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Fire Plan: The Canadian Army’s Fire Support System in Normandy

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The Canadian Army’s Fire Support System in Normandy

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Abstract: Consigned initially to a decentralized and limited tactical role, the fire support organizations of British and Canadian armies experienced exponential growth during the initial stages of World War II. By D-Day, fire support had become a critical enabler of Anglo-Canadian combat operations and artillery units were numerous, networked, and efficient. Facilitating successful tactical manoeuvre was the goal of the fire support system. This article will explore the ‘ways’ and ‘means’ of that system – the people, procedures, resources, and organizations that combined to produce the devastating battle-winning fire support that contributed to tactical success.

The contribution of the artillery to final victory in the German war has been immense. This will always be so; the harder the fighting and the longer the war, the more the infantry, and in fact all the arms, lean on the gunners. The proper use of artillery is a great battle-winning factor.¹

At the outbreak of the Second World War, British and Canadian fire support doctrine focussed on decentralised fire units supporting fluid, highly-mobile, infantry and tank manoeuvres. The disastrous Anglo-French campaign in France in May 1940 and subsequent British reversals during the opening stages of the Desert Campaign in North Africa demonstrated the weakness


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of this doctrine. Once the Allies halted the expansion of German forces and assumed the strategic offensive, thanks in no small part to a marked increase in deployed artillery assets, German skill at defensive operations forced the Anglo-Canadian armies to adopt an offensive tactical doctrine predicated on massive fire support. By the close of the Desert Campaign in North Africa in 1943, the pendulum of tactical doctrine had swung from a focus on manoeuvre to a focus on firepower. So fundamental was fire support to Allied battlefield success, the tactical doctrine employed by the Canadian Army in 1944 was, essentially, artillery-based.\(^2\) Thrust into this predominant role, the fire support organisations in the British and Canadian armies experienced exponential growth. By the start of the Normandy Campaign in June 1944, Anglo-Canadian artillery units were numerous, networked, and efficient.

While the ends that were furnished by the artillery of the Anglo-Canadian armies are generally well known, the ways and means of the fire support system are less so. Most historical works of Anglo-Canadian operations in Normandy focus almost exclusively on the manoeuvre element, the infantry and armour formations of the 21st Army Group. Detailed surveys of the fire support hierarchy and how it was employed are wanting. The exceptions are artillery-specific works such as, but not limited to, Colonel G.W.L. Nicholson’s official history of the Royal Canadian Artillery, *The Gunners of Canada*; Major-General J.B.A Bailey’s *Field Artillery and Firepower*; Brigadier Shelford Bidwell’s *Gunners at War*, and *Fire-Power, The British Army Weapons & Theories of War 1904–1945* (the latter with Dominick Graham); and of course George Blackburn’s excellent trilogy of first-hand accounts *Where the Hell are the Guns?*, *The Guns of Normandy*, and *The Guns of Victory*. While not exclusively artillery-based, retired Canadian artillery officer Brian A. Reid’s chapter entitled “Bullets and Bombs – The Fire Plan” in *No Holding Back, Operation Totalize, Normandy, August 1944*, is also instructive, although he does not delve into any great detail at the lower levels of the fires support organisation. Each of these worthy historical works only scratch at the surface of fire support tactics, techniques, and procedures: How was the artillery organised? How were fire plans and barrages planned and executed? How were

\(^2\) Terry Copp, *Fields of Fire, the Canadians in Normandy* (Toronto: University of Toronto Press, 2003), 29.
they controlled once the infantry crossed the start line? This article will attempt to shed light on the practices and procedures of the artillery organisation that delivered the all-important battle-winning fire support to the Canadian Army. It will begin with a review of the organisational structure of the artillery units and formations of the First Canadian Army, and then illustrate the processes and procedures that went into developing fire support plans. Finally, using the 6th Canadian Infantry Brigade’s attack on Verrieres Ridge on 19 July 1944 as a case study, this paper will demonstrate how the theory of fire support was put into practice. In doing so, this paper will provide a workable understanding of the fire support system employed by the Canadian Army in northwestern Europe that is not impenetrably technical.

THE ARTILLERY SYSTEM: FROM TROOP TO CORPS

While this paper will focus on the elements that provided indirect surface-to-surface fire support, it is important to note that the artillery organisation also included anti-aircraft and anti-tank artillery units. As their names imply, the former prevented the German Luftwaffe from interfering in Canadian manoeuvres, while the latter provided anti-tank fire support to defeat German armour (see Figure 1). These elements, combined with the field and medium artillery, which are the focus of this paper, constituted an immense fire support hierarchy within the Anglo-Canadian field armies. Obviously the roles and duties that existed within such a vast organisation were many and varied, thus our starting point will be the common denominator amongst all ranks of the artillery, the gun.

The most abundant of field artillery pieces in the Anglo-Canadian arsenal in the spring of 1944 was the venerable 25-pounder howitzer.

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3 Field artillery was of smaller calibre consisting of the 25-pounder (88 mm) howitzer, while medium artillery was of larger calibre, specifically the 4.5-inch and 5.5-inch howitzers.
4 All artillery personnel, regardless of rank, are referred to, colloquially, as “gunners.” Whereas infantrymen are referred to as “privates,” or “riflemen” depending on the proclivities of their individual regiments, the term “gunner” is also used as the official title of the lowest-ranking members of the artillery. The term “gun” itself, while having a specific technical definition, has nonetheless come to represent any manner of field piece employed by the artillery. For these reasons, in this article, the terms “gun” and “howitzer” will be used interchangeably.
The 25-pounder weighed 4,032 pounds and was capable of engaging targets in a 360-degree rotation due to an attached baseplate that, when lowered, allowed the gun to be rotated by the crew without displacing it. The range of the gun was impressive, it could fire its eponymous twenty-five-pound high-explosive projectile to a range of 13,400 yards, and a smoke shell up to 11,000 yards.\(^5\) Doctrinally the “normal” rate of fire was three-rounds per minute; however, when not constrained by orders to adhere to a specific rate, a well-trained crew produced an impressive volley of fire in a short period, limited only by their efficiency and level of fatigue. The achievable rate of fire was so high that George Blackburn, an officer with the 4th Field Regiment, Royal Canadian Artillery (r\(\text{CA}\)) reported that two captured German soldiers asked permission to see the “automatic gun.”\(^6\)

The gun was operated by a detachment. Commanded by a sergeant, it consisted of a total of six personnel whose responsibilities were to deploy, maintain, aim, and fire their gun on orders issued by

the gun position officer (gpo). The gun detachment members were
known as “numbers” with each of the six men having a number that
dictated their role in the detachment while also serving as a de facto
title: the number one was the detachment commander; the number two
operated the breech mechanism; the number three set the elevations
and bearings on the sites, elevated and traversed the barrel, and fired
the gun; the number four loaded the gun; and the numbers five and
six cared for, prepared, and supplied the ammunition to number four
for loading. Of course these were doctrinal duties and the detachment
commander would, from time to time, rotate individuals from one
position to another to manage crew rest and provide soldiers for local
protection duties.8

Tactical movement of the gun was provided by the gun tractor,
specifically, the Morris four-wheel-drive field artillery tractor, branded
colloquially by the gunners as the quad due to its four-wheel drive
capability.9 The quad towed a square, box-like ammunition trailer,
by 1944 the number 27 artillery trailer, that was positioned between
the quad and the gun during movement and was used to store and
transport thirty-two rounds of ammunition and propellant charges.10

