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OVERCOMING THE BATTLEFIELD STALEMATE:

The Introduction Of
Armored Fighting Vehicles And Tactics
In The British Army During The First World War

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13. ABSTRACT *(Maximum 200 words)*
This report documents the development of trench warfare on the Western Front during the First World War and the technological experiments conducted by the British Expeditionary Force to overcome the loss of strategic mobility. Reviews the work of E.D. Swinton, Churchill, Haig, J.F.C Fuller, B.H. Liddell Hart and Guderian with regard to the early development of tank and mechanized operations in W.W. I.

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The maps which appear at the conclusion of the text are taken from the Atlas For The Great War, edited by Thomas E. Griess (part of the West Point Military History Series,) published by Avery Publishing Group, Inc., Garden City Park, NY., 11040. Reprinted by permission.

The writer also wishes to express his gratitude to his wife Kathleen and their children, without whose support and motivation this finished product would not have been possible.

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Chapter I: Introduction

"From a mockery the tanks have become a terrible weapon. Armoured they come rolling on in long lines, more than anything else [they] embody for us the horror of war."

Erich Maria Remarque, All Quiet On The Western Front

The introduction of armored mechanized fighting vehicles by the British Army in 1916 signalled a transition in land warfare tactics. Prior to the employment of armored infantry support vehicles during the Battle of the Somme in late summer 1916, a soldier's ability to maneuver on the World War I battlefield was limited by a number of factors. These included the trafficability of terrain, the extent of camouflage and protective cover, the distance between starting point and objective, the complexity of obstacles, and the severity of enemy opposition. By the end of 1914 any possibility of large-scale maneuver had succumbed to the "battlefield stalemate," the maneuver deadlock resulting from the effective use of the Vickers-Maxim machine gun, the creative emplacement of barbed-wire/trench obstacles, and the increasingly accurate employment of high-explosive artillery fire.[1]

British and German military commanders during W.W. I were faced with similar maneuver constraints, yet each group of officers addressed those constraints differently. The Germans continued to rely on conventional methods and chose not to incorporate techniques or equipment associated with

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[1]Trevor N. Depuy, Dictionary of Military Terms (New York: The H. W. Wilson Company, 1986), 147.

mechanized warfare. The British relied initially on artillery barrages and then introduced a mechanized infantry support vehicle in the effort to break the battlefield stalemate.

The purpose of this study is to investigate the development of mechanized warfare equipment and tactics introduced by the British Army in response to the battlefield stalemate. The author intends for this study to provide the academic community with a synthesis of sources and secondary works associated with the introduction of the tank and with subsequent changes in land-based tactical operations.

The author also has a personal reason for conducting this study. B.H. Liddell Hart, recognized as a significant contributor to the collection of military history, commented on the tendency to focus on one's subject to the exclusion of general information. In his Strategy Of Indirect Approach he cautioned:

> "If a broad survey [of war] is an essential foundation for any theory of war, it is equally necessary for the ordinary military student who seeks to develop his own outlook and judgement. Otherwise, his knowledge of war will be like an inverted pyramid balanced on a slender apex."[2]

This study serves the author not only as an attempt at an academic contribution, but also as his personal effort to avoid crashing pyramids.

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[2]B.H. Liddell Hart, The Strategy Of Indirect Approach (London: Faber and Faber Unlimited, 1941), 6.

The literature which exists on the topic of military operations during World War I is varied in approach, but the sources generally recount particular events or series of operations as opposed to an in-depth analysis of equipment or doctrine development. This synthesis makes use of accounts which address the topics of trench warfare and of mechanized warfare development. The final outcome of this study will be a focused analysis of a significant transition in land warfare practices which carried over into the inter-war years and World War II.

Ernest D. Swinton's Eyewitness: Being Personal Reminiscences Of Certain Phases Of The Great War, Including The Genesis Of The Tank provides details concerning the early stages of armored fighting vehicle development. J.F.C. Fuller's Memoirs Of An Unconventional Soldier continues the story of mechanized doctrine development where Swinton left off and includes accounts of the successful British tank operations in the 1917 Battle of Cambrai. Sir Douglas Haig's Despatches, December 1915-April 1919 provides valuable insight into the British Expeditionary Force commander's strategic perspective. The remainder of the sources cited in this study contribute first-hand accounts of trench warfare practices, battlefield command decisions, and doctrine development.

Charles Carrington's A Subaltern's War, Lieutenant Colonel C. a C. Repington's The First World War, and General

Erwin Rommel's Attacks recount trench warfare experiences from the participant's perspective. Certain aspects of the British command decision process are revealed The Private Papers Of Douglas Haig 1914-1919. Similar information on the German command climate is discussed in General Erich von Ludendorf's My War Memories: Aug 1914-Nov 1918. The subject of doctrine development is addressed in the works of Swinton and Fuller, along with that of B.H. Liddell Hart in his Memoirs.

The secondary works cited in this study provide information on or interpretations of the problems encountered during the process of British mechanized doctrine development. Shelford Bidwell's Modern Warfare: A Study Of Men, Weapons and Theories addresses the overall changes in warfare strategy based on lessons learned during both World Wars. Hart's The Strategy Of Indirect Approach is the important study of selected offensive operations throughout history in which success resulted from attacks from unexpected, oblique or unconventional directions. This particular study inspired General Heinz Guderian in his efforts to create a German mechanized force during the inter-war period. Robert Larson's 1984 publication The British Army and The Theory Of Armoured Warfare, 1918-1940 begins with a discussion of the post-World War I decline of the British Army. He then continues his analysis by reviewing the inter-war period of British tank doctrine and

introduces several factors which constrained progress in this area prior to W.W. II.

Readers interested in continuing the study of mechanized doctrine development beyond the scope of this analysis will find several scholarly works which address German efforts prior to World War II. The 1942 work by Ferdinand Otto Miksche entitled Attack: A Study Of Blitzkrieg Tactics contains detailed explanations of blitzkrieg operations, especially the maneuver concepts of "Schwerpunkt" and "Aufrollen." The study is interesting for its contemporary perspective on German mechanized doctrine development, particularly during the period 1939-1941. Charles Messenger's The Blitzkrieg Story, published in 1976, is useful for general background on mechanized warfare in W.W. II. In his introduction Messenger focuses on the British success in 1917 at Cambrai and the German counter-attack after the initial tank penetration. In 1983 Bryan Perrett published A History Of Blitzkrieg in which he argues that the foundation of W.W. II blitzkrieg doctrine lay in a combination of the latter campaigns of W.W.I and the inter-war year writings of Hart.

By reviewing selected operations and analyzing the early development of mechanized doctrine this study will provide a picture of the methods used by the British Army to overcome the battlefield stalemate. In addition, this study will analyze the reasons which prompted the development of

these new tactics and the multiple forms they took during the war. The early period of development and the lessons learned by the British were critical to the later German operational successes in Poland and France.

The foundation of this study is a review of trench warfare practices and the impact of the battlefield stalemate on maneuver operations. A discussion of the introduction of British armored infantry support vehicles in 1916 will lead to an analysis of the work of J.F.C. Fuller and his maneuver doctrine. Despite its demonstrated offensive potential during the Battle of Cambrai, the tank was not wholeheartedly embraced by the British military establishment. This study will conclude presenting reasons for the apparent British unwillingness to develop the offensive potential of the tank after World War I.

It will become apparent that the events of 1939 were not the inevitable outcome of Swinton's early efforts. J.F.C. Fuller expanded on the early concept of a mechanized infantry support weapon, and Guderian took the concept of mobile mechanized operations far beyond anything Swinton imagined. What began as an innovative British response to the immediate problem of battlefield immobility evolved into the blitzkrieg of 1939 only after many years of doctrinal modification and development by British and German strategists.

The success of this study rests on two assumptions. The first is that the reader possesses an understanding of the political alliances in effect in Europe at the onset of hostilities in 1914. In order to remain focused on its subject, this study will concentrate on the tactical aspects of selected W.W. I combat operations and forego any discussion of political negotiations. The second assumption is that the reader possesses an elementary understanding of basic land warfare concepts, such as the need for adequate maneuver space or the incompatibility of offensive maneuver with defensive obstacles. These principles mediate the need for a solution to the maneuver deadlock that existed at the end of 1914. The early discussion of the W.W. I battlefield stalemate will clearly illustrate the maneuver deadlock, but the reader should be comfortable with basic concepts.

Chapter II: The Battlefield Stalemate

European military leaders maintained the belief in the spirit of the offensive which became the accepted style of strategic planning in the late nineteenth century. This fundamental attitude was reflected in the German Schlieffen plan and in General Joffre's counteroffensive plan for the Battle of the Marne. These plans were based on the assumption that large units would continue to achieve strategic mobility through the use of standard offensive operations. Both sides underestimated the effect modern firearms would have in support of defensive operations. As a result, the initial German offensive in 1914 fell victim to inadequate execution of a bold plan and valiant resistance from the French Army under General Joffre and the British Expeditionary Force. The subsequent degeneration of strategic mobility into trench warfare is directly attributable to the combined effects of machine guns, trench/wire obstacles and indirect artillery.

The initial German offensive operations were based on Field Marshal Count Alfred von Schlieffen's strategy of annihilation. While serving as the Chief of the German General Staff from 1891 to his retirement in 1906 he designed the plan for an offensive against France. The Franco-Russian alliance of 1893 made it politically certain that Germany would face a two-front war if hostilities broke out. In Schlieffen's estimate Germany's central position on

the continent provided a temporary strategic superiority if she was willing to accept the risks associated with uneven troop distribution in exchange for numerical superiority in the West.[1] His strategy was deceptively simple. The weight of German forces would be positioned in the West and would attack France, while on the Eastern front German forces would fight a defensive battle until reinforcements could be shifted from the West to participate in an attack on Russia.

Schlieffen's plan was based on three assumptions. The first was that France was the more powerful enemy and therefore had to be faced early. The second was that France could be defeated early in the war by a well-executed offensive. The third was that German control of France would not only free German forces for an offensive against Russia but would also preclude British intervention.[2] A key aspect of the German offensive plan was that the defeat of France and the capture of Paris would not achieve the required strategic goals. Only the total annihilation of the French army would ensure Germany's ability to wage a two-front war one front at a time.

The initial stage of Schlieffen's plan call for a massive movement of German forces through Luxembourg, Belgium and Holland. The deliberate violation of Belgian

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[1]Hajo Holborn, "Moltke and Schlieffen: The Prussian-German School," ed. Edward Mead Earle, Makers Of Modern Strategy (New York: Princeton University Press, 1967), 188.

[2]Ibid., 188-189.

and Dutch neutrality was viewed by Schlieffen as necessary to achieve strategic surprise. In a 1905 memorandum Schlieffen set the number of attacking armies at eight, with the majority of the forces concentrated between Metz and Aachen in the North and Central sectors.[3] In order to achieve the required tactical superiority he risked uneven troop distribution and planned for the majority of German forces to be positioned on the right wing of the offensive, resulting in a ratio of attacking forces from right to left of seven to one. He counted on a rapid movement aided by tactical superiority in numbers to achieve his ultimate goal. By quickly attacking Southwest to Paris, the German forces would create "the disturbance of the enemy's line of retreat and through it the disorder and confusion which gives an opportunity for battle with an inverted front, a battle of annihilation...."[4]

Prior to his retirement Schlieffen made a final revision to the offensive plan. In its final form it called for the defeat of France in three stages. The first stage required the attacking forces to reach a line between Verdun and Dunkirk, centered on the town of Metz. By the thirty-first day of combat operations the German armies were to reach the Somme and pass Abbeville and Amiens. The second stage of the offensive was to consist of operations in the

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[3]Ibid., 191.

[4]Ibid., 192.

vicinity of the Lower Seine River. The crossing of the Seine would mark the beginning of the final stage, in which the attackers would turn East, operate South of Paris, and force the French forces against their own fortresses and the Swiss frontiers.[5]

Schlieffen's successor as Chief of the German General Staff, the younger Moltke, inherited the 1905 plan but not the bold spirit of its author. Moltke retained the basic characteristics of the original plan, consisting of strong initial operations in the West with a defensive action in the East. But he revised the plan significantly by reducing the ratio between the attacking right and left wings from seven to one down to three to one, primarily out of fear of French offensive operations in the South. Because of this revision, the right wing assumed a role fundamentally different from that envisioned by Schlieffen.

Instead of a crushing, wheeling movement, the new role of the right wing was to draw French forces out into an offensive action in the South in the vicinity of Lorraine, there to be destroyed by the combined attack of all eight armies.[6] The revised plan of attack lacked the original's boldness and willingness to accept risk in exchange for tactical superiority.

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[5]Ibid., 191-192.

[6]Ibid., 197-198.

On August 4, 1914 the German forces marshalled in the North violated Belgian neutrality and crossed the Meuse River. Within four days German advances near Brussels forced General Joffre to begin an orderly withdrawal of French forces West to protect the capital. The beginnings of the German envelopment maneuver, as Marc Ferro wrote, showed Joffre that it was "once more patent that the French were inferior in manoeuvre [sic]. He took these lessons to heart, and with defeat everywhere, withdrew."[7]

Joffre had made two mistakes in failing to accurately estimate the strength of the German right wing and in overestimating the ability of the Belgian forces to resist the German attack. The result was that within two weeks of beginning the offensive the Germans were firmly established in Northern France and were in position to threaten Paris.

Throughout August 1914 the French army continued its retreat, trading ground for time in the attempt to slow the anticipated envelopment of Paris. The German offensive, weakened by Moltke's restructuring of the force ratios, was slowed in late August. In response to the Russian entry into the war which signalled the beginning of simultaneous two-front operations, Moltke on August 25th withdrew two corps from the West and deployed them in the East, reducing the potential for rapid German defeat of the French army.

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[7]Marc Ferro, The Great War 1914-1918 (London: Routledge and Kegan Paul, 1973), 50.

The German offensive plan required the attackers to possess a tactical advantage on the Western Front; Moltke's actions negated the boldness of the plan and restricted the attackers' capabilities. Reacting to the slowed advances of the Germans and desiring to end the French retreat, Joffre declared the line from Amiens to Verdun as the end of the French withdrawal and began preparations for a counteroffensive.[8]

On September 4, 1914 Joffre launched the Battle of the Marne counteroffensive. This operation was designed to preclude the encirclement of Paris and to commit French forces to a general engagement instead of retreat. Within two days, as the French counteroffensive met with success, Moltke's fear of a simultaneously active two-front war began to take shape. Fearing the potential loss of the weakened right wing he ordered a withdrawal of forces in the North in order to strengthen the line and consolidate gains.

On September 8 the British Expeditionary Force, fighting a rearguard action in support of the French withdrawal, located a gap in the retreating German forces. They quickly launched a cavalry probe to exploit the discovery. This action was unexpected because the exact status and positions of withdrawing forces was unclear to the German General Staff and because the active

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[8]Ibid., 51.

participation of British forces was unforseen.[9]

The problem for the Germans was compounded by the actions of Lieutenant Colonel Hentsch who ordered the First German Army in the North to retreat. Colonel Hentsch was a General Staff Officer who was visiting the Front on Moltke's orders in order to bring back an accurate assessment of the situation. Surprised at the actual status of the lines and alarmed at the British cavalry probe launched the day before Mentsch ordered the withdrawal on September 9th. His actions forced the Third and Fourth armies in the center to do the same to prevent an encirclement of the retreating German armies.[10] In a final attempt to relieve pressure on the retreating Northern forces Moltke ordered an attack on Verdun which failed, forcing him to order a general withdrawal to stabilize the front lines.

The revised Schlieffen plan failed to achieve its strategic goal. France had not been annihilated, therefore Germany could not bring full force to bear on Russia. Neither Schlieffen nor Moltke had counted on the possibility of the British sending a force to anchor the French left. Ferro attributed a great deal of the Marne operation success to this "contemptible little army [which] was hard hit during the retreat, as almost the main object of the German

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[9]Ibid., 53.

[10]Holborn, 199.

attacks...."[11] Moltke's failure to maintain adequate force ratios on the right wing resulted in the degradation of momentum and the eventual loss of strategic mobility.

The degeneration of strategic mobility into static trench warfare by the end of 1914 was brought about by two factors. The first was the onset of a type of siege mentality, and the second was the universal underestimation of the effects of modern firearms.

The first factor was described by Major Ernest D. Swinton, a British Army Engineer who was sent to the Western Front in September 1914. His primary role was to observe and report back to British General Headquarters on British defensive operations during the French withdrawal a the Marne Offensive in 1914. His reports were released by the British Press Bureau under the pen name "Eyewitness" for review by the general public. In these dispatches he described in vivid detail accounts of combat experiences.

In an article written on September 25, 1914 he likened the ongoing Battle of Aisne to siege warfare for two reasons. The first was that the German army possessed an "immense power of resistance" due to its ample supply of heavy artillery. The second was simply the vast number of forces engaged, "which at present stretch more than half-

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[11]Ferro, 54.

across France."[12] He described the extent of country covered as so great that the distances alone rendered "slow any effort to manoeuvre [sic] and march round a flank in order to escape the costly expedient of a frontal assault against heavily fortified positions."[13] The restricted maneuver space located between the English Channel and the Swiss Alps compounded the loss of mobility. Unlike the Eastern Front which was better suited to large-scale maneuvers, the Geography of the Western Front was a limiting factor for both sides.

In a book he wrote after the war Swinton referred again to the onset of siege mentality among the troops. In one passage he stated that few military leaders before 1914 "foresaw the possibility of the static warfare which lasted on the Western Front for nearly four years."[14] Recalling the action he observed in 1914 he stated that it "quickly became clear [to the British] that it was no rearguard action that we were fighting. As the resistance of the enemy grew protracted it opened up a prospect of a long continuation of such operations."[15]

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[12]Ernest D. Swinton, Eyewitness's Narrative Of The War (London: Edward Arnold, 1915), 32.

[13]Ibid.

[14]Ernest D. Swinton, Eyewitness; being personal reminiscences of certain phases of the Great War, including the genesis of the tank (New York: Arno Press, 1972), 41-42; hereafter referred to as Eyewitness....

[15]Ibid.

The onset of a siege mentality was augmented by the universal underestimation of the effects of modern weapons. The deadly combination of machine guns and indirect artillery forced both sides to forgo traditional offensive maneuvers and to adopt trench warfare practices until each could develop tactics to defeat this battlefield stalemate.

The British infantry was particularly vulnerable to the effects of modern weapons. Prior to W.W. I the British soldier had been range-trained to fire at a rate of fifteen rounds per minute, which was adequate for traditional operations.[16] But by the end of 1914, the exposed infantry soldier was incapable of sustaining any offensive momentum due to the effects of the battlefield stalemate.

One of the most influential technological advances prior to the start of the war was the invention of the machine gun. Inventor Hiram Maxim developed an automatic weapon in 1883. The weapon was a recoil-operated, belt-fed, water-cooled machine gun capable of firing six to seven hundred rounds per minute. Through a long association with the Vickers Company in England, the weapon took the name "Vickers-Maxim," and was later referred to only as "Vickers."[17] Maxim's invention single-handedly gave the infantry soldier mastery over the defensive battlefield.

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[16]Arch Whitehouse, Tank (New York: Doubleday and Company, Inc., 1960), 28.

[17]John Quick, Dictionary of Weapons and Military Terms (New York: McGraw-Hill Book Company, 1973), 298.

The machine gun accomplished this by producing a "stream of bullets in a cone of dispersion which traced a narrow elliptical pattern...swept by fire in which the probability of a man standing upright becoming a casualty was over ninety percent."[18] It provided the infantry with an incredibly efficient source of firepower at a low cost in manpower and resources.

Prior to this invention the basis for successful offensive operations had been a combination of numerical superiority against a defending force and the effective use of cavalry. While dismounted infantry formations fought with cannon, rifle and bayonet, cavalry units could exploit their inherent advantages of speed and mobility and outmaneuver enemy units. The fantastic increase in the rate of fire and accuracy provided by the machine gun negated the effectiveness of unprotected cavalry and allowed a numerically inferior defensive force to hold a position. As long as the machine gun was unchallenged it remained a cost-effective and lethal weapon.

There was early evidence that the German General Staff had recognized the machine gun's potential prior to 1914. After the war Swinton recalled a story told him by a British Royal Artillery officer who was involved in monitoring the German military armaments program. The Vickers-Maxim

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[18]Shelford Bidwell, Modern Warfare: A Study of Men, Weapons, and Theories (London: Allen Lane, 1973), 52.

machine gun was manufactured in Germany under license from the British Vickers company which retained the patent rights. Under the terms of the agreement between the two manufacturers the German subsidiary was required to report periodically the number of weapons produced. But for a period of two years prior to the outbreak of hostilities the German firm neither submitted a periodic production statement nor paid the British firm any patent royalties.[19] This lack of information obscured the extent of Germany's machine gun production, and to a certain extent the degree of German arms buildup in general.

During an official visit to a joint munitions testing range outside Berlin this British officer managed to get a retired German officer to admit two startling facts. The first was that Germany was aggressively involved in machine gun production and in fact already had thirty-eight thousand weapons in reserve. The second fact was that the German General Staff had forbidden any statement regarding the numbers of machine guns in production or in reserve to be released.[20] These facts attest to the degree of secrecy surrounding the German armament program, and also to the significant role the machine gun would play in German tactics. It is unlikely that the Germans foresaw the establishment of trench warfare, but their emphasis on

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[19]Swinton, Eyewitness..., 9-11.

[20]Ibid.

machine gun production gave them a marked advantage over the British in this area.

The German emphasis on machine gun production and fielding was not matched by the British. The light machine gun most used by the British during the war was the Lewis machine gun. It was gas-operated, air-cooled, and had a rate of fire between five and six hundred rounds per minute.[21] This weapon saw primary use in a defensive role and very limited use during offensive operations. It frequently jammed and took six men to operate in the attack; the firer, one man carrying spare parts, and four men carrying ammunition.[22] The British relied on more conventional weapons during the early phase of the war, especially the pistol and the .303 Lee Enfield rifle.

As the 1914 offensives ended and the Western Front stabilized into a labyrinth of trench networks, the problem of German machine gun positions quickly became most critical for the British. Reporting on the success of the German delaying action fought during the Marne counteroffensive, Swinton stated "two things stood out: first, that our advance was being held up in every direction; [and] secondly, that in nearly every case the cause was machine guns, with or without wire. The great problem before us

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[21]Quick, 275.

[22]Martin Middlebrook, The First Day On The Somme (New York: W.W. Norton Company, Inc., 1972), 18.

therefore, if we were to continue to press forward,...was how to deal with this factor."[23]

From the beginning of the trench warfare period the response of the French and British to the machine gun problem was to rely on indirect artillery barrages massed on enemy trench positions. This policy, designed to suppress defenders and destroy wire obstacles, required significant numbers of guns and ammunition,[24] and as will be shown below, met with limited success.

The deployment of machine guns was one component of the battlefield stalemate. Another was the construction of defensive trench networks by both sides. The British system was relatively simple. The standard system was composed of three lines of trenches: the "front line," the "support" and the "reserve." All three were constructed in a right-angled ziz-zag pattern, designed to minimize the effects of artillery shells bursting in the trench and to preclude unobstructed fire down the length of the trench.[25]

Roughly two hundred yards separated the "front line" trench which was manned by sentries from the main "support"

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[23]Swinton, Eyewitness..., 51.

[24]Martin Samuels, Doctrine and Dogma: German and British Infantry Tactics In The First World War (New York: Greenwood Press, 1992), 12.

[25]Middlebrook, 12.

trench "where most of the men off-duty lived in dugouts."[26] A series of communications trenches connected all three trench lines. The dugouts referred to began as mere cavities scooped out of the trench walls and were later expanded by occupants and strengthened with boards, beams and sand bags against artillery bursts.

Two other characteristics of the British trench system are significant. The first is the addition of barbed wire erected twenty to thirty yards in front of each line of trenches. Each barrier consisted of three lines of wooden posts hammered into the ground, with barbed wire criss-crossed from post to post. Soldiers often strengthened the obstacle by adding loose tangles of wire coiled among the stakes.[27] The second characteristic was the construction of "redoubts" or strong points behind the main "support" trench line. These strong points were fortified with trenches and wire and housed the permanent garrison in the sector.[28]

Though similar in general design, the German trench defensive system which devloped by the middle of 1915 was much more complex in reality. It consisted of three defensive sectors called the "outpost," "battle" and "rearward" zones. The total depth of the three zones could

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[26]Charles Carrington, A Subaltern's War (New York: Arno Press, 1972), 215.

[27]Ibid., 216.

[28]Ibid.

reach up to ten thousand meters.[29] Each of the three zones was designed to accomplish a specific mission, and each posed significant problems for an attacker. The "rearward" zone, so named for its location between three and ten thousand meters behind the front lines, contained the defender's resupply units, artillery support and command headquarters. The bulk of the fighting took place in the first two defensive zones.

The "outpost" zone measured five hundred meters wide by five hundred to three thousand meters deep on a battalion-sized front. It incorporated wire obstacles similar in design to those of the British, and was sub-divided into three distinct areas. The front line trench was manned by a maximum of fifty soldiers located in double sentry posts who functioned as early warning observers. This line overlooked the first set of wire obstacles and the ground separating the defenders from attackers, known as "No Man's Land."

