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Montbrehain: Artillery Tactics, Techniques and Procedures

Strategic Context

Following the success of the attacks at Soissons and Amiens in July and August 1918, the Allied powers began a sustained advance all along the Western Front that recaptured the German gains of the Spring Offensives and brought them within striking distance of the Hindenburg Line defences. Beginning on 26 September, four major attacks involving 130 divisions from Verdun to the North Sea aimed to rupture the German defensive lines and achieve victory in 1918.[1] The British Fourth Army attacked on 29 September with the Australian Corps, reinforced by two American divisions, taking the lead in breaking the Hindenburg Line between Bellenglise and Vendhuille. The 2nd Australian Division next came into action and captured the Beaurevoir Line, the last fortified position standing between Fourth Army and open country. Due for relief, 2nd Division planned a final attack by the 6th Australian Infantry Brigade to capture the village of Montbrehain on 5 October.

Solving the gunnery problem: 1918

A significant factor in the Allied success was their mastery of the gunnery problem, or how artillery located themselves, their targets and applied the necessary calculations to successfully engage the enemy.[2]

Component	**How achieved**
Know location of firing unit	survey mapping
Determine location of the target	flash spotting sound ranging aerial observation intelligence compilation
Determine vertical interval and site	survey mapping
Compensate for nonstandard conditions	meteorological telegrams
Convert chart data to firing data	calibration artillery board
Apply firing data to weapons	crew drills tactics techniques and procedures

The solution to the gunnery problem meant that British artillery could use predicted shooting, or firing at a computed location, rather than ranging, which relied on observers to adjust fire onto a target. Predicted shooting allowed for fire plans that neutralised enemy infantry and artillery without lengthy bombardments or registration, both of which telegraphed intentions and thus precluded surprise attacks.

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[1] Harris, John Paul, and Niall Barr, *Amiens to the Armistice: The BEF in the Hundred Days' Campaign 8 August-11 November 1918*, London, Brassey's, 1998, pp. 183-199.

[2] Headquarters, US Army Training and Doctrine Command, *FM 6-40/MCQP 3-16.4 Tactics, Techniques and procedures for Field Artillery Manual Cannon Gunnery*, Headquarters, Department of the Army and U.S. Marine Corps, Washington D.C., 1996. https://www.globalsecurity.org/military/library/policy/army/fm/6-40/Ch1.htm#p1

The gunnery problem: Survey and Mapping

The foundation to solving the gunnery problem lay in survey. By 1918, the Western Front was extensively surveyed, with a gridded coordinate system and standardised large-scale maps. The most common maps were 1:20,000 for artillery and operational planning and 1:10,000 for the infantry and field artillery. The fundamental feature of accurate mapping was a precise trigonometrical framework. Officers from the field survey units, and from 1917, Corps Topographical sections could then determine the location of a battery in relation to this framework by plane table resection and other methods. From 1916, bearing pickets, which were marked points from which bearings to several conspicuous points had been determined, were used to lay in batteries for line, which was horizontal plane of aiming. After 1915, batteries were provided with an artillery board, which was a map mounted on a board that graphically showed the positions of the guns, arcs of fire and other data. Artillery boards helped batteries correctly measure distance and bearing between gun and target while eliminating errors caused by map distortion in changing environmental conditions. These techniques vastly improved the accuracy of artillery fire, but required hours or days of work depending on the skill of the surveyor, availability of trig points and tactical factors. In open warfare, batteries often displaced too rapidly to be provided with any of these products.[3]

The gunnery problem: sound ranging, flash spotting, calibration and meteor

The sound ranging and flash spotting sections were part of field survey units and used to locate enemy units. A typical observation group had four survey posts that covered a corps frontage and were situated according to the terrain to be able to spot the muzzle flashes of enemy guns. Survey posts were coordinated at group headquarters by a flash and sound buzzer board that ensured that posts were oriented on the same flash.

Complementing flash spotting were sound ranging sections, which consisted of six microphones positioned in an arc between 7000 and 9000 yards in length and about 3000 yards behind the line. The microphones were attuned to the low frequency report of a gun sound wave, with an effective range of about 12,000 yards. The time difference of the report reaching each microphone was correlated at the section headquarters and the gun location plotted. Sound ranging could determine the calibre of the enemy gun and its target, which was useful for collating hostile battery information. Sound ranging and flash units were difficult to move quickly, with the former requiring up to 48 hours to get into action. Sound ranging was impossible when the wind was blowing toward enemy guns.