In addition to the field artillery regiments, the Canadian Army also
fielded a number of medium artillery units and formations as well. In
the medium artillery, Canadian gunners manned one of two different
pieces; a 4.5-inch howitzer that fired a 55-pound projectile up to a
range of 20,000 yards, and a 5.5-inch howitzer that fired a 100-pound
projectile to a range of 16,000 yards.11 Medium artillery batteries and
regiments were allocated to higher echelon commands, such as corps
and army, and were used to supplement the fire of divisional field

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7 UK War Office (WO), GS Publications 859, Artillery Training Volume III: Field
Gunnery. Pamphlet No. 3 Part 1—Fire Discipline and Observation of Fire (London:
War Office, 1942), 3.
8 UK WO, GS Publications 2251, Gun Drill for QF 25-PR Gun, Marks 2/1, 3/1 and
9 Shelford Bidwell, Gunners at War (London: Arrow Books Ltd, 1972), 104.
10 Doug Knight, The 25-Pounder in Canadian Service (Ottawa: Service Publications,
2005), 6. The 25-pound projectile was a “semi-fixed” projectile meaning it consisted
of a projectile that was mated with a cartridge that had a number of charges which
could be kept or removed to vary the muzzle velocity of the round and thus achieve
different ranges and different angles of fire.
11 Leslie W.C.S. Barnes, Canada’s Guns An Illustrated History of Artillery (Ottawa:
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The British artillery included in its order of battle regiments of heavy artillery sporting 7.2-inch guns and larger, but the Canadian Army did not include these in its fire support organisations, although from time to time British heavy artillery units would be attached to Canadian artillery formations for specific operations.13

A moment must be taken to discuss an item of extreme importance to the fire support system: the artillery projectile. It may seem counter-intuitive, but the weapon of the artillery is not the gun, which is simply a delivery system, but is, in actuality, the projectile which is responsible for producing the desired effect on the target.14 Artillery fire produces a number of different effects upon its targets, neatly summed up as suppression, neutralisation, and destruction. Different armies have defined these terms in manners that vary slightly, but the overall sense remains consistent: suppressing and neutralising fire prevent the enemy from moving, observing, or

13 Ibid., 111.
manning his equipment. The degree to which this is accomplished accounts for the difference between the two terms, the latter implying a slightly longer duration of the effect accompanied by a somewhat greater impact on materiel, while the former is fleeting and mostly psychological.15 Brigadier Shelford Bidwell, a British Second World War veteran who commanded a field battery of the Royal Artillery in both North Africa and Northwest Europe, described artillery’s neutralization effects thusly:

[artillery fire] would kill the bolder riflemen and machine-gunners and frighten the rest, throw dirt in their faces, blind them with smoke, damage their weapons and drive them to the bottom of their trenches or into their dug-outs until the attackers were on top of them.16

The effect of destruction, as the term implies, involved the physical destruction of materiel and enemy personnel, and was best achieved by long sustained bombardments which were costly in both time and resources.17

In addition to the high explosive rounds, the gunners also employed a number of specialty munitions, such as smoke and illumination projectiles, that produced unique effects on the battlefield. As their names imply, smoke projectiles produced a smoke screen that blinded the enemy and screened friendly manoeuvres, while illumination rounds ejected a parachute-equipped phosphorus flare at the apogee of their trajectory that lit up the battlefield and allowed friendly forces to observe the enemy during periods of darkness. In addition to these two specialty munitions, projectiles designed to be used in the direct-fire role against attacking tanks, known as armour-piercing shot, were available for the local defence of the gun position.18

Despite being deployed several kilometres behind the front line, the artillery was nonetheless subject to the threat of an infantry or tank attack on the gun position, thus local defence from ground and air attack was a critical factor in determining the appropriate location of the gun position. In addition to the armour-piercing shot for the 25-pounders, each battery also had anti-aircraft light machine

15 Ibid., 11.
16 Bidwell, *Gunners at War*, 77.
guns which were sited to the flanks to engage dive-bombing aircraft, as well as an anti-tank rifle and several Bren guns for protection from light armoured vehicles and infantry attacks respectively. In the event of an attack on the gun position, the howitzers themselves became rallying points for the defence of the battery and gunners were ordered to defend the guns “to the last man and the last round.”

Returning now to the organisational hierarchy of the artillery, two guns comprised a section and consequently the individual guns were sometimes referred to as “sub-sections.” The two guns of a section travelled in three quads—two for towing the guns and carrying the numbers one-through-four of each detachment while the third quad carried the four remaining section personnel—the numbers five and six of each gun detachment.

The two sections comprised a four-gun troop that was commanded by a troop commander, normally ranked a captain, who deployed forward of the guns as a forward observation officer (FOO). In his absence, the troop commander delegated the on-site command of the troop to the aforementioned GPO, a lieutenant, who was assisted in his duties by another junior officer, referred to as the troop leader, as well as the senior non-commissioned member of the troop, a staff sergeant or sergeant who held the position of the troop battery sergeant major (troop BSM). The hub of each troop of guns was the troop command post (CP) that was commanded by the GPO, or one of the junior officers, and manned by a team of non-commissioned personnel acting as technical assistants, and known colloquially as ‘acks.’ The CP was the technical nerve centre of the troop; it was here that the GPO and the ‘acks’ produced the firing data, such as elevations, bearings, and fuze settings, which the guns required to hit targets.

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19 UK WO, GS Publications 527, Artillery Training Volume I–Pamphlet No. 2B, RHA and Field Regiments, Battle Drill and Manoeuvre for the Reconnaissance and Occupation of Positions (hereafter Battle Drill and Manoeuvre) (London: War Office, 1941), 15. It should be noted that the guns themselves are, ceremonially, the “colours” of the Royal Regiment of Canadian Artillery. This originated in the practice of gunners rallying to the guns as their infantry brethren did to their own regimental colours. The injunction here to defend the guns at all cost was not universally followed and in France in 1940, 700 Royal Artillery field pieces were abandoned to the Germans as the British gunners evacuated from Dunkirk.

20 Ibid., 50.

21 Fire Discipline and Observation of Fire, 1. If the troop were lucky enough to have supplementary junior officers, they too would report to the GPO.

22 Blackburn, Where the Hell are the Guns?., 41.
the target. While it was possible for guns to fire in the direct role, wherein the gun detachment can see the target they are engaging, often referred to as firing *over open sites*, by the end of the First World War such practice had fallen out of favour. As the accuracy and range of rifle fire improved during the latter years of the nineteenth century, batteries were forced to seek gun positions out of sight of enemy infantry, and later tanks, in order to ensure their survival. By the end of the First World War, indirect fire, wherein the gunners could not see their target due to distance or intervening terrain, became *de rigueur*. This necessitated some manner of forward observation to locate targets and transmit their coordinates to the applicable CP where trigonometric calculations produced gun aiming data.

