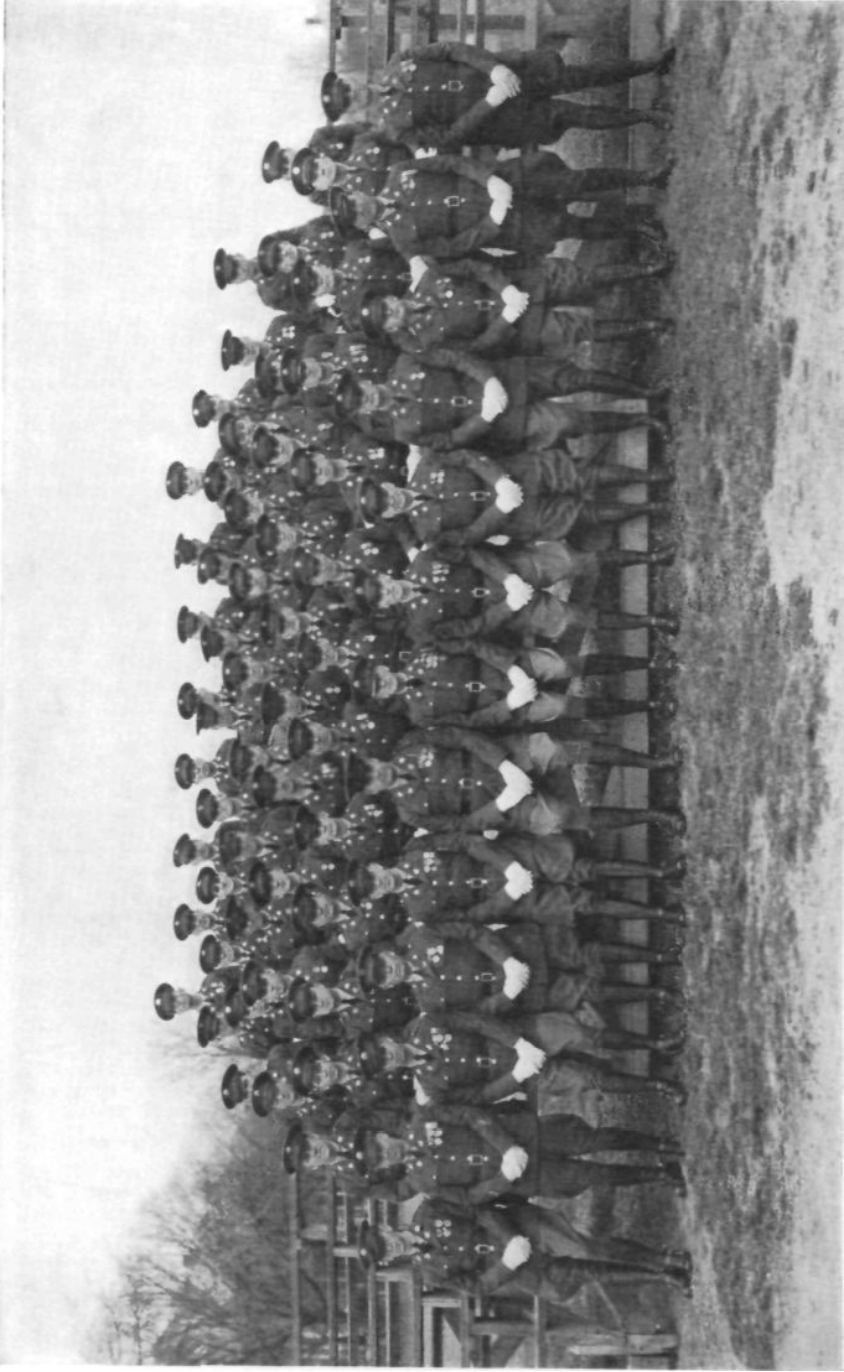


THE FIELD ARTILLERY JOURNAL

No. 3, May-June, 1933

Fifteen Years After the World War	Frontispiece
The Significance of the Truck-Drawn Battery of 75mm Guns	205
By Major General Paul B. Malone, U. S. A.	
American Military History	209
By Major C. C. Benson, Cav.	
Tactics: An Infantry Point of View	221
By Lieutenant Colonel M. O. French, Inf.	
The Battle of Montfaucon	226
By Colonel Conrad H. Lanza, F.A.	
A Practical Method of High Burst Ranging	249
By Lieut. R. M. Wicks, Instructor, Dept. of Gunnery, The Field Artillery School	
The Artillery Preparation for Attacks and the Rupture of Defensive Zones	254
By General Frederic Culmann, French Army Translated by Major Basil H. Perry, F.A. (Second Installment)	
They Don't Speak Our Language	268
By Webster	
French Artillery Doctrine	269
By Major John S. Wood, F.A. (Sixth Installment)	
Type Problems	280
Horse Artillery Mobility	282
By Major C. L. Clark, 82nd F.A.	
Field Artillery Notes	293
Truck-drawn 75mm Gun Battery and Battalion; Truck-drawn 105mm Howitzer Battery; Truck Prime Movers for 155mm Guns; High Speed Bearings for 155mm Howitzer; Modern Tractors for 155mm Howitzer Units; 75mm Howitzer; New Development in 155mm Gun Ammunition; 155mm Gun—8-inch Howitzer Carriage; Major Boles Scores High in Indiana State Rifle Shoot; Back Copies of THE FIELD ARTILLERY JOURNAL; Lieutenant Roger D. Black, F.A., Wins Place on Magdalen Crew.	
Lists of Military Books	296

AUTHORS ALONE ARE RESPONSIBLE FOR STATEMENTS CONTAINED IN THEIR ARTICLES



FIFTEEN YEARS AFTER THE WORLD WAR

MEN OF THE 1ST BATTALION, SIXTEENTH FIELD ARTILLERY WHO ARE VETERANS OF THE WORLD WAR AND STILL IN THE SERVICE FACE THE PHOTOGRAPHER AT FORT MYER, VA., AS MASTER SERGEANT JOSEPH L. HALEY, SPANISH AMERICAN AND WORLD WAR VETERAN IS RETIRED FROM THE REGULAR ARMY, SERGEANT HALEY IS SEATED IN THE MIDDLE OF THE FRONT ROW.

THE FIELD ARTILLERY JOURNAL

VOLUME XXIII

MAY-JUNE, 1933

NUMBER 3

THE SIGNIFICANCE OF THE TRUCK-DRAWN BATTERY OF 75MM GUNS

BY MAJOR GENERAL PAUL B. MALONE, United States Army

WHILE it was halted in Potomac Park, Washington, D. C., I enjoyed the privilege of observing the experimental truck-drawn battery of 75mm guns, assembled this Spring at the Holabird Quartermaster Depot and at Aberdeen Proving Grounds and now undergoing extensive field test by the Field Artillery Board at Fort Bragg, N. C.

The battery is the result of the efforts of Major General Harry G. Bishop, Chief of Field Artillery, to substitute for horses or tractors, existing types of commercial trucks available in quantity both in peace and in war, and thus to contribute to the solution of the problem of motorization for the 75mm guns.

In my opinion the result attained marks the outstanding achievement in this connection since the termination of the World War. This result is important not only to the Field Artillery but to all other branches of the Service as well.

Let us review our experiences during the World War and then consider the requirements of the future.

The hostile line stretched from Switzerland to the North Sea. Each successive assault by the Central Powers in 1918 forced rapid concentration over wide fronts to arrest the offensives. These concentrations were made by rail, truck and marching. The first concentration in which I participated was that to arrest the German offensive near Chateau-Thierry. Like all concentrations which preceded it and like all which followed it, the Infantry, less horse-drawn elements, moved by truck; the machine guns and other horse-drawn elements by marching. The Field Artillery, horse-drawn, was to have moved by train in the Chateau-Thierry concentration, but eventually was compelled to march. Thus the organization of the Division made it necessary in the mere act

THE FIELD ARTILLERY JOURNAL

of rapid concentration, to destroy the integrity of units, to disrupt the Command, and to force the Division to arrive at the scene of conflict unprepared for action as a unit.

The same experience was repeated in the Aisne-Marne offensive and will be repeated in every other hurried concentration of divisions so organized.

In both of the foregoing cases it was necessary to move at once into action with the elements of the Division dislocated and complete cooperation impossible.

As we look into the future, it would seem that we must contemplate, as in the World War, great masses of troops coming into contact on wide fronts, resulting in opposing lines of great length, deeply but hastily entrenched and formidably organized. To bring about decisive action, concentrations over wide areas will be necessary, followed by offensives delivered by waves of divisions, each prosecuted to the limit of the fighting capacity of the infantry involved.

To accomplish this result in the most satisfactory manner, it must be possible to pick up divisions intact, move them rapidly by night over great distances, deliver them in the theatre of offensive operations in such manner as to permit them to move into position under their own power, attack as a unit and continue the fight to the limit of the capacity of the infantry to endure.

This contemplates motorization and mechanization to the extent necessary to accomplish the result.

Ordinarily the number of railroad trains necessary to concentrate Field Artillery is so great as to make it undesirable to employ railroad transportation except in a very limited degree in concentrations of the above character. For such concentrations horse-drawn and portée artillery as used in France is undesirable. Tractor-drawn artillery was thought to be the answer, the tractor and the gun transported in trucks and unloaded near the scene of action. This makes an unsatisfactory load, too high for many railway undercuts and top-heavy for excessively curved roads. The noise of the tractor in hauling the gun to position would advise the enemy that a concentration was in progress.

To meet these and other objections, General Bishop initiated the effort which resulted in the truck-drawn battery of 75mm

THE SIGNIFICANCE OF THE TRUCK-DRAWN BATTERY

guns. The solution appears to be the best as yet worked out and offers an answer to the demand for field artillery so organized as to be able to travel rapidly by road, move into position over average terrain, echelon to the front in attack as rapidly as may be necessary to support successfully attacking Infantry, provide its own food and keep up its own supply of ammunition.

The methods employed by General Bishop are suggestive of the action that will be necessary in re-organizing other units of the Division to secure the best results.

It will be necessary to assign trucks permanently to the Division only for units now necessarily horse-drawn. Machine guns may be mounted on hand-drawn carts such as those developed by Major Lockhead or Lieutenant Matthews or possibly others, hauled by manpower on the roads and loaded into trucks for rapid transportation. The vehicles of the combat train, including kitchens, should be suitable for use as trailers behind trucks just as the 75mm guns are now trailed in the experimental truck-drawn battery. Any field cooking range or rolling kitchen must produce no smoke, for smoke rising through trees not only indicates the location of assemblies for meals, but betrays concentration of troops. Smokeless oil-burners must be used.

All vehicles, both truck and trailers, must be capable of rapid movement. To meet this requirement the hub of the French 75mm gun was modified by General Bishop so as to provide roller bearings; the result has met the test satisfactorily over more than three thousand miles of travel.

Similar modifications, easily made, will be necessary in all trailed vehicles. All trailed vehicles should be capable of rapid conversion or reconversion into horse-drawn vehicles so as to make them suitable in both classes of organization. Standard 1½-ton trucks with balloon tires have proved, through years of experiment, the best road and cross-country vehicles. These commercial trucks will need, in some cases, modification so as to become four-wheel drive or six-wheelers, reinforced in their underpinning to some extent to stand the strain of cross-country hauling. Sets of commercially available plate shoe-tracks probably also will be necessary for crossing marshy terrain.

All of these modifications can readily be made and I look forward

THE FIELD ARTILLERY JOURNAL

in the near future, to the realization of the dream of successful motorization of an Infantry Division, in which the tanks, if part of the Division, will probably be the only mechanized units.

It would be as serious a mistake to overlook the possibilities suggested by the experimental truck-drawn battery of 75mm guns as it would be to assume that the whole Army should be motorized along the lines suggested by the experiment.

The enemy has a habit of compelling the choice of terrain for a battle. There are some terrains in which motorized units cannot function; for such terrains horse-drawn or pack units, cavalry, or foot soldiers only are effective. We must be organized to meet such requirements.

On the other hand, no rapid concentration can be accomplished without the aid of mechanical transportation, and once arrived in the theatre of conflict, the combat units must be capable of launching a simultaneous attack of all elements of the Division and of driving the attack forward under its own power so long as the attacking Infantry is capable of "firing another shot or advancing another step." All vehicles must be capable of use in both situations.

The new experimental truck-drawn battery of 75mm guns is, in my opinion, the most valuable contribution as yet developed in the American Army to meet the foregoing requirements. If a battery commander can accomplish with the truck-drawn battery any mission that can be accomplished by the horse-drawn battery, we have gained at last the long-delayed objective. Captain Campbell, the former battery commander of the truck-drawn battery, believes that this can be done.



AMERICAN MILITARY HISTORY

BY MAJOR C. C. BENSON, Cavalry

"In my opinion the proposal with which this article concludes offers a sound and practical solution of the problem presented, which merits the careful consideration and support of officers of the Army and all others interested in a comprehensive and accurate recording of the facts of American Military History."

GEO. S. SIMONDS,
Brigadier General, U. S. A.

THEODORE ROOSEVELT, speaking about American military history at Boston on December 28, 1912, said: "I know my fellow countrymen, and I know that no matter what the lack of preparations, they would go to war on the drop of a hat if the national honor or the national interest was seriously jeopardized. The way to prevent the possibility, therefore, is to keep ourselves, our whole military system, the Army and Navy as part of the whole military system, in such a condition that there won't be any temptation on the part of anyone else to go to war with us. You can't do that unless you make our people wake up to the real meaning of our past history."

To "make our people wake up" to the real meaning of our military history is especially difficult. Many of our citizens are satisfied with histories that recount only our ultimate success in every war in which we have engaged. There are others, of pacifistic tendencies, to whom military history is a subject for avoidance rather than study. They may consider the study of military history to be antagonistic to their aims; but it would appear that, under present world conditions, efforts to promote peace must take into account the facts about war. The human factors that make for war have not disappeared; they recur in both hemispheres as strongly today as at any time in the course of recorded history. Many nations are crowding each other in their struggle for existence; some are seething with revolution. Wars are now in progress in various parts of the world, and have been continuously since the close of the Great War which was to have ended war. War is not a latent disease; it is a virulent pestilence. To limit its ravages, and to avoid having our nation subjected thereto, are the heartfelt wishes of every American. Despite the fact that war would bring to our professional soldiers opportunities for increased rank, pay and reputation, those who have experienced the horrors of war sincerely desire peace. Both

THE FIELD ARTILLERY JOURNAL

military and non-military advocates of peace are here on a common ground. If both can find secure footing on this common ground, there is hope that peace movements will develop along lines that hold the greatest promise of success.

The surest way to guarantee continued peace for the United States is to develop in the American people a broad knowledge of the facts of our military history, and an appreciation of their true significance. Let them know how close this nation has come to the brink of disaster; in addition to exploiting our triumphs, dwell on the humiliating defeats that we have suffered. Failure to investigate thoroughly our military history, and to apply its teachings, has added to our public debt billions that might otherwise have been devoted to the maintenance of peace. Before, during and after each great national emergency, we have repeated many of the costly errors that could have been avoided had experience been our guide. If our people could but know the truth, it would constrain them to recoil from war until there is, with honor, no alternative. All the peace societies in the world could do no more. Instead of antagonism between students of American military history and those who advocate peace at any price, there should be close cooperation.

It is essential that we know the strength and weaknesses revealed by our past military experience. This experience should be studied, in its proper relation to economic, social and political factors, as an integral part of our national life. It involves not merely the strategy, logistics, organization, training and tactics of military forces; it involves an analysis of our national growth, and of the attitude of our people towards their federal government, towards their national military system, and towards foreign nations whose interests have conflicted with our own.

The work necessary to the proper study of our military history includes four distinct operations:

Assembling historical evidence

Preserving the evidence

Writing history

Publishing and distributing historical material.

No one agency, official or otherwise, is capable of performing efficiently all of these operations; nor is it desirable that any one of them should undertake the whole task.

AMERICAN MILITARY HISTORY

ASSEMBLING HISTORICAL EVIDENCE

To establish historical facts, it is necessary to assemble evidence, evaluate it, and then, from a study of all available data, to deduce the truth. The evidence required may be in the form of an authentic contemporary written document, map, photograph, an article of uniform or equipment, field fortifications, and so on in endless variety. The important thing is to bring together in one place as much evidence as possible, in order that personnel trained in modern historical methods may evaluate it, index it, and prepare it for the use of students and historians.

It might be supposed that the evidence necessary to cover the comparatively brief period of our national life would be readily available; but that is not so. In the Congressional records, the printed official records of our Civil War, and in many unofficial publications pertaining thereto, we have a wealth of documentary source material for that war. And there are, in various publications and museums, fairly complete and reliable data on the Revolution. The same can not be said about our Hundred Years War with the Indians, the War of 1812, the War with Mexico, the Spanish-American War, or the World War. Until the evidence relating to each of these wars is assembled, evaluated, and made available for research, the facts can not be established, nor can the lessons of our past wars become known.

How necessary it is to assemble the evidence is indicated by the efforts of the 1st Division Association to complete the World War records of that Division. Soon after arrangements were made in 1927 for representatives of this Association to examine the official files, it became evident that there were great gaps in the records. Important field orders, situation maps, operations reports, and similar documents were missing. They were found, after diligent and systematic search, in other official files; among the current records of 1st Division units; and in the possession of individuals. The search was made by former members of the 1st Division who were well acquainted with its war-time personnel and operations. They wrote thousands of letters and made hundreds of personal visits. Curiously enough, sergeants who had served at battalion and regimental headquarters were able to produce carbon copies of many documents for which no originals

THE FIELD ARTILLERY JOURNAL

could be found. The official 1st Division files originally filled nine filing cabinets; when the job was done, there were nineteen.

The experience of the 2d Division Association parallels that of the 1st. Their initial efforts along this line preceded those of the 1st Division, and blazed the trail. One brigade of the 2d Division was composed of Marines; consequently, it was necessary to search the historical files of the Navy Department and the Marine Corps files at Quantico, Virginia, where this brigade was demobilized. Had the former members of the 2d Division not been determined to complete their records, and willing to support the project with approximately \$5,000, the work could not have been carried on to a satisfactory conclusion.

These examples have been cited to show the unsatisfactory condition of the official historical records of typical World War units. The assembling of World War records is still practicable because so many of the participants are living. They can be reached by mail or personal visit; and, on the whole, are seriously interested in helping to preserve the history and traditions of their units. Even for the World War, however, the situation is rapidly changing for the worse. The papers of deceased veterans fall into unappreciative hands, are mislaid, consumed by fire, eaten by mice, are simply thrown away or otherwise destroyed. It will not be long before the great mass of the documents in the possession of individuals has passed beyond the hope of recovery. That condition now applies to many of the scattered records of our prior wars.

Although official records will usually provide the backbone of our military history, much additional evidence must be assembled. Official documents are generally too restricted in scope to meet the historian's needs; an order, for example, states what certain troops are to do, but the commander's reason for issuing the order must be sought elsewhere. It may be found in his diary, in personal correspondence, or in the private papers of officers who were on duty at his headquarters. For periods in which small groups of observant educated people lived in isolation on the frontier, as Army garrisons commonly did during our Indian Wars, the casual letter of an officer or lady may establish facts of great value to historical research. The private correspondence

AMERICAN MILITARY HISTORY

of George Washington is invaluable as historical evidence on many matters connected with our early military history. Similarly, the letters of General Robert E. Lee to his wife throw much light on certain events of the Civil War. The diary kept by General Charles G. Dawes, and published in 1921 under the title "A Journal of the Great War," contains historical material of primary value that can not be found in official documents.

The assembly of this non-federal but none the less authentic evidence presents a serious problem. This material includes letters sent and received, diaries, account books, drafts of reports and studies on military and non-military subjects, miscellaneous notes and memoranda. Some of it is probably assembled now, in the archives of state and other historical societies in this country, where it could be reproduced or consulted; but no one knows exactly where to look for the remainder. Even when found, the present owners may be reluctant to part with it, or to permit the unrestricted use of documents that reveal the intimacies of family life. These obstacles can often be overcome by returning original documents after true copies have been made; and by safeguarding certain papers through suitable restrictions. Typical restrictions that might properly be imposed are that ownership is not relinquished; that examination will not be permitted during the lifetime of the donor; that the documents may be examined only by serious scholars or upon specific authorization of the donor. Persons who are justly proud of the achievements of their ancestors should regard it as both a duty and a privilege to deposit historical papers where they will be preserved for the future use of historians. The principal difficulty is the lack of a responsible central agency of unimpeachable standing that could undertake to assemble this non-federal material.

Little can be said, without over-extending this discussion, about evaluating evidence and making it available to students and historians. These additional steps must be taken to complete the assembly. When the Historical Section, Army War College, completes its present primary task of assembling, collating and indexing the official historical records of World War organizations, it will know what records are missing and will have ready for use a directory for all the important documents that are now

THE FIELD ARTILLERY JOURNAL

in the files. The experience of the Historical Section in evaluating evidence contained in organizational records, shows that this work should be done by those who have a broad background of military experience and knowledge—in general, by officers who are qualified for duty on the General Staff. Their work on official records should be supplemented, in the non-federal field, by that of qualified civilians and retired officers who are especially interested in our military history. Anyone who has attempted to dig out facts on a particular subject from a mass of documents, will appreciate the value of having all the pertinent evidence indexed in advance.

