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A MAXIMUM OF SUPPORT: THE DEVELOPMENT OF U.S. ARMY FIELD  
ARTILLERY DOCTRINE IN WORLD WAR I

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Final report, June 3, 1983

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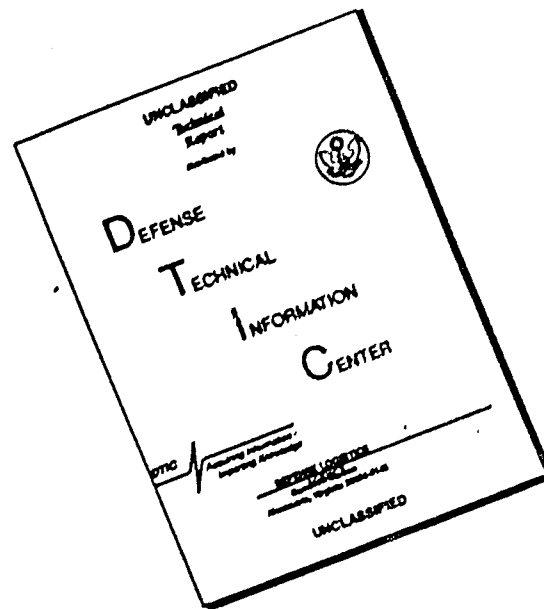
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be able to conduct an offensive operation. The American First Division, the first organized U.S. division, provides an excellent vehicle to demonstrate the various changes in American artillery doctrine. The First Division conducted the first limited American offensive at Cantigny on 28 May 1918, with the artillery using trench warfare methods taught by the French. The division then conducted a five day attack at Soissons in July and learned at great cost that their doctrine was inadequate for maneuver warfare. After that battle, and each succeeding battle, the division's artillerymen studied the battle's lessons and adapted their doctrine in pursuit of maximum support for the infantry. By the time of the last offensive in October 1918, the First Division had clear ideas on the requirements for infantry-artillery cooperation. Only the technical deficiencies of artillery and communications equipment prevented the optimum use of artillery fire support for the division's last battle of the war.

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THESIS ABSTRACT

THE OHIO STATE UNIVERSITY  
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NAME: Richard Lee Pierce

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TITLE OF THESIS: A MAXIMUM OF SUPPORT: THE DEVELOPMENT OF  
U.S. ARMY FIELD ARTILLERY DOCTRINE IN  
WORLD WAR I

Summarize in the space below the purpose  
and principal conclusions of your thesis.

The purpose of this thesis is to discuss the development of U.S. Army field artillery doctrine in World War I. This war marks a revolution in both technical artillery developments and their application in modern warfare. The prewar U.S. Army was unprepared in numbers of personnel, materiel, and training to make any contribution to the Allied war effort in France. In addition, U.S. field artillerymen possessed no modern doctrine. It would be over a year after the U.S. declaration of war before any unit of the American Expeditionary Forces would be able to conduct an offensive operation. The American First Division, the first organized U.S. division, provides an excellent vehicle to demonstrate the various changes in American artillery doctrine. The First Division conducted the first limited American offensive at Cantigny on 28 May 1918, with the artillery using trench warfare methods taught by the French. The division then conducted a five day attack at Soissons in July and learned at great cost that their doctrine was inadequate for maneuver warfare. After that battle, and each succeeding battle, the division's artillerymen studied the battle's lessons and adapted their doctrine in pursuit of maximum support for the infantry. By the time of the last offensive in October 1918, the First Division had clear ideas on the requirements for infantry-artillery cooperation. Only the technical deficiencies of artillery and communications equipment prevented the optimum use of artillery fire support for the division's last battle of the war.

*Alan R. Millot*  
Adviser's Signature

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All officers must undertake their mission with the most solemn determination that in case of attack our infantry should receive the utmost protection from the guns, and that in case of an offensive movement the infantry shall receive a maximum of support. Under no circumstances must it be said that the artillery failed in its full duty under any circumstances that might arise. No opportunity must therefore be lost to respond effectively to any demand whatever may be made by our infantry.

Major J. A. Crane  
Adjutant  
First Field Artillery Brigade  
8 January 1918<sup>1</sup>

## INTRODUCTION

When Congress declared war on Germany on 6 April 1917, the European war had been well underway for almost three years. During that time, the participating military organizations, at the cost of tremendous bloodshed, learned that man's technological genius had exceeded his ability to exploit and assimilate technological capabilities either quickly or decisively. Indeed, the new weapon developments, the machine gun and the modern artillery, coupled with the vast sizes of the armies in a constructed area, prolonged the war instead of hastening its outcome. The military's most important task became to seek a solution for the stalemate of the Western Front. Although not in combat, the U.S. Army was affected by the war. As an indication of its professionalism, the officer corps analyzed and published studies on the war's developments. While handicapped by an administration that shunned war and even frowned upon planning for it, the thought process had begun years before the declaration of war.

In the situation that the American army faced of rapid expansion, few qualified trainers, and equipment shortages, and in preparation for the uniqueness of combat, leaders place a high premium on available experience, hence the American dependence on the French and British for both instructors and doctrine. However, as the

American army gained experience both from training and actual battle, it began to evolve and standardize its own techniques, which represented in some respects an amalgamation of French and British ideas, in others its own doctrine.

Doctrine is a result of theory, usually based on past experience, tested by practical application. If in practice the theory proves deficient or unworkable, it must be altered. Prewar American artillery doctrine, based upon perceptions of warfare in the expanses of the North American continent, did not keep pace with the modern weapons of the First World War. Because of their unit dispositions and a lack of Congressional funding for new weapons, Army officers could derive new theoretical doctrine, but could not validate it practically. Only by the forced practical application of the First World War could the U.S. Army's field artillery adjust theoretical doctrine to fit the realities of modern warfare.

While new arms or branches came into existence during the war, the field artillery, as one of the three prewar combat arms, may have undergone the greatest changes in doctrine during the Great War. Long range, larger caliber, and more accurate weapons resulted in new methods of employment, communication, and targeting, developments

American artillerymen had not mastered. Most important, the U.S. artillery had to learn how to provide the infantry the support needed for success in battle with the new technology. The French term "liaison," with the intent to ensure the greatest cooperation between the infantry and the artillery, became the American by-word in what is now known as combined arms operations.

The American First Division, also the first in field as well as in name in the American Expeditionary Force (AEF), with its organic artillery, the First Field Artillery Brigade, provides an excellent vehicle to trace the evolution of U.S. Army field artillery doctrine during the war. The division received its initial training under French and British instructors, the experts of trench warfare for which the Americans were unprepared and had no doctrine. The French trained the First Field Artillery Brigade, inculcating all that they knew at the time about the modern application of field artillery firepower.

Trench warfare was inherently defensive in nature, a fact General John J. Pershing and his officers decried. Under Ludendorff's leadership, the Germans were able to break out of the stalemate of the Western Front, ably demonstrating their new techniques in the spring offensives of 1918. That display of offensive war changed Allied attitudes and allowed the Americans to pursue

their brand of what Pershing termed "open warfare." The First Division, the best trained of American units at that time, participated in the first offensive test of American abilities at Cantigny in May 1918, and major offensives from that period forward. By studying the division's conduct of successive battles, therefore, one is able to follow the development of the U.S. Army's artillery doctrine; that is, how the artillery adapted the new technology to offensive warfare.

The First World War marks a revolution in field artillery doctrine. From 1917 to 1918, the U.S. Army field artillery abandoned its outdated prewar doctrine, adopted French doctrine, and then evolved its own new doctrine for maneuver warfare. This is a study of the artillery methods used and the resulting changes in tactical doctrine as demonstrated in the First Division's participation in the battles of Cantigny, Soissons, the reduction of the St. Mihiel salient, and the Meuse-Argonne offensive.

## CHAPTER I

### PREWAR DOCTRINE AND THE EFFORTS TO MODERNIZE

"In almost every sense the doctrine of Field Artillery has advanced. The progress of the arm has been unprecedented, so that the organization and methods of three years ago are now in many respects obsolete. . . . During this time the United States Field Artillery has stood still."<sup>1</sup>

On 6 April 1917 the U.S. Army was far from prepared to fight on the Western Front. This total unpreparedness included personnel strength, state of training, and numbers and condition of equipment. The Regular Army numbered 128,000 officers and men in that month, and with the call-up of the National Guard for duty during the Mexican border crisis, active duty strength had increased to just over 190,000.<sup>2</sup> The largest permanent units were regiments of infantry, artillery, and cavalry. No divisional sized unit existed except in theory. The infantry and field artillery rarely, if ever, trained together.<sup>3</sup>

In 1914, the field artillery of the Regular Army consisted of 266 officers and 4,992 enlisted men, organized into six regiments of six batteries each. Formerly subordinate to the coast artillery branch, the field artillery had assumed this organization in 1907 after Congress established it as a separate branch. As Major General William J. Snow, Chief of Field Artillery

1918-1927, explained, this organization was sufficient only for small overseas garrisons and "display samples" of the different classes of field artillery in the United States. In the continental U.S. there was only one regiment each of light, heavy, and horse artillery and half a regiment of mountain artillery. In the summer of 1916 Congress passed the National Defense Act, which provided for an increase in the field artillery to twenty-one regiments over a five year period. Accordingly, by April 1917 three new regiments had been added. In addition to the nine regiments of field artillery, there were sixteen regiments of National Guard field artillery and a reserve corps of 221 officers and thirty-three enlisted men. This totaled 1,130 officers and 21,874 enlisted men trained, partly trained, or wholly untrained. Snow claimed the entire enlisted ranks with one year or more of service could not fill the noncommissioned officer (NCO) grades of the authorized twenty-one regiments. By 11 November 1918 there were 22,393 officers and 439,760 enlisted personnel serving in America's field artillery.<sup>4</sup>

While the numbers in themselves were insufficient for a meaningful American contribution to the war, those "trained" field artillerymen were not trained in the new methods developed in Europe. Many officers were fully aware of the tactical and technical developments of the

war, but the administration and Congress hampered possible modernization. Indeed many army officers recognized the importance of a well-organized and trained artillery before the U.S. declaration of war. An indication of this can be found in the semiofficial Field Artillery Journal.

As members of a developing professional body, U.S. Army officers studied war in theory and, when possible, in application during training. Much of the theoretical study was fostered at the Army War College in Washington and the Army Staff College at Fort Leavenworth. Those schools for middle grade and senior army officers provided a forum for discussion and thought about the way the army would fight the next war. The theoretical studies provided a framework of ideas that would prove prophetic in the later phases of World War I, when many of these officers would play leading roles.

A noteworthy example is a lecture delivered at the Army War College and subsequently published in the 1912 volume of the Field Artillery Journal. A general staff officer, Lieutenant Colonel John McMahon, described the organization of the field artillery in a future war. The field army, a term substituted for "corps" after the Russo-Japanese War (1904-1905),<sup>5</sup> was to consist of three regular divisions and an auxiliary division. In each of the first two divisions were two field artillery regiments of

eighteen 3-inch guns and six 3.8-inch howitzers each. The third division's artillery, organized similarly, would have the same complement of 3-inch guns, but twelve 4.7-inch howitzers. For the auxiliary division, the artillery would consist of only one regiment with a 4.7-inch gun battalion, a 4.7-inch howitzer battalion, and a 6-inch howitzer battalion. Each battalion would have two batteries of four artillery pieces.<sup>6</sup>

For regulations on the actual deployment of artillery, the army had the Field Artillery Drill Regulations and the Field Service Regulations. These regulations, the latter intended for brigade and higher units, placed emphasis on artillery support for the infantry, but discussed only principles and in general terms. They failed to discuss the modern use of artillery, even after the outbreak of World War I. If artillerymen were to learn of the evolving methods of artillery employment, it was through studies of foreign wars, such as the Russo-Turkish War (1877-1878) and the Russo-Japanese War.

These two wars in particular provided information on the effects of technically improved artillery. The Russo-Turkish War's third battle of Plevna in September 1877 proved that artillery could not shoot infantry out of their entrenchments and the uselessness of the "artillery duel." Captain Peyton C. March, an observer of the

Russo-Japanese War, noted that although the Russian artillery was technically superior, the Japanese artillery was more effective because they were meticulous in aiming and observing the fall of the rounds.<sup>7</sup>

Both McMahon and Major T. N. Horn, a field artillery officer, discussed field artillery employment in their articles in the artillery's journal and offered some insight into how American artillerymen viewed their role in battle. Horn began by quoting the pertinent portions of the applicable regulations. Of significance in the Infantry Drill Regulations was the following paragraph:

Artillery generally communicates with the firing line by means of its own staff officers or through an agent who accompanies some unit either in or near the front. The infantry keeps him informed as to the situation and affords him any reasonable assistance. When the infantry is dependent on the artillery for fire support, perfect co-operation through this representative is of great importance.

The Field Artillery Regulations stated that communications must be maintained between the superior commander and the artillery commander, between the field artillery and the infantry which it is immediately supporting, and between the elements of the field artillery itself. Tactical principles to govern the use of the artillery included displacement during an engagement only when "positive and well defined" advantages would be obtained. With the long ranges of modern artillery, slight changes in position

gained nothing, deprived the infantry of its assistance, and exposed the artillery to destructive fire during movement.<sup>8</sup>

For supporting an advance, batteries were designated as either "counter batteries," which must dominate the enemy's artillery, and "infantry batteries," that is, those designated to support the infantry advance and reduce obstacles. The designations would not be permanent and may vary with the progress of the attack. Generally, the artillery preparation was simultaneous with the infantry advance. However, if the enemy has occupied his position well, or the attack formed a close distance to the hostile positions and thus had only a short distance to progress, the preparation may take place both before and during the attack.

For the artillery to accomplish its task of infantry support, there should be a "complete understanding" between the superior commander and his chief of artillery, a relationship "at present not very well defined." Fundamental to this understanding was that the commander must inform fully his artillery commander of his general plan with an emphasis on the location of the decisive attack and the part he expected the artillery to play in it. In turn, he should give due weight to the recommendations of his artillery officer both to positioning of guns and

number of guns assigned to the particular mission. Since it was of importance that the artillery commander be informed of the attack's progress and of any plan changes, arrangements "should be made to keep up communication between the commander of the attacking line and of the artillery support by telephone courier or flag signals." As the attack proceeds, the artillery commander should know the positions of enemy resistance and when the artillery fire should cease because of endangering friendly troops. To assist the artillery commander, he ordinarily would send a staff officer, accompanied with trained scouts, or agents, to accompany the attack and to keep the artillery commander promptly informed of any instructions from the commander of troops.

Other important principles were practicing economy of ammunition by not firing in ravines, woods and villages unless they were positive enemy locations and pushing guns and observers forward to positions to provide more accurate fire, even if they must advance under fire. Aerial observation would greatly extend the effective range of artillery and would undoubtedly prove most valuable.

In the defense, the artillery had two main objectives: to cause the enemy's forces to deploy at long range and to help repulse the attack by inflicting severe losses on the advancing infantry. Initially, the major portion of the artillery concentrated on the fire of hostile guns

until the hostile infantry presented a vulnerable target. When the attack became menacing, all guns were to be used to drive back the enemy.<sup>9</sup>

These principles of theoretical doctrine were basically sound. Unfortunately, the officers had little opportunity to practice, alter, or perfect what they discussed in classrooms or on paper. It would take a cataclysmic event to provide impetus for practical application.

The accuracy of these previous studies and others like them were tested in August 1914 and the subsequent fighting on the Western Front. In particular, trench warfare resulted from the employment of immense armies nearly matched in numbers and equipment. The armies successively secured their flanks, gradually reaching from the English Channel to the Swiss border, and the deadlock ensued. Contributing to the stalemate was the unexpected defensive capability of the machine gun and the effects of the artillery. Artillery not only had greater range and rapidity of fire, but also greater accuracy and more destructive power.

As was the common practice of armies not participating in a war, the U.S. Army studied the Great War in Europe. As Major William S. McNair explained, many of the official reports were yet to be published, due to the sensitivities of the combatants, but some information made its way to publication in the professional journals.

From these journal articles, there was sufficient information to suggest new lines to follow in U.S. Army peacetime training. McNair suggested some ideas in an article published in early 1916.<sup>10</sup>

In contradiction to the popular idea that trench warfare was a new condition, McNair pointed out that professional soldiers recognized in these operations familiar methods modified by improvements in the character of weapons, explosives, and means of observation and communication. As far as artillery was concerned, he noted that the increase in range was aided by the accuracy provided by panoramic gun sights and efficient telephone service. The artillery therefore could work from positions concealed either by cover or by distance. In addition, the great improvement in other optical instruments aided in target location at distances which further necessitated concealment of guns. The introduction of "another dimension," that of aircraft, dirigibles, and balloons, forced the requirement of screening batteries against overhead observation. All of these developments--increased range, accuracy, improved ability to locate target--made it "of the greatest importance" to conceal the battery from observation, and, as a corollary, made it the duty of artillery observers to seek advance observing stations and the cooperation of the air corps. McNair warned that unless favorable circumstances enabled withdrawal, "a battery

not concealed. . . will be doomed to destruction."<sup>11</sup>

An attack under the characteristics of the Western Front would begin by concentrated artillery fire on a sector of the enemy's front line trench for the double purpose of inflicting casualties and destroying entanglements, which would allow the infantry to advance through them. After a successful assault, artillery observers would move forward to locate hostile batteries, reserves, or combat trains. To make use of this opportunity, they would need good communications and must carry forward their telephones because "it will rarely be possible to communicate to the rear by visual signals," although radio equipped airplanes might help. Communication systems necessarily would have to expand in scope; additionally, lines should be duplicated and buried. In comparison, the U.S. Army's "simple system of telephones, reel carts and buzzer wire" needed great improvement for this variation of warfare.<sup>12</sup>

McNair encouraged units to use aircraft to aid in training of concealment and to gear their training to the problems of trench warfare, to include training in communications. In addition, he asked all officers to report freely their experiences and to point out deficiencies in equipment.<sup>13</sup>

Other articles in the Field Artillery Journal appeared up until the U.S. declaration of war that reported developments in field artillery's role in the ongoing war.

Like McNair's piece, they were not examples of current doctrine, but merely for "information only" and encouragement to train with trench warfare methods. Major C. De F. Chandler wrote an article in the January-March 1917 issue that gave an overview of the use of observation balloons in the war and informed readers about the establishment of the U.S. Army Balloon School. He particularly encouraged field artillery officers to volunteer to attend and learn the methods of balloon observation. Also in that same issue, an article entitled "New Field Artillery Organization" explained specific developments of the European war, noting that in almost every sense the doctrine of field artillery had advanced with unprecedented progress. The organizations and methods of only three years previous were in many respects obsolete. Some of the new methods that were virtually unknown to Americans were the application of ballistic tables to improve accuracy, calibration of guns, the use and care of motor transport, and "many other things that are now . . . essential to the education of a field artillery officer." The author was perhaps not completely accurate in his assessment of the lack of theoretical development of U.S. doctrine, as many officers studied and discussed the artillery's role in the war. However, there was a major gap between theory and practice since they had neither the units nor the equipment for practical

application. The article was accurate, therefore, in its assessment of practical doctrine when it stated: "During this time the United States Field Artillery has stood still."<sup>14</sup>

When Congress made its fateful decision in April 1917, the army and government presses began to deluge army personnel with a large number of pamphlets and booklets documenting the developments and methods of the war. In joining the French and British against Germany, military missions were exchanged and constraints against publication of Allied official doctrine and experiences disappeared. Almost immediately, the Army War College edited and published pamphlets from Allied sources and virtually adopted their methods as doctrine.

A pamphlet published in the month of the war declaration entitled "Notes on the Methods of Attack and Defense to meet the Conditions of Modern Warfare," which was an edited version of Allied documents, detailed the state of the operational art primarily from the British viewpoint. In the description of artillery developments the editors noted: "Artillery cooperates more closely than ever with the Infantry." In contrast to U.S. prewar doctrine where an artillery representative was with the overall commander, artillery reconnaissance officers and scouts accompanied

the most advanced infantry lines to obtain information about targets for the artillery, "even going forward with the assaulting lines" to keep their batteries informed of the exact location of the infantry and of new targets. To accomplish this, artillery scouts, attached to each infantry battalion, "carried back" the information to artillery observing stations, from which observers telephone to the observing station of the artillery commander. While this system "causes considerable losses in the artillery, . . . it is of very great assistance to the infantry, and prevents enormous losses from their ranks."<sup>15</sup>

The war college editors then related the general method of attack used in Europe "almost exclusively." Unlike U.S. doctrine of short or no artillery preparation, Allied artillery "smothered" the defense, firing "incessantly for from one to three or more days," "shattering" the defense so that it presented slight resistance to the infantry advance. The infantry then rushed forward, seizing the enemy's positions, and consolidated before enemy reinforcements arrived for a counterattack. The artillery bombardment was "absolutely necessary" to prepare for the infantry advance, as it would not succeed because of hostile artillery, rifle, and machine gun fire.<sup>16</sup>

Among the bombardment's objectives were producing curtains of fire (or barrages) to cover the advance, and preventing the enemy from reinforcing the point of attack once revealed. Also of noted importance was one solution to the problem of the lack of communications with artillery after the infantry left their front line trenches. To provide for the engagement of targets that might appear, which artillery response time prevented firing upon, the Allies had developed light 37-mm. field guns, assigned to each infantry regiment and battalion under the direct control of the respective commanders.<sup>17</sup>

In a section in which the editors describe a British division in the attack, they were careful to point out that rarely would the division commander determine the characteristics of the artillery preparation. This task rather fell under the control of the corps commander, except in minor operations, due to the scale of normal attacks, although the division commander's recommendations were considered. For their "creeping" barrage purposes, the British usually assigned two artillery batteries to cover a front of 250 yards each, with the battalion's third battery to cover the entire front of the other two batteries. They claimed the advantage to this arrangement allowed the battalion to switch the third battery to special targets in the advance without stopping the

barrage on any part of the front. Because of the short time required for the enemy to man trenches after a barrage had passed, the infantry must be taught that "success depends on their getting within about seventy-five yards of the barrage before it lifts." Accordingly,

the secret of a successful assault rests upon the assumption that the Infantry conform their movements exactly to the timing of the barrage. . . . The pace of the barrage depends, to a certain extent, on the pace of the Infantry, which varies with the conditions of the ground, the length of the advance, [and] the number of enemy trenches to be crossed.