Two troops constituted a battery which had its own CP that was linked by telephone wire and radio to two subordinate troop CPs. The battery CP was commanded by a lieutenant called the command post officer (CPO) who was responsible for the deployment of the two gun troops of the battery. Additionally, along with his ‘acks’ called CPO/AS,

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24 For an excellent description of how the practice of direct fire was eventually replaced by that of indirect fire during the First World War see the chapter “Le Cateau” in Bidwell’s *Gunners at War*, 15–33.
he carried out the necessary fire support calculations when the fire of all eight guns of the battery was required on a single target.25

In addition to the two troops of guns and the battery CP, the battery also included support and sustainment elements such as the all-important ammunition trucks, and a ‘B’ echelon consisting of the battery quartermaster, mechanics, cooks, and all the vital supporting elements required for the battery to shoot, move, and communicate. These elements were deployed in a laager known then, as now, as the wagon lines, a term that pays homage to the hippomobile origins of the artillery. In addition to these support elements, the gun-tractor quads also moved to the wagon lines after dropping the guns off at their firing positions.26

Ammunition resupply was a critical factor in the provision of fire support; naturally, as the demand for fire increased, the need for vehicles to resupply the firing batteries did as well. Most ammunition resupply was the responsibility of the Royal Canadian Army Service Corps, especially in the delivery of ammunition from division, corps, and army ammunition dumps. However, within a field artillery regiment each battery was allocated four 3-ton ammunition lorries to pull ammunition from forward dumping areas to the battery positions. Three of these vehicles carried ammunition, dividing a total of 480 rounds between them, while the fourth vehicle carried camouflage stores and petrol. Although these ammunition vehicles belonged to the battery, they were normally grouped at the regimental level under the direction of the regimental quartermaster sergeant and used as a single regimental ammunition group.27

The battery was the principal fire unit of the fire support organisation.28 In command of this robust organisation was the battery commander (BC) who held the rank of major. During operations, the battery commander delegated the hands-on command of the battery to his second-in-command, the battery captain, whilst he established an observation post and provided artillery advice to the infantry

25 UK WO, _Battle Drill and Manoeuvre_, 5.
26 Ibid., 48–50.
27 Ibid., 4, 8, 38. There were no ammunition lorries allocated to an artillery regiment, only the batteries.
28 Ibid., 1.
battalion commander.\textsuperscript{29} The battery captain was responsible for the deployment and administration of the whole of the battery including the gun groups and the echelon elements. On behalf of the battery commander, the battery captain deployed the battery in accordance with the orders of the regimental second-in-command (Regt 2IC).

At the outbreak of the war, each artillery regiment consisted of two, twelve-gun batteries, the legacy of an ill-conceived restructuring of the Royal Artillery (RA) in 1938 and subsequently adopted by the RCA.\textsuperscript{30} This structure, adopted with almost no input or advice from artillery leadership, complicated what was then, and remains today, a critical element of the artillery system: the provision of fire support coordination and advice to the manoeuvre arm commander.\textsuperscript{31} Naturally, the two-battery organisation did not align with the three-battalion structure of an infantry brigade, which resulted in the deplorable situation of an infantry battalion commander left without artillery advice and coordination. While bcs and foos could be moved from battalion to battalion as required, this practice did not allow for the development of the high degree of team cohesion and implicit trust that is necessary in combat operations and which only comes with routine and prolonged interaction. The implications of this oversight were readily apparent during the disastrous operations of the British and French armies during the German attack into France in 1940. Consequently, in December of that year, the organisational structure of a Canadian artillery regiment changed. In its newest incarnation, the artillery regiment assumed a more conducive and logical hierarchy of three, eight-gun batteries, each divided into two, four-gun troops. The object of this reorganisation was to simplify the deployment of fire units, expedite the delivery of fire support, reduce inaccuracies in fire, and centralise administration.\textsuperscript{32} More

\textsuperscript{29} Ibid., 5. A battery commander could be tasked to support an armoured regiment as well, and thus would advise the commanding officer of the armoured regiment. For simplicity, throughout this paper we will only refer to the relationship between a battery commander and an infantry battalion commander.

\textsuperscript{30} Blackburn, \textit{Where the Hell are the Guns?}, 55; Bidwell, \textit{Gunners at War}, 128.

\textsuperscript{31} Bidwell, \textit{Gunners at War}, 128.

\textsuperscript{32} UK WO, \textit{Battle Drill and Manoeuvre}, 1.
importantly, this new organisational structure allowed for a proper affiliation between batteries and infantry battalions.\(^{33}\)

An artillery regiment was commanded by a commanding officer (CO) who was ranked lieutenant-colonel. Like his subordinate OCs, he too delegated the deployment, command and administration of the regimental gun groups and echelons to the aforementioned regimental second-in-command (2IC)—a senior major—while he co-located himself with his affiliated brigade commander.\(^{34}\) The regiment had a CP as well, commanded by the adjutant, a captain who was the CO’s staff officer whose primary responsibility was to control the fire of the regiment.\(^{35}\) In addition to fire control, the adjutant and his assistants issued routine and operational orders to the batteries, which included the preparation of barrage maps and traces.\(^{36}\) An artillery regiment was a large and intricate organisation, the day-to-day affairs of which were impossible for one man to coordinate. To support him in this endeavour, the CO had a number of officers to assist in the administration and command of his regiment such as the aforementioned adjutant, a regimental quartermaster, an intelligence officer, a regimental survey officer, a signals officer, a technical adjutant, a paymaster, and a regimental medical officer.\(^{37}\)

In the Canadian Army, the division was a self-contained force of all arms included its own supporting artillery organisation known as the divisional artillery, made up of three field regiments and the division’s allocation of anti-tank and anti-aircraft artillery. While a British infantry division’s artillery component included a medium regiment, in the Canadian Army these units were allocated to corps


\(^{36}\) UK WO, Battle Drill and Maneuvere, 4.

\(^{37}\) Library and Archives Canada (LAC) RG 24-C-3, Vol. 14461 War Diary (WD), 12th Canadian Field Regiment, “Regimental Orders Part I” dated 13 June 1944. This entry lists the appointments of regimental officers in the 12th Field Regiment which conforms to the doctrinal structure for a field artillery regiment.
The head of the divisional artillery was a Brigadier with the title of commander Royal Artillery (cra) who was responsible for the employment of all artillery in his command. Assisted by a small divisional artillery staff, the cra advised the division commander on the proper employment of fire support and, when required, requested and then coordinated reinforcing fire from flanking and superior artillery organisations. Like his subordinates, the cra had a divisional artillery cp that was linked by radio, and if possible, telephone wire, to subordinate and flanking artillery cps, as well as the corps artillery cp. Any reinforcing artillery assigned to bolster the fire of the divisional artillery joined its radio network and respond to calls for fire as they came in.

Most reinforcing artillery came from either flanking divisional artilleries, or the Corps Artillery headquarters. At the Corps headquarters, the senior gunner was a Brigadier who carried the title commander corps Royal Artillery (ccra) and carried out for the corps

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commander the same functions of advice and coordination as the CRA did for the division commander. The corps artillery consisted of a regiment of anti-aircraft artillery and a regiment of anti-tank artillery which the CCRA could allocate to subordinate formations as the situation dictated. In addition to these two units, the CCRA had under his command a subordinate medium artillery formation known as an Army Group—Royal Artillery (AGRA). Following the example of the RA, in the fall of 1942 the Canadian Army created two AGRAS, the 1st Canadian AGRA in support of the First Canadian Corps and 2nd Canadian AGRA in support of the Second Canadian Corps. In these AGRAS the Canadian Army brigaded three medium artillery regiments, one equipped with 4.5-inch howitzers and the other two with 5.5-inch howitzers, each consisting of two, eight-gun batteries. The AGRAS provided the CCRA a robust artillery “punch” that he directed towards the corps commander’s main effort and thus supplemented the fire of the divisional artillery. The creation of the AGRA in 1942 was major step in the evolution of artillery doctrine in the Second World War. Colonel G.W.L. Nicholson observed in the official history of the Royal Regiment of Canadian Artillery that the “important contribution that the creation of the AGRA [made] towards perfecting the rapid concentration of artillery fire—[was] a contribution that would rank high among the factors that led to final victory.”