The task of assembling this evidence falls naturally into three parts. That connected with the official service records of individuals belongs exclusively to The Adjutant General. That which deals with the official historical records of organizations is, as stated in Army Regulations 345-105, the particular concern of the Historical Section, Army War College. The assembly of all non-federal evidence relating to important individuals and to organizations, must be entrusted to a non-governmental agency which has yet to be created. To insure progress there must be complete cooperation between responsible and competent agencies. The most urgent historical task that now confronts these agencies is to assemble such evidence as is readily available, and then to search out more, before it is destroyed.

PRESERVING THE EVIDENCE

The necessity for preserving the evidence needs no discussion; this is simply a question of who is to do the work. The Adjutant General is the legal custodian of official War Department records, and should remain so. The Historical Section, Army War College, is made responsible for assembling the official historical records of organizations, because this work can best be done by an agency which makes it a primary function. These records must be set up separately from those pertaining to routine administration and personnel; but they should be kept under the official custody of The Adjutant General. Thus, they are available for both administrative and historical purposes until they are ready for transfer to the Federal Archives Building.

Legislation governing the transfer of records to the Archives

AMERICAN MILITARY HISTORY

Building has not yet been enacted; but the building is now under construction, and we may reasonably anticipate that it will be in operation within two years. Hearings on bills that have been introduced in Congress indicate that deposits will be strictly limited to the official Federal records, and that the documents will generally be fifty years old when they become eligible for admission. Once they are in the Archives Building, the official records will be more completely safeguarded than would be possible elsewhere.

Preservation of non-federal evidence is another matter. Assuming that an assembly of this material is to be made, as it must if we are to know the truth, adequate facilities to preserve it must be provided. It finds no proper place in the files of The Adjutant General; nor will it be admitted to the Archives Building. Some of it might prove acceptable to the Library of Congress where it would be classified, indexed, safe-guarded and held under any reasonable conditions that the owner might prescribe. As the funds available to the Library for these purposes must be applied to manuscript collections of outstanding importance, most of the non-federal evidence pertaining to our military history must be housed and cared for by a non-governmental agency. Until that agency is properly established, there can be little progress towards this objective.

WRITING MILITARY HISTORY

Through the control that a government has over its archives, it can influence the writing of military history. It may restrict the use of its material so that only facts which support a predetermined viewpoint will come to light. This course has been pursued so consistently by some nations that their "official" histories are now regarded as mere propaganda. No matter what precautions are taken, the truth turns up from some unsuspected source. The action of our government in publishing the records of the Civil War without comment, has been widely recognized as the greatest contribution to the study of military history that any nation has ever made. Our policy has been to make all the important evidence readily available, and to let historians use it as they see fit.

Though many of the more spectacular episodes of our military history have been admirably presented by various historians, no history has yet been written that adequately covers the whole

THE FIELD ARTILLERY JOURNAL

field. Once the evidence is ready to use, there will be as many different histories written as there are military historians. Many will be written by civilians, and it is highly desirable that this should be so. There are some things that must be said which would come with poor grace from military men. We can not, with propriety, criticize Congress, the President, the Executive Departments or the American people for their shortcomings. These matters should be left largely to civilian historians.

There are, however, many phases of our military history which must be handled primarily by military men. Under the provisions of Army Regulations 345-105, which require the preparation of organization histories, certain officers have acquired some experience in writing military history. In addition, the Army War College, the Army Industrial College, and the General and Special Service Schools have seriously undertaken the study of military history. These factors operate to educate Army officers in the methods of historical research, and to make them appreciate its high professional value. Thanks largely to a good Army school system, our Army is better prepared to undertake its share of this work than it has ever been before. Some of these historical studies will deal with special and technical subjects; others with broader subjects such as the coordination of land, sea and air forces; the control of manpower, munitions and finance in war; the selection of proper strategic objectives; and methods of cooperating with allies. The responsibilities of those entrusted with these studies will be great, for decisions that control the expenditure of large annual appropriations will result from their work.

The possibility of collaboration by military men and civilians on the most important parts of our military history should not be overlooked. If such collaboration could be arranged, it would provide the most favorable conditions for first class work. Professor R. M. Johnston of Harvard has enumerated four qualifications that he considers essential for the writer of military history, i.e., technical knowledge of the military art, erudition, critical skill, and literary skill. To find a well-balanced combination of these qualities in an individual, soldier or civilian, is rare; but in a properly organized group, the best qualifications of both elements would be in mutual support. If a group of qualified officers

AMERICAN MILITARY HISTORY

and civilians could be *permanently* organized, with adequate financial resources, it would provide the stability and continuity that are essential to the planning and execution of extensive historical projects. There will be need for just such an organization as long as there is need for an American Army.

PUBLICATION AND DISTRIBUTION

There are several routes that a military author's manuscript may take to appear in print. The manuscript must first be submitted to the War Department, and authority obtained for its publication. It may be published privately, in which event the author pays the cost of printing and distributing his product. Military men can rarely afford this luxury. Commercial publication affords another route. To find a publisher who will assume the expense of publication and distribution is difficult. Few worth while books on military history have a sufficiently wide appeal to justify their publication commercially. As commercial publishers must make profits if they are to remain in business, they are seldom eager to publish military histories. The third route to publication is through subsidization. Should an officer write, for example, a meritorious History of American Cavalry, he might persuade the Cavalry Association to publish it. Neither the author nor the Association could expect to profit financially; but both would have the satisfaction of having contributed something of value to the Service. The fourth route is through the Public Printer, who publishes and distributes "official documents" for all branches of the Federal Government. Military historical studies may reach him through the efforts of Congressmen or through the War Department. The size of each edition is fixed by law or by the sum that the Department can devote to a particular project. War Department funds for printing are so limited, and current demands for technical and administrative publications are so great, that but few crumbs fall from the table to nourish the publication of historical studies.

The War Department can not issue an "official" history without assuming full responsibility for its contents and the manner in which the material is presented. Whenever it does so, it has to weather a storm of abuse because of the expressed or implied criticisms that a truthful history is sure to contain. Current

THE FIELD ARTILLERY JOURNAL

War Department instructions to the Historical Section, Army War Colleges, on the writing of historical narratives, prescribe: "The narrative of facts will contain no comment, estimate, comparisons or conclusions." The publication of narratives thus written may serve some purposes; but would it not be better for the War Department merely to publish the official records?

It would appear that the publication and distribution of military histories can best be managed by a non-commercial organization that is entirely independent of the government. Such an organization could collect and disburse funds for historical work, and could integrate specific projects into broadly conceived plan. What might be accomplished is well illustrated by the "Chronicles of America," published by the Yale University Press. With a definite, coordinated plan of this kind, covering our whole military experience, it should be possible to secure the necessary funds from interested individuals and societies to publish and distribute the books on American military history that the American people should have. Lacking such an organization, progress on this work will continue to be haphazard.

NEW ORGANIZATION PROPOSED

There are in the United States hundred of historical societies, including national, state, county and local organizations. Two of them, the Military Historical Society of Massachusetts, and the Naval Historical Foundation, are of special interest to us. The former, organized in 1876 by the distinguished military historian, John Codman Ropes, has rendered invaluable service to students of our military and naval history. Its publications, library and museum contain materials that greatly facilitate research.

The Naval Historical Foundation was incorporated in 1926 under the laws of the District of Columbia, with its objects defined mainly as: "The collection, acquisition, and the preservation of manuscripts, relics, books, pictures, and all other things and information pertaining to the history and traditions of the United States Navy and Merchant Marine, and the diffusion of knowledge respecting such history and traditions." Supported largely by regular contributions from the United States Naval Institute and occasional sums from interested individuals, it has operated on a modest scale and has gradually built up its resources. Among

AMERICAN MILITARY HISTORY

other things, it has sponsored the preparation and publication of an accurate history of the Revenue Cutter Service, in accordance with the terms of a bequest made with that end in view. Its greatest value has been in providing a rallying point for the diversified activities of those who desire to foster the history and traditions of our Navy.

What is being done for our naval, economic, political, social and religious history, can and must be done for American military history. A permanent non-governmental organization is essential for this purpose. It might be possible to organize a military history branch of an existing national organization, such as the American Historical Association; but it would probably be better to create an independent society which could later affiliate with that Association. Government agencies, such as the Library of Congress, the National Museum, the Smithsonian Institution and certain parts of the War Department, have done and are doing military historical work, to the extent of their capacity; but no one of them is in position to coordinate this work. Some of the things which can best be accomplished by a permanent non-governmental organization, may be briefly summarized as follows:

1. To make detailed, comprehensive and coordinated plans for work on all phases of our whole military history.
2. To affiliate with organizations that are willing to cooperate.
3. To consolidate data on the location and contents of deposits of source materials pertaining to our military history that now exist in governmental archives, libraries, museums and historical societies, both in this country and abroad; and to facilitate the use of these materials.
4. To assemble, collate, index and preserve all the the pertinent non-federal historical evidence that can be found.
5. To establish a National Military Museum in Washington, D. C., which would serve as headquarters for the organization, provide proper housing for its archives and educational exhibits, and facilitate the research work of students and historians.
6. To arrange for the collaboration of military men and civilians in the writing of a complete series of first class military histories.

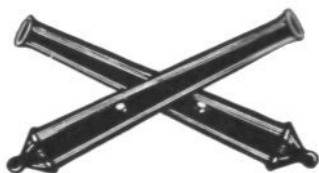
THE FIELD ARTILLERY JOURNAL

7. To subsidize the publication and distribution of these histories.

8. To develop in the American people a broad knowledge of the facts of our military history, and an appreciation of their true significance.

The establishment and maintenance of such an organization will require ample funds. Some financial assistance may be expected from interested civilians; but the responsibility for initiating and carrying on this work will devolve upon active and retired Army officers. It may be difficult at present to assemble funds for all eventual purposes, but there is no immediate need for large sums. The project can be launched and maintained for the first five years on the income from \$100,000. There will be time enough to seek additional financial resources after the organization has perfected its plans for the future. To provide a definite basis for discussion on this subject, it is proposed that there be established a non-commercial corporation—THE AMERICAN MILITARY HISTORY FOUNDATION—whose principal business and objects will be as outlined above.

This proposal has received serious consideration during the past two years from a group of active and retired officers in Washington, D. C. After consulting with a number of distinguished military and civilian historians, they have drawn up tentative articles of incorporation for the proposed Foundation, and have drafted its constitution and by-laws. If the publication of this article evokes sufficient response to warrant the formation of a permanent organization, a meeting for that purpose will be held in the near future. All who desire to cooperate in the further development of this project are invited to communicate with Lieutenant Colonel Charles E. T. Lull, Chief of the Historical Section, Army War College.



TACTICS

AN INFANTRY POINT OF VIEW

BY LIEUTENANT COLONEL M. O. FRENCH, *Infantry*

IN historical retrospect, freed from confusing details, the reciprocal action and reaction of opposing forces in war appears as the oscillation of a pendulum between the defensive power of posted weapons and the offensive power of protected mobility; a restatement, in broader terms, of the old maxim of fire and movement. Concurrently, with increase in range and rapidity of fire, there occurs a commensurate extension in deployment to avoid loss and to utilize power by concentric fire. Every extension increases the difficulties of control by the command.

Tactics have been modified constantly in accordance with developments in weapons, but remain much the same in principle. The offensive always seeks to envelop by the concentric fire of overlapping lines, or to penetrate with a wedge through a weak line. Envelopment requires preponderant numbers to overlap and penetration requires rapid movement to break through before fire can be concentrated against the flanks of the wedge. Therefore, offensive requirements are man power and mobility. The defense must be prepared to neutralize both methods of offense and its requirements for this dual purpose are weapon power and position.

Tactical success is dependent, principally, upon two factors. The first is the closely cooperative action of units in executing tactical tasks; which it is the function of training to make instinctive. The second is the closely coordinated control of units in correlating their action; which it is the function of command to make effective. At present, tactical success is doubly difficult because fire has forced extension of formations and means of offense and defense have tended to establish an equilibrium liable to lock the opponents in the intrenchments of position warfare. The moral means of surprise may be resorted to, but rapid reconnaissance by airplane and automobile has limited tactical surprise by maneuver to movements that can be made by motor between dusk and dawn. In compensation for the restriction on movement, the increased range, rapidity and flexibility of fire and

THE FIELD ARTILLERY JOURNAL

mobility of mounts has rendered it simpler to secure surprise by fire.

At modern ranges, it is possible to assure the success of either an envelopment or of a penetration by a sufficiently powerful and unexpected concentration of artillery fire. An adequate mechanized force might, then, exploit the success and disrupt the defense by striking at communications and command installations. Hence, it appears that tactical methods should be adapted to utilizing this very vital factor of surprise by fire as fully as existing armament will permit.

No alteration in organization or equipment is required to accomplish this purpose. It is necessary, however, to alter the present system of coordinating the action of the combined arms, if the full potential power of fire is to be made available. It is the infantry that scatters itself all over the landscape in order to avoid loss, the impulse to do so is irresistible, and the machine gun makes this dispersion possible without a complete sacrifice of the infantry's own fire power. Indeed, it is impossible for infantry to advance in the face of fire except by infiltration in dispersed dribbles, unless effective artillery concentrations have cleared the way.

The difficulty, in open warfare, lies in making the artillery fire effective; when the batteries must conform to the erratic movements and *unpredictable positions* of advancing infantry and must support particular units with fire that is frittered away on unseen and unsuitable targets. Indubitably, situations will arise when it will be expedient for the infantry to advance on a broad front, feeling for an opening. The command need not, on that account, submit to relinquishing, with patient resignation, the most effective means it possesses for influencing the course of combat. Not always, should the hounds be loosed to hunt. Often, it is wiser to wait until "the favorable minute that decides the fate of battles" indicates the instant when the leash should be slipped.

A remedy lies in coordinating the action of the division through the agency of the Field Artillery Brigade. Around this nucleus of power, action may be centered, when closely controlled action is essential. In warfare of maneuver, artillery depends

AN INFANTRY POINT OF VIEW

upon the direct observation of fire for its effect. Artillery observation posts are pivotal points of tactical action. To sense, to seize and to secure these points is an "open sesame" to success.

By this means, a general can fight his division, in lieu of devolving that responsibility upon infantry lieutenants of the line. To do so, he must pivot his plan around his weapon, the artillery. To it, he must tie his infantry, but with elastic bands. The Division Commander and his artillery brigadier should be two minds that work as one. The tactical concept of the commander must be transplanted into the technical terms of expert gunnery for execution. The role of the infantry will continue to be aggressive, but will revolve about the pivotal points of artillery observation. Successive infantry objectives will be these key positions in tactically vital areas.

Naturally, such key positions have been sought in the past, but from an infantry point of view. The selection of successive objectives and of the lateral location of objectives should be given due consideration from the standpoint of the artillery technician. The primary tactical concept of the commander will guide the artilleryman in his decisions, but he must present the essential requirements of the artillery arm. First and foremost will be that prime requisite, direct observation of fire. Gun positions will be regulated on O.P.s. and successive artillery areas should be such that contingent zones will permit concentration of fire within an infantry brigade sector by, at least, an entire light artillery regiment.

If this is not possible, the infantry sector should be *contracted* rather than to *expand* the artillery dispositions. Furthermore, lateral dispositions within the division should permit concentrations by the entire artillery brigade on the most practicable avenue of approach to the principal objective in each of the infantry brigade sectors. The contingent zones on the flanks of adjacent divisions and the disposition of the corps artillery should be adjusted, similarly, to assist in seizing the areas that will facilitate further progress by succeeding concentric concentrations of fire.

To cover a critical area with converging fire from the guns of adjoining divisions will necessitate narrowing normal frontages that are calculated on linear requirements of deployed

THE FIELD ARTILLERY JOURNAL

infantry. The alternative is to leave part of the infantry without artillery support. When, where and why either of these expedients is to be adopted will depend upon the situation, with particular reference to topographical opportunities. The infantry should adapt its formations and its weapons to the paramount consideration of applying a preponderant artillery power to pry apart and, piecemeal, to decompose the defense.

The role of the infantry will not be agreeable to it. Supported from initial artillery positions, infantry will seize advanced observation posts that cover suitable areas for forward displacement of the guns and, then, will dispose itself to protect the new positions. It must seize the observation posts that are, usually, most difficult to secure. It must hold them: at all hazards, if they give observation to the rear. Then, it must occupy positions, to cover the new artillery area, that may be altogether unsuitable from an infantry standpoint. Finally, most bitter blow of all, it will be tied to the artillery and will lose control of the battle.

Briefly, to make the method appear more specific, it may be likened to a game of chess. The chess player will have no difficulty in recognizing the tactics of that most ancient game, which Voltaire said "does most honor to the human intellect." The pieces are artillery and the pawns are infantry. Always, the object is to concentrate the power of two or more artillery pieces on a square that appears to be of vital tactical importance and, then, to occupy it with an infantry pawn. There is no set method of conducting the advance; certainly, not by a pawn advance in linear formation. Neither, is there any certainty as to which squares will assume tactical import. The duration of the game and its outcome depend upon the comparative skill of the players.

This discussion is not intended to convey the notion that "artillery conquers and infantry occupies," as some Frenchmen fancied at one stage of the World War. Battles are not won by fire alone. Neither are they won by shock alone. Only a combination of the two can be successful. But that combination can be secured only by coordination from above. Control from below, or cooperation of subordinate units, cannot be depended upon to secure it. The method suggested is *a* method. It is suitable for some situations. Particularly, it is adapted to a withdrawal, or

AN INFANTRY POINT OF VIEW

to an advance in which the decisive shock is to be delivered by a mechanized force. For success, fire effect must be exploited. So, also, must the effect of shock. Artillery must be able to support infantry action. Likewise, infantry should be able to contribute to and to fully profit by the action of the artillery.

Briefly, fire is not a mere adjunct to movement. At present, fire power is apt to act as the arbiter of the battlefield, in permitting movement or in paralyzing it. Therefore, plans of action based, primarily, upon movement will not always prove practicable. Frequently, it will be advisable to prescribe movements that conform to fire; rather than to attempt adjustment of fire on unpredictable moves. This is a variation from the ancient formula, from the customary procedure in planning action. However, it is a flexible innovation. Flexibility seems a desirable attribute in plans of action and in the minds that make them.



THE BATTLE OF MONTFAUCON

26 SEPTEMBER 1918—AN ARTILLERYMAN'S VIEW

BY COLONEL CONRAD H. LANZA, Field Artillery

THE battle of Montfaucon was planned as a breaking of the enemy's line, to be followed by a deep penetration. The instructions of Marshal Foch, issued on the 25th September, stated:

"The nature and importance of the operation to begin September 26, requires that all advantages gained be exploited without any delay; that the breaking of the line of resistance be enlarged to as great a depth as possible; to accomplish this halts should be avoided. Certainly the advance of the American Army, between the Meuse and the French Fourth Army, as well as the strength of this army, avoids all risks; it therefore follows that *without further orders*, and on the initiative of its commander, it push forward as far as possible.

"Above all, the American Army must seek to advance as far and as rapidly as possible . . . in the direction of Buzancy.*

"The French Fourth Army . . . will cover the American Army. It must, in any case, arrange to maintain liaison with it, *but at no matter what price, it will not delay the movement of that army, which is the decisive one.*

"Consequently, there is no question of defining for these armies *of fronts*, which are not to be passed without further orders, as such restrictions only serve to prevent full exploitation of favorable circumstances, and to break the morale, which above all must be maintained."

The front to be attacked was 26 kilometers long in an air line, from the Argonne Forest, inclusive, to the Meuse River. Nine American divisions, organized from left to right, into the I, V and III Corps, were to advance in parallel zones of action, protected by a powerful rolling barrage, fired by the division artillery, each of whose brigades had been reenforced by one regiment of 9 batteries of French 75mm portée guns. Corps artillery, mostly French, with 1,327 guns, were to neutralize enemy batteries and strong points. The Army artillery, with 412 guns, was to:

- a. Neutralize certain areas.
- b. Interdict distant places.
- c. Furnish a fire reserve, ready to intervene, where desired by the commanding general.

*See map, page 228.

