

28TH YEAR OF PUBLICATION

THE FIELD ARTILLERY JOURNAL

SEPTEMBER-OCTOBER, 1938

ASPECTS OF MODERN WAR

—Colonel Conrad H. Lanza

A GRAPHICAL SHORTCUT FOR K-TRANSFERS

—Captain Harold F. Handy

THE NEW FRENCH SHORT CANNON

—General Fredric Culmann, France

TYPE PROBLEMS



PUBLISHED BIMONTHLY BY
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CONTENTS

	Page
Point-to-Point with the Third Field Artillery, Fort Sheridan, Illinois	
	<i>Frontispiece</i>
Aspects of Modern War.....	341
By Col. Conrad H. Lanza, FA	
Notice of Annual Meeting, U. S. Field Artillery Association.....	363
A Graphical Shortcut for K-Transfers	364
By Capt. Harold F. Handy, FA	
Military Books.....	366
The New French Short Cannon	367
By General Fredric Culmann, Cadre of the Reserve, France	
Special Notice—U. S. Field Artillery Association Prize Essay, 1939	372
Leadership	373
By William R. C. Greene	
Reviews	383
Elements of Ordnance, by Lt. Col. Thomas J. Hayes	
Wagonsoldiers Win Inter-Circuit Cup.....	384
By Capt. John A. Smith, Jr., FA	
Battery Escorts Crown Prince of Sweden.....	387
Type Problems.....	388
More Motor Movement	396
By Major Henry Burr Parker, FA	
On the Other Hand——.....	402
By Lt. Col. John S. Wood, FA	
Questions and Answers, Conduct of Fire (Part 2)	404
Gas!	411
Field Artillery Association Medalists.....	412
Packsaddle Weddings.....	413
Lines of Communications.....	414
Some Forward Observations	415
An Appreciated Comment	416

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POINT-TO-POINT WITH THE THIRD FIELD ARTILLERY, FORT SHERIDAN, ILLINOIS

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Aspects of Modern War

BY COLONEL CONRAD H. LANZA, FA

THE world is singularly troubled with wars; with preparations for wars. Armaments are growing at a prodigious rate; opposition to rearming has all but disappeared. There is a general consent that another World War is only a question of time, and that arranging for the coming catastrophe is just common sense.

The money being expended for armaments is greater than ever before in times of peace. Hundreds of millions of dollars are being annually appropriated. Many there are who suggest that these amounts are not large enough; few ask for a reduction. Nations are convinced that in the near future they are going to need their armies, their navies, and their air forces. All wish to be strong, and especially stronger than the probable enemy.

Increases of armaments, and inventions of new materiel, have changed the art of war. War can not now be successfully fought unless guns, ammunition, tanks, planes, and quantities of accessories are available to the fighters. There are differences of opinion as to how the modernly equipped army can best utilize the means at its disposal. But it is certain that war will not be what it used to be.

In view of these conditions, and in view of the all-prevalent fear of a great war, let us examine a few aspects of modern war, which are going to affect

seriously many millions of human beings, even to their deaths.

A Principle of War:

Principles of war are immutable. Nevertheless, the war of materiel has modified their application. It behooves us to examine them closely. Let us consider one example—the principle of the *economy of force*, which may be defined as the use of the maximum possible force against single objectives, successively, until the desired mission has been accomplished.

In order to apply this principle it is necessary to select the objectives against which the maximum force is to be used. It has been agreed that these should be, not geographical points, but rather the enemy's main force. This interpretation has been largely based upon the campaigns of Napoleon, who, however, did not himself define his understanding of this principle.

Prior to the current century, forces in war were concentrated into one or more masses. When there were more than one, spaces existed between them, which afforded opportunities for maneuver. The war of fronts continuous over long distances did not exist. The determination of which of several forces was the enemy's major one seldom offered difficulties. Troops marched on foot, or on horses, and movements were slow, limited by the then means of transportation. Once

THE FIELD ARTILLERY JOURNAL

established, the main force could move from one theater of operations to another only after long and dangerous delays. Battles were fought to a conclusion within one or two days; rarely did they extend over three days. Bringing up reserves after a battle had started was limited to troops in the immediate vicinity. Distant reserves were unavailable.

Beginning with the 20th Century, the defensive has greatly increased in strength. It can no longer be overcome within one, two or three days. During the Russo-Japanese war, in 1904 and 1905, battles lasted one to two weeks; during the World War they were prolonged through weeks to months.

Because the entire nation participates in wars, enormous forces are engaged, and there are now two types of war: First, where fronts are not continuous, which was the rule until recent years; second, where fronts are continuous for long distances, which is the result of the totalitarian type of war of nation against nation, rather than armies against armies.

Wars on fronts not continuous are decreasing, but they exist. During the World War they occurred in Serbia, in Rumania, and in Palestine. There have since been such wars in the Chaco, in Ethiopia, in Spain, and in China. Success has depended on superior numbers, materiel, maneuver, and leadership. The principle of the economy of force has applied, but with a modification.

Modern materiel makes the defensive so strong that it can not be quickly overcome, even by greatly superior forces. With present means of transportation, the situation during the course of a single battle may completely change, owing to movements of reserves and of resources from one area to another.

To obtain rapid decisions in open warfare has been and is still the dream of many. Recent wars make it doubtful whether this will be practicable, because of the delaying powers of the defense, and ability to shift reserves and resources rapidly.

The Chinese, according to their own reports, had, in August, 1937, 80,000 well-armed and well-supplied troops near Shanghai, with the mission of attacking a Japanese force on the defensive, and estimated by them at about 5,000 men. The Chinese were so sure of victory that they felt the only alternatives possible to the Japanese were annihilation, surrender, or retreat to neutral territory. They requested the authorities of the International Settlement to take necessary measures to disarm and intern the expected retreating Japanese forces. Notwithstanding a superiority of 16 to 1, the Chinese were not able, in two months of attacks, to overcome the defense, during which period no retreat occurred and Japanese reserves and resources were brought from overseas to change the situation completely.

Reserves and resources are now the real main force, and no decision can be expected until these have been exhausted. Reserves and resources may be shifted from one front to another, and the main theater of operations will change correspondingly. This has happened in Spain and in China. The tendency is for prolongation of warfare. However desirable, the possibility of major-force employment of short wars gained by rapid maneuvers in open warfare yet remains to be demonstrated.

Nations intend to use in future all their available man power, and all their resources, to win a war in which they may be engaged. The results of defeat appear to be so terrible that none desires to take the chance of losing

ASPECTS OF MODERN WAR

by undertaking to fight with less force and less materiel than it can provide. This tendency has led to such an increase of forces that wars on continuous extensive fronts are now common.

Where fronts are continuous it is often difficult to decide which sector is more important than another to determine which is the main opposing force. Modern railroads and motor roads afford possibilities for quick concentrations of troops and materiel. To pierce a defensive—the only maneuver possible on continuous fronts—involves long and costly attacks; requires time for preparation; more for execution.

During the World War efforts were made to pierce continuous fronts in France, in Russia, and in Italy. Fronts were dented, but the operations took so much time that the defense was always able to bring reserves and materiel to the threatened area in such numbers and quantities that no attack succeeded in breaking through.

In such cases how is the principle of economy of force to be applied? What is the enemy's main force?

The Allied campaigns of the late summer and autumn of 1918 point to the correct answer. In a series of battles, Marshal Foch, having accumulated superior forces, and greatly superior resources, started continuous attacks against the German armies over a constantly extending front. The attacks suffered large losses, but the Germans were obliged to meet them, to engage their reserve divisions, one after another, until, at the beginning of November they had no reserves left.

It was then that Marshal Foch undertook to apply the principle of the economy of force. He prepared a final main effort against the enemy's critical front. This was the area northeast through Metz, leading directly to the

German center of *resources*—they had no *reserves*. An overwhelming force was assembled for this attack. If it succeeded, it could destroy the centers of resources, and at the same time would cut off the German armies in France and in Belgium by squeezing them between neutral Holland and the Allied armies.

In view of this situation the Germans applied for an Armistice. The effort was not made. The threat sufficed.

Where fronts are continuous, attacks to exhaust the enemy's reserves and resources are the initial steps to secure a decision. It may take a very long time to accomplish this. In carrying out such a policy, one part of a continuous front is not necessarily more important than another. The local situation, geographical possibilities, and the ability to deploy large forces on one side, to compel the enemy to use his reserves and resources, are the prime requirements. After the time has been reached when the enemy's reserves and resources approach exhaustion, it becomes most important then to select the objective for the final effort.

In applying the principle of the economy of force, account must be taken of another variation from past practices, occasioned by the mass of materiel now employed. Changing *troops and materiel* from one theater to another is relatively easy, but changing *the direction* of a maneuver once started is not easy.

To include the 19th Century applications of the principle of the economy of force involved mobilization of separated major and minor forces. These were then directed against one major objective, and such minor ones as were absolutely necessary. The direction of movements of columns could readily be changed from day to day. Troops had small trains; required very moderate amounts of ammunition; had little materiel. Modern armies do not operate

THE FIELD ARTILLERY JOURNAL

in this fashion. Artillery, tanks, airdromes, enormous quantities of ammunition, and much materiel are essential. Armies are relentlessly tied to depots and lines of communication, without which they are unable to receive the daily supplies of shells, gasoline, new guns, and materiel, necessary to success. Modern battles are long, and dependent for their outcome on which side can bring to the front the greater quantity of guns, ammunition, and materiel. This forces intensive use of depots and lines of communications.

Once established, only minor changes can be made in the direction of attacks, or maneuvers. It is indeed possible to withdraw troops and materiel to the rear, and forward them to other theaters, provided the necessary supply arrangements are in existence. It is no longer possible materially to change a maneuver which has commenced.

Battles now last over long periods. The days when campaigns and wars were decided in a single theater, and sometimes in a single battle, are not now with us. During the Napoleonic wars, Austerlitz in 1805; Jena in 1806; Wagram in 1809; and Waterloo in 1815, decided the fates of nations in one to three days. In 1866 the fate of Austria-Hungary was decided in one battle; in 1870, that of France by a campaign of about one month. In each of these cases, the decision was determined in one theater.

Times have changed. Wars may now have several theaters of operation; difficult to determine which is the more important. During the World War, the Central Powers shifted main forces in turn against France, Russia, Serbia, Rumania and Italy. The Allies changed the main front from Verdun to the Somme, and afterwards to other sectors. Reserves and resources decided these matters. It took many weeks to prepare

supplies for a shift in operations from one area to another. With the possibility of holding defensive positions for considerable periods of time, such shifts became common. They must hereafter be expected to occur.

Constantly increasing stocks of materiel, armaments, and man power, for war, in which the entire nation takes part, makes improbable the defeat of an enemy in one battle, or in one short series of battles.

Reserves and resources constitute main force. Until nearly the end of a war, it may be difficult to reach these directly. The modern application of the principle of the economy of force is toward wearing out reserves and resources, until the enemy has none remaining. It is obvious that wastage of an enemy's reserves and resources offers no advantage unless one's own losses can be replenished proportionately faster than those lost by the other side.

Failure to observe this rule was a prime cause of the defeat of the German armies in 1918. Their offensives of the spring and early summer of that year won territory, and inflicted very serious losses on the Allies. But the latter were able to increase through American participation, both reserves and resources, while those of Germany decreased. By July, 1918, the tables were turned. The Allies attacked. They indeed suffered severely, but they were able to restore their ranks and their materiel from new stocks. The Germans could not do this. By November, reserves had nearly ceased to exist; resources were insufficient; the source of these was threatened by a new attack. Resistance was useless; the war ended.

As long as the enemy has reserves and resources, a piercing of a front is improbable. And as long as reserves and resources are available, the theater

ASPECTS OF MODERN WAR



Tribune Photo

NIGHT FIRING, BATTERY F 14TH FA

of operations may be shifted from an old to a new area by either side.

The principle of the economy of force has not changed; the application of the principle has.

Initiative:

A battle is a terrifying experience. It calls for moral, physical, and intellectual qualities of the highest order.

Through the volume and accuracy of modern fire, an individual at the front is forced to the ground. Danger is imminent; it is everywhere; death is at hand; many are overcome; unable to move. Minds do not function. When an advance is in progress, those able select a shell hole, a depression, anything that offers shelter, not too far away, crawl, rush, move desperately from one position to another.

An officer sees a few men nearby. He cannot control the majority. His view is limited by his proximity to the ground; obscured by bursting shells,

smoke, dirt, bombs. With camouflage and indirect fire he sees little or nothing of the enemy. The rear of the battle prevents distinguishing where hostile fire is coming from. The telephone lines are cut; radio jammed; messengers shot down. He receives no orders; no advices; observes almost nothing. A person in the attack knows only what is happening in his immediate vicinity; is ignorant of what is going on only a short distance to the right and left. He is so overwhelmed by the awful sights and sensations of the battlefield, that he seldom writes a message; rarely succeeds in having a message sent back. He is so absorbed in dashing from one shelter to another; dodging shells and bullets; watching for enemy tanks, machine guns, batteries; knowing that a minute's lack of attention may mean sudden death; that he has neither time, ability, nor desire to send messages, sketches, reports to

higher authority, or to that best friend of the infantry—the artillery.

There is no place where initiative is more required than a battle. Yet without information from the front, it is hard intelligently to exercise initiative. Troops at the front need to decide whether to move or stand; artillery, where and when to direct their fire—where mass fire should be concentrated; infantry in what direction to employ reserves; higher commanders how to utilize large units, where to distribute ammunition, and other supplies, more artillery.

In the World War, it was noted that information from the front during the battle was generally lacking. No one knew where the infantry was, nor what it was doing, nor whether it needed help, and if it did, where. The usual display of initiative by commanders—

- a. Issued orders for continuing the attack, or holding the position, without regard to adjacent units.
- b. In an attack, prohibited the artillery (less division artillery in liaison with the infantry, if any) from firing, for fear that either the artillery might fire on its own infantry, or that its fire might prevent the infantry from advancing by not being lifted soon enough.

Initiative of this kind has been fatal to securing victories. Where there is opposition, infantry can not attack or defend without regard to adjacent units; neither can it advance without artillery fire, and plenty of it. Lessons of the World War in this line have been so commonly repeated since, that the rule can be considered general; that battles are won when, among other requirements, the commander exercises initiative.

With so little information from the front, how then are commanders to display initiative, so necessary in battle?

The successful commander in modern warfare is he who on scant information divines the probable situation, and who acts; who does something intelligent. Of course, there should be no loss of opportunity to seek information. If it can not be had from combat elements, it must be sought from the air, and all other available sources. Every bit of news about the situation must be found and utilized. But it is senseless to attempt to utilize initiative based upon complete knowledge of the progress of a battle. In days long ago, it was possible for a commander personally to observe the battle, and the disposition of the troops thereon. Those days are gone forever.

The modern commander does not see; knows only a part of what is happening; must nevertheless exercise initiative, and promptly. It means using the artillery, not suspending its fire. It means sending in the reserves, not holding them out. It means no waiting for improbable possible events, or for complete information which may never come. It is better to exercise initiative than to hesitate; better to use artillery, than to stop its fire for fear that it might interfere with other arms; better to act in time than to wait for information which may never come.

These statements apply particularly to the artillery. An artillery commander needs to show initiative, and mass his fire power for the common good. To wait for OP's, infantry, liaison officers, to indicate targets, is to pass the initiative to individuals none of whom have a point of view of the whole—it is the road to failure; acting by steps, when what is wanted is mass action by the artillery.

Targets are now only exceptionally visible. To try and handle artillery fire as if all targets could be seen is to use methods applicable to past days, when such conditions were the

ASPECTS OF MODERN WAR

rule. The modern battlefield presents few targets to observers; and yet to win, artillery fire must be had. Artillery commanders must have the initiative to direct fire, notwithstanding lack of complete information. This results in ammunition being expended in enormous quantities. All reports from recent wars comment on the extraordinary amount of ammunition required by the artillery. It has surpassed all expectations, but without this fire, battles could not be won. And to direct it, requires initiative.

Initiative is not successful when it is limited to directing subordinate units to take advantage of the situation without waiting for orders from higher authority. In modern war, units must act in cooperation with units on both flanks, and with the artillery, and this can only be assured by higher commanders.

It was at one time during the World War customary to charge divisions with the conduct of minor operations, such as a raid, which was to take place entirely within their own zones of action. Such operations frequently failed, the enemy's reaction extending outwards beyond the flanks. This led to the corps being charged with this planning. It naturally arranged for support, particularly artillery fire, from adjacent units, and success became the rule. Similarly the army was charged with planning and supervising operations which involved a corps.

One reason why the Loyalists in Spain have failed to win battles has been their doctrine that orders must be explained, and if desired, debated, before execution. This has killed initiative. Initiative requires action by the commander; there is little time in a battle available for discussions. The Nationalist forces have not been hampered by such a doctrine, and their success has been almost uniform.

Initiative of a negative nature is seldom successful. So, a general order issued by Loyalist GHQ, signed by Negrin, the prime minister, stating that in view of the powers of the defense strong defensive positions tenaciously held were all that were necessary to insure ultimate victory, has led to the Loyalist armies being slowly, but surely, driven from one position to another. Any defense can be overcome, provided sufficient time, men and resources are expended. The policy ordered can only succeed where the enemy lacks one or more of these three essentials.

Modern warfare requires men with initiative. There is need for *training* in this line. To develop initiative, opportunities to exercise it should be had at maneuvers, and at CPX's, and it should be based on incomplete battle information, such as is probable today. Tactical exercises based on complete, or nearly complete, information both as to the enemy, and as to our own forces, belong to a past age, and call for an entirely different kind of initiative than what is required nowadays.

Command:

Command may be exercised directly, or through a staff. Both methods have had successes in war; both methods have sometimes failed. Why? If the reason can not be determined, nations may travel a road to disaster in the next war.

The leading example of staff control has been Germany. Starting after the campaign of Jena, in 1806, it reconstructed an army, and led it to startling victories in 1866 and in 1870. The German staff system consisted in assigning commands of armies to kings and princes, trained and able men, but not necessarily the best leaders of the nation.

To assure the highest possible leadership, general staff officers were appointed as chiefs of staff and assistants,

THE FIELD ARTILLERY JOURNAL

to GHQ, armies, corps, and divisions. These officers were the real commanders, and it was customary to consult them, rather than the kings and princes who were the nominal commanders. General staff officers were the elite of the army. Trained in the same school, personally known to each other, they thought and reasoned alike; agreed among themselves. To coordinate the action of separated units, general staff liaison officers circulated between GHQ and subordinate staffs.

Liaison officers were selected men. They were familiar with the views of their chiefs, and when away, were ready to interpret their desires before any unexpected situation. During the wars of 1866 and 1870, and during the subsequent long peace, this system worked so well that it was widely copied. But it did not win in the World War, when it was opposed to the French system of direct command.

The modern exponent of direct command is Napoleon. Napoleon used staffs, but entirely as an adjunct. The staff neither outlined proposed lines of action for their leader, nor did they make serious studies for him. He did this himself. The French command on the west front in 1914 to 1918 was of this type. Both Joffre and Foch made their own plans, attended to their own liaison; inspected and commanded directly.

Why did the German system win decisive victories between 1866 and 1870, and lose the war between 1914 and 1918? Disregarding the tactics between the two periods, which certainly influenced results, there was a marked difference in leadership.

In 1866, Austrian leadership was poor. Their army was enveloped, and in one battle was placed in such a situation that a continuance of the war would have been difficult. In 1870,



THE REFUGEES

By Kerr Eby

—Courtesy Charles Sessler, Philadelphia

ASPECTS OF MODERN WAR

French leadership was worse than poor. We will not waste the reader's time in recounting the reasons; it will suffice that the French are the first to admit it. Against incompetent opponents the German staff system produced wonderful results. For nearly half a century the World admired it. May not the lack of effective opposition have been the explanation for winning these wars?