At the very top of the Canadian Army’s fire support hierarchy was the brigadier Royal Artillery (BRA)—First Canadian Army. Like the CRA and CCRA, the BRA advised the army commander on the use of artillery and had under his direct command two field artillery regiments known as the 11th and 19th Army Field Regiments, RCA. These units provided the flexibility for the BRA to bolster the fire of the subordinate fire support formations and were often detached to reinforce either a corps or divisional artillery as required. For example, the 11th Army

39 Later in the war, the Canadian artillery would adopt the title CRCA – Commander Royal Canadian Artillery and CCRCA, Commander Corps Royal Canadian Artillery.
40 Nicholson, The Gunners of Canada, 649. The question of how the name AGRA came about is somewhat nebulous and the inclusion of the term “army group” is unfortunately confusing given that this was a resource usually delegated to a corps. As in note 35 above, later in the war these formations adopted the title Army Group Royal Canadian Artillery (AGRCA).
41 Ibid., 649.
42 Ibid., 111.
43 Ibid., 111.
44 Ibid., 647.
Field Regiment, RCA was attached to 1st AGRA and sent to support the First Canadian Corps in Italy, while 19th Army Field Regiment, RCA was “grouped” with the field regiments of the 3rd Canadian Divisional Artillery (the 12th, 13th and 14th Field Regiments, RCA) in support of the two assaulting brigades (the 7th and 8th Canadian Infantry Brigades) on D-Day in order to ensure each brigade had two field regiments in support. Considering the organisations from sub-section up to the BRA, the First Canadian Army had a robust fire support organisation available to support it during operations in Normandy. How the fire of these numerous elements was coordinated to support Canadian manoeuvres is the question we next turn our attention to.

COORDINATION OF FIRE SUPPORT

While the guns and organisational structure of the artillery were the means of Canadian Army fire support, the ways of the artillery system existed in the coordination between the artillery commander or forward observer and his supported infantry or armoured commander. The lowest level of coordination was the troop commander who acted as a FOO, whilst conducting operations. The FOO, supported by an assistant known as the observation post assistant (OPA) and two radio operators, established an observation post linked by radio and telephone wire to their respective troop CPs. From this post the FOO maintained continuous observation over a particular zone of the battlefield as directed by the BC, reported activity to the troop and battery CPs, and of course engaged targets with artillery fire. During mobile operations, such as a set-piece attack, the troop commander advised an infantry company commander and coordinated fire support in order to facilitate the company commander’s manoeuvre plan. The battery commander, likewise assisted by an OPA and two radio operators, also established an OP that was linked to one of

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45 Ibid., 111; Colonel C.P. Stacey, *Official History of the Canadian Army in the Second World War Volume III The Victory Campaign The Operations in North-West Europe 1944–1945* (Ottawa: Queen’s Printer, 1960), 37. The four regiments that supported the assault on D-Day created two ad hoc and non-doctrinal organisations known as the 12th and 14th Regimental Artillery Groups comprising the 12th and 13th Field Regiments in the former and the 14th Field and 19th Army Field Regiments in the latter.

the troop CPs by radio or telephone wire. For operations, the BC provided support, advice, and coordination to his affiliated infantry battalion commander.

It is important to reiterate that while troop and battery CPs were linked together by telephone wire and radio, each battery CP was linked to its superior regimental CP, that was in turn linked to the divisional artillery CP, and so on to the corps artillery CP. This intercommunication from the troop to the corps CP ensured that the transmission and relay of data from the FOO to high-level artillery CPs happened in a matter of minutes and greatly facilitated the rapid engagement of targets with overwhelming fire.47

Naturally, there were more targets than guns available to engage them and it was critical to concentrate artillery fire at the most important part of the battlefield, rather than distribute it across the whole front and dilute its effects. Therefore, in order to expedite the process of engaging targets, and to ensure that fire was directed to the most important part of the battlefield, from time to time certain artillery commanding officers were delegated as the “CRAs’ representative,” invariably shortened in parlance to simply CRA’s rep. When so designated, the delegated officer linked his radio directly to the divisional artillery CP where, by convention, he was understood to have the priority of fire from all the guns of the divisional artillery. Thus, in a matter of minutes, the CRA’s rep could have seventy-two guns respond to a call for fire.48 Shelford Bidwell neatly observed in Gunners at War that: “in sophisticated guise and reanimated by electronics, Napoleon’s Grand Battery returned to dominate the battlefield.”49 This was more than just a superficial comparison. Whilst in command of the 8th Army in North Africa, Montgomery issued direction that the CRA was to employ the divisional artillery as a seventy-two gun battery.50

The nature of the fire employed is critical to the understanding of the fire support system, so it is important here to note the difference between adjusted fire and predicted fire. There is an inherent dispersion

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49 Bidwell, Gunners at War, 149.
50 Bailey, Field Artillery and Firepower, 306.
in all artillery fire caused by a variety of factors including such diverse elements as air density, the temperature of the propellant charge on the gun platform, the wear of the gun barrel, wind speed, and even minute human errors in the laying of the gun. All of these non-standard conditions contribute to a natural inaccuracy that is impossible to fully account for, and which creates a natural imprecision in the fall of shot. To compensate for these variations, artillery forward observers corrected for these inaccuracies through ranging—a method of observing the fall of shot of the engaging batteries and adjusting it, through corrections to range and bearing, to land on the target.

Predicted fire, on the other hand, is not previously adjusted and the gun data is calculated trigonometrically based on the grid location of the target, usually derived from intelligence collection, and the surveyed location of the firing battery. The inherent errors mentioned above can be minimised through the accurate survey of the gun position, exactness in the determination of the target location, and timely measurements of meteorological conditions. Regardless, these errors can never be fully accounted for and, consequently, predicted fire is not guaranteed to be precise. This lack of precision is compensated for by the use of mass to saturate the area with fire ensuring, through sheer volume, some degree of effect on the target. This saturation was only achievable when the aforementioned system enabled the concentration of a vast number of guns.

This was the system that made the artillery so effective; it allowed the Canadian formations to concentrate fires and suppress objectives during attack, and then cut the inevitable counterattack to pieces with defensive fire. This doctrine, which has become known as bite

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51 The question of artillery ballistics is one of some detail and impossible to delve into here. For an excellent technical review of the various effects of non-standard conditions on artillery fire see the Canadian Department of National Defence publication B-GL-306-006/FP-001 *Field Artillery Volume 6 Ballistics and Ammunition*, available at: https://docs.google.com/file/d/o/BwiHqlNsdxTZZWQyNGYyNmMtZmUyMSo0YmY1LTkyYTktMjI2MzgzNjlk/edit?pli=1, [last accessed 16 March 2015].


54 Bidwell, *Gunners at War*, 146.

and hold, was the only effective solution to the problem of implacable German defences and counter attacks.\textsuperscript{56} Infantry would charge forward under the cover of a barrage that suppressed German defenders. Upon reaching the objective, the Canadian infantry prepared hasty defensive positions in which killing zones were established by integrating machine-gun and anti-tank arcs of fire designed to defeat the inevitable German counter-attack. As the Germans emerged from their trenches to assault the Canadians, they exposed themselves to artillery defensive fire and “S.O.S.” missions—concentrations of artillery fire directed by FOOS onto the counter-attacking German forces.\textsuperscript{57}

Although incredibly effective, artillery was not a panacea. Barrages expended tonnes of ammunition, the majority of which never landed anywhere near the enemy.\textsuperscript{58} The majority of fire missions were fired unobserved, on predicted coordinates, often with little to no effect.\textsuperscript{59} Despite these drawbacks, when the rounds did find their targets, artillery was the critical enabler that allowed Allied manoeuvre units to achieve tactical success. We turn now to a study of the doctrine behind how barrages were planned during operations in Normandy.