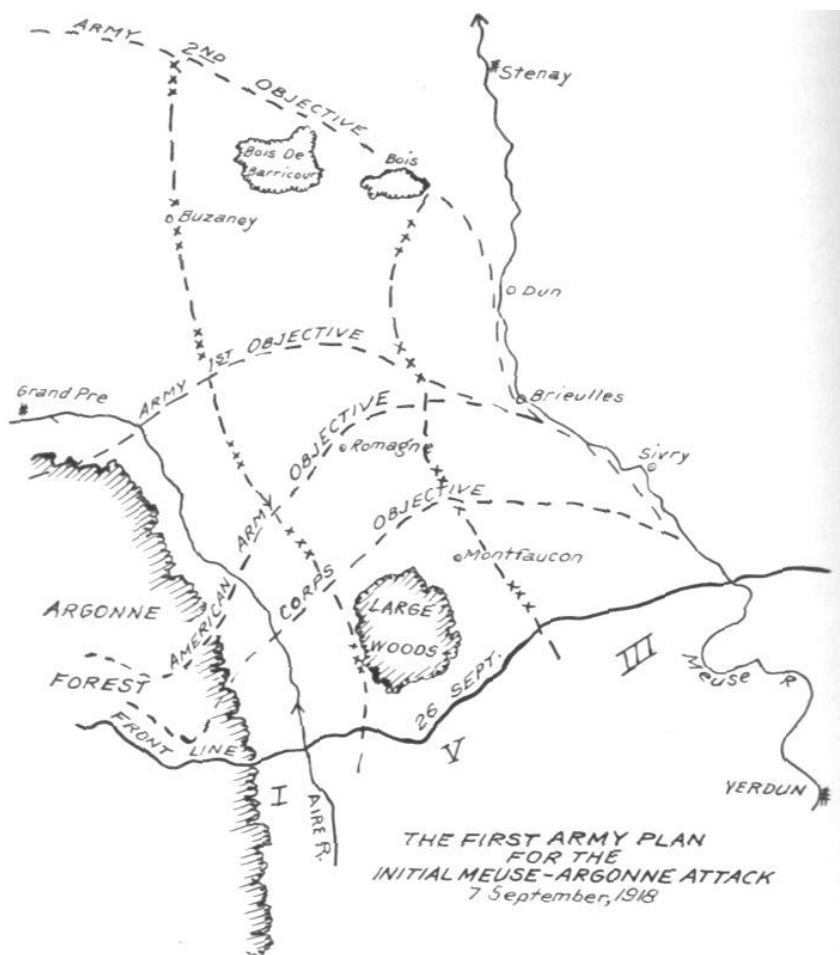
THE BATTLE OF MONTFAUCON

The depth of the initial attack was not to be uniform. The terrain suggested a special formation. On the left was the Argonne Forest, on high ground, rough, densely wooded, and with underbrush so thick, as to be a jungle. Visibility was generally limited to a few yards. The enemy had here constructed numerous trenches and belts of wire. They had had three years to prepare this position for defense, and were entitled to a rating of "Superior," for having created a perfectly first class obstacle. Our I Corps was to make its main effort, east of this forest, down the Aire Valley. To the right of the I Corps, were other woods, 4 to 5 kilometers wide and deep. The I Corps was to keep west of these woods, while the V Corps made its main effort to the east of them, directly against Montfaucon, a small village situated on the highest ground in front of our attack. Montfaucon was an important observation post for the Germans, and contained a special OP for the German Crown Prince. It furnished views in all directions. In our plans we left nothing undone, as far as could be foreseen, to insure the early capture of this place. On our right, the III Corps had no special terrain obstacles. They were liable to receive enfilade fire from enemy units east of the Meuse, and the French XVII Corps, on their right was ordered to counter-battery enemy batteries in this region. The III Corps was to assist in the capture of Montfaucon by flanking action from the east.

All three corps had before them No-Man's Land, a wonderful and terrible area of shell holes, many full of water, devastation, dead bodies, wire, broken material, the results of years of fighting. There was not a path over this area, and in places it was swampy. For forward displacement of artillery, it was sure to be a difficult problem, irrespective of any opposition to be encountered.

Our two attacks, one down the Aire Valley, and the other through Montfaucon, and east thereof, were to unite on the line Charpentry—Eclisfontaine—Nantillois, which constituted the Corps Objective, and was to be reached by noon of D day. In addition to the rolling barrage, there was to be an artillery preparation, and continuous artillery supporting fires throughout the battle in front of the infantry, until they arrived at positions close

THE FIELD ARTILLERY JOURNAL



to the Corps Objective. Beyond this line, the artillery plan did not go, but the troops were ordered to continue on D day, to the line Baulny—Romagne—Briuelles, which was designated as the Army Objective. The first advance was to be independently by corps, tied together by a central army artillery plan. For the second advance the V Corps was designated as the base, this was to be supported by the tanks (none with III Corps), and the division artilleries, without any prepared plan, according to the orders of local commanders.

Prior to September 25th, the Germans held the front about to be attacked with 5 divisions, of a nominal strength of about

THE BATTLE OF MONTFAUCON

10,000 each, less than one fifth the strength of our nine attacking divisions. The enemy added one more division the day before the battle, and parts of others during the 26th, so that the odds were reduced to a little better than three to one. The Germans had three prepared lines of defences, covered by trenches and wire. The first line was just in front of our line of departure, and was normally held by about 1 company to each 1,000 meters front. The second line, similarly occupied, ran south of Varennes and Cheppy, and north of Malancourt. The third line, held by one half the available infantry, or two companies per 1,000 meter front, extended from Baulny through Montfaucon.

THE BATTLE AS IT APPEARED TO THE ARTILLERY AT THE TIME

The artillery telephone net worked without serious trouble; communications were good. Thirteen central field artillery command posts secured the information, and transmitted it to all concerned. These CPs were:

CPs	Principal Sources of Information
9 division	OPs Liaison officers Infantry CPs
3 corps	OPs Balloons Corps Air Service
1 army	OPs Army Air Service

Each of these command posts had direct close liaison with its own division, corps, or army headquarters, with which information was promptly interchanged.

At 11.30 P. M., September 25th, we opened fire with 180 batteries. At the same time, the French Fourth Army on the left, and four corps on the right also opened fire, making a line of fire over 130 kilometers long, covering the real attack, and demonstrations to the right and left. It was an imposing artillery preparation, and the roar of the guns, so drowned out the noise of enemy bursting shells, that it was not until later, that it became known that there had been any. At 2.30 A. M., we opened fire with 537 additional batteries, and if we had been unable to

THE BATTLE OF MONTFAUCON

observe hostile fire before this hour, nobody except those hit noticed it now. Fortunately the occupation of our positions had been so well camouflaged, that the enemy had failed to identify the numerous new positions, and we suffered only from stray fire, which was never serious.

The night was at first dark but clear, and we could see bursts of shells, but could neither identify them, nor determine their adjustment. We observed flashes of some hostile batteries, and located these sufficiently well to start counter-battery fire against them. We noted fires, including large ones, which we attributed to bursting ammunition dumps, burning buildings, etc., according as their location checked with enemy information on our maps. This indicated that our fire was accurate, since we saw material effects. About 3.00 A. M., fog and mist set in, and shortly after the OPs ceased to report, but we kept on firing just the same. This fog lasted until 9.00 A. M.

The infantry were to jump off at 5.30 A. M. Artillery liaison officers were attached, and on time the rolling barrage started. But if the infantry did jump off, we heard nothing about it; for a long time no information was to be had. The artillery assumed that the advance was proceeding as prescribed, and fired on schedules prepared in advance for the entire period up to the expected arrival on the Corps Objective. Fire data was frequently checked to make doubly sure, that no battery was firing short. But we saw nothing, and heard nothing except our own firing.

Two hours elapsed. Then these messages arrived:

7.30 A. M.: liaison reports from the 33rd Division stated that they had advanced I kilometer.

7.45 A. M.: liaison report from the 33rd Division stated that prisoners had been taken; and that there were enemy machine guns in the Bois de Forges (no coordinates given), liaison reports from the 37th Division reported a normal advance; no resistance anywhere from hostile artillery.

Army Air Service reported a flight had just returned, and had seen little enemy activity in the air, or on roads; our troops appeared to be advancing unchecked.

8.00 A. M.: Army Air Service brought in the coordinates of hostile batteries near Cierges.

Counter battery on these was at once started. For nearly another

THE FIELD ARTILLERY JOURNAL

hour no more information arrived. Then the fog began to clear, and visibility improved. Information now came in rapidly.

8.55 A. M.: liaison reports from the V Corps indicated that the enemy first line had been crossed at 6.45 A. M.; no opposition.

9.00 A. M.: an aviator from the V Corps dropped a sketch showing our front line as 1 kilometer southeast from Very—north edge Bois de Montfaucon—I kilometer south of Cuisy.

Army Air Service reported infantry in Cuisy, not known whether enemy or friendly.

9.05 A. M.: III Corps ordered the division artillery to commence displacement forward, as infantry was believed to be progressing satisfactorily.

9.07 A. M.: liaison reports from the 33rd Division stated that the enemy first position had been taken at 7.25 A. M.; they were meeting with little opposition.

liaison reports from the 80th Division stated that the 33rd Division was not advancing, but was stopped by machine gun fire from the Bois de Forges. They themselves were advancing satisfactorily.

9.10 A. M.: V Corps Air Service reported that in spite of fog, by flying so low that pilots could recognize individuals, they had determined that the attack was progressing most favorably; troops were following the barrage at 300 meters with perfect coordination between artillery and infantry. Enemy had erected barricades across roads leading into Montfaucon. At 8.35 A. M., our line was 2 kilometers southeast from Cheppy in the Chambronne ravine—through center of the Bois de Montfaucon—Cuisy, inclusive.

9.15 A. M.: Army Air Service reported that the Bois de Forges appeared to be particularly well defended.

9.20 A. M.: Army Air Service reported very little movement in enemy back areas.

9.25 A. M.: 79th Division reported their advance going nicely, with but few cases of wounded, all slight from small arms.

9.30 A. M.: from liaison reports, the III Corps reported their line as of 7.00 A. M., as 1.5 kilometers northwest of Malancourt.

9.34 A. M.: Army Air Service reported that our fire on Montfaucon was effective.

9.35 A. M.: the I Corps, estimating that their front line was now through Cheppy, ordered forward displacement of the division artillery to commence.

THE BATTLE OF MONTFAUCON

9.45 A. M.: Army Air Service reported that they had identified the 4th Division north of the enemy's first line; the 80th Division in the Bois de Sachet; and the 33rd Division west of the Bois de Forges.

a pigeon arrived with a message from the Bois de Bethincourt, stating that troops there were badly checked.

balloons reported seeing what appeared to be heavy fighting in the Bois de Malancourt.

The messages arriving by the pigeon, and from the balloons at same time, confirmed one another. No coordinates of targets being given, and nothing being visible from the OPs, the artillery could do nothing. These messages being apparently contradictory with the reports of the aviators of 9.00 and 9.10 A. M., there was doubt as to the accuracy of the information transmitted. In view of the reports as to the location of the III Corps, orders were issued to both corps and army artillery to suspend all fire south of coordinate 281, which ran through the Bois de Sachet, the position where our troops were stated to have arrived. The fog was now lifting, and the balloons reported that several hostile batteries could be observed, some of which were firing at them. We took these under fire. The OPs reported that they could now observe, but saw no targets; and absolutely were unable to locate any infantry, friendly or hostile.

10.15 A. M.: balloons reported three hostile balloons up, one being just east of Montfaucon.

V Corps Air Service reported that at 9.50 A. M., the 79th Division had reached their objective beyond Montfaucon.

Army Air Service turned in the coordinates of numerous enemy batteries firing from the Bois Emont, and the Bois de Beuge.

Artillery fire was not lifted from Montfaucon, as the presence of a hostile balloon at that place seemed to indicate that the enemy was still there. The Bois Emont, and the Bois de Beuge were taken on by army artillery as additional targets.

10.20 A. M.: I Corps reported that liaison reports showed that the right of the 77th Division, had at 6.45 A. M., been held up by wire, after an advance of 500 to 600 yards; that the left of the 28th Division was behind schedule due to uncut wire, while their right, at 8.30 A. M. was over Petite Grurie, and progressing favorably.

THE FIELD ARTILLERY JOURNAL

10.30 A. M.: I Corps reported that liaison reports showed that the 35th Division at 8.40 A. M. was 1.5 kilometers southeast from Cheppy, in the Chambronne ravine.

10.35 A. M.: 79th Division reported our troops advancing a road fork southwest of Montfaucon, near Fayel farm. They were receiving fire from the direction of Montfaucon.

The source of this message is unknown. There were road forks southwest of Montfaucon; but Fayel farm is to the southeast, where there are road forks also.

10.40 A. M.: an aviator dropped a sketch showing the front line of the 37th Division as on the north edge of the Bois de Montfaucon.

10.50 A. M.: Army Air Service reported that at about 9.00 A. M., tanks had been seen on the line Varennes—Cheppy.

It was known that the enemy had no tanks.

10.55 A. M.: V Corps announced that their troops were on the road from Montfaucon northeast to Septsarges; that at 7.45 A. M., their troops had been 200 meters southeast of Cuisy.

10.59 A. M.: Army Air Service reported that notwithstanding army artillery fire was falling on Bois Emont, and Bois de Beuge, a considerable number of hostile batteries were still firing from there.

At this time our counter-battery on these two woods had been in progress about 15 minutes. The targets were defiladed from sight, and at a minimum range of 10,000 meters from our nearest batteries. As the planes did not remain over the targets, only an approximate adjustment was possible.

11.10 A. M.: III Corps reported that an examination of prisoners indicated that the enemy began withdrawing his artillery, and most of his infantry, when our artillery preparation began; that our advance was rapidly moving forward according to schedule, and without encountering great resistance.

11.20 A. M.: III Corps reported that the 4th Division had passed the enemy 2nd position at 8.45 A. M.; and that at 9.1 A. M., the 33rd Division was 600 meters north of Gercourt Forward displacement of the 80th Division artillery had commenced

11.24 A. M.: I Corps reported that from information received its troops had reached their objectives by 11.00 A.M. Very little opposition reported. Permission was requested from the Army to push on without waiting for the V

THE BATTLE OF MONTFAUCON

Corps, which was to have been the guide beyond the Corps Objective.

The Army instructed the I Corps by telephone, to push two advance guards, each of about one battalion of infantry, down the Aire Valley, and follow with the rest of the Corps. At this hour the artillery fire was nearly stopped, schedules of fire having been practically completed.

- 11.25 A. M. III Corps reported that the 33rd Division had reached its objectives along the Meuse River.
- 11.40 A. M.: Army Air Service reported the 91st Division on schedule, but with losses that seemed to be rather heavy; that the 37th Division was on a line from about 1 kilometer southeast of Very—thence east to the Chambronne ravine. They were unable to locate the 79th Division.
- 11.45 A. M.: I Corps advised that they had decided to hold their line, and only send strong exploiting details forward, pending the advance of the V Corps.
- 11.55 A. M.: we stopped firing on Montfaucon.
- 12.07 P. M.: Army Air Service reported seeing our infantry entering Eclisfontaine.
- 12.20 P. M.: 79th Division reported that at 11.25 A. M. their line extended from, slightly south of Montfaucon—Fayel farm—slightly south of Cuisy. 3,000 prisoners had been taken.

V and III Corps requested that in view of the situation corps and army artillery fire be lifted to north of coordinate 282.

This request was complied with, although coordinate 282 was about 4 kilometers *beyond* Montfaucon, and 2 kilometers beyond the Bois Emont and Bois de Beuge, not yet reported captured. The report of 12.07 P. M. as to our troops being at Eclisfontaine appeared of doubtful accuracy, in view of the Air report of 11.40 A. M.

- 12.45 P. M.: III Corps Air Service reported large bodies of our troops advancing along a line northeast from Septsarges.

4th Division reported that they had artillery on hill 295, northeast of Septsarges, and that enemy artillery was coming up the road between Septsarges, and the next town over the hill.

We could not reconcile this report. Hill 295 was half way between Septsarges and Nantillois, and was the only hill between

THE FIELD ARTILLERY JOURNAL

Septsarges, and the next town. It seemed queer for enemy artillery *to be marching here*.

12.50 P. M.: 33rd Division reported that after considerable opposition, the Bois de Forges had just been captured; our infantry had been observed 500 meters south of, and advancing on, Dannevoux.

V Corps reported that the tanks had fallen behind, but that they were expected to reach the front line about 1.00 P. M.

Army Air Service reported that the 80th Division had signaled that friendly artillery was firing on them.

We were unable to find any batteries firing south of coordinate 282, which was 2 kilometers beyond the Bois de Sachet, the last reported position of the 80th Division.

1.00 P. M.: 80th Division report stated their 320th Infantry had reached the Corps Objective and was now en route to the Army Objective.

1.10 P. M.: 91st Division reported that their troops were 1,500 meters south of Epinonville, and near Ivoiry.

the Commanding General Air Service, reported in person, that he had just completed a flight over the front, that he had noted about 60 American stragglers south of Montfaucon; that nothing had been seen in Montfaucon; very little, if any, enemy artillery fire; that there was a breach in the enemy line 10 kilometers long, forming a hole north of Montfaucon extending to the shoulder in the Meuse River near Brioules; no movements observed on roads for 10 to 12 kilometers north of Montfaucon.

1.20 P. M.: V Corps reported that as of 12.35 P. M., their troops were east of Varennes—north of Very—far edge Bois Chehemin. Enemy reported as falling back; explosions indicated blowing up of dumps, bridges and roads.

I Corps reported that telephone and radio communications were not working, but that they had ascertained that the 77th Division was on the Corps Objective at 10.45 A. M.; the 28th Division at 11.25 A. M. could not be located; the 35th Division at 11.10 A. M. was on schedule, and proceeding beyond the Corps Objective.

I Corps Air Service reported enemy shell fire heavy on Very, but they were unable to locate the batteries firing; after careful observation enemy resistance was observed in the vicinity of Cheppy and Montfaucon.

1.25 P. M.: Army Air Service reported hostile troops on north

THE BATTLE OF MONTFAUCON

edge Bois de Montfaucon, and in woods 1 kilometer east of Montfaucon.

- 1.30 P. M.: French XVII Corps OPs reported enemy artillery fire from east of the Meuse falling heavily on our troops west of that river. They were unable to locate the batteries firing.
- 1.40 P. M.: liaison reports in the V Corps indicated that at 9.30 A. M., the 91st Division was on a line through Cheppy; at 9.20 A. M., the 37th Division was north of the Laifuon ravine; at 7.45 A. M., the 79th Division was 200 meters north of Cuisy.
- 1.45 P. M.: I Corps Air Service reported they were still unable to locate the 28th Division.

The First Army at 1.47 P. M., 1.50 P. M. and 1.59 P. M., sent telephone orders respectively to the I, III and V Corps to advance to the Army Objective through the line Romagne—Brieulles.

- 2.00 P. M.: III Corps Air Service reported the 4th Division on a line 1 kilometer each side of Septsarges, following generally the Montfaucon road.

109th Infantry (28th Division) reported that they had been held up until 1.14 P. M., at a point 600 meters from their line of departure.

- 2.05 P. M.: Army Air Service reported that between 12.15 P. M. and 1.00 P. M., they had observed about 20 horses along road about 1 kilometer south of Montfaucon; and about 50 Americans along the Montfaucon-Cuisy road. Montfaucon appeared deserted.
- 2.10 P. M.: 37th Division reported it was still progressing; resistance slight; casualties few.
- 2.15 P. M.: a pigeon arrived with message dated 2.00 P. M., stating that tanks were jammed just south of Cheppy; impossible to detour.

a balloon reported having observed American patrols of 5 to 15 men approaching Montfaucon on two roads from the south, about 1.5 kilometers away.

- 2.19 P. M.: OPs reported that a hostile plane had just shot down two of our balloons.
- 2.20 P. M.: a message from the artillery liaison officer with the left front regiment, 79th Division, arrived, dated 11.45 A. M., stating that he personally noted that regiment stopped by machine gun fire in the Bois de Cuisy; and that the right front regiment was just east. He asked for artillery fire, and for tanks. No targets were located.

THE FIELD ARTILLERY JOURNAL

The 79th Division ordered the division artillery to advance at once to the assistance of the two front line regiments reported as stopped.

2.25 P. M.: OPs reported considerable hostile artillery fire from east of the Meuse; unable to locate enemy batteries.

2.30 P. M.: 4th Division reported that at 1.00 P. M., one brigade was moving north from Cuisy.

a radio message, sender unknown, stated that at 2.20 P. M., two battalions of infantry were stopped south of Varennes; that tanks were coming.

I Corps announced that, with help of tanks, Cheppy had been taken at 12.20 P. M., but that only 15 tanks were left out of an entire battalion.

3.00 P. M.: Army Air Service reported enemy resistance was concentrated in Bois Emont, and Bois de Beuge. They turned in the coordinates of three hostile batteries.

The V Corps artillery commenced counter-battery fire on these enemy batteries.

3.10 P. M.: III Corps announced they had reached the Corps Objective at 1.45 P. M.

3.30 P. M.: 28th Division reported that about two hours' delay was to be expected in occupation of forward positions by the division artillery, due to repairing bridges.

3.35 P. M.: Army Air Service reported that at 2.30 P. M., our line was along the northwest edge of the Bois Chehemin.

I Corps reported that enemy artillery fire had interrupted traffic at its railhead.

3.40 P. M.: Army Air Service reported that our patrols were entering Montfaucon; that there were heavy concentrations of Americans in Bois Emont, and in Bois Chehemin; no Americans north of the line Very—Montfaucon; enemy in Bois de Beuge; 91st Division close to hill 259.

4.00 P. M.: 79th Division reported that with the help of tanks they were no longer stopped in the Bois de Cuisy, but were going ahead.

35th Division reported that at 1.00 P. M., their line was $\frac{1}{2}$ kilometer north of the Varennes-Cheppy road. Their right was stopped at Cheppy by machine guns.

Army Air Service reported that at 3.25 P. M., our line in the Argonne Forest ran between points 5 and 7 kilometers due west of Varennes.