By 1917, the sound ranging apparatus was also used with calibration screens to determine muzzle velocity, droop and jump of artillery which increased accuracy and allowed groupings of similarly worn guns, simplifying calculations. Meteorological data including temperature, humidity and wind was issued to units starting in 1916 and by

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[3] Chasseaud, Peter, *Artillery's astrologers: a history of British survey & mapping on the Western Front 1914-1918*, Lewes, England, Mapbooks, 1999; Geographical Section, General Staff, War Office, *Report on Survey on the Western Front 1914-1918*, London, HMSO, 1920; General Staff, War Office, *Maps and Artillery Boards*, Second Edition, London, HMSO, 1918.

August 1918, seven telegrams were issued per day to allow for the meteorological 'correction of the moment.'[4]

The gunnery problem: Royal Air Force

Aerial support was essential in solving the gunnery problem. First, air superiority was a prerequisite for the corps squadrons to function. The corps squadrons provided aerial photographs behind enemy lines for both tactical and for mapping purposes. Artillery patrols could register artillery and observe for destructive and neutralisation shoots. This relied on a combination of wireless transmission by aircraft and ground panels from batteries. The zone call square and clock code were innovations to work within the limited transmission bandwidth. Aerial reconnaissance worked to reconcile other intelligence sources, but adverse weather that restricted flying significantly hindered artillery operations.[5]

The gunnery problem: artillery organisation and counter battery

Along with technical innovations, the organisation of British artillery underwent several revisions during the war. In December 1916, the field artillery was reorganised into divisional and Army Field Artillery (AFA) Brigades. Each division would have two brigades of four batteries, three of 18-pounders and one of 4.5-inch howitzers under the Commander, Royal Artillery (CRA). The AFA brigades were identical in organisation and allocated to armies and corps as necessary to provide additional firepower. This flexibility was also adopted by the Royal Garrison Artillery (RGA) brigades, who by 1918 were also organised by brigades into mobile, howitzer, and mixed brigades, along with ten Army Brigades that controlled 6-inch guns, 12-inch howitzers and railway guns. The standardised brigades facilitated control by providing a stable command structure and reduced unnecessary detachments of batteries. Multiple brigades were often grouped together under a CRA or brigade commander which reduced the number of subordinates the commander had to control directly.[6]

The artillery chain of command evolved along with the reorganisation of brigades. The growth of field and heavy artillery necessitated commanders at corps and army levels to coordinate fire support for operations. The last major reorganisation in December 1916 provided a General Officer Commanding, Royal Artillery (GOCRA) at army and corps levels, the latter a brigadier general. A second brigadier was Commander, Heavy Artillery (CHA or BGHA – Brigadier General, Heavy Artillery) who was subordinate to the GOCRA at Corps. A GSO1 (General Staff Officer Grade 1) was appointed to coordinate counter battery fire and became known as the CBSO (Counter Battery Staff Officer). In 1918, the CBSO typically controlled nearly two thirds of the heavy artillery for counterbattery operations. He was assisted by a staff office at corps that integrated intelligence from sound ranging, flash spotting, aerial reconnaissance and other methods and produced a hostile battery list for targeting. The CBSO worked

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[4] Farndale, Martin, *History of the Royal Regiment of Artillery: Western Front 1914-1918*, London, The Royal Artillery Institution, 1986, pp. 372-379; Innes, John R., *Flash Spotters and Sound Rangers: How they lived, worked and fought in the Great War*, The Naval and Military Press Ltd, 2017; The National Archives of the UK (TNA): WO33/831 General Staff, War Office, *Sound Ranging*, 1917; Geographical Section, General Staff, War Office, *Report on Survey on the Western Front 1914-1918*.

[5] Molkentin, Michael, 'Over the Western Front: Air power and the AIF', in Jean Bou (ed.), *The AIF in battle: How the Australian Imperial Force fought 1914-1918*, Kindle edn, Carlton, Melbourne University Press, 2016.

[6] Farndale, *History of the Royal Regiment of Artillery*, pp. 348-357.

closely with the corps squadron and scheduled destructive shoots to destroy enemy artillery or neutralisations to temporarily silence guns.[7]

Montbrehain: field and heavy artillery

For the attack, the field artillery was divided into left and right groups of four brigades each. Six brigades fired the creeping barrage while two fired on suspected enemy positions.[8] The heavy artillery was divided into four counter battery and three bombardment brigades. The counter battery group would keep 17 hostile battery areas under neutralisation fire while the bombardment brigades extended the field artillery barrage.[9]

Task	Total artillery[10]
Field artillery - barrage	119
Field artillery - bombardment	41
Heavy artillery - counter battery	75
Heavy artillery - bombardment	23
Heavy artillery -army control	10

Designated batteries were tasked to answer zone calls made by artillery patrols from the 3rd Squadron, Australian Flying Corps. After the creeping barrage ceased, the field and heavy artillery would remain on standby for calls for fire from the artillery patrols, infantry and Forward Observation Officer (FOO) teams who accompanied each infantry battalion.