Its pace should be quick initially and gradually slow down "as the men become exhausted," allowing them to close up to the barrage and "pull themselves together for the final rush."<sup>18</sup> In essence, the common dictum had become "artillery conquers, infantry occupies."

Last, the pamphlet gave a cursory description of "liaison," a new term "referred to in all reports from various fronts." Described as "one of the most important improvements developed in the present war," liaison covered communications "between, and cooperation and coordination of, the different elements of command."<sup>19</sup> The importance of this development was supported further by another publication, also published in April 1917, entitled "Notes on Liaison in Modern Warfare," in which liaison was

described as "absolutely necessary for success." The pamphlet was intended for use by all arms, but also contained specific information for the artillery. As part of the artillery liaison arrangement, the artillery regiment sent an officer to the corps or division headquarters (depending on which of the two it supported), each artillery battalion sent an officer to the infantry regimental commander, and each battery sent a sergeant to the battalion commander. Additionally, "forward observation officers" were sent to the infantry trenches to keep the artillery informed of the needs of the infantry.<sup>20</sup>

The pamphlet also described different methods to affect liaison. In the discussion of the use of the wireless, telephone, and various signal methods, it emphasized that there must be the closest cooperation between the signal services of the division and the artillery for the transmission of artillery messages. In some instances an infantry runner would be the only method available to deliver artillery messages; thus, the editors emphasized the need for infantry battalion and company commanders to be prepared to assist the artillery liaison agents with runners since artillery runners were not always sufficient. It was essential that the "needs of the artillery . . . be considered and provided for as far as possible."<sup>21</sup>

Although the information became rapidly available and in abundance, the War Department lacked the means to transform training ideas and concepts into the concrete results that would yield units capable of contributing to the combat effort in France. The army did have a training system that included schools at camps for the basic instruction of officers and NCOs, special schools for instruction in techniques and tactics of the different arms, general service schools for instruction in combined arms operations, and the Army War College. However, the system had many problems, not the least of which were insufficient direction from the Army General Staff and only a handful of trained officers.

In an effort to coordinate training, the War College Division of the General Staff organized a Training Committee on 16 June 1917. However, not until December did a major general assume the duties as Director of Training. At the same time, the committee expanded to twenty officers representing the different arms and staff corps. Their tasks included studying methods of warfare and instructions of the AEF and Allies and ensuring execution of those methods at training camps. The War Department, in order to standardize and maintain training efficiently, required that divisions in the U.S. follow programs established by the Training Committee.<sup>22</sup>

To train and implement doctrine requires instructors, and this proved to be the army's greatest problem in 1917 and early 1918. In the summer of 1917, of the three categories that made up the army, the Regular Army, in its own process of reorganization, had more than two-thirds of its enlisted ranks filled with raw recruits; the National Guard, to be organized into seventeen divisions, had thirty percent of its enlisted men trained "to a certain degree" and forty percent of its officer strength untrained; and the National Army, also to be organized into seventeen divisions, had only raw recruits in the ranks and officers trained primarily through the officer training camps and former NCOs of the Regular Army, with a few officers from the Regular Army to fill the higher command positions. The training of this vast force rested on the small number of trained officers of the Regular Army, already drained by the manning of the American Expeditionary Forces staff and initial divisions.<sup>23</sup>

For the officers of the various arms, the army already had central schools to teach uniform doctrine and methods of instruction, including the School of Fire for Field Artillery at Fort Sill, Oklahoma. However, like many of the other schools, the army suspended training at Fort Sill in 1916 during the Mexican border crisis. In July 1917, the School of Fire reopened with then Colonel

William J. Snow as commandant. He immediately began reorganization to develop comprehensive instruction and to provide for a larger enrollment. The shortage of trained officers affected the school's work, for by 1 September 1917 all but one instructor remained of the original staff when it reopened less than two months earlier.<sup>24</sup> In addition to these schools, newly created divisions conducted their training in divisional schools. Under the direction of the division commanders, divisional officers trained their own personnel, the lack of many prior trained personnel naturally inhibiting effective training.<sup>25</sup>

The shortage of trained officers did not go unnoticed by the War Department. The department immediately requested assistance of the Allies. Each division and central school received two groups of five officers and five NCOs. The British sent specialists in machine guns, light trench mortars, bayonets, antigas and flame measures, and sniping. The French specialists were in field artillery, automatic rifles, hand and rifle grenades, liaison, and pioneer work. At Fort Sill there was also a specialist in the 37-mm. gun, three additional French officers of artillery, and a French officer specialist of divisional trench mortars.<sup>26</sup>

While these advisers rendered great assistance in training, the training into early 1918 remained inefficient or, in Snow's words, "chaotic." At the insistence

of the War Department, President Woodrow Wilson issued an executive order creating the office of Chief of Field Artillery in February 1918 and selected Snow to fill the position with the rank of major general, National Army. His appointment proved to be a blessing for the field artillery.

Snow, fully aware of the problems of field artillery training in the U.S., immediately tackled the task of reorganization and standardization. He organized his staff and directed they study the problem. On 27 March he presented a training scheme which received the Chief of Staff's approval. Snow's recommendations included the establishment of an artillery replacement center at Camp Jackson, South Carolina to provide individuals for replacement in units in France, dispensing with the practice of filling vacancies in the AEF from divisions in training in the U.S. The plan would also concentrate all recruits for field artillery both for replacements for France and for the formation of new brigades in the U.S., thereby centralizing preliminary enlisted training. Instead of having future artillery officers trained in the established officer training camps, Snow felt the duties of a field artillery officer differed significantly from those of other branches. He advised the effort be consolidated into an artillery officer candidate training

camp at Fort Sill. In addition, he recommended the enlargement of the School of Fire to accept 200 officers weekly and the establishment of brigade training centers at Camp Jackson and Camp McClellan, Alabama, with two others to be established as soon as feasible. To those artillery centers brigades would be sent with their full complement of officers and enlisted personnel for final training prior to shipment to France. For the training of specialists, such as aerial observers, horseshoers, and wireless and telephone experts, Snow recommended no change in the original arrangement.<sup>27</sup>

Having established a coherent training system, Snow had another training problem: "It was no easy task even to get sound field artillery doctrine taught in this country" [emphasis in text]. When he assumed the position as artillery chief, the French had between seventy and eighty officers in the U.S. Because of their expertise and American lack of it, many brigade commanders leaned heavily on the French advisers, even allowing them to dictate training schedules. To Snow that was an abdication of command responsibility. His ideas conflicted with those of the French mission "who seemed to think that a large measure of responsibility for American field artillery was theirs." The critical point was that all of the French officers had a relatively short

time in the service, having left France at the height of stabilized warfare which prevented them from being "well grounded in field artillery." These French advisers consequently knew "almost no field artillery except the trench phase." Snow agreed with Pershing, that open warfare should be taught before units got to France. Once in France, the trench phase could be taught in a matter of a few weeks. Snow complained that the French, "fighting openly and under cover," continually interfered with his instruction to training center commanders.<sup>28</sup>

His efforts to teach proper doctrine were hindered further by "some few" Regular Army field artillery officers in France who wrote back saying American methods were obsolete and sent back French literature to prove it. Additionally, the Army War College merely translated and issued the immense amount of literature sent from France without having the time to digest it. "Almost all of it," claimed Snow, "was wrong, or untimely." His task was eased considerably when Pershing's cablegrams protested against the instruction in the U.S. at the expense of "absolutely necessary training." The Commander-in-Chief of the AEF claimed that their instruction had handicapped the brigades arriving in France. Snow also ensured that any other literature from France came to his staff for approval prior to issuance.<sup>29</sup>

While there was hyperbole in his comments that French methods were wrong, undoubtedly by the summer of 1918 Snow's work vastly systematized a training arrangement that was nearly ad hoc for the field artillery. If he was able to do nothing more than ensure a standardized training scheme and produce uniformly trained personnel before they went to France, he had taken a monumental step in the right direction. Unfortunately for the AEF, his efforts were not soon enough. As for artillery doctrine, the real developments were taking place in France.

## CHAPTER II

### THE AEF ARTILLERY ADOPTS FRENCH DOCTRINE

"The most important question that confronted us in the preparation of our forces of citizen soldiery for efficient service was training."

John J. Pershing<sup>1</sup>

Like the War Department, the Commander-in-Chief of the American Expeditionary Forces, General John J. Pershing, recognized the importance of training his infant force before committing it to the Allied war effort. He, too, recognized the scarcity of American expertise and turned to the Allies for assistance until sufficient numbers of men were trained to enable the AEF to conduct its own training. The First Division would provide the basis for the AEF training system as well as many of its instructors. In order to send a force to Europe quickly in response to Allied requests, the War Department designated four regular regiments of infantry and three of field artillery to form the First Division, under the command of Major General William L. Sibert. Brigadier General Peyton C. March commanded the First Field Artillery Brigade, which was equipped with French material upon its arrival in France. The brigade's Fifth Field Artillery Regiment received the 155-mm. howitzer (Schneider) and the Sixth and Seventh Field Artillery Regiments

received the 75-mm. field gun, the famous "French 75."

As a result of the experience gained from the training of the First Field Artillery Brigade, the scheme of training adopted for the field artillery brigades was in four phases. The first phase was technical artillery instruction, both theoretical and practical. Next came a brief period of service at the front where the regiments and batteries would have an opportunity to improve their methods under close French supervision. The following phase was tactical training with the rest of the division to which the unit was assigned. The last period was to be schooling for higher commanders and staffs as well as further training for specialists. Because of the urgency of halting the German offensives of 1918, no brigade ever completed the four phases, though the fourth phase was put into operation less than a month before the armistice. Only two or three brigades finished the third phase, less than half of all brigades in the AEF completed the second phase, and all completed the first phase, though some of the last brigades did so under serious handicaps such as lack of equipment and horses.<sup>2</sup>

Due to increased demand for combat divisions from the spring of 1918 on, the artillery training concentrated primarily on the first phase. The technical instruction of this phase included a two week theoretical course for all

officers. Then the instruction was broken down into instruction for officer and enlisted specialists, including training in liaison, telephones, wireless telegraphy, signalling, maintenance of materiel, and instruction for orienteurs (surveyors), aerial observers, and gas officers. General practical instruction included handling and use of material, firing and employment of artillery, laying and maintaining telephone lines, and signalling.<sup>3</sup>

The American desire to train various divisional units together to develop the necessary familiarity and cooperation had to be ignored for the first phase of artillery training. Because of considerations for suitable firing grounds and existing French installations, the artillery brigades were trained in separate locations. The brigade officers were responsible for this training, with the assistance of instructors assigned to the camps. Standardized camp organization ensured more rapid instruction and relief of many of the problems of camp administration and supply.<sup>4</sup>

Throughout the course of the war the artillery instructors used French manuals and instructions. The AEF artillery staff decided not to revise and print their own because of the amount of work involved. Major General Ernest Hinds, AEF Chief of Artillery, felt his staff, as well as that of the G-5, was entirely inadequate in

numbers to cope with all the myriad tasks it had to contend with. As such, he felt he could serve the AEF better by concentrating efforts on training. Boards of instructors at the training camps attempted some revising and proofreading of manuals, but their normal duties as trainers suffered as a result. However, Hinds did ensure that a number of memoranda, bulletins, and letters made their way to the camps to keep the training up to date.<sup>5</sup>

In an attempt to ensure compliance with directives from his office, Hinds set up a program of inspections at the completion of training and at other times deemed appropriate. His staff inspected all brigades to determine their fitness for duty at the front. The inspections were comprehensive, including the determination of training progress, state of equipment, and standardization of instruction. In addition, information about better methods developed at a particular camp was distributed to the other camps. All these techniques, including instructor tours of the front for observation of their particular specialties in combat, ensured prompt modification of training. Appointed to his position in late April 1918, Hinds and his staff produced results, though exigencies of the conflict prevented complete training of all units. Up to June 1918, only five artillery brigades had completed training, while three each completed in

June and July, seven each in August and October, six in September, and four in November prior to the Armistice. Divisional training camps also trained seven regiments of corps and army artillery.<sup>6</sup>

Peyton C. March, who had been an observer of the Russo-Japanese War, became Army Artillery Commander on 2 October 1917. In that capacity he forwarded the required report of the First Field Artillery Brigade's training on 5 November 1917. He recommended the scheme of training adopted, as described above, with the additional recommendation that the battalions and regiments be concentrated instead of separated in the phase of their occupation of a quiet front. This would allow the respective commanders exercises in actual command, which under the system used for the First Field Artillery Brigade deprived them of a "very valuable experience." In addition, he recommended that the brigade training camps be located within easy access of various divisions under the supervision of the Army Artillery Commander. Under that arrangement, officers detailed to the school from the front would be able to bring their experiences in actual war with them and then the "most advanced thought" in artillery matters could be maintained.<sup>7</sup>

The French gave the AEF the Le Valdahon camp for field artillery training in August 1917. The First Field

Artillery Brigade began its training there under March on 3 September. Additionally, the French gave Coetiquidon and Meucon, both in Brittany, and Souge near Bordeaux for other brigades. Later two more camps were added, Le Courtine and Le Courneau. According to Hinds, these camps would have sufficed for a regular influx of divisions to France, but beginning in the spring of 1918 they were below capacity due to the emphasis on shipping infantry and machine gun troops to France. Then the artillery brigades came faster than the camps could accommodate. Each camp had an American director of instruction with a staff of French and American instructors. Instruction of the First Brigade was entirely by French officers, but following Pershing's dictates, Americans gradually replaced all French instructors until on 11 November 1918 there was only one French liaison officer authorized per camp.

In addition to these artillery brigade training camps, the artillery also had three other major categories of training, though one did not begin operation until January 1919. For the training of replacement officers, the AEF artillery staff established the school at Saumur in September 1917. Originally started for the training of 6,000 reserve officers upon their arrival in France, the Saumur Artillery School became the central repository of technical field artillery training, where all newly

commissioned artillery officers began their training. From this school of technical training the graduates went to divisional artillery training camps or to the Heavy Artillery School, established in October 1917 at Mailly, for instruction in railway and tractor drawn artillery.<sup>8</sup> Technical training at Saumur included materiel, equitation, reconnaissance, topography, telephones, wireless, and signalling. Also involved was training in ballistics and dispersion, observation of fire, preparation and methods of fire, and a considerable amount of actual conduct of fire.<sup>9</sup>

The Heavy Artillery School was similar to Saumur in that its function was to provide general technical instruction in areas unique to heavy artillery assigned to army headquarters. This artillery consisted of 8-inch and 9.2-inch howitzers (primarily British although one regiment was equipped with twenty-four 8-inch American-made howitzers) and the French 155-mm. Grande Puissance Filloux (GPF) gun. In addition, the AEF organized Organization and Training (O & T) centers for the training of officers and enlisted men in the special skills required for heavy artillery, the most urgent being for drivers and mechanics. There was an O & T center planned for railway artillery, but never completed due to the cessation of hostilities.<sup>10</sup>

Soon after his appointment as the AEF Chief of Artillery, Hinds directed trench artillery training to come under the direction of the Heavy Artillery Section of his staff. Originally the Americans had copied the French with one battery of 58-mm. or 6-inch Newton trench mortars in the divisional artillery and one battalion of 240-mm. trench mortars in the corps artillery organization. The AEF artillery staff felt that the trench artillery, with improvements in methods and materiel, would be capable of accompanying infantry. The Trench Artillery Center, established in August 1918, strove for that end, but again, the brevity of American participation in the war prevented the concept's full development.<sup>11</sup>

For the further training of field and general officers, two schools were to be established at Le Valdahon. For field officers who had been on staffs and returned to artillery duty, a course was to refresh them of the duties of battery officers and train them in command duties. A Center of Artillery Studies was to bring together specially selected higher commanders of both the artillery and infantry with their staffs to study the broad concepts of field artillery employment in offensive and defensive operations. Though planned to begin on 16 September 1918, the St. Mihiel and Meuse-Argonne operations prevented its initiation until December 1918. The field officers' course

never got under way.<sup>12</sup>

The underlying theme of all training in the AEF was, as Pershing called it, "open warfare." Open warfare was a conglomeration of several ideas derived from the American experience. It was partially affected by the vastness of the North American continent, the frontiers of which most of the higher commanders of the war had begun their army careers, and partially affected by Generals Grant, Sherman, Lee, and others of the American Civil War. Basically it was a concept of maneuver warfare, ideally with a force moving in columns that would deploy to fight an equally mobile enemy, after the advance guard had made contact. Turning and flanking movements, possibly envelopments, made this type of warfare decisive.

But open warfare had disappeared from France in 1914, to be replaced by trench or stabilized warfare, a development the Americans detested. In August or September 1917 Pershing made major offensive operations his controlling goal. Undoubtedly he was influenced greatly by what he saw first in Britain before he got to France, and in the training of French soldiers. Pershing directed a special study of the basic principles taught by the Allies as well as the methods they used in their employment. The British and the French were not entirely in agreement in either organization or tactics, and the officers assigned

to the study were to "keep in view the development of the most efficient fighting machine as quickly as possible and as a means to this end to adopt only sound doctrines of training and make them essentially our own." The British methods appealed to Pershing particularly because they instilled aggressiveness, which was displayed in their training of hand-to-hand combat with the bayonet, grenade, and dagger. He noted that this training was a stimulant to morale and self-confidence. But what disturbed him was that the Allied instructors had developed the conviction that developments since 1914 had changed the principles of warfare. Trench warfare had rendered all previous training obsolete and preparation for open warfare was no longer necessary, or so the Allies felt.<sup>13</sup>

Had French doctrine prevailed, American instruction would have been limited to a brief period of trench warfare training. In a new army of former civilians, that type of training would have handicapped offensive operations, and the soldiers would have lacked aggressiveness to break through enemy lines. Pershing's opinion was that "the victory could not be won by the costly process of attrition, but it must be won by driving the enemy into the open and engaging him in a war of movement." This required "individual and group initiative, [and] resourcefulness and tactical judgement," a conclusion the Germans

had discovered under Ludendorff's direction and which led to their successful defenses in 1917 and then offensives in 1918. Without ignoring preparation for trench warfare, Pershing directed that the objectives of training would be open warfare and the offensive.<sup>14</sup>

While Pershing wanted rifle and bayonet training emphasized for the infantry, he dictated no distinct objectives for the artillery. Consequently, the AEF artillery actually gave lip service to open warfare methods and trained for trench warfare, at least until late spring of 1918. The artillerymen had to learn the technical details of their weapons and equipment before they could learn to operate with the infantry. As the war progressed in 1918, many divisions would never have the opportunity to train as complete units nor to exercise the methods of infantry-artillery cooperation except in actual combat. A lack of emphasis on offensive operations in artillery training would be revealed in the opening phases of the Meuse-Argonne offensive, when some divisions would be in action for the first time and many without their organic artillery brigades.

It would take a period of months before the Americans could develop methods to meet Pershing's requirement that they "remain and become distinctly our own," primarily because there were so few who could train in trench

methods. The AEF had to rely initially on both Allies for trainers, methods, and manuals, at least until "our infantry had attacked sufficiently to permit rewriting our Infantry Drill Regulations in the light of our own experiences." This statement was true not just for the infantry, but for all arms and specialists. In actuality, the AEF staff would not be able to start revisions of manuals until December 1918.<sup>15</sup>

The first American units, therefore, had to rely on either translated French documents or issue their own instructions. Though the First Field Artillery Brigade would not begin training until September 1917, a letter to its commanding general from the Operations Section of AEF headquarters in July 1917 directed that the division use the same system of signals and communications with aircraft as the French. The staff also directed that the brigade transfer five officers to the succeeding brigade to assist in training. Each officer was to be a specialist in one of the following areas: wireless, telephones, aerial observation, materiel, and firing data. Because of the reorganization of the 155-mm. regiment, the two excess officers would be trained in the methods of the Artillery Information Service (AIS), one of which was to be reassigned to the next brigade. The letter also delineated the minimum number of officers to be trained in

each specialty. Of importance was the last directive which stated that the artillery brigade commander would forward to AEF headquarters his suggestions on training, with a copy furnished to the succeeding brigade together with any other assistance.<sup>16</sup> A month later, artillery brigade commander March issued a memorandum noting the unique features of trench warfare and the requirement to acquire knowledge of those methods. Though all the initial training would remain primarily in trench warfare methods, March claimed "the principles governing the training of artillery in the United States are correct and should not be forgotten."<sup>17</sup> The AEF clearly was laying the groundwork for its own methods.