Orders were now issued to the army artillery to prepare for forward displacements. Reconnaissances were already under way.

THE BATTLE OF MONTFAUCON

4.15 P. M.: 77th Division reported that liaison reports indicated that at 9.45 A. M., their right was 2 kilometers west of, and slightly south of Varennes.

Army Air Service reported that at 4.00 P. M., no traffic was observed in the area Varennes—Charpentry—Montblainville.

4.30 P. M.: Army Air Service reported that between 3.30 and 4.00 P. M., no enemy movements had been observed north of Montfaucon; the sector from Bois Emont to Nantillois appeared quiet; they did see Americans in squad columns at south edge of Bois de Septsarges.

4.40 P. M.: Army Air Service reported large bodies of our troops about 2 kilometers southeast of Montfaucon.

4.50 P. M.: balloon reported that the 37th Division appeared to be in the redoubt 900 meters west of Montfaucon.

5.00 P. M.: 37th Division reported that at 2.00 P. M., their right was meeting resistance from the direction of Montfaucon, while their left was not in contact with the enemy.

A check as to the forward displacement of artillery at this hour indicated that no corps or army artillery had advanced. The situation as to the division artillery, by divisions from left to right, was:

Divisions

- | | |
|----|--|
| 77 | 2 battalions of 75s had started. |
| 28 | no advance; blocked by road destructions. |
| 35 | 2 battalions of 75s had started. |
| 91 | 2 battalions of 75s across No-Man's Land; not yet ready to fire. |
| 37 | blocked at Avocourt. |
| 79 | blocked at Avocourt. |
| 4 | stuck in vicinity of Forges brook. |
| 80 | unable to cross Forges brook. |
| 33 | had not started; terrain impracticable. |
- 5.05 P. M.: 28th Division reported their troops were ½ kilometer north of Montblainville.
- 5.25 P. M.: 91st Division reported a counterattack from Cierges had started at 5.00 P. M.; no details known.

This was the only counterattack reported during the day. There was insufficient information to enable artillery action to be taken.

5.50 P. M.: 79th Division reported they were advancing with no opposition to speak of since woods had been cleared of machine guns.

THE FIELD ARTILLERY JOURNAL

- 6.00 P. M.: Army Air Service reported that between 4.30 and 5.30 P. M., there had been no movements in the area Charpentry—Aire Valley—Romagne.
- 6.30 P. M.: I Corps Air Service reported our troops were north of Varennes on the Apremont road; troops in column of files were noted advancing just west and north of Apremont.
- 6.50 P. M.: I Corps Air Service reported having observed tanks 1 kilometer north of Varennes, and west of there, engaged with machine guns in the Argonne Forest.
- 6.55 P. M.: 80th Division reported their right stopped by artillery fire from Dannevoux, and strong machine gun fire from woods north of there; their left was advancing without interruption, except that there was a gap due to the 4th Division not being on the boundary line.

4th Division reported 5 enemy batteries near Cuisy.

We were unable to reconcile this message. Probably "firing on Cuisy" was meant.

- 6.55 P. M.: 33rd Division reported their left just south of Dannevoux.

If this last message was correct, hostile batteries could hardly be at Dannevoux stopping the 80th Division. Probably the latter division meant hostile artillery east of the Meuse firing over Dannevoux. We never located these enemy batteries.

- 7.00 P. M.: Army Air Service reported their last day reconnaissance showed that at 6.20 P. M., our line was: 2 kilometers due north of Very—.5 kilometer south of Epinonville—along trenches to 1.5 kilometers west of Montfaucon—.5 kilometer north of Montfaucon. Germans observed south of Epinonville, Ivoir and Nantillois. Cheppy burning; Epinonville and Ivoir unoccupied; line of Germans in woods just north of Epinonville.
- 7.15 P. M.: 79th Division reported that they had occupied Montfaucon at 6.45 P. M.
- 7.40 P. M.: 79th Division reported severe machine gun situation, but thought the situation was in hand.
- 8.15 P. M.: III Corps commanding general reported that the 80th and 33rd Divisions had reached the Army Objective, while the 4th Division was very close to it.

The Army ordered all army artillery fire stopped inside of a line through Dun.* and generally about 4 to 5 kilometers beyond

*See map, page 228.

THE BATTLE OF MONTFAUCON

the Army Objective. This line was so far away, that no possible advance of batteries would enable useful fire to be delivered; orders for forward displacements of army artillery were consequently cancelled.

- 9.40 P. M.: 4th Division reported large number of hostile machine gun nests southwest of Montfaucon, and near Cuisy. Their division artillery had been stopped in their advance by these machine guns.
- 11.00 P. M.: 4th Division reported that they had not reached the Army Objective, because they had met artillery and machine gun fire, and had no artillery themselves. They stated that the 79th Division could not have taken Montfaucon, as they were receiving enfilade fire from that place.

THE BATTLE AS IT REALLY WAS

Up to about 2.00 P. M., September 26th, we received a succession of reports announcing constant advances, meeting with but slight opposition, and almost no artillery reaction. At this hour it was generally believed at command posts that our troops had reached the Corps Objective on time, and that there was little or no enemy left in front of our victorious infantry. The Army consequently ordered the advance to continue on to the Army Objective. To avoid all danger of our own artillery fire falling on our men, the corps and army artillery, were ordered not to fire within limits, which from time to time were pushed further north, and corresponded to where the infantry was supposed to be, or hoped to be. By night the limit was so far away, that no fire could be delivered. There were no restrictions as to fire from division artillery, which it was expected would be close up with the advance, and in a position to observe the location of friendly troops. As noted, none of the division artillery was displaced forward in time to fire before dark. This left the front line without any artillery support, during nearly the whole of the afternoon.

The line that our attack really reached was generally short of the Corps Objective. Only on the flanks was this line seized. At night our line was:

Petite Grurie—1km north of Varennes—1km north of Very—enemy trench line from south of Epinonville to west of Montfaucon—2kms south of Montfaucon—1km north of Septsarges—Dannevoux.

THE FIELD ARTILLERY JOURNAL

The center, and key point, of the battlefield was Montfaucon. The terrain to be crossed to capture this place was largely visible from our lines; the location of the enemy defenses was exactly known; we even knew the strength of their occupation. The 79th Division was to make the assault, assisted by powerful artillery supporting fire, and by flanking operations of the 4th Division on the right, and the 37th Division on the left.

Prior to the attack, experiments had been made to determine the best methods of crossing belts of wire. It was decided to cut them with 2-men wire cutters. It was proved that this would take about 45 minutes, under battle conditions, for a belt of average width. The infantry and artillery plans of attack, provided for halting the barrage and the attack, the necessary length of time, at each belt, to enable the wire cutters to complete their mission, after which both the barrage and the attack were to move on at the prescribed rate to the next belt.

The attack progressed as planned as far as the first belt of wire, a short distance from the line of departure. The 2-men wire cutters took about 75 minutes (instead of 45) to make their cuts. The artillery never received a word from the infantry for hours after the attack, and in the fog and darkness the OPs saw nothing. Not knowing of the delay, the barrage moved on half an hour before the infantry were ready. The latter, thus early in the battle, were some 700 meters in rear of the barrage, and all the accompanying supporting fire. Without the barrage the infantry did not advance as fast as intended, and at times made only 100 meters in 10 minutes, instead of in 4 minutes. It kept getting further in rear of the supporting fire, and arrived in front of the enemy second line, through the Bois de Cuisy, about 1 mile in rear of the barrage, and over an hour late. The troops had at this time already commenced to discard the 2-men wire cutters.

The enemy, relieved of artillery fire, made a serious resistance from 9.00 A. M. on, and stopped the infantry. If the liaison officers made any report earlier than 11.45 A. M., as to what was going on, we failed to receive it, and the report of that hour took 2½ hours to reach the telephone net. The fighting in the woods was not visible from the OPs; the latter were unable to

THE BATTLE OF MONTFAUCON

pick up either our men, or the enemy even in the open ground east of the woods. There being doubt as to whether the situation might not have changed between the time the message was received and the time it had been sent, it was felt impracticable, with no observation, to support the infantry with artillery fire, except by advancing light artillery sufficiently close to enable it to observe its fire.

In the meantime, one battalion of infantry, of the 4th Division, which should have been in second line south of, and to the east of Cuisy, lost its direction in the fog and haze, and wandered off into the zone of action of the 79th Division, in rear of the enemy second line, which had been pierced about on time by the 4th Division. This battalion ran into the enemy defense system southeast of Montfaucon about 10.00 A. M., and close to the barrage. A fire fight occurred here, without decisive results. It ended when in the afternoon, the battalion having located itself, withdrew to the zone of action of its division, on the other side of Cuisy. The reports of our Air Service as to having observed American patrols, small bodies of our men, "stragglers," etc., south of Montfaucon, appear to have been elements of this battalion. They were at least two kilometers in front of the 79th Division, and were by no means "stragglers," in the sense that this word is usually employed. Neither the 4th, nor the 79th Divisions, at the time knew that they were in front of one another.

While this engagement was in progress, due to the Germans in the Bois de Cuisy being turned on both flanks, and some excellent fighting by the 79th Division (313th and 314th Infantry), the positions in the Bois de Cuisy, and east thereof were penetrated, and the 79th moved on to the next position. Not all of the Germans in the Bois de Cuisy were taken or driven out; some remained. When the 4th Division artillery attempted to displace forward, its advance was stopped north of Malancourt, through which ran the only available road, by hostile machine gun fire from the Bois de Cuisy and vicinity. This halted that field artillery brigade south of Malancourt, near the Forges brook, and blocked the advance of two other field artillery brigades, advancing through Avocourt, towards Malancourt. It also caused a terrific traffic jam.

THE FIELD ARTILLERY JOURNAL

The 79th Division arrived opposite the enemy trench system south of Montfaucon around 5.00 P. M. The men were tired, and they had discarded nearly all the 2-men wire cutters. They now found themselves in front of strong belts of wire, protected by machine gun and artillery support, having excellent observation. About 5.30 P. M. they launched an attack, without any artillery support on our side, and plenty of it, on the enemy's side. This attack broke down.

Montfaucon was defended by one battalion of German infantry. They defended the town by occupying trenches, protected by wire, encircling it, and about 1 kilometer distance. They did not hold the town itself; the information of our Air Service that Montfaucon was empty was substantially correct. Before daylight of the 26th our artillery preparation had everywhere destroyed the enemy lines of communications, and both fire direction and command had ceased. After the fog lifted, around 9.00 A. M., an idea of the situation became possible, but the uninterrupted fire of our artillery on Montfaucon up to noon, prevented any change of disposition. After our fire lifted, work was started on reestablishing the telephone net, and artillery OPs. Except for the battalion of the 4th Division to the southeast, there was no interference with the afternoon measures to repair damages. It was fairly well completed when the 79th Division arrived at 5.00 P. M.

Outnumbered in infantry strength, but with good wire, trenches and shell holes, plenty of machine guns, and excellent artillery support from batteries in the Bois Emont, and the Bois de Beuge, the enemy stopped our attack within 30 minutes. About 7.00 P. M., a battalion of fresh German infantry arrived, and was placed in line. No one on our side reported this, and it is doubtful whether it was noted.

The 79th Division sent instructions to lower commanders during the evening of the 26th, to hasten the capture of Montfaucon. Part of the division artillery was advanced, and with its support a second attack was made at daylight on the 27th. There was a fog at the time, which made observation impossible. Our artillery fire does not appear to have caused any particular damage, apparently due to having made assumptions as to the location

THE BATTLE OF MONTFAUCON

of enemy positions, which did not entirely correspond to where they really were. The enemy artillery saw nothing either, but they knew where their own front line wire was, and could place defensive barrages in front of them. With this barrage, uncut wire, and twice as many hostile infantry, as on the night before, our attack again broke down.

The 37th Division, on the left of the 79th, had at this time, reached a line nearly 1 kilometer north of Montfaucon, and to the west of it. It made a detachment, about 7.30 to 8.00 A. M., which attacked Montfaucon from the northwest. With little artillery support of its own, machine guns and unbroken wire in front, and enfilade artillery fire from the Bois Emont, and the Bois de Beuge, this attack also broke down. The 79th Division now requested the V Corps for artillery supporting fires for a new attack to be made about 11.00 A. M. The V Corps in turn, asked for assistance from the army artillery. It was agreed that the corps artillery, with 4 batteries 9.2" howitzers, and some 25 batteries 155mm guns and howitzers, assisted by three regiments of army artillery 155mm GPF guns would fire a preparation.

The attack of the 37th Division had alarmed the German commander of Montfaucon. The 4th Division were in Septsarges, and he noted that he was outflanked both to the west and east. He decided that his position was untenable, and so reported by telephone, recommending that he be authorized to withdraw. Expecting a favorable reply he issued his preliminary orders, effective at an hour to be announced later. His telephoned authority from the German Fifth Army reached him at 9.00 A. M. Within five minutes, he had issued his orders, closed his command post, and was on his way to the rear. His withdrawal to the Bois de Beuge and Nantillois was not observed by us, and was completed, less some losses, by 11.00 A. M.

The artillery preparation on Montfaucon started about 10.00 A. M. It caught a number of Germans who had not yet cleared that point. These Germans took refuge from the rain of heavy shells, withdrawing to cellars, holes and dugouts, with which the town was plentifully supplied. An hour later the 79th Division assault went home. The Germans hidden away were duly found and made prisoners. Montfaucon was ours.

THE FIELD ARTILLERY JOURNAL

We will only note one other fact connected with this battle. The Army orders issued shortly before 2.00 P. M. the 26th, directing the further advance that day to the Army Objective, did not reach the front lines until after 5.00 P. M. The III Corps advance had stopped around the noon hour, and except for patrols, no fighting occurred in their area, until in compliance with the Army order a new advance was attempted at 5.30 P. M. During this period of lull in our advance, the enemy had viciously shelled the III Corps with artillery, both from the north, and from across the Meuse to the east. A new defense line had been established, and in spite of our Air reports that there was no traffic north of Montfaucon, substantial reinforcements of infantry had been brought up by the Germans. When our advance was made, it had no artillery support at all, and was quickly stopped.

On the left, the I Corps had lost its artillery supporting fires at an early hour, had severe fighting, and was stopped at the enemy main position, which it was unable to cross. The same occurred on the left of the V Corps. As already noted the true account of what occurred did not reach the artillery nor the higher command, which had during the eventful day of the 26th a distorted view of successes, many of which never existed.

COMMENTS

We received almost no information from our OPs, and little from the balloons. This confirmed the experience had in the Battle of St. Mihiel. We did obtain, sometimes directly, and sometimes through infantry command posts, valuable information from liaison officers. But their reports took so long in transmission, that when received, so much time had elapsed, that we were uncertain as to whether material changes in the situation had not meanwhile occurred. We could not use the reports for fire direction. No one located any targets in such a way that artillery could fire on them.

Our best source of information was the Air Service. It was active, covered the field, and promptly furnished numerous reports. Some of the information was inaccurate. The report of 1.10 P. M. that there was a "hole" in the enemy lines north of Montfaucon, was not supported by events later in the day, nor

THE BATTLE OF MONTFAUCON

by German records since available, nor by photographs taken by the Air Service itself during September 26th. Statements as to absence of circulation in enemy rear areas failed to give a correct impression as to what was taking place. During daylight of the 26th, the German 37th Division, less artillery, traversed the area north of Montfaucon, and by dark was in line through the Bois Emont, and the Bois de Beuge. The march, made in small columns across country, was not observed by our planes. Substantial elements of other German divisions (53rd Reserve, 5th Bavarian Reserve, and 5th Guard) also crossed rear areas, and reached the front, without being observed. Reports as to no circulation *on roads*, appears to have been substantially correct, but it gave an erroneous impression as to "holes," and absence of enemy troops, not justified by the facts. It is only fair to state that German artillery, and vehicles, did not in general advance before dark, closer to the front than 10 kilometers.

Photographs were taken by our planes over part of the front between Montfaucon, inclusive, and the Argonne Forest. They were excellent, and show enemy in trenches about Montfaucon. Baulny, and many targets worth firing at. Comparing the photographs with the reports of aviators, the former were more reliable. It would have been invaluable to the artillery, to have had at the time, the information contained in these photographs. If such information had been transmitted by an examination at the air field, and telephone messages to the artillery CPs, a better job of fire direction, and conduct of fire, would have been possible. No one had thought of this.

Due to too great enthusiasm as to supposed successes, and absence of enemy opposition, our infantry, failed during the afternoon to have artillery support, when they needed it. This enabled the enemy to reorganize, and to be reenforced. There was no plan ready for the afternoon attack, and liaison between the artillery and the front line was lacking. We had depended on the OPs to advise us as to the situation, but this turned out to be reliance upon a broken reed. Advancing the division artillery to where it could intervene and support the infantry by direct liaison with the front line, also proved impracticable, in every one of the nine division which tried this. Later in the campaign,

THE FIELD ARTILLERY JOURNAL

we worked out a system of liaison with the front line which was practicable, but in the Battle of Montfaucon liaison between artillery and infantry was poor.

The Air Service was not always able to identify infantry observed by them. At times they mistook hostile for friendly troops. For example, the reports of 10.15 A. M. as to Americans being north of Montfaucon, and of 3.40 P. M. as to our patrols entering that town, appear to have been based on observation of German elements. Also the concentrations of Americans reported at 3.40 P. M. in the Bois Emont are now known to have been German reinforcements establishing a line through that wood.



A PRACTICAL METHOD OF HIGH BURST RANGING

BY LIEUT. R. M. WICKS, Instructor, Dept. of Gunnery, The Field Artillery School

A MAP high burst transfer is essentially a map K transfer in which the check point is located in the air by the intersection of two lines of sight. It replaces a K transfer whenever a suitable terrestrial check point is not available within transfer limits of the target or when, for any reason, observation upon such a check point is impossible.

Methods in use have all included preliminary data for both observers to establish the check point, and subsequently, either an adjustment on this point or computation to locate the burst center with reference to it. It is the purpose of this article to show a method of map high burst transfer which eliminates not only the observers' data but also the check data, adjustment, and computation, simply by making the burst center the check point, no matter where situated.

The initial layout includes: *a.* a plane table with grid sheet or map containing the plotted position of one gun, the targets to be fired upon, any convenient reference points visible to observers, the lateral observers position and that of the axial observer if not immediately behind the gun to be adjusted; *b.* one instrument to measure azimuth and site for the axial observer; *c.* one instrument to measure azimuth for the lateral observer. Communication of some kind with the lateral observer is convenient but not actually necessary.

PROCEDURE

1. The observers being posted, with their instruments set at zero and laid on one of the plotted reference points, the BC fires one orienting round with arbitrary data to place the burst near the center of the target area and high enough to be visible to both observers. He makes any necessary changes in corrector and fuze range and fires two more orienting rounds at 15 second intervals. No further change is made in data throughout adjustment.

2. The axial observer, using the upper motion of instrument, puts cross hairs on one of the last two orienting bursts and reports

THE FIELD ARTILLERY JOURNAL

the site and deviation from reference point (this report merely tells the BC he has seen the round).

3. The lateral observer, using the upper motion of his instrument, puts the vertical hair on one of the last two orienting bursts and reports deviation from reference point if communication exists. Otherwise he makes some signal, through relay if necessary, to show that he has seen the round.

Note: both observers now have an approximate instrument direction.

4. The BC fires six rounds at 15 second intervals without any change in data.

5. The axial observer reads site, and deviation from reference point, of each round, and reports the mean site and mean deviation.

6. The lateral observer reads the deviation from reference point of each round and reports the mean deviation if communication exists. Otherwise he brings his report to the BC as quickly as possible.

7. *a.* The BC plots the reported mean deviations, locating the burst center, and measures the map range from gun to burst center.

b. Subtracts the reported mean site from the quadrant elevation fired and converts the result to an adjusted range from gun burst center.

c. Obtains the ratio of the adjusted range just found, to the map range measured. (Corresponds to the K of a map K transfer.) This may also be expressed as the number of yards per thousand to be added algebraically to the map range, by subtracting map range from adjusted range and dividing the result by the number of thousands of yards in the map range (see example).

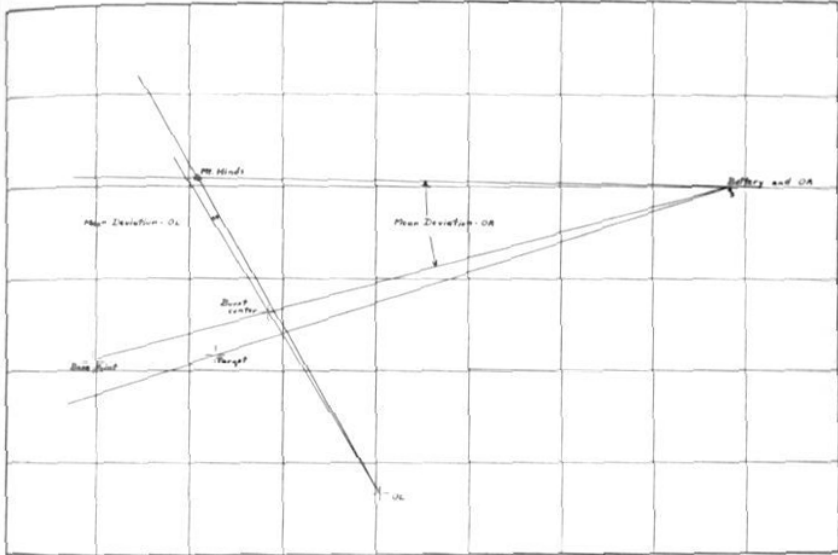
d. Measures the plotted shift, burst center to target, and applies the difference in drift for the map ranges to burst center and target, this correction being *left* if the target is the more distant and *right* if the burst center is the more distant.

e. Obtains the range to fire on the target by multiplying the target map range by the ratio found above, on the principle that the adjusted and map ranges at the target will have the same

A PRACTICAL METHOD OF HIGH BURST RANGING

ratio as at the burst center. He converts this range to elevation, and adds the site to the target, giving the quadrant elevation for the target.

f. Brings battery in with desired sheaf, and through desired zone, depending on the nature and accuracy of location of the target.



