closely.⁵⁰ 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.⁵¹ There was also the usual searching and back

⁴⁵ AWM224 Items MSS81, MSS82

⁴⁶ McNicoll, *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.⁵² 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.⁵³ The infantry later praised the work of the machine gunners, having found dead Germans who had evidently been killed by the machine gun barrage.⁵⁴

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.⁵⁵ 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.⁵⁶

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.⁵⁷ 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.⁵⁸

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.⁵⁹ 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.⁶⁰

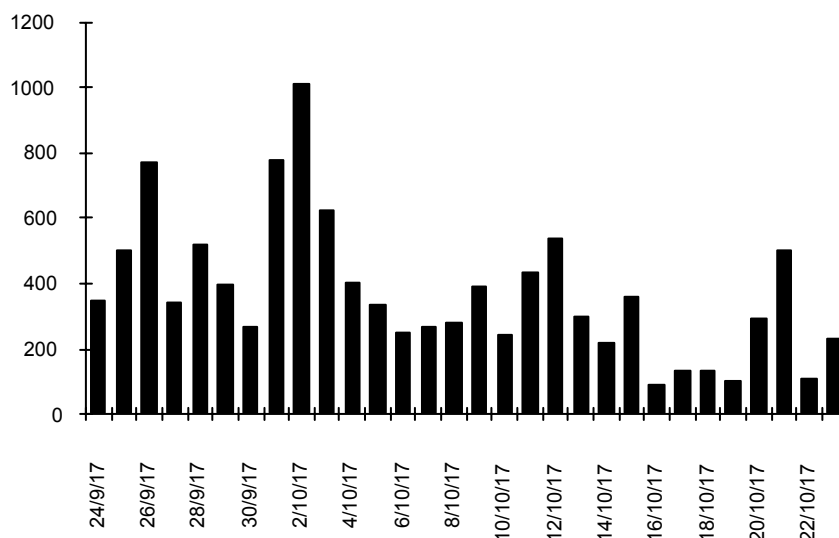
⁵⁷ Major General H.B. Walker, 23 September 1917, AWM26 220/10

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

British Second Army Light Rail Track Breakages in metres
(24 September 1917 to 23 October 1917)⁶¹



Roads and water supply pipelines were constantly cut and required an ever larger percentage of the available men to repair them.⁶² 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.⁶³ Such heavy demand meant that both drivers and trucks were working long hours.⁶⁴ 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.⁶⁵

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.⁶⁶ 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

⁶¹ British Second Army Light Railways Reports on Breakages, 24 September 1917 through 23 October 1917, AWM26 Items 211/7, 211/8, 211/9

⁶² War Diary I Anzac CE, 1-17 October 1917, AWM26 225/10

⁶³ War Diary I Anzac SMTO, 11 September 1917, AWM26 227/20

⁶⁴ War Diary I Anzac SMTO, 12 September 1917, AWM26 227/20

⁶⁵ BGHA I Anzac Corps to GOCRA I Anzac Corps, 13 October 1917, AWM26 224/14

⁶⁶ Bean, IV: *The AIF in France: 1917*, pp. 792-795

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

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.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.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 Broodseinde 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.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.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.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.⁷⁷ I Anzac Corps Heavy Artillery did carry out an unusual experiment in having twelve 60 pounders towed into

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

⁷³ BGGs II Anzac Corps, "II Anzac Instructions for the Offensive, No. 4", 3 October 1917, AWM26 229/21

⁷⁴ Bean, IV: *The AIF in France: 1917*, p. 831

⁷⁵ Rain fell on 4, 5, 8, 9, 10, 11, 12 and 13 October 1917. War Diary, SMT0 I Anzac Corps, AWM26 227/23 and 227/24

⁷⁶ Bean, IV: *The AIF in France: 1917*, p. 903

⁷⁷ BGHA I Anzac Corps to GOCRA I Anzac Corps, 13 October 1917, AWM26 224/14

position by tanks.⁷⁸ Ammunition, no less a problem, became coated with mud and unusable until cleaned.⁷⁹ 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.⁸⁰ 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.⁸¹ 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,⁸² 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,⁸³ 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.⁸⁴

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 Pozieres 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.⁸⁵

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,⁸⁶ 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

⁷⁸ BGRA I Anzac Corps to I Anzac Corps, 12 October 1917, AWM26 224/14

⁷⁹ Bean, IV: *The AIF in France: 1917*, pp. 905-906

⁸⁰ Hyatt, *General Sir Arthur Currie*, p. 82

⁸¹ GOCRA I Anzac Corps, "Artillery Instructions No. 124", 12 September 1917, War Diary of GOCRA I Anzac Corps, AWM4 13/4/1

⁸² Burgess was a New Zealand regular army officer who had joined the AIF in 1914 while on exchange in Australia. He had assumed command of the 4th Division Artillery in August 1917.

⁸³ Brigadier General W.L.H. Burgess to GOC 4 Division, 12 October 1917, AWM26 257/13

⁸⁴ Hyatt, *General Sir Arthur Currie*, p. 82

⁸⁵ Butler, II: *The Western Front*, pp. 180, 864

⁸⁶ "Mustard Gas found in German Shell", 12 July 1917, AWM25 21/15

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 discomfort but nonetheless was as toxic as phosgene. Although the Standard Box Respirator was sufficient protection against the gas,⁸⁷ 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,⁸⁸ while it could remain on the ground, poisonous and dangerous for up to 72 hours.⁸⁹ 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.⁹⁰ The first use against Australian troops was against the Siege Brigade on 10 July 1917.⁹¹

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, diphenylcyarsine 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.⁹²

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.⁹³ 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

calculated that one Australian casualty was caused for every 15 shells fired, making gas a very efficient form of harassment.⁹⁴

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.⁹⁵ Casualty evacuation was of course no less difficult than resupply and the ratio of killed to wounded increased from 1:4.2 to 1:2.7.⁹⁶

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.⁹⁷

⁹⁴ Chemical Adviser, Australian Corps, 4 October 1918, AWM26 501/8

⁹⁵ British Second Army, "Second Army Summary of Operations During Period 5th October to 12th October 1917", AWM26 274/6

⁹⁶ Butler II: *The Western Front*, pp. 235-236, 244-245

⁹⁷ Bean, IV: *The AIF in France 1917*, p. 936