Approximately three hundred meters behind the front line trench was the resistance line trench. It was manned by roughly two hundred men with six machine guns.[30] This line was designed to provide resistance to an attack, hide the strength of the defense and disrupt attacking formations. The final section of the "outpost" zone was

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[29]Samuels, 73.

[30]Ibid.

called the main line of resistance.[31] It consisted of three trenches separated by two hundred meters and wire obstacles. The defenders used the trenches as living areas and for protection from artillery barrages. They fought from shell holes and machine gun posts at the rear of the zone. This zone was manned by a battalion of soldiers minus those already located forward on the front line trench and the resistance line trench.

The primary defensive fight took place in the "battle" zone.[32] This area, located approximately three thousand meters behind the front line, was further divided into the forward and rear areas. The forward area was between fifteen hundred and two thousand meters deep and garrisoned by a readiness battalion of infantry. This unit represented a counterstroke force whose mission was to attack an enemy force attempting to break through the main line of resistance in the "outpost" zone.

In addition to the counterstroke force located in the forward area, the "battle" zone contained heavy machine guns positioned in nests of two to four guns and located in the rear area. This defensive arrangement was designed to stop any attacking force which succeeded in penetrating to the rear of the "battle" zone, and to prevent disruption of activities in the "rearward" zone.

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[31]Ibid., 74.

[32]Ibid., 76.

The "battle" zone represented the heart of the German defensive network. Here the attacker began to lose momentum; he was unable to count on the support of his own artillery due to inadequate communications; he was under fire from German artillery and machine guns; and he was forced to halt his attack to breach numerous wire obstacles. If the Germans succeeded in stopping an attack in this zone they launched a counterattack to repel the enemy and re-establish defensive lines.

The combination of trenches and wire obstacles with well-sited machine gun positions created a formidable tactical problem. The attacker was faced with the difficult mission of maintaining command and control over his forces while under artillery and machine gun fire, all the while sacrificing momentum to the obstacles in his way.

The third component of the battlefield stalemate was the use of indirect artillery. The loss of mobility resulting from machine guns used in concert with trenches and wire obstacles required some method by which the attackers could maintain momentum while suppressing defenders. The primary purpose for conducting a pre-assault artillery barrage was the neutralization of machine gun positions and the destruction of wire obstacles. Both sides recognized that the difficulty involved in suppressing machine guns lay in their elusiveness and mobility.[33]

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[33]Bidwell, 53.

Compared to artillery pieces, machine guns were much smaller and easily transported over the battlefield. They could be moved quickly when crews made use of shell holes as ready-made positions, or they remained hidden deep in a dugout until a barrage ended. Two solutions to this problem were developed. The British elected to attempt the suppression of enemy machine gun emplacements and the destruction of wire obstacles with massive preparatory barrages. The Germans developed a series of infantry assault tactics designed to isolate machine gun positions and clear wire obstacles.

British commanders had at their disposal a mixture of artillery pieces with which to attempt the machine gun suppression missions. The lightest and most plentiful variety, eighteen-pounder guns and 4.5 inch howitzers, fired small shrapnel or high-explosive shells out to approximately six thousand yards. The second category included sixty-pounder guns, 4.7 inch guns and six inch guns firing high-explosive shells out to ten thousand yards. The heaviest variety included howitzers ranging from six inch to fifteen inch. These fired one hundred to fourteen hundred pound shells at a high-angle trajectory a distance between five and eleven thousand yards.[34] All these varieties of weapons were used in British preparatory barrages.

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[34]John Keegan, The Face Of Battle (New York: Viking Press, 1976), 227.

The primary purpose of the eighteen-pounder gun was machine gun suppression and wire-cutting, as illustrated by the high number of shells fired in preparatory barrages. In March 1915 the British at the Battle of Neuve Chapelle allocated one gun to every six yards of enemy trench. During a thirty-five minute preparatory barrage five shells weighing a total of two hundred eighty-eight pounds fell on each yard of German trench network.[35] In a forty-eight hour bombardment in September 1915 at the Battle of Loos the British dedicated two hundred fifty-one guns to artillery preparation. The majority of these, one hundred eighty-four, were light field artillery dedicated to wire cutting. This last bombardment recorded one six hundred twenty-one pound shell for every yard of enemy trench line.[36]

In July, 1916 the British launched a massive artillery bombardment in preparation for the Battle of the Somme. Out of approximately one million five hundred thousand shells fired into an area twenty-five thousand by two thousand yards square, roughly one million shells were shrapnel fired by the eighteen-pounder guns.[37] The British depended primarily on artillery to suppress machine guns and destroy wire obstacles.

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[35]Robin Prior and Trevor Wilson, Command On The Western Front: The Military Career of Sir Henry Rawlinson, 1914-1918 (England: Blackwell Publishers, 1992), 112.

[36]Ibid.

[37]Keegan, 234.

Unfortunately for the British the artillery frequently met with limited success in the suppression/destruction mission. One reason for this was the often inaccurate position of the guns with relation to the target: in one instance "The light had been poor and time was short, with the results that the [forward observers] had not accurately registered the guns on the German trench. Consequently... most of the shells landed behind the German front line."[38]

Another factor was that the shrapnel shell and slow fuse combination fired by the eighteen-pounder guns tended to detonate in the ground under the wire obstacles instead of bursting on contact with the wire.[39] Despite the large numbers of shells fired at German trenches, the wire and trench obstacles all too often were left intact and the machine guns fully operational.

British military historian J.F.C. Fuller described the infantry's loss of mobility in the face of the battlefield stalemate.[40] With the end of the Marne counteroffensive the infantry ceased to be the primary attacking arm. The creation of trench and wire obstacles augmented with machine guns meant that the British army conducted the attack with artillery, since it was only under intense protective

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[38]Prior and Wilson, 46.

[39]Keegan, 227.

[40]J.F.C. Fuller, Memoirs Of An Unconventional Soldier (London: I. Nicholson and Watson, LTD, 1936), 106 ff.

barrages that the infantry was able to leave their positions without being annihilated. However, the effectiveness of any infantry assault was limited not only by the degree to which the wire was cut and machine guns suppressed, but also by the maximum range of the supporting guns. Without moving the guns forward, which would force a break in supporting fires during repositioning, the assault was limited in depth. Creating a reserve of guns positioned forward meant reducing the number of guns available to conduct the preparatory barrage.

The high number of shells fired in the preparatory barrages were impossible to resupply in time for continuous support, and communication with supporting guns was often impossible after the assault began. When the assault reached the maximum range of the supporting guns, and either the protective barrage ended or the guns ran out of shells, the infantry found themselves deep in enemy territory with no artillery support and faced by undamaged wire and operational machine guns. The British reliance on artillery to break the battlefield stalemate was resource intensive and ineffective. Until the introduction in 1916 of a mechanized infantry support weapon however, this practice was the primary means by which the British army attempted to counter the loss of strategic mobility.

The German army approached the loss of mobility imposed by the battlefield stalemate in a different manner. They

did have a sizeable arsenal of artillery, including two thousand five hundred 77mm cannon which compared favorably to the three thousand seven hundred ninety-three 75mm cannon in the French arsenal in 1914.[41] And while a preliminary artillery bombardment on every trench position was incorporated into assault operations,[42] the Germans were incapable of employing sustained quantitative measures such as the massive British artillery barrages. After 1914 the primary strategic emphasis for the German Army was the Eastern Front, and the supply requirements associated with those operations limited the campaign in the West. When these considerations were combined with industrial limitations brought on by the British naval blockade, the German Army was forced to develop qualitative measures to counter the loss of mobility.

The earliest German efforts to combat the battlefield stalemate included providing soldiers with armored shields in the effort to increase their level of protection. These proved ineffective against artillery fire, reduced mobility and did nothing to increase suppressive fire.[43] Another solution involved equipping front line troops with a direct-fire cannon capable of destroying enemy strong points and machine gun positions. The 37mm Sturmkannone, designed with

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[41]Ferro, 93.

[42]Samuels, 51.

[43]Ibid., 37.

this particular mission in mind, was ineffectively employed because the infantry tended to move them forward without adequate protection.[44]

The Germans determined that a viable solution to the problem had to incorporate a combination of new equipment and new tactics. The solution would have to provide the infantry with the means to augment the effects of indirect artillery with direct-fire suppression which was accurate and responsive.

In early March 1915 the German army created the first sturmabteilung ("storm detachment") to test new equipment and tactics.[45] The detachment totalled twenty-one officers and six hundred twenty-eight men and was equipped with standard infantry weapons and twenty 37mm cannons. At this stage of development the assault tactics consisted of four phases. The first phase was the preparatory artillery barrage of enemy trenches and wire obstacles. Once the barrage ended, small parties of combat engineers with armored shields moved forward to clear remaining obstacles.

In phase three the supporting sturmkannonen were physically brought forward to form a line from which the infantry fired on remaining machine gun positions. In the fourth phase mixed sturmtruppen ("storm troops") of engineers and infantry assaulted the enemy positions. The

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[44]Ibid.

[45]Ibid., 13-15.

first exercise of these tactics in June 1915 resulted in two hundred casualties and the loss of six sturmkannonen in two weeks.

The German army reorganized the sturmabteilung in September 1915. The new detachment included the addition of a mortar troop composed of four light mortars; a machine gun platoon with six guns; and a flamethrower troop with six man-packed weapons.[46] The Germans also rearmed the prototype assault unit with weapons better suited to its mission. They added a combination of heavy and light weapons to the standard infantry rifle and pistol already in use.

The sturmkannone was replaced by a 77mm feldkannone which was employed in a direct-fire role against machine gun positions. To supplement the feldkannone the Germans developed the 76mm minenwerfer mortar. This weapon fired a high-trajectory mortar shell which, since its drop was almost vertical, could effectively bombard deep enemy trenches.

In addition to these two heavy weapons, the sturmabteilung assault troops were armed with two new light weapons: the granatenwerfer ("grenade firer") and the maschinengewehr '08/'15 ("light machine gun.") The granatenwerfer was a versatile, accurate and portable grenade launcher which fired a two pound grenade a maximum

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[46]Ibid., 18-19.

range of 300 meters. The grenades exploded with a splinter effect, making them highly effective in close-quarters trench fighting. The maschinengewehr '08/'15 was a variation of the belt-fed water-cooled Maxim gun. It was capable of a five hundred round per minute rate of fire and was much more portable in the assault than its predecessor.[47]

Early operations involving the re-organized sturmabteilung met with such success that the German High Command authorized its increase in size to a fourteen-hundred man sturmbatallion. In October 1916 General Ludendorf, the Chief of the German General Staff, ordered each army on the Western Front form an internal sturmbatallion. By November 1916 over fifty German army units had fielded sturmbatallionen, each one having the primary mission of training infantry units in the new tactics.[48]

General Ludendorf was convinced that the solution to the loss of mobility was in the training and deployment of infantry trained by the sturmbatallion: "The formation of storm troops from the infantry not only had to be regularized, but to be adapted to the common good. The Instruction Formations and the Storm Battalions had proved their high value both intrinsically and for the improvement

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[47]Ibid., 42-43.

[48]Ibid., 25.

of the infantry generally."[49] The mission of the sturmbatallion quickly evolved into that of a trainer rather than an actual assault force. Once a regular infantry unit had undergone training in the new tactics with new weapons, it returned to its area prepared to conduct assault operations in accordance with the new practices.

The assault units' success was based on the development of new weapons systems used in conjunction with the principles of feuerkraft ("firepower") and stosskraft ("assault power.")[50] The concept of feuerkraft evolved out of the German belief that indirect artillery barrages were ineffective against wire obstacles and machine guns for the same reasons the British discovered. Instead of adopting the British practice of massive barrages, the Germans developed direct-fire weapon combinations which provided the infantry with responsive and accurate fires.

The combination of the 77mm feldkannone and the 76mm minenwerfer provided effective fires against machine guns, strong points and trenches. During the assault the use of the granatenwerfer and maschinengewehr '08/'15 gave the infantry a level of portable firepower which far exceeded standard rifles, pistols and bayonets. These weapons combinations returned to the German infantry the firepower

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[49]General Erich von Ludendorf, My War Memories, 1914-1918, vol. 1 (London: Hutchinson and Company, 1920), 239.

[50]Samuels, 171.

needed to defeat the British trench defenses.

The German infantry exercised the stosskraft ("assault power") by combining the effective use of feuerkraft with innovative tactics.[51] The infantry abandoned the standard linear assault formations in favor of small compact assault groups. After a preliminary artillery barrage augmented by fire from feldkannonen and minenwerferen, a wave of small reconnaissance patrols was launched to identify enemy strong points and to verify that the schwerpunkt ("focus of energy") for the attack was valid. Each reconnaissance squad was followed at a distance of two hundred to two hundred fifty meters by a nine-man strosstruppen assault team. Armed with a maschinengewehr '08/'15, a granatenwerfer and sometimes a flame thrower, their mission was to react to reconnaissance team information, breach obstacles, and locate and destroy enemy weak points either by direct assault or envelopment.[52] The final assault phase involved heavy infantry following one hundred fifty meters behind the strosstruppen. Their mission was to enlarge the gaps in the defense made by the strosstruppen assault teams and eliminate any bypassed enemy strong points.

These assault tactics and weapons combinations developed by the Germans, though highly effective in breaching the first line of British defenses, had several

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[51]Ibid., 172.

[52]Ibid., 51.

shortcomings. The assault troops were dismounted, thereby forced to negotiate difficult terrain already worked over by indirect artillery. They had to carry all their ammunition with them in the assault, which increased each soldier's combat load and further decreased his mobility. Once through the first trench line the feldkannonen and minenwerferen were no longer close enough to provide heavy support, which resulted in exposure to secondary belts of machine guns and fortified trench positions.

The German infantry experienced difficulties in maintaining indirect artillery support in the assault for the same reasons the British did: long distances, ineffective communications, and inadequate resupply. In the final analysis these new tactics were time-consuming, requiring manual destruction of wire obstacles and close-combat fighting to secure enemy trenches. Any machine gun position or strong point left untouched by the preparatory barrage or feldkannonen had to be individually destroyed by infantry.

The German sturmbatallion tactics proved to be an short term solution to the first line of British trench defenses, but were not an effective long-term solution to the overall problem of mobility loss. The battlefield stalemate remained a problem of defenses in depth which had to be reduced by teams of dismounted infantry. The German tactics were time consuming and man-power intensive.

In contrast to the German assault tactics, British assault tactics in the early phase of trench warfare were very simple. The assault began with the preparatory artillery barrage designed to suppress enemy machine guns and destroy wire obstacles. At zero hour the troops "climbed over the top of [the] trench, raced across No Man's Land and occupied the enemy's front line."[53] Once, and if, the troops reached the enemy trench before the defenders re-occupied their fighting positions, they engaged in hand-to-hand "bombing." This practice refers to the British use of the Mills bomb (grenade), an "oval-shaped object which could be bowled like a cricket ball thirty yards."[54] The assault was basically a linear mass rush across contested terrain with a very general objective. These tactics were very much unlike the German meticulous organized assault with its designated teams and specific targets.

The British infantry did not have assault weapons like those found in the sturmbatallionen. The British Stokes mortar, similar in weight and caliber to the minenwerfer, was inaccurate and unwieldy. The Lewis machine gun was ill-suited for assault operations due to its weight and operational reliability, and the British had nothing to compare to the granatenwerfer.[55]

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[53]Carrington, 217.

[54]Ibid., 220.

[55]Samuels, 45.

Because the British infantry were organically incapable of dealing effectively with heavy enemy weapons, they had to rely on the preliminary artillery bombardment to destroy them. This forced the British to execute massive preparatory bombardments which negated any surprise factor preceding an assault. These barrages also consumed vast quantities of munitions, and made the battlefield extremely difficult for assaulting infantry to maneuver over.

The inadequacies of the British solution to the battlefield stalemate were described by Swinton after a British attack on a German position on May 9, 1915.[56] As soon as the preparatory shelling by the eighteen-pounder guns ended, the British infantry began their assault. Once the artillery stopped, the German defenders, relatively unhurt by the barrage, manned their trench and shell hole positions. Because they were no longer suppressed by the artillery the defenders were capable of accurate cross-fire from "machine gun emplacements fitted with loopholes just clear of the ground."

Some troops, carrying sixty-pound packs and extra ammunition, made it as far as the German wire which in most areas was still standing, "but in most cases our assault was stopped dead on top of our own parapets or a few yards in front. A feature of the defense was once again the slaughter dealt out by the machine guns, firing directly and

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[56]Swinton, Eyewitness..., 90-91.

obliquely across No Man's Land."[57]

By the end of 1914 both sides adopted trench warfare practices because the concept of warfare had changed under the influence of technology. Prior to 1914 an offensive succeeded if a superior number of soldiers could be concentrated effectively on the critical point of assault.[58] This strategy proved impossible to maintain in 1914 because technology provided firepower which could enact an "intolerable rate of attrition, however heavy and persistent the attack might be."[59], especially when the fighting took place in an area which geographically restricted maneuver.

The development of advanced weapons systems changed the nature of war and required innovative responses to the maneuver deadlock imposed by the battlefield stalemate. The German solution was effective to a point, but the impact of technology on the offensive required a three-part solution. A truly effective solution would have to incorporate armored protection for an assault force, adequate accompanying suppressive firepower, and cross-country mobility. The next chapter will analyze the early British attempts to respond to the battlefield stalemate with a mechanized infantry support vehicle which incorporated these three components.

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[57]Ibid., 91.

[58]Bidwell, 48.

[59]Ibid.

Chapter III: The Unconventional Response

The loss of strategic mobility experienced by the British on the Western Front in 1914 was a result of technological advances in weaponry. It became clear to the British by the Summer of 1916 that reliance on artillery barrages as the primary means of breaking through German defenses was unsuccessful in overcoming the combined effects of machine guns and trench/wire obstacles. Because of this, the existing mobile arm of the British Army, the cavalry, was unable to fulfill its traditional roles. The cavalry was incapable of executing its missions of reconnaissance and exploitation in the face of modern firepower. This loss of maneuver capability left the British with no adequate means of combating the battlefield stalemate or exploiting a breakthrough of enemy lines.[1]

What few contemporaries realized was that a successful solution to the technological problem posed by the battlefield stalemate had to be technical in nature itself. Battlefield mobility depended on three critical components: protection, suppressive firepower, and cross-country mobility. Battlefield experiences from the beginning of the war showed these three factors to be the key components to successful breaching of the German trench networks. The omission of any one of the three requirements meant failure

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[1]John Terraine, White Heat: The New Warfare, 1914-1918 (London: Sidgewick and Jackson, 1982), 92-93.

in the effort to break through enemy positions and maintain offensive momentum.

As early as December 1914 the maneuver deadlock was officially recognized and brought to the attention of the Committee of Imperial Defense. The Secretary to the Committee, Lord Hankey, wrote a memorandum in which he set forth the "general situation and the trend of opinion on the War Council."[2] The document, which came to be known as the "Boxing Day Memorandum," reviewed the general loss of strategic mobility on the Western Front and offered two suggestions for its resolution.

The primary focus of the memorandum was a discussion of locations suitable for peripheral attacks designed to weaken the German effort in the Western theater of operations. The chief recommendation centered on offensives in the East, later resulting in the Gallipoli operation in 1915. For the purposes of this analysis, however, two other aspects of this document are important. The first is the author's recognition of the loss of mobility in the face of trench warfare: "Days are required to capture a single line of trenches, the losses are heavy, and as often as not the enemy recaptures his ground on the following day."[3] The second is his suggestion that a technological solution was

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[2]Lord Maurice Pascal Hankey, The Supreme Command, 1914-1918 (London: George Allen and Unwin, Limited, 1961), 244 ff.

[3]Ibid., 245.

necessary to restore offensive momentum. Citing historical precedent in the use of "special materials" such as battering rams, catapults, and movable towers, the memorandum asked "Is it possible by the provision of special material to overcome the present impasse? Can modern science do nothing more?"[4]

The author then suggested several theoretical mechanical solutions to the problems created by the battlefield stalemate. In addition to recommending the use of bullet-proof shields, artillery-fired smoke screens, and rockets with rope and grapnel hooks attached, the memorandum called for the development of a mechanical machine which could be used to restore mobility.

This futuristic device would consist of "bullet-proof large heavy rollers, propelled by motor engines fitted with 'caterpillar' driving gears to grip the ground - fitted with a Maxim gun and an armored driver seat." The object of the device would be to "roll down the barbed wire by sheer weight, to give some cover to men creeping up behind, and to support the advance with machine gun fire."[5]

The Committee of Imperial Defense took note of the innovative mechanical solutions suggested by Lord Hankey in the Boxing Day Memorandum, but concentrated its efforts on strategic problems instead. The memorandum, while not

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[4]Ibid., 246.

[5]Ibid.

responsible for any deliberate action with regards to a mechanical solution, is important for its recognition of the principle components of the battlefield stalemate. The description of the mechanical device designed to roll down barbed wire was visionary if only for its implicit incorporation of the three critical components: protection, suppressive fire power and cross-country mobility.

Inspiration for the creation of a mechanical solution to the battlefield stalemate came primarily from two independent sources.[6] The first was Major Ernest D. Swinton, the Royal Army Engineer officer referred to earlier in this study. The second was the operation of the Royal Naval Division under the direction of the First Lord of the Admiralty and member of the Committee of Imperial Defense, Sir Winston Churchill.

Swinton and Churchill pursued the development of a mechanical solution for different reasons. Swinton was interested in developing a machine gun destroyer, while Churchill was interested in developing an armored escort vehicle. Their paths crossed during the course of conceptualization and development, but it is Swinton who is generally recognized as the impetus behind early British tank development in World War I.

Between 1900 and 1913 Swinton was involved in military

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[6]Field Marshall Lord Carver, The Apostles Of Mobility (New York: Holmes and Meier Publishers, Inc., 1979), 13.

activities which provided him with increased exposure to machine guns and their employment. In June 1900 he was attached to the Railway Pioneer Regiment in South Africa and saw the early use of machine guns during the Boer War. In 1908 he was assigned to edit a British handbook on machine gun tactics written by Captain Applin of the 14th Hussars Regiment. Between 1910 and 1913 he was involved in the compilation of the last two volumes of the Official Naval and Military History of the Russo-Japanese War, which showed him the value of effective heavy artillery and machine gun employment.[7] These experiences combined to create what Swinton called a "mild form of obsession [which] for want of a better description...may be called a 'machine gun complex.'"[8]

Swinton's interest in machine guns intensified as a result of his exposure to German trench operations. The scarcity of war news and the growing civilian unrest stemming from the lack of information forced the British government to reach a compromise between complete coverage and complete censorship. War correspondents were not allowed at the Front, but a specially appointed officer would serve as the correspondent for the British press. Winston Churchill recommended Swinton to Secretary of War Lord Kitchener based on Swinton's work The Defence Of

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[7]Swinton, Eyewitness..., 8-9.

[8]Ibid., 5.

Duffer's Drift. This fictional brochure written after the Boer War conveyed tactical operations in understandable prose and made Swinton a logical choice for the position. Swinton departed for France on September 8, 1914 and during his time spent with the British Expeditionary Force wrote a total of 103 articles for publication.[9]

As the government's official observer he was able to witness firsthand the devastating effects of machine guns used in combination with trenches and wire obstacles. His experiences brought him face to face with the reality of lost battlefield mobility and he found himself devoting attention to the discovery of a solution. On October 19, 1914 he wrote:

> "Throughout this time I had been racking my brains to discover an antidote, and within the last two weeks my vague idea of an armored vehicle had definitely crystallized in the form of a power-driven, bullet-proof, armed engine, capable of destroying machine guns, of crossing country and trenches, of breaking through entanglements, and of climbing earthworks. But the difficulty was to find or evolve something which would fulfill the conditions."[10]

In the Summer of 1914, prior to his appointment to the Front, Swinton received a letter from a professional engineering acquaintance. Mr Hugh F. Marriot was a mining engineer whom Swinton met while in South Africa during the Boer War. Mr. Marriot periodically wrote to Swinton regarding technical developments in civil engineering

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[9]Ibid., 31.

[10]Ibid., 57-58.

circles which might prove useful to the Army. He had been working for some time to find a solution to the problem of transporting mining equipment in remote regions. In the course of his search he found an agricultural machine of American manufacture called the Holt Caterpillar Tractor which had surprising powers of cross-country mobility. Mr. Marriot thought this machine might be of use to the Army for purposes of transport.[11]

This particular piece of knowledge lay dormant in Swinton's mind until some time after he began his Eyewitness correspondence. His exposure to trench warfare combined with his previous machine gun complex to inspire in him the drive to define a solution to the seemingly insurmountable problem posed by the battlefield stalemate. In mid-October 1914 he realized that the Holt Caterpillar Tractor described by Mr. Marriot had the potential to be the answer. "If this agricultural machine could really do all that report credited it with," Swinton wrote, "why should it not be modified and adapted to suit our present requirements for war?"[12] Swinton was the first to propose a practical mechanical solution to the technical dilemma by matching the requirements of the tactical problem with his knowledge of existing technology. Swinton envisioned a vehicle which combined the cross-country maneuverability of the tractor

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[11]Ibid., 12.

[12]Ibid., 58.

with the protection of armor plate and the suppressive firepower of the machine gun to overcome the battlefield stalemate.