Example (actually fired). See figure.

Reference Fort Sill Military Map 1931—contoured. Gun position—858.834—1,297.007 Btry. 155mm Howitzers. O.A.—back of No. 1 piece—battery executive. O.L.—855.046—1,293.668—instrument sergeant.

Ref. Point—Triangulation Station Mt. Hinds 853.094—1,297.091.

Target—853.280—1,295.165—battery.

Map range 5,840, site + 3 mils.

Base deflection (previously fired) A.P. Triangulation Station Mt. Hinds Def. 305.

1. Initial data:

Base deflection (arbitrary) Shrapnel, charge V. time 18 sec. Kr. 50, No. 1, 1 round, quadrant 330 (this was figured to give an air burst in center of target area and about 30 mils high as seen by O.A.)

THE FIELD ARTILLERY JOURNAL

2. O.A. reported 290 left, Site 337 on this first round.
3. O.L. reported 129 right.
(These reports merely showed B.C. that both observers saw the rounds and had their approximate instrument direction. They were not used in the averages later figured because they were approximate, due to time taken to lay on the smoke ball).
4. B.C. commanded:
Down 15, 6 rounds, 330.
(In order to save expensive ammunition other two orienting rounds were dispensed with.)
5. O.A. reported mean deviation 287 left.
 mean site 312.8
6. O.L. reported mean deviation 26 left.
7. *a.* B.C. plotted deviations, locating burst center with scaled map range of 5,170 from piece to burst center.
b. Quadrant elevation 330
 Site to check point 12.8

- Elevation 317.2 = 5,402 adjusted range to burst
 center.
- c.* Ratio of $\frac{\text{Adj. Rn. } 5,402}{\text{Map Rn. } 5,170} = 1.045$ or $\frac{5,402 - 5,170}{5.17} = 45.$,
 i. e., 45 yards added for every thousand yards in the map range. This method is preferable for mental use.
- d.* Measured shift Left 50 (from burst center to target).
 Difference in drift Left 3

- Shift to target Left 53
- e.* Map range to target measures 5,840
 $1.045 \times 5,840 = 6,103$ range to fire on target (or $5,840 + 5.84 \times 45 = 6,103$)
 Elevation for target = 381.5
 Site to target = +3

- Quadrant Elevation for target . 384.5

Note: A precision adjustment on the target gave adjusted shift, Left 48, and adjusted elevation, quadrant 375. This showed a

A PRACTICAL METHOD OF HIGH BURST RANGING

deflection error of +5 mils and range error of one half fork. Firing for effect later with shell disclosed a deflection error of +5 mils and range error of less than a fork.

The deflection error was due to a strong wind blowing from left to right. The slight delay of the axial observer in laying on some of the bursts allowed a drift of the smoke ball and caused the axial reported mean deviation to plot somewhat down wind from its true position. This increased the shift as measured on the board, but did not materially increase the range since the lateral observer was affected by the same drift.

It is evident, in locating the burst center, that, excluding errors in plotting, the accuracy of location will vary directly as the number of rounds observed, the more rounds the less the mean is affected by one erratic burst. Conversely, when rounds are lost by the observers, accuracy is reduced. Experience has shown, however, that in general the usefulness of this method is not seriously impaired by a "Lost" sensing by either or both observers on the same round or different rounds.

The above method has been successfully used with the lateral observer at a point of approximately known location such as a terrain feature instead of a point of known coordinates, and has worked with no lateral communication except visual signals. It has been found in this latter case that a time schedule is of great value, particularly when other batteries are firing shrapnel in the same vicinity.

I do not think that this method of high burst ranging is more effective than any other, being at best an emergency substitute for a K transfer. On the other hand, it is a practical method which requires less set-up, preliminary data, and above all less computation. It is therefore certainly worthy of consideration for use in the field by artillery officers of average war time training.

**IF YOU CHANGE STATIONS, PLEASE SEND
THE JOURNAL YOUR NEW ADDRESS.**

THE ARTILLERY PREPARATION FOR ATTACKS AND THE RUPTURE OF DEFENSIVE ZONES

BY GENERAL FREDERIC CULMANN, FRENCH ARMY

Translated by Major Basil M. Perry, F. A.

(Second Installment)

EFFECTS OF VIOLENT ARTILLERY PREPARATIONS ON THE MORALE OF THE HOSTILE INFANTRY

In order to appreciate the normal effect on the defending infantry of the violent bombardments preceding great attacks, there is no better source of information than General Passaga, the commander of a division at Verdun (7). He has thus expressed himself on the subject:

"What was the effect of this torrent of iron and fire? It was hell!

"There were tremendous concussions, heartrending explosions, sheafs of flame, whirlwinds of smoke, a rain of earth, of stones, of iron! The blast of the explosions turned things and men topsy-turvy. Arms and munitions were destroyed, scattered, buried; trenches were filled up, shelters demolished, men buried alive, wounded, dead.

"What did the defender become?—A rag.

"He ran to hide himself in a shelter, or perhaps at the bottom of the trench, or even behind the slightest bit of cover. He tried to make himself small, smaller. Stupefied, with empty head, haggard, with fixed eyes, dilated pupils, his blood vessels contracted to the utmost, his nerves were broken. He no longer existed, his will was gone.

"But if it wanted its infantry to be able to overrun the entrenchments, the attacking artillery had to lengthen its fire.

"Then it seemed to the defender as though the ground was trembling less, the bursts were growing less powerful, the infernal cyclone really was spending its violence farther away . . . without a doubt death was further away. Now *progressively* the defender took hold of himself. The anguish which had oppressed him *progressively* diminished. His eye began to perceive, and with that perception of exterior things, the defender little by little regained his sense of duty; he looked for his weapon and ammunition, retook his post, and at last *his will to make use of his arm returned*.

(7) Verdun in its Torment (Charles-Lavauzelle & Co., Editors).

ARTILLERY PREPARATION FOR ATTACKS

"If the adversary had not been able to overrun the trenches before this instant, he was too late! . . .

"The time which elapsed between the moment when the hostile artillery lengthened its fire, and that when the defender recovered his will to make use of his arm, represents the entire value of the combat of this epoch.

"This time was of a duration essentially variable: *more or less lengthy* in proportion as the bombardment was more or less *heavy* and more or less *precise*. *More or less brief*, according as the troops were more or less brave, hardened to war, instructed, more or less well commanded and officered. But whatever the duration was, in this space of time truly was decided the outcome of the attack. . . ."

But in order to create this moral breakdown of the defender, which carried the germ of the success of the attack, there was no need at all for an artillery preparation of several days: a violent, heavy, well adjusted bombardment of a few hours was sufficient, and heavy artillery must take a very great part in it, for humans are not accustomed to the terrifying effects of high explosive shell of large caliber.

General Passaga further states:

"Tactics, in its essence, is the art of *paralyzing* the adversary at the desired moment for the desired length of time. And this must be done by the judicious and *intensive*, successive or simultaneous, employment of means, arms, or methods which *disarm* the enemy and permit him to be *surprised*."

* * * *

THE TECHNICAL ASPECTS OF THE BATTLES OF 1918. SHORTENED ARTILLERY PREPARATIONS

The form of the battles of 1918 was the result of a series of technical advances, patiently studied during the period of stabilization and finally put into practice towards the middle of 1917. These were:

1. *The methodical employment of gas shell*. Gas heavier than air sank to the bottom of entrenchments and shelters, creeping everywhere. Its effectiveness lasted several hours, sometimes for days. The toxic projectile was considered an excellent agent for paralyzation and neutralization. By infecting them, it made certain parts of the terrain untenable, and thus permitted the canalization of attacks.

2. *The deliberate calculation of firing data* resulted from

THE FIELD ARTILLERY JOURNAL

modifying the data of the firing tables by topographic, ballistic, and meteorological corrections. Aerial observation sought and located the target, but no longer had to regulate fire. It controlled the fires only in case it was necessary to execute destruction fires, for then extreme accuracy was required.

3. *Tanks* favored surprise. They assumed certain missions which cannon were accomplishing with difficulty and not without a great loss of time. They crushed wire entanglements and entrenchments, destroyed at close range the machine guns of the defense, and thus cleared the way for the infantry which followed them and exploited their success. Tanks caused a modification in the constitution of the mass of the artillery. In order to protect them counterbattery cannon had to be augmented, and in order to mask them a large allowance of smoke shell was necessary. On the other hand, the number of howitzers required for destruction fires was diminished.

Toxic shell facilitated the substitution of neutralization for destruction; the deliberate calculation of firing data permitted short preparations for the attack, if at the same time all the cannon were rapid fire, long range weapons: tanks furnished hope for the possibility of eventually suppressing all preparation and of realizing complete surprise.

The battles of Cambrai and of Riga showed the important results which these new means promised.

The Battle of Cambrai (20th of November, 1917)—At Cambrai, tanks were employed in mass for the first time and the artillery preparation was entirely omitted.

The English successfully kept the secret. They even left the French Command in complete ignorance of their project, and did not advise them of it until the day before the attack. They concealed the preparations by adroitly utilizing the great amount of cover in the vicinity.

The attack (on a front of 11 kilometers) was supported by 1,000 pieces of artillery and by 360 tanks, the latter hidden in the woods.

At 6:10 A. M., the infantry and the tanks debouched. The artillery did not open fire until 10 minutes later, at the instant

ARTILLERY PREPARATION FOR ATTACKS

when the assault waves arrived in view at the approaches of the hostile first line.

The artillery fires comprised: a general neutralization for a quarter of an hour on command posts, observation posts, etc.; the smothering of every battery noted in action; and, in front of the infantry and tanks, a barrage of high explosive and smoke shell advancing in accordance with a fixed schedule.

The Germans were completely surprised: the two first lines of their strong position (the Hindenburg position) were taken without difficulty.

The English, advancing in some places as much as 8 kilometers, reached the very gates of Cambrai in a few hours. But there their advance was blocked by a German division, detraining, by chance, on its return from Russia. Never on the front of France had the breakthrough been so nearly realized; never had success been so rapid and deep.

Unfortunately the British attack made a pocket, and ten days later the line was forced back to the line of departure by counter attacks on the two flanks, executed in accordance with the methods already employed at Riga.

The Battle of Riga (1st of September, 1917)—The Germans were the first to learn how to obtain the total and rapid rupture of the strongest fortified positions, by utilizing to the maximum the *surprise* which bestows on *power* its full value. They also succeeded in perfecting, in the summer of 1917, methods of deliberately preparing fire, and of using great quantities of gas shells (8). The method of attack which they used in Galicia (24th October), was the pattern followed by them in their offensives on the French front in 1918, and the Allies likewise adopted it in the battles which ended the war. It should be remarked here that the Germans possessed but few tanks; they delivered only 59 of them to the Interallied Control Commission.

Surprise was sought for by the Germans in the following manner:

All work changing the terrain in preparation for the offensive was executed almost entirely in the rear areas of the battlefield,

(8) The scientific methods of preparation of fire were used widely by the French Army in October, 1917, at the Battle of la Malmaison. Long range heavy artillery thus prepared 90%; short, 30%, of their fires.

THE FIELD ARTILLERY JOURNAL

where it had a chance of escaping the notice of the enemy, who saw principally the routes of communication being perfected.

The great attack units were brought up to their places only at the last moment. At the end of the concentration marches were made only at night and using secondary roads. All possible precautions were taken in order to conceal during the day troops in cantonment or in bivouac (9).

The approach march took place at night, avoiding all noise. Batteries marching to position, wrapped their wheels with padding, their horse shoes with rags, and took all precautions to deaden the jangling of the shields and ironwork.

The opening of fire took place as a surprise. The reinforcing batteries executed no adjustments, in order not to reveal their presence before the day of the attack. Adjustments were replaced by a preparation of fire as complete as possible, the remaining lack of precision being compensated for by firing throughout a zone containing the objective, thus accepting as inevitable an enormous expenditure of ammunition.

The preliminary bombardment lasted only a few hours. It was even omitted in certain attacks in which tanks were used (10). The duration of the artillery preparations in some of the great battles of the latter part of 1917 and of 1918 was as follows:

- 5 hours at Riga (1st September, 1917)
- 6 hours at Caporetto (24th October, 1917)
- 5 hours in Picardy (21st March, 1918)—hour of assault: 9:10 A. M.
- 2 hours 20 minutes on the Aisne (27th March, 1918)—hour of assault 3:40 A. M.—density of artillery particularly great.
- 3 hours 45 minutes on the Matz (9th June, 1918)—hour of assault 3:45 A. M.

(9) The troops designated for the Battle of Riga (8 Infantry Divisions, 2 Cavalry Divisions) were held during the major part of the month of August in a region 120 kilometers away. There they were trained for the operation entrusted to them. They took their place on the field of battle only the evening before the assault, the 31st of August.

(10) Examples: The battle of Cambrai, the counterattack by the French 10th Army the 18th of July, the counterattack of Mangin's Army the 11th of June on the Matz, etc.

The Franco-Americans even successfully launched, the 8th of October at Verdun, an attack without tanks and without artillery preparation. But breaching fires had been executed during the preceding days, and at this time the morale of the Germans had become sadly shattered.

ARTILLERY PREPARATION FOR ATTACKS

4 hours	in the Champagne (15th July)—hour of assault 4:45 A. M.
None	Counterattack of the French 10th Army with tanks (18th July)—hostile position of little solidity.
1 hour 30 minutes	Counterattack of the French 6th Army with tanks (18th July)—hostile position of little solidity.
5 hours	French attack in the Champagne (26th September)—hostile position very strong.

It is to be noted that in the battles of 1918 the Germans almost always started the preparation about midnight so as to be able to attack at daybreak. They operated thus in order better to surprise their adversaries, and to make a long day available for the attack which they wished to go to as great a depth as possible with the greatest ease.

The duration of the preparation was in accord with the following principles, as set forth in the French Instruction on the Tactical Employment of Large Units (Article 189):

"Artillery preparations comprise fires as violent as possible—the duration of which varies from several minutes to many hours, according to: the nature (resistive strength) of the defensive works to be taken, the material and moral state of the enemy, the presence or absence of tanks and the quantity of artillery available. . . . When it is desired to secure the benefit of surprise and tank units in sufficient numbers are available, or when the enemy already is shaken and poorly covered by obstacles, the preparation *could* be very short, or even dispensed with."

Evidently the *nature* of the desired results determines whether the preparation should last two to ten hours, or even three to twelve days.

Material destruction required *lengthly* preparations — and this was seen to be true of the Battle of the Somme—because such destruction was so difficult to obtain. *Short* preparations have principally for their object the *neutralization*, the *paralyzing* of the enemy whose *momentary moral breakup* is sought. This object was attained by the number of batteries engaged and by the rapidity of their fire, by a large proportion of heavy calibers, by the employment to a great extent of toxic shells.

The density of the attacking artillery was greater than before

THE FIELD ARTILLERY JOURNAL

1917 and sometimes reached that of the limited objective attacks as at La Malmaison (11).

The proportion of toxic shell was much increased. At Riga the initial stockages of the batteries were:

77 mm. Batteries 2,300	toxic shell..... 600	high explosive shell
Light Howitzers.....	1,200	toxic shell..... 500	high explosive shell
Heavy Howitzers....	700	toxic shell..... 300	high explosive shell
10 cm. Cannon	800	toxic shell..... 500	high explosive shell

The initial preparation was executed over a great depth (10 to 12 kilometers), thanks to the number of batteries deployed, to their great range, to their increased rate of fire. The opening act of the battle sought, in reality, the taking of the whole of the most solidly organized ground and the capture of the mass of the hostile batteries in order to facilitate a final rapid progress over terrain incompletely or but slightly organized.

During the preparation, the infantry moved up to assaulting distance (200-300 meters) of the hostile first line, which was attacked in a generally dense formation. It was preceded by a rolling barrage advancing slowly (100 meters each 4 or 5 minutes), with prearranged halts between successive objectives. In these barrages there was a strong proportion of smoke shell: thus the assault troops were not seen by the hostile sharpshooters and artillerymen until they had arrived a few meters from them.

The neutralization of observation and command posts, already begun during the preparation, was continued, as was that of the batteries. Harassing and interdiction fires were placed on the rear areas of the defense in order to hinder the arrival of its reserves on the field of battle.

The German artillerymen continued all these fires up to the Firing Tables maximum range, (diminished by 5 per cent only)—which requires very accurate materiel. In certain cases, from the same battery emplacements barrage fires were continued to a range of 6 to 8 kilometers according to the ground.

The progress of the assault was as rapid as possible. Through

(11) In the German offensives of the first six months of 1918, the density of the artillery was one piece per 8 to 11 meters of front. At Riga were deployed opposite the front of attack which measured 4,500 meters only; 175 batteries, say 35 per kilometer; and 550 trench mortars, say 120 per kilometer. In each division sector an average of 22 heavy batteries of which one third were long range weapons were engaged.

ARTILLERY PREPARATION FOR ATTACKS

the fortified zone, the Germans obtained a series of passages, or corridors, by carrying the centers of resistance which guarded them. They pushed forward briskly. They fanned out, overran the final resistances, caused the fall, by outflanking maneuvers, of the parts of the front line which they had not been able to take at the first rush, and whose occupants, seeing the assailant at their rear, fell back or surrendered.

The command of the enormous mass of batteries of the attack was *centralized* in the hands of the commander of the army artillery at the beginning of the battle, for as long as it was a question of breaking a strongly fortified front, while operating according to definite information, with the aid of a complete network of communications.

It was *decentralized* when a tactical result, previously determined on, had been obtained; that is to say when the infantry had reached a predetermined terrain line. At Riga, the decentralization took place after the capture of the second position. In this second phase of the battle the defender was already considerably weakened by his initial check; the tactical situation was subject to rapidly improvised changes; and communications were not to be relied upon. Then the advance was directly supported by the organic artillery of large units, reinforced by some heavy batteries, and the mass of the heavy batteries designed for the actual rupture passed into the fire reserve at the disposal of the supreme command.

* * * *

OBSERVATIONS ON THE ATTACK OF ZONES

Because it retains the initiative in operations, that is to say the *priority of decision*, the attack can, thanks to the secrecy of its preparatory measures, gain over the defense *a headstart of two or three days in the concentration of forces*. This jump is a factor in strategic surprise. It gives to the assailant an overpowering superiority of force, for he has before him at the beginning only the reduced number of effectives habitually occupying the stabilized sectors. Thus he succeeds in taking and crossing the first two fortified positions, the strongest ones, before the defender has had time to reinforce them.

In execution, this sudden rupture of fortified fronts is based

THE FIELD ARTILLERY JOURNAL

on *power, tactical surprise, rapidity*, and on *an exact knowledge of hostile dispositions*. It has succeeded, although the methods employed require such a delicate touch that success is at the mercy of luck. One time only did the breakthrough fail. That was in Champagne the 15th of July, 1918. The Germans lost surprise, and the French 4th Army, warned, withdrew in time a distance of several kilometers to a new position of resistance organized a long time before, on terrain easy to entrench.

But if, at the beginning, the breakthrough battle almost always succeeds, it has, nevertheless, never resulted in victory.

When its front once is pierced, the defense early succeeds in organizing resistances with resources which although at first only local, are such that the exploitation divisions are unable to break them with their light and medium (77 and 105 mms) artillery; the support of 15 cm howitzers, of 21 cm mortars, and of counterbattery cannon is necessary. The forward displacement of the artillery, the carrying of munitions across the torn up terrain, momentarily halt the attack. The fatigued infantry must be relieved. But the least respite gives the defense time to bring up its reserves, which can be more numerous as communications facilities are better.

When the defense succeeds, in spite of lack of means, in installing a *continuous* line of cross and flanking fire of automatic weapons, even though supported only by light batteries, the terrible power of modern armament reveals itself brutally; and at the same time the tactical superiority of the defensive over the offensive is apparent. The initial surprise has thenceforth ceased to bear fruit.

Sooner or later, all attacks were thus stopped.

In order to continue the battle it became necessary: either to break the new wall of organized fires, and for that purpose to bring together ahead of time means formidable especially in artillery and ammunition (this is what the Germans did)—or to extend the wings of the initial front of attack (this is what the Allies did). For this purpose the Germans used their reserves dangerously; on the other hand the Allies succeeded in rolling back their adversaries *slowly* by wider and wider frontal attacks, renewed sometimes in one place, sometimes in another, over an

ARTILLERY PREPARATION FOR ATTACKS

extended front. *But the decisive, blasting, overwhelming victory of past wars could not be obtained.*

For this mediocre success of the military art various remedies have been proposed.