Montbrehain: objectives

The 6th Brigades plan of attack placed the 24th Battalion on the left and the 21st Battalion on the right. The 2nd Pioneer Battalion would follow behind the 21st Battalion and form a defensive flank facing southeast against Mannequin Hill and Doon Mill. The objective line ran north and east of Montbrehain, and if the attack by the 25th British Division to the north against Beaurevoir was successful, then the Fourth Army would have secured all of the high ground that overlooked the Beaurevoir line system.[11]

Montbrehain: the attack

The Germans suspected an attack and heavily shelled the allied rear positions during the night of 4 October. At 06.00 am, the attack against Beaurevoir commenced and at 06.05 am, the 6th Brigade stepped off against Montbrehain. The infantry reported the

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[7] Farndale, *History of the Royal Regiment of Artillery*, pp. 343-345; Palazzo, Albert P., 'The British Army's Counter-Battery Staff Office and Control of the Enemy in World War I', *Journal of Military History,* vol. 63, no. 1, 1999, pp. 55-74.

[8] AWM4 13/11/32 Headquarters, 2nd Australian Division Artillery October 1918, Part 1, Order 158, 4 October.

[9] AWM26 494/4 Final Offensive. 3-6 October 1918. Aust Corps B.G.H.A., Heavy Artillery Order No. 162. Serial Letter 'O', 4 October and Counter Battery – Australian Corps H.A. Operation Order – No 12/8, 4 October.

[10] AWM4 13/7/31 Brigadier General, 1st ANZAC Corps Heavy Artillery and Headquarters, Australian Corps Heavy Artillery October 1918, Australian Corps Heavy Artillery – Location List. 5 October 1918; AWM4 13/11/32, Part 1, Ammunition, gun and casualty returns 5/10/18.

[11] AWM4 23/6/38 Part 1 6th Infantry Brigade October 1918 Appendices, Report on Operations of 6th Aust. Inf. Brigade for period 2nd October to 6th October, 1918, 12th October 1918, pp. 5-6.

creeping barrage as ragged and falling short, causing casualties in the leading companies. The German counter barrage, in a new development, tracked the infantry as they made their way into the village. Despite these difficulties, the attacking Australians were on their objectives by 09.00 am. However, the Germans soon counterattacked and pushed the Australians back through the village. Aerial, infantry and artillery observers all directed heavy fire on Doon Mill southeast of Montbrehain and on German infantry forming up north and northeast of the village. This support frustrated their attempts to push the Australians further back and the 6th Brigade was able to stabilise their line at the outskirts of the village. The Australians consolidated in these positions and were relieved by the 118th Regiment of the 30th American Division, which ended the last battle of the Australian infantry in the war.[12] Overall, the artillery likely prevented the German counterattacks from succeeding.

Solving the gunnery problem: Montbrehain

The battle of Montbrehain shows both the tremendous progress made in solving the gunnery problem and the limitations in communications and mobility that still hindered operations. As the Australian Corps broke through the Hindenburg Line, the tempo of operations increased to what has been termed 'semi-open' warfare.[13]

The field and heavy artillery supporting Montbrehain had accurately surveyed and abundant maps provided by the corps topographical section, but due to the speed of advance, survey support for batteries in the form of artillery boards, bearing pickets and plane table resections were unavailable and batteries had to revert to their own methods to lay in for line and determine the vertical intervals in their areas. The Australian field artillery had all been calibrated before the battle of Amiens, and meteor telegrams were available to provide the environmental correction of the moment.

The intelligence organisation utilised sound ranging, flash spotting, aerial observation and the input from artillery and infantry observers to identify enemy target locations, particularly in the form of hostile battery lists. The advance had left behind the sound ranging sections and the primary target location was via artillery patrols from the corps squadrons, which functioned virtually unhindered as a result of the British air superiority. Zone calls and the clock code made the best use of the limited wireless capacity to provide ranging for batteries and rapid neutralisation of enemy batteries that threatened the Australian infantry.

Solving the Gunnery Problem: Conclusions

The solutions to the gunnery problem were still optimised for static warfare, even if they had made great strides in mobility from 1917. The improvements in survey, aerial observation and collation of artillery intelligence via the CBSO allowed for predicted shooting that retained surprise and increased accuracy. The solutions to the gunnery problem were a significant factor in the British victory in 1918.

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[12] AWM4 23/6/38 Part 1, Report on Operations of 6th Aust. Inf. Brigade for period 2nd October to 6th October, 1918, 12th October 1918, pp. 7-12.

[13] Boff, Jonathan, *Winning and losing on the Western Front: the British Third Army and the defeat of Germany in 1918*, Cambridge Military Histories, edited by Hew Strachan and Geoffrey Wawro, Kindle edn., Cambridge, Cambridge University Press, 2012, kindle locations 1180-1195.