In 1914, von Moltke was the Chief of Staff at German GHQ. He was the real commander. Moltke did not visit his subordinates; tried to maintain contact with them through staff liaison officers; was not very successful in doing so. The French and English were competent opponents. When the decisive day of the battle of the Marne arrived on 11 September, 1914, it was an obscure general staff officer, a lieutenant colonel, who as liaison officer from GHQ, seems to have advised the German right wing to retire, and indicated to them the direction of the retreat. Neither the nominal head of the German army nor the Chief of Staff knew of this decision until it was too late to intervene. It lost the battle for Germany.

At this same time, the French army had a commander. Joffre was this man; few can name his chief of staff. Joffre made his own plans. He instructed his chief of staff; told G-3 what to do. Contrary to the practice of the Germans, Joffre traveled extensively; saw his army commanders and some subordinate commanders, and at first hand learnt their problems. As to this he copied the methods of Napoleon, who rarely failed to investigate the situation personally before issuing his orders.

During the World War, both French and Germans maintained their respective systems for command—the former, directly; the latter through the staff. Yet the Germans made some modifications.

In 1918, the German chief of staff did travel, and he did hold consultations with his subordinates. But it was the chiefs of staff who attended conferences, and whose advice was sought, and not the nominal commanders—the staff decided.

The American army in France had been trained on the German system. Prior to the St. Mihiel campaign, the commanders of corps were convened in an effort to establish direct command. They discussed the proposed plan of battle. Each general present had a plan; but none were alike. Everyone voted against all plans not his own. Each plan had one vote for it, and the field against it. No decision was arrived at, and the commanders were not again convened.

In their place, chiefs of staff were consulted. Like the German staff, they had been similarly trained at Leavenworth. They were well known to each other. They could see merit in each other's plans, and they quickly agreed upon what ought to be done. After the conference the chiefs of staff returned to their own commanders with orders based upon staff recommendations. In most cases the chief of staff was the real commander.

General Pershing spent considerable time visiting his corps and divisions, but for tactical matters he generally followed the advice of his staff. As in the years of 1866, and 1870, the American army did not have an equal opponent. The German leadership was good, but the Americans so greatly exceeded the Germans in men, guns and ammunition, as to make them greatly superior in strength.

Staff-directed command has been successful when it has had time to prepare plans, and when it has been opposed by an enemy inferior in strength, or leadership. History indicates that a

THE FIELD ARTILLERY JOURNAL

competent commander exercising direct command, such as Napoleon, Frederick the Great, Alexander, Hannibal, has a better chance for achieving success in war than a collection of officers organized as a staff.

Modern war is complex. Compared with the beginning of our own century, we have new arms—aviation, tanks; new weapons; more powerful cannon; extraordinary increases in sizes of forces and quantities of materiel. To coordinate the parts of this great mass, to direct the men who handle it; to handle the needed supplies, control is necessary. In some armies this is still exercised through a staff; in others by a commander.

When staffs are relied on to advise commanders, there is a tendency for them to grow in size, in order to furnish specialists on every weapon and arm, and for every possible question. It takes time for a staff so organized to grasp a problem, to agree; more time to act. Divided into sections, and assisted by services, a headquarters staff is frequently a collection of officers, supposedly specialists, each in some line. Discussions and conferences are frequent; papers are innumerable. Often at maneuvers, and at CPX's, before the nominal commander makes a tactical decision, an opinion must first be had from G-2 as to what the enemy is doing, and will do. G-3 then outlines what he thinks our own action should be, with reasons therefor. Some generals consult other members of their staff; there may be a general conference. The result is usually that the G-3 plan and recommendations, with or without modifications, are adopted.

Whenever a commander finds it necessary to engage in conversations or consultations before he can safely make a decision, uncertainty is present, and there is doubt as to whether proper orders will issue in time. A commander

who understands the employment of the arms and services himself, to an extent that he can issue suitable orders without delaying for investigation and advice, has confidence in his own abilities, and has the power to make clear decisions with an executive ability intelligently to carry them out.

Some armies appear to have gone too far on staff control. Staffs are too large and have too many specialists. It takes too long to consult them all; still longer to coordinate divergent interests and views. From the point of view of time, a commander who can order, without waiting for staff consultations, has a distinct advantage over an opponent who feels he must consult. Modern warfare requires *commanders*, who while not ignoring advice, will themselves observe events as they occur, and order promptly.

A commander proficient in the art of war is independent at critical moments. His staff informs him as to the facts, about men, about supplies; carry out his orders. They do not delay decisions through any necessity for studies and consultations. They assist their commander as he may direct. The totalitarian states have leaders of this type. One man has the authority, and the will to decide. The heads of these states can and do act, sometimes instantaneously, without previously divulging their intentions through discussions or need to await advice. The efficiency of this type, from a military point of view, is so superior to a system of consultations and agreements, that one fear of the World today is that some one of the totalitarian dictators will take advantage of the possibilities of his kind of government to engage in war at an unexpected moment. This situation is so real, or appears to be so, that it constitutes an emergency for the democratic nations, and is a main cause for their haste to

ASPECTS OF MODERN WAR

arm to the maximum extent of their resources.

A competent commander does not depend on a staff, either for an opinion as to what the enemy will do, or for a recommendation as to what our own forces should do. He watches events, supervises his own troops, and decides such things himself. He issues his own orders, and instructs his staff and subordinates as to his wishes. Our great American military chiefs. Washington, Grant, Lee, followed this plan. They marched in the footsteps of Napoleon and other great commanders, and both in victory and in defeat they were generals.

Modern wars indicate that these men made no mistake in their method of command. It is more important to train officers to be *commanders*, than to train them for staff duty.

How should commanders be trained for war? All nations recognize this as necessary, but there is some difference of ideas of how to accomplish this. The totalitarian states have each, as a leader, a man of great executive ability, and of wide knowledge, who unites within himself all powers of the state, military, naval, economic. There is no detail about which he can not issue *orders*. Operating under the dictators are commanders of their GHQ's, groups of armies, and armies, who with their staffs are permanently assigned. Through maneuvers, and CPX's (war games), commanders train and lead the same staff, and the same troops which they are expected to command in war.

Other nations are preparing for the expected great war through staff studies. In some states, the commanders, nominal or actual, and the staffs, are regularly changed every few years. Maneuvers and CPX's are held, but the commanders and staffs are the officers who happen to be in the area at the dates

prescribed. Would it not be worthwhile permanently to assign commanders and staffs to armies and to corps, or corps areas, rather than to maintain a policy of periodic changes, which from a strategical or tactical point of view is unnecessary, and generally undesirable? Permanent commanders, with permanent staffs, commanding the same troops in peace and in war; leaders and men known to each other, training together, form the basis for future victories.

Democratic states have need for more and better generals, to meet the advantages which totalitarian states have already provided themselves with, in having leaders competent to act, with, without, or against the advice of their staffs. Democratic states need no dictatorial governments, but they do need generals to lead their armies for the next war.

Changes in Tactics:

It is a dangerous habit, fraught with disaster, to imagine that in the future, battles will be fought in some particular manner, on a certain kind of terrain, or that some special form of tactics is in itself superior.

Tactics are a function of terrain and fire power; the latter varies with troops and materiel. It is impossible to foresee correctly how a battle to occur at a distant day should be fought. Tactics change. New materiel, with old materiel in increased numbers, demands modifications of old ideas.

So, for example, prescribing that the offensive had notable advantages over the defensive, and should be generally undertaken as a matter of national policy, was a prime cause of the disasters that fell upon the French armies during August, 1914. In this case, the terrain of heavily wooded territory, with numerous lines of hills, made an offensive difficult. The defenders were able to stop, with bloody

losses, the French attacks, while other troops gained time to execute a wide enveloping movement.

So also, prescribing that artillery fire, while desirable is not indispensable, and that infantry can advance in an attack regardless of support from other arms, caused disastrous losses and repulses during the campaigns in the autumn of 1918. This idea was true in the past, but it is no longer so.

Short-range weapons, troops on foot, or on horseback, formerly made it possible to march large bodies in columns. The last time this was attempted appears to have been by the French in 1914. It was so severely punished that this form of tactics has not since reappeared in war. It has been replaced by advances in deployed, or partly deployed, lines, by bounds from one position to another, whenever contact with hostile forces is expected. At the present time, advance lines are equipped with armored cars or tanks, with numerous machine guns, and with considerable forces of artillery. As there is no fire power while in motion, the necessity to halt in order to fight is still present. Any halt in unsuitable formation, or on unfavorable terrain, is liable to be disastrous before an active antagonist. Bounds, both by artillery, and by other troops, by echelons, from one fighting position to another, at this date, seem to be the probable method of advance in battle. Failure to observe this rule has resulted in severe lessons during recent wars.

During the first years of the World War, great importance was placed on trenches and barbed wire for defence. This began to pass out as early as 1916. With the increasing size of guns, their increase in numbers, and the increase of available ammunition, trenches were death traps under artillery fire, as they

could be completely demolished within a relatively short time. Wire could have practicable breaches blown through it either by a heavy artillery barrage, or by tanks. In place of what is already an out-of-date system, infantry is now for defence deployed irregularly in depth, and in front.

There has never been a time when tactics have changed so radically in so short a time. The new weapons; the increasing numbers of men, ammunition, and materiel now everywhere available create a doubt as to what will be the best tactics for the future battle. Terrain and fire power are bound to control; the uncertainty is as to the effects of fire from modern weapons against modern targets. Can the artillery stop fast-moving armored vehicles? How fast should tanks advance in an attack? Just how much artillery fire is required to blast an enemy out of his position? What kind of a barrage should artillery furnish to force through a rapid modern assault?

In the absence of conclusive evidence, the best method for entering the new battles of the future, will be to avoid having preconceived opinions as to what is going to happen; to enter the battle with caution; watch carefully; according to events, act with determination and with promptness.

To insure the use of correct tactics, observation, evaluation, and command are necessary.

Blockades and Bases:

Blockades are an important means for securing victory. In modern war, supplies of many kinds must be had. If one side can provide and operate materiel, as against an opponent who can not, the one with materiel wins. It is evident that food is essential. Stopping an enemy in part or in whole from securing raw materials for manufacture into war supplies, and food for

ASPECTS OF MODERN WAR

support of armies and people, is a powerful factor in winning a war.

Few nations are self-supporting. The United States, fortunately, comes near to being so. To be completely blockaded would be an unlikely event for us, but if it did occur, we could carry on for a long time without outside assistance either for food or for raw materials. Other nations are not so favorably situated. Some who feel that war is approaching, and that they may be blockaded, are striving to provide in advance for needed foods and supplies sufficient to last for the expected probable duration of the war. Nations who do not fear a blockade owing to expected control of the sea, and to their own satisfactory condition of resources, may desire to blockade their enemies.

The sea is the great route for supplies. When the sea is open to a belligerent it may secure all, or many, supplies absolutely necessary for modern armies. When the sea is closed, through lack of supplies a belligerent may be forced to abandon the war.

This principle was prominently brought out during the World War when the blockade of Germany materially contributed to the winning of the war by the Allies. The lack of food in this case caused by the blockade reduced the moral and physical condition of the people to such an extent as to make them unwilling to continue longer to fight.

The rule of international law used to be that marine blockades, in order to be recognized, must be close-in to the ports declared as blockaded, so that a ship about to enter would by the presence of the blockading fleet be made aware of the blockade. It was further required that the number of ships in the blockade must be sufficient to ensure enforcement, and make it manifestly hazardous to attempt to pass.

No nation now pays any attention to this ancient rule. Air forces and submarines make it impossible to maintain blockades close to ports. Since 1915, sea blockades have been enforced by notice; blockade forces being posted at distant control points.

So, when Italy, in 1935, went to war with Ethiopia, there was a strong world-wide sentiment that a blockade of Italy ought to be established. Few nations had fleets equal to, or superior to, the Italian fleet. It was suggested that the British Empire should undertake the blockade, as agent for the League of Nations. Without accepting the detail, the British fleet concentrated at Malta, obviously in a position to start a blockade of the Italian peninsula. Immediately strong submarine and air forces were assembled in Sicily, and it became apparent that it would be difficult to maintain a war fleet at Malta against bombing and submarine raids. The British fleet withdrew, in part to the east end of the Mediterranean, based on Egypt, and in part to the west end of the Mediterranean, based upon Gibraltar. Except for control of local traffic, sea lanes to and from Italy could be effectively closed or opened, as well at the entrances to the Mediterranean as by a close blockade of Italian ports.

As soon as this occurred, Italy assembled an army of about 5 divisions opposite the west frontier of Egypt, obviously threatening the British base in that country. Other forces, Arabs, appeared opposite the east frontier in Palestine. Although not of a formidable nature, the Arab forces were not negligible. Near Gibraltar, a strong force of field artillery, including 12" mortars, deployed north of that station and within range of the harbor, while other artillery took position on the

south side of the strait, obviously capable of interfering with navigation entering or leaving the Mediterranean.

Danger of war did not become sufficiently acute to require the British to take measures to meet this situation at their threatened bases. But, had it been necessary to do so, the blockading forces based on Egypt could have withdrawn to Aden, from where the traffic to the Mediterranean from the east could have been effectively controlled. It could be withdrawn still farther, through bases on the line Muscat, Mauritius, etc. Similarly, blockading forces based on Gibraltar could have withdrawn to the English Channel, or to the Azores, Canaries, and other islands, from where the sea routes leading to the Mediterranean from north Europe, and from the two Americas, could have been cut. This illustrates the difficulties of close blockades, which are no longer to be expected; and the advantages of having numerous sea bases, properly defended, by nations proposing to establish blockades.

Land forces may interfere with blockade operations, provided the geographical situation is favorable. Laying siege to a base, such as Gibraltar, or to Port Arthur as occurred in 1904, may prevent use, even if capture has not taken place. Military air forces, based on the Balearic Islands, have maintained a fairly effective blockade of the Spanish Loyalist coast. In narrow seas, such as the English Channel, artillery from the shore may close to a belligerent a section of the channel. The Germans established railroad artillery along the Belgian coast during the World War, and prevented a band of sea from being available to hostile shipping, while protecting their own naval forces.

Shallow seas, like the English Channel, which is not over 50 meters deep, except for a narrow channel not

over 150 meters deep, lend themselves to antisubmarine measures, through air observation and bombing from air fields, and by mining. A deep sea, like the Mediterranean, where depths of 1,000 to 2,000 meters close to shore are common, are favorable to submarine action. This is the reason why air forces have been unable to stop submarine operations along the Spanish coast. On the other hand, both mines and air forces are effective in the shallow North Sea and the English Channel.

Materiel is a main factor in modern war. Blockades may be the easy method of stopping a flow of supplies which a modern army needs. The great nations are engaged, one set in preparing to enforce blockades; the other set to avoid the effects of them. In the first case, this means increased sea power, and more and better protected bases; in the other case, autarchy.

The two greatest sea powers are democratic nations, with common ideals, which are likely to stand together in the next crisis. They are the powers against whom blockades are improbable; but who could in all probability impose blockades if they so desire. These nations see no necessity for establishing large stocks in advance of war. They can obtain them, as and when required, locally and by keeping the sea lanes open.

A report was recently made by a British Commission headed by Lord Falmouth, appointed to investigate, report, and submit recommendations, upon the supply of gasoline and other oil products for Great Britain should war occur. It was found that about 5,000,000 tons of oil products would be required yearly. It would be practicable to manufacture this quantity from coal, of which England has ample supplies, but this would require 150,000 miners to extract the coal. Men to operate oil plants would

ASPECTS OF MODERN WAR

number tens of thousands more. It was clear that this method would considerably deplete man power for the military services.

From the point of view of cost, it was found that if £50,000,000 sterling was invested in plants, this would produce only about 1,000,000 tons of oil products per annum, just 1/5 of the total needed. The same amount of money would construct 32 tank ships, capable of carrying at least 320,000 tons of oil products in one voyage, or nearly 1,000,000 tons in three round trips. Assuming that the tankers could make six round trips in one year, which would appear to be a very reasonable estimate, money invested in tankers would produce twice as much oil as the same sum invested in plants, and would at the same time release for other war purposes some 60,000 miners.

From the point of view of safety and certainty of supply, oil plants in England might be destroyed by air bombing; would in any case need considerable and expensive protection.

Taking everything into consideration, provided it would be possible to purchase oil products from friendly or neutral countries, and that the sea routes thereto could be kept open, a large saving in man power, in money, and in defense establishments would be had through buying refined oils, rather than in developing a home oil-production industry.

The situation with regard to oil applies to other articles which have to be imported. Nations which have the sea power and the bases for blockading hostile naval forces, and who are able to maintain the ocean routes for their own use, need not go to the expense of stocking materials in excessive quantities, except where the articles are a monopoly of probable enemy nations. Fortunately for the democratic nations, raw materials

and food which would be needed in war can be obtained within their own territories, or from nations which can be reasonably expected to be allied or friendly.

This condition does not apply to the totalitarian states, including Russia. These countries have neither the sea power required to maintain sea routes, nor do they have all the raw materials, or plants, or food, needed for their purposes for war. There are several ways for meeting this problem, which must be solved before these states will be ready for a world war. One is to stock in advance stores required; a second is to manufacture synthetically within their own territories substitutes for materials needed but not possessed; a third method is to acquire first, through minor limited wars, new territories which provide desired food and raw material products.

The nations which are commonly classed as the Have Nots are using all three methods to prepare for the decisive day. For material which will be needed in small quantities only, such as some alloys, medicines, special tools, instruments, it is entirely practicable to stock these in advance, in quantities which should last for the expected duration of the war.

The manufacture of substitutes, such as synthetic oil products, textile products, and the like, is practicable, but it requires large investments of money, construction of plants, vulnerable to bombing or shelling; withdrawal of large forces of workers from military reserves; and troops and materiel for protection of plants.

In Germany, the production of synthetic gasoline from coal and lignites, of which Germany has ample quantities, increased from 350,000 tons in 1936, to 850,000 tons in 1937. It is to be still further increased to 2,000,000 tons by 1939. This will be about

sufficient for peace purposes, but will hardly be enough for war. The manufacture of lubricating oils has not been so successful. These are being produced, but they are of an inferior quality. Research is in progress to correct this defect.

Similar examples for other articles could be quoted, but the ones given illustrate the extraordinary efforts being made to provide materiel for the next war.

Securing new territories through minor wars, in order to obtain access to raw materials, and food supplies, to be available for the expected future major war, has been a policy of opportunity for the Have Not powers. Within the past ten years, desirable lands or entire countries have been seized in South America, Africa, Asia, and Europe. This policy has had so much success that it may be expected to continue, and even spread, as new desirable occasions present themselves.

In fact, the uniform successes of these minor wars, and the securing thereby of valuable resources, has improved the military position of the Have Not powers. It has alarmed the Have powers, who since the end of the World War, controlled major raw materials, much of the food, and held control of the sea. It had been the hope of the Have powers that through sea power, which afforded opportunities for blockades, and through control of materials absolutely necessary for a major war, and not obtainable in sufficient quantities except from them, war could be abolished. They intended to effect this much-wished-for objective by using their superior power and resources, by blockading sea routes and denying needed material to other nations who entered, or threatened to enter, upon war. In this way, the world was to be made safe for democracy, for it was the great democratic nations that held

control of the sea, and who owned the major sources of raw materials.

The Have powers expected that this condition would continue. They attempted by treaty to have the Have Not powers agree that the latter would not maintain armies or navies in excess of assigned percentages of those of the Have powers. The latter would thereby continue to have superior forces, capable at any time of requiring certain standards of political conduct from the smaller nations, through a mere threat to use their superior power, and to deny use of resources alone obtainable from the Have powers.