The battle of Soissons appeared to justify Pershing's insistence on training for open warfare, at least in principle. But in technique and technical detail there were many new developments for which the Americans were essentially unprepared to handle. The use of artillery, both in infantry support and actual materiel handling, was immensely different from anything the Americans had experienced.

By 1917, the theoretical use of the new gunnery techniques was known to at least a few American artillerymen. But with the great expansion of the army, the knowledge of a few was practically impossible to disseminate where no

written doctrine existed. The AEF, then, had to rely on those with experience. While the Americans made some effort to use both British and French methods, American sector location and a general acknowledgement of French superiority in artillery allowed French practices to dominate. So predominant were the French that many French words found their way into the American vocabulary. One such word was "liaison."

The official provisional manual of the AEF on liaison, a translation of a French manual, stated that the purpose of liaison was to keep the commander constantly posted on the situation, thereby furnishing him a basis for decisions. Liaison also meant ensuring the safe transmission of orders, questions, reports, and all communications necessary to obtain close cooperation between the various echelons of command, adjacent units, and the different arms of the service, but "particularly between the infantry and the artillery." Liaison officers (LNOs) could not perform their function "unless their military education [was] perfect and their judgement excellent," and therefore they must be carefully selected.<sup>18</sup>

To perform liaison, every artillery regiment in direct support of an infantry brigade sent a lieutenant to the supported headquarters. Each artillery battalion also sent an officer to its supported infantry regiment.

Accompanying the LNO to the regiment was a detachment that included one or two NCOs for each infantry battalion, enough telephone operators to support him and his NCOs on a continual basis, and signalmen with all their necessary material such as flags and signal lamps. The LNO remained near the regimental commander unless he went into a sector to ensure his detachment's proper conduct of duties. The liaison NCO with each front line battalion similarly maintained his post near the battalion commander. These men remained with the infantry permanently, informing the infantry of artillery capabilities and their artillery headquarters of infantry requirements. The LNOs were to send daily reports to their battalion commander. The LNOs could also initiate a defensive barrage and adjust fire for their batteries if necessary.<sup>19</sup>

While liaison detachments were sent primarily from 75-mm. units in direct support, there were instances when it was necessary to send LNOs from 155-mm. and larger artillery units, depending upon the urgency of knowledge on the infantry situation. Since these heavier artillery units were generally tasked with counterbattery and destruction missions, they were not normally in direct liaison with frontline units.

The chief of liaison had an important function as a "diplomat" between the two arms. In order to keep both

commanders informed, the instructors at the Saumur Artillery School suggested that the LNO keep charts of information obtained from the operations officer. These charts should include indications of normal and eventual barrages, short and long limits of fire, the artillery dead space, and the firing capabilities of each battery. The LNO should know the amount and percentages of the various ammunition on hand and what other artillery units could support the sector. To perform his duties properly, the LNO must carefully study terrain, battle maps, photographs, and perform visual reconnaissance from observation posts.<sup>20</sup>

Among the problems that American LNOs faced early in the war was that the infantry did not in general appreciate the artillery's lack of responsiveness. The artillery could respond quickly to defensive barrage requests, but the infantry needed to understand the delay of firing on unexpected targets. As the French set up the system, when there was a request for unplanned targets telephone calls had to go to the regiment or battalion headquarters, depending on the call's origination and in turn was relayed to the batteries. Then, after the necessary shifts, the battery would fire. This circuitous route could take twelve minutes or longer. To prepare for the contingency, the Saumur instructors recommended installing a visual signal system to expedite

unplanned fire requests.<sup>21</sup>

For the artillery to provide the best support possible, it had to be fully informed of the infantry's plans. The infantry commander must inform the LNO of his plans before an operation to include details of the plans of deployment, signals, and the successive positions of the commander's PC (post of command). During the operation the infantry commander must relay all information about his front line, enemy dispositions, and his further intentions.<sup>22</sup>

On 30 December 1917 before the First Division moved to a quiet sector of the front, artillery brigade commander Charles P. Summerall issued his instructions for liaison officers that were to be the guiding principles in the brigade throughout the war. In his order he reiterated much of what the French manuals and instructors had taught during the brigade's training, stating that the purpose of detailing permanent LNOs with the infantry was to establish "close and cordial relations" and mutual understanding to prevent any failure in cooperation. While Summerall did state that those officers selected for liaison duty must have a thorough knowledge of artillery employment and of all means of communication, his primary emphasis was on the relationship of the LNOs with the infantry commanders. Using such phrases as "agreeable

and friendly," "tact and good judgement," and "a sincere spirit of loyalty," Summerall clearly desired the best relationship between his brigade and the infantry of the division, knowing that his only mission was infantry support.<sup>23</sup>

In addition to the liaison with infantry units, the artillery had to maintain liaison with the air service. Radio communication was in its infancy when the Americans entered the war. Two separate sets were required, one each for sending and receiving. Since they acted on commands from the air observer, the artillery only had receiving sets, which also aided transportation problems as one set weighed 500 pounds initially. Artillery units communicated with ground panels using differently arranged patterns corresponding to a code system. As the aircraft observer could see the flash of the guns, it was unnecessary to inform him of fired rounds. The radios were delicate and easily damaged, or transmissions could be jammed by either the enemy or other friendly transmissions, so signal lamps and dropped messages provided backup.

Aerial liaison was not always effective for most of the war. Surprisingly, after the establishment of an American air corps, coordination seemed to get worse. The commander of the corps aviation wing of the First Army reported to Pershing of the "very grave lack of

co-ordination" between his units and the artillery, blaming the lack of knowledge and training of combat troops in the capabilities of the air service.<sup>24</sup> On 22 October 1918 General Hunter Liggett, First Army commander, directed the establishment of corps schools for instruction in liaison with the air service. Additionally, Liggett ordered air observers to spend as much time as their duties permitted with frontline infantry and artillery units, squadron commanders to pay frequent visits to the infantry and artillery units they supported, and every artillery battalion commander and his radio officer to spend one day at the base of the squadron serving his battalion. He directed that every opportunity be taken to conduct panel exercises between airplanes and artillery PCs.<sup>25</sup>

As volume three of the Manual of Artillery stated: "To accomplish . . . liaison requires the transmission of messages from one point to another as rapidly as possible." This communication was accomplished through what were called "Lines of Information," theoretical lines between the various commands and observation posts made real by telephone, visual signalling, radio, or runners. The war had demonstrated to the French that no one means was infallible. Therefore plans for using all means had to be made. Due to the primitive state of the radio,

the telephone was the basis of nearly all communications. But an enemy bombardment could destroy twenty lines entering a battalion PC in a mere six minutes. The first backup system that then should be attempted was visual, using signal lamps, pyrotechnics, or flags. Then there were the most costly means, carriers of messages such as runners and horse mounted couriers. Pigeons and message carrying rockets were used also, but they were unilateral, front to rear only, which was a major drawback.<sup>26</sup>

When the Americans entered the conflict, only divisional and higher units used radios because of their lack of mobility. The 500 pound sets hardly could be transported by maneuver units. Transmissions were in Morse code, not voice. Through continuous research and development, the Signal Corps reduced radio weight to fifty pounds, light enough for one man to carry, by the end of the war. The developers were also able to combine receiving and sending units into one set. However, these sets were adapted first for aircraft. For artillery units, reduction in weight and better reliability allowed the receiving sets to be used at battalion level by the time of the St. Mihiel offensive. This, of course, was not completely satisfactory, but was a major improvement for artillery communications.<sup>27</sup>

A major development of the war was the increased accuracy of artillery fire. This was a result of many factors including technical improvements in the weapons, such as the panoramic telescope enabling refinement in aiming, and increased knowledge of ballistics. Improved optical instruments also allowed better vision at greater distances. The overall effect of these developments was that observation of fire became highly important, making it a science involving mathematical calculations and requiring greater training. Along with this science of observation came the problem of integrating it with the art of supporting the infantry.

As the authors of "General Notes on the Use of Artillery" noted in 1917, the purpose of artillery observation was twofold: 1) the surveillance of the enemy sector for batteries, fieldworks, and movements, and 2) the adjustment and control of fire. Proper conduct of artillery observation was of capital importance for "an artillery without observation is blind and useless" [emphasis in text]. Terrestrial and aerial (balloons and aircraft) were the two classifications of observation. Terrestrial observation had the advantages of permanence, use of sighting instruments, and relative independence of weather conditions; whereas airplanes provided rapid, precise, and vertical observation of targets masked by

terrain. Balloon observation had the advantages of continuity of observation and direct transmission of information by telephone.<sup>28</sup>

In the stabilized conditions of trench warfare, artillery batteries established observation posts (OPs) in positions located near the front line of trenches. Forward observation officers manned these positions and were usually battery officers. The OPs were connected by telephone directly to their parent batteries. In important actions the battery commander did the observation, converting his sightings into data the gun crews would use to fire.<sup>29</sup>

The AEF artillery instructors at Saumur recommended the use of at least two OPs for each battery, one near the targets and one near the battery. From those OPs near the battery, adjustment of fire was easier because the field of vision was greater and communications easier to maintain. However, their greater distance from the targets prevented close adjustment on objectives in the enemy's front trenches. For stabilized conditions the battery observing station would often be concealed in a building of some kind, as from the trenches the view was limited and only through periscopes.<sup>30</sup>

In trench warfare the artillery directed fire by three methods: direct observation from an OP, by map

with no real observation, or aerial observer. Direct observation was the usual method for the light artillery while the heavier units used all three. Even firing by map was used rarely in this environment without previous registration.<sup>31</sup> Registration, as it developed in this war, was a method of firing a weapon from a known location at a target also of known location and comparing the data required to hit the target with the data from firing tables. Firing tables were specific to the type of weapon, enabling battery personnel to convert gun-target range and gun-target altitude differences to firing data. The firing tables, however, were based on standard values: atmospheric temperature, barometric pressure, wind velocity, powder lot and powder temperature, and muzzle velocity of the weapon. Since all these factors were rarely at standard conditions, the registration process enabled taking the deviations from standard and applying them to all the firing on that particular period or day.<sup>32</sup> When occupying a new position a battery would "shoot itself in," that is, register on targets and especially on those near friendly troops. This process was repeated usually daily and most importantly prior to an operation.

The chief problem artillerymen noted in direct observation was inaccuracy due primarily to a lack of knowledge, experience, or both by observing officers. Because

they had a fear of endangering friendly troops, the tendency was to lengthen the range whenever a short round happened to fall, and then all the shooting generally would be too long. Map firing had two potential problems. One was the inaccuracy of some maps and the other was the "correction for the day," or registration data. Inaccurate maps made locating the battery's position difficult, but could be alleviated by using the technique of resection. The correction of the day, also referred to as the error of the day, was more important for the heavier artillery since the 75-mm. gun with its flat trajectory and shorter range was less affected by atmospheric conditions. Map shooting placed a premium on knowledge of atmospheric variables. If these variables, some determined by meteorological data sent by signal corps units and others by registering, were ignored or applied incorrectly, serious errors could result. The use of these methods required skill in mapreading and determination of firing data, skills American artillerymen had not mastered.

Training was vitally important for efficient use of aerial observation. Aerial observation was a primary method of targeting for the heavier artillery units, to a lesser degree for the light artillery. A major constraint on the use of aerial observation was time as flying was necessarily limited by fuel and enemy aircraft

or antiaircraft weapons. An insufficient knowledge of the system or a lack of practice could cancel any advantage the method could otherwise give. The fault could lie with the battery, the observer, or with the signallers.<sup>33</sup>

One of the benefits that aerial observation provided was the capability to fire on enemy positions beyond the vision of ground observers. In particular, it enabled delivery of accurate counterbattery fire, either by actual adjustment or through aerial photographs. As one pamphlet stated: "Counterbattery action is the essential mission of the artillery, as the enemy gun is the most redoubtable adversary." At the height of stabilized warfare the emphasis of counterbattery fire was destruction, the adjustment of fire on each enemy piece of artillery through continuous observation. Estimates of the number of rounds this required numbered 1000 rounds for the 75-mm. and 500 to 600 rounds for the 155-mm. It was also recommended that two batteries be used simultaneously to accomplish this mission. If direct observation was not feasible, an alternate method was to saturate areas with fire, called zone fire, but while this required the expenditure of four or five times as much ammunition, great destruction was expected against clusters of battery positions. Army corps headquarters issued daily programs of

destruction, continually updated. In an offensive action the destruction of enemy batteries was undertaken days in advance and concluded during the actual artillery preparation prior to the attack.<sup>34</sup>

The alternate method of counterbattery fire employed neutralization fire, used when time, means, and precise data on targets were lacking. Neutralization provided only momentary effects, interfering with the enemy batteries and occasionally putting them out of action. It entailed the reduction of the density of fire in order to cover an extended area. In addition to high explosive shells, gas shells were used. When using gas, the Allies recommended continuous fire to prolong its effect, causing the enemy to wear their protective masks and thus reduce their freedom of movement. Neutralization also included targeting German observation posts to further inhibit effective enemy fire.<sup>35</sup> As the Americans gained experience they would place less emphasis on destructive fire and much more on neutralization, relying on the infantry to overrun and capture hostile batteries.

To make counterbattery fire more effective, the French developed a system of intelligence specifically for the artillery and separate from normal channels. The objective of this service, called the Service des Renseignements de l'Artillerie (SRA), was to furnish accurate information

as rapidly as possible about hostile batteries, including numbers of pieces and degree of activity, and other enemy dispositions, such as OPs, communication lines, railways, and ammunition dumps. The SRA, an army and corps organization, collected and assembled information from all sources, including artillery OPs, PCs, aerial observation and photographs, neighboring corps, and the intelligence section of the staff. Additionally the French used special OPs for the service itself and sections for target location by sound. The SRA issued bulletins distributed down to battery commanders as often as daily during active operations, or by telephone if urgent. To supplement the corps organization, officers at divisional down to battalion levels were tasked with providing the corps all information in their respective sectors and distributing the information received from the corps. When a battery received incoming artillery fire, it was to report the number and caliber of the projectiles.<sup>36</sup>

The AEF adopted this French method of artillery intelligence, calling it the Artillery Information Service (AIS). However the Americans did not develop the system entirely as they would have liked. American officers received training at French schools until 17 October 1918 when the AEF Chief of Artillery established the AIS school at Angers. The First Corps had an AIS section that began

operation in June 1918, though in the St. Mihiel operation only one of three American corps had an American artillery staff. The First Army AIS, however, began operations in late August 1918, coinciding with the formation of the First Army. Divisional AIS sections were added to the AEF divisions as they were formed (except the first three divisions--the First, Twenty-sixth, and Forty-second).<sup>37</sup>

The American AIS also used the two special methods developed by the French, calling them flash and sound ranging sections respectively. Both systems used intersection for locating targets. For flash ranging, the observers used directional instruments, called aiming circles, at four different surveyed locations, sending simultaneous readings of an enemy weapon firing to a controlling station or flash central. Flash central would use the directions to determine the intersection and derive a map location for the enemy battery. The sound ranging sections performed similarly, but instead of using optical instruments, used a system of microphones attached to an automatic recording instrument at sound central. The microphones were spaced evenly about 340 meters apart in a large arc, the center of which was near the expected enemy activity. Plots were determined by the time each microphone recorded the sound of the weapon firing. Instead of artillerymen performing these

duties, as would be the case in the future, AEF engineers manned these stations because of the surveying required for the placement of the instruments. Both methods could locate enemy batteries to an accuracy of fifty meters, close enough to fire a counterbattery mission.<sup>38</sup>

Although flash ranging sections could go into action faster, both units were at their optimum in defensive operations. But they also proved useful during the major offensives near the end of the war. As operations stabilized, for example at night, and prior to reinitiating the offensive, these units were in operation providing useful data for counterbattery fire, especially to corps and army artillery organizations.<sup>39</sup>

While mastering each of the new artillery techniques was a necessary requirement, the American artillerymen also had to learn to integrate all the techniques and skills to perform its mission of infantry support. This training was provided to each division during its occupation of a quiet sector. It was in the quiet sector that theory and practical skills for supporting the infantry were united for the first time.

Once an artillery unit had occupied its new position, the first major requirement was to register on defensive targets. The object of defensive fire was to stop the enemy before they penetrated friendly lines. According

to the initial training under the French, defensive fire consisted of two types: counterpreparation, during the enemy preparation aimed on enemy lines, and barrage fire in front of friendly lines at the moment of attack.<sup>40</sup>

Corps or divisional commanders ordered counterpreparation fire, also referred to as counter offensive preparation (COP) or counterpreparation offensive (CPO), in accordance with a detailed plan which corps headquarters made distinguishing between a general attack and attacks on portions of the front. Because a German attack was characterized by a general bombardment of an extended front that converted into an intense preparation on a particular area, all means of observation should be attuned to discern the variation in hostile artillery activity. Once the commander determined an attack was to begin, the artillery delivered a "violent" fire for about five minutes against the enemy's front line. The staff monitored the situation and determined how often and how long to repeat this fire. In case of lengthy firing periods, instructions directed battery commanders to fire alternate pieces to allow cooling of the weapons. The heavier artillery fired simultaneously on counterbattery targets and delivered interdiction fire on enemy rear approaches.

If the counterpreparation fires did not prevent the enemy attack, the artillery fired barrages. The twofold

objective of barrage fire was to block the enemy attack the moment the troops deployed and to prevent the arrival of reinforcements and reserves to strengthen the attack. This necessarily required a quick transition from counter-preparation to barrage fire. For each light battery, commanders designated a distinct sector of the front. If there were sufficient numbers of batteries assigned to the command, several batteries could superimpose their fire for reinforcement. Initial instruction recommended an artillery battalion supporting an infantry battalion, a situation in which the AEF rarely would find itself. When fired, the barrage was to form a "continuous curtain" as close to the friendly front lines as possible, usually at a distance of 100 to 200 meters depending upon the artillery range. (At greater ranges, artillery fire experiences greater dispersion of rounds.) Once an effective barrage was established the range would be gradually increased until the fire reached the enemy front lines. To supplement this barrage, some units would fire in depth against the trenches and lines of communication. If the enemy successfully penetrated the front lines, the light artillery had to bring the barrage back onto the captured positions at the request of the infantry.

At the opening of barrage fire, units fired as rapidly as possible, the rate tapering off to meet the

situation and needs of the defenders. As with the counter-preparation fires, the battery commanders were to alternate weapons to allow cooling. As for guidance on calculations, initially the instructors recommended a density of one round per minute on ten meters of front. Based on the 75-mm.'s rate of fire of five rounds per minute, each battery could sufficiently protect 200 meters of front. Supporting units delivered barrage fire at the request of the infantry, when battery commanders deemed it necessary by indication from observation agents, or when the situation seemed to demand it. Barrage fire was continuous until the infantry asked for its cessation, or if all communications were cut, when the artillery commander determined it appropriate to cease firing.

The successful coordination of barrage fire rested on a good barrage plan and successful liaison. The plan included details on targets, methods and rates of fire, and orders for each battery. In addition, good observation posts and provisions for night firing had to be established. Artillery support from adjacent units might be needed and should be planned. Finally, in a defensive posture, the artillery pieces should have the firing data set on them at all times to ensure rapid response, except when firing other missions.

Brigadier General Charles H. McKinstry, who commanded the First Division's artillery brigade after March for a brief period before Summerall took command, emphasized the importance of the defensive barrage in a memorandum for his regimental commanders. The memorandum discussed in detail how batteries were to conduct a barrage with specific guidance on the information to give each gun. The memorandum went to the extent of providing the exact firing data for each round of each gun in the battery. McKinstry stated all officers and all chiefs of gun sections were to have a copy of the barrage orders as well as having a copy posted near each gun.<sup>41</sup>

Another type of artillery fire the French taught the Americans was the general category they termed contingent fire. The first of two methods was harassing fire, the purpose of which was "embarassing" the movements of enemy troops and supplies. The corps commander issued daily orders listing targets for harassment the next day. Artillery fire of this type was targeted on the routes of reliefs and supplies, railways, cantonments, and working parties. The key for successful harassing fire was surprise and the best weapon to deliver it was the small caliber. The fire was short in duration, only long enough to force the enemy to seek cover, usually one or two volleys at different hours of the day and night. When

the target was vehicles, artillery would deliver two or more volleys.

The second form of contingent fire was fire in reprisal. This fire was intended "to keep up the morale" of the infantry by demonstrating that the artillery was "looking out for it," and to convince the enemy of a "willingness to return his fire with interest." Reprisal fire followed an enemy bombardment of friendly trenches and cantonments, a luxury only affordable in stabilized warfare where ammunition resupply was not difficult. Delivered at the request of the infantry or on the initiation of the battery commander, reprisal fire was to be greater than the number of rounds fired by the enemy, in a two-to-one ratio if possible. Against cantonments, the artillery should fire several volleys, assisted by heavy artillery if necessary, using shrapnel and incendiary shells.<sup>42</sup> The Americans would eventually dispense with reprisal fire, deeming it useless and a waste of ammunition.