Swinton's fledgling concept for a machine gun destroyer remained just that for quite some time due to his difficulty in obtaining official backing for further development. The earliest official action taken towards the development of an armored infantry support weapon took place not in Army circles but in the British Admiralty. It seems that the Admiralty was in the market for a "landship" capable of traversing open country with the purpose of providing escort protection for armored car units patrolling the Naval Air Squadrons based at Dunkirk. Churchill had seen the December 1914 Boxing Day Memorandum and took up the idea personally. The patrol cars at Dunkirk were experiencing difficulty in negotiating bombed-out roads and needed some mechanical means of bridging the craters.

In January 1915 Churchill wrote a letter to the Prime Minister developing his own ideas on the subject. He saw the validity of the mechanical solution suggested in Hankey's memorandum and from that idea drew the correlation between the Admiralty's need for a mechanical crater-bridging device with the Army's need for a mechanical trench-crossing machine.[13] In his letter to the Prime

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[13]David Lloyd George, War Memoirs Of David Lloyd George (Boston: Little, Brown and Company, 1933), 98-99.

Minister Churchill wrote:

"It is extraordinary that the Army in the Field and the War Office should have allowed nearly three months of trench warfare to progress without addressing their mind to its special problems. An obvious measure of prudence would have been to have started something like this [armored vehicle development] two months ago. It should certainly be done now."[14]

The Prime Minister passed Churchill's letter on to technical authorities in the War Office who spent two months working on the problem, but were unable to design a mechanical solution, citing problems in vehicle weight, vulnerability to gun fire, and cross-country mobility. At this point, Kitchener developed a very skeptical opinion of the concept; Lord Hankey recalled that Kitchener "never gave me any encouragement to think that these difficulties could be overcome...."[15] Churchill did not wait for the War Office to finish preliminary investigation of his idea. On February 20, 1915 he formed a Committee under the Chief Constructor of the Navy to design a land battleship.[16] Work under this committee continued until August 1915 when the War Office consolidated developmental responsibility for a prototype vehicle.[17] The fairest summation of Churchill's contribution is to credit him with keeping the fledgling concept alive until the War Office realized its potential.

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[14]Swinton, Eyewitness..., 80-81.

[15]Hankey, The Supreme Command, 252.

[16]Ibid.

[17]Swinton, Eyewitness..., Appendix 2, 308-325.

While Churchill kept the Admiralty involved in armored vehicle development Swinton struggled to get official backing for his machine gun destroyer concept. On October 20, 1914 Swinton met with the assistant secretary of the Committee, Captain Hankey, (no relation to Lord Hankey,) to describe for him the battlefield stalemate and the future of siege warfare if the stalemate remained unbroken.

Swinton told Hankey of the Holt Caterpillar Tractor and outlined his concept of a machine gun destroyer. When Swinton concluded by recommending the immediate procurement of several tractors for modification and testing, Hankey agreed and suggested Swinton brief Lord Kitchener himself. Swinton was unsuccessful in securing an appointment with the Secretary of War, but realized he had found a fellow advocate in Captain Hankey. Swinton later wrote that he regarded his October 20, 1914 conversation with Hankey as "the sowing of the first seed." [18]

Despite his optimism over having found support for his idea in Captain Hankey, Swinton quickly ran into the reality of economic constraints and the military status quo on innovative research and development. Before returning to the Front in late October 1914 Swinton reported to the General Headquarters Engineer-in-Chief that he had briefed Captain Hankey and of his unsuccessful attempt to gain an audience with Kitchener. The Engineer-in-Chief, though

[18]Ibid., 60-61.

ambivalent on the subject, wrote to the War Office concerning the possibility of procuring several tractors.

Swinton discovered that a shipment of Holt tractors had landed in England on October 26, 1914. It seems that the Transport Department at the War Office had been trying since 1909 to get an allotment of funds for the purchase of a few machines, but the item each year had been left out of the estimates.[19] Swinton wanted the tractors for purposes other than those of the Transport Department, and had to trust Captain Hankey and the Engineer-in-Chief to secure support for his concept while he returned to his duties on the Front.

On his return to England on leave in early January, 1915 Swinton ran headlong into the military establishment status quo. Swinton met with Captain Hankey to determine the status of his proposal to the War Office. He discovered that Hankey had briefed Lord Kitchener personally, who, remembering the failure of the War Office technical committee, flatly refused to support the proposal. Swinton, fearing that he would never be granted official government sponsorship, attributed this latest setback to the: "inevitable tendency in every profession towards a belief in the infallibility of rank and seniority which ...amounts to a reliance on possibly more or less stale experience."[20]

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[19]Ibid., 63.

[20]Ibid., 74.

Swinton should have recognized the institutional reluctance of the senior British leadership to embrace a novel concept at the expense of traditional artillery and cavalry practices. In spite of the difficulties he encountered, he continued his pursuit of official backing. On January 4, 1915 he reported to the senior officer of the Royal Engineers at the War Office, Major-General Sir G. K. Scott-Moncrief. Swinton briefed him on siege warfare practices and the status of German defensive trench networks. He concluded his briefing with the recommendation that "a practical solution should be sought by a committee of experts in the branches of engineering concerned, who should have a free hand to experiment in the conversion of the Holt Tractor."[21] General Scott-Moncrief was somewhat interested and referred the matter to a small departmental committee under the Director of Fortifications. Swinton still had not received official backing, but his concept was beginning to circulate.

By this time the War Council had reviewed Lord Hankey's Boxing Day Memorandum, and Churchill's letter to the Prime Minister had prompted the War Office to conduct some preliminary investigations. After determining that "no modification of the engine would make it possible for [the trenches] to be crossed,"[22] the War Office abandoned all

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[21]Ibid., 77.

[22]Ibid., 139.

testing. Churchill's Admiralty Committee under the Director of Naval Construction, formed in February 1915, continued developmental research. In May, 1915 Churchill authorized the expenditure of seventy thousand pounds to continue the development of a landship on behalf of the Army. By late May, 1915 the War Office discovered the work being done at the Admiralty and began correspondence concerning the establishment of a joint project committee, but still withheld official sanction of the concept.

June 1, 1915 was a critical date for Swinton in his pursuit of official backing for his concept. On that date he was officially terminated as the "Eyewitness" government correspondent on the Western Front. Swinton credited his experiences with enabling him to acquire direct knowledge of one of the principle factors contributing to the British failure to achieve strategic mobility: "this factor was the power of the machine gun when sheltered under shell-proof cover or kept under it until required."[23] The combination of all his experiences inspired him to record his thoughts in June 1915 in a memorandum entitled "The Necessity For Machine Gun Destroyers." Swinton believed that the concept of a machine gun destroyer was the only viable solution to the battlefield stalemate.

Swinton's memorandum was remarkable for its clarity and content. In it he described the German trench network

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[23]Ibid., 103.

system with its interlocking and mutually-supporting fields of fire. He cited the number of machine guns employed as the critical factor in the British failure to penetrate defensive positions. He then recognized the unsuccessful efforts to neutralize German trenches, wire and machine guns with artillery:

> "So far, we have in all our offensive efforts been unable, with our guns, to shatter the defensive zone to its full depth over any considerable length and so blast a path for our advance. The machine guns have not been neutralized, and it is our infantry, either caught up in wire, in the open, or collected in the enemy's trenches, that have had to suffer from the undivided attention of these weapons."[24]

Swinton's practical and innovative solution called for the development of an "armored machine gun destroyer" to neutralize enemy machine guns and create a path through wire obstacles for the infantry assault formations.

Swinton presented general characteristics for the construction and operation of this machine. The prototype was to be a petrol tractor employing the caterpillar track principle which would be capable of: a speed of four miles an hour on flat ground (to allow the infantry to keep pace); crossing ditches four feet wide without having to climb (so at to maintain the momentum of an assault); and climbing in and out of large ground depressions (such as artillery shell craters.)[25] In addition, the vehicles were to be armored

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[24]Swinton, "The Necessity For Machine Gun Destroyers," June 1, 1915, cited in Eyewitness..., 106-111.

[25]Ibid.

with hardened steel plate and armed with machine guns and a two-pounder cannon.

Swinton saw these machine gun destroyers as the solution to the battlefield stalemate, and in this memorandum gave suggestions for their employment. He recommended the machines be used "as a surprise in an assault on the German position to be carried out on a large scale. There should be no preliminary efforts made with a few machines, the result of which would give the scheme away."[26]

The idea was to locate enemy machine gun emplacements through direct observation and infiltration, conduct the usual pre-assault artillery barrage, but then to launch the machine gun destroyers towards the enemy position in advance of the infantry. Swinton's idea coincided nicely with the traditional practices by which the artillery conquered and the infantry occupied. After breaching the wire the machines would destroy the gun emplacements either by crushing them or by neutralizing them with their cannon. Resistance in the trenches would be suppressed by the on-board machine guns, allowing the infantry, "who will leave their own trenches and assault just as the destroyers reach the hostile parapet, to cross the fire-swept zone between the lines practically unscathed."[27]

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[26]Ibid.

[27]Ibid., 109.

Clearly Swinton saw the machine gun destroyer as an infantry support weapon designed to break the battlefield stalemate and restore mobility to the infantry. He intended for this machine to provide a means for the infantry to break into the "outpost" and "battle" zones of the German defense system and reach the "rearward" zone to engage enemy supply and command elements. Swinton was so sure that his solution was a viable one he submitted the June 1, 1915 memorandum to Major-General Sir Edward M. Perceval, sub-chief of staff, for final submission to the Commander-in-Chief of the British Expeditionary Force, General French.

As the memorandum made its way through channels it encountered establishment opposition in the person of the Engineer-in-Chief, who summed up his assessment with "I think therefore that before considering this proposal we should descend from the realm of imagination to solid facts."[28] The Engineer-in-Chief was the third highly-placed official who scorned Swinton's idea, the first being Lord Kitchener and the second the Director of Fortification and Works. Swinton responded to the Engineer-in-Chief's criticisms concerning vehicle speed, steering and weight in a reply dated June 5, 1915,[29] and submitted the original memorandum together with this subsequent addition to a

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[28]Ibid., 111.

[29]Memorandum from Swinton to Engineer-in-Chief dated June 5, 1915, cited in Eyewitness..., 112.

newly-formed Inventions Committee. Although Swinton was experiencing difficulty getting official support from General Headquarters, he was not lacking in support from actual Front commanders. On June 12, 1915 Swinton received a note from Lord Cavan, the Commanding Officer of the Fourth Guards Brigade, one of whose staff officers Swinton had briefed previously on the machine gun destroyer concept. In this note Cavan stated he would "welcome any suggestion in this extraordinary war that will help to take an enemy's trench without a cost of fifty percent of the leading company and seventy-five percent of that company's officers."[30]

Lord Cavan emphasized that the destruction of wire obstacles was the key element to the success of an assault, and summarized his requirements in this way: "What one wants is: 1) the path cleared to the enemy's first trench; and 2) fire kept down from the second trench and machine guns in strong points behind."[31] Given those requirements from the field Swinton was convinced a vehicle designed in accordance with his concept and general specifications was the solution to the battlefield stalemate.

Not satisfied with general requirements and specifications, on June 15, 1915 Swinton submitted another

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[30]Note from Lord Cavan to Swinton dated June 12, 1915, cited in Eyewitness..., 121.

[31]Note from Lord Cavan to Swinton, dated June 12, 1915, cited in Eyewitness..., 122.

memorandum containing specific design requirements for a machine gun destroyer. These requirements included a speed of four miles per hour; the capability to travel in reverse; the ability to cross an earth parapet five feet thick and five feet high; the ability to cross a gap five feet wide without bridging; and the capability of carrying a crew of ten men armed with two machine guns and one quick-fire cannon.[32] This memorandum, along with the original memorandum "The Necessity For Machine Gun Destroyers" dated June 1, 1915 and the memorandum for the Engineer-in-Chief dated June 5, 1915 passed through the Inventions Committee and on to the Commander-in-Chief.

On June 23, 1915 General French sent the Secretary of War a formal request for consideration of the mechanical battlefield stalemate solution contained in these memoranda by Swinton.[33] "There appears to be considerable tactical value in this proposal," French wrote Kitchener, "which adapts the peculiar qualifications of the caterpillar mode of traction to the transport of a species of armored turret... especially in connexion [sic] with the trench warfare which is the fate of the present operations...."

Eight days later the War Office organized a field

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[32]Swinton, "Caterpillar Machine Gun Destroyer: Suggested Conditions To Be Adhered To In Design, If Possible," dated June 15, 1915, cited in Eyewitness..., 123-124.

[33]O.A. 2/108. D., FROM: The Field Marshal Commanding in Chief, TO: The Secretary, War Office, London, S.W., dated June 22, 1915, cited in Eyewitness..., 125-126.

demonstration of a small caterpillar tractor engaged in crossing wire entanglements. Among the observers were Churchill and Mr. Lloyd George, head of the newly-formed Ministry of Munitions. Lloyd George was so impressed with the concept in theory that he agreed his ministry would take over responsibility for landship production once the War Office approved an Admiralty prototype. That same day, June 30, 1915, the War Office forwarded to the Admiralty Landships Committee Swinton's June 1 and June 15 memoranda on the necessity and specifications for machine gun destroyers. Up until that point the Admiralty had pursued the concept of a vehicle designed to carry a number of men based on naval air station security requirements. These documents focused the Admiralty's research on a vehicle manned by a minimum fighting crew designed to breach wire obstacles and destroy machine guns.[34]

In July 1915 the War Office and the Admiralty formed a joint committee to pursue final departmental responsibility for vehicle development. The result of these discussions was a joint committee meeting on August 26, 1915 between the Admiralty, the War Office and the Ministry of Munitions. This meeting designated clearly the roles and responsibilities of each department with regards to machine gun destroyer development and production.

The War Office would generate specifications and

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[34]Ibid., 141.

requirements; the Admiralty would continue design improvement and experimentation; and the Ministry of Munitions would assume responsibility for construction and fielding of the final design.[35] Swinton had succeeded in getting official approval for his machine gun destroyer. This concept, which began as a "machine gun complex" based on Swinton's personal experiences in the Boer War and on the Western Front, was accepted for development by a military establishment desperate for a solution to the battlefield stalemate.

In mid-July, 1915 the War Office recalled Swinton to London and made him the Secretary of the Dardanelles Committee of the Cabinet, formerly the Committee of Imperial Defense. This position gave him access to the department heads involved in prototype production and allowed him to monitor the development of the machine gun destroyer from a central position. On July 30, 1915 Swinton reported to the Director of Naval Construction, Mr. D'Eyncourt, to ascertain the status of Admiralty progress. Mr. D'Eyncourt outlined the Admiralty's position and informed Swinton that a prototype landship was being prepared in accordance with specifications recently received from the War Office.[36] Those specifications were Swinton's own, contained in his memorandum of June 15, 1915. Mr. D'Eyncourt also told

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[35]Ibid.

[36]Ibid., 136-137.

Swinton that the question of departmental responsibility was still unresolved; a situation corrected by the War Office at the August 26, 1915 joint committee meeting.

The first field test of a Landships Committee prototype tracked vehicle, dubbed "Little Willie," took place at a London test site on September 19, 1915. The prototype, designed in accordance with Landships Committee specifications, not Swinton's, failed the test. The Committee then circulated a report that the machine gun destroyer concept had failed in the effort to maintain secrecy surrounding the development of the next prototype already under construction.[37] This prototype, originally referred to as "H.M.S. Centipede," was built following Swinton's design specifications listed in the June 15, 1915 memorandum. This vehicle later came to be known as "Mother," and served as the prototype of the Mark I series of tanks called "Big Willies" which first saw action in September 1916.[38]

Development and construction of the next prototype continued throughout the Fall of 1915. Shortly before Christmas the War Office convened a conference with representatives from the three departments to determine the next stage of production should the prototype test successfully. Swinton, acting as the secretary for the

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[37]Ibid., 146.

[38]Ibid., 147.

conference, was detailed to find a non-committal word to take the place of "landships" of "land cruiser" which were considered too revealing for security purposes. Swinton related the selection of the name as follows:

> "The structure of the machine in its early stages being boxlike, some term conveying the idea of a box or container seemed appropriate. We...rejected in turn 'container,' 'receptacle,' 'reservoir,' and 'cistern.' The monosyllable 'tank' appealed to us as being likely to catch on and be remembered. That night [December 24, 1915], in the draft report... the word 'tank' was employed in its new sense for the first time."[39]

Although the prototype construction was nearing completion Swinton still had not been able to brief Kitchener on the overall concept of a machine gun destroyer. Despite repeated requests from field commanders for a solution to the battlefield stalemate, Kitchener withheld enthusiastic approval for Swinton's concept. After reviewing a draft of the report by the Interdepartmental Conference of December 24, 1915 Kitchener wrote: "As soon as a machine can be produced the first thing necessary... [would be] to test its practical utility under field conditions; without such a test we may be wasting material and men uselessly."[40] Swinton and his associates complied and designed a steeplechase test course at Hatfield Park outside of London which contained obstacles resembling those found on the Western Front.

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[39]Ibid., 161.

[40]Minutes by Lord Kitchener, dated December 29, 1915, cited in Eyewitness..., 163.

On February 2, 1916 the prototype Mark I tank, known as "Mother," underwent testing at Hatfield Park. The demonstration was held for senior Cabinet members including Lord Kitchener, Lloyd George, the Admiralty staff, and senior officers from the War Office and General Headquarters.[41] The tank was based on much the same components as the earlier version, but incorporated several design modifications resulting from Swinton's specifications and front line experiences.

It was thirty-one feet three inches long, rhomboidal in shape, and had an overall weight of twenty-eight tons. It achieved a maximum speed of three and a half miles per hour. The vehicle was equipped with two six-pounder cannon, four machine guns, and carried almost one half inch of armor plate protection on its front slope. A later version of this vehicle, known as a "Female," differed from the prototype in that, while it was outfitted with identical armor plating, its armament consisted of five machine guns only. Total crew on either vehicle numbered eight.[42]

The reasoning for two versions was based on projected employment. The Male version, armed with heavy cannon, was suited for assault on heavily-fortified trenches and buildings. The Female version was better suited for

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[41]Ibid., 170.

[42]Richard M. Ogorkiewicz, Armour (London: Stevens and Sons Limited, 1960), 143.

infantry escort and protection. Both designs incorporated Swinton's requirements for cross-country maneuverability, suppressive firepower, and personnel protection.

The Hatfield Park field test was a success. The prototype tank fulfilled all the requirements and the general attitude of the observers was highly receptive. Llord George wrote: "The experiment was a complete success, the Tank achieving even more than it was asked to accomplish. At last, I thought, we have the answer to the German machine guns and wire."[43] Despite the tanks' demonstrated potential, Kitchener was still not enthusiastically supportive, and claimed that the war would never be won by such machines due to their inherent vulnerability to enemy artillery. In reality, Kitchener was very impressed with the tank, remarking to General Sir Robert Whigham that it was far too valuable a weapon for so much publicity. He purposely left the test site before the trials were concluded to create the impression that he did not see any value in the new equipment. By portraying an outward appearance of skepticism, he hoped to increase the level of secrecy surrounding the project.[44]

The primary purpose of the field test, outside of verifying the tank's operational capabilities, was to impress the representatives from the War Office and General

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[43]David Lloyd George, War Memoirs..., 98.

[44]Ibid., 99.

Headquarters. They were favorably impressed and forwarded their opinions to General Douglas Haig, now commanding the British Expeditionary Force. Lord Kitchener, appearing outwardly skeptical, authorized Haig latitude in requisitioning tanks. On February 11, 1916 the War Office received from Haig's staff a request for forty tanks. Swinton recommended increasing the number to one hundred and drafted an official request from the War Office to the Ministry of Munitions. The next day, February 12, 1916, Lloyd George authorized the production of the tanks.[45]

After contracting for the vehicles the War Office began to create a Table of Organization and Equipment for the first tank unit and appointed Swinton as commander of the new Tank Detachment.[46] Swinton's role was to raise and train the detachment in England, and relinquish command to the local BEF commander when the unit deployed to the Front. Swinton initially wanted all the tanks to be consolidated into one battalion organization, but General Headquarters was opposed to that plan. After the production contract was increased in April 1916 from one hundred tanks to one hundred fifty, GHQ finalized the Detachment organization at six companies of twenty-five tanks each.[47]

Swinton and his staff worked hard on the final

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[45]Ibid., 100.

[46]Swinton, Eyewitness..., 175.

[47]Ibid., 184.

organization listing [then called a "war establishment."]

With regards to creating the table Swinton wrote:

> "This is a complete and detailed tabular statement of every man, animal and vehicle required by a unit to take to the field. There were no precedents to follow, and one of our great difficulties was to convince many of the officers that the [detachment] was totally unlike any formation familiar to them."[48]

Swinton finished the document in May 1916 and incorporated the following figures: six companies of twenty-five tanks each (seventy-five each of Male and Female versions;) eleven motor cars; ninety-nine bicycles; twenty-seven motorcycles; one hundred eighty-four officers and one thousand six hundred ten enlisted soldiers.

While working on final vehicle development in February 1916 Swinton published what is probably his most important memorandum entitled "Notes On The Employment Of Tanks." In this document he emphasized his concept of the tank as "primarily a machine gun destroyer, which can be employed as an auxiliary to an infantry assault, designed for the express purpose of assisting attacking infantry by crossing the defenses, breaking through obstacles, and of dispersing the machine guns."[49] He clearly saw this machine as an infantry support weapon designed to achieve a break-in of the enemy's defenses, allowing the infantry to conduct the assault and eventual breakthrough to the enemy's rear areas.

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[48]Ibid., 185-186.

[49]"Notes On The Employment Of Tanks," February 1916, cited in Swinton, Eyewitness..., 308-325.

Swinton included suggestions on the employment of the tanks to improve their chances for success. First, he recommended that tanks be employed only in areas without restriction on their maneuverability, avoiding for instance "canals, rivers, deep railway cuttings with steep sides, or woods and orchards." Second, he recommended that the traditional role of the artillery [long preparatory bombardments designed to cut wire obstacles and destroy trenches] be revised so that the artillery concentrated on counter-battery fire during the advance to protect the tanks. "It follows therefore," he wrote in the section entitled "Coordinated Action Of All Arms," that:

> "in order to help our infantry in any operation in which Tanks take place (which is admitted to be the role of artillery, also an auxiliary arm,) the principal object of our guns should not be to endeavor to damage the German machine guns, earthworks and wire...a task they cannot with certainty carry out, and which the Tanks are specifically designed to perform. It should endeavor to help by...concentrating as heavy a counter-fire as possible on the enemy's main artillery positions... for the purpose of spoiling the enemy's shooting for the period of the advance."[50]

This revision in artillery tactics would minimize the destruction of the terrain and help maintain the momentum of the assault by protecting the tanks from enemy artillery fire.

Swinton's last and most important suggestion regarded the premature employment of the tanks. He restated his insistence that the existence of the tanks remain a secret

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[50]Ibid., 323.

as long as possible to allow their employment on a mass scale, rather than employing them "in driblets, for instance as they may be produced." In spite of Swinton's recommendations, events conspired to force the early employment of the tanks in September 1916. This study will analyze in the next chapter the political and strategic factors which influenced General Haig in his decision to ignore Swinton's advice and commit the first tanks before swinton and others thought the situation warranted.

Swinton's memorandum marks the beginning of a significant split in the military establishment over the role of the tank on the battlefield. Few military commanders were willing to forego traditional artillery operations in favor of Swinton's recommended revisions. And since even Swinton maintained that the tank was primarily an infantry support weapon pressure mounted to incorporate tanks as quickly as possible into assault operations, even at the expense of secrecy and surprise. As Robert Larson well explains in his study The British Army and the Theory of Armored Warfare, 1918-1940,:

> "This was the vital junction at which the Army high command and the tank people parted company: the former believed the tank would have at most a limited effect on the operational methods of the other arms, whereas the latter were already beginning to perceive it would necessitate significant changes in those methods.[51]

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[51]Robert H. Larson, The British Army and the Theory of Armored Warfare, 1918-1940 (Newark: University of Delaware Press, 1984), 56.

In a period of roughly eighteen months Swinton's concept had become an operational reality about to be committed to action on the Western Front. Trevor Wilson, in his work The Myriad Faces Of War, considered the rapid inception and development of the tank a "prime indication of Britain's considerable war-making capacity in a long drawn-out struggle."[52] He credited the country with possessing the industrial skills and resources capable of converting the ideas of visionaries like Swinton into functioning machines.

Swinton might have been blessed with Britain's industrial complex, but he was forced to deal with a War Office under great pressure to break the battlefield stalemate and free the BEF offensive on the Somme in the summer of 1916. Swinton's tactical recommendations recorded in his February 1916 memorandum fell victim to political and strategic constraints. In late August and early September 1916, fifty tanks arrived in France for use by General Haig, and he assigned them to his main effort. Swinton stated that "It was evident that the section of GHQ set on using the tanks at once had been carried away by the need of the moment to bank too much on what might be accomplished by fifty of them."[53]

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[52]Trevor Wilson, The Myriad Faces Of War (New York: B. Blackwell, 1986), 341-342.

[53]Swinton, Eyewitness..., 234.