What they did not foresee was that the Have Nots would in time object to the ability of the Have powers to dictate solutions to political questions by interfering with supplies of materials and foods to nations opposed to their ideas.

But the Have Nots have now arrived at a point where they have openly expressed their intent no longer to abide in a condition of acknowledged inferiority, either as to maintaining smaller forces, or as to dictation in their efforts (through minor wars) to improve their access to resources and food supplies. Efforts to establish through *sanctions*, pressure on nations not accepting the policies of the Have powers, have failed.

The Have Nots have grown greatly in strength; they are improving their military position by all available methods; they are preparing for another major war. The Haves realize this. They are not ready on their part quite to agree to what appears to be a growing sentiment for dictatorial governments, involving the overthrow of minor states. They would like to maintain their previous unchallenged position of supremacy in the world by

ASPECTS OF MODERN WAR

still being able to control the seas, and also sufficient resources, so as to make it impossible for nations opposed to them waging war without their consent.

Thus has arisen the present armament race in the world. The Have Nots desire to secure additional resources; the Haves, for their own safety, and for the continuance of democratic ideals, are opposed. The Haves have expressed their disapproval of the policies of the Have Nots, but they have not yet threatened war. The Have Nots are not now prepared for war with the Haves; they are however rapidly becoming more so. Both sides understand that control of resources will be an important factor, in the next World War.

In the securing of resources and food, blockades and bases are bound to have decisive effects.

Shelling and Bombing of Cities:

The world has been shocked, or has pretended to be shocked, by the shelling and bombing of populous cities, resulting in the death and maiming of women, children, and noncombatants, and the destruction of private property. Neutral nations have protested to belligerents concerned, strongly expressing disapproval, and suggesting arrangements be made to exempt cities, not in the zones of action of field armies, from shelling by long-range artillery, or bombing by air forces. Meetings have been held where prominent statesmen have indicated their horror at such things being done, and where they have announced that if their people go to war, they most certainly will not initiate any such inhuman acts.

A large part of the population lives in cities. To them it is a matter of considerable moment to know whether in the next war, they are likely to be shelled and bombed, and their women and children slaughtered. A general

agreement that such things are unethical, barbarous, undesirable, will not ward off the evil.

Why are cities shelled and bombed? Is the killing of noncombatants an objective? Are there other reasons? What is the cost of such shelling or bombing? Are results commensurate with costs?

Some experience was had during the World War in shelling and bombing of cities. Everyone remembers that Paris was shelled; London was bombed. What was accomplished that was useful to the belligerent responsible? Many fled from Paris, and the number of workers was appreciably reduced; outside of this, damage to property, and losses of personnel, although serious, was not of military importance. In London, general disruption of production and cessation of circulation occurred, with considerable damage to property and losses of personnel.

Bombing was frequent during 1917 and 1918. Cities were bombed; if not too far from the front they were shelled by artillery. Accurate reports as to the results were made.

Our artillery shelled Metz; the fire was so badly adjusted that that city did not know it was being shelled. No hits were obtained. Shelling of Montguyon was more effective; important CP's felt it necessary to move to the rear. Shelling of Conflans and of Mars-la-Tour interrupted main rail lines of supply for the time the shelling continued, and thereafter until the personnel could be recalled and duties resumed.

In those days bombing from the air was not accurate; the target was seldom struck; other objects were. People were killed and wounded; fires, sometimes destructive, were started; much property damage occurred.

THE FIELD ARTILLERY JOURNAL

Bombing invariably caused an alarm to be sounded, not only at the place attacked, but in other places sufficiently near as to believe themselves to be in danger. Everybody, over a wide area, rushed to shelter, abandoning whatever task they were at; sirens screamed, there was extraordinary excitement, some confusion; all work stopped, transportation ceased to move; there was an almost complete arrest of activity. When the danger had passed, people were slow to return to their posts. Workers wanted to look at the killed and wounded, watch the ambulances; rush after the fire engines; assist in extinguishing fires. Many went off to determine whether their families and homes were safe, and see what had happened to their neighbors. Workers were required to repair utilities, gas, water, phones, electricity; many workers just ran around getting in the way. Work for the balance of the day was so difficult that it was customary not to attempt it. Production was seriously curtailed.

Complete reports on recent bombings in Spain and in China, and of shelling of cities in Spain, are not yet available. The evidence so far agrees as to character with the results obtained twenty years ago. Because the bombardment forces are now more numerous, the amount of bombing is much greater. It is much more accurate. Targets are frequently destroyed. More and better bombs, and more and better hits, has caused more damage, and has killed and wounded many more than in past wars. Among these were numerous noncombatants, women and children.

From the viewpoint of the attacker, the results seem to have been:

- a. Destruction of utilities of all kinds; of transportation, both rail and marine; facilities; factories; shelter.
 - b. Serious losses to civilians in killed and wounded.
 - c. Large losses to private property, including charitable institutions, such as schools, hospitals, churches.
 - d. Cessation of work.
 - e. Where shelling and bombing has been frequent, partial abandonment of cities, thereby resulting in reduction of production, disarrangement of services, and refugee problems.
- It is useless to claim that shelling and bombing of cities, with killing of men, women and children, produce no results. Unfortunately, for many they do. The question is, Are nations going to continue this in the next war in which they engage? The answer depends on,
- a. Is shelling and bombing of cities of prime value to the attacker?
 - b. Even if it is, will it nevertheless be abandoned, as unethical?

The cost of shelling by the artillery is the cost of the batteries, if specially furnished for that purpose, plus the ammunition used. If the batteries are for general combat purposes, the increased cost is only that of ammunition fired. This has been the case at Madrid, where the artillery shelling that city was there primarily to support the field troops. It might be the case where long-range artillery was provided for interdiction fire on important centers of communication. In general, shelling by artillery is relatively inexpensive.

Bombing by air forces requires large expenditures. European nations foresee such bombing; they have made extensive provisions for maintaining this service. Besides the bombs, aviation gasoline and oil are of course absolutely necessary. Recent estimates by Germany (*Deutsche Volkswirth*, April, 1937) indicate that about 1,000,000

ASPECTS OF MODERN WAR

tons of oil products would be required per annum, in war, for German bombardment air forces. If this quantity would have to be manufactured, which seems probable, about 30,000 workers would be needed to produce it, exclusive of the distribution service. These men and women would reduce the number available for the army, or for other work, to just that extent. The fact that this is so, is a measure of the value placed on bombing, including cities.

Shelling is decidedly cheaper than bombing, but it is only practicable for some objectives. An increase in very long range artillery, and an increase in their range, is to be expected. The artillery has the advantage that it can fire at any time, regardless of weather, and can also maintain an uninterrupted fire if desired.

The real reason for shelling and bombing of cities is that modern war is a war of materiel. Without materiel, no modern army can function. Materiel comes from cities. More men engaged in winning the war are in back areas, and fewer men are in front lines. In 1914, 70% of armies were infantry fighting with hand weapons. They were the backbone of armies, around which everything else revolved. By 1918, the proportion of infantry had fallen to about 45% of the whole. By this date, materiel had become the backbone of the armies; guns, ammunition, tanks, planes. Without these there was no victory. The artillery in 1914 numbered around 15% for armies. It had doubled by 1918, and stopped at this figure only because more guns, and ammunition for guns already constructed, could not be furnished. In the battle, the artillery outnumbered the infantry; caused 70% to 85% of the casualties. Without it no attack succeeded. In the infantry, the hand weapons were of so little use that many

rifles were never fired; they had been replaced by tanks, machine guns.

All arms now require large quantities of materiel. The artillery must have guns and plenty of ammunition; battles are no longer won unless these are provided. Tanks must be had for offensives. Engineers require large amounts of materiel to open communications whether advancing or retreating, and for demolitions, or repairing demolitions. Air forces must have planes, bombs, airdromes. All troops need motor transportation, gasoline, and oil. Modern divisions each require 1,200 to 2,100 motor vehicles, depending on motorization or mechanization, and the great powers expect to employ divisions by the hundreds in the next war.

In the World War. France started with 500,000 workers in arsenals and in private establishments producing war materiel. By 1918, this number had been increased to 2,000,000. Such increases no longer suffice. To fight a modern war requires such an extraordinary amount of materiel, that it can only be produced if *all* man power is mobilized to obtain maximum possible quantities. The nations are doing it: the race for armaments is on; it is realized that furnishing ammunition and materiel to troops in line will have to be done in enormous tonnages, and that the outcome of the war will depend on which side can the better equip its fighting men.

A mechanized, industrial civilization has brought into being "the nation at war." Modern communications and transport enable more men to be brought into action on a given field. They likewise demand more of their own characteristics for their own maintenance, and for the supply and replacement of their own using and constructing personnel. Along these channels,

THE FIELD ARTILLERY JOURNAL

extending from the farms and cities to the active front, there are divisions of work, duty, and responsibility only artificially and arbitrarily demarcated, and then but for administrative purposes.

The machine-gunner aims and fires his piece, and an assistant hands him the ammunition. The latter has been brought, perhaps by hand, from the dump. It was trucked to that place by the division trains, who had received it at the railhead. The rails had been the channel for its passage from the factory, where denim-garbed workers, many of them women, in wartime, had assembled the ammunition from materials mined, extracted, and processed by other workers. The farms, ranches, and reservoirs supply the human necessities for all engaged in this chain, and where, along it, is the dividing line between combatants and noncombatants?

This is the reasoning process employed by those nations who pride themselves on a realistic concept, and it may be that they have so indoctrinated their peoples that their soldiers supply the pressure for warfare on civil inhabitants, since it is no pleasure to any soldier to be shot, and he would rather the shot that might kill or wound him be stayed as far back from his person as possible.

As nearly as can now be determined, cities will escape bombing and shelling only when they are located beyond the effective range of aircraft. Russia is making a strong effort to increase her natural facilities in this regard; our own geographical situation affords considerable protection. With constant improvement in size and operation range of air forces this partial immunity, limited principally to but two nations, may entirely disappear.

What has been mentioned with regard to shelling and bombing of cities applies equally to sinking of ships by

submarines, artillery, and aircraft. The presence of noncombatants on board has not saved them: probably will not save them.

Accuracy of Bombing and Long Range Shelling:

If cities are to be bombed and shelled, how accurate will this be?

Bombing by modern air forces is accurate, provided the target is visible, and that antiaircraft defenses do not prevent planes from descending to low levels before releasing their bombs.

Antiaircraft artillery is also accurate. If present in numbers commensurate with the size of the target to be defended, it can force hostile planes to remain at altitudes exceeding 5,000 meters. At this altitude bombing is practicable, but accuracy is lessened, and the area of dispersion increased. If the target is small and protected, it stands a chance of being missed by dropped bombs; if the target is large, or unprotected, its vulnerability is increased. If the target is surrounded by other buildings, the target itself may be missed, but the surroundings may suffer.

An estimate of the probable effect to be expected from bombing a harbor, such as Malta, which is nearly enclosed by land containing naval, military, and commercial establishments, showed that antiaircraft defenses were such that hostile planes would probably not descend to lower levels than about 5,000 meters. By ascending to higher levels, then diving to 5,000, and releasing bombs directed at the center of the harbor, the probable dispersion for 1,000 bombs would cover the harbor with sufficient hits to strike all ships present. Bombs that missed the harbor would fall on surrounding territory, and cause important damage. The mission of preventing the use of the

ASPECTS OF MODERN WAR

harbor as a base for surface craft could probably be accomplished.

A small industrial establishment, located by itself, and using smoke and camouflage to conceal its exact position, and by use of AA batteries to force enemy planes to high altitudes, might escape unhurt from a hostile bombardment. An establishment in a city can be protected to the extent of forcing the enemy to disperse his bombs, by dropping them from high altitudes. In this case repeated bombings may be required to destroy the target, but each attempt will incidentally damage property within the zone of dispersion; will cause loss of life; will stop work throughout an extensive territory around the objective; will temporarily stop production. By the theory of probabilities it is only a matter of time until sufficient direct hits will be obtained on any particular target.

Antiaircraft protection of cities forces repeated bombings, to accomplish a mission of destroying an objective. It delays the ultimate event. It probably also increases the loss of life to defenders. When there is no protection, less bombing can be expected to accomplish a mission. In this case the loss of military objectives will be greater, and they will occur in less time; also there will be probably less loss of life, due to less dispersion of bombs. Reports from China indicate that the Japanese bombers have destroyed a fair proportion of targets, because of the absence or inefficiency of AA artillery and defense air forces. In Spain, where the AA artillery is reported as having considerable efficiency, accurate bombardment has not always been practicable. Repeated bombings, with widespread destruction to nonmilitary establishments, because of large dispersion, have resulted in astounding

losses to life and property, much of it nonmilitary.

The rule seems to be that AA protection can and will delay destruction of particular targets, by requiring a greater number of bombings, involving more time. Incidentally, such repeated bombings will cause greater loss to life and property in the neighborhood of the target. In locating AA defenses, consideration should be given as to whether it is worth while to cause the enemy to disperse his bombs, and cover increased surfaces, in order to delay damage to a special target.

Long-range shelling by artillery will occur whenever a city in enemy territory is within range, and is a source of supply or of distribution. Depending on the range, shelling may, or may not, be more accurate than bombing. It has the advantage that neither visibility nor weather conditions affect it. It can be used at any time, day or night, and its action may be continuous.

Shelling is cheaper than bombing, and does not require the installation of anything elaborate like airdromes. The batteries can go into position almost anywhere, and can be shifted from one location to another with facility. Guns can be camouflaged, and are not liable to interference by enemy air forces to the extent that air fields are.

An increase of very long range artillery, both in number of batteries, and in the range of batteries, may be expected in the next war, in order to reduce the high cost of bombing, and in order to release air forces for missions at greater distances.

For shelling cities of general wood construction, any caliber using HE shell may be used. Against cities constructed substantially of stone, concrete or steel, 8-inch batteries are the

THE FIELD ARTILLERY JOURNAL

smallest calibers effective. If nothing else is on hand, batteries of around 6-inch caliber can be used, and will give considerable effect, but it will take more ammunition by weight, and more time, to accomplish a mission with this caliber than with the larger calibers.

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SUMMARY

1. Principles of war have not changed, but the adaptation of them has. Do not expect to *apply* the principles in the future, as in the past.

2. Command requires *initiative*. This used to be based on personal reconnaissance and observation of the battle by the commander. Battles are no longer observed; neither the commander, the OP's, nor the air forces see, or follow, the majority of the rapidly moving events of a modern battle, covering an extensive territory. The successful commander is he who seizes the initiative, and with, or without, information, acts. Doing nothing, or instructing subordinates to act, without specifying how, is fatal. The modern battle needs coordinated action by infantry, tanks, artillery, aviation, and the services; can be had only through the initiative of the commander.

3. Artillery requires initiative. Artillery fire controlled by OP's, who could see all, or most of the targets, and who could follow the movements of troops in battle, has not occurred in this century. That system belongs to past ages. At present the artillery has become the most numerous force on the battlefield; causes the majority of losses; without its fire success is impossible. It must fire—information or no information. The artillery must have the initiative to place its fire in mass volume, in time, and at the critical place; it must determine these essentials itself.

4. Staff control is unsuited for modern war. With motor transportation,

aviation, large armies and larger theaters of operation, events move so rapidly that time is lacking for "studies," recommendations, discussions, either from staff sections, specialists and services. The *commander*, although not refusing advice, must be able to do without it; must act instantly as occasion requires.

5. Tactics are changing every year because of new inventions, new weapons, increased quantities of materiel and ammunition. Tactics depend on the terrain, and on fire power. It is not exactly known what the fire power of the new weapons in new numbers will be. Make no assumptions that, in the next war, some particular form of tactics is the preferable one. Be cautious; watch carefully; act promptly.

6. Reserves and resources are the main forces. Enemy reserves and resources may be destroyed by forcing their expenditure in battle at a rate proportionately greater than our own. Thus to exhaust reserves and resources, battles may occur at places not in themselves of prime importance. Resources in rear areas may be interrupted or destroyed by blockade or by direct hostile action.

7. Shelling and bombing of cities, centers of supply, and of distribution, with attendant widespread loss of life and property, with a view of destroying resources and reducing reserves through casualties, refugee problems, and forcing detachments for defense purposes, will occur.

8. Modern war is a war of materiel, and of men to handle it. The outcome depends on which side can furnish and maintain the greatest force of artillery, aviation, tanks, etc., with the necessary services, ammunition, supplies, and men, required to serve them efficiently. Nations in modern war concentrate on.

ASPECTS OF MODERN WAR

a. Maximum production of materiel, and men to handle it.

b. Maximum destruction of enemy materiel, and men.

To secure these objectives, nations.

c. Mobilize their entire populations.

d. Assume the enemy has done the same, and that all enemy troops and workers, regardless of age or sex, are fair targets, as opportunity presents itself.

* * * * *

Modern war is cruel and horrible—is now so in Spain and in China; has been so elsewhere. Nations now endeavor to destroy their antagonists. They have been destroying cities, with their noncombatants, since 1917; are doing it now; will do it in the future.

War is not humane; cannot now be made so. When wars were fought by small bodies of men, rules of chivalry might be enforceable, but nothing of that kind exists today. Modern wars are of an

unlimited character. The entire nation takes part, and seeks complete domination of its opponent. This requires complete destruction of the enemy's power to resist. With the desire not to allow the enemy the slightest opportunity to secure an advantage, wars commence with both sides engaging in horrors and destruction.

The loss of a war entails such a disaster to a nation that it stops at nothing to insure success. If one side uses frightful methods, the other side must do likewise, or give up the contest. Starting, or accepting, a war, means the commencement of an era of frightfulness which modern materiel makes possible beyond anything imagined in the past.

It is this fact, and the uncertainty of the effects of modern weapons, which have been a main factor in preventing a major war from breaking. How long this condition will continue, no man knows.

Let us maintain our vigilance, and our training, so that we will not be found wanting when the day of trial arrives.

NOTICE OF ANNUAL MEETING, U. S. FIELD ARTILLERY ASSOCIATION

In compliance with Article VII, Section I, of the Constitution, notice is hereby given that the Executive Council has fixed 4:45 PM, Wednesday, December 14, 1938, as the time of the annual meeting of the Association, to be held at the Army and Navy Club, Washington, D. C.

The business to be disposed of will be the election of three members of the Executive Council (of these, two are to be elected from the Regular Army, and

one from the Field Artillery section of the Officers' Reserve Corps) and the transaction of such other business as may properly come before the meeting.

Proxy cards are being sent to all active members of the Association within the continental limits of the United States, as required by the Constitution, and it is desired that they be returned promptly. Nominations may be made on the proxy cards, or from the floor at the meeting.

A Graphical Shortcut for K-Transfers

BY CAPT. HAROLD F. HANDY, FA

THE set of curves shown in the figure is a graphical device for finding and applying *K*. It eliminates taking from the firing tables the "yards per mil" at check-point (base point) and target map ranges. It saves a good bit of repetitious multiplying, dividing, and thinking, thereby saving time and reducing the chance of error. Any intelligent soldier can operate it dependably. It finds its best use on those not-so-rare occasions when the overlay arrives late and many concentrations have to be figured against time.

Abscissas are map ranges. Ordinates are " $\Delta\theta$," a symbol here used to mean adjusted elevation minus initial elevation. (Note that if one follows the convention of subtracting *algebraically* the initial elevation from the adjusted elevation the sign of *K* determines itself by rule of thumb and the likelihood of a common error is considerably reduced.) The curves

step disregard the sign of $\Delta\theta$) and directly above check-point map range. (3) Select the curve which passes closest to the point found in (2) and follow this curve to that point on it which lies directly above target map range. (If a value of *K* closer than the nearest 10 yards per thousand is desired, sketch through the point found in (2) an interpolated curve and use it instead of the "nearest 10" curve. So doing requires practically no time or effort, is likely to give rather better results and is therefore recommended.) (4) Directly opposite the point found in (3) read a new $\Delta\theta$ for the target and apply this new $\Delta\theta$, which is the elevation correction due to *K*, with the same sign as that of check point $\Delta\theta$, to the initial elevation for the target. The result is the quadrant elevation for attacking the target.