French artillerymen also instructed the initial AEF divisions on the technique of concentrating the fires of several units on one area, known now as massing fires. Artillery employed concentrations of destructive fire against enemy works, in counterbattery fire, in offensive

counterpreparations, and against enemy materiel concentrations and supply routes. The advantages of concentrations included the effectiveness of various directions of fall of the rounds and types of shells, the increased rapidity of fire, and the dispersion of the firing pieces which reduced the risk of detection. In order to affect immediate concentrations, artillery staffs (divisional and higher) prepared "tables of concentrations" which delineated map coordinates indicating the coverage of the different batteries of the command. Along with these tables, the staff would indicate on their battle maps the respective areas of coverages. Thus, the staff could make a rapid determination of the number and caliber of units able to range any particular target.<sup>43</sup>

An outgrowth of trench warfare was the increased dependence upon artillery by all armies to destroy enemy defensive works. This task required not only precision, but an enormous expenditure of ammunition. Because the war was stabilized, ammunition expenditure was not an obstacle to the fulfillment of artillery destruction. As a consequence, the amount of time to complete destruction was measured in days and weeks, rather than in hours.

The French instruction to the Americans on the destruction of field works claimed that the fire was "precise fire," not to be undertaken except when conditions

were favorable. The conditions that had to be favorable were weather, optimum ranges for the weapons, perfect observation, and close adjustment. An invariable rule was that all fire for demolition should be controlled not only by observers and infantry and artillery reconnaissance, but also by the examination of aerial photographs. The Allies had enough experience that they were able to provide tables that listed the required number of rounds of each different artillery weapon that were necessary to destroy different types of field works. The time required for destruction varied from one to five or six days, depending on the importance of the works, the number of guns used, and the means of observation. Surprise was regulated to secondary importance. The French gave detailed instruction on destruction of wire entanglements trenches, permanent (concrete) fortifications, towns and villages, railways, and lines of communications. Included were types of shell, number of rounds, maximum ranges, and caliber of weapons for maximum effect.<sup>44</sup> The French relied heavily on the artillery, so much so that they would claim that artillery "conquered" and the infantry "occupied."

The instruction of the AEF artillery units received from the French included the use of artillery in the attack. The offensive employment of artillery involved

two general methods, initially counterbattery fire, not significantly different from that of the defense, and then at H-hour, accompanying fire. The French preferred to call accompanying fire what the British called the creeping barrage and the Americans were to call the rolling barrage. Accompanying fire was that fire in direct support of the advance, moving immediately in front of the infantry assault wave. Its purpose was to keep the defenders underground or undercover until the attackers reached enemy lines. The commander determined the barrage's rate of advance based upon the infantry's rate of movement. The standard was fifty meters per minute over easily traversed ground and half that for more difficult terrain. Because the infantry followed from fifty to 100 meters behind the barrage, the artillery had to fire precisely. When the infantry reached the objective, the barrage stood beyond the objective to allow the assault troops to consolidate and dig in. Those artillery units not participating in the rolling barrage provided covering fire, firing at longer ranges to prevent reinforcement, on possible assembly areas, on the flanks of the objective, and all communications trenches. If the attack was limited, instead of emphasis on covering fire, the heavier artillery would fire a box barrage, surrounding the objective and thereby preventing enemy reinforcement

and counterattack. The barrage and covering fires were to terminate only when the advance stopped, the assault troops were securely in place on the objective, and normal liaison was reestablished to the rear.<sup>45</sup>

The First Field Artillery Brigade commander also supplemented specific information to his unit about rolling barrages. McKinstry emphasized the necessity to verify the progress of the barrage by observing it as it passed over visible ridges and other noticeable areas. The commanders should compare the time they see the barrage hit with the time designated by the infantry advance schedule. A written order should be in the hands of each gun section chief, and commanders should ensure that these NCOs had their watches synchronized with the official time. He recommended that battery commanders indicate the time of the advance, H-hour, with a blast of a whistle. Battery officers were to supervise overall firing and also watch for over heating guns.<sup>46</sup>

Once a new front line was established, batteries had to move forward to support the advanced units for counterpreparation and any further advance. The French recommended battery movement be kept to a minimum, since during movement artillery could not support and also ran the risk of destruction by enemy artillery. However when a move was necessary, the artillery should conduct

a thorough reconnaissance of routes and future positions, even to begin some construction of positions with complete camouflage prior to occupation, and preparation for crossing vacated friendly and hostile positions, all of which entailed a sufficient detail of men.<sup>47</sup> Movement of artillery, especially as the French taught it, was tedious business.

For exploitation of a successful attack, the instruction the AEF units received was that second line units, usually divisions which had not taken part in the initial attack, were to conduct the exploiting attack. For artillery support, units that participated in the exploitation were silent during the initial assault so as not to disclose their positions. Some of these batteries would be positioned near the initial infantry departure lines, ready to fire when the exploitation began. The more mobile batteries were further back, ready to fire and prepared to move once they had reached their maximum ranges. They were positioned in echelons, which then allowed movement of the farthest rear units while the closer units continued to support the attack. Artillery units would continue to move by echelon as the exploitation continued.<sup>48</sup>

The First Field Artillery Brigade, organized at Le Valdahon on 24 August 1917, would spend the next three months under direct French tutelage, adopting French

doctrine as its own. In late November the brigade would join the remainder of the division at Gondrecourt. Throughout December, except for a brief Christmas celebration, the division conducted maneuvers, with the artillery simulating fire, but all other tasks of combat being practiced. It was primarily a period in which all the various staffs performed what they previously had been able to do only in a classroom environment. The division, with training completed and declared qualified for combat in a quiet sector, relieved the First Moroccan Division in the Ansauville sector twenty-five kilometers northwest of Toul. The artillery completed its relief on 26 January 1918, a process that consumed four days.<sup>49</sup>

The primary purpose for the division's tour in this sector was to allow the soldiers a taste of trench warfare and also to allow the staffs to function as part of the division. Here the division was in a defensive posture, although two major raids involving the use of artillery were planned. Those raids allowed the infantry to maneuver on a very small scale and also the artillery to plan and conduct supporting fire. This fire support was in the form of a short preliminary fire of destruction on enemy trenches and then shifting to a box barrage of continuous fire to the rear and flanks of the objective in the enemy's trenches. Though one raid failed and the

other was postponed, the artillery evidently did its work well as no Americans were killed and only a few were wounded.

The division also faced serious enemy artillery fire and, in particular, counterbattery fire on the artillery. This forced the movement of some guns to alternate positions, increased the artillery's appreciation of camouflage, and gave the unit experience in antigas measures. French aircraft also gave the artillery the opportunity to fire with aerial observers. Finally, the artillery brigade had the opportunity to provide defensive barrages in response to German raids.<sup>50</sup>

In this sector, the division's artillery brigade made its first alteration of French methods. Instead of one defensive barrage, the brigade used two types, both centrally controlled. Each unit had assigned a "normal" barrage and several "eventual" barrages. The normal barrage was instantaneously delivered at the request of the infantry, the guns always being set, or laid, on the data to fire it, unless a special order of the artillery brigade commander directed otherwise. The eventual barrages were to be fired at the command of the artillery brigade commander. If communications were cut or an emergency arose, artillery regimental commanders could order the eventual barrages and shift battery fires to

meet the circumstances. All barrages had a specific rate of fire and a certain number of rounds for firing. Unlike the French method of continuous fire, when the American batteries had expended the rounds, the barrage was to cease, unless again requested or if the situation required its repetition.<sup>51</sup>

This experience in the Ansauville sector was of value to the First Field Artillery Brigade. It allowed the artillerymen to perfect their technical skills and practice the important mission of defending a sector, a necessity in trench warfare. This phase of training, like all the French training the brigade received, prepared the unit only for trench warfare and its limited offensives. The brigade would find that a major offensive required different and more difficult skills to provide adequate support for the infantry. The artillerymen of the First Division would learn just how difficult it was to support a major offensive at Soissons.

### CHAPTER III

#### THE FIRST TESTS: CANTIGNY AND SOISSONS

"Our Artillerymen feel that they are now superior to the British, French and German."

A.L.P. Sands<sup>1</sup>

In March 1918 the Germans launched their spring offensives with a fury, occupying areas in their advance larger than any captured on the Western Front since 1914. While those offensives struck fear in the Allies because of the possible consequences, the German techniques also signified a break with the static trench warfare. The conduct of war had regained some of its former mobility and vindicated Pershing's insistence on open warfare training. In April, the French High Command began publishing memoranda on the conduct of "semi-open warfare." The Americans readily followed the French lead.

Artillery liaison in open warfare would be more difficult than in the static conditions of the trenches. Accordingly, on 13 April 1918, Summerall published his liaison plan that established the standard procedures for the First Division's artillery brigade throughout the war. The total number of liaison personnel for each artillery grouping would be four officers, eleven NCOs, twenty-six telephonists, sixteen signalers, and twenty-four runners.

Of those personnel one officer, one NCO, two telephonists, two signalers, and two runners would be detailed to the front line infantry battalion and two NCOs to infantry companies. Two officers, one who was the Chief of Liaison, eight NCOs, twenty-two telephonists, and twelve signalers would be at the infantry regimental headquarters. The remaining personnel would be assigned to the infantry brigade commander, with the twenty-four runners posted between the brigade and regimental PCs. Additionally, an officer, NCO, and two each telephonists, signalers, and runners would assume duties at the divisional OP.

As Summerall directed, the Chief of Liaison was responsible for liaison between himself and the infantry battalion, and between himself and his artillery grouping. He was also responsible for the training of all the personnel. All telephone lines would be duplicated by signal projectors, flags, and runners. The liaison detachments would be instrumental in the success of the division's future operations. Specific details of exactly how the system was to work would be determined by differing circumstances and features of terrain. Nevertheless, liaison was to be maintained "at all hazards".<sup>2</sup>

On 16 April 1918, First Division Commander Bullard published his instructions on open warfare, which was essentially a resume of French memoranda. One of the

important things that all commanders were to ensure was a "close working" liaison between infantry battalions and supporting artillery. Artillery's role differed in that it would concentrate on enemy strong points, while the infantry pierced the weak points. Registration on enemy positions was essential, conducted rapidly and briefly, but carefully, because of the difficulty of ammunition resupply. Bullard also reiterated that rigid prescriptions for artillery fire could no longer be dictated, and that firing by time tables would be exceptional.<sup>3</sup> In theory he was right, but the state of the art of communication would prevent this dictum from full implementation, and the Americans would be forced to adhere to time tables rather than abandon them, at least more than they would have liked.

When the Germans launched their spring offensives of 1918 on 21 March, Pershing offered, and the French accepted, the First Division to help stop the German onslaught. Relieved by the American Twenty-sixth Division, the last elements of the First Division left the sector on 5 April and, moving to Toul for entrainment, arrived in the Gisors area. The period in the Gisors area was for rest and relaxation, but it also proved to be a period of intense training in maintenance of communications and liaison. The character of the war had changed as a

result of the German drive and Pershing instructed the division to prepare for semi-open warfare. After observing a division liaison maneuver, Pershing, the French Fifth Army Commander, and other staff officers declared the First Division ready.<sup>4</sup>

The First Division occupied the front on 24 April 1918, due east of the village of Cantigny, with a mission of defense. The division was subordinate to the French X Corps (General Vandenberg) of the First French Army (General Debeney). Cantigny was a village in ruins located on high ground in the point of the sector of the Germans' deepest penetration in the March offensive. The sector was "exceedingly active," the French officers comparing the artillery fire over it to that of the last days of the Verdun battle. This made it nearly impossible to dig trenches, construct wire entanglements, or otherwise strengthen the position for defense. Since no movement could safely take place during the day without drawing rifle and machine gun fire, the line remained little more than a succession of shell holes.<sup>5</sup>

The French had planned in May, and later dropped, a counterattack in the sector to retake Montdidier, a short distance southeast of Cantigny. They did permit, however, at the urging of the Americans, the First Division to stage a limited attack to regain Cantigny, thereby

regaining the high ground of the sector and depriving the Germans of that advantage. This being the first American attack of the war, the First Division planners, including the First Field Artillery Brigade, made elaborate preparations.<sup>6</sup>

The Twenty-eighth Infantry Regiment (Colonel Hanson Ely) was to conduct the attack. In addition to a French tank unit and flamethrower section, the French X Corps Artillery, supplemented with units of the French First Army Artillery, was also available for the attack. The French provided two groupments, the first of corps artillery consisting of eighteen batteries including 105-mm., 120-mm., 155-mm., and 280-mm. guns. The second groupment of army artillery contained seventeen batteries of 145-mm., 155-mm., and 160-mm. guns and three groups (battalions) of 240-mm. tractor drawn and railway artillery. Artillery groupments, or groupings, were temporary organizations designed to meet the requirements of an operation. As an artillery command ranging in size from a few batteries to several regiments, groupings assisted the command and control of the overall artillery commander and also allowed the assignment of special missions. The two groupments of heavy artillery had a two-fold mission: to neutralize enemy batteries in the vicinity and to execute interdiction fire on the dugout areas and

"sensitive points of circulation" beyond the zone of the American divisional artillery, both to commence at the same time of the American preparation. In addition, the divisional artillery of the French Sixtieth and 152nd Divisions on the First Division's flanks were to fire for diversion.<sup>7</sup>

For support of the attack directly, the French provided two complete regiments and one additional battalion of 75-mm. guns and a 155-mm. battalion. These, with the units of the First Field Artillery Brigade, Summerall organized into six groupings. The southern grouping (Major de Vesins) and the northern grouping (Captain Malpot) of three 75-mm. battalions each would protect the flanks. Colonel Murray's grouping of 155-mm.'s consisted of his Fifth Field Artillery and the additional French battalion. The center grouping (Colonel Holbrook) was further divided into right (Major Sands), center (Lieutenant Colonel Parker), and left (Lieutenant Colonel Crane) sub-groupings. Holbrook's grouping would be in direct support of the attack and each of the sub-groupings of two 75-mm. battalions would support one infantry battalion.<sup>8</sup>

The plan of artillery-infantry liaison was not elaborate. Holbrook was to establish his PC at the PC of the Twenty-eighth Infantry. An artillery LNO from each sub-grouping of direct support would be at each infantry

battalion PC with direct contact to Holbrook's PC. In addition, an artillery officer was detailed to the division's advanced observation post and each artillery grouping commander was to establish liaison with Summerall's headquarters. The 155-mm. grouping would maintain liaison with aircraft detailed for counterbattery missions.<sup>9</sup>

A problem the planners encountered was the registration of the newly-arrived French artillery batteries prior to the attack. To prevent warning the Germans of the pending attack, the operations staff devised a plan to allow the French batteries to start registration fire at the first light on the morning of the attack. This would commence at 4:45 a.m., with an hour allotted for the registration. Then the general bombardment, to destroy the enemy's trenches and battery positions, and to demoralize the garrison, would begin. The 75-mm.'s were to sweep the attack front during this period. At 6:45 a.m. the infantry would assault, following the rolling barrage, which the division's light artillery would begin five minutes before H-hour. The heavier artillery would maintain its fires in concentrations on enemy positions, forming a box around the objective.<sup>10</sup>

The plan of attack called for the rolling barrage at H-hour to proceed at the rate of 100 meters in two

minutes up to a line delineated by the objective on the left. It was then to proceed at a rate of 100 meters in four minutes up to the final objective. The change of rate would require the infantry to halt for about two minutes at the first line. From H+1 hour 15 minutes the barrage and neutralization fires were to continue to cover the infantry consolidation, and from that time to gradually decrease in rate of fire. Artillery fire was to cease gradually, but the units were to remain prepared to fire on demand. The final positions of the rolling barrage would become the locations for defensive barrages. Summerall stipulated the number of rounds per gun for each caliber weapon to fire, noting that the ammunition expenditure could be increased, but not decreased.<sup>10</sup> Since there would be no artillery displacement, ammunition supply would present no problems. The planners made no provisions to control the rolling barrage except by timetables. With no forward displacement of artillery, the attack plan was not significantly different than what was required for a raid. The exception was that the infantry would not return to their original line after the operation.

On 27 May the Germans launched their offensive on the Chemin des Dames, making rapid progress. Late that evening, the division learned that some of the French

artillery units supporting the attack would withdraw to support the defensive against the Germans as soon as the American infantry had reached its objectives. This was a significant development as the infantry depended on those longer range guns to suppress the enemy's artillery fire once they had occupied the objective. Nonetheless, that night the assault troops moved to the front lines.<sup>11</sup>

The morning of the 28th the preliminaries of the attack "were carried through with precision." The artillery bombardment opened at 5:45 a.m. and an hour later the waves of the Twenty-eighth Infantry and the French tanks jumped off behind the 75-mm. rolling barrage on a front approximately one and half kilometers wide. Suffering few casualties, the troops swept through the village and beyond to the final objectives. As they reached their objectives, the artillery enclosed the area in a box barrage, preventing an immediate counterattack. With most of its companies on their objectives, the Twenty-eighth had made the division's plan a success.<sup>12</sup>

The euphoria of the initial success was short-lived. Orders for the French artillery to withdraw arrived before the infantry had completed its advance and the division staff learned later that at least one French artillery regiment had started its withdrawal prior to firing a round. The German artillery, no longer suppressed by

counterbattery fire, opened several bombardments on the infantry positions throughout the next two days. More French artillery withdrew later to join the battle of the Chemin des Dames until nearly all the reinforcing artillery was gone by midnight 28 May.<sup>13</sup>

For three days the assault troops faced counter-attacks and bombardments which Marshall, the division's operations officer, described as exceeding "any experience they were to have later on in the great battles of the war." Each time the Americans broke attacks by using combined small arms and artillery fire. But the Germans had suffered from coordination problems. Unable to provide artillery support for a single unified attack, the commanders of two regiments failed to coordinate their efforts and did not establish close liaison with their artillery. Their understrength companies could not overcome the Americans. However, losses among American officers and noncommissioned officers had been especially high, the division losing forty-five officers and about 1000 men to take and hold Cantigny. Four days after the relief of the Twenty-eighth Infantry, the Sixteenth Infantry was still receiving heavy shelling, but for the First Division, the real fighting was over.<sup>14</sup> The division now knew from first-hand experience that infantry-artillery cooperation was important for gaining and holding ground.

Relieved by two French divisions from 5-8 July, the First Division had remained in the Cantigny sector a total of seventy-two days, most of it in a defensive posture. The division then moved to a rear area, and after a period of rest and reception of replacements, again began training with emphasis on open warfare.

On 9 July Bullard issued his instruction on future divisional training, with the general objective to prepare the units, services, and staffs for semi-open warfare. The "delicate phase" of operations in that environment would be the maintenance of liaison, and for the artillery that between the leading infantry battalion commanders and their supporting group of 75-mm.'s. The next day Summerall published his detailed schedule of instructions in accordance with Bullard's. His emphasis was on liaison duties of both officers and enlisted personnel in the advance under open warfare conditions. Summerall directed commanders to detail permanent liaison personnel, and each light battalion to train on its own in support of the infantry, especially in situations where they could not locate the enemy without information from the front lines.<sup>15</sup>

The First Division knew what its future tasks would involve and set out to train for them. The division's training schedules, to begin on 12 July, were explicit

in the importance of liaison. The division's leaders were right. But before they could implement fully these training techniques for open warfare, the schedules were suspended. The First Division had a date at Soissons on 18 July when they would learn first-hand, and at great cost, the liaison requirements for open warfare.

Moving only at night, the division began its journey to the northeast of Paris on 12 July and completed the movement of all elements during the early morning hours of 18 July. This movement situation would prevent detailed planning for the upcoming operation. While the infantry moved in trucks, the artillery started out with its horses. On the 15th, the artillery brigade realized the horses were not proceeding fast enough and acquired trucks for the 75-mm. guns to lighten the load for the animals. The trucks carried the guns and their crews near their deployment areas on the night of the 16th. The horses and caissons would not arrive until the night of the 17th. The Fifth Field Artillery (155-mm.) had to rely on their horses for movement since the guns were too large to place on trucks, but on the 17th, spurred no doubt by urgency and exhausted horses, they devised a method of towing the guns with the trucks. Only one battery of the Fifth Field Artillery was ready to fire at H-hour, the others within an hour later.<sup>16</sup>

The western face of the German Marne salient went directly south at the Aisne River about fifteen kilometers west of Soissons, turning southeastward about ten kilometers south of the Ourq River. The distance between the two rivers was approximately twenty-five kilometers. The Allied High Command's plan was to break into this area, the Germans' right flank, and to advance eastward into the center of the salient with the French XX Corps. The corps's order of battle was the First Division on the left, the First Moroccan Division in the center, and the American Second Division on the right. The First Division covered a front of nearly three kilometers and within its boundaries lay the deep and swampy Missy, Ploisy, and Chazelle ravines.

While the three ravines would be formidable obstacles, Missy ravine in particular was treacherous. More than a kilometer in width and containing cultivated fields, in the ravine were also a stream, marshes, woods, and above its southern edge, in the center of the division's zone, was the village of Missy-aux-Bois. Some of the ravine was bordered by cliffs as high as fifty and sixty meters. Beyond the three ravines was the Crise ravine, large enough to be called a valley, also with marshy areas, and on its eastern edge lay the heights of the town of Buzancy, giving the Germans command of the battlefield.