Along with the tanks GHQ issued instructions to the BEF commander on their employment. They stated there were four ways of using the machines: the advance in line, which depended on large numbers [and reflected Swinton's recommendations;] the attack in groups or pairs; their use for hauling guns, stores, etc.; and their employment as mobile light artillery.[54] Unfortunately for Swinton, General Haig did not feel that he had time to wait for additional tanks to arrive in theater, and was forced to commit the few he had based on the tactical situation at that time.

The first employment of British tanks on September 15, 1916 did not absolutely rewrite land warfare tactics. Their use was plagued by premature disclosure, mechanical difficulties, and the piecemeal employment of tanks as opposed to mass formations as recommended by Swinton. What the tanks did demonstrate in September 1916 was an effective and innovative solution to the battlefield stalemate with demonstrated potential for expanded tactical development.

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[54]Fuller, Memoirs Of An Unconventional Soldier, 80-81.

Chapter IV: The Unsuccessful Debut

In early December 1915 military representatives of the Allies met at Chantilly to conclude strategy for the following year.[1] They designated the three major areas of emphasis as the Western, Russian and Italian Fronts. One result of the conference was a recommendation that the Allies deliver a series of offensives on these principal fronts as near as simultaneously as possible to prevent the enemy from shifting reserves. Following that recommendation the British War Committee resolved on December 28, 1915 that the BEF should concentrate its efforts in late 1916 or early 1917 on the Western Front.

The War Committee rendered its decision cautiously. Minister of Munitions Lloyd George was adamant that any British or combined offensive be delayed "until we are at full strength, which they say will not be until well into the summer."[2] His fear, as well as that of several other Committee members, was that the Allies would launch an offensive before reaching a level of troop and munitions superiority which would guarantee victory. George's caution was mitigated however, by the German offensive against Verdun which began on February 21, 1916.

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[1]Hankey, The Supreme Command, vol. 2, 468-469.

[2]Robertson, (CIGS) to Haig, January 13, 1916, in Robert Blake (ed), The Private Papers of Douglas Haig, 1914-1919 (London: Eyre and Spottiswoode, 1952), 124.

Three months after the beginning of this costly operation, the War Committee authorized General Haig, the BEF commander, to begin offensive planning and preparation to relieve the French. The War Committee withheld authority from Haig to actually begin combat operations, still hoping that the British would have enough time to build sufficient combat strength. The political ramifications of a French defeat at Verdun outweighed the recommendations of Lloyd George and those who called for delay, however, and the planning quickly gave way to execution.

The German selection of Verdun as the focus of the February 1916 offensive was based on political more than tactical reasoning. The fortress at Verdun was an historical site of great pride for France. Churchill called it "the great advanced citadel of France; the principal bastion of her Eastern frontier, whose fall resounding throughout Europe and the whole world would efface forever the victories of the Marne...."[3] As a military objective it held limited value; the French had allowed the fortress to deteriorate physically, while its garrison was reduced to provide replacements for the Front. But as a psychological objective the fortress was priceless.

The Germans did not necessarily seek to break through Verdun, nor did they have to. Instead, the primary

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[3]Winston S. Churchill, The World Crisis, 1916-1918, vol. 1 (New York: Charles Scribner's Sons, 1927), 76-77.

objective was the destruction of the French Army which, out of pride, would not relinquish the position. General Falkenhayn, the German Chief of Staff who insisted on the plan over the objections of the German Crown Prince, saw the Verdun offensive as the means to forestall the Allied offensives he anticipated. The essential point of the offensive as he saw it was not to take Verdun but to "pin down the French, pull them towards the battlefield, and since they will have to defend it shoulder to shoulder, we shall bleed them white by virtue of our superiority in guns."[4] Churchill, writing after the war, recognized the strategic value of a German victory at Verdun: "Whether Verdun was taken or not the French Army would be ruined and the French nation sickened of war."[5]

The Germans began their assault on Verdun at 0400 hours on February 21, 1916. On that day alone the German artillery fired approximately 1,000,000 shells at the French defenders.[6] Caught unprepared for an offensive of that magnitude the French garrison made plans to abandon the fortress and withdraw to the left bank of the Meuse river. Before the withdrawal operation could begin however, General Joffre, the Chief of the French General Staff, sensed the

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[4]General Falkenhayn to German Crown Prince, cited in Ferro, 76.

[5]Churchill, The World Crisis, 1916-1918, vol. 1, 79.

[6]Ferro, 76.

strategic importance of Verdun and canceled the withdrawal.

So critical was the French retention of the fortress to Joffre that for seven months the French reinforced Verdun with an average weekly strength of 90,000 men and 50,000 tons of supplies.[7] During that same period, out of a total French army-wide strength of 330 infantry battalions, 259 rotated through the defense at Verdun.[8] These figures attest to the accuracy of Falkenhayn's prediction that the French would not relinquish the fortress willingly.

Joffre's decision to reinforce and defend the fortress, although it enabled the French to stop the initial German assault by February 28, proved very costly. From the end of February to June 1916 the battle centered on the fortress just as Falkenhayn had planned. During this four month period the French lost an estimated 179,000 enlisted soldiers killed, with an additional 263,000 wounded. Churchill estimated the total number of French casualties at Verdun during this period, once the officer casualties were included, to be approximately 460,000 men.[9] The cost of this defense included more than just the number of French casualties, however. It also affected the status of preparations for the upcoming combined Allied offensive and the ability of the French to support that operation.

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[7]Churchill, The World Crisis, 1916-1918, vol.1, 87.

[8]Ferro, 77.

[9]Churchill, The World Crisis, 1916-1918, vol. 1, 90.

The situation at Verdun was not viewed in the same manner by all observers. The Germans believed their plan to demoralize the French nation and bleed the French Army was succeeding. General Haig's Chief Inspector, General Robertson, was of the opinion that the Germans were wasting troops at Verdun: "It seems to me that we can desire nothing better than that the enemy should continue his attacks, as they will use up his troops to a much greater extent...."[10] During a meeting on May 6, 1916 between Haig, Robertson, the BEF Adjutant General and the BEF Quartermaster General, Haig explained to Robertson his belief that he "deemed it unwise to attack until all resources had been developed and our Army in France was as strong as possible. Robertson replied that he entirely agreed..., and that he knew the British government was also of this opinion."[11] Haig believed the French capable of maintaining a defensive posture long enough to allow the BEF time to build combat strength.

Haig based his assessment of the French capability to sustain the defense of Verdun not only on the input of his General Staff and the British War Committee, but also on the recommendations of the French government. In late May 1916 Haig received a letter from the President of the Military

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[10]Robertson to Haig, cited in Paul Guinn, British Strategy and Politics, 1914-1918 (Oxford: Clarendon Press, 1965), 138.

[11]Blake, 142.

Committee of the French State, Georges Clemenceau.[12] In this letter Clemenceau made four specific statements which reinforced Haig's analysis of the French position.

First, the general feeling was that the French were opposed to any offensive until the Allies were as strong as possible so as to ensure success. Second, that France was prepared to pass another winter under war conditions rather than risk failure through making a premature attack. Third, Monsieur Briand, the French Prime Minister, had personally told Clemenceau that there was no intention of making an attack that year [1916] and that General Foch agreed with that opinion. And fourth, the poor financial condition of France required some type of financial agreement. Based on this information, in addition to the opinion of his own staff and the British War Committee, Haig believed his decision to continue building combat power in anticipation of a late 1916 or early 1917 offensive to be correct. However, the actual French military situation in the Summer of 1916 changed Haig's perspective.

On May 24, 1916 Haig received a letter from General Joffre in which the latter stated "that owing to the hard fighting at Verdun he had not the number of Divisions available for a combined attack which he had hoped."[13] The letter went on to state that since the French losses at

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[12]Ibid.

[13]Ibid., 143-144.

Verdun were approaching two hundred thousand, the author was of the opinion that the offensive could not be delayed beyond the beginning of July 1916. Joffre exhibited some of the French pride which was an integral part of the German strategy when he stated that the French "would prefer to lose their casualties in an offensive attack rather than to melt away while sitting still."[14]

Joffre had additional reasons for requesting Haig that accelerate offensive planning. Subordinate commanders had asked him for help on the Italian Front, claiming that the loss of 200 artillery guns and 20,000 prisoners jeopardized their ability to hold out in anticipation of a later offensive. In addition, the Russians had decided to begin their offensive on June 15, 1916. The Germans had withdrawn troops from the Eastern Front to participate in the attack on Verdun, while the Austrians had employed their reserves, making the situation favorable for a Russian offensive sooner than expected.[15]

Joffre's letter convinced Haig of the need to accelerate his planning, and he committed to a BEF offensive to begin sometime in mid-July, 1916. Joffre responded with another letter on May 26, 1916, in which he explained his general situation in plainer language. For three months the French had borne the brunt of the German offensive at

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[14]Ibid.

[15]Ibid.

Verdun. French losses were approaching 200,000 men, and if this continued the French Army would be ruined. Joffre's opinion was that "the 1st July was the latest date for the combined offensive of the British and French."[16]

Pressured by the losses to the French Army, Haig received authorization from the War Committee to begin offensive operations on July 1, 1916. The area he selected for the operation was in the vicinity of the Somme River, giving rise to the popular reference of the Somme Campaign of 1916. This offensive is important to this study because it represents the operational debut of Swinton's machine gun destroyer as a mechanical solution to the battlefield stalemate.

Haig and his planning staff selected the Somme area for the 1916 offensive for a number of reasons. Flanders was ruled out because the combination of a high water table plus the artillery barrages of the previous two years had turned the area into a quagmire. The southern sector of the Western Front, from Verdun to the Swiss border, was heavily wooded and full of hills and valleys, making it unsuitable for a sustained advance on a wide front. In contrast, the Somme sector had seen very little activity since late 1914, which meant minimal artillery damage. The ground was generally composed of chalky sub-soil covered with loam which would provide good maneuverability if the weather

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[16]Ibid., 144-145.

stayed dry. The area was fairly flat, contained few major dominating terrain features or built-up areas, and most importantly for Haig, was open enough to allow for the employment of cavalry once the infantry achieved a breakthrough.[17] "The most striking characteristic of the Somme battlefield," wrote Douglas Johnson in his survey Battlefields of the World War, "is its monotonous succession of low rolling plain."[18]

The area might have been suitable for offensive operations, but Haig realized that it favored the German defenders.[19] The Germans had been in the region since late 1914 without either side conducting offensive operations. This period of inactivity had given the defenders ample time to reinforce and extend their positions. The "outpost" and "battle" zones consisted of multiple trench systems, dug to a depth of ten feet and inter-connected with numerous communications trenches. Beneath the trenches the Germans constructed dugouts of reinforced barrier mater. sometimes at depths of thirty feet, designed to protect the defenders from artillery barrages and allow them to wait in safety until the actual assault appeared. Each zone was protected with two belts of barbed wire obstacles, each

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[17]Wilson, 312-313.

[18]Douglas Wilson Johnson, Battlefields of the World War (New York: Oxford University Press, 1921), 96.

[19]J.H. Boraston, Sir Douglas Haig's Despatches, Dec. 1915-April 1919 (New York: Charles Scribner's Sons, 1927), 23.

forty yards deep and staked in place with wire stakes.

The defending machine gun positions were not only sighted in on "No Man's Land" but also on the trenches themselves. This arrangement made each trench position mutually supporting and gave the defenders the capability to physically abandon a trench while retaining the ability to suppress the assaulting infantry. German artillery batteries, located behind the "outpost" zone, could fire on the attackers as soon as they left their own trenches. This aspect of the defense was particularly important because the ground, while relatively flat, sloped upwards from the British to the German trenches. This forced the attackers to move forward uphill and without cover, and precluded observation of the area directly behind the forward positions of the"outpost" zone. Haig's own assessment of the defensive network was that "they formed, in short, not merely a series of successive lines, but one composite system of enormous depth and strength."[20]

After the war Churchill wrote that the complexity of the defensive network was as much a factor in the selection of the Somme for the 1916 offensive as was the area's suitability for maneuver. "All these conditions," he wrote, referring to the terrain and the complexity of the German defenses, "clearly indicated to the staffs a suitable field for our offensive, and it was certain that if the enemy were

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[20]Ibid.

defeated here, he would be more disheartened than by being overcome upon some easier battleground."[21]

The plan called for an assault of the defensive system on a wide front, with an expansion of any penetration to the Northeast and North by the British and to the Southeast by the French. As the troops stabilized the penetration and rolled up the exposed flanks, British and French cavalry divisions would push forward through the gap and conduct operations in the "rearward" zone.[22] The success of this simple plan hinged on the initial penetration of the "outpost" zone into the "battle" zone. In other words, British success was again directly related to the constraints of the battlefield stalemate and the effectiveness of the artillery in breaching the trench and wire obstacles.

Haig assigned the main effort of the attack to the Fourth Army under General Sir Henry Rawlinson. Rawlinson held the Somme Front with the French in position on his right. His orders were to mount an infantry attack and breakthrough the "outpost" and "battle" zones on a ten mile front from Montauban in the South to the Rivre Ancre. North of this river another corps was to seize the German trenches on a three mile front and perform flank guard operations in

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[21]Churchill, The World Crisis, 1916-1918, vol 1, 172.

[22]Ibid., 173.

support of the main effort.[23]

Haig made it clear that he expected a rapid breakthrough on a wide front to allow the cavalry to get into open country. This type of rapid offensive was crucial if Haig were to succeed in achieving his three strategic goals for the overall operation: to relieve the French at Verdun; to inflict high losses on the Germans; and to place the British Army in favorable positions for the final offensive in 1917.[24] The boldness of the plan reflected Haig's desire to employ the cavalry as quickly as possible, and required that Rawlinson secure rapid and widespread breeches in the "outpost" and "battle" zones. In contrast to Haig's expectations, Rawlinson's plan was much less assuming but perhaps more realistic in its expectations.

Instead of planning for a rapid initial breakthrough directly to the "rearward" zone, Rawlinson projected an offensive operation conducted in stages. He proposed on the majority of his front to capture initially only the "outpost" zone trench positions. Once this was accomplished, he would advance his artillery and assault troops and attack the "battle" zone. "Ultimately," wrote Trevor Wilson, "the entire enemy defense system would be overrun, and at that stage the break-in could become a

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[23]Middlebrook, 51-52.

[24]Ibid.

break-through and the cavalry make its advance."[25]

Rawlinson's lockstep approach to the offensive was a marked contrast to Haig's concept. Haig planned for a decisive operation designed to employ massive artillery barrages and heavy infantry formations in the effort to capture all three defensive networks rapidly, ultimately allowing for the employment of large cavalry divisions. Rawlinson planned for the piecemeal destruction of the obstacles and was skeptical of the potential for cavalry exploitation.[26] Haig was motivated by the French situation at Verdun, whereas Rawlinson was more realistic in his assessment of the tactical capabilities of the infantry and the realistic constraints on battlefield maneuver.

British preparations for the Somme offensive of 1916 were detailed. They improved assembly and assault trench positions, constructed communications trenches and lines, laid rail lines to carry supplies, and stockpiled 1,500,000 artillery shells for the preparatory barrage.[27] During the seven days prior to the assault the British fired approximately 1,000,000 shrapnel shells at the "outpost" and "battle" zone trench positions. Such a massive artillery prep obviously meant the loss of surprise, but this did not bother the British. Rawlinson, in a pre-assault

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[25]Wilson, 317.

[26]Prior and Wilson, 232.

[27]Boraston, 21.

communication with his corps commanders, stated his belief that "nothing could exist at the conclusion of the bombardment in the area covered by it."[28]

His faith in the traditional British solution to the battlefield stalemate was based on impressive statistics. Along the fifteen mile front assigned to the Fourth Army the 1,437 guns, firing over 1,000,000 shells (an average of one gun per seventeen yards of trench line), could deliver a preparatory barrage which was designed to accomplish three tasks. The first was the suppression of German artillery at its farthest point. The second was the destruction of the German wire obstacles at the nearest point. And the third was that the defenders would be rendered incapable of employing their weapons, particularly the machine guns.[29]

This operation placed excessive faith in the ability of the artillery to destroy trench and wire obstacles and suppress machine guns, which would then allow the infantry to assault uncontested. The offensive planners discounted the capabilities of the German defenders and their ability to survive a British artillery barrage. Their failure to accurately assess the deficiencies inherent in artillery barrages resulted in horrific loss of life for the British and underscored the need for a solution to the stalemate.

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[28]Sir James Edmonds, Military Operations in France and Belgium, 1916, vol 1 (London: Macmillan Publishers, 1932), 288.

[29]Wilson, 318.

On July 1, 1916 the British ended the preparatory barrage and began their assault. Fourteen British divisions in the North faced eight German divisions (five in the trenches and three in reserve) across "No Man's Land." As the British troops climbed over their parapets and began their assault, they discovered that the artillery had failed.

The massive barrage had not succeeded in suppressing machine gun positions because the defenders merely waited out the shelling in the relative safety of the dugouts. German soldiers were able to rebuild the wire obstacles which had been minimally damaged by the shrapnel shells, and they continued to improve their positions. As the barrage lifted, the defenders were able to man their trench and shell-hole positions before the assault troops reached the first wire obstacles. Over 60,000 men assaulted in the first waves; about 120,000 attacked by the end of the day. In the first thirty minutes alone, the British experienced 30,000 casualties.[30] Churchill estimated the total British first day losses to be nearly 60,000. He called July 1, 1916 "the greatest loss and slaughter sustained in a single day in the whole history of the British Army."[31]

Haig's initial reaction to the tremendous loss of British life on July 1 was one of acceptance. He wrote in

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[30]Ibid., 325-327.

[31]Churchill, The World Crisis, 1916-1918, vol. 1, 179.

his journal on July 2 that the "AG [Adjutant-General] reported to-day that the total casualties are estimated at over 40,000 thousand to date. This cannot be considered severe in view of the numbers engaged and the length of the front attacked."[32] His attitude was tempered, however, by the complete British failure to achieve any of their initial tactical objectives for the first day. Out of a front of fifteen miles they succeeded in controlling a stretch three miles wide and only one mile deep. Of the thirteen villages previously controlled by Germans and considered crucial to the offensive, the British managed to capture only three.

At no point were the British even close to the "battle" zone positions, and they did not control any of the higher ground.[33] The first day assault which met with tactical failure and incredible casualties underscored the need for an alternative solution to the battlefield stalemate. British artillery had proved incapable of adequately addressing the combination of trenches, wire obstacles and machine gun positions.

After the first of July the British offensive degenerated into a series of "minor operations which proceeded continuously on a comparatively small front."[34] By the end of July the British succeeded in extending their

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[32]Blake, 154.

[33]Wilson, 325.

[34]Churchill, The World Crisis, 1916-1918, vol.1, 180.

advance to a depth of two miles on the same frontage, but for this minimal gain a total of over 170,000 soldiers were lost, either killed or wounded. In contrast, the German losses for the same period totalled just over 11,000.[35] The offensive might have degenerated into a series of "minor operations," but the cost in lives was anything but minor. The BEF casualties for July 1916 totalled 196,081; for August 75,000; and for September 115,056 men.[36]

The tragedy of the operation lay not only in the tremendous loss of lives, but in Haig's failure to transform this loss into strategic success. He had achieved partial success by relieving pressure on Verdun and preventing German diversion of troops to other fronts. But he had failed in the most critical aspect of his plan, which was to achieve a complete breach in the enemy line and let loose his cavalry divisions. His failure to achieve this third goal is directly attributable to the British artillery's failure to overcome the combined effects of the battlefield stalemate.

In response to growing political opposition to the operational casualty reports, Haig listed the strategic accomplishments of the Somme offensive in his August 1, 1916 Army Order of the Day to the Minister of War.[37] In this

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[35]Ibid., 182.

[36]Churchill, The World Crisis, 1916-1918, vol. 3, 821.

[37]Blake, 157-158.

letter he emphasized the positive progress made by the BEF in support of the French at Verdun and downplayed the negative. He stated:

a) "Pressure on Verdun relieved. Not less than six enemy divisions besides heavy guns have been withdrawn.

b) Successes achieved by Russia last month would certainly have been prevented had enemy been free to transfer troops from here to the Eastern theater.

c) We have inflicted very heavy losses on the enemy. In one month, thirty of his divisions have been used up, as against thirty-five at Verdun in five months. In another six weeks, the enemy should be hard put to it to find men."

Haig continued in his letter to state his intention to continue the Somme offensive, to push the attack whenever possible, and to consolidate his gains. He addressed specifically his success in achieving two of his goals (relief of pressure at Verdun and prevention of German troop movement between fronts) but avoided any discussion of failure to achieve the breakthrough of enemy lines. He was aware that this failure was due in part to the artillery's inability to open a path for the infantry. His subsequent actions with regards to Swinton and the machine gun destroyer underscored his willingness to employ innovative measures to secure his needed battlefield breakthrough.

In April 1916 Haig had met Swinton in London. Haig's staff had by that time placed the initial order for tanks based on the Hatfield Park test results. In addition, Haig was familiar with the contents of Swinton's February 1916 "Notes on the Employment of Tanks." Haig discussed the

operational recommendations made by Swinton and emphasized his desire to have tanks in theater as soon as possible. In response to Swinton's statement that August 1916 was the earliest possible date that tanks would be available in large numbers, Haig replied "that was too late - fifty were urgently required for the 1st June."[38] Swinton took Haig's interest in procuring sizeable shipment of tanks as general agreement with his principle of employing the tanks in mass: "I was much relieved that the two senior officers in France... were in accord with my ideas. It implied that they approved the policy of not employing tanks in driblets, a point which I had emphasized."[39]

Swinton's desire to guarantee operational success of the tanks by ensuring their employment in accordance with his own personal principles clouded his assessment of the tactical situation. After the initial July 1916 offensive stalled Haig felt pressure to regain momentum and was willing to sacrifice surprise if it meant the possibility of achieving a breakthrough of the German lines. "Even if I do not get as many [tanks] as I hope," he wrote to the Chief of the Inspector General Staff General Robertson, "I shall use what I have got, as I cannot wait any longer for them...."[40]

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[38]Ibid., 138.

[39]Swinton, Eyewitness..., 192.

[40]Letter from Haig to Robertson, cited in A.H. Farrar-Hockley, The Somme (Chester Springs, P.A.: Dufour Publishing, 1964), 181.

Haig later wrote that he was disappointed by an August 1916 letter from the Ministry of Munitions which advised him that accessories for the tanks [weapons] would not be delivered until September 1, 1916. "This is disappointing," he wrote, "as I have been looking forward to obtaining decisive results from the use of these 'Tanks' at an early date."[41] Between late August and early September 1916 fifty-nine tanks arrived in France and Haig assigned them to his main effort which had remained the Fourth Army under General Rawlinson.

On September 11 Haig visited Rawlinson at Fourth Army headquarters. Among the things they discussed was the "necessity for advancing quickly so as to take full advantage" of the tanks.[42] Rawlinson agreed and briefed Haig on the general concept of the upcoming operation and the role the tanks would play. Rawlinson assigned small numbers of tanks to each corps for the express purpose of capturing specific strongpoints which were likely to interrupt the offensive momentum. He concentrated a larger number with the object of capturing the village of Flers, which he considered key to the defense in the Southeast. In general, Rawlinson expected the tanks to enable the infantry to capture tactically important villages, reduce the overall number of casualties in the main attack, and assist in

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[41]Blake, 159.

[42]Ibid., 165.

maintaining the momentum of the assault.[43]

In some respects Rawlinson and Swinton were in complete agreement. For each the tank was an infantry support weapon, auxiliary to the assault, and designed to assist the infantry in maintaining forward momentum. Where differed was in the area of employment strategy. Whereas Rawlinson saw the use of the tanks as supporting the infantry, he was unwilling to mass them in one sector as Swinton recommended. Instead, he allocated them to local commanders for immediate use, practically assuring that Haig's desperately needed breakthrough would not occur as a direct result of massed tanks penetrating on a narrow front.

Rawlinson's piecemeal allocation of the tanks and his instruction to his local commanders to have the tanks precede the infantry in the assault resulted in an immediate conflict between the infantry and the artillery. The specific source of contention was the traditional reliance of the infantry on the supporting and protective creeping artillery barrage. Prior to mid-September 1916, the British infantry assaulted the "outpost" zone behind a barrage of shells. This barrage advanced forward at a rate of one hundred fifty yards per minute and consisted of one or two rounds of shrapnel per minute from each eighteen-pounder

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[43]Prior and Wilson, 229.

gun.[44]

This barrage was designed to suppress any defenders who survived the preparatory barrage and provide the assaulting troops with a wall of shells behind which to advance. The experiences of July and August 1916 demonstrated to the British that the traditional creeping barrage advanced too rapidly and was of insufficient density to suppress the defense. To correct this problem, the creeping barrage designed by Rawlinson's artillery commanders was slowed to a rate of advance of fifty yards per minute while the rate of fire from the eighteen-pounder guns was increased to three rounds per minute.[45] The problem facing the infantry was not in the design of the creeping barrage but in the relationship between the barrage and the movement of the tanks.

Put simply, the artillery could not fire the creeping barrage in support of the assault without hitting the tanks. Without the barrage, the assaulting infantry would be exposed to any defenders not immediately engaged by the tanks. Rawlinson's solution was to group the tanks together and create corridors in the creeping barrage down which the tanks would assault. The corridors were designed to be one

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[44]X Corps, "Questions relating to an initial attack after a lengthy preparation;" 16/8/16, Montgomery-Massingbard Papers, Folder 47; cited in Prior and Wilson, 236.