THE BARRAGE: THE TEXTBOOK STRUCTURE

Barrage ... The word has come to be loosely used for any heavy concentration of gunfire, when, in fact, it has precise and exact meaning.\textsuperscript{60}

Starting in the First World War, and remaining in force during the Second World War, the barrage became the primary means by which fire support was provided to infantry and armour attacks.\textsuperscript{61} As Second World War RA BC Ian Hogg observed above, it was more than simply an excessive expenditure of ammunition; a barrage was a very detailed and deliberate fire plan that required a great deal of team

\textsuperscript{57} Lee Windsor, “Updating the Official Gospel: Canadian Military History’s Third Wave” \textit{Acadiensis} 33, no. 2, (Spring/Summer 2004).
\textsuperscript{58} Ian V. Hogg, \textit{Barrage, the Guns in Action} (New York: Ballatine Books, 1970), 34–51. Hogg gives an excellent, technical account of the means and results of barrages during the Second World War.
\textsuperscript{59} Bailey, \textit{Field Artillery and Firepower}, 312.
\textsuperscript{60} Ian Hogg, \textit{Barrage: The Guns in Action}, 8.
\textsuperscript{61} Ibid., 8–33.
work and coordination to implement. During the Second World War, fire plans consisted of both barrages and concentrations, although the term barrage was often used synonymously to refer to the fire plan. Strictly speaking, a barrage differed from a “concentration” wherein the fire of multiple batteries was directed onto a single point in order to concentrate an overwhelming effect. To expedite the engagement of concentrations the number of fire units requested were allocated a code word: Mike indicated a call for fire from all the guns of a regiment, Uncle for a division, Victor for a corps, and Yoke for the fire of an AgrA. Calls for fire were preceded by repeating the code word three times. For example: “Uncle Target, Uncle Target, Uncle Target...” followed by the target coordinates called for the immediate fire from all the guns of the divisional artillery.

A barrage differed from a concentration in that it was deliberately planned, and distributed linearly as “a stationary or moving belt of fire providing a protective screen behind which the attackers advance.” The production of an artillery barrage in support of a deliberate attack was a very demanding process. Artillery Training Volume III: Field Gunnery Pamphlet No. 6 Programme Shoots (Barrages and Concentrations) dictated that in order to produce a quick regimental barrage, three hours of planning were required, including time to move batteries into firing positions. A divisional barrage required ten to twelve hours to coordinate, although a quick divisional barrage—one that was straightforward and involved a simple manoeuvre plan—could be executed in as little as two hours, if all of the supporting batteries were already deployed and did not have to move. At the corps level, twenty-four hours were required to coordinate the artillery plan. Needless to say, the planning of a barrage was a very calculated and command-driven exercise, thus, the best place to start an analysis of how a barrage was planned is at the top of the organisational hierarchy.

The first step in the planning of a barrage rested not with the artillery commander, but with the infantry commander. Based on the task he received from his superior, he determined the location

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63 Bidwell, Gunners at War, 136–150.
64 UK WO, Programme Shoots, 1.
65 Ibid., 7.
of the objective, or objectives; the frontage of the attack; and the start line of the attacking troops.\textsuperscript{66} Determining the frontage of the attack was extremely important as it established the number and type of artillery regiments that were required to support the attack. The linear frontage of a troop of 25-pounders was 140 yards, and a battery 280 yards. Standard operating procedure dictated a field artillery regiment to fire two batteries side by side, with the third battery superimposed across the whole regimental frontage, slightly more in depth. Thus, a field artillery regiment produced an artillery barrage with a frontage of 560 yards. This distance was deemed acceptable to support tank assaults, but, in the case of an infantry assault, regimental frontages were reduced to 400 yards in order to provide more weight to the fire.\textsuperscript{67} The location of the start line of the attacking troops was also critical as it determined the location of the opening line—the line where the fire from the barrage was intended to begin. As the intent of the barrage was to provide as much protection as possible to the assaulting troops, it was important that the barrage opening line be as close as possible to the forward edge of the attacking infantry or tanks. The assaulting troops were told to try to keep as close as possible to the line of fire—referred to in many narratives as \textit{leaning into the barrage}. When using 25-pounder howitzers, the safety distance was 150 yards, although this was increased to 200 yards if the guns were firing at near-to right angles to the line of advance—the extra fifty yard safety distance accommodated the splinters (jagged fragments of the steel casing of the round that is ejected upon its detonation) that flew to the left and right of the point of impact, and potentially towards the friendly forces.\textsuperscript{68} All of this information provided a very rough manoeuvre plan that the artillery commander and his staff used to develop the artillery-specific elements of the barrage.

Once the rough manoeuvre plan was developed, the infantry commander then coordinated with his affiliated the artillery commander. Together, they coordinated the general form of the artillery support that was required, and determined how much artillery to use, how deep the barrage was to be, the timings of the barrage, and the

\textsuperscript{66} Ibid., 6.
\textsuperscript{67} Ibid., 2.
\textsuperscript{68} Ibid., 2.
rates and the density of fire. This information was critical to allow the artillery staff to draw up the technical details of the artillery plan.69

Having determined the conceptual form of artillery support, the artillery commander then convened his artillery staff to develop the barrage details. In the case of an attack being coordinated by a division, the responsibility for the initial technical artillery calculations fell to the senior staff officer in the divisional artillery headquarters, the brigade major Royal Artillery (BMRA).70 This was a crucial stage in the development of the barrage as the calculations produced by the divisional artillery staff determined the amount and nature of ammunition that was required to support the attack. As the batteries would likely not have sufficient ammunition in their own stocks, this in turn dictated the subsequent ammunition delivery plan that the Royal Canadian Army Service Corps was required to execute.71

The divisional artillery staff then developed a barrage map and task table for distribution to all participating regiments. This map included a schematic trace of the barrage incorporated onto which was a series of parallel lines dictating where the batteries would fire (see Figure III). As time progressed, in accordance with the task table, batteries “lifted” their fire—meaning to move it—to the next line on the schematic. Usually these lines were spaced a minimum of one hundred yards apart, although the anticipated speed of the

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69 Ibid., 6.
70 Ibid., 35.
71 Ibid., 7.
assault determined their actual distance.\textsuperscript{72} The divisional artillery staff then divided the width of the whole barrage into regimental “lanes”—the width of each based on the frontage mentioned above, either 400 or 560 yards, and issued a grid reference to a point, often the right-most point, on the regimental lane to indicate where the adjutants would start the calculations for their own regiment.\textsuperscript{73} The actual frontage was determined by the density of fire required in that particular sector.\textsuperscript{74} Each participating regiment was allocated a lane for which it was responsible. Once this was complete, the CRA presented the plan to the manoeuvre commander to receive his final approval. Upon his approval, the divisional artillery staff issued the barrage map and task table to the participating regiments.