The terrain, with the exception of the ravines, was rolling and covered with grainfields, waist high and taller. The Paris-Soissons road crossed the division boundaries as well as a railroad line from Soisson into the point of the salient, both major supply routes for the Germans.<sup>17</sup>

The XX Corps operations order called for no artillery preparation, a new technique for the Allies which reflected an adoption of German methods. To achieve surprise, the artillery would fire a rolling barrage of light artillery "as dense as possible" with the heavy artillery concentrating on suspected enemy positions, especially in the ravines. Major General Charles Summerall, the artillery brigade commander appointed division commander on 16 July, repeated the same information in Field Order No. 27 the same day he assumed command. The artillery would occupy their positions on the night of 17 July, an order of necessity more than of desire. On the 17th, Summerall announced H-hour as 4:35 a.m. 18 July. For support of the First Division's attack, the French provided forty-eight tanks, three battalions of 75-mm.'s, and two batteries of 105-mm. A French aero-reconnaissance squadron and a French balloon company would assist in aerial observation.<sup>18</sup>

Colonel Lucius R. Holbrook, First Field Artillery Brigade commander ad interim, directed on 17 July, as his

superiors had ordered, that no adjustment nor preparation would be fired prior to the attack since "force, order and rapidity of movements" would assure success. Including the French 253d Artillery Regiment attached to his command, all 75-mm.'s were to cease firing at H+122, and all guns at H+248, to resume only on request of the infantry. For moves Holbrook ordered the caissons of the Sixth and of two batteries of the Seventh Field Artillery to move forward at H+60, with the remainder of those units' batteries moving on order of brigade headquarters. For further moves, reconnaissance parties were to leave at H+120, selecting positions within their own zones. The Fifth Field Artillery would move on his order, and tentative routes "in principle" for all units were designated. The all important matter of liaison with the infantry was now critical. Holbrook ordered liaison detachments "be sent immediately," adding that battalion commanders would be in close liaison for fire on request because all conditions "become from this time on those of open warfare."<sup>19</sup>

The attack began as scheduled on 18 July, achieving nearly total surprise. The infantry moved quickly, meeting virtually no resistance. The lack of an elaborate trench system on either side no doubt eased the initial advance. At 5:30 a.m. the division had reached its first

of three objectives for that day. At 7:15 a.m. the First Brigade, on the right supported by the Sixth Field Artillery, reached its second objective. The Second Brigade, supported by the Seventh Field Artillery, reached its second objective "shortly afterwards," having encountered the German defenses in Missy ravine. The First Brigade continued to advance to its third objective more than a kilometer in front of its sister brigade.

The Second Brigade could not advance because of enfilading machine gun fire from the ravine, some of whose positions lay in the French zone on the brigade's left. Despite the bombardment of the division's heavy artillery, the cliffs masked the German machine guns, as well as several batteries of artillery using direct fire, from the incoming American rounds. The 75-mm. guns could not assist because of their flat trajectory and some units were displacing. The heavy artillery was too far in the rear for its fire to drop with the proper angle on the Germans protected by the cliffs. As the machine gun was not yet light enough to advance with the front lines, the infantry virtually had no alternative but to advance without the assistance of suppressive fire. By the end of the day the Second Brigade had swept the ravine of Germans, but not without heavy casualties.

At the completion of the planned barrage, all artillery units moved forward as ordered, some units facing serious difficulties. Units of the Seventh Field Artillery encountered effective enemy artillery fire en route. Battery C began movement at 10:15 a.m. and would not get into its next position until 8:30 p.m. Battery E moved at 2:00 p.m. and would not be ready to fire until late that night. Once in their new positions, the artillery units could provide only harassing fire because they were unsure of friendly locations.<sup>20</sup>

On the 19th, the division renewed the attack at 4:00 a.m., the conditions for artillery support remaining the same as the previous day except that Holbrook brought the French 75-mm. regiment under his control, relieving it of its mission of direct support. Either he felt this would better assist the division, or the French commander refused to submit his units to potential losses. The French regiment would remain for the rest of the operation in the more protected zone of the First Brigade.<sup>21</sup>

The attack continued for three more days in a similar pattern, the Second Brigade having the most difficulty because of its often exposed left flank. On the 21st, the attack was renewed with the First Brigade advancing at 4:45 a.m. with no artillery preparation and only a rolling barrage. To assist in softening the assumed

strong defenses of the town of Berzy-le-Sec, the Second Brigade's advance was set at 8:30 a.m. to allow for a three hour artillery preparation on the town. This proved to be advantageous as the Second Brigade was beyond the town by 9:15 a.m. Once the division reached its objectives on the 21st, it settled into a defensive posture in anticipation of a much-deserved relief that night. The relieving Fifteenth Scottish Division was late, and the First Division spent one more day in the position. The Scottish division resumed the attack on the 23rd and, because its entire artillery had not arrived on time, Summerall volunteered the First Field Artillery Brigade to assist its attack. The artillery finally moved to the rear the nights of the 23rd and 24th.

During the eleven kilometer advance over five days, the division captured 3,550 prisoners and about seventy-five field guns and howitzers.<sup>22</sup> To replace guns lost by German counterbattery fire, the Seventh Field Artillery used four of the captured German 77-mm. guns. The attack also had taken its toll. The division lost--killed, wounded, missing, or prisoners--234 officers, including several field officers and a regimental commander, and 7,083 men.<sup>23</sup>

The problems of the battle were not lost to the First Division, and the artillery learned valuable lessons

during the course of the offensive. Because of the rapid changes of position of the Germans in retreat, little time was available to gain information on enemy artillery. This resulted in ineffective American counterbattery fire, especially since the German aerial support, disclosing American positions, was better than the French support throughout the operation. Lack of information about enemy artillery and the absence of quick liaison with corps artillery severely handicapped friendly counterbattery fire. Since the American artillery fired generally in the open, using the ground's "natural folds," the necessity of changing battery positions located by the Germans "was more appreciated from day to day" and resulted in fewer divisional artillery losses than in neighboring divisions. For example, Battery C, Seventh Field Artillery moved twice under heavy artillery bombardment. In addition, with battery positions echeloned in depth, each regiment was able to provide fire support at several ranges and to the flanks.

The artillery commander noted a major problem in traffic congestion. As almost all major movements of divisional support units were at night, traffic at times became so entangled that many senior commanders, including the artillery brigade commander himself, had to direct traffic. Colonel Holbrook claimed that the problem

would not have been so severe with a little foresight in using military police. This was a matter of prime concern since nearly all ammunition supply occurred at night. Because the brigade made provisions to deliver ammunition directly to the batteries by truck, there were no ammunition shortages. Artillery movement was restricted to roads. Wire entanglements and loose wire in fields prevented movement of horsed units. Horse drawn artillery also faced problems of fatigued animals when frequent moves were required, especially for the 155-mm. regiment. As for infantry support, Holbrook found he was able to leave the light artillery regiments completely at the disposal of the infantry brigade commanders. He maintained control of the heavy regiment, three French battalions of 75-mm.'s, one French battalion of 105-mm.'s and three French battalions of 155-mm.'s "generally at his disposal." While this may have been beneficial from his position, it may have improved infantry support to have distributed more of those units for direct support roles.

All artillery units reported that liaison with the infantry and between artillery headquarters was difficult to maintain and often nonexistent. The direct support artillery regimental commanders claimed tanks and enemy artillery fire destroyed their communications wire, and

it was difficult to get wire resupplied. The difficulty in sending back information from LNOs with the infantry meant "almost always a great deal of doubt" about the exact locations of the front lines. The result was that rolling barrages began too far ahead of the initial infantry positions, sometimes as far as 500 to 600 meters, which would make the barrage ineffective. To counter that, Lieutenant Colonel Parker (Sixth Field Artillery) recommended that the barrage stand for a few minutes prior to its movement to allow the infantry to close up to it, a technique the First Division would use frequently in the future. Lieutenant Colonel Sands, commanding the Seventh Field Artillery, recommended that aircraft mark the front lines of the infantry by air-dropped maps. He also recommended that the radio be used between the infantry and artillery, a recommendation that would go unfulfilled in this war.<sup>24</sup>

Most important, the First Division artillerymen felt the battle had displayed the "absolute necessity" of appointing the best available officer in charge of liaison between artillery batteries and the supported front line. The officer must keep communication "at all hazards," even if he has to sacrifice communication with his rear units. This point "was fully impressed upon all concerned." Accordingly, Holbrook assured that liaison

"will be given position of first importance by all Regimental Commanders."<sup>25</sup>

In contrast with the Cantigny operation, Soissons was an entirely new experience. Cantigny was easy. The First Field Artillery Brigade personnel merely had to apply the methods they had been taught. At Soissons the artillery had to affect liaison in a mobile environment for the first time. Instead of an advance of 800 meters, the artillery had to support an advance of eleven kilometers. It required increased efforts to maintain communications. Unlike remaining in one position, which could be improved for protection against counterbattery fire, the artillerymen faced frequent displacements, both for support purposes and to escape destructive fire. During displacement also, artillery was vulnerable to enemy artillery fire and moves could take longer than anticipated, a fact that meant the infantry went that much longer without support. Though the division's artillery faced no significant problems, ammunition resupply was difficult and road traffic had to be regulated.

The artillerymen of the First Division learned valuable lessons at Soissons, lessons that would allow them to make adjustments in their doctrine to support the infantry better. Unfortunately, they learned their lessons at a great cost of lives. The battle of Soissons had vindicated

the American emphasis on open warfare training, but also proved how important, and difficult, artillery support for the infantry's success could be.

## CHAPTER IV

### THE AMERICANS ON THEIR OWN: ST. MIHIEL AND THE MEUSE-ARGONNE

"The first and most essential element of success is that the front selected for attack should [allow] a full development of artillery fire, and . . . complete cooperation between the artillery and the infantry."<sup>1</sup>

As a result of the American experiences in the Aisne-Marne offensive of late July, Pershing had published on 5 August a memorandum for corps and division commanders which dealt with training of divisions after duty in the line. After a two or three day rest, Pershing directed each division to train at least five hours of five days every week. For regimental and higher units, the training consisted of practice and utilization of all liaison means, either through terrain board exercises or maneuver of the complete division if suitable terrain was available. All situations in these exercises would be based on open warfare conditions and "occasionally" on a set piece trench warfare attack.

The AEF commander also ordered the artillery to train for open warfare conditions, with emphasis on speed over accuracy for fire support. Training for cannoneers was to consist of using the weapon's attached range scales, instead of using the separate gunner's quadrant, a time

consuming instrument for precise measurement of tube elevation. All officers and some NCOs were to practice in rapid preparation of firing data, especially on visible objectives. Rapid selection and occupation of positions for gun sections would be part of the training as well as rapid changes of position by echelons for units. Specialists such as scouts, liaison agents, and route markers would practice semaphore signalling. Pershing also directed practice on the use of single artillery pieces, using direct fire techniques, to accompany the infantry. The central theme the artillerymen had to emphasize was that they had to receive prompt information of infantry difficulties and use that information to deliver fire rapidly. The recent offensive substantiated that failure of quick action resulted in greater infantry losses.<sup>2</sup>

Two days later AEF GHQ published "Notes on Recent Operations--No. 1," also based on the experiences of American divisions from 18 to 31 July in the Marne salient. In the section devoted to the artillery, the pamphlet noted that American regulation methods of handling artillery in open warfare "were found to be sound and capable of execution," and that artillery mobility was utilized well. In no case did any of the divisions use smoke shells in their barrages, which, had they been used, would have reduced the effectiveness of enemy machine guns and OPs.

Artillery units fired barrages "habitually" by map, which prevented the close infantry protection that observed fire would have afforded. Thus, the AEF staff recommended that all units constantly seek observed fire. The offensive experience also demonstrated that it was practicable to use the telephone and radio, though the radio was not used because there had been little aerial observation available.

Because of lack of information, the artillery and infantry encountered many difficulties, and the latter suffered high casualties. Artillery liaison should be "direct, positive, and multiple," pushing as far forward as possible to secure information. Communications should be through wire or visual means, preferably both, with less dependence on the usually too slow messengers. Since its prime mission was fire superiority at the point of contact, supporting artillery should fire in violent concentrations immediately in front of the infantry, especially when most hostile artillery was silent or overrun. Artillery commanders should keep a portion of their artillery to fire on objectives that held up the infantry, instead of devoting it all to the barrage.<sup>3</sup>

The studies continued. On 5 September the AEF G-5 published a similar pamphlet, again emphasizing open warfare training for all units. But it also amplified

the methods of divisional artillery employment mentioned in the previous pamphlets. It divided divisional artillery into two classes for open warfare: that retained by the division commander under the direct command of the artillery brigade commander, and that assigned to infantry units under the command of infantry commanders. Since the maintenance of close and direct liaison was a prime factor for good artillery support, the G-5 staff supported decentralization of artillery command for open warfare, which was completely at odds with what the Americans had learned about trench warfare.

The artillery under the command of the infantry, usually one light artillery battalion to one infantry brigade, was further divided into "infantry batteries" and "accompanying guns." A suitable arrangement was to break up one of the batteries for accompanying guns and use the remaining two batteries to support each infantry regiment. Or the artillery battalion commander could retain control of the two batteries under his direct command. The missions of infantry batteries included attacking enemy strong points, defense against local counterattacks, and firing on enemy reserves. With their positions well forward, they would use direct observation and visual communications.

Accompanying guns, under the supervision of an artillery officer, came under the direct command of infantry battalion commanders. Using direct fire, these guns would attack machine guns, tanks, and strong points. Pieces moved by horse until deployment, when the crew would move the guns into firing position by hand. For protection, the G-5 staff felt a single piece would not present a good target, and its mobility and the utilization of natural concealment would assist in survivability. The infantry commander's responsibility was to designate targets and provide information on friendly and enemy dispositions. Additionally, the officer in charge of the piece should use his own initiative for target selection in the absence of orders.<sup>4</sup>

These three publications, published immediately after the first American experiences at open warfare, clearly reveal a search for a solution to the inadequacies of artillery support using the established methods. The recommendations were American in origin and marked the real beginning of U.S. doctrine rather than a reliance on Allied methods. Decentralization of command and the use of infantry batteries and accompanying guns, both new methods of artillery employment, would undergo scrutiny in the last battles of the war.

After a three week period of duty in the trenches of the Saizerais sector, where the artillery remained while the rest of the division then spent a week at the Vaucouleurs training area, the First Division moved to assume its position for the reduction of the St. Mihiel salient. The plan of assault for the American army envisaged a two-pronged attack, I and IV Corps conducting the main attack in the south, moving north, and V Corps in the west attacking east. These corps would converge in the vicinity of Vigneulles, cutting off the salient, and then proceed to straighten out the line. Specifically, the Twenty-sixth Division, on the right of V Corps, and the First Division, on the left of IV Corps, were to meet, with the French Second Colonial Corps mopping up the remainder of the salient in a later secondary attack. The front assigned to the First Division was from Xivray to Seicheprey, a zone of about two and a half kilometers. The division, being on the left flank of the southern attack, would have its left flank exposed.<sup>5</sup>

Between the German and the division's lines was a small creek called the Rupt de Mad, reported as unfordable. On the German front were several trench lines and wire entanglements, and the enemy had made the woods nearly impassable with recent wire construction. Intelligence reports showed a partially constructed new line with two

rows of wire entanglements about eight kilometers behind the old trenches, just behind the Madine River, itself a natural obstacle with steep banks. The Americans expected the hardest fighting at this new defensive line, which was out of range of the initial artillery position. At about the middle of the two enemy positions were patches of wooded areas and small lakes. To the north and west, near the center of the division's zone, were several narrow forests.<sup>6</sup>

To assist the First Field Artillery Brigade in its sector, Pershing assigned the Fifty-eighth Field Artillery Brigade (Brigadier General Henry D. Todd). General Todd, as the ranking officer, would command all the artillery for the First Division's attack. His brigade consisted of the 122nd and 124th Field Artillery (75-mm.) and two battalions of the 123rd Field Artillery (155-mm.). In addition the Seventy-sixth Field Artillery (75-mm.) and one battalion of the Forty-fourth Coast Artillery (8-in.) were attached to the division. The artillery was organized into three groupings for command and control purposes, an east grouping (Colonel H. W. Butner) supporting the Second Brigade, a west grouping (Colonel W. C. Rivers) supporting the First Brigade, and a left flank grouping (Colonel H. B. Hackett) protecting the division's flank. Each of the groupings in direct support of the brigades

consisted of two 75-mm. regiments. The Hackett grouping had one 75-mm. regiment and a 155-mm. battalion. Hackett had to establish liaison with the First Brigade and the French division on the left. Also under Todd were two heavy artillery groupings, Colonel C. G. Davis's of a 155-mm. battalion and the 8-in. battalion, and Lieutenant Colonel J. P. Kennedy's grouping of his own Fifth Field Artillery.

Because of the enlargement of the command, the divisional artillery commander specified liaison requirements that were beyond those normally used. Todd required the grouping commanders in direct support to send a LNO to their supported infantry brigade with a detail of three soldiers and necessary equipment to run a phone line to his grouping if required. Under normal conditions, however, those LNOs were to use the general telephone system. Each artillery regiment in direct support was directed to send three LNOs to the supported infantry regiment: a chief of liaison from the artillery regimental headquarters, one LNO from a battalion headquarters to the commander of the front line infantry battalion, and one LNO from a battalion headquarters in reserve. The chief of liaison's duty was to maintain liaison from each artillery battalion to the infantry regiment and down to the front line infantry battalion. He was assisted by

two separate details, each consisting of two NCOs, ten runners, six telephone operators, and three signal projector operators. Each detail was equipped with three telephones, one projector, three kilometers of wire, and one telephone switchboard. The chief LNO was to maintain in reserve a projector, a switchboard, and one kilometer of wire.

Rivers, Butner, and Hackett also were to send LNOs to divisional artillery headquarters. Hackett had to send one LNO to the First Brigade and one to the French division on the left. As a standard measure, Todd reminded all commanders that every means of communications would be used when necessary.<sup>7</sup>

Since surprise was to be the essential feature of the operation, the division's field order directed the artillery not to fire a preparation before the attack, but to plan for a fourteen hour bombardment if Pershing decided otherwise. Summerall gave general guidance to his artillery commander, including restriction of firing within 100 meters of the division's eastern boundary and on bridges across the Rupt de Mad. He also directed that no gas shells be fired into neighboring divisions' zones nor in their own zone where the infantry would occupy within four hours. Guidance on the rolling barrage, starting at H hour, was that its depth was to be increased

with a reinforcing barrage 200 meters ahead of the normal barrage. The artillery was to use smoke extensively and the heavy units were to concentrate on woods in the zone. Since the French division was not advancing, the artillery was also to fire on Montsec, a hill of 400 feet elevation outside the division's boundary occupied by the Germans, which provided commanding observation of the entire area.

The division had a balloon and an aviation squadron attached for the operation. The balloon was to assist both the artillery and the division staff during the attack. Two aircraft had specific missions, one to observe for the 8-in. battalion and one to report friendly tank movements and direct artillery fire to protect them. Other planes would observe generally for the divisional artillery. Summerall also directed Todd to designate one 155-mm. unit and one 75-mm. unit to attack fugitive targets sent from air observers.

In the artillery plan, Todd designated tasks to his subordinate commanders, indicating specific targets on accompanying maps. From H hour to H+10 the two 75-mm. battalions (referred to as groups according to the French method) in the Hackett grouping and one battery in each battalion of direct support would fire gas concentrations on designated targets, those units then joining in the rolling barrage at H+10. The two groupings of direct

support would cover the advance with a rolling barrage. To provide the depth dictated in the division order, one battery of each battalion was to fire at 200 meters greater range.

The barrage was to stand for twenty minutes on the enemy first line to allow the placement of bridges across the Rupt de Mad. Then it was to proceed, in fifty meter jumps, at the rate of 100 meters in four minutes to the first objective and stand 200 meters beyond it for twenty minutes to allow for infantry reorganization. Then the artillery would continue the barrage to the second objective at a rate of 100 meters in three minutes, again standing for twenty minutes 200 meters beyond this objective. To the third objective the rate would be 100 meters in four minutes where the barrage would halt and gradually cease.

Of the two 75-mm. battalions of the left flank grouping, one battalion would fire on three successive lines designated on the flank, then at H+10 one battery was to fire on the "Observatoire du Mont" and the other two batteries on the trench running from the eastern edge of the town on Montsec to the northeast. The other battalion would fire only volleys of gas shells on Montsec, Summerall's prohibition against gas in neighboring zones apparently being waived. The battalion was to concentrate each

volley on a different point, providing wide coverage of the hill.

The rate of fire for the 75-mm.s in the rolling barrage was two rounds per piece per minute and half that during the standing barrages at the first two objectives. At the third objective the rate of fire was to be only two rounds per battery per minute. One piece in each battery participating in the barrage was to fire smoke shells at the rate of two rounds per minute continually, except in the first and last standing barrages in which no smoke would be fired. The 155-mm. units would fire two rounds per piece every three minutes from H to H+210 and the 8-in. units were to fire at the maximum rate compatible with well-controlled fire.

Todd further ordered supplemental missions to two units. One battery of the Seventy-sixth Field Artillery (east grouping) was to be ready to fire on-call missions on anti-tank guns as spotted from a designated OP near the left boundary. Todd designated the third battalion of the Fifth Field Artillery as the counterbattery group to answer air observer calls in addition to its other mission. The artillery plan made no mention, other than this directive, to counterbattery fire, as that mission was given to corps and army artillery.