[45]XV Corps Artillery Operation Order #47, 13/9/16; cited in Captain Wilfred Miles, Military Operations France and Belgium: 1916, July 2 to the End of the Somme Battles, vol. 2.

hundred yards wide to ensure the tanks safe passage.[46]

The creation of these corridors resulted in more problems for the infantry. Since the tanks would engage only those strongpoints within range of their weapons, any strongpoint beyond that range but still within in the corridor would immediately engage the infantry. The relative slow speed of the tanks (less than four miles per hour) made it likely that the infantry would outrun the tanks down the corridor and end up assaulting without the benefit of a suppressive barrage. Rawlinson's actions not only ignored Swinton's recommendations but denied the infantry the established support of the creeping barrage and replaced it "with a vulnerable substitute of doubtful efficacy."[47]

The potential loss of artillery protection caused by Rawlinson's plan was not the only reason cited by tank advocates for recommending a delay in the introduction of the new weapon. Both Churchill and Lloyd George were opposed to the premature disclosure of the tanks. Churchill sought an interview with the Prime Minister to protest the "exposure [of] this tremendous secret to the enemy upon such a petty scale and as a mere makeweight to what I was sure could only be an indecisive operation...."[48] Lloyd George

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[46]Prior and Wilson, 234.

[47]Ibid.

[48]Churchill, The World Crisis, 1916-1918, vol. 1, 186.

disagreed with Haig's decision to throw "a few specimen machines into the fight without waiting until a sufficient number had been manufactured...."[49]

Swinton of course was opposed to the tanks' immediate employment for the same reasons he outlined in his February 1916 memorandum: Haig would have too few tanks available with which to strike a heavy blow; the shell-torn battlefield would hinder tank movement; Rawlinson's piecemeal allocation negated the tanks' mass assault capability; and the premature disclosure of the tanks would result in the overall loss of surprise associated with the new weapon. All of these were valid reasons for not committing the tanks to action in September 1916, but Haig had few other options. The Somme offensive had stalled, resulting in high British casualties with little strategic gain to show for the sacrifice. British artillery had failed to adequately address the combination of trenches with wire obstacles and machine guns. Haig needed a solution to the problem of lost battlefield mobility and was willing to commit the tanks early in the attempt to achieve his needed breakthrough.

On September 12, 1916 the British began a three-day preparatory artillery barrage on the German defensive positions. The artillery fired 828,000 shells weighing a total of over 30,000,000 pounds. Because the "rearward"

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[49]D. Lloyd George, War Memoirs, 133.

defensive zone was beyond the range of the British guns, the emphasis was on the destruction of the trenches in the "outpost" and "battle" zones. With approximately 55,000 yards of trench in these first two zones, the British allocated over 15,000,000 pounds of the total bombardment weight to trench and wire destruction, resulting in a total of 280 pounds of shell fired per each yard of trench network.[50]

The introduction of the tank during the September 15, 1916 Battle of the Somme did not have a significant strategic impact on the overall battle. There are several reasons for the apparent failure of the tanks to live up to their potential and Swinton's expectations. Out of the fifty-nine tanks which arrived in France before the battle, forty-nine reached the battlefield preparation area. Of that number, only thirty-five reached the assigned starting points with Rawlinson's Fourth Army; the remainder experienced mechanical difficulties. Thirty-one tanks actually moved forward into "No Man's Land" on the assault, but only nine maintained momentum and crossed over the "outpost" zone trenches.[51]

The remainder of the thirty-one fell victim to

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[50]"Battle of the Somme: Artillery Notes and Statistics; Table 3, Rawlinson Papers 5201/33/71 NAM;" cited in Prior and Wilson, 233.

[51]Churchill, The World Crisis, 1916-1918, vol. 1,186-188; see also Wilson, 344.

Swinton's fears: poor crew training and inadequate logistical support resulting from premature employment; unsuitable terrain caused by preparatory barrages; additional mechanical breakdowns; and actual combat losses.[52] The impact of the tanks was tactically marginal at best, and the infantry on that day had to struggle forward with ineffective artillery support and their own resources just as always.

The September 15th assault was relatively successful in comparison with that of July 1st. By the time Rawlinson ended the first day's maneuver, the British had achieved several tactical objectives. The "outpost" zone trench line was captured on a front of 9,000 yards, while the "battle" zone line in the vicinity of Flers was in British hands for a distance of 4,000 yards. Several German strongpoints in the vicinity of High Wood were finally neutralized after two months of fighting. Perhaps most important, the British had troops in position on Bazentin Ridge which afforded them good observation of the "rearward" zone.

Despite these achievements, due more to the efforts of the infantry rather than any significant contribution on the part of the tanks, the British still faced major problems. The "rearward" zone was neither penetrated nor captured. German morale remained generally high. None of the five divisions of British cavalry even began to deploy, and

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[52]Whitehouse, 51-53.

Haig's breakthrough did not materialize.[53] The estimates of British casualties for September 15, 1916 ran as high as 29,376 men killed.[54]

Two reasons for these high casualty figures are apparent. The first was Rawlinson's interruption of the creeping barrage technique to create the tank corridors. The infantry assigned to assault along those lanes faced fully-operational defensive positions and paid dearly in lives lost. The second was Haig's and Rawlinson's insistence that the preparatory barrage be aimed over the whole "outpost" and "battle" zone frontage as was standard practice, instead of concentrating on a narrower area to increase the chance for penetration and breakthrough.

Rawlinson's reliance on British artillery and his piecemeal allocation of the limited number of tanks at his disposal was based on his assessment of the capabilities of each. It is possible that, had he adhered to some of Swinton's recommendations with regards to massing vehicles in the assault and counter-battery artillery fire rather than preparatory artillery barrages, he might have succeeded in penetrating to the "rearward" zone and creating a breakthrough. However, his decision to rely on a heavy preparatory barrage and to allocate his tanks along numerous assault corridors resulted in limited tactical

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[53]Prior and Wilson, 242-243.

[54]Ibid., table 21.1, 243.

gains and high casualties.

Despite the statistically disappointing showing, this first tank action made several intangible contributions to the overall British effort during this battle. In spite of faults or mistakes with regards to employment strategy, the vehicles did appear on the scene with devastating surprise. Historical accounts provide examples of individual tank actions where a single vehicle would move forward and eliminate a machine gun nest or breach a wire obstacle and enable the infantry to continue the assault.

The most significant contribution made by the tanks on Septemb r 15 was probably in that they raised considerably the morale of the British troops who saw them in action. Arch Whitehouse told the story of one wounded soldier who recounted his impression of one of the tanks, designated D.16:

> "Wounded? Who cares about being wounded? There was that old D.16 groaning and grumbling along, poking her big nose here and there. She stopped now and then as if unsure of the road, then plunged on over everything. I can still see her great big head, coughing like a hippo. But the best of it was how the Tommies went on, following her - actually cheering! There hasn't been anything like her in this bloody war before. Lets have more of them, I say."[55]

The few tanks which actually crossed the "outpost" zone trenches quickly established a remarkable relationship with the British infantry. Frederick Palmer was a young British lieutenant who saw action in one of the sections which had

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[55]Whitehouse, 52.

tanks assigned. "No more thrilling message was ever brought," he wrote, "than that which said that a tank was 'walking' up the main street of Flers, surrounded by cheering British soldiers, who were in possession of the village."[56] A little later he summarized the attitude of the infantry towards the tanks with this passage:

> "'Leave it to me!' was the unspoken message communicated to the infantry by the sight of that careening, dipping, clambering, steel body as it rumbled towards a [machine gun post]. And the infantry, as it saw the tanks' machine guns blazing, left it to the tank... confident that no enemy would be left behind to fire into their backs."[57]

Churchill recalled conversations with soldiers who told him that whenever a tank approached a strongpoint, "the sight of it was enough, and the astounded Germans forthwith fled or yielded."[58] Both Churchill and Palmer were convinced that the tanks in action in September 1916 saved British lives; Palmer in particular felt "they saved twenty-five thousand casualties [over the entire month], which would have been the additional cost of gaining the ground won by unassisted infantry action."[59] Palmer's estimate is difficult to validate, but his opinion of the tanks and their value to the infantry is not.

Haig's reaction to the initial tank operation was

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[56]Frederick Palmer, My Second Year of the War (New York: Dodd, Mead and Company, 1917), 349.

[57]Ibid., 352.

[58]Churchill, The World Crisis, 1916-1918, vol. 1, 186-187.

[59]Palmer, 358.

favorable. After the first day's battle he wrote: "Certainly some of the tanks have done marvels and have enabled our attack to progress at a surprisingly fast pace."[60] And even though the tanks had not produced the breakthrough he wanted, Haig told Swinton that: "Though the tanks had not achieved all that had been hoped, they had saved many lives and had fully justified themselves...."[61] Senior War Committee members, however, did not share Haig's opinion of the first tank action, especially with regards to the loss of surprise surrounding the new weapon.

Lloyd George wrote in his memoirs that he considered the decision to launch "the first handful of these machines on a comparatively local operation... to have been a foolish blunder."[62] His reasons for that statement included the fact that the premature introduction of the tank was contrary to the views of those "who had first realized the need and had conceived it, fought for its adoption, designed it, produced it, and carried out the crew training...."[63] Brigadier Sir James Edmonds in the official British military history of the war stated that "To divulge our new methods whilst attacking with insufficient means was to squander possibilities of surprise,... and the first effect of the

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[60]Blake, 166-167.

[61]Swinton, Eyewitness..., 239-240.

[62]D. Lloyd George, War Memoirs, 101.

[63]Ibid.

tanks was thrown away as the Somme in September 1916."[64]

Churchill's opinion of the misuse of the tank in September 1916 was much more blunt. "To achieve this miniature success and to carry the education of the professional mind one stage further forward," he wrote, "a secret of war which, well used, would have procured a world-shaking victory in 1917 had been recklessly revealed to the enemy."[65] Of course Swinton viewed the early use of the tanks as an "error of judgment by reason of the gulf which lay between the utmost that could have been achieved then and what might have been gained by waiting."[66]

Despite Swinton's admitted interest in the success of his invention, this last statement summarizes the conflict between the planners and developers in the rear areas and the executors in the forward battle areas. The tank advocates in Great Britain recommended delay in tank employment until the Ministry of Munitions produced larger numbers of vehicles and Swinton could train additional crews. But the troops in the field needed help in assaulting the German trenches and breaking through the wire obstacles. In the end, Haig based his decision to employ the tanks on the practical demands of the moment,

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[64]Brigadier Sir James Edmonds, Military Operations: France and Belgium, 1916, vol. II, preface, VI.

[65]Churchill, The World Crisis, vol. III, 186.

[66]Swinton, Eyewitness..., 250.

sacrificing strategic surprise for immediate results.

Rawlinson's tank tactics employed individual tanks on a small-scale as infantry assault support weapons. Each tank was capable of breaching trench obstacles on a very narrow front to assist small infantry units in local attacks. On an individual vehicle level, these tactics were in accord with Swinton's concept, who viewed the tank as completely auxiliary to the infantry. Unfortunately for Haig, tanks employed in low numbers and without the covering artillery barrage Swinton recommended could not, and did not, achieve the larger breakthrough he needed.

The September 1916 Battle of the Somme effectively demonstrated the potential of the tank as an infantry support weapon and machine gun destroyer on a limited scale. More importantly, this operation demonstrated that effective battlefield stalemate neutralization on a large scale was possible with the employment of larger numbers of tanks and the adaptation of artillery tactics. This next phase in land warfare practices in the BEF required not only increased tank production but also a drastic revision in the military establishment mentality with regards to the relationship between the infantry, cavalry, artillery and tanks. It would be over a year, until the November 1917 Battle of Cambrai, before tanks were employed in accordance with Swinton's recommendations to achieve a breakthrough on a large scale.

Haig recognized the potential of the tank and during his conversation with Swinton after September 15 indicated that he wanted five times as many tanks and that he wished Swinton to continue to train the crews.[67] Based on Haig's request, the War Office placed orders with the Ministry of Munitions for one thousand tanks and ancillary equipment.[68] Nevertheless, the tank continued to run up against the conservative British military establishment. Haig's Chief of Staff, General Sir Lancelot Krigell, was far from impressed by the September 15 performance. In a letter to Rawlinson he maintained that "In the present stage of development they [tanks] must be regarded as entirely accessory to the ordinary methods of attack, i.e.: to the advance of the infantry in close cooperation with artillery."[69] For the next fourteen months the BEF employed tanks strictly as infantry assault weapons designed to assist the initial trench penetration. Only a few tank advocates worked towards expanding the role of the tank in the effort to achieve a major defensive breakthrough.

On September 29, 1916 Swinton was replaced as commander of the Tank Detachment by Lieutenant Colonel Hugh Elles.

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[67]Swinton, Eyewitness..., 241.

[68]Ibid., 246.

[69]Kriggel to Rawlinson, 5/10/16 (OAD 169), AWM 51, (The Hayes Papers), Bundle 31; cited in Official History: Military Operations France and Belgium, 1916: 2 July to end of Battle of Somme, 367-368.

Swinton returned to London to assume new duties as the War Committee. He continued to follow the developments in tank production and doctrine development, but from this point forward his active involvement with the tank ended. Lieutenant Colonel Elles and his General Staff Officer J.F.C. Fuller assumed the duties of training tank crews and operational command of tank units in the field with the BEF.[70] These two men are responsible for the continued development of early British tank tactics and the expansion of the role of the tank beyond that of a machine gun destroyer.

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[70]Swinton, Eyewitness . . ., 242-243; see also J.F.C. Fuller, Memoirs of an Unconventional Soldier, 85-86.

Chapter V: Progress At Cambrai, Hamel and Amiens

At the end of September 1916 Lieutenant Colonel Hugh Elles took command of the Tank Detachment. He was described by his primary staff officer, Major J.F.C. Fuller, as "boyish and reckless in danger; perhaps a better soldier than a strategist, yet one who could profit from the cooperation of his advisors, and one who was universally loved and trusted by his followers."[1] Historian Douglas Orgill looked beyond Elles's personality and wrote that Elles represented a "bridge between the new military knowledge and the old soldierly virtues."[2] As the commander of the Tank Detachment Elles was responsible for overseeing both the development of new tactics and the incorporation of those tactics into existing practices.

Elles may have been the detachment commander, but Major Fuller was the one who developed doctrine and training programs. At their first meeting in late 1916 Elles stated that "this show [the Tank Detachment] badly wants pulling together; it is all so new that one hardly knows which way to turn."[3] Elles charged Fuller with creating a sense of discipline and esprit-de-corps in the detachment. Fuller regarded this mission as a three part problem. First, he

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[1]Fuller, Memoirs of an Unconventional Soldier, 88.

[2]Douglas Orgill, The Tank: Studies in the Development and Use of a Weapon (London: Heinemann Publishing Co., 1970), 31.

[3]Fuller, Memoirs of an Unconventional Soldier, 87.

had to instill a sense of discipline, which he pursued via a series of lectures on the subject. Second, he had to instruct the officers in new doctrine. And third, he had to reorganize the detachment so as to maximize the use of their equipment.

Fuller was a light (i.e. dismounted) infantryman with a reputation for being a highly efficient staff officer. Freely admitting that his knowledge of tanks and their potential was limited, he began a comprehensive study of the subject. In February 1917 he published a training manual entitled "Training Note #16."[4] This document was designed to standardize all training practices in the detachment. Fuller structured the manual in nine sections: organization, operations, tactics, co-operation with other arms, preparations for offensives, supply, communication, reinforcements, and camouflaging. He benefited from Swinton's earlier writings as well as the results of the September 1916 Battle of the Somme. Calling the tanks "a mobile fortress, which could escort the infantry into the enemy's defenses, and from behind which they could sally forth and clean up his trenches,"[5] he developed the opinion that the tanks were capable of a more offense-oriented role.

He continued his studies and in June 1917 produced a document entitled "Projected Bases for the Tactical

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[4]Ibid., 96ff.

[5]Ibid., 97.

Employment of Tanks in 1918." In this study he drew on the results of ineffective tank employment during the battles of the Somme (September 1916), Arras (April 1917), and Messines (June 1917). Fuller advanced three points based on his analysis. The first was that the tanks' effectiveness was directly related to the terrain over which they operated. The second was that properly employed, tanks were capable of executing a penetration of enemy defenses which could allow for a breakthrough by follow-on cavalry and infantry forces. The third principle was that the success of any tank penetration required a surprise artillery bombardment not to exceed forty-eight hours in duration.[6]

Fuller expanded on Swinton's concepts in his belief that tanks were capable of more than strongpoint and wire obstacle reduction. Much of Swinton's theoretical work was based on perceived potential and was written before the tanks had been tested in combat. Fuller believed that the tanks were capable of more than Swinton had envisioned. "He soon became the leading advocate,' wrote Liddell Hart, "of the tanks' wider potentialities - as a means to revive mobile warfare, instead of merely as a modernized 'battering ram' for breaking into entrenched defenses."[7] Fuller proposed an operation to GHQ to test these principles.

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[6]Ibid., 129-130.

[7]B.H. Liddell Hart, The Memoirs of Captain Liddell Hart, vol. 1 (London: Cassell and Company LTD, 1965), 87.

Fuller's initial recommendation detailed a small-scale operation with limited objectives. He proposed a raid of no more than a few hours duration, designed to penetrate enemy defenses, capture prisoners, and shake up the defenders. In an August 1917 paper entitled "Tank Raids" he summarized the objectives of just such a limited raid as "Advance, Hit and Retire; its objective being to destroy the enemy's personnel and guns, to demoralize and disorganize him and not to capture ground or hold terrain."[8] Unfortunately for Fuller, such a plan had little to recommend it to GHQ; the limited tactical gains were outweighed by the potential loss of surprise and vehicles.

The Third Army Commander, General Julius Byng, saw Fuller's "Tank Raids" proposal at GHQ and recognized the potential for tanks to effect a trench penetration which could enable the cavalry to conduct a breakthrough. He developed a plan which incorporated Fuller's proposal but which had much larger objectives, especially regarding the capture of territory. Byng wanted the focus of the operation to be the communication center at Cambrai; once that town was captured he could then release his cavalry to the Northwest to raid behind the German lines. Byng's plan relied on the tanks to penetrate the defense and assumed that such a break-in would automatically result in a cavalry

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[8]Fuller, Memoirs of an Unconventional Soldier, 172-175; see also Wilson, 488.

breakthrough. His plan meticulously prepared for the initial break-in, but discounted the fact that at that stage of the year he lacked adequate reserves to follow through. Even if the operation was successful in effecting a break-in of the "outpost" and "battle" zones, he would not be able to penetrate into the "rearward" zone to launch his cavalry.[9]

In the end Haig devised a compromise between Fuller's small-scale raid and Byng's more ambitious plan. Haig recommended an advance with limited objectives in the vicinity of Cambrai but not necessarily focused on the town itself. He revised Byng's plan to concentrate on the Bourlon Ridge, which if captured would provide British forces with excellent observation of the "battle" and "rearward" zones. Unwilling to discount completely the possibility of a breakthrough, Haig nevertheless retained the option to terminate the operation at the end of forty-eight hours unless clear progress was evident.[10] Fuller began working on a new plan and by October 1917 had revised his original "Tank Raids" proposal to incorporate Byng's and Haig's guidance. His revisions, submitted to GHQ for analysis, detailed an attack which take place in the vicinity of Cambrai before the end of 1917 His plans featured the tank in a leading, spearhead-type role.

It is evident to the post W.W. I historian that the

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[9]Orgill, 35-36; see also Wilson, 488.

[10]Wilson, 488-489; see also Boraston, 152-153.

plan for this operation represents a transition to some degree in the BEF position concerning battlefield mobility. By relying on the tanks to execute the initial break-in and machine gun suppression Fuller's plan accepted Swinton's earlier work and the limited successes on the Somme battle. And by recognizing the potential for the tanks to penetrate to the edge of the "rearward" zone and set up a breakthrough, Fuller advocated an increasingly offensive role for the tank. This increased role was mitigated by constraints on maneuverability, operational readiness, and the actual number of tanks available for any given operation. Fuller's plan relied on the cavalry to conduct the exploitation of any breakthrough achieved by the tanks. This reliance on traditional tactical practices represents not so much reluctance to accept the tank in an offensive role as a recognition of the tank's capabilities and limitations at that stage in its development.

By mid-November 1917 the staff at GHQ had finalized the plans for the Cambrai attack. The sector was constricted by two canals, the Canal du Nord on the left and the Canal de l'Escaut on the right, six miles apart. The initial attack area included a number of small villages and two dominant ridgelines, the Flesquieres and Bourlon. The Hindenburg trench system in this sector was over five miles deep, complete with dugouts, machine gun posts, wire obstacles, anti-tank ditches in excess of twelve feet wide, and

supporting artillery batteries.[11] The defensive network was comprised of three distinct areas. The Hindenburg Line proper ran in a Northwesterly direction for almost six miles from the Scheldt Canal at Banteux to Havrincourt. The line then turned North for four miles to Mouvres. Roughly one mile behind this first line lay the Hindenburg Reserve line, and an additional three and a half miles behind that lay the Beaurevoir, Masnieres and Marquian Lines.[12] This description indicates the area was heavily defended and represented a formidable test of Fuller's principles and the tank's offensive capabilities.

The plan in its final form called for the tanks to penetrate the Hindenburg Line between the two canals, pass the cavalry through the gap, then continue to move forward and assist the infantry to seize Bourlon Wood and the town of Cambrai. The tanks and infantry would continue to expand the penetration while the cavalry raided support units in the "rearward" zone and beyond.[13] Fuller expressed concern over the suitability of the terrain beyond the "battle" zone and over the lack of reserves available to exploit any breakthrough, but the plan stood as written.[14] Key to the success of the operation was the clear delineation of the

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[11]Ibid.

[12]Boraston, 153-154.

[13]Fuller, Memoirs of an Unconventional Soldier, 181-182.

[14]Ibid.

roles designed for the individual combat arms. The Cambrai plan was a mixture of traditional operation and innovative thinking. The general plan of attack was to dispense with the traditional long duration artillery bombardment. Instead, the 1003 supporting artillery guns were given the mission to conduct a brief suppressive bombardment on the day of the attack, concentrating on counter-battery and smoke-screen fire. Once the assault began in earnest, the artillery was to shift into the creeping barrage pattern similar to that designed by Rawlinson for the Somme operation. The tanks were assigned the mission of breaching the trenches and wire obstacles and leading the attack, precluding the need for an intense preparatory bombardment. By giving the tanks the mission to breach obstacles and lead the assault, the infantry was free to secure objectives and hold open the penetration.

Byng anticipated a breakthrough which would allow the cavalry to pass through to the "rearward" zone in order "to raid the enemy's communications, disorganize his system of command, damage his railways, and interfere as much as possible with the arrival of his reinforcements."[15] This plan reflected the level of development which mechanized strategy had reached; Haig was willing to commit the tanks to a crucial role and expected them to accomplish more than obstacle reduction. At the same time, the exploitation and

[15]Boraston, 153.

disruption role stayed with the cavalry who remained vulnerable on a battlefield replete with machine guns and artillery.

Fuller devoted a great deal of effort to developing a tactical plan which would maximize the tanks' capabilities to breach the Hindenburg trenches. He divided the six mile wide offensive sector into a series of objectives, each of which was further subdivided based on the number of strongpoints into "tank section attack areas." He assigned a three-tank section consisting of one Male and two Female tanks along with an infantry section to each attack area. Each tank carried one bundle of wood which was three or four feet in diameter and weighed over one ton affixed to the front of each vehicle with chains. The wood was carried to fill in anti-tank ditches, thereby allowing the tank-infantry teams to negotiate a total of three ditches as they leapfrogged through the defenses.[16] The final plan reflected a combination of reduced but concentrated artillery bombardment with an increased mission of obstacle reduction and penetration for the tank/infantry teams.

On November 20, 1917 at 0620 hours the British artillery commenced a suppressive barrage along the six mile wide front. Unlike previous preparatory barrages in which the majority of shells fired were shrapnel designed to

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[16]J.F.C. Fuller, Tanks In The Great War (London: John Murray, 1920), 136-153; see also Wilson, 489.

reduce wire obstacles, this forty-five minute barrage was predominantly smoke and high explosive. The obstacle reduction mission was given to the tanks, while the artillery concentrated on suppressing the defenders' artillery and masking the advance. After less than one hour, the artillery began firing the creeping barrage and the tanks moved forward. The absence of a traditional preparatory bombardment probably contributed to the defenders' surprise and to the success of the tanks in breaching the first defensive lines.

GHQ allocated 476 tanks to Byng's Third Army for the Cambrai attack. Out of this total, 378 were fighting tanks; 44 were devoted to communications, command and control, and the remaining 54 were assigned resupply duties. These latter tanks each carried two tons of supplies and hauled an additional five tons on sledges over the breached obstacle networks. Fuller estimated that it would have required over 21,000 men to carry a similar resupply load, which represents a significant savings in fighting troops which were not diverted from actual combat duties.[17]

The tanks were accompanied and followed by elements of six infantry divisions. Waiting behind the safety of the British trenches were the five divisions of cavalry which Byng hoped to launch forward. The opening stages of the attack were successful. Masked by smoke and the creeping

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[17]Fuller, Memoirs of an Unconventional Soldier, 198.

barrage, the tanks tore holes through the wire obstacles and filled in ditches with the wood. Less than two hours after the attack began the British captured the Hindenburg Main Line over the six mile front between the two woods. By 1130 the Hindenburg Support Line, with the exception of the ridge at Flesquieres, was in British hands as well. Completely outdone by the rapidity of the operation, the Germans were unable to reinforce the line and the sector defense cracked. By the end of the day, the BEF had penetrated to a depth of just over four miles, capturing over 5,000 prisoners, with a loss of just over 4,000.[18] The first days' operation demonstrated the effects of coordinated tank, infantry and artillery tactics over suitable terrain within the parameters of a well-thought out tactical plan.