* * * *

IN PURSUIT OF THE DECISIVE VICTORY

Ever since the end of the war we have been busy analyzing the causes of that failure of the military art, and in seeking remedies.

The most noticeable of all was the slow progress of the infantry after the rupture of the front. It is thought that if the assailant had been able to advance more briskly, the constantly buffeted defender would not have been able to establish a new zone.

General von Seeckt, former commander of the Reichswehr and more recently a populist deputy to the Reichstag, said in a conference on modern armies:

"War will commence with attacks by both aerial forces. . . .

"To disturb the mobilization of personnel and of materiel will at that time be one of its principal missions. . . .

"Whichever of the two adversaries shall have been victorious during this first act of the war will seek by the superiority of his armament, of his information, of his mobility, to prevent the mass of the hostile armies from deploying its forces and especially to prevent *the possibility of his setting up continuous defensive fronts.*"

The German general thus sees the following remedies:

- 1—Preliminary action of the aviation;
- 2—High quality of the army, and of the value of its instruction;
- 3—Superiority of its armament;
- 4—Great mobility.

We shall examine only the 3d and 4th points.

Previously, in the directive of July 12, 1918. General Foch had thus expressed himself:

"The infantry must be persuaded that it is furnished with armament which permits it to exploit its initial successes and to pursue its forward movement by reducing local resistances by its own means, without the action of the artillery. . . ."

But the facts did not justify that confidence at all. The infantry was insufficiently armed; it did not possess accompanying

THE FIELD ARTILLERY JOURNAL

cannon; its supply was not certain; it could not replenish its cartridges, its grenades, the bombs of its few still imperfect Stokes mortars. It always had to call on its artillery.

An official note written the day after the armistice observed with considerable truth:

"So long as the problem of the *tactical mobility* of the artillery is unsolved, the army which has broken the hostile front will see its infantry supported solely by a small fraction of its batteries, themselves poorly supplied with munitions. Liaison between the arms, thanks to which the initial success will have been obtained, will be succeeded by a dissociation of the arms, which will prevent the realization of unified exploitation. That army never will obtain any except limited successes.

"When, on the contrary, the light and heavy artillery can follow as a whole over all terrain with the same speed as the infantry, with its supply assured, liaison between the arms will be maintained, and consequently the faculty to renew efforts without cessation and without allowing the adversary the time to recover himself, the possibility of maneuver, and finally the ability to push the exploitation to its farthest limits will be assured. Then, without exaggeration, will reappear *great decisive victories*. . . ."

In accordance with the immediate experiences of the war, the means to be employed are:

1—Combat aviation which disturbs the deployment of forces, harasses the enemy by fire, retards or prevents the methodical formation of defensive fronts;

2—Mobility, which is dependent on the battle field above all upon fire superiority; hence, among other things the attachment to the infantry of light curved-fire accompanying cannon and the perfection of artillery technique (range, precision, rapidity of fire); and on the motorization of at least part of the light artillery and all of the medium and heavy artillery and the supply and munition trains;

3—The perfection of communication apparatus in order to facilitate the exercise of command, and infantry-artillery liaison.

All these remedies are limited on the whole to the assuring of a more permanent, massive, diligent and opportune employment of the artillery projectile.

But, the field gun is not well fitted for the destruction of the

ARTILLERY PREPARATION FOR ATTACKS

small objectives offered by the infantry automatic arms; its explosive shell is only fairly efficient for the destruction of entanglements and wrecking trenches, and is unsuited for use against deep dugouts; as an agent of neutralization it is less efficient than the gas shell whose employment has been tabooed. Thus the means praised above run the risk of being insufficient.

As during the war, it will be necessary to replace cannon by the tank, which alone is capable of combatting automatic weapons at close range after having crashed entanglements and crossed trenches.

But in 1918 the tank was still in its infancy. Being able to execute on roads only very short marches at exceedingly slow speed, and thereby wearing out the roadways and causing the deterioration of its own tracks, it had to be brought up by rail to the vicinity of its place of employment. This complicated and slowed up its entry into action considerably; by its extreme slowness over varied and too rugged terrain, it offered to the artillery an easy target; it was incapable of protecting itself against antitank cannon, of which the most dangerous fired from flank emplacements with ranges much greater than those of its own armament; its inherent limitations of vision were such that it was practically blind.

But in 1918 there had already appeared a heavy tank, designed to act in combination with the light tank (12).

The latest French Instruction (24th January, 1929) on the employment of tanks, states:

"The *light* tank weighs 7 tons. . . .

"On account of the difficulty of vision and of the particular conditions of service in the interior of tanks, the useful ranges are of the order of:

"400 meters for aimed fire of the 37mm cannon and machine guns;

"250 meters for aimed fire of the 75mm cannon (shortened cannon with which some tanks are armed). . . .

"The light tank is suitable to take part, in liaison with the infantry, in the various phases of the battle from the initial contact to the exploitation.

(12) The two models of tanks were employed in liaison for the first time, probably, in the course of the counter attack of 18 July, 1918, on the west flank of the Chateau-Thierry pocket.

THE FIELD ARTILLERY JOURNAL

"The heavy tank weighs 70 tons (13). . . .

"Its armament consists of a 75mm cannon in a turret, and 4 machine guns; . . . good conditions of visibility permit it to use its cannon and its machine guns up to ranges of 1,000 to 1,200 meters.

"The command employs it:

"—for taking positions very strongly fortified, or covered by natural obstacles;

"—for fighting against the automatic weapons which, not weak enough to be neutralized by infantry fire, are found at the same time out of the radius of action of the light accompanying tanks;

"—for the *protection of light tanks* against anti-tank weapons and hostile tanks.

"On the heels of a successful attack, *heavy tanks can penetrate deep* into the hostile dispositions in order to exploit the disorganization of the enemy, *by destroying his batteries*, his organization of command and of the defense, and *by attacking his reserves*.

"On the defensive, the 2C tank can be used for attacking hostile tanks having penetrated deep into the defensive dispositions."

To sum up, the light tank is an accompanying weapon for the infantry; the heavy tank serves eventually for making the breach; above all it is used for the protection of the light tank and for the deep exploitation after an initial success.

The regulation previously cited says in addition:

"When the formation of the ground favors the installation, by the enemy, of long range flanking fires and when the intervention of hostile tanks is to be feared, it is always well to plan the use of heavy tanks. . . .

"The presence of heavy tanks *ahead* of the light tanks constitutes the best protection for the latter."

But in order to practice with ease the tactics as written in the regulations, it would be necessary that:

1—The tanks be freed from rail transportation, which, necessitating prevision and organization several days in advance, excludes all rapid entry into action and makes surprise more difficult;

2—Their speed be much greater than that of the two French tanks; the light model of which has a speed of 3½ kilometers

(13) Here reference is to the new tank, called the 2C, introduced after the war. We do not mention the "medium tank," a hybrid machine very inferior to the heavy tank.

ARTILLERY PREPARATION FOR ATTACKS

per hour on the road and 2 kilometers on the battle field, the heavy model, 10 and 5.

The enemy likewise will use tanks and for the same purposes.

It can thus be seen that *the battle of tomorrow will begin with a struggle between heavy tanks.*

It is also believed that, in order to seek out the hostile tanks, to pursue and to destroy them, it would be handy to have a self-propelled cannon on tracks; of a caliber of 90 to 100mm; with greater speed than the two types of light and heavy tanks; partially shielded; transporting an initial supply of armor-piercing projectiles, as well as its serving personnel.

The artillery, obtaining its information from the aviation, will strive to take part in this struggle. In the future it will employ a larger proportion of long-range cannon than in the last war. The future infantry accompanying cannon, the field gun and the heavy cannon up to caliber 105, ought to be given armor-piercing projectiles. Tanks spotted while moving rapidly ought to be *demolished with one single shot.* Admitting this necessity, and the increasing thickness of the armor which will be of steel more and more resistant, the anti-tank machine-gun no longer will have any value.

Finally, a fast tank seems indispensable for the commanders (Brigade and Division), in order to permit them to get into the middle of the battle, to judge the circumstances of the combat for themselves, and no longer by the intermediation of terrestrial and aerial observers.

(THE END)



THEY DON'T SPEAK OUR LANGUAGE —BY WEBSTER

I'M ON MY WAY TO H.Q. TO MEET MY P. AND T.O. FOR A LITTLE CHIN ON LOGISTICS. WE'RE GOING PORTEE. R.O.T.C., C.M.T.C. AND N.G. COME IN TO-MORROW AND TAKE OVER THE OUTFITS, HOPE THEY GO EASY ON THE LEAD PAIR FROM NO. 1 GUN OR WE'LL HAVE ANOTHER RUNAWAY

WHAT HAPPENED? SWING AND WHEELERS RIDE UP TOO CLOSE?

I GUESS THAT'S WHAT STARTED 'EM. ANYHOW, THE LUNETTE SNAPPED, THE TRAIL DROPPED AND THE SPADE DUG IN. THE CAISSON LEADERS ALMOST WENT STRAIGHT UP IN THE AIR. THOUGHT WE'D GOT G.R.F.'S ABOUT NOW BUT INSTEAD WE'RE MOUNTING 37'S ON THE TUBES OF OUR '75'S

WHAT KIND OF TRAJECTORY WILL YOU GET?

YOU CAN HIT A G.I. CAN AT 3000 WITH ABOUT 3 ROUNDS. YOU CAN HARDLY HEAR 'EM POP, THOUGH AT THE C.R. OR O.P. I PUT ON A NEW TOP KICK TO DAY, THE LAST ONE WENT A.W.O.L. AFTER A SQUABBLE WITH ONE OF THE N.G. SHAVETAILED, OR SO MY STRIKER TELLS ME

THE LEAD DRIVER ON NO. 2 GUN PULLED A RIGHT OBLIQUE ON AN ACTION RIGHT TODAY AND IT TOOK HIM UNTIL MARCH ORDER TO GET THE TRACES UNTANGLED

WHAT DO YOU SAY WE LOOK IN ON THE 37th INFANTRY DANCE?

HOW GOES THE DRILL THESE DAYS?

NOTHING DOING! ALL THEY KNOW IS RIFLES AND PUP TENTS. THEY DON'T SPEAK OUR LANGUAGE!

GLOSSARY OF ARTILLERY TERMS
 H.Q. ----- HEADQUARTERS
 P.&T.O. ----- PLANS AND TRAINING OFFICER
 LOGISTICS -- SUPPLY & MOVEMENT OF TROOPS
 PORTEE ----- ARTILLERY CARRIED ON TRUCKS
 R.O.T.C. ----- RESERVE OFFICERS TRAINING CAMP
 C.M.T.C. ----- CITIZENS MILITARY TRAINING CAMPS
 LEAD, SWING, WHEEL --- THE THREE TEAMS OF HORSES
 N.G. --- NATIONAL GUARD PULLING A GUN
 LUNETTE --- EYE AT END OF GUN UNDERCARRIAGE
 G.R.F. --- 6 INCH GUNS BY WHICH IT IS PULLED
 TRAIL ----- REAR END OF GUN CARRIAGE
 SPADE ----- PART OF CARRIAGE WHICH DIGS IN TO STOP
 STRIKER ----- OFFICER'S SERVANT RESCUE
 37-75 --- MILLIMETER SIZES OF FRENCH GUNS
 G.I. CAN --- GALVANIZED IRON RUBBISH CAN
 C.R.-O.P. --- COMMAND POST, OBSERVATION POST
 TOP KICK ----- FIRST SERGEANT
 SHAVETAILED ----- SECOND LIEUTENANT
 ACTION RIGHT } GUN DRILL COMMANDS
 MARCH ORDER }

Copyright 1933. New York Tribune, Inc. Courtesy Washington State

FRENCH ARTILLERY DOCTRINE

(Sixth Installment)

(The following is a digest by Major John S. Wood, F. A., of the course in artillery given at the Ecole de Guerre under the direction of Colonel de la Porte du Theil. Major Wood was a student there in 1929-1931.—EDITOR.)

PART III

ARTILLERY IN THE DEFENSIVE

SECTION II—ORGANIZATION OF COMMAND

NOTE: The French division artillery provides three battalions of 75 (36 guns) and two battalions of 155 (24 howitzers) for the support of 3 regiments of infantry. Although it contains a greater number of guns in proportion to infantry than our division artillery, it has fewer regimental and battalion headquarters and far less headquarters and communications personnel. Hence the organization of command to conform to various maneuvers of fire presents a more difficult problem to them than to us. The principles involved merit consideration, nevertheless, for we have similar problems in the constitution of groupments and the assignment of reinforcing artillery.

GENERAL AND DIRECT SUPPORT

The organization of artillery command for any defensive operation depends on the maneuver of fire involved, of which the principal phases are the counterpreparation and the main defensive barrage. Counterpreparation fires are established ordinarily by division or corps commanders and require no special distribution of command to insure their execution. Defensive barrages, on the contrary, depend strictly on the assignment of guns to subsectors, and the command must be organized accordingly. Every gun must be engaged, and the fire must be arranged in advance, for the crisis is sudden, violent, and very short. However, since the situation may change suddenly, both the artillery allotment and the prearranged fires must be susceptible of rapid modification.

Naturally, at the beginning of an assault, the defending infantry sends up calls for fire all along the line. After a time, however, the form of the attack becomes more apparent. Certain regions of the defense are menaced more than others, and it is at these points that the reserves must act in order to reestablish continuity of front. *The first reserve immediately available is the fire of artillery.*

Therefore, as in the offensive, part of the division artillery is placed in direct support at the disposal of infantry sector commanders, while the remainder is kept in general support to facilitate rapid intervention by the division commander. The amount of artillery in these two categories is by no means invariable. The 155 howitzers are usually placed in general support on account of their range, their greater radius of action, and their relative

THE FIELD ARTILLERY JOURNAL

slowness of fire. The assignment of 75s is based on the principle that at least one battalion must be allotted to each regimental sector in order to provide a sufficient artillery staff for handling the direct support missions. Beyond this, the amount of light artillery assigned in direct support depends on the situation, the reinforcing artillery available, and the front to be covered. The last factor has great weight in the decision. For example, a battery of 75s has a maximum effective range of 9,000 meters and can cover 60° of front. Hence, when the division front is not greater than 9 kilometers, as large a groupment of 75s as possible should be kept in hand to support the defense at any point along the front. The staff provided should be sufficient to handle any missions incident to the entry into action of the division reserve.

The plans of fire must provide for keeping up the necessary defensive barrages, even though the artillery in general support is withdrawn for other missions. The 155s offer no difficulty in this regard, but the disposal of the 75s in general support is not so simple. They may be placed either on the less important portions of the front or be superimposed on the zones covered by the artillery in direct support. Generally, a combination of the two arrangements is employed.

A question arises as to the employment of the light artillery regimental commander when his battalions are all assigned to direct support missions. Undoubtedly, the division commander acts directly through the various groupment commanders, but the regimental commander still has an important part to play in coordinating observation and communication between his battalions and in supervising ammunition supply. He also holds himself in readiness to execute any change in assignment or any displacements of his units, and to take over the direction of fire when necessary.

The application of fire to meet the fluctuations of combat is a delicate affair and is best left to the commanders of groupments in direct support. Through them pass the orders to the artillery in general support for fire within their sectors. They alone are able to follow the infantry combat at close hand.

The communications net linking up the various artillery units

FRENCH ARTILLERY DOCTRINE

is extensive, and considerable time is required for its installation. The importance of the artillery net in the defensive is paramount, and *the possibilities of artillery fire depend to a large extent on the time allowed for its installation.*

The division commander determines what portion of the artillery in direct support is to be made available to answer calls for fire from the outpost. Artillery missions beyond the combat zone of the outpost are too wide in scope to be handled by the division and are assigned by the commander of the corps artillery to corps groupments. The latter are reinforced when necessary by units of division artillery.

To sum up, the steps in defensive maneuver of fire and the resultant organization of command are as follows:

1. Distant action, participated in by both corps and division artillery and directed by the corps artillery commander.
2. Attacks by the division artilleries of all enemy units coming within their zones of action. Counterbattery begins as directed by corps orders.
3. Counterpreparation—division commanders utilize both division and supporting corps artillery in order to break up the impending attack.
4. Barrages to break up the assault—all artillery at the disposal of infantry regimental commanders.
5. Readjustment of missions as the attack develops—division commanders regroup their artillery to constitute as strong a force as possible in general support and maneuver the reinforcing fire as demanded by the situation. Counterbattery is continued by the corps artillery.

DEFENSE AGAINST TANKS

The problem of defense against tanks will become increasingly important as the tank is improved in speed and armor. The methods in use at the end of the war against the slow and relatively vulnerable tanks of that period will avail little against a modern light tank of the Vickers type travelling at 20 kilometers an hour across country, or against the heavier models with 1.6 inch armor and speeds of 12 to 15 kilometers an hour.

The speed of the modern tank places it beyond the reach of massive artillery concentrations. An effective barrage against

THE FIELD ARTILLERY JOURNAL

tanks would require an impossibly large number of guns. Reliance must be placed on direct fire from individual pieces. This means special anti-tank guns, for the present field gun fires and traverses too slowly to be effective.

Heavy 20 to 25mm machine guns and small 25 or 35mm cannon have been designed to act against light tanks. These guns must be automatic or semi-automatic in order to deliver a sufficient density of fire. Naturally, such guns are infantry weapons and should be an organic part of infantry units, not only for defense against tanks but also for defense against the armored vehicles of mechanized cavalry.

Against heavily armored tanks any sort of machine gun is ineffective. A rapid firing field gun of 50 to 80mm caliber is required. These pieces must either be very mobile or be installed in large quantities along the front. As the expense involved will hardly permit the manufacture of large stocks of such weapons, the solution appears to lie in providing mobility and protection by means of self-propelled mounts and armor. The gun then becomes a tank itself, which points to the conclusion that the tank is perhaps the best weapon against tanks.

The fact that the speed of tanks is their main protection suggests the countermeasure of slowing down this speed by the employment of obstacles, so that the defending artillery may regain its power of action against tank attacks. Study must be directed toward devising an easily transportable obstacle capable of slowing down tanks and at the same time of being rapidly installed by infantry.

SECTION III—MANEUVER OF MATERIEL

DEPLOYMENT

The principal defense missions of the division artillery are counterpreparation and the main defensive barrage. Counterpreparation deals with deliberately prepared and unobserved fires, and hence may utilize maximum effective ranges (8,000 meters for the 75 and 9,000 for the 155 howitzer).

In the case of barrage fires, however, the light artillery must be placed not more than 5,000 meters nor less than 1,500 meters from the main line of resistance in order to fire effective concentrations with safety for the defending infantry. In general, light batteries occupy positions within a mean distance of 2,000 meters

FRENCH ARTILLERY DOCTRINE

in rear of the main line of resistance, but a certain portion must be emplaced a like distance in rear of the regimental reserve line if well adjusted fires are desired throughout the battle position.

There are, however, other defensive artillery actions to be considered. The outpost troops must not be left without support, even when their mission is one of surveillance only; and in the case of outpost missions of resistance, the proportion of light guns in support becomes considerable. Moreover, the importance of observed fire during the enemy approach must not be overlooked. To be effective, such fire requires ranges of not more than 5,000 meters and the emplacement of batteries close to their observation posts.

Since the regulations prescribe in principle that all artillery shall be covered by the battle position, it will be seen that a conflict exists among the various requirements. Of course, the differences could be adjusted by movement of guns from forward to rear positions in conformity with the enemy advance. It must be remembered, however, that no extensive displacements can be counted on after combat begins. The movement of ammunition alone would be practically impossible. Batteries once emplaced in the defensive generally remain in the same positions throughout the combat.

The decision as to the proportion of artillery to be emplaced for carrying out the various missions can be made only by the division commander. In practice, he first arranges for the defense of the battle position, and then indicates his wishes in regard to long range fire and outpost support. The division artillery commander deploys the artillery accordingly.

The light artillery must deploy in depth in order to fire effectively throughout the zone covered by its missions. The necessary echelonment of units may be either by battery or by battalion. The first method lends itself to better direction of fire in depth by the battalion commander, but it does not facilitate rapid concentrations of all three batteries on the same target. It is used when a single battalion is assigned to an infantry sector as supporting artillery. In case a regiment or a groupment of battalions is so assigned, the echelonment is usually by battalion. It is also by battalion in the case of light artillery in general support. The

THE FIELD ARTILLERY JOURNAL

howitzers present no such problem of deployment since their range is greater, their fire more precise, and their missions less rapid and less frequent than in the case of the light guns. They are placed by battalion, well in rear of the battle position.

Defensive deployment of artillery is much less capable of change than offensive deployment. Hence greater care must be taken not to disclose battery positions to the enemy. Of course, all batteries cannot remain silent until the enemy reaches the battle position, but the amount of artillery put in action prior to this time must be reduced to an absolute minimum and definitely prescribed by the division commander. Effective long range artillery combat requires observation of fire. The heavy batteries engaged in long range fire are kept at a strict minimum, since they are not readily displaced and must fire from their normal emplacements. Therefore, greater dependence must be placed on roving batteries of light artillery, firing from positions near their observation posts.