The distance to the division's objectives necessitated planning for forward displacement of artillery units, some of the units having to move early in the operation. The artillery plan detailed by battalion the time, new positions, and the routes for the movement of all the battalions in direct support and one 155-mm. battalion of each of the heavy groupings. Orders for the other units would be issued later. One battalion of the Sixth, Seventh, Seventh-sixth, and 122nd Field Artillery was to cease firing at H+216 and begin movement at once. The other battalions of the Sixth and 122nd were to move as soon as their sister units had opened fire from their new positions. The remaining battalions of the Seventy-sixth and Seventh Field Artillery were to move at H+6 hours. The remaining 155-mm. battalions would move on order of the division artillery commander.

Immediately after the infantry had seized the first objective, each of the battalion commanders whose units were to move first were to send their respective battalion survey parties to perform the topographical work necessary for the artillery to begin firing upon their arrival into the new positions. The commanders whose units were secondary in movement would send their advanced parties as the infantry advanced far enough for the work to be done. In addition, units would send forward detachments

for reconnaissance and marking of routes. If batteries found the designated roads too congested, they were to cross fields where practicable. Commanders were to keep in mind that while they moved, the barrage would be less effective and therefore all delay should be minimized.<sup>8</sup>

To fulfill the AEF requirements for accompanying guns, Todd ordered a 75-mm. battery from each of the regiments in direct support to send forward at least one gun. This gun was to be at the complete disposal of the infantry, moved forward with the infantry, and at the same time to stay as far as possible out of enemy machine gun range. The battery commanders of the guns were responsible for supply of ammunition, food, and replacement of guns, horses, caissons, or personnel at all times. An officer selected for his initiative and courage would command the gun and, as the crew chief, an NCO capable of handling the gun should the officer become a casualty. The gun and two caissons were to be in position the night preceding D-day. Todd directed the officer in charge to confer with the infantry regimental commander to learn his desires and to perform reconnaissance and selection of initial position at once.<sup>9</sup>

The IV Corps artillery plan directed details of an officer or NCO and ten men to follow the advance for the purpose of using captured German guns. Accordingly, Todd

directed each of the 75-mm. regiments in direct support and the two 155-mm. regiments to form a detail. They were to follow one kilometer behind the infantry first wave in the zone of their supported units.<sup>10</sup>

On 11 September the division issued its order for a four hour artillery preparation. The 75-mm. battalions were directed to fire gas concentrations on designated targets in volleys of twelve rounds per gun every two minutes. The Butner and Rivers groupings were to expend all their gas shells during the preparation, while the 75-mm. units in Hackett's grouping were to fire gas during both the preparation and the advance. In addition, each battalion was to fire a wire cutting mission in its zone using 150 rounds per gun over four hours. The 155-mm. units would fire only 130 rounds per gun during the preparation, and, along with the 8-in. battalion, would fire on the same targets as designated for the attack.<sup>11</sup>

The directives on number of rounds to fire in the preparation and rates of fire during the attack reflect careful planning for the use of ammunition. A week prior to the attack, Lieutenant Eaton, the First Artillery Brigade's Munitions Officer, recommended changes to the original plan of ammunition supply. According to the first plan, he felt his units could not accomplish their tasks in the time allotted. The batteries were to have

three days of ammunition which equaled a total of 86,400 75-mm. rounds and 21,600 155-mm. rounds that had to be delivered prior to the attack. Additionally his trains were to resupply all units with the same amount once the attack started. Eaton therefore requested authority to move the 75-mm. ammunition at once, that part of the ammunition be issued at army dumps to relieve congestion at the division dump, and that he be able to relocate the one designated 75-mm. dump to three different brigade dumps. Based upon Eaton's experience, it appeared that Todd granted him the authority to carry out the recommendations.<sup>12</sup>

The artillery bombardment began with no adjustment at 1:00 a.m. on 12 September as scheduled. After the four hour preparation, the infantry advanced, encountering slight resistance, slight enough that one participant claimed it was more of a maneuver than a battle.<sup>13</sup> The Germans had made plans to begin abandonment of the salient after they had discovered the American plans, but their withdrawal was a day too late. The infantry advanced with such rapidity that the first objective of the second day's advance was taken on the 12th. By 7:15 a.m. of the 13th, the junction with the Twenty-sixth Division had been completed. The First Division had advanced eleven kilometers and taken only 672 casualties.<sup>14</sup>

Generally the operation went well for the artillery. The division staff described the preparation as effective, with little enemy artillery reaction. The rolling barrage and the use of smoke in the division zone was "very effective." The smoke that the Hackett grouping fired on Montsec was ineffective because of a strong left to right wind. With such light resistance, at 1:15 p.m. on the 12th Todd ordered the Sixth and the Seventh Field Artillery to support the First and Second Brigades respectively and the Fifth Field Artillery to move batteries as far forward as possible. All other artillery units were ordered to assume positions to provide a defensive barrage in front of the day's objective in case of counterattack.

While the first 75-mm. units to displace were in position on time to assist the further advance, all artillery units experienced difficulty in displacing forward due to factors that included muddy terrain (it had rained all night), congested and insufficient roads, abandoned trench systems, and the Rupt de Mad. Engineers designated to assist the artillery had little experience in bridge building and the military police lacked training in traffic control. The 155-mm. units especially faced difficulties because they could only travel on roads. The artillery brigade commander recommended that in future

rapid advances all roads be kept clear until the artillery passed through the entrenched zones. The Sixth Field Artillery commander was "convinced" that field artillery equipped with a light tractor would have rendered more efficient service than horse drawn artillery.<sup>15</sup>

Liaison in the division was "fair" and within the artillery brigade "very satisfactory." The division G-3 claimed the radio, pigeons, and signal projectors were not suitable for this type of attack and were of no service. Telephones among the artillery units were in continuous operation until the batteries moved, and then with only brief interruptions. One artillery regimental commander noted that the quality of the communications wire was unsuitable for wet weather. Lieutenant Colonel Ruggles, Seventh Field Artillery commander, reported his radio communications were good, but the fact that artillery battalions only had receiving sets prevented the acknowledgement of messages. Radios worked well for rear units, but air to ground communications were poor due to bad weather, rapid advance, and perhaps poor training.<sup>16</sup>

In his report on the operation, Lieutenant Colonel Kennedy, Fifth Field Artillery commander, remarked on the poor cooperation between the air service and his unit, blaming the American aerial observers and squadron commander. Citing his past success with the French, he claimed

the main problem was the failure of observers to provide information during the advance because they failed to use their radios properly, to him an indication of a lack of training. "The radio," Kennedy claimed, "is the only means by which artillery units can hope to obtain information in time to be of any value during periods of advance and quick changes." Another problem was that the aircraft went up with a specific mission, such as to observe the fire of one battery, and ignored all other possibilities of assistance.<sup>17</sup>

The artillery brigade commander, division commander, and G-3 agreed that the accompanying gun was not effective. The artillery brigade commander felt the problem was insufficient directives from the infantry and an inability to fire at targets through smoke. The G-3 felt the function of the accompanying gun could be "fully executed" by the infantry's own 37-mm. guns. Lieutenant Colonel Dodds, Sixth Field Artillery, reported his detached gun had "little to do." It fulfilled the mission the infantry gave it, protecting the left flank of the last objective, and fired only five rounds. The Seventh Field Artillery's gun went forward as ordered with two caissons, eighteen horses, and nineteen men. The officer in charge went forward with the infantry assault for reconnaissance. As he brought the gun forward he lost one horse to machine

gun fire. By the time the gun was in position, the infantry had moved so far forward that it was impossible to see any target. The crew found it impossible to move except on roads because of wire entanglements, trenches, and swamp. They reached the day's last objective or three hours after the infantry had assumed a defensive position. The gun had fired two rounds and the infantry never asked for its support. Direct fire had been impossible behind the smoke barrage. As the officer in charge stated: "I had seen no targets [and] had been unable to follow the Infantry in their line of advance."<sup>18</sup> For the First Division in the St. Mihiel operation, the record of the accompanying gun was dismal.

As after the July operations, the GHQ staff published a pamphlet based on the experience gained in the reduction of the St. Mihiel salient. GHQ found fault with the artillery, pointing out that while plans called for rapid and successive movement as required for open warfare, in reality there was a lack of urgency in initiating forward moves. In surprise attacks, GHQ recommended placing artillery well forward and making prompt movement once the attack had commenced. Route reconnaissance should follow the first assault waves immediately, and thereafter movement should be continuous. Reports indicated instances of instructions not to advance artillery closer than a

prescribed distance from the front line. These instructions "induced timidity," were "not sound for offensive operations," and would "be revoked at once."

In the recent operation, the various artillery units used two different methods of fire support, the barrage and progressive fire on selected points. GHQ felt the latter method was preferable, unless there was sufficient artillery available to permit an effective barrage in the entire zone. Because resistance was less than expected, the barrages proved too slow and hampered the infantry advance. The staff recommended devising prearranged signals or other means either to increase the rate of the barrage or cease it altogether. Observed fire rarely was used, even where the terrain afforded excellent observation. GHQ repeated the advantages of observed fire, especially in rapidly moving operations where ammunition supply was an important factor.<sup>19</sup>

Soon after withdrawing from the line after the St. Mihiel operation, the First Division marched west, again at night for concealment, to assume its role of army reserve for the Meuse-Argonne offensive. Compared to the terrain encountered in the previous operation, this sector was formidable. On the sector's right was the Meuse River, unfordable and bounded by a number of hills which provided excellent observation and positions for firing into the

sector. Less than twenty miles to the west was the Argonne Forest, the left boundary. Heavy growth and steep ravines characterized the forest, and bluffs, which overlooked the Aire River on the eastern edge of the forest, also provided observation and gun positions similar to those on the right boundary. Between these two major features were ridges, hills, and various woods. The Germans had established four defensive lines in the sector. Beyond the first two, located in the initial ten miles into the sector, lay the Kriemhilde Stellung or Hindenburg Line. This defensive position crossed the Meuse north of Brioules, passed through the Cunel Heights, and north of the Argonne near Grandpré. The fourth defensive line was the Freya Stellung along the Barricourt Ridge. The terrain greatly favored the defense.<sup>20</sup>

Pershing had I, V, and III Corps, from left to right, conducting the attack. The attack began early on 26 September. Initial movements went well with the advantage of surprise, but about four miles into the sector, the American divisions, many in battle for the first time, began to face stiffened resistance. The attack then essentially stalled.

On the 29th, Pershing assigned the First Division to Hunter Liggett's I Corps, and on the 30th Liggett ordered the division to relieve the inexperienced, bloodied, and

disorganized Thirty-fifth Division. By 5:00 a.m. on 1 October, the First Division was in the line again. For three days it occupied that position, preparing for a renewed attack to commence at the direction of corps headquarters.

Unlike the St. Mihiel operation, the First Division only had the 219th French Field Artillery (75-mm., tractor drawn) attached. For counterbattery work, the divisional artillery commander, Colonel Butner, was to maintain liaison with a counterbattery grouping (Colonel Chapelain) of I Corps Artillery, consisting of French units, two battalions of 105-mm. and three batteries of 155-mm. Butner chose to maintain direct control of the French 75-mm. regiment to provide reinforcing fire in a similar manner as his 155-mm. regiment. The infantry brigades, therefore, each had only one 75-mm. regiment in direct support instead of the two regiments in the previous operation.

The artillery plan for the attack of 4 October was similar in most respects to the plan for St. Mihiel, with the exception that two accompanying guns would be provided to each front line battalion, which also lessened the power of the barrage. The rolling barrage was similar, to include the rate of progression, length of time for standing beyond objectives, and designation of the rate

of fire. For depth, the 219th Field Artillery would fire 200 meters in advance of the barrage. All 75-mm. batteries were to fire smoke from H hour to H+2, and from then on one gun would fire smoke throughout the barrage until the smoke shells were consumed. The Fifth Field Artillery would fire in advance of the barrage on designated targets that included woods, ravines, and known enemy locations.

Liaison was to be accomplished in the standard manner, and the second battalion of the 219th Field Artillery was designated to attack fugitive targets requested by air observer in addition to its normal mission. The artillery was to have two aircraft and one balloon in constant support. Batteries would have ammunition for two days of fire at their positions and the First Ammunition Train was to resupply from corps dumps on demand.

For forward displacement, Butner ordered one battalion of the Seventh Field Artillery to move at H+210 and one battalion of the Sixth Field Artillery at H+280. While each of the units moved, the regimental commanders were to extend their coverage to make up for the loss of those units in the barrage. As soon as each of those battalions opened fire from their new positions, the remaining battalions were to move forward. Batteries were directed to occupy positions within the zone of advance of their supported units as much as possible. One battalion of

155-mm. was to move as soon as the units of the Sixth and Seventh Field Artillery had cleared the roads, the others and the 219th Field Artillery to move on Butner's orders.<sup>21</sup>

The attack on the 4th did not progress as far as planned, as the division was delayed by well prepared defenses, flanking machine gun fire, and enemy artillery. The division planned to continue the attack on the 5th with modifications in the artillery support. Instead of the 219th Field Artillery firing in superposition, it would participate in the rolling barrage with the other 75-mm. regiments. For depth Butner directed regimental commanders to designate units to fire 200 meters ahead of the barrage. Fifteen minutes before H hour the artillery would begin firing, the 75-mm.'s raking the entire zone from the jump off line to the first objective and the heavy artillery firing on designated targets in the same area. At H-2 the barrage was to begin 200 meters beyond the front lines and then move at H hour at the rate of 100 meters in four minutes. At the first and second objectives the infantry would halt for two hours, during which the artillery would fire concentrations between the objectives. The advance would begin again accompanied by the barrage.<sup>22</sup>

This plan worked to some extent, but the division still suffered casualties from the flanks and enemy

artillery, some of the worst bombardment the division had experienced. On 6, 7, and 8 October the division sent out patrols to maintain contact with the enemy. If possible, the infantry would advance, but each time to assume defensive positions. The artillery provided constant support, prepared to repel counterattacks and firing on interdiction and harassing targets day and night.

On 8 October the division, now under V Corps, was ordered to extend its front, bringing it in line with adjacent units. For the attack on the 9th, Summerall directed it be conducted in three separate operations allowing the artillery to provide all its firepower in different sectors. The artillery support for each operation was similar to the advance on the 5th, preparations for thirty minutes to two hours prior to each advance followed by a rolling barrage. This unique plan provided three infantry attacks, each conducted in succession after the previous attack's consolidation, the maximum support of the entire divisional artillery. It proved a success.<sup>23</sup>

However, by this time the division was exhausted and its personnel strength depleted. On the 10th and 11th, the infantry sent out patrols and moved forward when possible into defensive positions. The artillery prepared and fired defensive barrages and counterpreparations.

On the night of the 11th, the Forty-second Division relieved the infantry of the First Division. The First Field Artillery Brigade and First Ammunition Train stayed to support the fresh division and later the Second Division. The artillery would rejoin the division when it reentered the line on 6 November. However, except for about 200 rounds fired across the Meuse River near Sedan, the First Field Artillery Brigade would not fire another shot in support of a First Division advance during World War I.

The division's report on the operations stated that at no time was there any ammunition shortages. Liaison was good, telephones proved valuable, and runners were used to some extent. Liaison with aircraft was again poor. As for artillery support, preparations were generally effective and barrages very effective. What smoke was used produced good results. Artillery moves were made without great difficulty. The heavy artillery regimental commander reported using observed fire whenever possible and claimed he would have used more OPs had he had more communications wire. Attempts to use the balloon and aircraft failed primarily because they had other missions. The telephones of his unit were in over ninety percent of the time. The radios worked all the time, but lack of batteries hampered use near the end of the operation.<sup>24</sup>

The division report stated the accompanying guns were often lost or disabled and concluded that in general "they are not considered effective." The reports of the two officers in charge of the accompanying guns of the Seventh Field Artillery supported the division's claim. Lieutenant McVickar, who commanded the accompanying gun for the St. Mihiel and Meuse-Argonne operations, reported to the infantry battalion commander on 3 October. The gun, this time with only one caisson, was positioned and ready in a ravine immediately behind the front line for the initial advance of the 4th. However, as soon as the artillery barrage started, the German counterpreparation knocked out the gun, and the section suffered casualties of nine of the thirteen men and eleven of the twelve horses.<sup>25</sup>

Lieutenant Cross commanded the other accompanying gun. Notified late of his mission, he proceeded with his gun section to the infantry position on the night of 3 October. Delayed by an enemy gas attack, and later by French tanks on the road, his section arrived at its position an hour after the attack had commenced. Cross had two opportunities to fire on enemy machine guns and 77-mm. guns, but both times he was advised not to fire because friendly infantry were in the vicinity. The next day he could not fire because of fog. In his reconnaissance for a new position. Cross, with the assistance of

an infantryman, turned a German 77-mm. around and fired all the fuzed ammunition into a hill in front of the infantry. That afternoon, the 5th, his battalion commander ordered him to bring his gun back to his battery. Cross never fired his gun, and while none of his men became casualties, he lost three horses to machine gun fire.<sup>26</sup> While Cross's poor initial experience might be blamed on a lack of sufficient planning prior to deployment, his experience in action, as well as McVickar's, provided a disastrous record for the accompanying gun.

One of the most significant events of the offensive was that related by Major Lyman S. Frasier, commander of the Third Battalion, Twenty-sixth Infantry. Frasier claimed his artillery LNO from the Seventh Field Artillery performed excellently, controlling the fire of two guns of his artillery regiment's "infantry battery." The guns were located about 1,500 meters to the rear. This "unusually competent officer" had direct telephone communications with those pieces and issued fire orders from "wherever he happened to be." He destroyed many machine guns and two artillery pieces. During a German counter-attack, Frasier asked for artillery fire through his LNO on a numbered concentration previously designated. "The fire came down promptly and was effective." This unnamed artillery liaison officer presaged the function of

a future artillery officer--the forward observer.

From the 4th to the 11th of October, the First Division advanced a total of seven kilometers and suffered over 8,500 casualties. There were several reasons for the high casualties. The division did not begin with a surprise attack, which had proved an important factor in previous actions. The terrain greatly favored the defense and the Germans had prepared their positions well. Once the infantry broke through the first German line, they encountered more trench systems. The fact that the division was in front of adjacent divisions until the 9th also contributed to the casualties. The 75-mm. gun, the artillery's primary weapon for direct support, was too small a caliber to be effective in heavily wooded areas. Finally, the division's artillery support for the offensive was much less than that for the St. Mihiel operation.

Three key points came out of the last two American offensives of the war: the artillery needed greater mobility, communications with front line units had to be improved, and a howitzer smaller than the 155-mm. and larger than the 75-mm. was needed. But the First Division had learned the importance of artillery support for an infantry attack. As the attack of 9 October and the abilities of the liaison officer with the Twenty-sixth Infantry demonstrated, the First Field Artillery Brigade

was able to use what weapons and equipment it had probably  
in the best manner possible.

CHAPTER V  
AFTER ACTION REPORT

"To my mind, superiority of fire is the most important element of success in war and one which demands our greatest study. It can only be obtained by the proper employment of artillery in sufficient quantities and in conjunction with machine guns."

Charles P. Summerall<sup>1</sup>

As was the established practice, the GHQ AEF staff published a pamphlet on the last operations conducted.<sup>2</sup> Many of the criticisms GHQ made were directed to the inexperienced divisions, repeating much of what it had published earlier. Among the more important points addressed, the GHQ emphasized that the tendency during the last offensive was to rely on map firing at the exclusion of observed fire and, while map firing had a "permanent and important place" in artillery support, it tended to lessen the efficiency of the artillery and deprive the infantry of close support. For closer support, decentralized control was essential.

The pamphlet also listed a set of general principles that contained "sound doctrine" for artillery officers on the employment of artillery. Since the staff officers had more time to reflect on their experiences, these principles reflected a more circumspect view of the American experience, and were intended for all tactical

commanders and staff. One principle stated that for effectiveness on a particular point, artillery fire must either be accurately adjusted on the objective or the area searched by firing, which entailed large ammunition expenditure. Only by observation could the artillery accurately adjust fire, and terrestrial observation was best. Observation was easier when the observer was near the target, but conduct of the adjustment was easier and more rapid when the observer was near the battery. While artillery employed farther to the rear reduced vulnerability, forward deployment provided more direct and faster communication and therefore closer infantry support. Artillery on the move was helpless and useless. For the best fire support, changes of position should be minimal. These principles were conflicting, indicating that the importance of one over another depended upon the situation, such as stabilized or open warfare, or any form in between. As GHQ noted, fixed precepts could not be applied to all situations, and the "art in handling artillery consists in meeting these considerations in the best possible manner."

Finally, the GHQ still insisted on the use of accompanying guns. Their failure, according to the staff, was because of defective reconnaissance or a lack of it. For success, the greatest care must be exercised in

maneuvering, as exposure before firing and even during firing meant destruction. The task required great skill, probably much more skill than the GHQ staff realized, as they seemed to overlook the many problems the accompanying gun had to overcome. Horse drawn artillery could not traverse trenches, wire entanglements, heavily wooded areas, and shell-pocked ground. To provide direct fire at a safe distance, observation had to be virtually unobstructed, a situation a 75-mm. gun would not likely find on a dust and smoke obscured battlefield. In a defensive position, a direct fire artillery piece, protected by defensive works, might do wonders against an attacking enemy. In the offense, where infantry battalion commanders do not know the exact locations of their men, effective direct fire artillery support is impossible unless it can maintain a position in the front lines. The real accompanying gun concept would see fruition only with portable weapons of greater firepower or with the modern tank.