Example: 75-mm. guns, M 1897 (French), firing shell Mk I, normal

	Map Rn	El for Map Rn	Site	Init. El.
Check Point	4840	176.7	+7.6	184.3
Target	6320	315.3	+14.2	329.5

Registration on check point gives adjusted elevation of 172.6.

Finding and applying *K* by the usual method:

Check Point

$$K = \frac{\Delta\theta \times \text{yds per mil}}{1/1000 \text{ of map range}} = \frac{-11.7 \times 14.4}{4.84} = -34.9$$

Target

$$\text{Correction} = \frac{K \times 1/1000 \text{ of map range}}{\text{yds per mil}} = \frac{-34.9 \times 6.32}{8.7} = -25.4$$

are curves of *K* in yards per thousand.

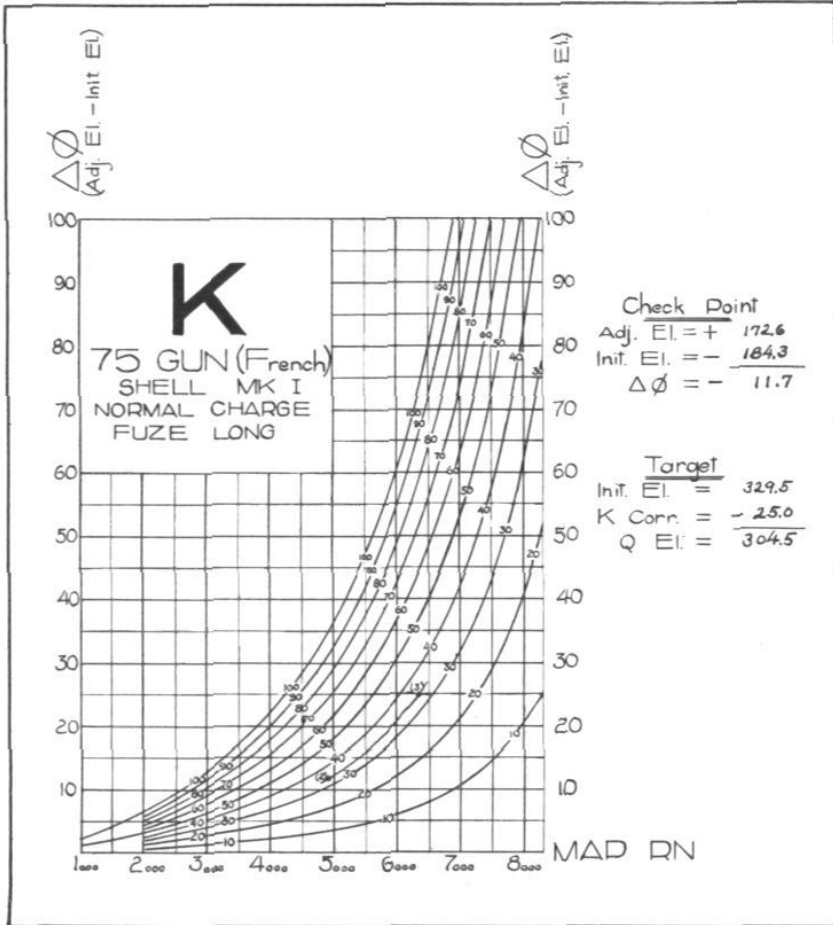
Having registered, use the chart as follows: (1) Compute $\Delta\theta$ for the check point (base point). (2) On the chart find that point which lies opposite $\Delta\theta$ (in this

charge, fuze long.

Quadrant elevation is, then, 329.5—25.4, or 304.1.

Chart method, using interpolated curve: The problem is worked on the

A GRAPHICAL SHORTCUT FOR K-TRANSFERS



form provided by the chart (see figure). The elevation so found is 304.5, which differs by only 0.4 of a mil from that computed above by taking *K* to the nearest tenth of a yard per thousand. (A soft pencil is recommended for use on the chart as it facilitates erasures for future use.) Note that in the entire process only six numbers need be written, two of which (initial elevations for check point and target) would generally be recorded prior to registration.

In the arithmetical illustration *K* is taken to the nearest tenth yard per thousand merely to show the degree of precision to be had from the chart when the interpolated curve is used. Using the chart result of 304.5, either 305 or 304 would normally be fired. Had *K* been taken to the nearest 10 yards; that is, as —30, the resulting elevation would have been 308, three or four mils greater. Four mils elevation change at 6320 gives a range change of about 35 yards. This tends to show that in the long run the additional

THE FIELD ARTILLERY JOURNAL

precision given by the interpolated curve should be of some value. Certainly it can do no harm although it is, of course, more apparent than real.

"Yards per mil at map range" being a function of materiel and ammunition, it is necessary to have a different set of curves for each combination of weapon, projectile, charge and fuze. This drawback is partly offset by the fact that the charts are very easy to make. Given a firing table, a pencil, dividers, and cross-section paper, anybody can make a perfectly usable one in a few minutes. It is important to note, by inspection of the

construction formula ($\Delta\theta = \frac{K \times R/1000}{\text{yds per mil}}$)

that the vertical interval between adjacent curves is the same throughout for any given abscissa. Thus, one abridges the process by first constructing the $K=100$ curve, then dividing into ten equal parts each of various selected ordinates under this curve and sketching in all remaining curves through the sets of points thus plotted.

To anyone who finds desirable this method of dealing with K I would recommend making a chart for each combination of charge, projectile, and fuze and pasting each chart in its proper section of the firing tables. By so doing he will get a considerable amount of third-grade arithmetic permanently attended to and out of the way.

MILITARY BOOKS

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

	<i>Price</i> (Domestic postage included)
THE UNITED STATES ARMY IN WAR AND PEACE— <i>Col. O. L. Spaulding</i>	\$6.00
WARFARE— <i>Spaulding, Nickerson and Wright</i>	3.00
PEN AND SWORD IN GREECE AND ROME— <i>Col. O. L. Spaulding</i>	2.00
ELEMENTS OF ORDNANCE— <i>Lt. Col. T. J. Hayes</i>	6.50
FROM SAINTS TO RED LEGS— <i>Heiner</i>	1.00
FIELD ARTILLERY: The King of Battles— <i>Maj. Gen. H. G. Bishop</i>	1.00
CARBINE AND LANCE, A HISTORY OF FORT SILL— <i>Nye</i>	3.00
R. E. LEE— <i>Freeman</i> (4 vols., each).....	3.75
A MODERN MILITARY DICTIONARY— <i>Col. Max B. Garber</i> —Cloth.....	2.50
—Leather.....	2.75
THE STORY OF RECONSTRUCTION— <i>Henry</i>	5.00
COMBAT INTELLIGENCE— <i>Schwieen</i>	2.00
INFANTRY IN BATTLE.....	3.00
THE INFANTRY BATTALION IN WAR— <i>Lt. Col. Walter R. Wheeler</i>	3.00
CAVALRY COMBAT.....	2.50
MILITARY HISTORY OF THE WORLD WAR— <i>Col. G. L. McEntee</i>	7.50
THE SIEGE OF ALCAZAR—(<i>McNeill-Moss</i>).....	3.50
ARMY MESS MANAGEMENT SIMPLIFIED— <i>Maj. E. A. Hyde</i>	2.00

A reduction of 10% will be made to JOURNAL readers who purchase any of the above books through the U. S. Field Artillery Association.

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%.

The New French Short Cannon

BY FREDRIC CULMANN

General, French Army, Cadre of the Reserve

BRIEF Historical Summary—Patterning after the example set long ago by all foreign artilleries, the French Artillery has at last just adopted a light howitzer.

This howitzer, of 105-mm. caliber, follows after a long interval a short gun dating from 1890, 84 pieces of which out of the 210 in existence were included in the small number of heavy guns mobilized in 1914. However, the mediocre range of these cannon (5,000 meters at most), and their lack of precision and of stability during fire, soon caused them to be relegated to the quiet defensive sectors which existed during the first years of the War, where we only very exceptionally saw them used at ranges of more than 3,500 meters.

In 1890, also, Major Baquet (General Director of Artillery at the end of 1914), inventor of the 120 C howitzer, designed the carriage of a 155 cannon of the same type, on which he mounted the model 1887 short gun invented by Colonel de Bange.

Thus, a dozen years after the siege of Plevna (1878), from before which the Turks retreated in the course of the operations, and whose intrenchments could neither be destroyed by the Russian field guns, with their flat trajectories, nor could the troops sheltered in them be reached by their fire, the French artillery possessed two short guns differing greatly in weight and power. On analyzing the problem posed at Plevna, we find that the French artillery sought to deliver a curved fire mainly with the aid of the 120 C howitzer and to destroy field shelters and ruin lands mainly by means of the 155 C howitzer and this idea, born of experiments on the proving ground, seems to be still held in technical circles.

In 1915, in view of the urgent need then felt, recourse was had to a single caliber, 155 (the 155 C of Schneider and Saint-Chamond) as that most necessary, because both the more economical bombardment of slopes that escaped the 75, and the destructive results necessary during that phase of the hostilities, could be obtained with this howitzer.¹ At that time, however, there was no shell intermediate between that of the 75, weighing 6 kg and containing 0.8 kg of explosive, and the shell of the 155, weighing 43 kg and containing 10 kg of explosive. This gap was filled later.

Description of the 105. Its Transportation.—The new 105 C howitzer of model 1935 "B" is described in a set of Regulations concerning Maneuvers which have only just appeared, although they were approved by the Minister more than a year ago, on April 12, 1937.

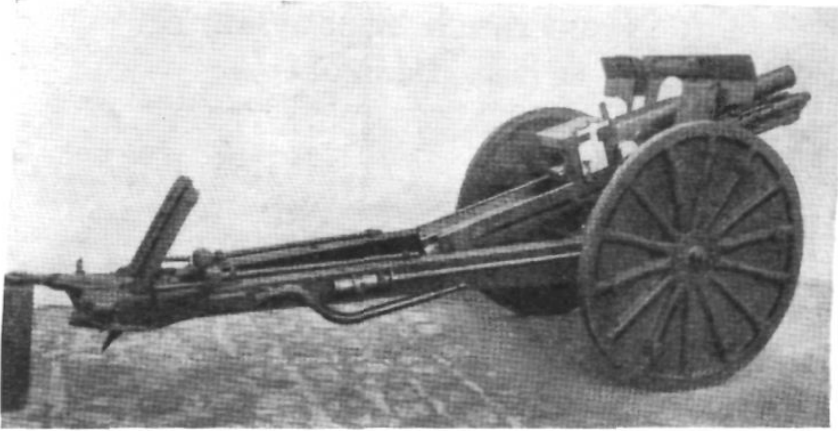
This is a rapid-fire howitzer, mounted, like the long 155 G.P.F., on a carriage with shields and a split trail, equipped with an automatically variable recoil brake.

When the two trails are open, the horizontal field of fire is 940 thousandths (940 meters at the range of 1,000 meters) or 58 grades. The vertical field of fire extends from —6 to +50 grades.

In case of urgent necessity, the gun can also fire with its trails closed. The

¹In June, 1917, the shelters constructed by the Germans, often of concrete, had become much stronger, and Gen. Petain demanded that the manufacture of mortars of 220-mm. and 280-mm. caliber, be accelerated to the detriment of the 155 C. howitzer. The Minister was unable to accede to this request, since, had it been granted, it would have brought about great confusion and caused great delay in the manufacture of cannon.

THE FIELD ARTILLERY JOURNAL



FRENCH 105-mm CANNON, MODEL 1935

fields of fire are thus limited to 100 thousandths to the right and left, respectively, in direction, and to from —6 to 12 grades in elevation.

Whether the trails are open or not, however, the gun must be *anchored*, that is, the two spades must be firmly thrust into the ground, *before* the first shot is fired.

The weight of the rear carriage in marching order with all its equipment and accessories is 1,705 kg. The weight (not excessive) of the piece in battery is 1,627 kg, as compared with 1,140 for the 75 gun, model 1897, 1,400 kg for the German 77, model 1916, and for the 75 produced soon after the war and having a range of 13.5 or 14 km. It should be noted that the split trail increases the weight by about 150 kg.

The total length of the barrel (including the recess for the breech-block) is 1.76 m. The total length of the gun in battery is 4 meters. The width of the track is 1.51 m; each wheel weighs 107.500 kg.

When it is to be transported, the 105 C howitzer is hitched to a limber drawn by six horses or is towed by a tractor; in the latter case it is either provided with wheels having pneumatic tires, or mounted on a bogie, an easy operation lasting only ten

minutes. This bogie assures the elastic suspension necessary for rapid travel. It comprises two identical and separate assemblies fastened on the inside and near the wheels of the piece or caisson. Each of these assemblies is composed of two small solid wheels equipped with rubber tires 0.50 meter in diameter and with ball-bearings, their axles being connected by means of leaf springs. Owing to these arrangements the *average speed* of a *group* of batteries reaches 20 km per hour on roads. When the guns are to be transported over a broken terrain, the bogies are removed.

The speed of 20 km is that contemplated for large-scale strategic movements of artillery. It is likewise the speed of *tanks* and therefore of the main body of mechanized divisions (modern cavalry) and large motorized units (reserves of the high command transported rapidly to any section of the front indicated by the circumstances). The speed of the *reconnaissance* agencies (motorized machine cannon, light tanks, tankettes) is evidently much higher.

With regard to this speed of 20 km, which may at first glance seem low, Lt.

THE NEW FRENCH SHORT CANNON

Col. Perré, whose competency is recognized, said in a recent address to the reserve officers of the Paris Region: "When we wish to give an idea of the tank's possibilities we state its *maximum speed at a given instant* when traveling in a straight line over hard, level ground." This is the only speed that can be mathematically defined, and is therefore the only one that permits comparisons. The *marching* or average speed, however, including the halts of a unit making a long march over roads or trails, is much lower than the speed at a given instant. It is roughly estimated in kilometers per hour by means of the following empirical

formula: $v = \frac{V}{3} \times 2$, in which v is the marching speed and V the speed at a given instant.

Moreover, the speed of a *column* is limited by the power of the brakes that regulate the distance between the vehicles, which is fixed in such a way as to prevent telescoping in case of the breakdown of a vehicle.

These remarks have seemed necessary in order to give a correct idea of the possibilities of artillery, and of the new 105 cannon among others.

Ammunition. — The 105 C howitzer

360	gr.	Bal.	10	+	730	gr.	S.D.4
360	"	"		+	360	"	"
360	"	"		+	150	"	"
360	"	"					
300	"	"					
250	"	"					
205	"	"					
175	"	"					
145	"	"					

fires but one kind of projectile—an explosive shell of the 1935 model having *two fuzes*, the rear part of which is shaped like a truncated cone, while the front part is highly streamlined. This arrangement

ensures optimum stability in the air and therefore a very long range. In the rear portion of the cylindrical central part of the body of the shell is the usual *rotating band*, in its front portion is a *guiding band*. These two bands assure good stability of the projectile in its trajectory, on the one hand, and *greater precision*, which they probably double, on the other.

The explosive inside the shell is of two kinds, either a very powerful *nitro* compound (of the melinite type), producing a very noticeable black smoke on bursting—or a *nitrate* mixture, which is less sudden in its action but makes large craters in the ground and produces an almost invisible white smoke on bursting.

The shell is exploded either by means of the instantaneous or short-delay fuze RYG Model 1918, or by the double-action fuze L D of the 1917 model. The weight of a shell equipped with the former is 15,670 kg, while that of one provided with the latter is 15,850 kg.

The propelling charge is contained in a separate cartridge case inclosing six bags of ballistite of variable weight, and one, two, or three bags of S.D.4 powder making it possible to obtain nine different charges, depending on the muzzle velocity desired.

Muzzle velocity :	442 meters
" " :	345 "
" " :	287 "
" " :	248 "
" " :	220 "
" " :	195 "
" " :	175 "
" " :	150 "
" " :	145 "

(The use of the latter charge is temporarily prohibited.)

Ballistic Properties.—The ballistic properties of the 105 C howitzer cannot be exactly determined except by means

THE FIELD ARTILLERY JOURNAL

of the range tables, but to date these tables, which are rightly kept secret, have not yet been published. Nevertheless, it appears from various indications found in the Regulations of April 12, 1937, that the range and precision of the new gun are certainly excellent and at any rate superior to those of the French guns previously used. Among these indications should be noted the use of a projectile having two fuzes and bands and a high weight per sectional unit; the employment, as a propelling charge, of ballistite, a slowly and gradually acting powder capable of increasing the range by nearly 10 per cent as compared with the B powders, and lastly, the adoption of a mechanical rammer operated by a spring, which firmly places the projectile in a leading position that is always the same in spite of the elevation of the barrel.

Since the muzzle velocity of 442 m. per second, which may seem low, is retained well in the air, the range should reach 11 to 12 km, as it does for all modern guns of the same kind. It should be noted, however, that a Czechoslovak howitzer of 100 caliber, evidently constructed by the Skoda establishments in Pilsen, which have had long experience in the manufacture of short guns, has a range as high as 13 km.

The *precision*, which is especially necessary in short guns, should at least equal that of the best foreign guns, whose range error is only 1/400 of the range, in the vicinity of the maximum range. Efforts are rightly being made to reduce this error still further in all armies, and especially in that of *Germany*.

It appears that the maximum rate of fire should not exceed six shots per minute, which is that of the German howitzer of the same caliber. As compared with the rate of fire of the 75 gun, which can reach 30 shots with a trained personnel, that of the 105 C is

low, owing to the weight of the projectile (about 16 kg), the separation of the shell and cartridge, which makes two loading operations necessary, and the usual elevation of the barrel, which renders the position of the loading gunner uncomfortable and forces him to use a rammer. The rate of fire of the 105 C howitzer, however, can certainly be retained for a long time at medium ranges involving the use of moderate charges. Moreover, it is known that the life of a howitzer can, without running the risk of causing excessive erosion, be prolonged much more than that of a gun characterized by the muzzle velocities suitable under present conditions of combat.

Organization of the Divisional Artillery and Tactical Employment of the 105 C.—The 1937 Regulations are silent on everything relating to the consequences of the adoption of the 105 C howitzer on the organization of the divisional and corps artillery. It is to be foreseen, however, in accordance with the views expressed several years ago by military writers, that the 105 C howitzer will take the place of the excessively heavy 155 C in the division (weight in marching order 3,800 kg, in battery 3,300 kg) and that the latter will be relegated to the army corps.

The idea is that the corps artillery shall lend to the divisions, at the proper time, a number of its 155 C howitzers that will vary in accordance with the exigencies of the combat in which each division is engaged and the strength of the enemy organization, and more rarely, if, for instance, there are too few of the 155 L guns, it will keep all or part of its 155 C cannon for use in counterbattery missions in conformity with the limited range of such howitzer (less than 12 km).

The 105 C divisional artillery will form a regiment just as the 155 C artillery does now: it will not be composed

THE NEW FRENCH SHORT CANNON

of mixed regiments or groups of 105-75 guns, like the groups of 105-77 guns created in Germany in the fall of 1917 at the time of the Riga offensive. The mixed group, indeed, has the disadvantage of posing a delicate problem in fire direction, and it is almost impossible to find good emplacements that are suitable for both the long and the short gun. It is therefore said in Germany: "First put the two batteries of 77's on the ground and the 105 C howitzers can then be easily emplaced." Moreover, the mixed formation is not necessary, since the group is assigned a zone of action which is so narrow that the configuration of the terrain near the objective does not require that a battery of ordinary guns be placed in one position and a battery of howitzers in another. If the configuration of the ground changes in the direction of depth, this will usually occur at such a distance as to necessitate a change of position; while this change is being made the initial distribution of the groups or regiments will be adapted to the terrain which is to be bombarded from the new emplacements.