If possible, each battery should have an alternate position. Ordinarily, this is not difficult to provide since there is little crowding of artillery in a defensive situation. Nevertheless, these alternate positions are relatively close to the normal emplacements, for large changes would create tremendous difficulties in displacement of ammunition and in rearrangement of communications. Even the limited displacement indicated here is only possible in stabilized situations.

OBSERVATION

Groupments in direct support must be able to observe fire throughout the battle position. This requirement leads, ordinarily, to a selection of three sets of observation posts, viz., one covering the approaches to the main line of resistance, one covering the interior of the position, and one covering the terrain in rear of the regimental reserve line. One battalion can man three observation posts. These might be assigned within the battalion zone on the three lines indicated. The problem, however, is not usually so simple. Observation posts for one groupment must often be located in the zone of another, and the commander must prescribe the installation in considerable detail so that no gap will be left in the system.

FRENCH ARTILLERY DOCTRINE

The artillery in general support, in order to cover an entire division front with its own observation, would have to man more observation posts than its equipment permits. Hence the division artillery commander must designate certain OPs to observe for both direct and general support missions.

COMMUNICATIONS

Artillery should have under its own control sufficient means of signal communication to link up the firing batteries with command and observation posts and with the supporting units. The limited signal equipment of the French artillery permits this within the battalion, but it is not sufficient to provide communication from battalion to higher headquarters, or between battalions. For these installations, recourse must be had to the division net, in which a separate circuit is usually reserved for the artillery.

SECTION IV—ARTILLERY IN SPECIAL PHASES OF DEFENSIVE ACTION

The object of warfare is to destroy the enemy. This demands offensive action. However, the will to attack is not sufficient. The means must be provided, which implies at times a defensive attitude at certain points in order to release effectives for use at other points. The defensive attitude must be considered as only a temporary expedient for two reasons. On the one hand, the defender is determined to resume the offensive at the earliest possible moment; on the other hand, the attacker is determined to dislodge and rout the defending forces who oppose him.

The resultant special operations, growing from the defensive, may be classified as follows;

1. General counteroffensives, such as the allied offensive of July 18, 1918. The artillery action involved is purely offensive and requires no additional comment.
2. Counterattacks to eject enemy forces that have penetrated the defensive lines at critical points.
3. Deliberate withdrawals to gain time in order to concentrate sufficient forces to resume the offensive. This is the maneuver in retreat.
4. Forced withdrawals during which the first concern is that of restoring order among the units involved, so as to resume the defensive or to organize a maneuver in retreat.

THE FIELD ARTILLERY JOURNAL

Consideration of the part played by artillery in counterattack, withdrawal, and retreat is necessary to complete our discussion of artillery employment in the defensive.

COUNTERATTACK

Counterattacks may be either small affairs, delivered on the initiative of infantry sector commanders to reestablish their lines, or larger scale attacks executed by division or corps reserves with organized artillery support. Artillery support of this nature is rarely practicable in the first type of counterattack, which is the immediate and instinctive reaction of small infantry reserves. In such cases, the confusion is too great and the time too short for deliberate organization of supporting artillery fire, although invaluable assistance may be rendered at times by artillery battalion or battery commanders who can intervene with fire as a result of their own first hand observation—an added argument for close artillery observation of the entire defensive terrain.

The second type of counterattack is usually a division or corps operation. It is an attack with limited objectives to reoccupy essential portions of the hostile position or to regain crests which give the enemy observation or cover for his maneuver. These critical regions are known in advance, and the general form of the counterattack may be planned accordingly.

The time for the attack and its direction cannot be foreseen. Evidently the most favorable moment is when the assaulting enemy becomes disorganized and the balance of combat inclines toward the defender. This implies the reestablishment of coherent and continuous fire by the defending infantry and the temporary ascendancy of the defending artillery which may be due either to the displacement of enemy artillery or to the concentration of more defensive guns on the region of the counterattacks. Artillery support is an essential factor for success.

The same factor influences largely the direction of the counterattack. Undoubtedly, an attack against a flank of the pocket occupied by the enemy would be most advantageous to the defender, but this is often impossible owing to the fact that the supporting artillery must be deployed in the axis of the attack. Time does not permit changes of position, for the favorable conditions of counterattack are fleeting and the defender must act rapidly.

FRENCH ARTILLERY DOCTRINE

Counterattacks by the reserves of front line divisions must rely ordinarily on the division artillery as originally emplaced. Consequently, such attacks are directed against the base of the pocket instead of its flanks. On the other hand, counterattacks executed by second line divisions or supported by reinforcing artillery from the proper direction may be oriented against a flank, the remaining artillery assisting with fires of protection and counterbattery from its original emplacements.

The first requirement in executing a counterattack is to limit further extension of the pocket which the enemy has created in the battle position. In consequence, the commander first employs his artillery to cover the flanks of the pocket. This is the normal role of the artillery in general support and, also, of the artillery in direct support of the sectors on each side of the region affected.

This condition once assured, the artillery then seeks to prevent the enemy from reinforcing his assault units. The action required may be either interdiction or counterbattery. In either case, it must be systematic, and it is executed ordinarily by the corps heavy artillery, since the division artillery is usually busy at this time in preparing its support for the counterattack.

The supporting fire required conforms to the ordinary rules for an attack. Above all, it must be simple in its execution. To assure directness and simplicity of action, the supporting artillery command must be organized immediately—an added reason for retaining staffs and units of light artillery in general support. The support consists of successive concentrations, reinforced by protective fire on the exposed flanks of the attack. A definite preparation is not indicated usually, as the enemy positions are only vaguely known and ammunition is scarce. However, a certain amount of covering fire must be placed ahead of the advancing infantry; and this, together with the fire of machine guns, serves automatically as a preparation. Counterbattery becomes particularly important, as the counterattacking assault lines must advance rapidly toward their objective without much regard for cover. At this time, losses are more to be expected from enemy artillery fire than from fire of the disorganized enemy infantry.

THE FIELD ARTILLERY JOURNAL

MANEUVER IN RETREAT

The maneuver in retreat is a delaying action by successive echelons, each withdrawing when the one in rear is in place ready to cover the movement and take up the defense. Command must be decentralized and each echelon must be provided with attached artillery.

Fire must be brought to bear on the enemy at as great a distance as possible from each position, and the successive positions must be evacuated before coming to grips with the attacker—hence the absolute necessity for artillery, acting at the extreme limits of its effective range. The positions, chosen with this in mind, should furnish good terrestrial observation for artillery fire, for in this situation planes and balloons for aerial observation can rarely be furnished.

All available artillery ammunition will be utilized for distant action and none held out for close defensive barrages. The 105 and the 75 firing long range shells are the calibers best suited to this action. In exceptional cases, certain long range material of the units in the rear echelons may be able to augment the fire from forward positions. Evidently, the artillery fire will be supplemented by long range fire of machine guns whenever possible.

In delaying actions, the full initiative of subordinate artillery commanders comes into play. Each battalion has its zone of action and its battery sectors within which the battery commanders fire rapidly on any observed targets.

RETREAT

The retreat differs from the maneuver in retreat in that it is a forced withdrawal under pressure from the enemy and, consequently, attended with inevitable disorder and confusion. The reestablishment of order is imperative. Time and space must be gained for regrouping the disorganized units. There is no question of distant action nor of coherent and continuous effort—the enemy is at hand, and must be stopped at all costs.

In this crisis, the artillery will often fight to its last round in the immediate ranks of the infantry, sacrificing itself when necessary, as it did many times in 1914. Also, in the absence of infantry reserves, it may engage a line of batteries in mass at close range, utilizing continuous fire. The light batteries of the 6th

FRENCH ARTILLERY DOCTRINE

Corps at Vaux Marie in 1914, using direct fire against repeated attacks of German infantry, furnish a magnificent example of such action.

DEFENSE OF WIDE FRONTS

In order to complete this study of artillery in the defensive, the employment of artillery in the defense of unusually wide fronts must be considered. Situations in which divisions occupied far more frontage than that normally assigned them (7 to 8 kilometers) often occurred in the last war and will probably arise in the future.

The defensive front of a modern infantry battalion is not more than 1,000 meters under ordinary circumstances. The power and range of its automatic weapons permit a considerably greater extension, but the organization of command becomes difficult. This question of organization of command is, in fact, the controlling factor in the problem of extended fronts.

The artillery maneuver of fire differs considerably from that of the usual defensive situation. Deliberately prepared mass action, such as counterpreparation fire, becomes impossible. The artillery defensive barrage becomes of minor importance. The barrage of infantry automatic weapons must suffice, and the infantry must realize that it will have to defend widely extended areas of front without the aid of artillery fire.

In this way the artillery can be kept in hand for certain definite classes of missions to be prescribed by the division commander. These may consist of interdiction fire on the most important approaches, concentrations on favorable assembly zones, fire on the terrain most favorable to tank attacks, etc. The artillery command is organized so as to distribute the firing units by battalion or groupment, acting independently of one another for the accomplishment of the missions assigned within their zones of action. They are subordinate to the local infantry commanders, but only for missions of the kind prescribed by the division.

The action of infantry reserves, furnished with rapid transport, becomes of great importance in the defense of wide fronts. Artillery support for such action can be assured only by retaining artillery units in reserve, limbered and ready to move with the infantry which they are to support.

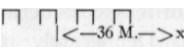
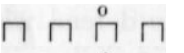
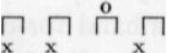
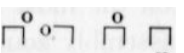
(THE END)

TYPE PROBLEMS

Time Bracket Lateral—Small t

Target Description: Battery in action. *Mission:* To neutralize. *Type:* Time bracket lateral. *Materiel:* French 75, Model 1897. *Visibility:* Excellent. *Initial data obtained:* Shift from base point and range finder range ($r=3600$). R estimated 3200 by comparison. B. C. on the right. $r=3600$, $R=3200$, $T=160$, $r/R=1.1$, $S=5$.

Initial Commands: Base Deflection Right 25, Site minus 5, Corrector 35, No. 2 One Round, 3200.

Commands	Range	Sensings			Remarks
		Deviations as viewed from OP but not announced	Range	Deflection	
	3200		G-	?	Sensed for range on terrain. To get on line $1.1 \times 36 =$ L 40. To stay on line $4 \times 5 =$ L 20 Net shift= L 60
L 60 U 5	3600		A+	+	To stay on line $2 \times 5 =$ R. 10. Bring in the battery when making a 200 yard range bound.
R 10 D 3 BR	3400		G- A? G- G-	-	
L 5 U 5	3500		G- A Target A+ A?	Cor rect	B. C. started with a parallel sheaf as the target had width. Deflection appeared correct so in passing to fire for effect the sheaf was left parallel.
B 2 Rd	3500				



SUMMARY: Errors in initial data—Range, 300 yards; deflection, 55 mils. Time to 1st range—1 minute, 25 seconds. Total time: 4 minutes, 41 seconds. Classification: Satisfactory. A well handled problem.

TYPE PROBLEMS

Percussion Bracket Lateral—Small t

Target Description: Machine gun fire from vicinity of a tree. *Mission:* To neutralize. *Type:* Percussion bracket lateral. *Materiel:* French 75mm, Model 1897. *Visibility:* Good. *Initial data obtained:* Measured shift with B. C. scope and range finder range (3200). B. C. on the left. $r=3200$, $R=3200$, $T=160$, $S=5$, $r/R=1$.

Initial commands: Base Deflection Right 150, On No. 2 close 3, Site 0, Shell Mk. I, Fuze long, No. 2 One Round, 3200.

Commands	Range	Sensings			Remarks
		Deviations as viewed from OP but not announced	Range	Deflection	
R 10 BR	3200	 x	-	-	B. C. partially closed his initial sheaf as the adjusting point is narrow and the probability of obtaining a range sensing is greater when the battery is brought in. Deflection sensed on sheaf as a whole. Deflection is close. Most of effect to left.
	3400	x x x x 	+	-	
R 5 on No. 2 Op. 7. B 1 Rd Zone	3200 3400	Not fired			On No. 3 open 7 would have been a better command.

SUMMARY: Errors in initial data: Range, 100 yards; Deflection, 30 mils. Time to 1st Range—30 seconds. Total time: 2 minutes, 25 seconds. Classification, satisfactory.

HORSE ARTILLERY MOBILITY

BY MAJOR C. L. CLARK, 82nd Field Artillery

THE Field Artillery personnel who have served at Cavalry Posts in the last few years have had the opportunity of witnessing the well planned efforts of the Cavalry to adjust itself to the requirements of the age of motorized transportation in which we live. These efforts have brought to the Horse Artillery the need for consideration of its own similar problem.

Study was begun at Fort Bliss, by a committee of the First Cavalry Division Board, about two years ago, the object being to determine means whereby the mobility of the Artillery of a Cavalry Division might be increased without loss of its firing efficiency. During the course of this study a number of reports have been submitted to higher headquarters, but the final report has not yet been prepared. The committee at present dealing with the subject, is composed of Major L. C. Sparks, 82d F. A., Major J. H. Woodberry, Ord. Dept., and the writer.

As a starting point in its study the committee considered the weights and loads of the existing horse-drawn transportation of the Division, which data are tabulated below:

	Weight Empty	Weight Equipment and One Driver	Weight Loaded and Equipment	Net Load
Escort Wagon.....	2150	2400	4900	2500
Ambulance Type Wagon.....	1760	2000	3000	1000
Mountain Wagon.....	1750	1900	2900	1000
Caisson and Limber with ammunition load (Shrapnel) no personnel on vehicle.....	2400	2600	5000	2400
Battery Wagon and Store Limber, no personnel on vehicle.....	3000	3000	4500	1500

As to the loads which teams are able to pull in difficult terrain, such as found in the vicinity of this station, the committee was influenced by the comments on Horse Artillery and Wagon Transportation found in Preston's "Desert Mounted Corps" as follows:

"A total load behind 6 horses of about 3500 pounds"

"A total load behind 4 horses of about 2400 pounds"

These figures are represented as showing the results of tests and field experience of the British force noted.

The figures quoted are given to show what led the committee to make the attempt described later on, to develop a horse-drawn vehicle having new characteristics. The real need of the Artillery of the Cavalry Division appears to be for horse-drawn

HORSE ARTILLERY MOBILITY

vehicles which will closely follow Cavalry troops. This at times requires movement at rapid gaits, on poor roads and where no roads are found. A comparison of the figures tabulated above indicates that the existing horse-drawn transportation of the Division must move either at a slower rate of march and thereby become separated from the Cavalry in tactical maneuvers or, if it is able to keep up, be very inefficient due to the small loads carried. Vehicles of low pay load capacity can only be compensated for by an increased number of vehicles, more animals, more men and more supplies.

The extent to which overhead—by which is meant the ratio of men, animals and vehicles to the number of guns—has already been built up in the Horse Artillery is a matter of interest. The Tables of Organization for a war strength Battery of Horse Artillery, show the following allowances of animals:

Riding Horses:

Battery Headquarters and reconnaissance and observation agencies.....	36
Four Gun Section	56
Ammunition Section	13
Maintenance Section	18

Total.....	123
------------	-----

Mules	4
--------------------	---

Draft Horses	86
---------------------------	----

Total.....	90
------------	----

Grand Total	213
-------------------	-----

The personnel requirements and ammunition and supply trains are correspondingly large.

The high overhead in the Horse Artillery is due to the fact that the matériel in it is the same as that of the Artillery of the Infantry Division. The additional speed required of the Artillery of the Cavalry Division has been obtained by applying additional power in the form of horses. The figures quoted give reason for the belief that this simple means of obtaining mobility may have been carried too far. In view of the possibilities now in sight of improving matériel it may be possible to decrease overhead and at the same time increase mobility.

To return to the problem of developing an ammunition wagon of new characteristics—since existing types of horse-drawn vehicles appeared not to permit the degree of mobility desired, the committee turned to an investigation of the principles governing the construction of motorized transportation. The horse-drawn vehicles found in the service appeared to be excellent if conditions

THE FIELD ARTILLERY JOURNAL

existing at the time of their introduction into the service were considered, but not good in the light of the developments of this generation. Specifically, the following features found in automobile and airplane construction, seemed to be of possible application; light body and wheel construction to reduce weight, leaf springs to protect the load from damage from road shock, pneumatic tires to lessen ground pressure, roller bearings to reduce friction, and knuckle steering to permit the center of gravity of the load to be lowered.

In pursuing a study of the principles involved, the committee was fortunate in being able to embody the ideas developed into practical working models. Two kinds of wagons were constructed, one with steel tires and one with pneumatic tires. In addition to the vehicles, a new means of packing ammunition and a means of protecting pneumatic tires from puncture were devised. These additional developments were not attempted by choice, but rather through necessity—if the objects of the committee were to be carried to successful conclusion. When later the wagon was turned over to the 82d Field Artillery for tests, further extensions of the original plan were suggested by personnel of that unit. Upon the same chassis several different types of bodies were placed to carry respectively, battery stores, radio and kitchen equipment, including rations and water. Although not a part of the original plan these matters also will be touched upon in the description of what was undertaken.

THE FIRST WAGON

The post wheelwright, a skilled mechanic experienced in wagon construction was placed at the disposal of the committee for its work at times when his regular duties permitted. In a few months a wagon was completed which contained a number of the requirements. A means of packing ammunition was also devised which saved weight and space. At the time this work was performed, no funds were available for experimentation. The work was only made possible by the active interest of the Division Commander, Brigadier General Walter C. Short, and by the labor and supplies from existing stocks, furnished by the Division Ordnance Officer and the Division Quartermaster. The committee was attempting to produce something from available material. Later on, when funds were supplied by the War Department,

HORSE ARTILLERY MOBILITY

a number of improvements were made possible.

The wagon was built from a one ton trailer chassis cut down to appropriate size and provided with wagon wheels in which were installed, in lieu of the wagon hubs, the roller bearing hubs taken from the trailer. An especially designed tongue connection gave the proper height of the tongue for Artillery draft, and a light wooden platform body of sufficient size to carry 15 six round packages of ammunition was provided. Although the importance of pneumatic tires was fully appreciated, these were not installed at this time because it was desired first to observe the results of other changes which had been planned. The wagon however, did, incorporate the following features desired; an empty weight of 1,500 pounds previously specified, a light compact ammunition package, leaf springs, roller bearings, and knuckle steering.

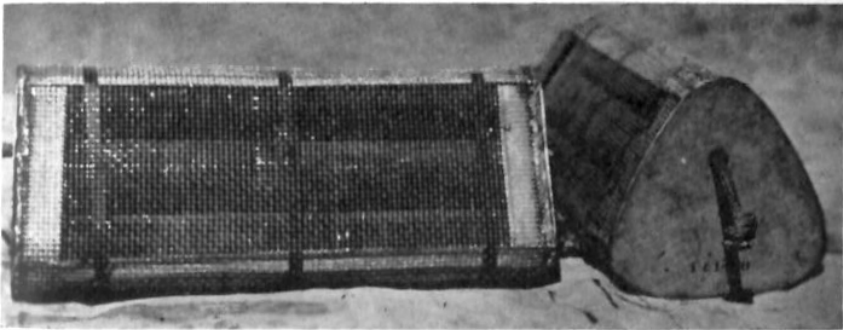


PLATE 1. THE SIX ROUND PYRAMIDAL AMMUNITION PACKAGES

METHOD OF STOWING AMMUNITION

When the first wagon was built it was planned to carry the ammunition in the wooden boxes in which it is normally shipped, and the first tests were made with ammunition in service nine round boxes. But it was soon found that these boxes would break up when handled in the field. The use of four round boxes was then considered. It was soon discovered, however, that ammunition so packed occupied more space per round and carried more tare weight than ammunition in caissons or limber chests. The committee then began experimenting with other forms of ammunition packing. The means finally selected as being most suitable for use in the field, consisted of a six round pyramidal

THE FIELD ARTILLERY JOURNAL

package (Plate 1). The six rounds, each of which was left in its tin or fiber container, were bound securely together with steel bands of the same type commonly used on packing boxes. At first a jute material was placed around the packages to protect the ammunition containers from damage, but later metal—a combination of galvanized sheet iron and hardware cloth—was found to be more suitable. In the metal package, the exterior parts were soldered together, but in such a way that the package might be easily opened in the field without carrying additional equipment for the purpose.

The advantage of the pyramidal package over the rectangular one lies in the fact that the space between round is reduced to a minimum, and the fact that individual rounds, from contact with other rounds, are, to a degree, mutually supporting. It goes without saying that the individual rounds of ammunition must be either mutually supporting, or be contained in strongly constructed boxes and separated from adjacent rounds by spacers. The degree of advantage in the use of the metal pyramidal package described above is indicated by the following comparison of cubic volumes and tare weights:

Cubic Volume of container per round:

Issue 4 round boxes:	540 cubic inches.
Pyramidal 6 round packages:	250 cubic inches.

Tare weight per round:

Issue 4 round boxes:	8.65 pounds.
Pyramidal 6 round packages:	3.33 pounds.