After the war, artillery officers had time to study and digest the lessons of the conflict. The Field Artillery Journal, as well as the other army professional journals, was replete with articles throughout the early 1920s that recounted the war's battles and lessons learned by all armies. The students of the various army schools,

both in the United States and in occupied Germany, used recent battle studies for their exercises. In addition, shortly after the armistice several official boards studied various features of the war to analyze problems and recommend solutions. Pershing's "Superior Board on Organization and Tactics" emphasized the critical importance of infantry-artillery cooperation.<sup>3</sup> AEF Chief of Artillery Ernest Hinds appointed a board headed by Brigadier General Andrew Hero, Jr. to study reorganization and armaments for division, corps, army, and reserve artillery; mechanization of artillery transport; liaison; staff systems; and ammunition supply. Among the Hero Board's various recommendations were that communications personnel and equipment be increased for artillery units; that the personnel of the flash and sound ranging services be artillerymen and the Artillery Information Service be a permanent part of the artillery organization; that the personnel for liaison detachments be increased considerably; and that a more thorough study be conducted for motorization of every piece of artillery.<sup>4</sup>

Simultaneous with the Hero study, Army Chief of Staff Peyton C. March directed a group of officers representing the field artillery, coast artillery, and ordnance branches to study the artillery's materiel needs. Headed by an ordnance officer, Brigadier General William

I. Westervelt, the Westervelt or Caliber Board produced a penetrating study that provided direction for the ordnance department for the next fifteen years. Its recommendations, still cited in 1939 and 1940, included the "ideal" artillery piece for every mission of support, different types of ammunition and fuzes, and immediate motorization of all weapons larger than the 75-mm. gun and the 4-inch howitzer. The board recommended the immediate adoption of 5-ton and 10-ton caterpillar tractors for prime movers and four-wheel drive cargo trucks for ammunition supply. As the report stated: "Mechanical transport is the prime mover of the future . . . we are on the verge of [radical] changes." Westervelt's study claimed that the first country to utilize these new capabilities would have a great advantage in the next war.<sup>5</sup>

The Signal Corps likewise continued its research and development. The corps's researchers would gradually develop the item sorely needed for instantaneous liaison and immediate fire support: the man-packed, two-way radio. While the researchers would produce better communications wire and field telephones quite rapidly, they directed most of their efforts for radio improvement to aircraft communication. Even with the emphasis on mobility and mechanization immediately after the war, only after

1937 would concerted efforts produce a radio suitable for front line units.<sup>6</sup>

While much of the technical advancements would require years of further research and Congressional appropriations, the tactical lessons of the World War would not be lost. Entering the conflict severely handicapped with no modern doctrine, the AEF artillerymen were forced to rely on the French for the lessons of trench warfare. As they gained in experience, especially in the conduct of major offensives, several maxims for success became evident. Observed fire was the most effective, particularly for the front lines of advancing infantry, and it conserved ammunition. In mobile operations, ammunition expenditure must be regulated and greater efforts were required for resupply. Smoke obscuration assisted infantry movement, especially against enemy positions that the artillery could not destroy. Enemy batteries must be neutralized because their effect on both the artillery and infantry could stop an attack. Aerial observers should be either artillerymen or thoroughly trained by artillerymen. Finally, in mobile operations, artillery must balance the requirements of forward displacement with the necessity of providing continuous fire support.

The tactical lessons were a result of two major processes. First, the American artillerymen had to transform their theoretical doctrine into the practical methods of trench warfare. This the First Field Artillery Brigade accomplished from September 1917 to July 1918, a period of training by French instructors and operations on stabilized fronts. Then the Americans had to adjust trench warfare doctrine to open warfare doctrine, which the First Division's artillerymen did from the battle of Soissons in late July 1918 until the last offensive in the Meuse-Argonne.

By October 1918, after participating in the Meuse-Argonne battle, the First Division had clear ideas of the needs for successful offensive operations. The technical limits of equipment, however, hampered the artillerymen in their efforts. The three major limitations were communications, the mobility of horse drawn artillery, and the inadequacies of the 75-mm. gun in destructive power and trajectory, especially in wooded, hilly areas.

The American artillerymen developed their doctrine during the conduct of battles instead of peacetime training. In war lessons are learned sometimes at a high cost in casualties, as the First Division discovered at Soissons. However, for the American soldiers there were few alternatives. Their deficiencies in training to a

great extent were due to the limited size of the prewar army, the disposition of units throughout the continental United States and other American territories, and a lack of modern equipment. While theoretical doctrine existed in 1917 prior to the American declaration of war, the institutional arrangements to teach and test it did not match the army's expansion. The result was an army with virtually no modern doctrine until its artillery learned it in battle in Europe, a process that included absorbing and then changing French artillery practices.

As the war demonstrated to the First Division, the artillery had become a vital part of the modern battlefield. Only through its effective use, in close cooperation with the infantry, was real battlefield success possible. Infantry-artillery cooperation would mean a successful defense, as the operation at Cantigny showed, and ineffective use could mean severe infantry losses, as the First Division learned at Soissons. Technical inadequacies of equipment also resulted in higher casualties, especially during the Meuse-Argonne campaign.

The artillerymen of the First Division proved that they had learned valuable lessons from each offensive experience. Using French methods initially, the artillerymen analyzed problems, searched for better methods, and adjusted doctrine to support the infantry more effectively

after each operation. They vigorously made every effort to increase infantry-artillery cooperation. In sum, the AEF artillerymen sought to provide the maximum support.

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42. AWC, "General Notes on the Employment of Artillery," pp. 27-28.

43. Ibid., pp. 28-29.

44. Ibid., pp. 16-19.

45. The information on artillery in the offense is taken from the following sources: "Instruction of December 16, 1916 Concerning the Object and Conditions of an offensive action," 8 August 1917, Document No. 767, G-5 Library, RG 120, NA; AWC, "Field Artillery Notes No. 9," pp. 24-26.; U.S., American Expeditionary Forces, "A.E.F. Instructions for the Training of Divisions for Offensive Action," reprint, (Ft. Leavenworth: Army Service Schools Press, n.d.), pp. 15-26.

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2. WWR, Vol. 9, HQS 1st FA Bde, "Plan of Liaison For Forthcoming Operations," 13 April 1918.

3. WWR, Vol. 1, HQS 1st Division, "Open Warfare," 16 April 1918.

4. Society, History, p. 64; Pershing, My Experiences, 1:391-393; Millett, The General, pp. 354-57.

5. Society, History, p. 69; Millett, The General, pp. 358-59.

6. Millett, The General, pp. 360-62; Coffman, The War, pp. 155-56.

7. USA/WW, 4:276-79; WWR, vol. 1, HQS 1st Division, "Cooperation of Adjacent Divisions," 25 May 1918.

8. WWR, vol. 9, HQS 1st FA Bde, "Plan of Employment of Artillery," 20 May 1918; Ibid., vol. 14, HQS 1st FA Bde, "Report on Operation Against Cantigny, May 28, 1918," n.d.

9. WWR, vol. 1, HQS 1st Division, "Plan of Liaison," 22 May 1918; Ibid., vol. 9, HQS 1st FA Bde, "Plan of Liaison," 25 May 1918.

10. Ibid., vol. 1, HQS 1st Division, Field Order No. 18, "Operation against Cantigny," and "Amendments and Additions," 24 May 1918; Ibid., vol. 9, HQS 1st FA Bde, "Plan of Employment of Artillery," 20 May 1918.

11. George C. Marshall, Memoirs of My Services in the World War 1917-1918, with a Forward and Notes by Brigadier General James L. Collins, Jr. (Boston: Houghton Mifflin Company, 1976), p. 94.

12. Ibid., p. 95; Society, History, p. 84; Millett, The General, pp. 363-64.

13. Marshall, Memoirs, pp. 95-96; Millett, The General, pp. 365-66.

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15. WWR, vol. 20, HQS 1st Division, "Instructions and Training," 9 July 1918; Ibid., vol. 21, HQS 1st FA Bde, "Memorandum No. 231," 10 July 1918.

16. WWR, vol. 12, HQS 1st Division, G-3 Memorandum, "Report on Operations of the First Division south of Soissons, July 18-24, inclusive," 27 July, 1918; Society, History, pp. 99-102, 108.

17. Society, History, p. 103; Coffman, The War, p. 237.

18. Society, History, p. 104; USA/WW, 5:277-78, 291.

19. WWR, vol. 9, HQS 1st FA Bde, "Operations Order No. 180," 17 July 1918.

20. WWR, vol. 14, HQS 1st FA Bde, "Report on Operations South of Soissons, July 18-24 (inclusive)," 4 August 1918; Ibid., HQS 5th FA, "Operations South of Soissons during July, 1918," 1 August 1918; Ibid., HQS 6th FA, "Report on operations South of Soissons," 1 August 1918; Ibid., HQS 7th FA, "Report on Action of the 7th Field Artillery in the Soissons Area," 2 August 1918; Ibid., HQS Btry B, 7th FA, "History of battle July 18, 1918 to July 24, 1918," 2 August 1918; Ibid., Btry C, 7th FA, "Resume of Operations," 2 August 1918; Ibid., Btry E, 7th FA, Memorandum for Battalion Commander," 2 August 1918. No other batteries filed a report.

21. WWR, vol. 14, HQS 1st FA Bde, "Report on Operations South of Soissons, July 18-24 (inclusive)," 4 August 1918.

22. The exact number is unclear: the artillery brigade commander reported ninety-six pieces captured, The Society of the First Division stated seventy-five, and the division commander's report stated sixty-eight. The division's report acknowledged not having current information at the time of the report.

23. Society, History, p. 141.

24. WWR, vol. 14, reports listed in note 20.

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1. AWC, "Field Artillery Notes No. 1," p. 138.

2. U.S., American Expeditionary Forces, Chief of Staff, "Memorandum For Corps and Division Commanders," 5 August 1918, G-5 Library, RG 120, NA.

3. U.S., American Expeditionary Forces, General Headquarters, "Notes on Recent Operations--No. 1," 7 August 1918, pp. 6-7, G-5 Library, RG 120, NA.

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5. U.S., War Department, Report of the First Army, American Expeditionary Forces (Ft. Leavenworth, Kan.: The General Service Schools Press, 1923), pp. 13-28; Society, History, pp. 153-54.

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8. WWR, vol. 2, HQS 1st Division, "Field Order No. 36," 9 September 1918, Ibid., vol. 9, HQS 1st FA Bde, "Artillery Plan," 11 September 1918.

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10. Ibid., vol. 9, HQS 1st FA Bde, "Operations No. 276," 10 September 1918.

11. Ibid., HQS 1st FA Bde, "Artillery Preparation," 11 September 1918; Marshall, Memoirs, pp. 134-35; USA/WW, 8:208-26.

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14. Society, History, pp. 161-68.

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16. Ibid., vol. 14, HQS 7th FA, "Operation against St. Mihiel Salient," 19 September 1918.

17. Ibid., vol. 14, HQS 5th FA, "Aerial Observation," 26 September 1918.

18. Ibid. See notes 15-17.

19. U.S., American Expeditionary Forces, General Headquarters G-5, "Notes on Recent Operations No. 3," 12 October 1918, pp. 9-11.

20. Millett, The General, pp. 396-97; Coffman, The War, p. 300; Society, History, pp. 172-76.

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22. Ibid., vol. 3, HQS 1st Division, "Field Orders No. 48," 5 October 1918.

23. Ibid., HQS 1st Division, "Field Order No. 49," 8 October 1918.

24. Ibid., vol. 13, HQS 1st Division, "Report on Operations of the 1st Division in the Sector east of the Argonne and west of the Meuse October 1st-12th inclusive," 17 October 1918; Ibid., vol. 14, HQS 5th FA, "Report on offensive Operations of the 5th Field Artillery in the recent Offensive of the 1st Division from September 21st to October 11th, inclusive," 20 October 1918. None of the other artillery units filed reports probably because they were fighting until the signing of the armistice.

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26. Ibid., Btry D, 7th FA, "Report on accompanying Gun," 25 November 1918.

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2. U.S., American Expeditionary Forces, General Headquarters G-5, "Notes on Recent Operations No. 4," 22 November 1918, pp. 5-9.

3. "An Artillery Study Made in the A.E.F.," FAJ 10 (January-February 1920):50-63 and (March-April 1920): 93-108.

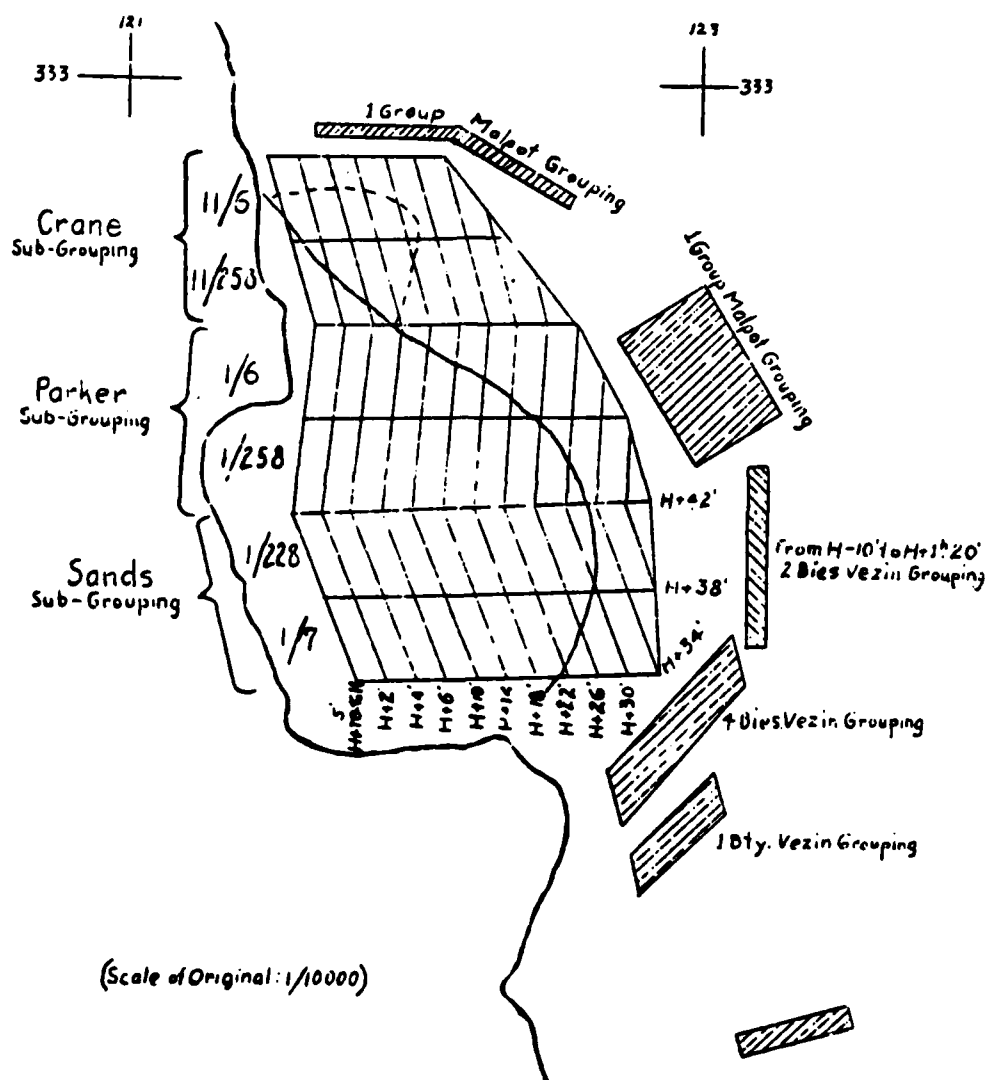
4. "Report of the Chief of Field Artillery," WD/Annual Report, 1:5233-35.

5. "Study of the Armament and Types of Artillery Materiel to be Assigned to a Field Army," FAJ 9 (July-August 1919):289-347; Constance McLaughlin Green, Harry C. Thomson, and Peter C. Roots, The Ordnance Department: Planning Munitions for War in Office of the Chief of Military History, United States Army in World War II: The Technical Services (Washington: Office of the Chief of Military History, 1955), pp. 169-215.

6. Dulany Terrett, The Signal Corps: The Emergency (to December 1941) in Office of the Chief of Military History, United States Army on World War II: The Technical Services (Washington: Office of the Chief of Military History, 1956), pp. 22-69, 82-88, 116-121.

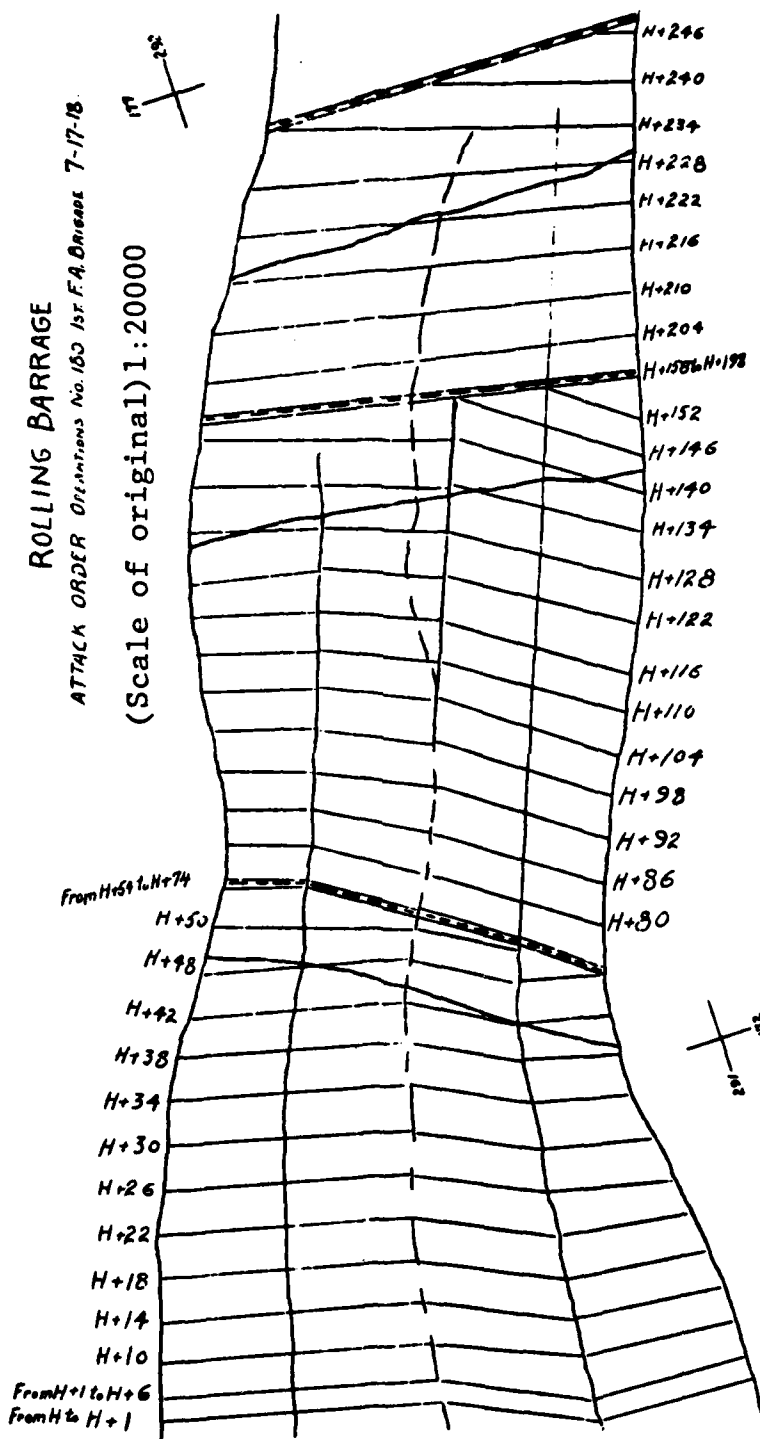
## Appendix A: Fireplan for Cantigny Operation

Rolling barrage  
and its immediate protection



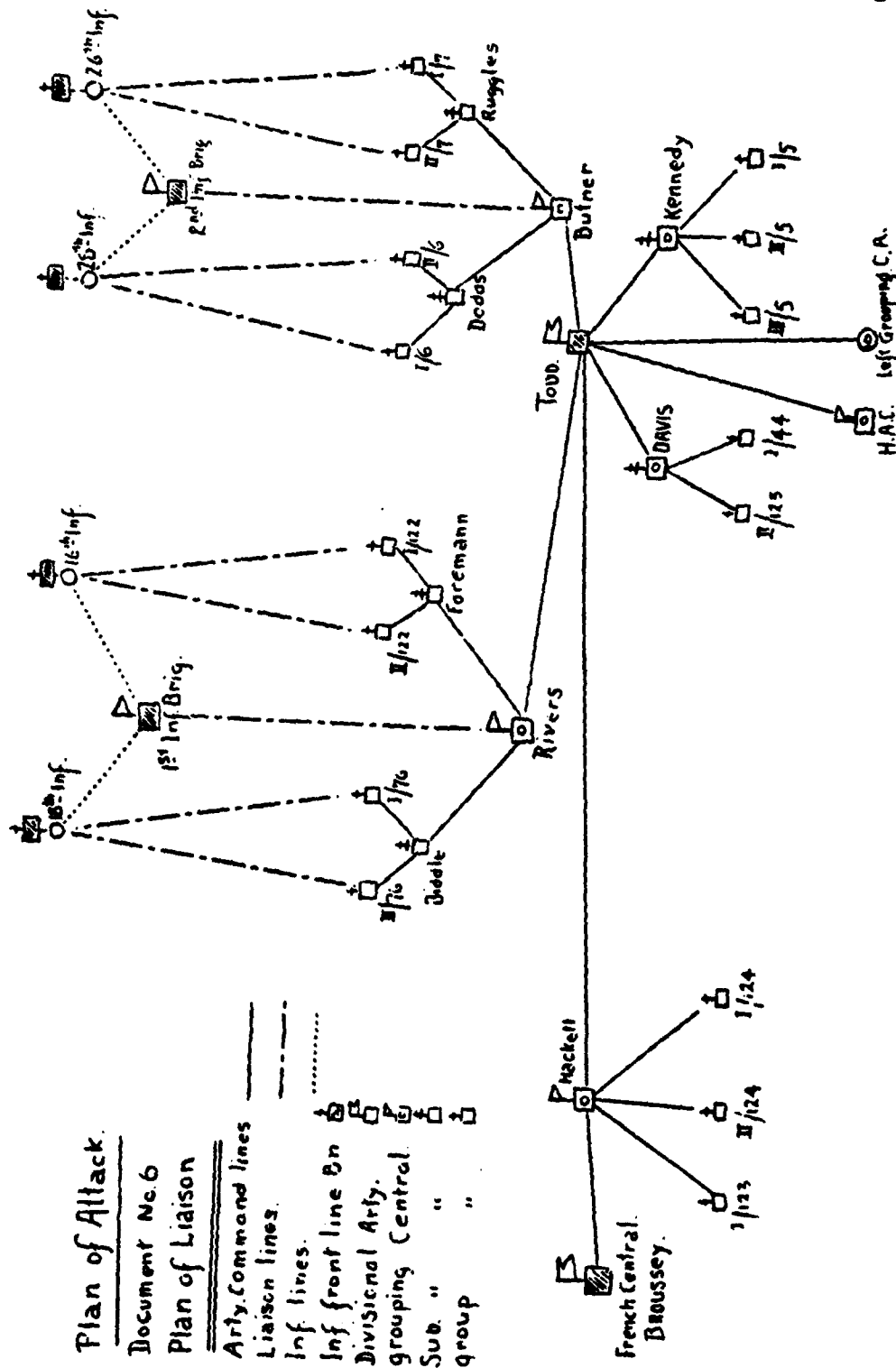
Source: U.S., War Department, World War Records, First Division A.E.F. Regular, vol. 9 (n.p., 1928).