In calculating the increased quota suitable for a division which is to play an important part in a great battle, it will be assumed that a battery of 105 cannon is, like a battery of 105 L guns, equal to two batteries of 75's, as the 16-kg shell of the former is roughly equal in power and radius of action to two shells of the latter.

The motorized regiments of 105 C howitzers of the General Artillery Reserve will rectify, through the armies and army corps, the organic quota of each division — which is too rigid and generally too low — according to the mission of the latter and the configuration of the terrain on which it must fight.

The divisional 105-mm. artillery will mainly be used in firing over slopes descending toward the enemy; in such

cases it will take over all the missions of the 75 guns and will thus deliver, among other types of fire, creeping barrages patterned after the examples given in the 1937 Regulations. It will also destroy the light shelters and shallow trenches encountered during the first day of a battle at the outposts on an advanced line, when, for lack of time the enemy effectives and material are merely organized in a tentative manner.

The 155 C howitzers will be lent by army corps to divisions only after the reconnaissance made by the latter, one of whose objects will be to search for objectives for these big howitzers. The latter will be given the task of destroying the strong shelters and deep trenches which the enemy may dig locally even during a single night's halt.

Conclusion.—In summing up we may say that the French Army has decided to organize the light field artillery with two guns, one a 75 delivering a flat fire, the other a short gun delivering a curved fire. The adoption of the new cannon continues the development which led to the introduction, during the War, of light charges in the cannon of 75 and 105-mm caliber, in order to curve the trajectories of these long cannon. This was a logical development, since the objectives are increasingly employing natural defiles, shelters or trenches in order to protect themselves against modern armament, the killing power of which is increasing.

The German artillery, however, had already adopted a similar organization at the end of the last century, though in a truly timid fashion. During the War it was compelled to increase the proportion of curved fire and it now regards its ideas of 20 years ago as old-fashioned. It is gradually eliminating its 77-mm guns and replacing them with its light howitzer. It is possibly desirous of adapting the trajectory of its principal

THE FIELD ARTILLERY JOURNAL

divisional gun to the configuration of the terrain in an ever closer manner, and perhaps it also regards the caliber of 105-mm as the lowest permitted by the teachings of the War in the Chaco.

Nevertheless, the 105 caliber seems too high for a light *single* piece. On the one hand, it results in a reduction of the range to a maximum of a dozen km in order that the gun may not be too heavy; on the other, it necessitates the consumption of too great a weight of ammunition in fire echeloned inside the wide forks now frequently used owing to the dispersion of the enemy infantry in depth and the inaccuracy of the aerial observations, which are often the only ones possible. Lastly, the high weight of

the shells (16 kg) reduces the rate of fire too much. From these different viewpoints, the Czechoslovak howitzer of 100-mm. caliber with a range of 13 km would be more suitable to be chosen as the only light divisional cannon,* but we should still prefer a jacketed 38-caliber gun with a muzzle brake, firing a 13-kg projectile 14 km, for the increase in range has continued through every epoch and in all wars, and the inferiority in this respect of a currently used gun which is the only one of its kind can be made up for only with difficulty on the battlefield.

*This is now duplicated by a cannon of 30 caliber, model 1930, having a range of 14 km.

SPECIAL NOTICE

U. S. FIELD ARTILLERY ASSOCIATION PRIZE ESSAY, 1939

A PRIZE of \$100 is offered by the United States Field Artillery Association for the best essay submitted by any Field Artillery officer of the Regular Army, National Guard, or Reserve Corps, on any subject of current interest pertaining to the Field Artillery.

The Executive Council of the Association, in announcing the essay prize, offers, in addition, a prize of \$50 to that student of the 1938-39 Regular Course of the Field Artillery School whose required thesis shall be adjudged best by the Commandant of the School or by his delegates.

The following rules will govern the essay competition:

(1) The award of prize to be made by a committee of three members to be nominated by the President of the Field Artillery Association, voting by ballot and without knowledge of the competitor's names or of each other's vote.

(2) Each competitor shall send his essay to the Secretary-Treasurer of the Association in a sealed envelope marked "Prize Essay Contest." The name of the

writer shall not appear on the essay, but instead thereof a motto. Accompanying the essay, a separate sealed envelope will be sent to the Secretary-Treasurer, with the motto on the outside, and the writer's name and motto inside. This envelope will not be opened until after the decision of the Committee.

(3) Essays must be received on or before January 1, 1939. Announcement of award will be made as soon as practicable after that date.

(4) The essay awarded the "United States Field Artillery Association Prize" will be published in the FIELD ARTILLERY JOURNAL as soon as practicable. Essays not awarded the prize may be accepted for publication in the FIELD ARTILLERY JOURNAL at the discretion of the editor and the writers of such articles shall be compensated at the established rate for articles not submitted in competition.

(5) Essays should be limited to 8,000 words, but shorter articles will receive equal consideration.

(6) All essays must be typewritten, double spaced, and submitted in triplicate.

Leadership

Prize Military Science Thesis, Harvard University

BY WILLIAM R. C. GREENE, '38

IN this paper I shall attempt to discuss some of the "human," or "psychological," or "social" aspects in the efficiency of military leadership in war time. This can be looked at from two aspects: (1) The relations between the officers and their men, and (2) The relations between the commanders themselves. Now, it has been observed that there is no one correct kind of military leadership. It varies with the varying conditions, especially the psychology of the people. The traits and procedures that had made Hannibal such a great military leader would be utterly unsuited to Americans. Hannibal employed foreign mercenaries who were attracted to his campaigns only by the prospect of loot and conquest, not by the fervor of a great cause. Carthage was not their native city. Undoubtedly, during the course of the dozen or more years of their service under Hannibal, these veterans developed a "Kameradschaft" and a certain personal loyalty to Hannibal himself. But even on top of this, Hannibal, and to a lesser degree the Romans, had to resort to bullying and intimidation of their troops.

"To one brought up under the methods of Continental armies, the discipline of the armies of the Civil War may well have seemed strange or even nonexistent. The free chaff by the men in the ranks of any idiosyncracies of

manner or of dress in the officers must, naturally, have horrified a Prussian, who would, just as naturally, have been amazed at seeing the Commander-in-Chief of the Army of Northern Virginia, when riding with his staff past a prayer meeting, conducted by a humble private, halt, dismount, bare his head, and humbly take part in the simple service. Discipline to be of value must be suited to the character of the men who are to be controlled. He (Lee) did not drive, he led his men; he led and they followed, because he lived amongst them, because they knew of his constant anxiety for their welfare, because his honest and complete lack of selfseeking were obvious to the least observant, and because his early victories had given him a prestige so high that it could not be lowered even by defeat. . . . The object of discipline in an army is to give bodies of men both cohesion and the instinct to suffer all for duty in circumstances of great stress and danger. If this be so . . . there must have been some value in the discipline which took Pickett's men across the fire-swept ground up to the ridge of Gettysburg, and Grant's soldiers to the assaults of the "Bloody Angle" of Spottsylvania. Armies which stood the losses of the battles of the Civil War and kept their spirit and cohesion had a discipline which, *if sui generis, was effective*" . . .¹

EDITORIAL NOTE: *These impressions of a young student of military history are considered of interest because of the particular angle of approach to an important subject, whatever difference may be found with their conclusions. Mr. William R. C. Greene majored in Sociology, and received the degrees of A.B. and M.A. from the Graduate School of Arts and Sciences, Harvard University, in June. He now is a 2d Lieutenant, FA-Res. A graduate, 1934, of the Boston Public and Latin School, he lives at 8 Haynes Park, Roxbury, Mass.*

THE FIELD ARTILLERY JOURNAL

The type of leadership of the Carthaginian and Roman armies would not only be unsuitable, but unthinkable, for an American army in any past or future wars. It is not merely that Hannibal was employing mercenaries, but that he and Scipio Africanus had under them armies composed of veterans of 12 to 30 years' constant service. In other words, they employed professional armies par excellence. The psychology of a professional soldier is quite different from that of the man who volunteers in time of war—even in America where the difference is probably less than anywhere in the world. As has been suggested to me, one characteristic of a professional army is its ability to go anywhere, at any time, for any glorious or inglorious purpose whatsoever, and act efficiently. This is undoubtedly the result of constant drill and discipline. Pleasant or unpleasant, the undeniable fact is that drill is intended to eliminate the reasoning, thinking processes in one's actions, to make one's acts more automatic, unreflective, instinctive. In war, or such emergencies, this has great advantages. If one has to undergo all sorts of intensive, exhausting deliberations to meet each new emergency, the sudden torrent of them that occur in war would soon incapacitate a man. If on the contrary, a man has been trained automatically to do this or that when this or that occasion arises, he is relieved of a tremendous mental strain. The mental energies that were being devoted to reasoning out each new situation are then entirely devoted to the immediate concrete automatic reaction. Thus, one of my instructors mentions how during his first service in the British army during the World War he would have been saved much internal disturbance had he been a professional soldier like his fellow officers, trained to act automatically and unthinkingly. As it was, when he asked

his fellow officers (the first force was a professional army)—intelligent men whom he knew personally—what they thought would be the result of this action or that, they were plainly bored. When he asked one officer if he realized what would be the outcome of their expedition, the latter replied naively that he had not yet heard the commander's decision. In the rapid retreat in August of 1914 when the French, British, and Belgians fell back 200 miles in 10 days, the professional soldier took this all in a very unperturbed, matter-of-fact way. He was not upset by any reflections that this was an alarming loss of ground. He was simply ordered to go from one place to another, and that it happened to be toward Paris was no concern of his; he simply went where he was told. There is no doubt that an army of volunteers would never have put on such an orderly rear-guard action as did this little regular army, for men newly recruited from civil life would immediately start to thinking about what they were doing—namely, retreating at about the most rapid rate in history. In that case the retreat would have soon become a panicky rout, and it might conceivably have been wiser to make a determined stand merely for the psychological effect.

Examples of the ability of a professional army to serve efficiently anywhere, regardless of the ideals and issues involved, are the campaigns of Generals Taylor and Scott in Mexico. According to Grant.

"The presence of the United States troops on the edge of the disputed territory furthest from the Mexican settlements, was not sufficient to provoke hostilities. We were sent to provoke a fight, but it was essential that Mexico should commence it. It was very doubtful whether Congress would declare war; but if Mexico should attack our troops, the Executive could announce, 'Whereas,

LEADERSHIP

war exists by the acts of, etc.' and prosecute the contest with vigor. Once initiated there were but few public men who would have the courage to oppose it.² . . . The Mexican War was a political war, and the administration conducting it desired to make party capital out of it. . . . General Scott was at the head of the army . . . General Scott was . . . known to have political aspirations, and nothing so popularizes a candidate . . . as military victories. It would not do therefore to give him command of the 'Army of Conquest' . . . Zachary Taylor . . . too, was a Whig . . . but was not supposed to entertain any political ambitions . . . but after the fall of Monterey . . . the Whig papers . . . began to speak of him as the candidate of their party for the Presidency. Something had to be done to neutralize his growing popularity. . . . It was finally decided to send General Scott to Mexico in chief command, and to authorize him to carry out his original plan. . . . It was no doubt supposed that Scott's ambitions would lead him to slaughter Taylor or destroy his chances for the Presidency". . .³

In spite of all this Grant states further on:⁴

"The victories in Mexico were in every instance, over vastly superior numbers (and in hostile territory). There were two reasons for this. Both General Scott and General Taylor had such armies as are not often got together. At the battles of Palo Alto and Resaca de la Palma, General Taylor had a small army, but it was composed exclusively of regular troops, under the best drill and discipline. Every officer, from the lowest to the highest, was educated in his profession, not necessarily at West Point, but in the camp, in garrison, and many of them in Indian Wars. The rank and file were probably inferior as material out of which to make an army, to the volunteers that

participated in all the later battles of the War, but they were brave men, and the drill and discipline brought out all there was in them. A better army, man for man, probably never faced an enemy. . . . Whether General Scott approved of the Mexican War and the manner in which it was brought about I have no means of knowing. His orders to the troops indicate only a soldierly spirit, with probably a little regard for the perpetuation of his own fame. On the other hand, General Taylor's, I think, indicate that he considered the administration accountable for the war, and felt no responsibility resting on himself further than the faithful performance of his duties." . . .⁵

This attitude of General Taylor summarizes the philosophy of the professional soldier. To serve with maximum efficiency in the field, it is necessary that one's mental energies be not dissipated by feverish, excessive thinking about the moral or political situation. In General Robert E. Lee we find the ideal professional soldier. His exhausting conflicts and deliberations of the ethical, moral, and political issues of the Civil War ceased once he took the field. From then on he entrusted himself and his cause to the "Merciful God" and spent his mental energies on the military issues. Yet Robert E. Lee was a highly intelligent, reflective man.

Contrast the conduct of the volunteers of the War of 1812 with the conduct of the regular soldiers in the same war or in the Mexican War! The latter presents a force which showed itself highly efficient whether defending its own country from invasion, or invading another country. The former we find consisting of individuals, each of whom goes through an exhausting process of ethical and political deliberation before he decides whether he can rightfully fight in any other state than his own.

THE FIELD ARTILLERY JOURNAL

or in a foreign country, or if so under what conditions. As a result, we see one force stopping or depleted at its state borders, another stopping dead at the Canadian border, watching before its eyes a little force of regulars, previously victorious, being destroyed for lack of reinforcements. Or finally, those who do decide to follow a commander across this or that border, still are shaky and uncertain as to the rightness of doing so, and fight accordingly. The function of the drills and routines of the regular army is to eliminate this exercise of individual deliberation in spheres other than the military, and even there to make it as automatic as possible. In the field in an actual war one could not conceivably employ any more complicated march maneuver than a "column right or left." Anything more complicated is ridiculous. Yet the regular soldier expends great care and energy and constant practice to acquire a nice precision in the minutest details of such customs and maneuvers as the proper use of the saber, the manual of arms, and the execution of "on right (left) into line." *Intrinsically* any ritual, any custom, any formality of etiquette, — whether religious, social, or political, or military — is ridiculous, but not when one considers its *function*—namely, to build up and maintain solidarity and morale.

War time volunteers or levies cannot be built into an efficient fighting force by the same procedures as the regulars. Certain aspects of the training of the regular soldier in certain degrees may help, but that is all. In the first place there is not time by long practice in the rituals and routines of the professional soldier to build up the latter's traditions and sentiments. Secondly, even if plenty of time were allowed, it is very doubtful whether the procedures that succeeded for a highly selected type of individual would prosper with the heterogeneous civil

volunteers. Only in a military society like the Prussian can the procedures of the regular army be applied to the general population, for Prussia has historically been in a chronic state of emergency. In such a case the virtues of the American citizen would become vices of the soldier. With the proper procedure the characteristics of an American citizen would become the virtues of the American wartime soldier. The central, fundamental element in this is propaganda (I here use the word without any moral evaluation, as simply a tool), inspiration with a "cause." As the levies or volunteers serve longer and longer in a war, the original "cause" must be replaced or reinforced by a developing "Kameradschaft," a brotherhood among the soldiers and a loyalty to the *persons* of their commanders. Before the moral reinforcement of "Kameradschaft" can arise, the wartime soldiers must have behind them a record of good service inspired by a cause. There is no doubt in my mind that the victories of the Japanese in China can be attributed to the divided loyalties and conflicting ethical issues of the Chinese rather than to the overwhelming superiority of the Japanese in machines and munitions. They are not united by a cause, not even sections of China. Politically they are in the condition of the original American colonies, fighting and bickering among themselves in common distrust. To fight is not contrary to one of the great religions of China, rather it is foolish, since perfect, transcendent bliss can be attained, and only be attained, through obliviousness to worldly and bodily affairs. But this same religion, through its emphasis on this Nirvana and obliviousness to worldly and bodily cares if so directed, could just as well give China an irresistible military force. For an army of citizens with a little training, led by trained, experienced

LEADERSHIP

officers, inspired by a cause, and fighting with their backs to their homes is a match for forces much superior in numbers and equipment, professional or nonprofessional. The reason the most efficient fighting force Grant had ever seen — Taylor's little regular army — was victorious was not because the Mexicans were especially whipped, but because they lacked any training either in officers or men.

"The Mexican army of that day was hardly an organization. The private soldier was picked up from the lower class of the inhabitants when wanted; his consent was not asked; he was poorly clothed, worse fed, and seldom paid. He was turned adrift when no longer wanted. The officers of the lower grades were but little superior to the men. With all this I have seen as brave stands made by some of these men as I have ever seen made by soldiers. . . . At these two battles (Chapultepec and Molino del Rey) while the United States troops were victorious, it was at very great sacrifice of life compared with what the Mexicans suffered. . . . The trouble seemed to be the lack of experience among the officers, which led them after a certain time to simply quit, without being particularly whipped, but because they had fought enough" . . .⁶

As Professor T. N. Whitehead stated in a private chat, the French and British were fighting with their backs to their homes, but he could not see what the Americans were fighting for. "After all, it was our war, not yours." This may partially explain the tremendous rates of shell-shock among the Americans as compared with the Europeans. Shell-shock has nothing to do with "shells"; it is a nervous reaction to which a man is more susceptible the more developed and sensitive are his habits of thought and his sense of morals. In fact, it is the solution to a conflict between the two. Activity and rapid movement absorbs one's

energies and time, and does not allow opportunity for much thinking. As a result T. N. Whitehead found that although mortality was higher and danger of ambush constant in the marching warfare he experienced in South Africa, there was no shell-shock there. On the Western front he found the troops to be suffering from endless boredom. In South Africa it was the endless marching and the diseases. I suspect that the diseases may have been a way out of the hated marching. It is reasonable that in a rapidly moving campaign in which one has to be ever on the alert for the constant menace of ambush, that one is devoting little of his energies to excessive, exhausting thinking over the moral and political issues involved in the situation. 1914-1918 witnessed the first stabilized, trench warfare — and the first appearance of "shell-shock."

One factor preventing shell-shock or any other nervous disorders resulting from conflict of ethics or duties is the mental integrity that comes from faith in, and inspiration by, a "cause." Of course, during the World War, the cause soon was replaced in the front of the soldier's mind by a "Kameradschaft," but the "cause" must come first and never be forgotten.