The success of November 20 was mitigated by several failures however. The British lost 179 tanks on that day to a combination of enemy fire and mechanical breakdown. The tank/infantry teams penetrated to a depth of over four miles, but not deep enough to qualify as a breakthrough into the "rearward" zone. The cavalry divisions in most sectors never even made it into the battle, and the few cavalry units which were committed failed to accomplish anything significant in terms of rear area exploitation.

A negative aspect of the rapid tank penetration was the degradation of coordination between the tanks, infantry and

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[18]Boraston, 157; see also Wilson, 490.

artillery. The 51st Infantry Division fell so far behind the assaulting tanks that when the tanks reached the Flesquieres Ridge, the infantry could not detect the breaches in the wire. A little while later, sixteen tanks, without the protection of their own infantry teams, were destroyed by a battery of German field guns which were out of range of the tanks' weapons.[19] This particular incident illustrates clearly that Fuller's tactics needed refinement. While he had proven that tanks were capable of rapid and deep penetration into established defenses, they were by no means capable of independent operations.

What the tanks were especially incapable of was the capacity to hold the terrain without the infantry. Additionally, it was clear that the cavalry remained at the mercy of the machine gun, and without a breakthrough into the "rearward" zone it was incapable of conducting any exploitation. While the tanks were impervious to machine guns, the unprotected infantry and cavalry were unable to maneuver at will. Until the level of operational reliability was increased, the tanks were not capable of conducting the exploitation mission themselves. They had accomplished all they were capable of at Cambrai given the constraints under which they operated.

Haig terminated the Cambrai attack on November 22, just as he had promised if the offensive failed to result in a

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[19]Fuller, Memoirs of an Unconventional Soldier, 209.

breakthrough. He recognized that the BEF lacked the reserves needed to continue the attack because of the previous diversion of five divisions to the Italian Front at Caporetto.[20] One week after the attack began he wrote "I have not got the necessary number of troops to exploit our success. Two fresh divisions would make all the difference and would enable us to break out...."[21] This lack of reserves, combined with the cavalry's inability to achieve a breakthrough on their own, convinced Haig to end the attack after only limited gains. It is clear that no one, with perhaps the exception of Fuller himself, anticipated the extent or rapidity of success. Swinton reacted to the initial reports on November 20 with this comment: "I'm pleased all right, but I'm wondering. I bet that GHQ are just as much surprised by our success as the Boche is, and are quite unready to exploit it."[22]

The lack of reserves resulted in the loss of British momentum at Cambrai. The Germans were able to fall back, regroup, and on November 30 launch a counterattack to eliminate the new British salient. The Germans began their attack at 0700 with an intense one hour long artillery bombardment, similar to the one used on November 20th. Then, using the sturmabteilung tactics discussed earlier,

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[20]Blake, 265.

[21]Ibid., 269.

[22]Swinton, Eyewitness..., 266.

they succeeded in reducing the salient on an eight mile front in just over three hours.

Several minor successes followed, but they were unable to execute a rapid or violent breakthrough due to inadequate reserves, British reinforcements and general troop exhaustion. The counterattack did force the BEF to withdraw partially to stabilize the lines, resulting in practically no net gain based on the success of November 20th. By December 7, the lines had stabilized. The Germans had, between November 20 and December 7, lost 41,000 men and 138 guns. The British during the same period had lost 43,000 men, 158 guns, and 213 of their available tanks.[23] In strategic terms the BEF had gained nothing.

But from a tactical and developmental viewpoint, the battle of Cambrai represents a transition in BEF operations. Because of the complete tactical surprise and significant gains made in less than twelve hours, several contemporaries mark November 20, 1917 as a landmark of sorts in the history of warfare. Lloyd George later said that the battle "will go down to history as one of the epoch-making events of the war, marking the beginning of a new era in mechanized warfare."[24] Haig credited the use of tanks at Cambrai with making it possible "to dispense with artillery preparation,

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[23]Wilson, 492; see also David Eggenberger, A Dictionary Of Battles (New York: Thomas Y. Crowell Company, 1967), 73.

[24]D. Lloyd George, 102.

and so to conceal our intentions from the enemy up to the actual moment of attack."[25] Despite the failure to achieve a breakthrough, Haig later credited the tanks' penetration of the Hindenburg Line with having "a most inspiring moral effect on the Armies I command... the great value of the tanks in the offensive has been conclusively proved."[26] And Swinton, not surprisingly, claimed some credit for the success of November 20th. "It has an added interest," he wrote, "in that it was upon the lines here laid down [reference made to his February 1916 'Notes on the Employment of Tanks.'] that the epoch making Battle of Cambrai was fought...."[27]

The combination of surprise, suitable terrain, adequate numbers of tanks, coordinated artillery bombardment, resourceful preparation and, most importantly, comprehensive planning resulted in a major penetration of enemy lines. Compared to the British losses in 1916, particularly during the Battle of the Somme, Cambrai was a success. The lessons learned by doctrine developers in the areas of economy in men per weapon, in men per yard of front, in casualties, artillery preparation, cavalry personnel, ammunition, and battlefield labor were important.[28] There was no denying

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[25]Boraston, 157.

[26]Ibid., 173.

[27]Swinton, Eyewitness..., 171-172.

[28]Whitehouse, 93.

the significance of the event. What remained unclear was the extent to which each aspect of the assault contributed to the initial success: the unpredictable bombardment, the coordination between tanks, infantry and artillery, and the use of massed tanks to achieve a rapid and widespread penetration. The British failed to convert the early success of November 20th into widespread exploitation, and Fuller set out to determine exactly why.

Fuller and the General Staff of the Third Army developed a list of lessons learned based on the Cambrai operation.[29] Six of the most significant lessons with regard to this study appear below:

1. "Tank units and infantry units must maintain close liaison during offensive operations." Haig used the incident at Flesquieres Ridge as an example of this lesson: "This incident shows the importance of Infantry operating with tanks and at times acting as skirmishers to clear away hostile guns...."[30]

2. "Keep large reserves of tanks to replace unexpected losses in any sector."

3. "The present model tank is mechanically unable to deal with enemy parties in upper stories of houses."

4. "Tanks must not outdistance supporting infantry - this allows enemy to hide and reappear."; this was a contributing factor in the cavalry's failure on November 20th.

5. "Infantry must not expect too much from tanks - they must assist the tanks with protection - this requires continuous combined arms training."

6. "Tanks used in small numbers are only 'frittered'

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[29]Fuller, Memoirs of an Unconventional Soldier, 218-219.

[30]Blake, 269.

away. If it is desired to continue the advance with tanks on the second day, a completely new formation of tanks should be earmarked." John Terraine alluded to this in his study White Heat when he stated "the tanks [at Cambrai] had shown their effectiveness for breaking into even a very elaborate and strong trench position. Breaking through was another matter."[31]

The Germans, in contrast to Fuller and Haig's recognition of the potential for offensive success with tanks, chose to learn a different lesson from these early operations. As noted earlier, they developed the sturmabteilung tactics to break into British trench systems. They deduced from the early tank failures at the Somme and Messines that the tanks would always prove ineffective and would not need to be copied.[32] They did produce limited numbers of the "A7V" tank, a thirty ton, eighteen man armored vehicle equipped with one 57mm Belgian cannon and four machineguns.[33] Despite this, they generally discounted mechanized operations in favor of small-unit infantry tactics in the offense and heavy anti-armor machine guns in the defense. The German command ignored the potential for tank operations and issued the following instructions to those units which did receive the few A7V tanks or used captured British tanks:

"The infantry and Tanks will advance independently of one another. No special instructions regarding cooperation with tanks will be issued. When advancing with tanks the

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[31]Terraine, 242.

[32]Wilson, 344.

[33]Fuller, Tanks In The Great War, 214.

infantry will not come within 160 yards of them on account of the shells which will be fired at the tanks."[34]

The tank never became an integral part of German W.W. I offensive doctrine, partly due to the rigid, tradition-bound military hierarchy and partly due to the economic blockade which resulted in a shortage of raw materials. The first A7V wasn't built until December 1917, and only five were available for use in the March 1918 Offensive.[35] Instead of fighting British tanks with armor of their own, the Germans relied on artillery and machine guns. Particularly after the first French armored operation, the Nivelle Offensive of April 16, 1917, the Germans felt that they could defeat tanks with large-caliber rifles or groups of machine guns. Out of 132 French Schneider tanks employed on that day, the Germans knocked out sixty with machine guns alone. "The Germans," wrote Marc Ferro," in a fatal error, reckoned that guns would always win."[36]

Fuller incorporated the lessons learned at Cambrai into his ongoing analysis of mechanized doctrine. One of the primary problems he identified was the Mark IV tank the BEF was fielding. The Mark IV was mechanically limited by its low cross-country speed and restricted range. In early 1918 the British successfully field tested the "Medium D" tank

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[34]Ibid.

[35]Charles Messenger, The Blitzkrieg Story (New York: Charles Scribner's Sons, 1976), 25.

[36]Ferro, 95.

which incorporated several significant design changes. This tank was capable of crossing wide trenches, had a 200 mile range with a road speed of 20 miles per hour, and was able to ford shallow rivers.[37] These improvements resulted in a vehicle which would be capable of accomplishing more than basic obstacle reduction or machine gun suppression. A large unit of these tanks might be capable of not only executing the "outpost" and "battle" zone penetration, but also of continuing the offensive into and beyond the "rearward" zone. If this were the case, Fuller envisioned the tanks eventually replacing the cavalry as the battlefield exploitation force.

In May 1918 Fuller published an important doctrine study entitled "The tactics of the Attack as Affected by the Speed and Circuit of the Medium D Tank," more commonly referred to as simply "Plan 1919."[38] In this study he modified the early tactics in light of the improved capabilities of the Medium D tank. His plan called for the initial penetration of the "outpost" and "battle" zones by tanks. Once into the "rearward" zone, the tanks would seek out the enemy's command and control systems and artillery support, thereby assuming the role of the cavalry.[39]

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[37]Orgill, 88-89.

[38]Fuller, Memoirs of an Unconventional Soldier, 322-335.

[39]Larson, 90; see also Orgill, 89; see also Fuller, Memoirs of an Unconventional Soldier, 321.

This plan represented a further innovation on tactics beyond those employed in September 1916 and November 1917. Fuller advocated the destruction of systems of control rather than the elimination of enemy troop concentrations, and believed the end result would be the same; the crippling of the enemy's will and capacity to fight. His futuristic concept was based on the speed, maneuverability and firepower capabilities of the Medium D tank, and he assumed, mistakenly, that the military establishment would agree with him. In order to execute his plan, Fuller required a force of over 5,000 tanks, an increase in Tank Corps personnel from 17,000 to 37,000, and a willingness on the part of the military to replace the horse-mounted cavalry with tanks.[40]

Despite the success of November 20, 1917 Fuller's "Plan 1919" was too radical for the established leadership to endorse, and it never progressed beyond the theoretical stage. What "Plan 1919" represents is the continuing development of mechanized doctrine beyond the initial role envisioned by Swinton. Fuller viewed the tank as more than the mechanical means by which the BEF could overcome the battlefield stalemate; it would restore widespread battlefield mobility and produce a real breakthrough into and beyond the "rearward" zone. The limited success of November 20th demonstrated the capabilities of tanks in the

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[40]Orgill, 89; see also Fuller, Memoirs of an Unconventional Soldier, Appendix I, 334-335.

role of obstacle reduction and infantry support beyond the initial penetration. In July, 1918, at the Battle of Hamel, the Tanks Corps had another opportunity to demonstrate the potential for tank operational success on an increasingly greater offensive scale.

The German offensive of 1918 slowed to a halt in late Spring, and by June Haig decided to commit Rawlinson's Fourth Army to several limited engagements. These operations were designed to gauge the level of German morale and to solidify the Allied lines in the Somme River valley near Amiens. Any territory gained in this area would improve the starting points for the projected Allied offensive.[41] A perfect example of just such a limited objective was located on the ridgeline between Villers-Bretonneux, eight miles East of Amiens and the Somme River. The ridge provided the Germans with a solid defensive position near Amiens; if the British captured the ridge they would command observation sites through the Somme valley while denying the Germans the ability to observe the British rear areas.[42]

Rawlinson's Fourth Army consisted of the British III Corps and the Australian Corps, commanded by Lieutenant General John Monash. Monash submitted a plan to Rawlinson

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[41]Orgill, 43.

[42]Edmonds, Military Operations: France and Belgium, 1918, vol. 3, 198.

which centered on the recapture of Hamel village along with the Hamel and Vaire woods. The plan called for tanks leading the assault, coordinated artillery support, and relatively subordinate missions for the infantry. The Australian Corps was understrength, and in the final plan Monash avoided the potential for a major loss of troops by limiting the number to ten battalions of Australian infantry and four companies of Americans, a total of approximately 7,500 soldiers.[43]

To overcome the limitations resulting from reduced infantry assets Monash planned to employ sixty Mark V tanks from the 5th Tank Brigade commanded by Brigadier General A. Courage.[44] The Mark V was an improvement over the previous Mark I and Mark IV models: its speed was increased from 3.7 mph to 4.6 mph; it only required one driver instead of four; and its fuel tanks were armored and positioned outside the crew compartment for added safety. The Male version carried two improved model 6-pounder guns and four .303 Hotchkiss machine guns, while the Female version remained armed with five machine guns.[45] In addition to these improvements, the Mark V was significantly more reliable mechanically than were its predecessors.

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[43]Ibid.

[44]Orgill, 44-45.

[45]R.E. Jones, G.E. Rarey, and R.J. Icks, The Fighting Tanks From 1916 to 1933 (Old Greenwich, Connecticut: W.E. Publishers, 1969), 5, 16, 31; see also Orgill, 45.

Monash's plan for the attack on Hamel incorporated the lessons learned at Cambrai in November 1917 but also had to account for reduced infantry assets. The Cambrai operation, employing sixteen brigades over a six mile front, averaged two brigades of soldiers for every 800 yards. Monash chose instead to employ two brigades over the entire 7,000 yard front and compensate by allocating 600 artillery pieces, sixty tanks and increased numbers of machine guns to the assault.[46]

The artillery would open up with a bombardment at zero hour targeted on German batteries and strongpoints in the village and Vaire wood. Simultaneous with the barrage commencement the sixty tanks would roll forward while the artillery fired a creeping barrage 300 yards in advance of the tanks. The infantry brigades would follow the tanks enroute to the ultimate objective approximately 2,000 yards from the start point.[47] Monash's plan emphasized fire power over man power, and gave the tanks the critical mission not only of strongpoint reduction but also of capturing terrain: "the operation will be primarily a tank operation... the roles of the infantry following the tanks will be 1) to assist in reducing strongpoints and localities, 2) to 'mop

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[46]Prior and Wilson, 296.

[47]Ibid.

up,' [and] 3) to consolidate the ground captured...."[48] This change in the roles of the tanks and the infantry acknowledged the operational limitations imposed on Monash by reduced infantry assets and the tanks' potential to provide the major offensive thrust.

Monash's plan incorporated a revision of the Cambrai-style artillery bombardment. Instead of detailing all the artillery to the creeping barrage or the suppression bombardment, he split his guns into two groups and assigned each a specific mission. 313 heavy artillery pieces would first fire the initial bombardment and then shift to concentrate on German artillery batteries. The remaining 320 field artillery pieces (18-pounders and howitzers) would fire the creeping barrage. This revision in artillery practices was designed to afford the assaulting infantry increases chances for surviving the attack. The German defenders would now face first a heavy artillery bombardment, then a field artillery creeping barrage, and finally an assault by tanks leading infantry.[49] The Hamel plan in its final form compensated for the limited numbers of infantry by maximizing the available firepower and by specializing the roles of the artillery, tanks and infantry.

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[48]Lieutenant General Sir John Monash, Australian Victories in France, 1918, 227; cited in Orgill, 43.

[49]P.A. Pedersen, Monash as Military Commander (Melbourne: Melbourne University Press, 1985), 227; cited in Prior and Wilson, 298; see also Orgill, 46.

Monash's directed his preparations against the German defenders located in the village and adjacent woods. The defenders were part of the 13th German Infantry Division and the 43rd German Reserve Division, both of which had suffered losses during the German Spring offensive. Australian intelligence sources estimated the defenders' strength at approximately 2500 men of low grade training and poor morale.[50] The 13th Division only assumed their positions in Hamel the night before the attack, and its understrength companies were further reduced in number by rampant cases of Spanish influenza. And unlike the typical German three-zone defensive network, the defenses around Hamel generally consisted of hastily dug single line trenches with few wire obstacles and no communications trenches or dugouts.[51] The defense was admittedly weak, but the attack was not designed as an all-out offensive; it was rather a test of combined operations between tanks, infantry and artillery with the tanks taking the lead role in the assault.

The attack began at 0310 hours on July 4, 1918, with the heavy artillery firing the initial bombardment. Immediately after the initial bombardment began the tanks moved ahead, preceded by the creeping barrage. The defenders were overwhelmed, surprised by the immediate

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[50]Prior and Wilson, 298.

[51]Edmonds, Military Operations: France and Belgium, 1918, vol.3, 198.

assault on the heels of such a short bombardment. The tanks and infantry stayed close behind the creeping barrage, wiped out the unprotected defensive positions, and by 0500 hours the two Australian brigades had captured the village and began to dig in to establish new lines. The rapid operation resulted in approximately 900 casualties to the Australians and Americans; the German garrison lost over 1,000 killed or wounded with another 1,000 captured.[52] Equipment loses were just as unbalanced in favor of the Australians. The attackers lost five tanks, but all were salvaged within twenty-four hours. No tank crewmen were killed, although thirteen were wounded as a result of the vehicle damage. The Germans lost two field guns, 41 trench mortars, 171 machine guns, and two of the newly-developed heavy caliber anti-tank rifles.[53]

The Battle of Hamel verified several points in the developing mechanized doctrine. The Mark V tanks were mechanically reliable. The two-phase artillery operation was effective in support of the tank and infantry assault. The tanks were capable of penetration and infantry support, while the infantry benefitted from the tanks' leading and the creeping barrage. Monash called the operation "the perfection of teamwork. It attained all its objectives; and

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[52]Prior and Wilson, 300.

[53]Edmonds, Military History: France and Belgium, 1918, vol. 3, 208.

it yielded great results.... The tanks fulfilled every expectation...."[54] Fuller recognized that the importance of the battle lay in the fact that this operation appeared to validate the concepts of tanks leading the assault supported by accurate artillery and accompanying infantry. After the war he wrote: "This [the Battle of Hamel] was the decisive turning point in our tactics, and from July 4 onwards there was no question now of who would or could win the war on land...."[55] Fuller of course wrote that from the security of post-war victory. The success at Hamel did not guarantee victory. What it did was to validate the role of the tanks in the assault and demonstrate the potential for tanks to reestablish battlefield mobility with real possibilities for a breakthrough into the "rearward" zone. The final Allied offensive of W.W. I, begun in August 1918, incorporated the tanks in a major offensive role and built on the lessons of Cambrai and Hamel.

Soon after the success at Hamel Haig suggested to Marshal Foch, the Supreme Allied Commander, a plan for an offensive which would advance the Allied front East and Southeast of the town of Amiens. This operation would free a vital communications and transportation center, as well as the Amiens-Paris railway. Foch agreed, and on July 26, 1918 issued a formal operations order which stated the following:

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[54]Monash, 56-57; cited in Orgill, 54.

[55]Fuller, Memoirs of an Unconventional Soldier, 289-290.

"The object of the operation is to disengage Amiens and the Paris Amiens Railway, also to defeat and drive back the enemy established between the Somme and the Avre [rivers.][56]

This German salient, a remnant of the Spring Offensive, consisted of a thirteen mile wide sector near Amiens which straddled the Somme River just a few miles West of the 1916 battlefield. Haig wanted to reduce the salient, recapture the communication/transportation center, and exploit any breakthrough of the lines. He assigned the operation to Rawlinson, who began immediate preparations.

Rawlinson's plan for this operation represented a decisive offensive attempt to capture the entire depth of the German defense in this area. He incorporated elements of seventeen divisions. totaling almost 258,000 soldiers. In addition he incorporated nine battalions of tanks (the total of 580 represented the largest concentration of tanks employed by the BEF to date,) 600 aircraft and 2.070 artillery pieces.[57]

The operation was designed in three stages. The first stage objective included the German Front Line and the territory behind it for a distance of 2,500 yards. Rawlinson assigned four divisions to this stage who, once they reached the objective, would halt and consolidate their

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[56]Edmonds, Military Operations: France and Belgium, 1918, vol. 4, 3.

[57]Larson, 62-63; see also Eggenberger, 18; and J.F.C. Fuller, A Military History of the Western World, vol. 3 (New York: Funk and Wagnalls, Inc., 1954-56), 287.

positions. At this point an additional four divisions would pass through the first objective enroute to the second objective 3,000 yards beyond the first. Once they captured the objective and consolidated, the same troops would then push forward an additional 1,000 yards to the third objective, the Amiens defense line itself. The offensive would end with the capture of the third objective.[58] Rawlinson based his "leapfrog" plan in part on the lessons of Cambrai. The November 1917 operation failed in part because of the lack of reserves available with which to exploit the initial penetration. Rawlinson hoped to avoid the same mistake by allocating separate divisions to the first and second objectives.

The Germans located in the Amiens salient comprised elements of roughly eleven understrength divisions, with a total strength of only 35,000 men. Not only were they undermanned and inadequately supplied, the defenders would face an Allied offensive which employed the revised artillery tactics tested at Hamel. Rawlinson assigned his heavy artillery to the initial bombardment and then counter-battery fire, while the field artillery was responsible for the creeping barrage. The final plan allocated 450 heavy field guns against the defenders' 108 batteries, and almost 700 field artillery pieces (one gun per every twenty-five

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[58]Prior and Wilson, 302-303.

yards of defensive line) in support of the creeping barrage.[59] The number of guns firing in support of the assault, combined with the amount of shells available for each mission (700,000 shells for the creeping barrage and 432,000 shells for the counter-battery mission) ensured Rawlinson that the defenders would be unable to engage the assault without great difficulty.

Rawlinson's assault tactics were similar to those tested at Cambrai and Hamel. "The battle of Amiens," wrote Larson, "was in fact, designed to be a large-scale Cambrai."[60] Under cover of the creeping barrage the tanks, 420 in the initial assault on the first objective, would lead the infantry across No Man's Land and penetrate the first defenses. The second four divisions, led by the remaining 160 tanks, would pass through enroute to the second objective, consolidate, then follow their tanks towards the final objective. Success was predicated on absolute secrecy prior to zero hour, the effectiveness of the counter-battery fire and the creeping barrage, and especially on the tanks' ability to spearhead the assault on the objectives.

At 0420 hours on August 8, 1918 the heavy artillery began the bombardment and counter-battery fire while the field artillery commenced with the creeping barrage along a

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[59]Ibid, 313-314.

[60]Larson, 62.

ten mile front. 300 yards behind the creeping barrage the tanks moved forward, breaching the trench and wire obstacles and eliminating the machine gun positions. By mid-afternoon the Allies, in accordance with Rawlinson's leapfrogging plan, had captured all three objectives and began consolidating the new lines. In twelve hours the Fourth Army advanced eight miles, captured over 400 field artillery pieces, and caused 27,000 German casualties. These remarkable gains cost the British the relatively low figure of 9,000 casualties.[61] The operation continued for another three days with consolidation and equipment recovery, but the bulk of the damage to the defenders was done on the first day.

The success of this operation lay in several areas. Of course, the BEF was able to conduct meticulous planning and preparation, to include rehearsals between tanks and infantry and the stockpiling of artillery ammunition. The Allied divisions were somewhat better equipped and at a higher state of morale than were the Germans. These factors aside, two other aspects of this operation were critical to its success.

The first was the complete inability of the German artillery gunners to participate in the battle due to the accuracy of the British counter-battery fire. The German

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[61]Edmonds, Military Operations: France and Belgium, 1918, vol. 4, 84-85.

artillery gunners either did not survive the bombardment, or at the least abandoned their weapons before the tanks reached their positions. Units in the southern sector of the offensive reported that the enemy barrage started out "very weak and, as the attack progressed, ceased altogether."[62] Further evidence that the counter-battery fire was effective is found in the fact that out of just over 500 German guns operating in the BEF sector, 450 were captured intact, undamaged and abandoned.[63]

The second element which contributed to the success of August 8th was the surprise with which the 420 tanks appeared out of the early morning fog and overwhelmed the defenders. The sheer volume of tanks, combined with their imperviousness to the defenders' machineguns and fact that there was no time lag between the initial bombardment and the assault, caused many of the defenders to flee or surrender.[64] The strongpoints which did not surrender were destroyed by infantry teams working in conjunction with the tanks to outflank the positions individually and eliminate them one by one.[65]

Ludendorf called August 8, 1918 "the black day of the

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[62]Prior and Wilson, 321.