# Appendix B: Barrage Plan for First Day of Soissons Operation



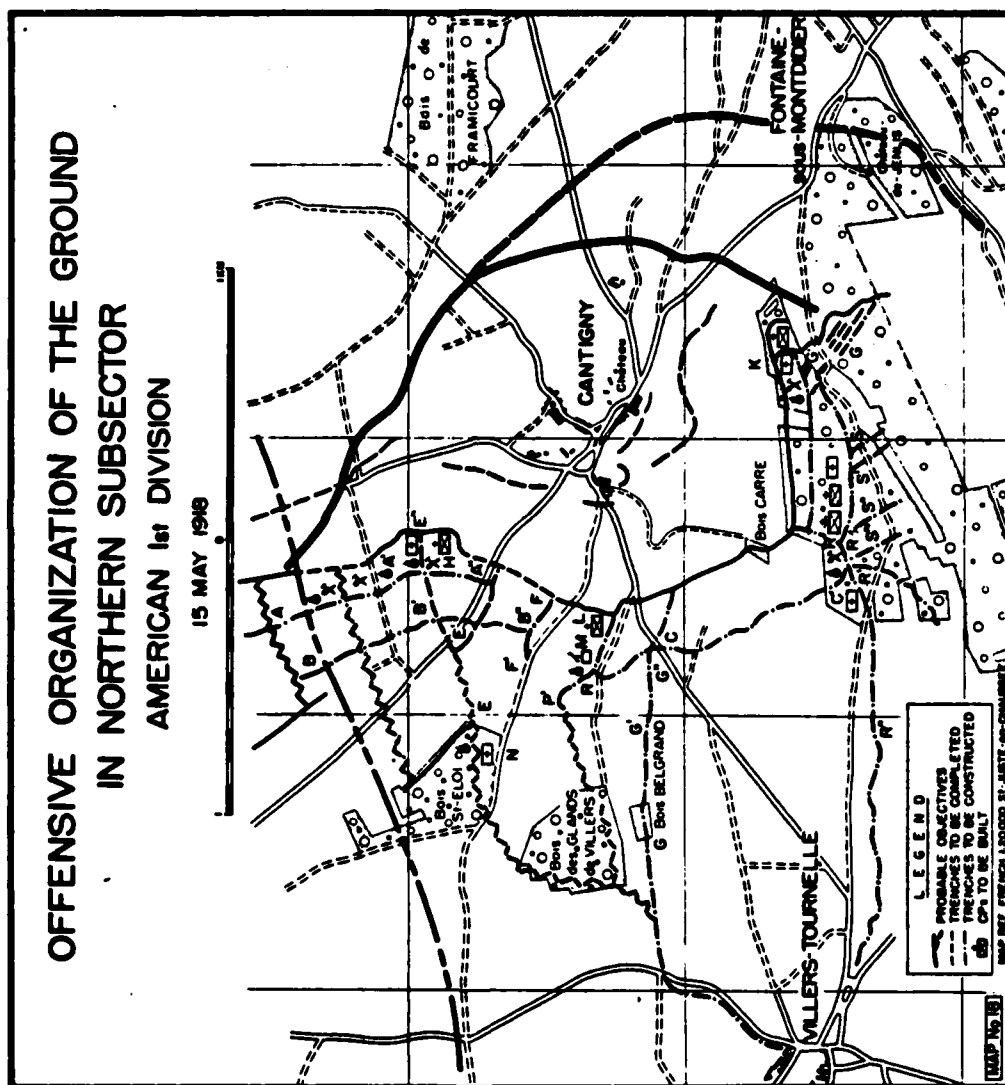
Source: U.S., War Department, World War Records, First Division A.E.F. Regular, vol. 9 (n.p., 1928).

Appendix C: Liaison Plan for the St. Mihiel Operation

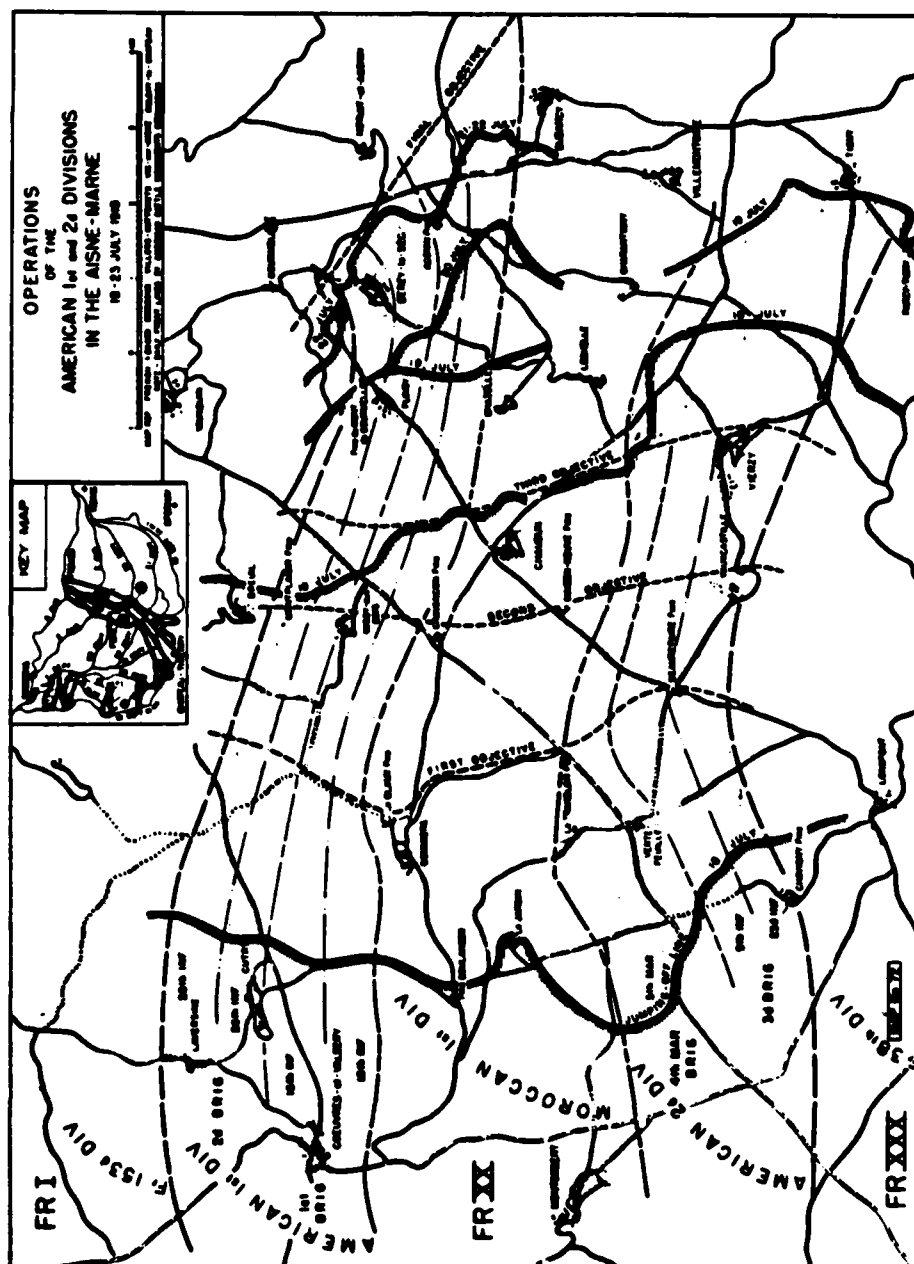


Source: U.S., War Department, World War Records, First Division A.E.F. Regular, vol. 9 (n.p., 1928).

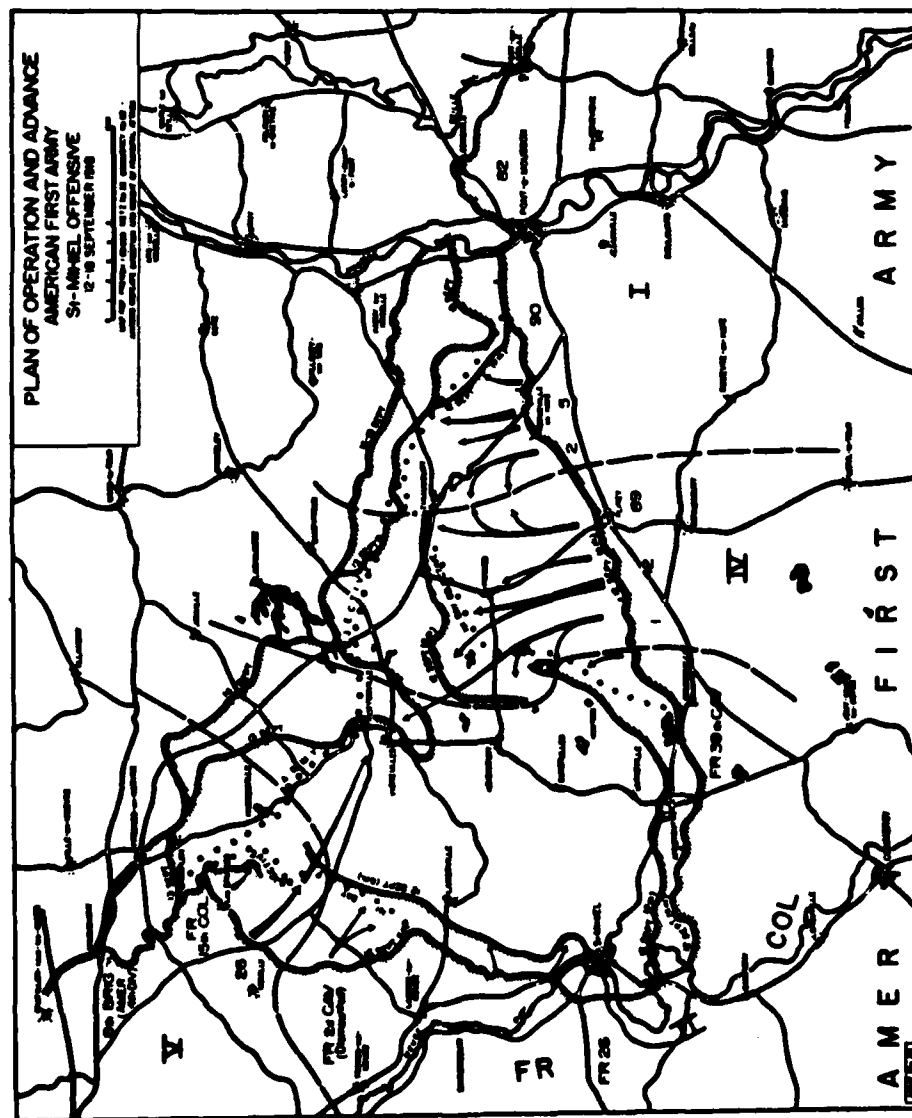
Appendix D: Maps



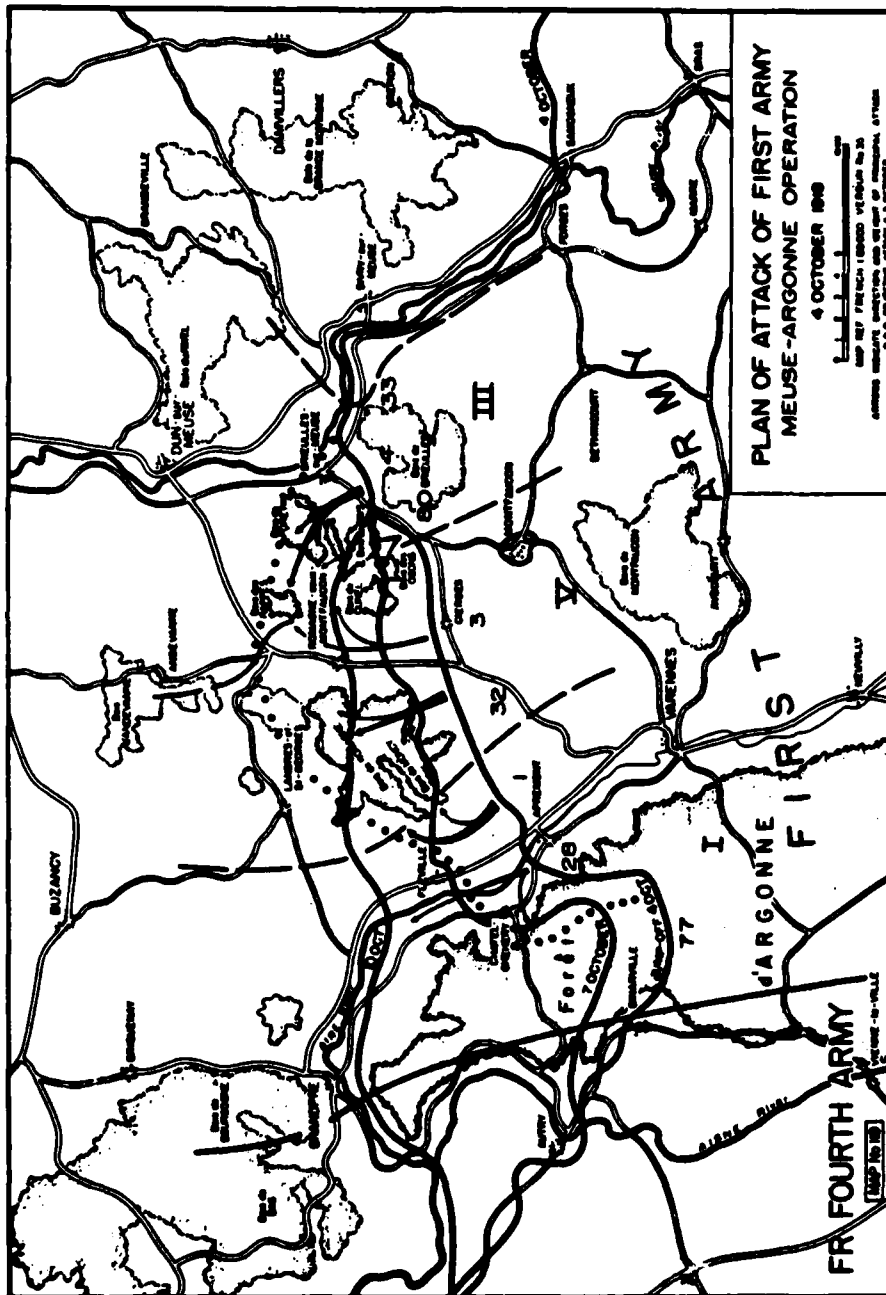
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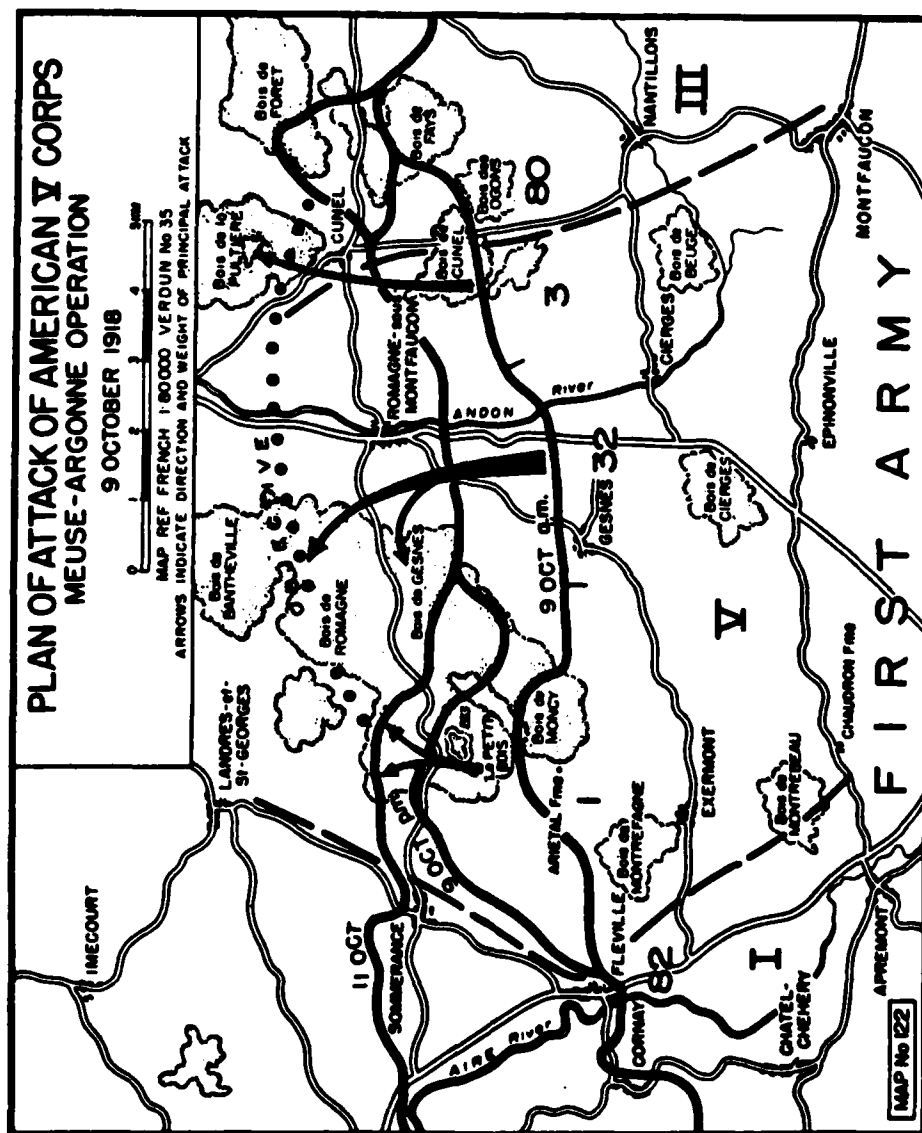
Source: U.S., Department of the Army, Historical Division, United States Army in the World War 1917-1919, 17 vols. (Washington: Government Printing Office, 1948), 5:309.



Source: U.S., Department of the Army, Historical Division, United States Army in the World War 1917-1919, 17 vols. (Washington: Government Printing Office, 1948), 8:314.



Source: U.S., Department of the Army, Historical Division, United States Army in the World War 1917-1919, 17 vols. (Washington: Government Printing Office, 1948), 9:211.



Source: U.S., Department of the Army, Historical Division, United States Army in the World War 1917-1919, 17 vols. (Washington: Government Printing Office, 1948), 9:242.

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