"On September 23, 1862, Lincoln issued his first emancipation proclamation . . . which . . . was a . . . war measure of the first importance. It is unnecessary to insist upon the military value of enthusiasm for a cause. With it armies, inferior in every material respect to their opponents, have triumphed; without it, numerous and well-equipped hosts have failed. During the first years of the War the advantage of enthusiasm lay . . . with the Southerners, who were convinced, in the mass, that they were fighting for liberty. In the North few besides Lincoln saw the vision of the future which lay before a great and united America, and toward

THE FIELD ARTILLERY JOURNAL

the close of 1862 the maintenance of the Union was becoming more and more a party rather than a National question. The emancipation proclamation gave the Northern cause a moral fillip which it was beginning to need. Its effect was not immediate, for it was received with divided opinions in the army of the Potomac, in which McClellan in particular did not accept it with joy, but its effect was certain and far-reaching." . . .⁷

"Kameradschaft" — personal loyalty to one's comrades and officers — requires that each member of the "chain of command" have an intimate understanding of each subordinate with whom he has direct relations and that each subordinate feel that his direct superior takes a personal interest in his welfare. Although Col. Harris described the "chain of command" as arising from the inability of an officer to assume responsibility for execution of orders which he gives to more than a few individuals, T. N. Whitehead suggested another explanation, namely, that an officer cannot have an intimate understanding of the personal situation of more than a few subordinates. In the British army during the World War an officer was supposed to know all about the personality, the family conditions, and all other relevant facts concerning any of his subordinates, or at least to be able at a moment's notice to learn those facts. As an example. Professor Whitehead mentioned the case of a private who was running into debt back home. He was summoned before the commander, and as is the custom, Whitehead and his subordinate noncom stood at attention beside the man when interviewed by the commander. It turned out that the private, whose pay was very low, had a wife and six children to support at home. Whitehead's subordinate knew that, but Whitehead did not, for which he was roundly upbraided in private by the

commander. As Whitehead put it, unless one knew one's men personally, how could one know that in a battle they would not break? However, Professor Whitehead's natural branch seemed to have been the Navy in which he served as a technical officer during the last part of the World War. The relationships between the men and officers in the Navy were just the opposite from those in the army. In the latter the officers led, in the former they drove, the men. The officers in the navy had no personal knowledge of the men. The officers are quartered at one end of the ship and the men at the other, with the marines in between, so that if a mutiny broke out and the men tried to rush the officers, they would have first to get past the marines. One explanation of this is that the men cannot leave the officers; if the officers direct the ship somewhere, the men have no choice about it, they are going there too. If they are engaged in a naval battle, there is nothing left for them to do but fight for their lives. In one humorous instance in history the men had to release the officers from irons when they suddenly encountered a French fleet at the mouth of the Thames, and promptly tossed them back into chains when the battle was over.⁸

Some months ago I scribbled on some blank pages at the front and rear of the "Personal Memoirs of U. S. Grant" ten "principles of war" that I had gleaned from this and other works, of which I shall quote the first five:

. . . "(1) The quality and the efficiency of the army varies completely as the quality — especially the training — of the officers.

"(2) The quality (efficiency) of the officers varies with (a) their training, and (b) the personal attitudes and sentiments toward one another of those officers who are to cooperate and associate for the common goal.

LEADERSHIP

"(3) Often these attitudes and sentiments are determined — even in spite of resistance to them on the part of the officers themselves — by the social situation. Certain frequently repeated types of situations engender harmonious relationships; others automatically breed antagonism, distrust, and all sorts of unpleasant or embarrassing attitudes among the officers.

"(4) Chief among these latter situations are those in which an officer feels that he loses social prestige in the eyes of the community. Wages, privileges, and (in the army) rank are the indices of status. One's status determines one's attitudes, sentiments, and behavior, but when one is demoted, he is demoralized by the conflict between those appropriate to his old and new status. To be placed under a former junior is often equivalent to demotion in its effects. For the same reason it is harmful to change commanders in the field. If a man is demoted, he should be transferred to where he will have new associates, and not his old associates to work with; that will minimize conflict of attitudes and sensitiveness to loss of prestige.

"(5) Such disharmonious relationships and situations are the fault of the superior officers (or authorities) who are empowered to assign the officers involved. The subordinate, no matter how clearly he may see the situation and the remedy, is helpless; he cannot take the initiative or go half way to meet the antagonistic superior (or more usually, the superior to whom he is antagonistic). Rather, it is up to the superior to initiate the remedy all the way." . . .

There are no end of illustrations of "principle 1" — that the quality of the men and efficiency of the army varies completely as the quality, especially the training, of the officers. Of the volunteers that followed the regular troops in the armies of Scott and Taylor, Grant says that they "were of better material, but without

drill or discipline at the start. They were associated with so many disciplined men and professionally educated officers that when they went into engagements it was with a confidence they would not have felt otherwise. They became soldiers themselves almost at once." . . .⁹

Both Grant and Sherman describe how at the Battle of Shiloh whole companies and regiments of raw troops under raw, untrained commanders broke and fled at the first fire, while other bodies of equally raw troops under cool, courageous, or experienced officers held their posts and served excellently.¹⁰

"Their officers were equally ignorant (with the men) of their duties. Under these circumstances it is not surprising that many of the regiments broke at the first fire. . . . Better troops never went upon a battle-field than many of these, officers and men, afterwards proved themselves to be, who fled panic-stricken at the first whistle of bullets and shell at Shiloh. . . . In moving along the line, however, I never deemed it important to stay long with Sherman. Although his troops were then under fire for the first time, their commander, by his constant presence with them inspired a confidence in officers and men that enabled them to render services . . . worthy of the best veterans." . . .¹¹

Often antagonistic officers may work together in the field without the lack of cooperation becoming noticeable. The best example I know of was in Scott's army in Mexico. The administration deliberately appointed officers from the opposition party, whom they expected would not get along with Scott.

"Soon after entering the city of Mexico, the opposition of Generals Pillow, Worth, and Colonel Duncan to General Scott became very marked. Scott claimed they had demanded of the President

THE FIELD ARTILLERY JOURNAL

his removal.¹² . . . At last he placed them under arrest. . . . Shortly afterward orders were received from Washington relieving Scott of the command of the army in the field." . . .¹³

In spite of this antagonism among the regular army officers, they served with great efficiency under Scott. However, it was a fast-moving campaign, with great individual freedom of initiative and of brief duration. Likewise, Sheridan served well under Grant despite his close friendship with Halleck, toward whom Grant was hostile. But Sheridan seized the first opportunity to get transferred from Grant's command, and though Grant was nettled, he did not detain Sheridan.

The traditional hostility between the French and the British, especially between the British General French and the successor to Marshal Joffre, ruined cooperation between them, with disastrous military results. Again, in South Africa, Professor Whitehead humorously describes the "cooperation" between his brigade and a Boer brigade, between which was surely trapped a German force. Each had to move in by careful mutual timing. Out of hostility, the British commander of Whitehead's brigade failed to keep sending the requisite information as to his movements. In retaliation the Boer General sent a note stating that he was not moving at all. The Germans, meanwhile, simply walked out of the trap. Col. Harris described how General Pershing was unable to keep an American Admiral from tying up the railroads with his coast artillery and baggage just when the army needed the roads most. If such had been the relations between Admirals Porter and Foote, and Generals Grant and Sherman, the Federal forces would never have taken Vicksburg.¹⁴

Usually antagonism is reflected in a protracted, steady, mild lack of

cooperation which only occasionally flares up into some notable incident. Such were the relationships between Lee and Longstreet.¹⁵

"On the defensive,' says Longstreet, 'Lee was absolutely perfect . . . but of the art of war, more particularly of that of giving battle, I do not think General Lee was a master . . . and on the field his characteristic fault was a headlong combativeness."¹⁶

"Grant found him to be 'of a slow and cautious nature.' To another critic who used almost the same words of Lee as did Grant, Jackson, the designer, with Lee, of those very enterprises which have been most criticized as lacking in prudence, said: 'I have known General Lee for twenty-five years; he is cautious; he ought to be. But he is not slow.'" . . .¹⁷

Longstreet, by his stubborn opposition to Lee's decisions, even after they had been initiated, made it a *certainty* that those moves would fail which he criticized as being *likely* to fail. Again and again we read how Lee sends order after order to Longstreet without any response other than excuses for not moving. This destroyed the coordination of the Confederate attacks, weakened their blows, destroyed surprise, allowed the Federals to prepare resistance, allowed opportunities to be lost, and wasted lives. For example, at one time Lee ordered General Longstreet to attack in cooperation with the other corps without waiting for Pickett's brigade. Longstreet delays several hours waiting for Pickett, without regard to the fate of those who were depending on him, because he "doesn't believe in jumping off with only one boot on." While the rare opportunities slip away Longstreet remarks in amusement at Lee's frequent orders and perturbation. On the other hand, Lee and Jackson thought as one mind, so much so that Jackson habitually anticipated

LEADERSHIP

Lee's decisions. As a result they were able to grasp at the most fleeting opportunities and strike the most sudden blows. When Lee lost Jackson at Chancellorsville he lost his "right arm."

"Never again were there to be those bold and brilliant maneuvers which turned doubtful situations into victory. Without Jackson's daring energy, tactical skill, and instant sympathy with and reading of Lee's mind, the combinations of the Second Manassas and Chancellorsville were impossible." . . .¹⁸

The harmonious cooperation between Grant and Sherman is all the more noteworthy because they did not always think as one mind. Once Grant made his decision Sherman executed it with all his abilities and energies whether he had previously concurred in it or not. When Grant's base of supplies was destroyed by a cavalry raid and the railroad behind him damaged, he decided to abandon his base of supplies and his long lines of communications.¹⁹ Sherman, in alarm that he could not persuade Grant of the folly of such a decision, wrote to other of Grant's officers asking them to lend their persuasion.²⁰ Says Grant:

"I did not regard either the conversation between us or the letter to my adjutant-general as protests, but simply friendly advice which the relations between us fully justified. Sherman gave the same energy to make the campaign a success that he would or could have done if it had been ordered by himself." . . .

Quite different from Longstreet.

A situation in which an officer feels that he loses prestige, as when he is demoted or placed under a former junior, is usually demoralizing to that officer, as has been already mentioned. Sherman and Grant recognized all this. In fact, Sherman, being unusually unselfish in his devotion to his country, had during

Grant's siege of Fort Donelson, acted as Grant's supply officer although Grant's senior, and offered to waive rank and come to assist Grant if the latter wished. They tried their best to avoid such situations, but the generals were finally assigned by Stanton. One general assigned to Grant was General McClelland whom Stanton and Halleck had even considered to replace Grant.

"Immediately after the reduction of Arkansas Post and the capture of the garrison, McClelland returned with his entire force to Napoleon, at the mouth of the Arkansas River. From here I received messages from both Sherman and Admiral Porter, urging me to come and take command in person, and expressing their distrust of McClelland's ability and fitness for so important and intricate an expedition.

On the 17th I visited McClelland and his command at Napoleon. It was here evident to me that both the army and navy were so distrustful of McClelland's fitness to command that, while they would do all they could to insure success, this distrust was an element of weakness. It would have been criminal to send troops under these circumstances into such danger. By this time I had received authority to relieve McClelland or to assign any person else to the command of the river expedition, or to assume command in person. I felt great embarrassment about McClelland. He was the senior major-general after myself within the department. *It would not do with his rank and ambition to assign a junior over him.* Nothing was left, therefore, but to assume the command myself. I would have been glad to put Sherman in command, to give him an opportunity to accomplish what he had failed in the December before; but there seemed no other way out of the difficulty, for he was junior to McClelland." . . .²¹

THE FIELD ARTILLERY JOURNAL

McClelland took exception to Grant's assumption of direct command, obeyed Grant's orders very poorly, issued orders which Grant had to contradict, and finally, without Grant's permission, issued a congratulatory publication to his corps which unjustly slurred the men and commanders of the other corps. Grant had to relieve him of command.

Again Stanton and Halleck sent to the assistance of Grant General Buell, an excellent officer, four years older than Grant, who had graduated from West Point two years before Grant, and had never left the army. Because Buell had for some time been a department commander, while Grant commanded only a district, and had been his superior only a few weeks, as much as he might want to order Buell to make a certain move, he felt that he could not more than request it. The relations between Buell and Grant were highly uncooperative, Buell being very critical of Grant's management of affairs. For a while Halleck had to come and assume direct command, as in the trouble with McClelland. Grant (like McClelland) was made "second in command" but was deprived of any of the privileges and duties of such a position, especially over General Buell. Again we find General Thomas refusing to serve under General Rosecrans, a former junior.

Finally, when Grant was given command in the field of all the federal armies and Sherman succeeded him in command of the army of the Mississippi. Grant and Sherman desired to assure the services of various excellent, trained generals who had discontentedly retired or been pushed into inactivity, such as McClelland, Burnside, Fremont, and Buell. Says Sherman:

"My understanding was that General Grant thought it wise and prudent to give all these officers appropriate commands, that would enable them to regain the influence they had lost . . . and to endeavor to give them commands that would be as near

their rank and dates of commission as possible . . . but he would have to consult the Secretary of War before making final orders. . . . As it was manifest that we were to have some hard fighting we were anxious to bring into harmony every man and every officer of skill in the profession of arms. . . . Mr. Stanton, who was notoriously vindictive in his prejudices, would not consent to the employment of these high officers." . . .

The order of rank among the four highest officers of the Federal generals in the field had been the opposite to the order of age and graduation from West Point. Stanton had been assigning officers without such human situations in mind. To him must go the blame for the consequent antagonisms and lack of cooperation. For the relationships between the officers themselves is less important than only the relationships between the officers and the men.

NOTES

1. Maurice, Frederick: "Lee the Soldier" P. 162-3.
2. Grant: "Personal Memoirs"; I, 118.
3. *ibid.* I, 67-68.
4. *ibid.* I, 118.
5. *ibid.* I, 164.
6. *ibid.* I, 168.
7. Maurice: 156.
8. For a milder mutiny in the Spanish legions of Scipio Africanus see Polybius, XI, 25-30. One of the controls of Hannibal was that he had led his army into Italy and he was the only one who could lead it out. They had to fight or be slaughtered.
9. Grant, I, 118.
10. Sherman: "Memoirs," I, 263-269.
11. Grant, I, Also contrast the punitive expedition sent out by the Achaeans (Polybius, IV, 7-13) with that of Scott and Taylor.

LEADERSHIP

12. As Grant later claimed that Stanton and Halleck for a moment planned to replace him by McClelland.
13. Grant, I, 172-3.
14. A good example from ancient history is that of Fabius and Minucius in the Hannibalian Wars (Polybius, III, 90-94).
15. It is hard to penetrate into the relations between the Confederate Generals, possibly because only the victorious side feels that it can afford to lay the bones bare and even indulge in a little debunking.
16. Maurice: 275.
17. *ibid.* 282.
18. *ibid.* 187-8.
19. Grant, I, 432-3.
20. Grant, I, 542-3.
21. *ibid.* I, 440-442.
22. Sherman, II, 5-7.



Reviews

Elements of Ordnance. By Lt. Col. Thomas J. Hayes. John Wiley and Sons, New York. 715 pages. \$6.50.

This is a textbook at the United States Military Academy, prepared under the direction of Colonel Hayes, Professor of Ordnance and Science of Gunnery, USMA.

It is a mighty handy book to have around. Artillerymen, particularly, will find it of aid. Not only will they have occasion to refer to its discussion of artillery ballistics and probabilities, or to the chapters on sighting and laying equipment, and the characteristics of artillery weapons, but they can find in it answers to those technical questions that sometimes arise concerning the other arms, antiaircraft, for instance. The whole subject of ordnance is discussed very thoroughly, and very mathematically. The many symbols and formulas need not daunt those who are allergic to them; the reading matter among which these are interspersed is notable for its interest and

clarity. It is most convenient to have, in one volume, such an encyclopedia of technical information, not the least interesting of which is that section on the ballistics of airbombing, which reminds us that the bomb trajectory is an interesting inversion of that which we are familiar; subject to the same "conditions of the moment," but launched toward a fixed (generally) target from a moving platform.

During a period when the literature of the arm properly emphasizes the simplicity of its employment, and presents the essentials in digestible form, it is still good to have at hand an account of the spade work, and the deeply detailed analyses which mathematicians and ballistics have contributed to the derivation of the formulas and processes on which this simplicity is based. Gadgeteers—and aren't we all?—will value this work for the ready check it affords on that theory only vaguely postulated now.

Wagonsoldiers Win Inter-Circuit Cup

BY CAPTAIN JOHN A. SMITH, JR., FA

(Captain of the Field Artillery Polo Team)

FOR the second successive year the National Inter-Circuit and 12-Goal Championship Polo Tournaments were held at the Oak Brook Club near Chicago in August and September.

The Field Artillery team from Fort Sill again won the right to enter this tournament as winners in their (Northwestern) circuit, and again were guests at Fort Sheridan, Ill.

The chance of our team in this tourney depended upon one game. After the drawing was made, and the withdrawal of one team, we found ourselves in much the same dilemma as a young flying cadet at Brooks Field they tell an old story about. The matter-of-fact old sergeant who was instructing the newly arrived birdmen in the mechanics of using the parachute had about finished his first period of instruction. After explaining how to get oneself out of the cockpit, the number to count, and so on, he showed the class the position of the ring to pull in order to release the 'chute, and just how it should be yanked. To his abrupt query, "Any questions?" one of the bolder fledglings piped up, "Sergeant, don't you think we ought to have some practice in the use of the 'chute?" "Hell no!" replied the matter-of-fact one. "The first time you do it, it's gotta be perfect."

Five of the six winning teams in the six national circuits entered for the championship tournament at Chicago, and as a result of these entries, the drawings were made by the tournament committee prior to the arrival of all of the teams.

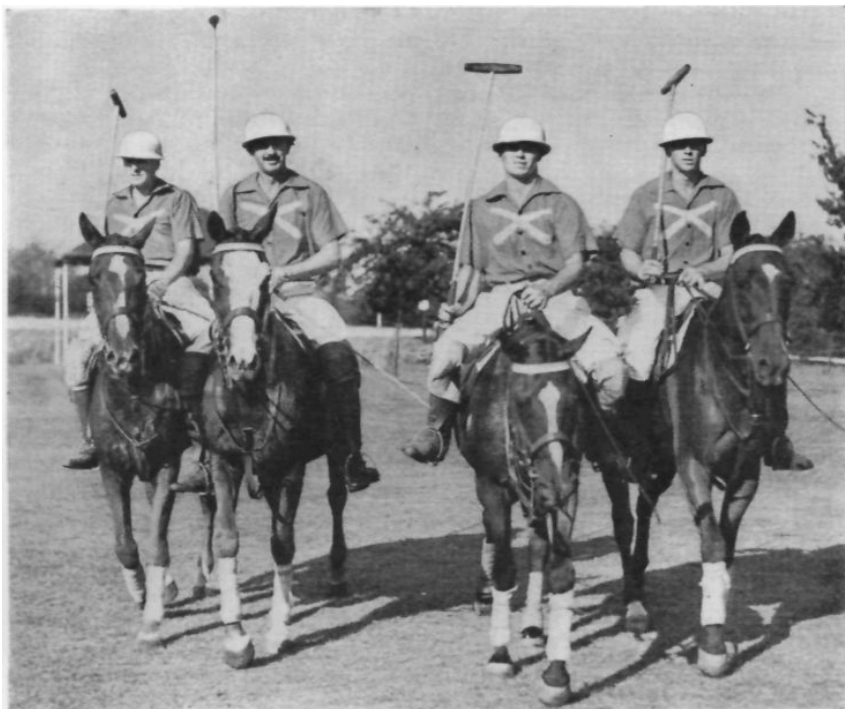
This drawing brought together in the

lower half of the bracket the Field Artillery team and the Pegasus four representing the Northeastern Circuit. In the upper bracket the draw found Santa Barbara, Austin (Texas), and Detroit matched to see who would go to the finals, against the winner of the Artillery-Pegasus game.

After the drawing was made and the schedule published, the Pegasus team found it impossible to get to the tournament in time to play their first game, and as a result withdrew from the tournament. Whether the Artillery could have beaten this team—who can tell? At any rate, their withdrawal put us into the finals without a game. This may or may not have been an advantage, depending upon how you look at it. At the time, all of our mounts were in excellent shape, and should we have won this semifinal match the practice undoubtedly would have been good for the team. On the other hand, there is always the chance of crippling a pony or two, so it may have been in our favor not to play before the finals. At any rate, though there was a suggestion from one of the teams to have another drawing, the committee decided the tournament would be played as originally drawn, and so we had to stand by our chance of being champions or runners-up on the results of one game.