Once the CPSs at each of the participating regiment’s received the orders, the Adjutant divided his regiment’s assigned lane into battery lanes, starting from the grid issued by the divisional artillery staff. If, for example, this grid was the right-most grid of the regimental lane, the adjutant then moved leftwards along the regimental lane and divided it into two battery lanes. He assigned these two battery lanes to two batteries, and then tasked the third battery to superimpose its fire across the whole of regimental frontage, one line deeper than the other two batteries.\textsuperscript{75} The adjutant then issued the regimental orders to each of the three battery CPSs in his regiment. It was at the battery CPSs that the majority of the finite technical calculations were made under the supervision of the battery CPO.

Upon receipt of the regimental orders, the battery CPO ordered the two GPOs from the subordinate troops to report to the battery CP. Once there, the three officers produced gun programmes, which were forms that provided the gun detachment commanders with all of the information they required to orient and fire their gun throughout the programme.\textsuperscript{76} Based on these gun programmes, the detachment commanders and their crews prepared their ammunition, set their watches, and at the appointed time, executed the fire plan in accordance with the gun programme. Stop watches were normally used on the gun line, but if unavailable, each detachment commander

\textsuperscript{72} Ibid., 3.  
\textsuperscript{73} Ibid., 8.  
\textsuperscript{74} Ibid., 8.  
\textsuperscript{75} Ibid., 22.  
\textsuperscript{76} Ibid., 15.
would set his watch so that it would read 12 o’clock at zero hour\textsuperscript{77} Thus, from the rough manoeuvre plan drawn up by the division commander, or higher, the fire plan travelled down the hierarchical chain of command, at each level becoming more and more finite in its details, until finally reaching the men who actually fired the gun. Having reviewed the theory behind the fire support system, let us now look at a practical example of how that system was used to support a tactical operation, the 2nd Canadian Division’s attack on Verrieres Ridge on, 20 July 1944.

**VERRIÈRES RIDGE: THE MANOEUVRE PLAN**

The first step in developing the fire plan for the 2nd Canadian Division’s attack was to develop the manoeuvre plan. The 2nd Division’s attack on 20 July was part of a larger operation that fell under the aegis of Operations “Goodwood” and “Atlantic.” As part of Montgomery’s overall plan to maintain pressure on the eastern front of the Allied bridgehead, and thus free up Americans in the west, Operation “Goodwood” was designed to penetrate in depth to the south-east of the city of Caen. By 19 July this attack had sputtered out and the the Second Canadian Corps, under the command of Major General Guy Simonds, ordered 2nd Canadian Division to maintain offensive pressure south of Caen in the direction of Verrieres Ridge and Falaise.\textsuperscript{78} Simonds intended to use this attack to secure ground from which further offensive action could be launched.\textsuperscript{79}

Simonds’ tactical philosophy was one in which he believed that it was necessary for a division to attack on a narrow, single-brigade front. His justification for this policy reflected the importance he placed on employing overwhelming fire support to facilitate manoeuvre. He maintained that any attack must be “supported by all available artillery” and, despite the large amount of artillery available in a divisional artillery, it was “only sufficient to support attack by one brigade.”\textsuperscript{80} To this end, the tactical policy of the Second Canadian

\textsuperscript{77} Ibid., 19.

\textsuperscript{78} John Maker, “The Essex Scottish Regiment in Operation Atlantic: What Went Wrong?,” *Canadian Military History* 18, no. 1, (Spring 2009), 8.

\textsuperscript{79} Copp, *Fields of Fire*, 148.

\textsuperscript{80} “Operational Policy, 2 Cdn Corps” in *Fields of Fire*, 272–273.
Corps was to concentrate all resources at a single point that was attacked by a single brigade. Thus, for the 2nd Canadian Division’s attack on Verrieres Ridge, the brigade assigned the task of carrying it out was the 6th Canadian Infantry Brigade.

While it was a 6th Brigade show, Simonds and his staff were nonetheless deeply involved in the planning of the attack. Simonds held a conference at 2:00 a.m. on 20 July, during which he expressed his intent for the 6th Brigade to attack and capture the towns of St. Andre and St. Martin, and the Verrieres feature. Intelligence indicated that the ridge was held by a thin defensive line of infantry, so the staff at the Second Canadian Corps were relatively optimistic of the prospects of success for a quick offensive action. The plan of attack was to assault with three battalions in line, and one in depth, supported by direct fire from tank elements (See Map 1).

On the right, Winnipeg’s Queen’s Own Cameron Highlanders of Canada were tasked to capture St. Andre. In the centre, the South Saskatchewan Regiment’s objective was the ground to the east of St.

LAC, RG 24-C-3, Volume 14116, 14117, WD 6th Canadian Infantry Brigade (6 CIB), 20 July 1944.
Andre and, on the left, Montreal’s Fusiliers Mont Royal were ordered to secure Verrieres Ridge near a place called Troteval Farm. In order to bolster the force, the 6th Brigade was allocated Windsor’s Essex Scottish Regiment from the 4th Canadian Infantry Brigade, whose scheme of manoeuvre was to move behind the South Saskatchewan and secure the ground just to their north. Additionally, the brigade was allocated the 27th Canadian Armoured Regiment for direct fire support. This armoured regiment detached their ‘A’ Squadron to support the Camerons on the right, ‘C’ Squadron, although reduced in strength to two troops of a total of seven tanks, supported the Fusiliers Mont Royal, with the detached troop covering the left flank of the Saskatchewan. ‘B’ Squadron, having helped the Black Watch to secure the town of Ifs the day previous, was held in reserve to support any threatened portion of the line and maintain observation over the Verrieres feature.

A critical component of Canadian tactical doctrine was the establishment of an anti-tank screen to defeat German armoured counter-attacks. In support of the 6th Brigade was a battery from the 2nd Anti-Tank Regiment, RCA, as well as the 33rd Self-Propelled Anti-Tank Battery. From these units, each infantry battalion was allocated either a troop of 6-pounder or 17-pounder anti-tank guns, while the Saskatchewan received an extra troop of 17-pounders.

**VERRIERES RIDGE: THE FIRE PLAN**

The fire support plan was devised by the CRA of the 2nd Canadian Division, Brigadier Ralph Keepler. For the assault, Keepler arranged a tremendous amount of fire support that incorporated the fire of twenty-eight artillery regiments during the preliminary bombardment three hours prior to the attack. During the attack,
in addition to the organic artillery regiments of the 2nd Canadian Divisional Artillery, the 6th Brigade also had the fire support of the 3rd Canadian Divisional Artillery, the 2nd Canadian AGRA and the 8th (UK) AGRA.88

At the tactical level, the control of the fire support was delegated to the lowest possible level. As the tactical manoeuvre commander was the commander of the 6th Canadian Infantry Brigade, Brigadier H.A. Young, the CO of his affiliated artillery regiment, Lieutenant-Colonel A.M. Keefer (no relation to the CRA) of the 6th Field Regiment, RCA, was designated the CRA’s rep.89 Augmenting the artillery fire was close air support from the Royal Air Force’s (RAF) 83 Group flying rocket-firing Typhoons.90 These aircraft were tasked to seek targets of opportunity in the depth of the German defensive lines, specifically in the area of Fontenoy le Marmion and Rocquencourt South.91 Additionally, the RAF would engage the high ground to the west of the 6th Brigade to prevent the enemy from observing the attacking troops and directing German artillery onto them.92

Brigadier Keefer’s fire plan was designed to accommodate an infantryman’s rate of advance of 100 yards every three minutes.93 Each line of fire was 700 yards in depth and timed to lift to the next line of fire as the friendly infantry moved close to the impacting artillery rounds. Indicative of how important it was to have fire support in place on time, the timing for H-hour was delayed from 12:00 p.m. to 3:00 p.m. in order to allow sufficient time to ensure that air force assets were available to augment the artillery fire, and to ensure that FOOS could reach their assigned battalions in time.94