[63]Ibid.

[64]Edmonds, Military Operations: France and Belgium, 1918, vol. 4, 48.

[65]Ibid., 48-50.

German Army in the history of the War."[66] He acknowledged the fact that "six or seven divisions that were quite fairly to be described as effective had been completely broken," and that the Germans had to resign themselves to the prospect of the continuation of the Allied offensive.[67] He had received reports of masses of German soldiers, victims of low morale, surrendering to the Allies, and he recognized that the end was near.

His characterization of the British tactics which had resulted in such overwhelming success was simple but telling: "The characteristic of [British] tactics was narrow but deep penetration by tanks after short but extremely violent artillery preparation. Mass attacks by tanks... remained hereafter our most dangerous enemies."[68] Rawlinson felt likewise, stating "The success of the operation of 8th August and succeeding days was largely due to the conspicuous part played by the 3rd, 4th, and 5th Brigades of the Tank Corps."[69] After the war a German military historian stated his view on the impact of tanks in general on the German W.W. I efforts:

"And therefore I consider that we were not beaten by the genius of Marshal Foch, but by 'General Tank,' in other

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[66]Ludendorf, 326.

[67]Ibid., 328-331.

[68]Ibid., 340.

[69]Fourth Army Special Order of the Day, 16 August 1918; cited in Larson, 63.

words, a new weapon of war, in conjunction with the widespread reinforcement of the Americans."[70]

The Allied victory at Amiens was a result of the combination of several variables which had not been effectively linked on that scale in previous operations. This mixture consisted of: superior weaponry, particularly the tanks; combined infantry and tank tactics; adequate levels of supply, especially in the area of artillery munitions; the revision of the artillery mission to maximize the capabilities of the tanks in the assault; and an overall plan designed to make full use of the capabilities of each of the combat arms. Tanks were an integral part of that plan, and their success, particularly in the first two hours on August 8th, reflected just how far their mechanical and doctrinal development had progressed.

These three battles provide a picture of the tanks' development from infantry support weapons with limited offensive potential to weapons employed on the point of the offensive. They had proven capable of clearing a path for the infantry into the main defensive zone and demonstrated the potential to advance further. During the inter-war period, mechanized doctrine would vacillate between those who believed tanks should remain auxiliary to the infantry and those who were willing to take the doctrine to a higher

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[70]General der Infanterie A.D.H. von Zwehl, Die Schlachten im Sommer, 1918, am der Westfront; cited in Swinton, Eyewitness..., xi.

level. Interestingly enough, it was the British who elected to revert back to the early philosophy while the Germans under General Heinz Guderian explored the potential for expanded mechanized operations. In retrospect, the decision by both sides is logical. The British had won the war using traditional strategies augmented by innovative equipment and tactics, and therefore had little inclination to change. The Germans on the other hand had lost; their tactics had proven ineffective on the large scale of the Western Front, and they had everything to gain by adopting new equipment and strategies.

Chapter VI: Conclusion

In his book The Tank Douglas Orgill stated that operations between July 1916 and August 1918 focused the British General Staff on the real value of tanks in the offensive. By using tanks massed in formations of hundreds, the British hoped to overcome the effects of the battlefield stalemate on wide fronts. Appearing simultaneously with this attitude was the need to provide what had been lacking in previous operations, namely "an effective reserve for the second, third, fourth, and fifth days of the battle, so that a breakthrough could be made through the whole depth of the front."[1] Once the breakthrough occurred, then, "and only then," Orgill stated, "might the cavalry come into its own."[2]

Orgill's position regarding the strategic role of the tank was that by the end of 1918 the BEF viewed the tank not as a substitute for cavalry but as a wrecker of infantry morale. The British maintained the philosophy that the tank was auxiliary to the infantry and the cavalry. The tank was useful for penetrating the defenses but incapable of assuming the role of primary combat arm. And as subsequent events will show, few British military professionals during the inter-war period wanted to replace the infantry or cavalry with a mechanical innovation such as the tank.

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[1]Orgill, 83.

[2]Ibid.

In the years following W.W. I the British Army remained steadfastly devoted to the infantry and cavalry as their primary battlefield combat branches, due in no small part to the opinion of senior military leaders like Haig. In December 1918 he recorded his thoughts on the effectiveness of the infantry, artillery, and cavalry based on his experiences.

With regard to the infantry he wrote: "Despite the enormous development of mechanical invention... the infantry remains the backbone of defense and the spearhead of the attack."[3] He credited the increase in the number of artillery pieces and the amount of munitions, along with improved ranging techniques, with fostering "the intimate cooperation between artillery and infantry... which has been a marked feature of our operations."[4] The cavalry, whether used for shock effect "under suitable conditions" or as mobile infantry, still had "an indispensable part to play in modern war." And while he gave credit to the tanks for their role in breaking through defenses, he was adamant in his view that mechanical innovations were useful only for supporting the primary branches. These opinions are remarkably traditional given the fact that Haig was the most supportive senior leader when it came to the tanks and early mechanized doctrine during the war itself.

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[3]Boraston, 300.

[4]Ibid.

The following quote represents clearly Haig's opinion of the relationship between improved mechanical weapons and the infantry and cavalry:

> "It should never be forgotten however that weapons of this character [motor transport, heavy artillery, machine guns, aeroplanes, tanks] are incapable of effective independent action. They do not in themselves possess the power to obtain a decision, their real function being to assist the infantry to get to grips with their opponents."[5]

Clearly Haig viewed the proper role of the tank as being auxiliary to the infantry. Because of opinions like those held by Haig post-W.W. I mechanized development in the British Army slowed dramatically in comparison to the period between 1916 and 1918. During the last three months of the war the British employed tanks in large numbers, along the tactical lines established at Cambrai and Amiens, with great success. On August 21, 1918 they opened the Battle of Bapaume with 190 tanks; on September 27 the BEF launched a direct attack on the Hindenburg Line with 230 tanks, succeeding in advancing twenty miles in two weeks and capturing 48,000 prisoners and 630 guns.[6]

In spite of the demonstrated success of tank operations, by November 1918 roughly fifty percent of the almost 2,000 tanks used by the BEF since Amiens were sent to the salvage yards to be scrapped, and by Armistice Day only

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[5]Ibid., 327.

[6]Larson, 63.

204 tanks were operational and ready for duty.[7] These statistics would indicate that the War Office believed the need for tanks had arisen out of the peculiar requirements of the W.W. I battlefield and saw no need to maintain high levels of tank production once the war was over. In fact, a combination of variables came together at wars' end to frame the British Army's inter-war period philosophy concerning the role of the tanks and the need for standing tank units.

In mid-November 1918 the Ministry of Munitions canceled all orders for future production of 6,000 tanks. Because the tank had evolved in direct response to the problems posed by trench warfare, and because the likelihood of another war fought along the those same lines was deemed slim, the Treasury saw no need to invest the funds. One senior officer, Major-General Sir Louis Jackson, went so far as to state "the tank proper was a freak. The circumstances which called it into existence were exceptional and are not likely to occur again. If they do, they can be dealt with by other means."[8] Despite the successes of 1918, by the end of 1919 the British Tank Corps consisted of only four battalions, down from a wartime level of twenty-five battalions in 1918.[9] The tanks fell victim to the

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[7]Ibid.

[8]B.H. Liddell Hart, The Tanks: The History of the Royal Tank Regiment (London: Cassell Publishing, 1959), vol. 1, 306; cited in Messenger, 36.

[9]Messenger, 37.

combination of traditional infantry and cavalry mentalities and the hard facts of post-war economic depression.

The inter-war period for the British Army was filled with debate over the changing roles of the infantry, cavalry and mechanized arms. It is beyond the scope of this study to conduct a detailed analysis of the changes in British military attitude from dependence on the traditional formula to an offensive strategy based on mechanized lines. Larson, Messenger and Bryan Perret all devote significant time to discussions of this period; Larson because his central topic is primarily the development of British mechanized strategy after W.W. I, and Messenger and Perret because this period forms the foundation for their analyses of blitzkrieg operations. During the inter-war period, while British tank production slowed dramatically and the Tank Corps remained numerically small in size, doctrinal development continued under Fuller and Hart.

Fuller's work on the 1920 version of the British Army Field Service Regulations emphasized the tanks' firepower and mobility and specified that the duties of the tanks in the attack were: 1) to assist the advance of the infantry; 2) to destroy hostile tanks; and 3) to exploit a success.[10] He also stressed the necessity for continuous coordination between the tanks and the infantry: "tanks must protect

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[10]Great Britain, War Office, Field Service Regulations, vol. 2: Operations (London: HMSO, 1920,) 31-32; cited in Larson, 113.

infantry from machine gun fire and the delay imposed by uncut wire; infantry must protect tanks from the close range fire of enemy field artillery and anti-tanks guns."[11]

Despite this kind of recognition for the tanks and their potential, the Field Service Regulations maintained the traditional emphasis on the infantry and cavalry as the primary combat maneuver arms of the British Army. These regulations set the tone for the inter-war period of strategic development for the British, and that tone specified that the traditional arms would retain the primary roles in offensive operations, while the artillery and tanks performed support roles.

By cutting through wire and destroying enemy strongpoints the tanks enabled the infantry to attack without sacrificing the element of surprise previously lost during artillery bombardments. As a result the use of tanks reinforced the validity of the W.W. I strategy of attrition because it increased the effectiveness of that strategy. "This," said Larson, "was the contention that the theorists of armored warfare challenged and which forms the focus of the tank controversy in the British Army during the inter-war years."[12] Fuller's work on this and other writings continued theoretical doctrine development and helped keep the idea of mechanized offensive operations alive.

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[11]Ibid.

[12]Ibid., 67.

Hart was a British infantry officer and a keen student of military history who held that future wars would be shaped by the combined employment of tanks, artillery and aircraft. Forced to resign from the Army in 1924 for health reasons, he turned to the full-time study of military operations from ancient Rome to 1918 for Encyclopedia Britannica. While researching this material, he developed a concept of strategic operations he termed the "strategy of indirect approach."

This strategy, as he outlined in his work of the same title originally published in 1929, involved more than troop movement and supply routing on the battlefield. Hart proposed a departure from the traditional European frontal assault mindset to one circuitous in attitude and execution. He determined through his studies of various military leaders such as Philip, Alexander, Hannibal, Cromwell, and Napoleon that throughout history "decisive results in war have only been reached when the approach had been indirect. In strategy, the longest way round is apt to be the shortest way home."[13]

Hart became convinced that in any major military operation, the opponent who pursued a "direct approach," that is, along the expected lines of attack, often experienced disappointing results. He stated that "to move along the line of natural expectation consolidates the

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[13]Hart, 4.

opponent's equilibrium, and by stiffening it, augments his resisting power."[14] He claimed that his study of decisive military campaigns demonstrated that the dislocation of the enemy's psychological and physical balance was the vital prelude to a successful attempt at his overthrow.[15] One need only review the trench warfare practices of W.W. I to recognize the validity of the argument against a strictly "direct" approach to warfare.

By 1933 the British Army was comprised of 136 infantry battalions, twenty regular cavalry regiments, twenty-one Indian cavalry regiments, sixteen training regiments, and only four tank battalions.[16] These unit allocations represent the real areas of emphasis for the British. The only real concession to the future of mechanization came when the War Office decided in 1937 that all the cavalry regiments would exchange their horses for light tanks. These tanks which, Orgill said, "if not horses, at least looked like they were the nearest thing available to a mechanized horse,"[17] enabled the cavalry to retain their spirit as well as their role as a primary combat arm.

Hart's study is significant because he maintained that with correct employment, the tank was admirably suited for

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[14]Ibid., 5.

[15]Ibid.

[16]Orgill, 98.

[17]Ibid.

much more than infantry support missions. The tank had not only demonstrated the potential for effective penetration of established defensive lines (the direct approach), but Hart insisted that tanks were capable of rear area exploitation operations against enemy command and logistics centers (the indirect approach.) By marrying the historical examples in his study with the demonstrated results of tank operations in W.W. I, Hart's study did much to focus the potential of mechanized operations on the doctrinal level.

The British Army, distracted by the debate between traditionalists like Haig and visionaries like Fuller and Hart, and restricted by the post-war economic depression, took note of Hart's work but made minimal progress towards preparing the Tank Corps for the future. While the British were thus stymied, the Germans devoted great energy and resources to developing a mechanized force with the tank as its foundation.

In 1936 the British fielded 209 light tanks and 166 medium tanks in its four battalions. Out of this total, 140 of the light tanks and 164 of the medium tanks were obsolete. In contrast, the Germans at that time could field 1,600 new light tanks and between 300 and 400 new medium tanks.[18] Perhaps more important than the sheer numerical superiority was the fact that the German mechanized doctrine during the inter-war period was developed by leaders who

[18]Messenger, 108.

understood its potential and were dedicated to creating an offensive force based on the tank. General Heinz Guderian was among the foremost of those leaders.

Guderian was the first of the German generals to grasp fully the significance of the work done by Fuller and Hart. He credited both men with providing him with his initial motivation to pursue a working mechanized doctrine:

> "It was principally the books and articles of the Englishmen, Fuller, Liddell Hart,...that excited my interest and gave me food for thought. They envisioned [the tank] in the relationship to the growing motorization of our age, and thus became the pioneers of a new type of warfare on the largest scale."[19]

Based on the principles outlined in Fuller and Hart and on the W.W. I experiences at the hands of the British tanks, Guderian succeeded in convincing Hitler of the potential success to be gained by organizing entire units of tanks and mechanized infantry together in one command. In 1935 Hitler authorized the creation of the first three Panzer Divisions.[20] Under Guderian's leadership each division contained a mixture of heavy and light tanks, motorized infantry battalions, mechanized engineers, mechanized reconnaissance elements, field artillery units, and signal units.[21] This type of organization is significant because Guderian designed each Panzer division to be an independent

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[19]Heinz Guderian, Panzer Leader (New York: Dutton Publishing, 1952), 20.

[20]Ibid.

[21]Ibid., Appendix XXIV.

combined arms command, with a core of tanks to spearhead offensive operations, and capable of diverse missions.

For Guderian the combined arms operation came to life in the "blitzkrieg." This concept of mechanized warfare combined the basic elements developed and revised during W.W. I, incorporated the principles espoused by Fuller and Hart, and added a spirit of ruthlessness and efficiency. The primary characteristics of blitzkrieg operations were speed, surprise, maneuver, and overwhelming firepower concentrated on a narrow front.[22] In its execution reconnaissance units located enemy weaknesses and protected the advancing division's flank. Tanks with air support predominated in seizing vital objectives and held them until infantry units with anti-tank capabilities arrived to secure them against counterattack. Artillery supported all phases of the attack and temporary defense.

Guderian considered the key to offensive success to be movement. He believed that by attacking with tanks he could sustain a higher rate of movement and that once a breakthrough was made the movement could be maintained by the combined arms division.[23] Since the tank had developed in response to the loss of battlefield mobility in 1916, and since it had demonstrated the capability to restore momentum

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[22]Ferdinand O. Miksche, Attack: A Study of Blitzkrieg Tactics (New York: Random House, 1942), 10.

[23]Guderian, 42.

to the BEF, Guderian's reliance on the tanks to lead his assaults and maintain forward momentum seems logical. The doctrine of the blitzkrieg in many aspects represented the strategy of the indirect approach and traditional frontal maneuver taken to a higher level. When the Germans launched their assault into Poland in September, 1939 Guderian had at his disposal forty infantry, six panzer, four light and four mechanized divisions with a total strength of 2, 977 tanks.[24] The Polish campaign proved the validity of Guderian's concept; he considered the campaign to have been the baptism of fire for his armored formations as well as the overall philosophy of the blitzkrieg.[25]

This study has shown clearly that the tank was designed in the early stages of W.W. I as strictly an infantry support weapon, developed in direct response to the loss of mobility in the face of barbed wire and machine guns. Swinton never envisioned the tank as the primary offensive arm of an operation; for him the tank was auxiliary to the infantry who remained the premier maneuver force on the battlefield. As British tank doctrine developed in the latter stages of the war it took on an increasingly offensive role but always remained secondary to the infantry and cavalry.

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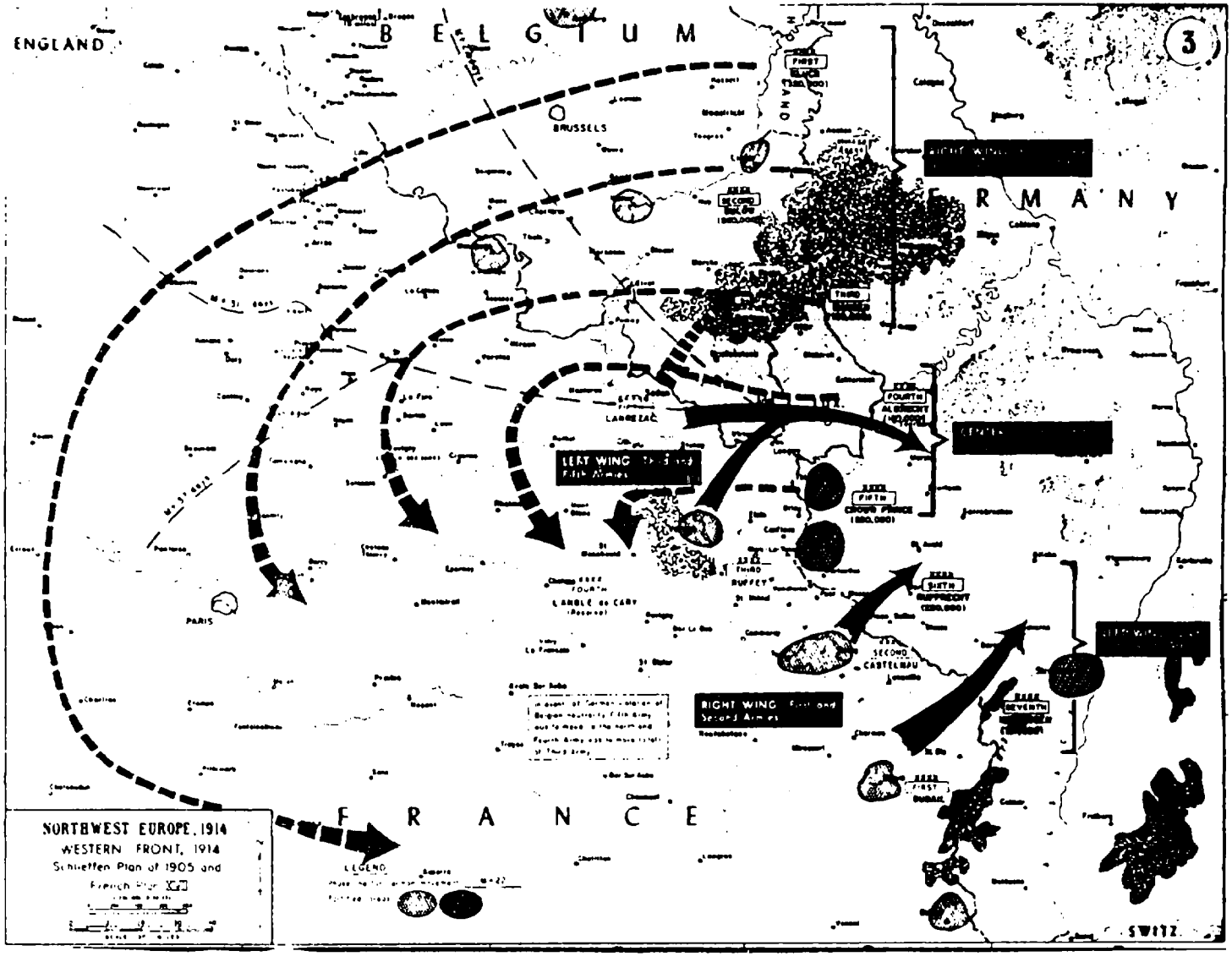
[24]Bryan Perret, A History of Blitzkrieg (New York: Stein and Day Publishers, 1983), 78.

[25]Guderian, 82.

The immediate post-war reduction in British standing tank forces indicated a reluctance on the part of the military establishment to continue practical development of mechanized equipment or doctrine. It was the Germans under Guderian who expanded on the basic principles of tank operations and pursued the concept of large combined arms divisions and rapid, long-range offensive maneuver. To state that the German blitzkrieg is the logical result of the progression of W.W. I mechanized doctrine is to make an inaccurate analysis. Guderian built on the early work of men like Swinton, Fuller and Hart but also incorporated an offensive philosophy, a spirit of innovation, and the ability to fund new vehicle production, none of which were present in the British Army during the inter-war period.

In the final analysis, the mechanized operations conducted by the BEF were innovative solutions to the problems posed by the battlefield stalemate. Tanks provided the means by which mobility was restored to the infantry, enabling them to penetrate defensive lines and fight the battle. The British Army ignored, for the most part, the offensive potential which existed in mechanized operations. During the inter-war years the tank retained its original mission and purpose for the British, while under the Germans it assumed a new role as the primary offensive component of the blitzkrieg spearhead.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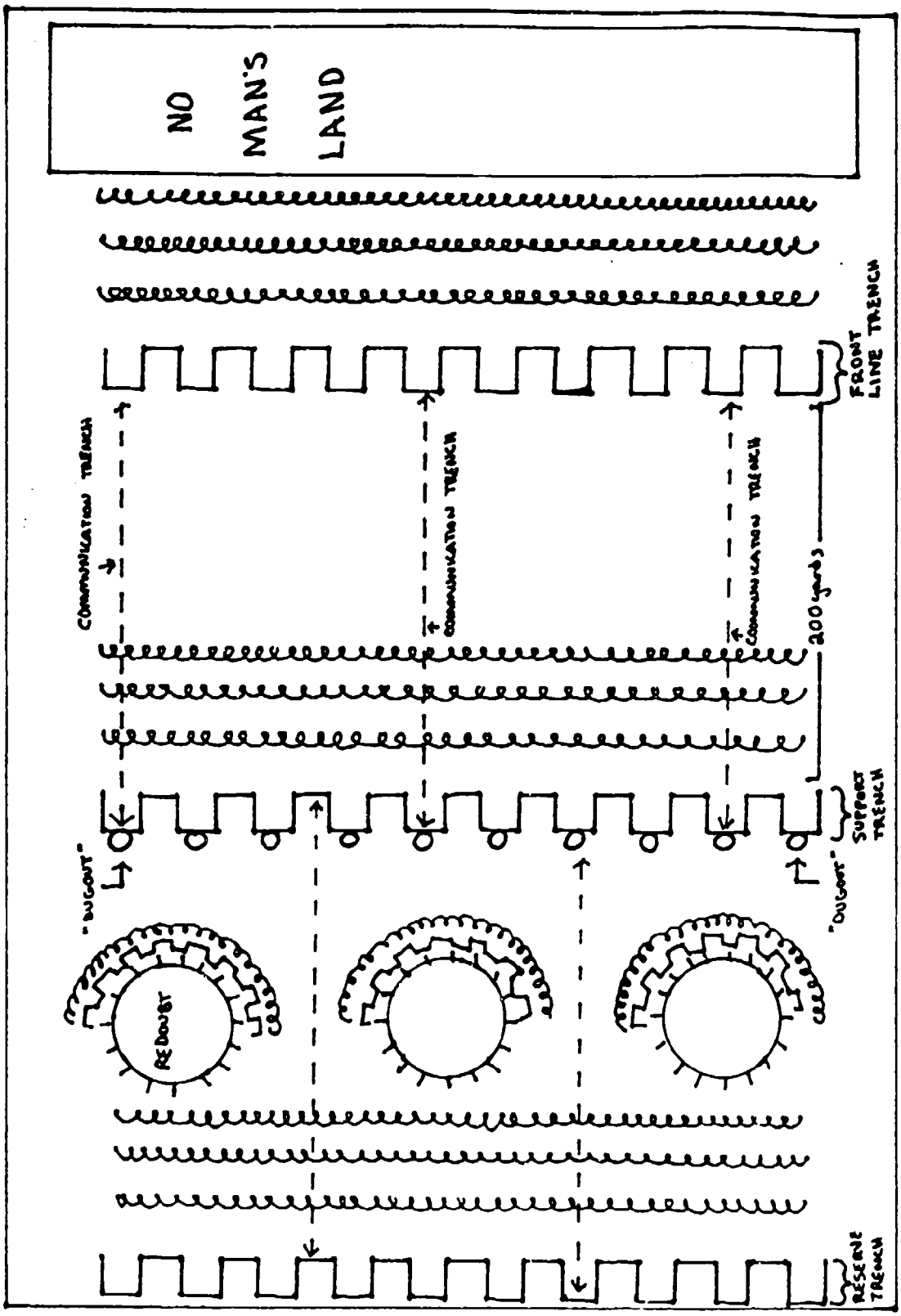
NORTHWEST EUROPE, 1914
WESTERN FRONT, 1914
Schlieffen Plan of 1905 and
LEGEND