In the opening tilt, the Santa Barbara team, representing the Pacific Coast Circuit, defeated the Central Circuit entry from Detroit without much difficulty. Clever ball-handling and extreme handiness of horses were the outstanding features of the Californians'

WAGONSOLDIERS WIN INTER-CIRCUIT CUP



FIELD ARTILLERY POLO TEAM

Left to Right—Capt. A. E. Solem, on *Lightning*; Capt. John A. Smith, Jr., on *Flackie*; Lieut. D. W. Sudduth, on *Lucky Pennant*; Lieut. E. A. Walker, on *Clifton*.

game. Though extremely fast, their beautifully turned-out mounts rated and handled like indoor ponies.

Major C. E. (Red) Boyle on his vacation from duty at Cornell ROTC, played with the Grosse Pointers of Detroit. He was beautifully mounted with two of his own ponies, and one or two others, and though he played an excellent game at number one, there was not enough strength behind him to hold down the Santa Barbara four.

The semifinal game of the top bracket found the Austin team, representing the Southwestern Circuit, matched with the Pacific Coast team. The Santa Barbara team last year lost their first game in the Inter-Circuit by what to all appeared to be an upset, and then went on to win the 12-

Goal Championship against the team which had won the Inter-Circuit. On the other hand, the Texans had won the right to represent the Southwestern Circuit this year by defeating last year's Inter-Circuit winners, the Houston Huisaches, in their circuit elimination at San Antonio.

The Santa Barbara team entered the game favored by most of the spectators, but after a chukkar or two the Austin team showed stronger hitting ability, and better defensive play, coupled with hard, fast riding; and as a result, went to the finals with a well-earned victory.

Our Field Artillery team, after arrival at Fort Sheridan, participated in seven practice games prior to the opening of the Inter-Circuit and National

THE FIELD ARTILLERY JOURNAL

12-Goal Championships. These games were used to condition our mounts, improve our team play, and get used to the softer, slower fields we would play on in the tournaments. We won six of these seven games, using all of our twenty-six mounts in practically every game. Of the twenty-six, twenty were thoroughbreds, most of whom were bred and raised at our Remount depots.

With the financial allowance from the Polo Association, donations from Fort Sill, and the use of our truck-drawn trailers, we were able to take this number of mounts to Chicago. We did not, of course, expect to use this number of ponies in our tournament games. Only about sixteen, as a matter of fact, were used in our hardest game. However, the addition of the extra number that were not quite up to fast tournament play greatly helped in saving our best mounts, and so we played all of them whenever we had the opportunity. As a result of this, our top ponies were ready for the big game without an exception. There was not a lame or "ouchy" one in the lot, and whatever the outcome was to be, we couldn't blame it on the absence of our best ones.

The one practice game we lost was to the Austin team, that had now won its way to the finals, and whom we were to meet for the championship. Which of their ponies the Austin team used in this practice game I cannot say, but we used all of our string, just as we had in our other practices, and we lost to them 7-5. During the first four periods, while we were mounted on our first-string ponies, we led them, but in the last two they overtook us to win the tune-up match.

Meadowbrook is the only polo center that surpasses the Oak Brook Club in number of fields available for tournament play, and on the best of these fields, one side fenced by a hedge over

which the filled grandstands look across the green carpet to the car-lined, opposite boundary, our red-shirted artillery team played the Texas cowboy team on Sunday, September 4th, for the Inter-Circuit Championship.

To say that we were not favored by most of our friends and others that had watched our practice matches is the simple truth. We had been defeated once by the same team, and in addition, against the other teams we had beaten in practice, the Texans had outscored us in their practice matches against them.

But our players felt quite differently about it. We thought that by playing only our best mounts we would be as well if not better mounted than our opponents. We also believed that by keeping both ends of our team well out, we could handle the men that would make or receive their long drives, and at the same time allow our two interior men, who were the better mounted, to hustle for the ball against their inside players.

How well we diagnosed their team is a question, but our team play, our horses, and the ability and willingness of our players to give back as much hard, fast riding as necessary, won the game for us. 9 to 8.

The newspapers remarked that it was the roughest game of the tournament. To the players on the field, and to others who understood the game, it was just a good, hard-riding game between two teams, each willing to give or take anything fair. The Austin team had won from Santa Barbara by speeding up the game and riding their opponents off the ball. They were unable to do this to our mounts, as ours were a shade faster, and could withstand the bumps.

Team and mounts deserved praise they received from the large crowd at the conclusion of the last chukkar when

WAGONSOLDIERS WIN INTER-CIRCUIT CUP

we were presented with the Bowl emblematic of The National Inter-Circuit Championship.

Owing to weather and other conditions the team was unable to stay in Chicago for the completion of the 12-Goal Championship. In our first game of this tournament we defeated Mr. Butler's Rising Sun Ranch team, and progressed to the semifinals.

The day after this game rain interrupted the schedule and for a week it was impossible to play. And the time we had been allowed in order to participate in these tournaments was running short. The tournament had been scheduled to close on September 11th, but now it would be impossible to do this. In

addition, two of our players were scheduled to become students in service schools on September 15th. As a result of these conditions it was necessary for us to withdraw from the 12-Goal Tournament.

The officers who composed the team were the same who had played through the Circuit Championship at Fort Sill in June, except that Captain A. R. S. Barden joined us at Fort Sill in August, and accompanied the team to Chicago as substitute.

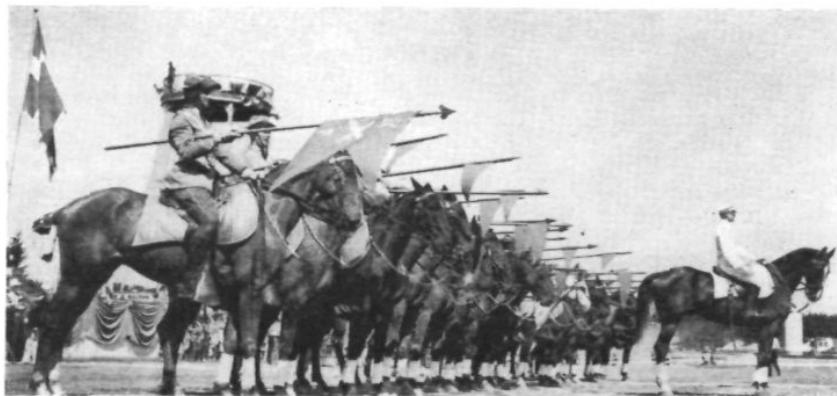
Our line-up throughout both tournaments was Number 1, Captain A. E. Solem; Number 2, Captain John A. Smith, Jr.; Number 3, Lieut. D. W. Sudduth, and Number 4, Lieut. E. A. Walker.

BATTERY ESCORTS CROWN PRINCE OF SWEDEN

The only separate battery in the Field Artillery, F of the 14th, Fort Snelling, Minn, (Captain Lee V. Harris, FA), combined training with ceremony when, on July 24th, it garbed the battery detail as lancers to escort the Crown Prince of Sweden on his appearance at the State Fair Grounds. The entire battery marched 12.6 miles to the scene, provided the escort and fired the salute to the

distinguished guest. It left the stables at 10:00 AM, and returned at 4:20 PM, having covered 27.6 miles in that period.

The lancer costume: Hats, battleship gray with crimson cross-cannon on turn-up; coat, crimson; breeches, blue, with red stripe; cross-belt, white; saddle-cloth, crimson, with yellow piping and insignia. Officer's dress — white, with crimson piping.



LANCERS OF BATTERY F, FOURTEENTH FIELD ARTILLERY

Type Problems

Prepared by Instructors of the Department of Gunnery, The Field Artillery School

PRECISION AXIAL (37-mm.)

Target: OP with light cover.

Mission: Destruction.

Deflection Obtained: Instrument.

Range Obtained: Range Finder.

R = 2300, site = O, Fork = 5.

Initial Data: No. 3 Adjust, Aiming Point, Marker on Mt. Hinds, Df 1060, Sh 37-mm.
F. S.

Commands	Elev	Dev	Rn	Remarks
No. 1, 1 Rd, Q	120	30 R	?	
L 30	120	Line	—	
	130	Line	—	
	140	5 L	+	
	135	3 L	+	Should have shifted R 4 or 5.
3 Rds	133	2 L	+	Splitting 1-F Bracket. Should have shifted R 3.
		3 L	+	
		2 L	+	
2 Rds	130	2 L	—	Elevation changed to limit of bracket. Should have shifted R 3.
		3 L	+	
				Six rounds fired at 131.5. Fork at 131.5 is 6.
R 3. 6 Rds	129.5	(End of Problem)		

CRITIQUE

The target was a covered OP to be destroyed. A precision adjustment with a short fuze was called for. The proper type of ammunition and fuze were used but the mission has not yet been accomplished because the adjusted elevation is not correct.

4 overs and 2 shorts were obtained. $2/12 \times 6 = 1.0$. Preponderance is over. $131.5 - 1.0 = 130.5$ which is the correct elevation.

The entire six rounds for effect was fired with an incorrect deflection. A shift of R 3 should have been made before beginning the first series of 3.

When firing 37-mm., the proper fuze should be announced as though a larger caliber were being fired.

TYPE PROBLEMS

AXIAL TIME BRACKET

(75-mm.)

Target: OP in vicinity of a scar on a crest.

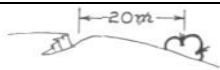







Mission: To be neutralized.

Deflection Obtained: Shift.

Range Obtained: Range Finder.

R = 3500. site = + 5. Corrector for the day is 35. Wind from the rear.

Initial Data: BD R 160, Cv at 3500, Si + 5, Kr 35.

Commands	Range	Observation	Sensing	Remarks
No. 3, 1 Rd	3500		20 R, A ?	(Below +)
L 20, Down 5	3500		Lost	
Up 5	3700		A+	
Down 5, BL	3500		A+, G+, G+, G+	
No. 3, 1 Rd	3300		Lost	
Up 5	3300		A+	
Down 2	3100		G —	
R 5, Up 5, BL	3300		A —, A+, Lost, Lost	
Btry 1 Rd	3100	(Cease Firing)		(Open the sheaf)
	3200	(End of Problem)		

CRITIQUE

The target was an OP in the vicinity of a scar on a crest. Mission—neutralization. The mission called for a 200-yard bracket and an open sheaf, with a correct height of burst. The mission has not been accomplished. The final sheaf was converged on the adjusting point, the best range bracket was not obtained, and the adjustment for height of burst is uncertain.

A better final command would have been, "On. No. 2 open 10, Up 2, Btry 1 Rd, 3300." This range should be repeated because a mixed sensing was obtained. The bracket selected was 3100-3300. A better one would have been 3200-3400.

An interesting point was brought out by the first round. This round was an air behind the crest, and could properly have been sensed "Below, over."

The officer firing showed good judgment in going back to one gun after obtaining overs at 3500. The target was on difficult terrain and ranging with the battery would have wasted ammunition.

THE FIELD ARTILLERY JOURNAL

PERCUSSION BRACKET, AXIAL
(75-mm.)

Target: Machine guns firing from the vicinity of a small bush.





Mission: Neutralization.

Deflection Obtained: Shift.

Range Obtained: Estimated.

R = 2900, Site = —5.

Initial data: BD L 150, Converge at 3000, Site 295, Sh. Mk. I, FL.

Commands	Range	Observation	Sensing	Remarks
No. 3, 1 Rd	2900		10 R ?	
L 10	2900		3 R —	Range seems fairly close.
L 5, BR	3100		?? ++	Sheaf about 4 mils wide.
On No. 1 Open 9, Btry 1 Rd	3000		?? ? +	2900 better.
R 5, On No. 1 Close 2,	2900	(End of Problem)		

CRITIQUE

The target was machine-gun fire from the vicinity of a small bush, to be neutralized. The mission called for shell with a long fuze, a 200-yard bracket, and an open sheaf. The mission was accomplished.

Fire for effect should have been commenced at 2900 instead of 3000 in order to verify the short limit of the bracket. The sheaf should have been opened 10 on either No. 2 or No. 3 in order to center the sheaf on the adjusting point. A sheaf 5 mils or less in width is treated as a converged sheaf. The final width of sheaf, 21 mils, is too narrow. A 30-mil sheaf would be better.

The time, three minutes and forty seconds, was excellent.

TYPE PROBLEMS

PERCUSSION BRACKET, LATERAL, SMALL-T (37-mm.)

Target: Machine guns firing from the vicinity of a stump.

Mission: Neutralization.

Deflection Obtained: Range-deflection fan.

Range Obtained: Range Finder.

$R = 2200$, $r = 2100$, $T = 200$, $s = 10$, $r/R = 1$, $\text{site} = 0$.

Initial Data: BD L 160. Cv at 2000. On No. 1 open 15. Si 300,
Sh 37-mm., F. L. Wind from the left.



Commands	Range	Observation	Dev	Rn	Df	Remarks
No. 2, 1 Rd	2200		30 R	?		
L 30	2200		10 R	—		(L 10 + R 20) = R 10
R 10	2400		6 L	?		(BR)
R 5	2400		Line	—		
R 20	2600		30 L	?		(BR) Behind the crest
R 30	2600		Line	+		
L 10, BL	2500			?		
				—		
				+		(+)
				+		
L 5, Btry 1 Rd	2500 2600	(End of Problem)				

CRITIQUE

The target was machine-gun fire from the vicinity of a stump, to be neutralized. The mission called for a 200-yard bracket with an open sheaf. The mission was accomplished.

The initial sheaf should have been left converged so as to facilitate sensing. The battery should have been brought in when going to 2400 and 2600. Difficulty was encountered in keeping rounds on line due to a draw in front of, and one behind, the adjusting point. L 10 would have been a better final command for deflection than L 5. The final sheaf was nine mils too wide.

THE FIELD ARTILLERY JOURNAL

PERCUSSION BRACKET, LATERAL, SMALL-T
(75-mm.)

Target: OP in the vicinity of a scar on a hill.

Mission: To be neutralized.

Deflection Obtained: Range-deflection fan.

Range Obtained: Range Finder.

$R = 3700$, $r = 3600$, $T = 150$, $s = 5$, $r/R = 1$, Site = +5.

Initial Data: BD L 280, Converge at 4000, On No. 1 open 10, Sh Mk I, FL. Wind from the right.



Commands	Range	Observation	Dev	Rn	Df Remarks
No. 2, 1 Rd	3700		40 L	?	
R 40	3700		Line	—	
R 10	3900		5 R	+	(Btry Left)
L 10, BR	3800			— + — +	(Df Over)
Btry 1 Rd	3700	End of Problem			

CRITIQUE

The target was an OP on a hill, to be neutralized. A 200-yard bracket with an open sheaf was required. The mission was partly accomplished. An effective range bracket was obtained but the sheaf is too wide. It now measures 30 mils according to the commands given. It should be 24 mils in width.

The initial sheaf should have been left converged to facilitate sensing. The command for site was omitted from the initial data.

The battery should have been brought in with the command "Btry Left" when going to 3900. The salvo which was fired at 3800 actually was fire for effect and should have been a volley. It was correct to begin fire for effect at the center of the bracket to obtain the best information as to the deflection. The deflection of the salvo at 3800 should have been sensed, "Over." Since a bracketing salvo was obtained at 3800, this range should have been repeated. With the sensings obtained, a better set of final commands would have been, "L 10, On No. 3 close 2, Btry 1 Rd, 3800." After this has been given the remainder of the bracket should be covered promptly with volleys.

TYPE PROBLEMS

PRECISION LATERAL, LARGE-T
(75-mm.)

Target: Check point.
 Mission: Registration.
 Range Obtained: Range Finder.
 $R = 3400, r = 3600, T = 450, c = 5, s = 13, d = 12.$
 Site = 0.
 Modified $s = 8, c/d = A, F = 3.$
 Initial Data: No. 1 adjust, BD R 40, Sh Mk I, FL.



Commands	Elev	Dev	Rn	Df	Remarks
No. 1, 1 Rd. Q	100	30 L		?	$30 \times .4 = 12$
	88	Line		—	Line — at 88 Estimated Df. error = 30 mils $88 + 12 = 100$
R 32	100	10 L		?	$10 \times .4 = 4$ $100 - 4 = 96$
	96	5 R		—	$5 \times .4 = 2.0$ Line — at 98 Estimated Df. error, 15 mils $98 + 6 = 104$
R 16	104	10 L		?	$10 \times .4 = 4$ $104 - 4 = 100$
	100	5 R		?	$5 \times .4 = 2$ $100 + 2 = 102$
	102	2 R		—	$2 \times .4 = .8$ Line — at 103 Estimated deflection error, 15 mils, $103 + 6 = 109$
R 16	109	8 L		?	$8 \times .4 = 3$
	106	5 R		+	$5 \times .4 = 2$ Line + at 108
L 8	106	2 L		?	Splitting Df. bracket and elev. bracket of 103-108 $2 \times .4 = .8$ Line + at 105
L 4, 3 Rds	105	Line		+	(Range over)
	104	Line	Correct	+	(Range over)
		2 L	+	?	Range sensed by rule
		2 L	+	?	
	104	2 L	+	?	(L 2, 102)
		5 L	+	?	
4 L		+	?		
		6 L	+	?	
107 End of Problem					

CRITIQUE

The target was a check point to be registered on. The mission called for a precision adjustment, using shell with a long fuze. The mission was not accomplished because of failure to obtain an adjustment in elevation and deflection.

The first round of the series of three was sensed "Line, range correct, deflection over." This round was over in range as well as in deflection. The target was silhouetted against the burst before being enveloped in smoke. The command for the second series of three should have been "L 2, 102," splitting

THE FIELD ARTILLERY JOURNAL

the deflection bracket and making a half-fork elevation bound. The announced adjusted elevation, 107, is incorrect, both because of the missensing, and because six overs were obtained at 104.

The target was on ground which made estimation of deflection error extremely difficult and which also caused considerable range dispersion.

PRECISION LATERAL, SMALL-T (37-mm.)

Target: Check Point.

Mission: Registration.

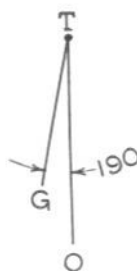
Deflection Obtained: Range-deflection fan.

Range Obtained: Range Finder.

$R = 2200$, $r = 3100$, $T = 190$, $c = 8$, Site = +5, $r/R = 1.4$,

$F = 6$, Mod. $s = 5$.

Initial Data: No. 1 Adjust, BD L 100, Shell 37-mm. FL.



Commands	Elev	Dev	Rn	Df	Remarks
No. 1, 1 Rd, Q	120	Lost			(5 R ?)
	120	4 R	?		To get on line, $4 \times 1.4 = L 6$
L 5	120	Line	—		To stay on line, L 10
L 10	132	Line	+		To stay on line, R 5
R 5	126	Line	+		To stay on line, R 2 or 3
R 3, 3 Rds	123	Line	+	+	
		Line	+	+	
		2 R	+	?	Range sensed by rule Shift deflection $\frac{1}{2}$ -s
R 2, 2 Rds	120	5 L	—	?	
		Line	—	—	Six rounds fired at mean elevation of 121.5
L 1, 6 Rds	121.5 (End of Problem)				

CRITIQUE

The target was a check point to be registered on. A precision adjustment, with a long fuze, was called for. The mission was accomplished, the final elevation and deflection being correct.

A good point was brought out in this problem: After obtaining positive deflection sensings in the first series of three, a shift of $\frac{1}{2}$ -s in deflection was called for. In this case, $\frac{1}{2}$ -s was either 2 or 3 mils. The officer firing elected to make a 2-mil shift. By so doing, he was able to split a 2-mil deflection bracket after the second series, thus making his deflection correct. Had he made a 3-mil shift, his deflection would not yet have been correct because he would have had to split it with a 2-mil deflection shift after the positive sensing in the second series. At least half the time, a correct deflection is obtained after the second series if the procedure used in this problem is followed.

TYPE PROBLEMS

PRECISION LATERAL, SMALL-T (75-mm.)

Target: Base Point.
Mission: Registration.
Deflection Obtained: Instrument.
Range Obtained: Range Finder.