THE FIRE PLAN COMMENCES

89 Canada, Six Years, 54.
92 LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 19 Jul 1944.
93 LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, “Confirmatory Notes Comds Conference 200200B hrs,” 20 July 1944.
94 LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 20 Jul 1944.
Blackburn was on his battery’s gun line to witness the preliminary bombardment that occurred three hours prior to the fire plan:

At noon on July 20 … the villages of St. Andre-sur-Orne and St. Martin-de-Fontenay, sitting cheek by jowl down on the right from Verrières Ridge [were] subjected to a “murder target” [all guns available] shelling by all field guns of 2nd and 3rd [Canadian] Divisions and all the mediums and heavies of three AGRAs. In just three minutes, 59 tons of shells (60 percent more than were fired during the Battle of Waterloo) [were] sent screaming and crashing into the twin hamlets by six regiments of 25-pounders firing 1,728 rounds, nine medium regiments firing 648 100-pound sells, and two regiments of 7.2–inch heavies firing 48 200-pound monsters.\(^95\)

Twenty minutes prior to H-hour the artillery fired a concentration on a suspected German location centered on Tilly-la-Campagne using “predicted” fire at a rate of 3 rounds-per-gun, per minute for ten minutes. After this intense bombardment, a ten minute pause allowed the guns to shift their points of aim onto their next target, which was the first line of the barrage. At H-hour, the two-and-a-half hour barrage commenced (see Map II). Along the gun-lines of seven field artillery regiments, three medium artillery regiments, two medium batteries and four heavy batteries, Canadian and British gunners unleashed a maelstrom of high explosive only a few hundred meters in front of the assaulting infantry as they stepped off their start line.\(^96\)

It was critical for the infantry to “lean-in” to the barrage and get as close as possible to it in order to minimise the time between the lifting of the artillery fire that was suppressing the enemy, and the arrival of assaulting infantry onto the defender’s positions. This left the defenders little time to recover from the suppressive effects of the artillery fire and engage the attacking infantry. Because the barrage employed during the 6th Brigade attack was a box barrage, the fire remained stationary until the infantry neared the opening line at which time it lifted onto targets further in depth.

\(^95\) Blackburn, *The Guns of Normandy*, 181.

\(^96\) LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 19 July 1944.
The Fusiliers Mont Royal leaned well into the barrage, so much so at least two men were wounded by friendly artillery fire. The fire plan was initially successful in suppressing many of the German defenders and preventing them from engaging the assaulting Canadians with their small-arms. ‘C’ Company of the Fusiliers Mont Royal captured thirty German soldiers who were struck dumb by the barrage. On arrival at their objective, Troteval Farm, they took another twenty-five prisoners one of whom was an SS captain. Another captured German soldier, who had fought at Stalingrad, reported to his interrogators that he had never before experienced that level of shelling. These testimonials indicate how important

100 Blackburn, The Guns of Normandy, 181.
the use of massive concentrated fire support was to facilitating Canadian manoeuvre.

A key element often overlooked in these narratives is the herculean efforts of the Royal Canadian Army Service Corps and the gunners working in the ammunition parties to deliver the necessary ammunition to the guns. Shortly after midnight on 19 July, ammunition trucks arrived at the gun positions and delivered 350 rounds-per-gun or a total of 25,200 rounds for all the guns in the 2nd Canadian Divisional Artillery. At 9:00 p.m. on 20 July another ammunition dump of 450 rounds-per-gun occurred to replenish the rounds fired since the opening of the barrage. Several hours later, another 100 rounds-per-gun were dropped on the positions. In each case, these rounds needed to be loaded on the trucks at the ammunition depot, and then driven forward to gun positions where they were delivered as close as possible to each gun, terrain permitting. Ammunition also had to be stored in “ammo pits” that were dug into the earth near the howitzer to minimise any blast should an enemy round land too close to the store of ammunition. This was no light work, particularly when the gun detachment was still expected to fire their gun in accordance with the gun programme. The rounds came packaged in a steel box containing four projectiles and cartridge casings (the brass casings that held the propellant charges), and each box weighed 117 pounds. In the case of the 4th Field Regiment, the truck carrying the ammunition sank into mud up to its axle so the rounds had to be carried by hand from the road to the gun itself.

For the first couple of hours, the assault seemed to be going according to plan. At 5:00 p.m. the Saskatchewans reported that two companies were on their objectives. At 5:40 p.m. a similar report was received at 6th Brigade Headquarters from the Camerons. The situation seemed satisfactory enough that the brigade commander ordered the Essex Scots forward at 5:30 p.m. An axiom of military operations is that no plan survives contact with the enemy. Unfortunately for the 6th Canadian Infantry Brigade, the German army still had their card to play.

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101 Ibid., 495.
102 Ibid., 201.
103 LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 20 Jul 1944.
THE BITE THAT DIDN’T HOLD

Despite the overall effectiveness of the fire plan, there were bound to be some hiccups. In the centre, the Saskatchewans were ambushed by infantry of the German 272nd Division and forced to ground by fire. Consequently, they “lost the barrage.” It is here that it is important to note the functioning of the fire support system. The batteries fire in accordance with the tasks delivered them by the task table and have no contact with the supporting infantry, save for the FOOs and BCs that are moving with them. If enemy fire is sufficiently severe to slow or stop the advancing infantry, the artillery barrage will carry on unless ordered otherwise by the FOO or BC. It appears in the case of the Saskatchewans that did not happen.

The optimistic first two-and-a-half hours of the attack evolved into two days of fierce and incessant German counterattacks. Across the whole 6th Brigade frontage the Germans counter-attacked almost immediately. Most surprisingly, to the Canadians, was the appearance of German tanks in support of these counterattacks. The 6th Brigade’s war diary notes that the first indication of German tanks started to filter back to the brigade HQ at 5:50 p.m. The key to bite and hold was to have sufficient time to consolidate on the objective and deploy anti-tank guns to defeat the German counter attack. Unfortunately, nowhere along the 6th Brigade’s frontage was that accomplished. In the centre, the Saskatchewans were engaged by German infantry and tanks shortly after arriving at their objective. In the firefight, the Saskatchewans lost all of their anti-tank guns. Shortly thereafter, the Essex Scottish arrived on their objective to the north of the Saskatchewans and, almost immediately, German tanks appeared and knocked out an entire troop of 17-pounder anti-tank guns of the 2nd Anti-Tank Regiment, RCA. On the left, the FOO supporting the Fusiliers Mont Royal, Captain Arthur Smith, observed the beginnings of the German counter-attacks from Troteval Farm:

At first their attacks are infantry only, and we are able to cope with them reasonably well with our artillery fire, but when they begin coming

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105 LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 20 Jul 1944.
107 Blackburn, The Guns of Normandy, 188.
with tanks, we realize the jig is up. We have no anti-tank guns, no PIAT [Projector, Infantry, Anti-Tank, a shoulder-fired anti-tank weapon] ammunition and the [Fusiliers Mont Royal] are very thin on the ground.108

To make matters worse, the weather turned especially sour. Smith tried to call a Typhoon to engage a German self-propelled gun that was engaging Canadian tanks, but he found that all aircraft were grounded, and there was no prospect for any air support from the 83rd Group, rAF.109 Exacerbating the problem, the tanks of the 27th Canadian Armoured Regiment (car) were unable to render assistance due to the limited visibility created by the weather.110