In the construction of the wagon which was designed to carry 90 rounds of ammunition, the saving in the cubic volume of the wagon body obtained by the use of the six round pyramidal package instead of the four round box, amounted to 15 cubic feet. A considerable reduction in weight was made possible due to the smaller dimensions of the wagon. The savings in the tare weight of the ammunition load was about 450 pounds. The economies shown are the elements which led the committee to consider the ammunition package as a part of the wagon design. Among other possible advantages in this means of packing may be mentioned: ease of quantity production, durability, absence of fire hazard, and the fact that the raw materials used are so inexpensive that the salvage of containers will be unnecessary in time of war.

HORSE ARTILLERY MOBILITY

TEST OF FIRST WAGON

The wagon was tested during the 1931 First Cavalry Division Maneuvers, by Battery "A" 82d Field Artillery, under command of Captain A. F. Doran. The maneuvers, which were of 12 days' duration, about 4 days of which were spent in the Sacramento Mountains, New Mexico, afforded a good test. Captain Doran reported improved mobility on roads and in cross country movements, protection of the ammunition from damage by vibration, less injury to animals, and less damage to wheel bearings, than in the caisson sections of his battery.

AN EXPERIMENTAL BATTERY

A report was then submitted to the War Department by the Division Commander, which recommended the construction and issue to one battery of a sufficient number of the experimental wagons to enable the entire ammunition and equipment (aside from guns) to be carried. The object of this recommendation was to enable direct comparisons to be made between an experimental battery and a regularly equipped battery. It further recommended that one of the wagons be equipped with semipneumatic tires, of the so-called zero pressure type.

During the course of the year the project was approved by the War Department, the necessary funds allotted, and the wagons constructed as recommended. In all, ten wagons were completed at Fort Bliss. Of these, six were for use as ammunition vehicles, and four were equipped to carry special loads as follows:

1 Radio Wagon.	1 Kitchen Wagon.
1 Ration and Water Wagon.	1 Battery Store Wagon.

The work was performed in the 27th Ordnance Company Shop, the limited personnel of that organization having been expanded by use of mechanics from the 82d Field Artillery. Much of the work in providing means for carrying special loads was performed entirely by personnel of Battery "A" 82d Field Artillery, the organization which had been designated to conduct further tests of the wagons.

SPECIAL LOADS

To adapt the wagons to carry special loads, side boards and tops were added to three of the wagons—the radio wagon, kitchen wagon and ration wagon. The radio wagon was provided with a built-in antenna and the kitchen wagon with an 80 gallon

THE FIELD ARTILLERY JOURNAL

water tank. In the wagon carrying battery stores, sheet iron chests containing tools and spare parts were placed without the additional protection found in the regular Battery and Store wagon, and no top was placed on this vehicle. A section was cut from the floor of this wagon to provide a place for spare wheels.

TEST OF THE EXPERIMENTAL BATTERY

During the maneuvers (May 9 to 20, 1932) the Battery accompanied the Cavalry Troops. The ammunition wagons carried ammunition, and the special vehicles, their appropriate loads. Almost all types and conditions of terrain were traversed including extremely wet ground and mud, a condition that had been missing in the 1931 maneuvers. The report which was submitted covering this test stated that the steel tired wagons appeared to perform satisfactorily except for one defect, the fact that the front wheels appeared to be too small for easy draft in soft ground. It may be noted that this defect was not observed the preceding year. During the preceding year, however, the wagon had been pulled by six horses in Artillery Draft, while this year four horses driven from the seat were used with most of the wagons, and the teams were composed of horses that had been trained in Artillery Draft rather than to drive from the seat.

SECOND MODEL STEEL TIRED WAGON

After maneuvers the steel tired wagon was equipped in front with larger wheels. The wheels front and rear were now the same—those used in the service as front escort wagon wheels (size 45" with 3¼ inch tread). As noted above, the wheels were altered to provide roller bearings instead of plain bearings. A steel body built up from light box channel material welded and reinforced with gussets at each intersection was substituted for the wooden platform body used previously. These changes resulted in increasing the weight of the wagon from 1,500 pounds to about 1,750 pounds.

From tests made since completion the new wagon appears more satisfactory than the earlier model in spite of the increased weight. The committee is now satisfied with this wagon as a steel tired type. The only feature that it would change, if possible, would be to have it redesigned part by part to reduce excessive weight. The overweight construction now incorporated

HORSE ARTILLERY MOBILITY

is apparent from the fact that the trailer chassis from which the wagon was made is rated by its manufacturer as being capable of carrying 8,000 pounds. The wagon still does not give the full degree of mobility desired. As requirements placed on a vehicle which will accompany Cavalry Troops on close country movements are very severe, it is doubtful whether any steel tired wagon can be constructed that will be entirely satisfactory.

SUMMARY OF STEEL TIRED WAGONS

Before leaving the steel tired wagon it may be well to summarize the work of the committee up to this point. The principal advantage gained appears to have been in the method of packing ammunition. The pyramidal ammunition container in itself has resulted in a considerable reduction in the load behind the teams. Several other advantages may be mentioned. The roller bearings have proved entirely satisfactory, and superior to the bearings at present found on 75mm gun matériel. The leaf springs have proved preferable to the coil springs found on the 75mm caisson, as they give greater protection from road vibration to the ammunition carried. Finally, the knuckle steering has proved preferable to the fifth wheel steering used on service wagons, and the limbered steering method used with the caisson.

PNEUMATIC TIRES

The recommendations of the committee with reference to equipping one wagon with pneumatic type tires were contained in the first report submitted to the War Department. The report enumerated the following advantages that might be expected from the use of these tires. They would give:

- a.* Increased contact with the ground which would enable the vehicle to pass over soft ground more easily.
- b.* Cause decrease in vertical vibration.
- c.* Reduce noise.
- d.* Adapt vehicle to being towed behind a motor vehicle in strategic movements.

The great disadvantage of pneumatic tires was also recognized—the fact that the low pressured variety are easily punctured. The committee at first hoped to obtain for test a special and a recently developed type of tire having puncture proof qualities. It was unable however, to obtain the tires desired, and therefore, turned to other means of obtaining this requirement.

THE FIELD ARTILLERY JOURNAL

The tires selected were of low pressure balloon type (9.00 × 13), carrying about 12 pounds of air pressure per square inch, and weighing with the small disk wheels to which they are fitted, about 50 pounds each. A puncture protecting device which was improvised at this station to protect the tires from puncture was added to the tires. To form the puncture protecting device, sections cut from another kind of tire having a tougher tread than the low pressure tires, were superimposed on the low pressure tires, the sections being connected to continuous chains on each side of the tires. To hold the sections firmly in place tension springs were placed between the ends of each section and proper links on the chains. This puncture protecting equipment weighed about 30 pounds per tire.

The question may be raised as to why such low pressured tires were used on the wagon. The committee desired to have less ground pressure under the wagon than under the animals pulling it and thereby to insure against the vehicle sinking in the ground. The advantage of keeping the wheels on top of the ground is easily explained, for if this object can be accomplished the entire draft power of the animals will be devoted to moving the load, rather than in altering the surface of the ground under the wheels.

THE FIRST PNEUMATIC TIRED WAGON

In the first pneumatic tired wagon tested no changes were made in construction except those necessary to permit the new wheels to be installed in place of the steel tired wheels. This one change resulted in a reduction of weight from 1,500 pounds to 1,320 pounds. During the 1932 maneuver this wagon was tried out along with the steel tired wagons. It was found to pull much more easily in cross country movements than the steel tired vehicles.

THE SECOND PNEUMATIC TIRED WAGON

After the 1932 maneuvers an effort was made to eliminate the unnecessary weight found in the pneumatic tired wagon—a step not previously undertaken. The same welded steel body described above in connection with the steel tired wagon was again used. This would have resulted in additional weight had not the plan of construction been altered to transfer to the body a large part of the stresses formerly carried in the frame thereby enabling the elimination of considerable weight in the frame. To accomplish

HORSE ARTILLERY MOBILITY

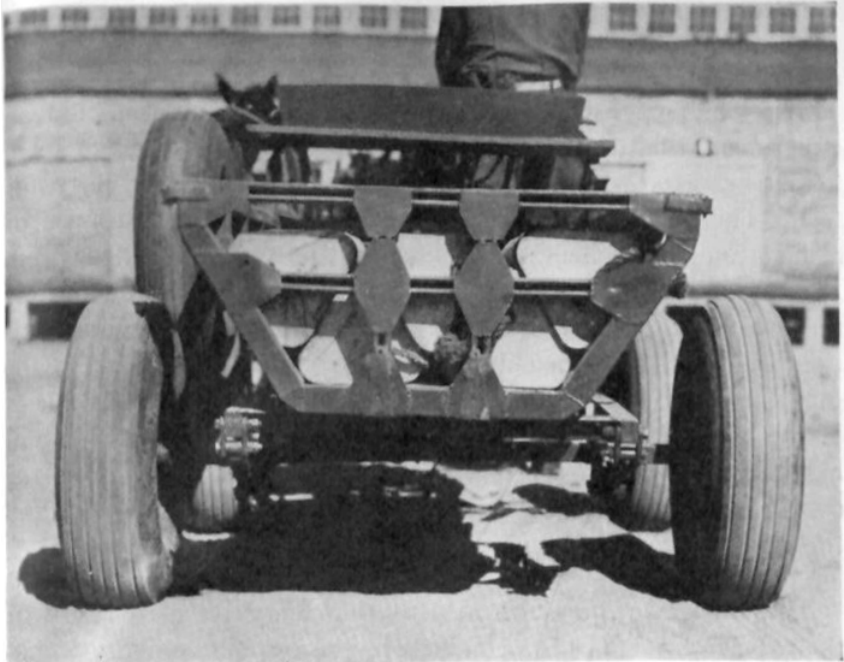


PLATE 2. REAR VIEW OF PNEUMATIC TIERED WAGON SHOWING METHOD OF LOADING AMMUNITION PACKAGES

this the tongue was attached directly to the body and the frame was connected to the body at numerous points. Further reduction in weight was made by substituting lighter parts where possible. The wagon (Plate 2), equipped with tools, spare wheels, spare tire and draw bar for conversion to draft behind a motor vehicle, was found to weigh about 1,100 pounds. If tire protectors be added the weight becomes about 1,250 pounds.

In testing the wagon with its tire protectors it was moved by animal draft across a country covered with thorny vegetation such as had been previously a constant source of puncturing. It also has been used in draft in difficult terrain, in direct comparison with modern trucks equipped with the most modern tires, as well as in comparison with all types of wagon transportation found in the Cavalry division. So far no punctures have occurred, and no vehicle has been found to equal it in ability to cross difficult terrain. It was also moved in tow behind a motor vehicle at speeds up to 30 miles per hour. Although the wagon has proved suited to being towed at this speed the tire protectors have not, due to friction at the point of contact with

THE FIELD ARTILLERY JOURNAL

the tires. They appear to be satisfactory for use at animal draft rates of march only.

PNEUMATIC TIRED EXPERIMENTAL BATTERY

The Chief of Field Artillery has recently announced that an experimental battery of light guns—the 75mm howtizer adapted to horse-draft—will soon be sent to the 82d Field Artillery for test. The pneumatic tired ammunition wagon gives promise of being a suitable vehicle to accompany this pneumatic tired gun. It is not believed, however, that caissons should be completely replaced by wagons. The caisson is a means of keeping ammunition and fuses classified in addition to giving protection to the gun crews. The committee favors replacing only the vehicles of the battalion combat train and of the ammunition and maintenance sections of the battery. The caissons retained should of course be constructed so as to have the same kind of tires, and the same degree of mobility as the remainder of the battery.

SUMMARY

To summarize the views held by the committee as a result of the experiments and tests conducted—the committee believes that the idea of using wagons for carrying ammunition is sound and it favors equipping these wagons with low pressure pneumatic tires when the gun material is pneumatic tired. Some form of puncture proofing should be included with the tires. It also favors packing the ammunition in pyramidal bundles, rather than in issue four round boxes or in caisson or limber chests, except that one caisson per gun be retained. It has not yet formed an opinion as how great a load teams may be expected to haul in tactical movements on the last models of the wagon. The wagon at present is designed to carry 90 rounds which, with containers, averages about a ton. It has an additional capacity of about 1,000 pounds, but how much of this load capacity may be utilized will depend on further tests in the field. It may be noted that the wagon with a one ton load already exceeds by 800 or 900 pounds the gross draft weight for four horses quoted earlier in this discussion where reference is made to the ability of teams to follow cavalry in difficult terrain. Those figures, however, were based upon steel tired vehicles, and the committee believes that in case of the pneumatic tired wagon, the use of low pressure tires and other features embodied, will more than offset this discrepancy in theoretical weights.

FIELD ARTILLERY NOTES

Truck-Drawn 75mm Gun Battery and Battalion:

The test of the truck-drawn 75mm gun battery was completed by the Field Artillery Board March 1, 1933, and the equipment was transferred by a more or less circuitous route to Fort Sill, Oklahoma, where it has been assigned to Battery A, 1st F. A., for extended service test by the Field Artillery School. En route west, the battery made side trips to Fort Benning and Fort Sam Houston.

Battery D, 17th F. A., commanded by Captain A. L. Campbell, achieved such success with this light truck-drawn battery that the test is to be extended into a battalion this summer. The Chief of the Militia Bureau, Major General George E. Leach, a Field Artilleryman of long service, is also applying the truck-drawn idea to a large proportion of light artillery units of the National Guard as a result of the test of this battery.

Truck-Drawn 105mm Howitzer Battery:

The purchase of light six wheel-four wheel drive trucks to equip a battery of 105mm howitzers for test is being made at present. While there is no question of the ability of trucks to tow these howitzers on highways, the object of the test is to determine if a truck-drawn howitzer battery can perform its tactical missions satisfactorily. This test will be conducted at Fort Bragg by the Field Artillery Board.

Truck Prime Movers for 155mm Guns:

A four months' test of the 155mm gun battery, truck-drawn, using 10-ton Sterling Trucks (Group V, QMC classification) was completed April 15th. The trucks were given a good bill of health. Some trouble was experienced with the closures on the wheels of the 155mm G. P. F. carriages that had been modified for high speed. The Fort Bragg sand had penetrated and caused some damage to the bearings. Otherwise the modification of the carriage was satisfactory for towing at 20 or 25 miles an hour.

High Speed Bearings for 155mm Howitzer:

High speed bearings have been provided for the 155mm howitzer (Schneider) and two carriages, so equipped, are being tested at Aberdeen Proving Ground. One of these includes the limber and the other has a lunette attached to the end of the trail. It is anticipated that both will be ready for test by the Field Artillery Board in the near future.

Modern Tractors for 155mm Howitzer Units:

The Ordnance Field Service, recognizing that the upkeep of the wartime tractors was uneconomically high, have succeeded in securing new "Caterpillar 35" tractors to re-equip the 3rd Battalion, 17th Field Artillery at Fort Des Moines and one battery of the 17th Field Artillery at Fort Bragg. It is anticipated that a substantial saving in cost of maintenance will result in these organizations, as well as providing them with modern tractors in lieu of obsolete ones.

75mm Howitzer:

The Field Artillery Board having completed test of the new 75mm howitzer, and while making a number of recommendations for improving it and for increasing its field of usefulness, was enthusiastic about this new weapon. Their report of test is being studied preparatory to the manufacture of a battery of these howitzers for test in the 1st Cavalry Division during the next fiscal year.

New Development in 155mm Gun Ammunition:

The T1E2 fuze was tested in the new 155mm gun T3 and found to function satisfactorily at all charges and elevations. This fuze is bore-safe and is made from metal parts of the Mark III fuze. Fired in the new T1E1 shell from the new 155mm gun, the Board was gratified to find a noticeable improvement in accuracy and a marked increase in range over the present standard ammunition fired from the G. P. F.

155mm Gun-8 inch Howitzer Carriage:

The results of the test of the new 155mm gun-8" howitzer carriage described in the May-June, 1931, issue of THE FIELD ARTILLERY

FIELD ARTILLERY NOTES

JOURNAL were highly satisfactory. The mobility of the carriage and the ease of emplacement were particularly good, and the accuracy of fire and increase in range showed a considerable advance over the G. P. F. and the present 8" howitzer.

Major Boles Scores High in Indiana State Rifle Shoot:

Major John K. Boles, Commanding the 3rd Field Artillery, Fort Harrison, won the state championship of Indiana at the rifle and pistol matches of the Indiana State Rifle Association recently held at Culver Military Academy. Major Boles also won the standing championship in the rifle matches and placed second in the re-entry match standing.

Back Copies of *The Field Artillery Journal*:

The Field Artillery Association has on hand a number of FIELD ARTILLERY JOURNALS which it wishes to dispose of at the moderate price of 35c per copy, postage prepaid. These JOURNALS cover the period from the first JOURNAL—January-March, 1911—to include the November-December, 1931, number. The regular price for single copies of the JOURNAL is 75c. It is believed that some members of the Association would like to complete one or more particular volume of the JOURNAL by taking advantage of the above offer.

Lieutenant Roger D. Black, F. A., Wins Place on Magdalen Crew:

Lieutenant Roger D. Black, F. A., who graduated from West Point in June, 1932, and entered Oxford University in the fall of the same year, has recently won a place on the eight of Magdalen College. This crew in competition with some forty other crews retained the championship of the University.

**IF YOU CHANGE STATIONS, PLEASE SEND
THE JOURNAL YOUR NEW ADDRESS.**

MILITARY BOOKS

Following is a list of latest books on military subjects which are recommended for their professional value as well as interesting reading:

	<i>Price</i> (Domestic postage included)
THE PERSONAL MEMORIES OF JOFFRE (2 vols.).....	\$ 6.00
THE NATION AT WAR— <i>Gen. Peyton C. March</i>	3.00
THE GUNNERS' MANUAL— <i>Capt. Arthur M. Sheets, F. A.</i>	1.50
FOCH: THE MAN OF ORLEANS— <i>Capt. Liddell-Hart</i>	4.00
SQUADS WRITE!—A selection of the best things in prose, verse and cartoons from <i>The Stars and Stripes</i> . Edited by <i>John T. Winterich</i>	4.00
LEE OF VIRGINIA— <i>Brooks</i>	3.50
PRACTICAL JUMPING— <i>Barrett</i>	5.00
MY EXPERIENCE IN THE WORLD WAR— <i>Pershing</i>	10.00
VERDUN— <i>Pétain</i>	4.00
REMINISCENCES OF A MARINE— <i>Lajeune</i>	4.00
JULY, 1914— <i>Ludwig</i>	3.50
FOCH SPEAKS— <i>Bugnet</i>	3.00
IT MIGHT HAVE BEEN LOST— <i>Loneragan</i>	3.00
THE OLD ARMY: MEMORIES— <i>Parker</i>	4.00
SHERMAN: SOLDIER-REALIST-AMERICAN— <i>Hart</i>	5.00
REPUTATIONS: TEN YEARS AFTER— <i>Hart</i>	3.00
REMAKING OF MODERN ARMIES— <i>Hart</i>	3.50
INTRODUCTION TO MILITARY HISTORY— <i>Albion</i>	2.25
AMERICAN CAMPAIGNS (2 vols.)— <i>Steele</i>	10.00
FOCH: MY CONVERSATIONS WITH THE MARSHAL— <i>Recouly</i>	3.00
PRINCIPLES OF STRATEGY— <i>Maurice</i>	2.60
GERMAN STRATEGY IN THE GREAT WAR.....	4.00
COLOSSAL BLUNDERS OF THE WAR— <i>Woods</i>	2.50
NAPOLEON'S MAXIMS OF WAR— <i>Burnod</i>	1.00
STUDIES IN NAPOLEONIC WARS— <i>Oman</i>	3.00
ROBERT E. LEE, THE SOLDIER— <i>Maurice</i>	4.00
FIFTEEN DECISIVE BATTLES— <i>Creasy</i>	1.25
MECHANIZATION OF WAR— <i>Germain</i>	2.15
FUTURE OF THE BRITISH ARMY— <i>Dening</i>	2.60
MAP RECONNAISSANCE.....	1.60
OFFICERS' MANUAL (Revised)— <i>Moss</i>	3.00
OFFICERS' GUIDE, 1930.....	2.75
HINTS ON HORSEMANSHIP— <i>Lt. Col. McTaggart</i>	2.50
ARTILLERY TODAY AND TOMORROW— <i>Rowan Robinson</i>	1.50
SOME ASPECTS OF MECHANIZATION— <i>Rowan Robinson</i>	1.00
THE FELLOWSHIP OF THE HORSE— <i>Lt. Col. Goldschmidt</i>	5.00
LIFE OF GRANT— <i>Fuller</i>	5.00
THOUGHTS OF A SOLDIER— <i>Von Secht</i>	2.50
HORSE SENSE AND HORSEMANSHIP— <i>Brooke</i>	5.00
INEVITABLE WAR— <i>Lt. Col. Richard Stockton, 6th</i>	7.50

(Less 35% to members of all components of the services.)

A reduction of 10% will be made to JOURNAL readers who purchase any of the above books through the U. S. Field Artillery Association, with the exception of INEVITABLE WAR on which 35% is allowed.

The Association is in a position to obtain for its members not only books on military subjects but biographies and fiction as well at a reduction of 10%.