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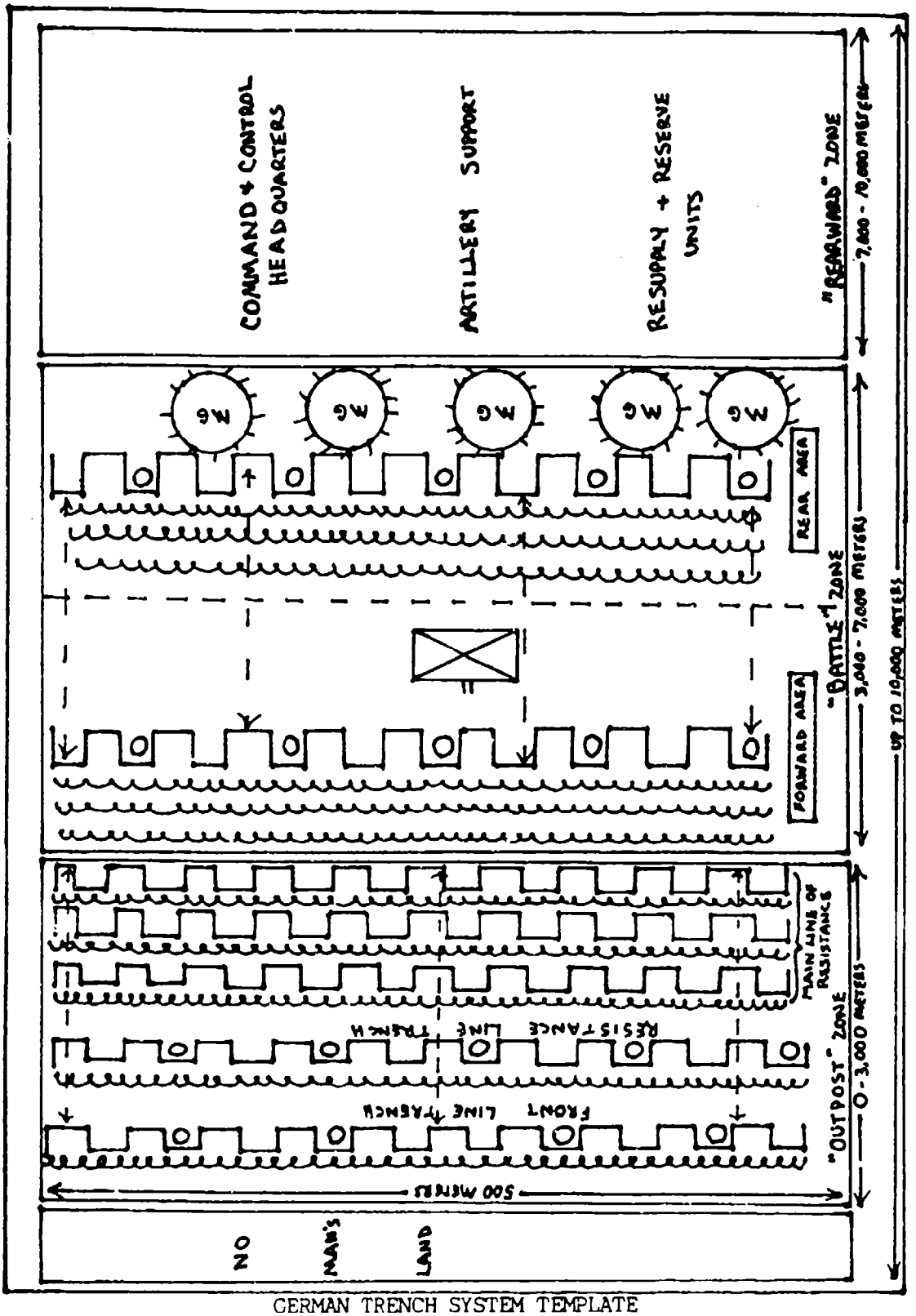
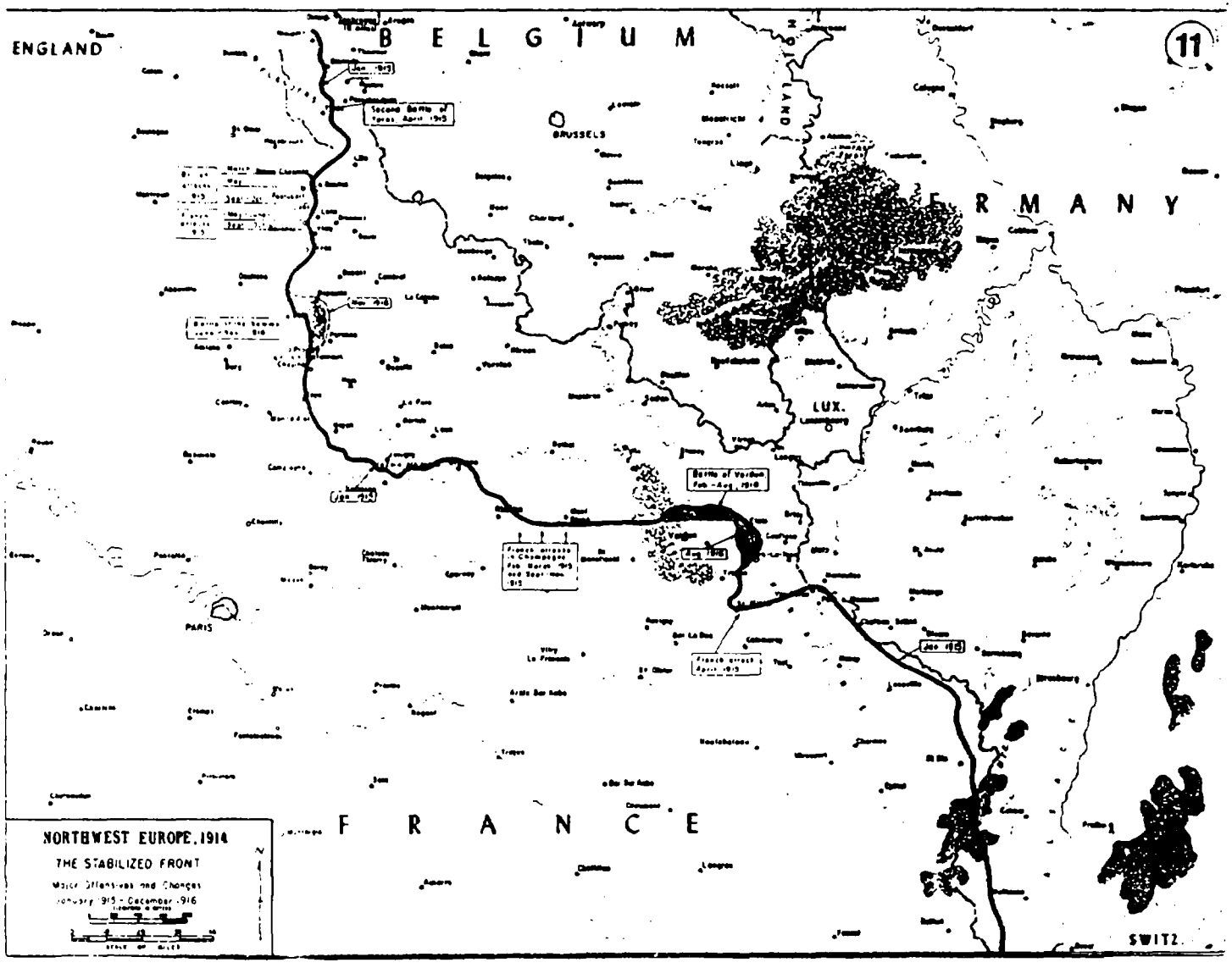


GERMAN TRENCH SYSTEM TEMPLATE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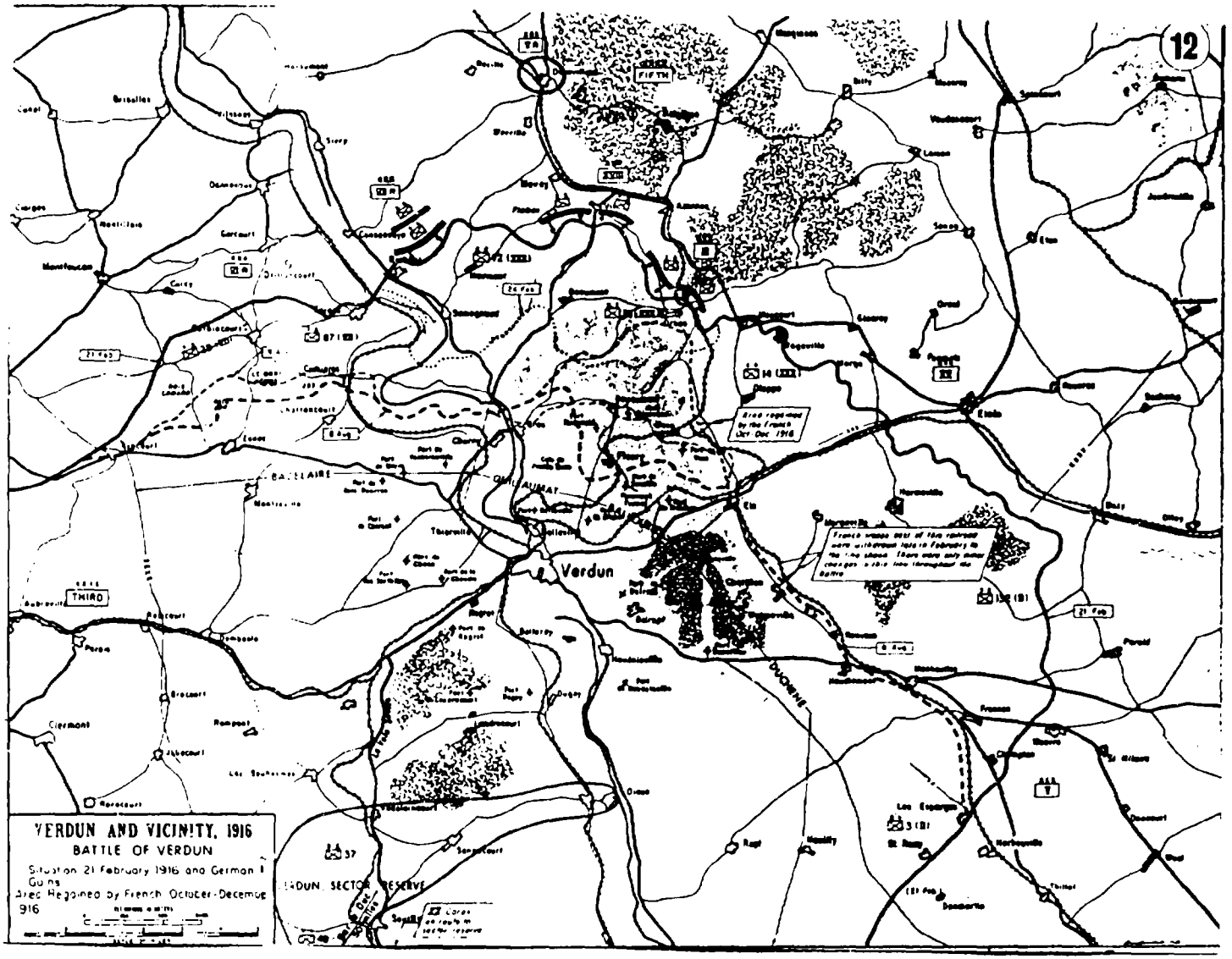
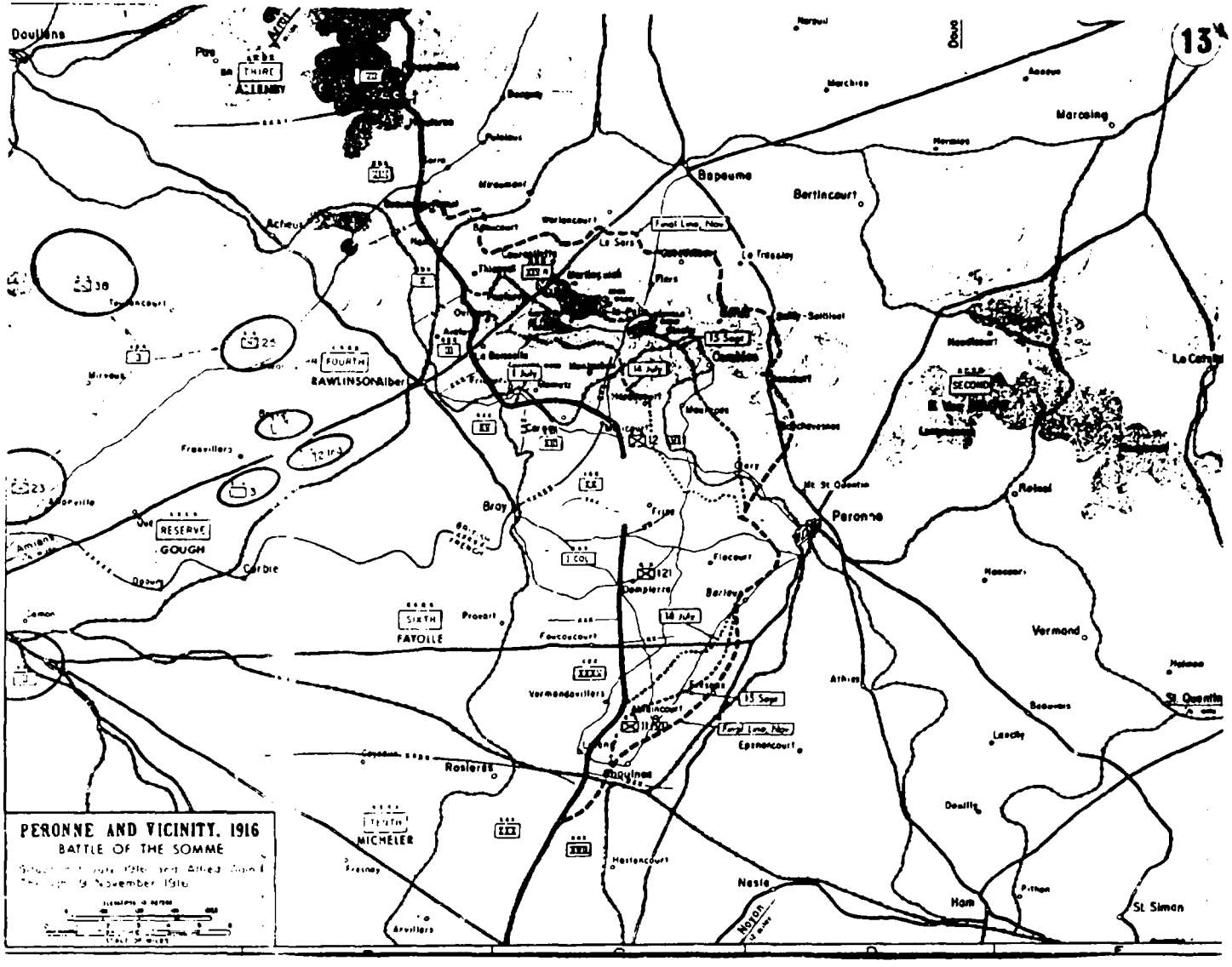
11
NORTHWEST EUROPE, 1914
THE STABILIZED FRONT


12
VERDUN AND VICINITY, 1916
BATTLE OF VERDUN
Situation 21 February 1916 and German Gains
Area Regained by French October-December 1916
Verdun
FIFTH
THIRD
BAPTISTAIRE
DUGNENE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Albert
FOURTH
RAWLINSON
Bray
Peronne
RESERVE
GOUGH
Corbie
Amiens
SIXTH
FAYOLLE
Proyart
Foucaucourt
Vermandovillers
Rosières
Chaulnes
Nesle
Ham
St Simon
Vermand
St Quentin
Roisel
Le Cateau
Epehy
Combles
Flers
Guillemont
Guinchy
Morval
Longueval
Delville Wood
Ginchy
Hardecourt
Maricourt
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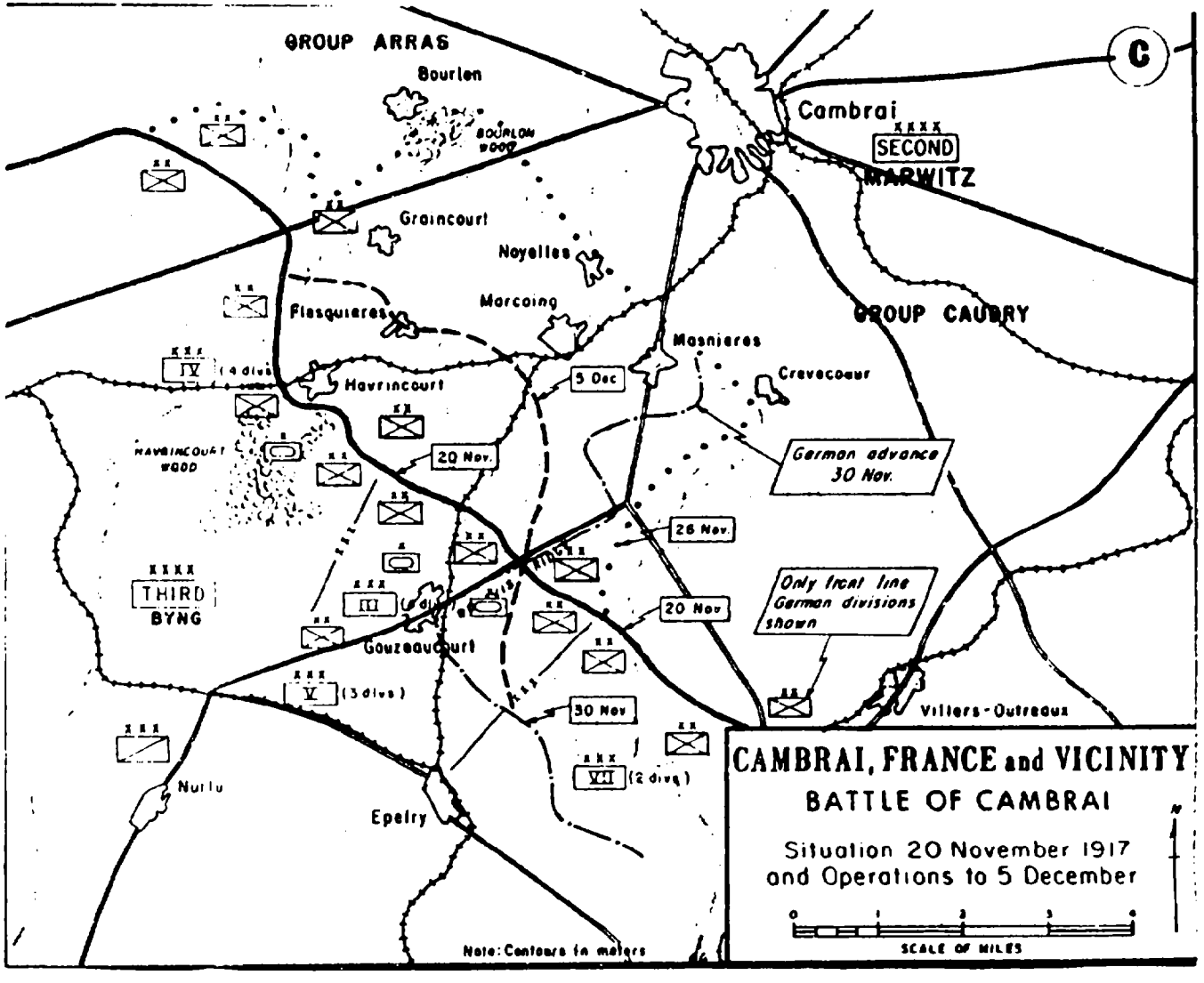
PERONNE AND VICINITY, 1916
BATTLE OF THE SOMME


GROUP ARRAS
Bourlon
BOURLON WOOD
Graincourt
Noyelles
Flesquieres
Marcoing
Cambrai
XXXX
SECOND
MARWITZ
GROUP CAUDRY
Masnieres
Crevecoeur
C
XXX
IV
(4 divs)
Havrincourt
5 Dec
20 Nov.
HAVRINCOURT WOOD
German advance 30 Nov.
26 Nov.
XXXX
THIRD
BYNG
XXX
III
(4 divs)
Only final line German divisions shown
20 Nov
Gouzeaucourt
XXX
V
(3 divs)
30 Nov
Villers-Outreaux
XXX
VII
(2 divs)
Nurlu
Epehy
Note: Contours in meters
CAMBRAI, FRANCE and VICINITY
BATTLE OF CAMBRAI
Situation 20 November 1917
and Operations to 5 December
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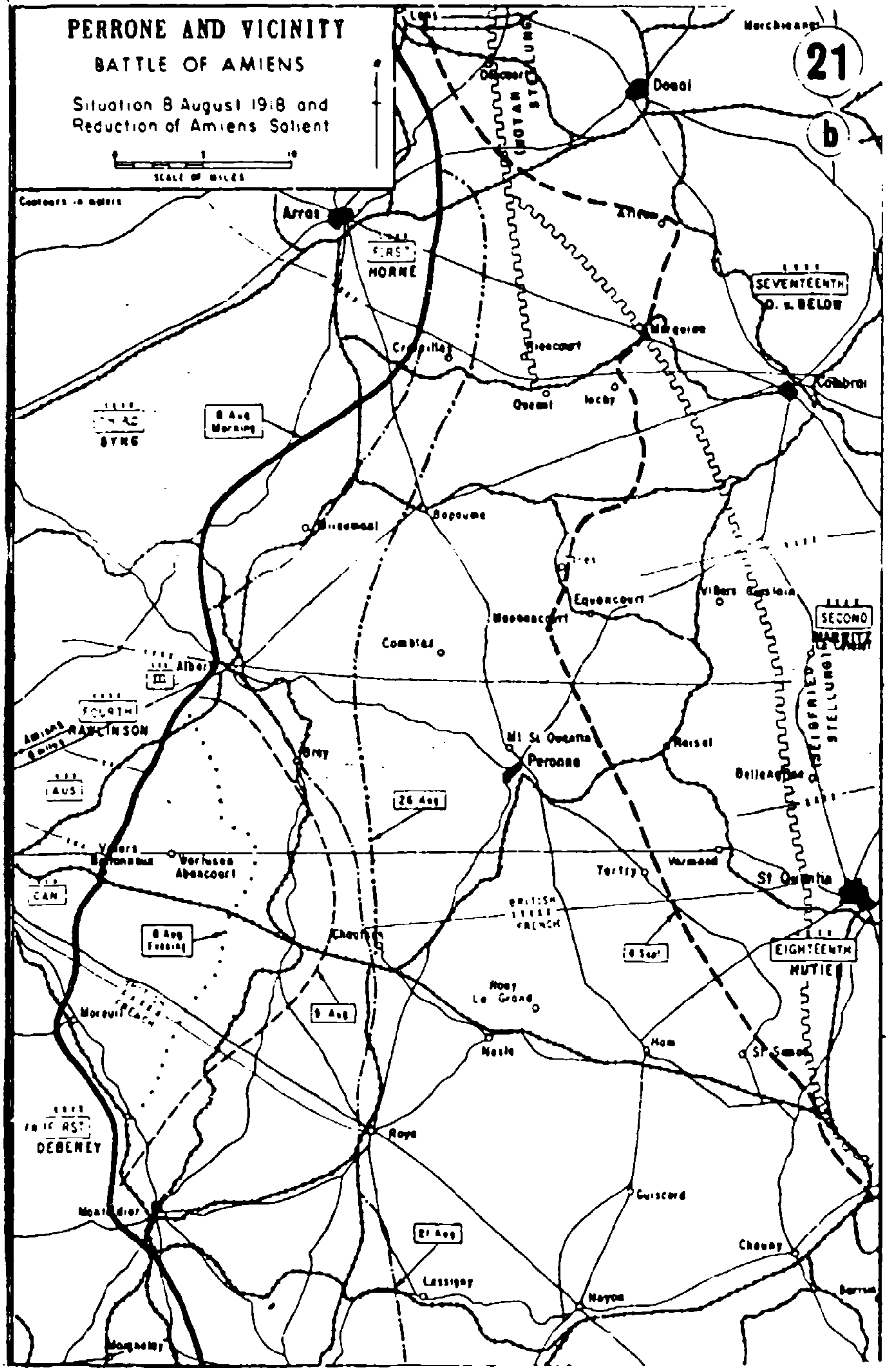
SCALE OF MILES


PERRONE AND VICINITY
BATTLE OF AMIENS
Situation 8 August 1918 and
Reduction of Amiens Salient
SCALE OF MILES
21
b
Douai
Arras
FIRST
HORNE
SEVENTEENTH
Cambrai
8 Aug
Morning
Bapaume
Equancourt
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Combles
FOURTH
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Bray
Mt St Quentin
Peronne
26 Aug
St Quentin
8 Aug
Evening
Chaulnes
EIGHTEENTH
HUTIER
8 Aug
Nesle
Ham
Roye
DEBENEY
Guiscard
21 Aug
Chauny
Lassigny
Noyon

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The undersigned, appointed by the Dean of the Graduate Faculty, have examined a thesis entitled

OVERCOMING THE BATTLEFIELD STALEMATE: THE INTRODUCTION OF ARMORED FIGHTING VEHICLES AND TACTICS IN THE BRITISH ARMY DURING THE FIRST WORLD WAR

presented by

DAVID P. CAVALERI

a candidate for the degree

MASTER OF ARTS

and hereby certify that in their opinion it is worthy of acceptance.

Jonathan Bailey

[illegible]

Eric R. Cunningham