Hitherto, the tanks gave good service during the initial assault, providing direct fire support from positions of observation near the start line. They had moved into position by 1:00 p.m. on 20 July and, at the time of the assault, adopted positions of fire. ‘A’ Squadron, on the right in support of the Camerons, moved forward when it came in contact with enemy tanks and adopted a position northeast of St. Andre where it was later engaged by a large number of enemy tanks just prior to last light. When the initial counter-attacks began at 6:00 p.m. on 20 July, ‘B’ Squadron, originally in reserve, was ordered forward to reinforce ‘A’ Squadron.111 But, as was their doctrine, the tanks withdrew into a laager after last light. During the 6th Brigade assault the tankers of the 27th Canadian Armoured Regiment engaged and destroyed a number of German tanks and vehicles; the after-action report indicated twenty-six confirmed and three probable kills. Despite this impressive count, the tankers themselves suffered a large number of casualties.112 ‘C’ Squadron began the operation with depleted numbers as they were down to only six tanks on the morning of 21 July, hence the reason it was ordered to remain in reserve. Later that day when the co of the 27th car ordered his tanks into a laager at 10:00 p.m., only thirty-three of the regiment’s fifty-seven tanks were fighting fit.113

111 LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 19 Jul 44; LAC RG-C-3 Vol. 14287, WD 27th Canadian Armoured Regiment (Sher Fus R), 20 July 1944.
113 Ibid., 7.
By 22 July, ‘A’ Squadron, although it rolled out of the laager the day previous with fifteen tanks, was down to only six.\textsuperscript{114}

Like their armoured confreres, the gunners made a valiant effort to assist the 6th Brigade in holding its “bite.” On the left, Smith recalls that he and the Fusiliers “held on at Troteval Farm largely because of terrific artillery fire, which amounted to over 600 rounds-per-gun for 4th Field ... mostly fired on “Mike” [regimental] targets.”\textsuperscript{115} When a tank engaged the fusiliers, Smith bombarded him with medium artillery. He recalled that he “hammered him for about half an hour. I may not have knocked him out, but I’ll bet I loosened the bowels of that crew.”\textsuperscript{116} In the centre, the FOO with the Essex Scottish brought down considerable fire on the attacking German infantry who had closed up with the Canadians. So close were the counter-attacking Germans, he found that the only way to engage the enemy with effective defensive fire was to call for fire on his own position.\textsuperscript{117} Although the Camerons on the right enjoyed the only real success during the first day, they were soon to bear the brunt of the German counter-attacks at dawn on 22 July when they were subjected to brutal mortar and artillery fire along with infantry and tank attacks. They credited their affiliated battery commander, Major R.E. Lucy, of the 13th Battery for saving the day. No one on the gun line knew what was happening, but they sensed the situation was grim when Lucy radioed the 6th Field Regiment’s command post, indicated the target grid and ordered them to “fire like hell until told to stop.”\textsuperscript{118} Despite this departure from artillery fire discipline, which is the rigidly observed artillery radio voice procedure, the batteries obliged and the firing went on for forty-five minutes until “the paint peeled off, the guns were red hot, the gunners sweating and happy.”\textsuperscript{119} Such an overwhelming amount of fire support demanded that the already weary ammunition truck drivers redouble their efforts to resupply the guns. Blackburn recalled that by mid-afternoon of 21 July, most of the original dump of ammunition had been expended, necessitating the rush delivery of another 350 round per gun. The ammunition arrived just in time, when the German counterattacks

\textsuperscript{114} Ibid., 11.
\textsuperscript{115} Smith, “A FOO at Troteval Farm 20–21 July 1944,” 72.
\textsuperscript{116} Arthur Smith quoted by Blackburn, \textit{The Guns of Normandy}, 191.
\textsuperscript{117} Captain Grange quoted by Blackburn, \textit{The Guns of Normandy}, 189.
\textsuperscript{118} Canada, \textit{Six Years}, 56.
\textsuperscript{119} Ibid., 56.
were at their most frenzied. When the ammunition arrived at the 4th Field Regiment battery positions, Blackburn’s battery had only twelve rounds-per-gun remaining.\footnote{120} Despite the valourous efforts of the 6th Canadian Infantry Brigade, the 27th Canadian Armoured Regiment and the fire support team, the operation ended poorly. In the center, the Essex Scottish and Saskatchewan withdrew, leaving a dangerous salient between the Camerons and the Fusiliers. At 6:00 p.m. on 21 July an attack by the Black Watch of Canada, supported by tanks and artillery fire, re-established the front in the centre.\footnote{121} The front was stabilised along the road between Troteval and St. Andre although Troteval itself was lost.\footnote{122} At Troteval Farm, ‘C’ Company of the Fusiliers Mont Royal repelled a total of five German counter-attacks on 21 July alone before being ordered to withdraw.\footnote{123} By 23 July the front was tenuously stabilised and the Second Canadian Corps started preparations for the next operation to seize Verrieres Ridge.

CONCLUSION

The fact that the 6th Canadian Infantry Brigade’s attack was unsuccessful does not negate its value as an analytical tool to help understand the artillery-based doctrine of bite and hold, and the fire support system that was integral to it. Quite the contrary, it is an excellent tool to demonstrate the intricacies, systems, procedures and limitations of that doctrine.

Firstly, the operation demonstrates the importance placed on the centralisation of fire support. For this attack, the fire of all of the 2nd and the 3rd Canadian Divisional Artilleries was allocated to 6th Canadian Infantry Brigade, along with reinforcing fire from the Second Canadian Corps, flanking Corps’ and at least two agras. This type of centralisation was a critical element of the bite and hold doctrine.

Secondly, understanding the structure of the fire support system, makes it easier to understand how it functioned. Rather than simply

\footnote{120} Blackburn, The Guns of Normandy, 206–207.\footnote{121} Stacey, Official History of the Canadian Army in the Second World War Volume III, 176.\footnote{122} Ibid.\footnote{123} LAC, RG 24-C-3, Volume 14116, 14117, WD, 6 CIB, 21 Jul 1944.
dismissing the barrage as a wall of fire that rolls on ahead of the assaulting infantry, one understands the numerous and intricate systems and procedures that overlay the organisational structure and allow it to function. It is then easier to understand why a barrage was, or was not, effective. Understanding the relationship between the infantry battalion commander, the BC and the FOOS helps to understand why the artillery based doctrine was critical to “shooting” the infantry on to the objective and then defeating the German counter-attacks.

Finally, this operation serves to illustrate the limitations of the bite and hold doctrine. When poor weather grounded the close air support, there was no air interdiction to prevent German artillery from engaging the attacking Canadians, and the troops of the 6th Canadian Infantry Brigade suffered as a result. When the German counter-attack materialised before the anti-tank guns could be emplaced and when visibility limited the Canadian tankers’ ability to provide direct fire support, the Canadian troops were hard-put, and in many circumstances unable, to hold their ground. In the end, all that the 6th Canadian Infantry Brigade had for support was the artillery. The gunners in support of the Brigade did good service to support the infantry, but even with the massive amount of artillery support available, the Brigade was unable to complete its initial mission. Although a critical part of the bite and hold doctrine, the artillery was still only one part.

During Canadian Army operations in Normandy, artillery fire support was a critical factor for success. Whether intimidated by fears of the artillery’s technical nuances, or simply mesmerized by the glamour of the manoeuvre element, historians have overlooked the details of the fire support element to their detriment and left a valuable part of the narrative untapped. Hopefully this paper has in some way served to remedy that.

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