$R = 3800$, $r = 3800$, $T = 400$, Site = 0, $c = 5$, $s = 10$, Fork = 4, $r/R = 1$, Modified $s = 8$.

Initial Data: Compass 2240, Sh Mk I, FL.



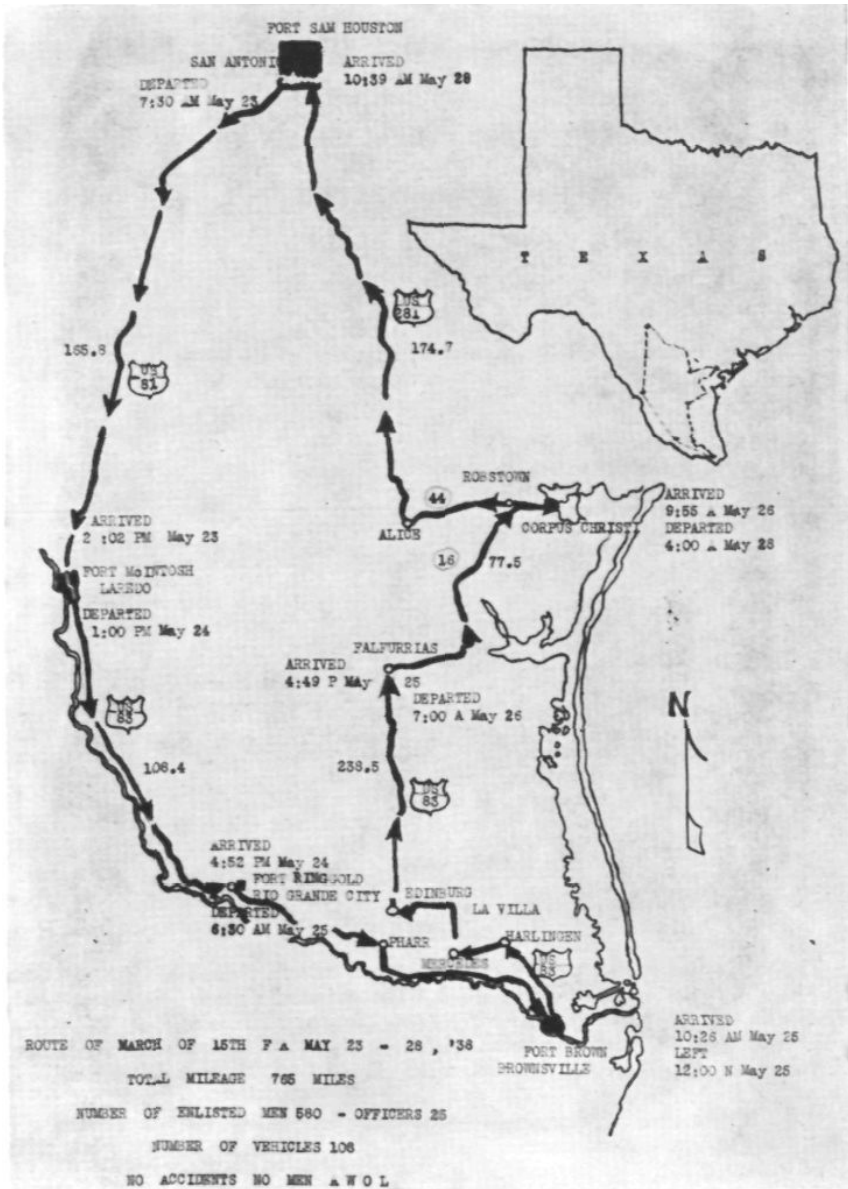
Commands	Elev	Dev	Rn	Df	Remarks
No. 1, 1 Rd, Q	120			Lost	
	110	5 R	+		L 5 to get on line. R 16 to stay on line.
R 11	102	10 R	—		L 10 to get on line. L 8 to stay on line.
L 18	106			Lost	
	106			Lost	
R 10	106	10 R	+		L 10 to get on line. R 4 to stay on line.
L 6, 3 Rds	104	5 R	+	?	Range sensed by rule.
				Lost	Dud.
		3 R	+	+	Terrain sensing.
1 Rd	104	4 R	+	?	
R 4, 2 Rds	102	5 L	—	?	
		Line	—	—	3 overs and 3 shorts. Six rounds fired at mean elev. of 103.
L 2, 3 Rds	103	End of problem			

CRITIQUE

The target was a base point to be registered on. A precision adjustment was required. The mission was accomplished. The adjusted elevation is correct. The deflection is not yet correct but the correct procedure was followed.

This problem is interesting because it shows that small- T methods may be used with values of angle T greater than 300 mils. Angle T in this case was 400 mils.

THE FIELD ARTILLERY JOURNAL



SKETCH TO ACCOMPANY "MORE MOTOR MOVEMENT"

More Motor Movement

BY MAJOR HENRY BURR PARKER, FA

EDITORIAL NOTE—*Herewith the conclusions reached by two commanders of motorized-artillery units as a result of marches made in widely separated areas during the spring of 1938. Some of their conclusions are widely divergent. But one is a detailed study of a movement in time of peace; the other commander kept constantly in mind the possibility of hostile interference under conditions of combat. Each is considered a valuable contribution to our knowledge of motor-convoy conduct, whether in a strategical or a tactical situation, particularly since official doctrine on the matter has not yet been promulgated.*

THE annual training program of the 15th Field Artillery for the year 1937-38 directed that a practice march be held during the month of May, 1938. The march made pursuant to this directive exceeded in performance some of the statistical data computed for a truck-drawn 75-mm. regiment.

A complete account of the details of supply is intentionally omitted. This is not through lack of appreciation of supply's importance, but rather to avoid digression from the main issue, and in the interest of brevity. The regimental Service Battery furnished ration staples and perishables (including meat and bread), and wood, from the home station base by three round trips. On May 23d the supply convoy accompanied the column to Laredo; on May 25th it met the regimental column at Falfurrias: and

Author's Note—It is desired to acknowledge the services of Mr. C. Ekmark, Post Photographer, Fort Sam Houston, who accompanied the column and contributed the photographs herewith.

the final issue was made at Corpus Christi on May 26th. An improvised refrigerator truck constructed at the regimental shop carried the meat, and the bread was transported in trailers. The total transportation of the supply section was 1 Reconnaissance car, 1 truck (1½ T) refrigerator, 2 trucks (1½ T) staples, 2 trucks (1½ T) wood, 2 trailers, bread, and 1 pick-up, motor repair. The system was satisfactory in every detail.

It is not intended to elaborate on the methods of training which produced the march. However, some explanation may be of value. The convoy training had been unusually thorough. Briefly, the proposed-in-fantry-division tests, followed by the large truck movement described in the March-April FIELD ARTILLERY JOURNAL under the title "Convoy," and the division, brigade, regimental, and battalion problems and marches, with and without lights, since these tests, have produced in the driver personnel of this regiment a marked "convoy consciousness." This regiment, or each of its units, when acting independently, as a result of the lessons learned, always moves in a column as closed as is compatible with safety. It moves without prescribed vehicle or unit distance. The distance between successive vehicles in a column depends upon the individual driver, who has been trained by many miles, and by repeated admonitions and corrections, to keep a "tight" column. A speed is prescribed that drivers may attain (but not exceed) to recover normal distance. The rate of the leading vehicle is also prescribed and announced. Halts are on synchronized

THE FIELD ARTILLERY JOURNAL



time within the battalion, normally for fifteen minutes of every two hours. At halts vehicles close without distance within the battalion, and elongation takes care of the lost distance between battalion units soon after the march is resumed. Such, in short, is our "system."

A commander of such a unit may gaze back with pleasure at the very limited and practically uniform contraction and expansion of his unit as it approaches a rise or comes down a hill. He can view with satisfaction the prompt resumption of normal distance when level ground is reached.

This standard of training, and its objective, march discipline, can be attained only through the intensive instruction which is possible under unusual circumstances, when funds are available for considerable motor movement.

Specifically, the purpose herein is to limit discussion to the essentials of

- a. The itinerary.
- b. The nature of the statistics and how obtained.
- c. The conclusions reached through these statistics.

The Itinerary

Date and time *Incidents*

Monday, May 23

7:30 AM—Left Fort Sam Houston en route to Fort McIntosh, Laredo via US Highway 81.

8:30—Halted for 15 minutes.

10:30—Same.

12:30 PM—Halted for 20 minutes.

2:02—Arrived at Fort McIntosh and established bivouac.

Elapsed time: 6 hrs. 32 min.

Distance travelled: 165.8 miles.

Weather: Heavy rain, 9:00 to 11:00 AM

Condition of roads: Wet and slippery (50 miles).

Motor failures: Two (2).

Causes—1 truck out of gas 19 miles from destination; 1 leaky oil pan gasket.

Tuesday, May 24

1:00 PM—Left Fort McIntosh en route to Fort Ringgold, Rio Grande City, via US Highway 83, in two sections: 1st Section, 1st Battalion; 2d Section, Reg'l Hq. Battery, 2d Battalion, and Brigade Hq. Battery; same route successively.

1:45—Each section halted; for 15 and 20 minutes respectively.

3:07—Section 2 halted on account of muddy crossing of Arroya Burros. A few vehicles were towed through by a State Highway Department tractor.

3:25—Last vehicle through Arroya Burros.

3:45—Section 1 halted for 15 minutes.

4:52—Section 1 arrived at Fort Ringgold.

5:10 PM—The regimental commander, after observing the entire regiment pass from near the start, had passed through Section 2 and arrived at destination, shortly before this section.

Elapsed time: Section 1, 3 hrs. 52 min.; Section 2, 4 hrs. 30 min.

Distance travelled: 108.4 miles.

Weather: Partly cloudy.

Condition of roads: Muddy in Arroyas. 73 miles dirt and gravel.

MORE MOTOR MOVEMENT

Motor failures: Nine (9).

Causes—3 flat tires, 1 broken battery terminal, 1 wire burned out on stop light, 1 carburetor trouble, 1 water in gas, 1 radiator leak, 1 rear axle came loose.

Wednesday, May 25

6:30 AM—Left Fort Ringgold,¹ en route to Falfurrias via Fort Brown, Brownsville. Route: US Highways 83 and 281 to Fort Brown; US Highway 83 to Mercedes—State Road to La Villa and Edinburg—thence north on US Highway 281.

7:30—Halted for 15 minutes.

8:15—Head reached dirt road (19 miles).

8:37—Road muddy.

9:30—Halted for 10 minutes.

10:20—Entered Fort Brown.

10:26—First vehicle refueled.²

11:35—Last vehicle refueled.

12:00 Noon—Left Fort Brown.

2:00 PM—Halted for 15 minutes.

4:00—Same.

4:49—Arrived at Falfurrias and established bivouac.

Elapsed time: 10 hrs. 19 min.

Distance travelled: 238.5 miles.

Weather: Clear.

Condition of roads: Paved except 19 miles dirt (muddy).

Motor failures: Two (2).

Causes—1 broken fan belt; 1 brakes dragging (one gun turned over on dirt road crossing bridge after sharp turn. Continued at reduced speed).

Thursday, May 26.

7:00 AM—Left Falfurrias en route to Corpus Christi via State Highway 16.

8:00—Halted for 15 minutes.

9:58—Arrived at Corpus Christi and established bivouac.

Elapsed time: 2 hrs. 58 min.

Distance travelled: 77.5 miles.

Weather: Clear.

Condition of roads: Paved.

Motor failures: One.

Cause—1 flat tire.

Friday, May 27—In bivouac at Corpus Christi.

¹On this day's march the kitchen, ration, supply and baggage trucks (23 vehicles), moved by a short cut direct to Falfurrias.

²It is interesting to note that 85 vehicles were refueled in 1 hour 9 minutes with the single pump available (less than one minute per vehicle). It had been estimated that refueling would require 4 hours. The economy in time resulted from system and from pumping the same amount into all vehicles of similar type; that is, 5 gallons to station wagons and pickups; 8 gallons to trucks. This eliminated slow pumping and inspection to prevent spilling.

Saturday, May 28

4:00 AM—Left Corpus Christi en route to Fort Sam Houston via State Highway 16 and 44 to Alice—thence US Highway 281.

4:50—Very bad fog.

5:05—Fog lifted.

5:15—Halted for 15 minutes.

7:15—Same.

9:15—Halted for 20 minutes, all vehicles in column.

10:39—Arrived at motor park. Fort Sam Houston.

Elapsed time: 6 hrs. 39 min.

Distance travelled: 174.7 miles.

Weather: Foggy; clear after daylight.

Condition of roads: Paved.

Motor failures: Two (2)

Causes—1 condenser burned out; 1 rear wheel brake froze.

Nature of the Statistics and How Obtained

The figures kept were actual speedometer readings, every five minutes, of the cars at the head and the tail of the column. When the battalions marched separately on the second day, (see *Itinerary*), each section kept this record. Watches of the officers or noncommissioned officers detailed to ride in the head and tail cars were synchronized. The detailed personnel recorded the speedometer reading when passing the initial point in both head and tail vehicles. Every five minutes thereafter, on the five minutes, the reading of the speedometer and the rate of both vehicles was recorded. Simple computations, made from this record after arrival at the destination each day, determined the distance travelled each five minutes and the length of the column (road space) each five minutes of the march, to the tenth of a mile. Through further computations from this data also were determined the average rate of march, including and excluding halts, the time length each five minutes, and the average time length.

This method of securing the march data and making calculations based

THE FIELD ARTILLERY JOURNAL

thereon did not originate in this regiment for this march. It was introduced and developed to secure march data during the proposed-infantry-division tests. Those detailed to maintain the record knew what was desired and required no special training.

The figures below are part of the calculated record, (a) of the 1st Battalion march on the second day, and (b) of the regimental march on the final day, based upon the time and speedometer readings made by the personnel detailed for that purpose.

Regarding the May 24th figures in the table just below, it is noteworthy that the two sections had almost identical time lengths; that is, these two unequal sections averaged such speeds and distances that, theoretically, they would have passed a point in about equal time. The 10 per cent greater speed in Section 1 resulted in a road space per 100 vehicles of twice, and a time length per 100, 50 per cent greater, than in Section 2. The drivers automatically increase their distance with increased speed. The results in the

(a) EXTRACT—1ST BATTALION MARCH—SECOND DAY

Time	Average M.P.H.	Distance Marched	Column Road Space	Column Time Length
3:45 PM	34.8	2.9	5.9	10.2
3:50	....*	....	2.6	....
3:55	....	....	.2	....
4:00	....	....	....	....
4:05	32.4	2.7	2.5	4.6
4:10	36.0	3.0	4.2	7.0
4:15	38.4	3.2	4.5	4.9
4:20	38.4	3.2	4.5	4.9
4:25	30.0	2.5	4.0	8.0
4:30	34.8	2.9	4.2	7.2
4:35	34.8	2.9	4.0	7.1
4:40	34.8	2.9	2.9	5.0
4:45	34.8	2.9	1.9	3.3
4:50	21.6	1.8	.9	2.5

*15 minute halt.

(b) EXTRACT—REGIMENTAL MARCH FINAL DAY

Time	Average M.P.H.	Distance Marched	Column Road Space	Column Time Length
7:00 AM	36.0	3.0	3.9	6.5
7:05	34.8	2.9	4.1	7.1
7:10	31.2	2.6	3.4	6.5
7:15	22.8	1.9	2.9	7.6
7:20	....*	....	.5	....
7:25	....	....	....	....
7:30	....	....	....	....
7:35	33.6	2.8	2.6	4.6
7:40	34.8	2.9	3.1	5.0
7:45	34.8	2.9	3.4	6.0
7:50	28.8	2.4	2.4	5.0
7:55	32.4	2.7	3.2	5.9
8:00	25.2	2.1	2.8	6.6

*15 minute halt.

The Conclusions Reached Through Statistics

The daily records were consolidated after the return to Fort Sam Houston and produced the following table:

Date (May)	Distance Marched (Miles)	Number of Vehicles	Average M.P.H. (Including Halts)	Average M.P.H. (Excluding Halts)	Average Road Space (Miles)		Average Time Length (Minutes)	
					Actual Vehicles	Per 100 Vehicles	Actual Vehicles	Per 100 Vehicles
23d	165.8	108	25.54	29.33	4.63	4.28	9.24	8.55
1st Bn		41	28.71	32.55	3.14	7.66	5.57	13.58
24th								
2d Bn		67	24.03	29.62	2.65	3.12	5.60	8.36
Regt	108.4	108	26.87	31.08	5.79	5.39	11.17	10.97
25th	238.5	85	23.09	30.77	2.52	2.96	5.36	6.30
26th	77.5	108	26.72	29.14	3.20	2.96	6.58	6.09
28th	174.7	108	26.55	31.08	3.45	3.19	6.88	6.37
SUMMARY	764.9	108	25.94	30.28	3.92	3.76	7.85	7.66

MORE MOTOR MOVEMENT



A CIVILIAN CAR HOLDS UP THE COLUMN

table indicate how it multiplies in a large column! The 1st Section required no towing; it took 38 minutes less to complete the march; it arrived intact. Nevertheless, principally because of difference in rate of march, the figures show a shorter average road space for the 2d Section on that day with 50 per cent more vehicles.

These figures indicate so clearly what happens as speed is increased. They were obtained under unusually adverse weather and road conditions. They have been used as an example because they illustrate well the published data on the proposed-infantry-division movement which is now quoted. From paragraph 4, Memorandum No. 33. Headquarters Proposed Infantry Division, September 24, 1937: "*a* For a given speed, the road space and hence the time length increases with the vehicle and unit distance ordered beforehand. *b* The road space increases with the speed. It does not follow, however, that the time length also increases. In fact, the results indicate that the time length decreases as the speed increases up to a speed of about 25 miles per hour. For greater speeds, the time length increases somewhat with the speed. There is no question, of course,

that high speed moves the column as a whole more rapidly than low speed." Also in this connection, the following is quoted from paragraph 2, Memorandum No. 45, same headquarters, November 16, 1937: "The following road spaces of the complete division are indicated: At 30 miles per hour—40 miles. At 35 miles per hour—70 to 80 miles."

In forwarding the report of the regiment's march, the Commanding General Second Field Artillery Brigade remarked:

"1. Based on the tabular values so established by the test of the proposed infantry division (1937), this march was an excellent performance.

"2. The following data are of interest:

Tabular	Road Space Per 100 Vehicles (Miles)	Time Length Per 100 Vehicles (Minutes)
Large	5.4	9.9
Average	4.5	8.3
Small	3.6	6.7
Actual		
May 23	4.3	8.6
24	5.4	11.0
25	3.0	6.3
26	3.0	6.1
28	3.2	6.4
Average	3.8	7.6

"3. The movements were essentially strategic, for which the tabular motor failures are 1 per 3,000 vehicle-miles. Actually, there

THE FIELD ARTILLERY JOURNAL

were 16 motor failures in 77,231 vehicle-miles of movement—or 1 per 4,800 vehicle-miles."

Finally, a comparison of the actual average road space, the actual average time length, and the actual motor failures, of the regiment on this march, with the tabular values, leads to three conclusions:

First, a "tight" column was maintained; Second, relatively little "car trouble," and no serious accidents, were experienced;

Third, the previously proven efficiency of this system of motor movement has once again been verified.

On the Other Hand—

Extract from March Report, 3d Battalion 80th Field Artillery, (155-mm. Howitzers) Fort Des Moines, Iowa, to Fort Sill, Oklahoma, and return, April 12 to April 29, 1938.

* * *

8. *Summary.* The following points are believed worthy of emphasis:

a. In its present state of development the radio is too uncertain, too limited, and too revealing for use in the control of large motor convoys. Furthermore, in the forward zones, its use must be closely restricted to advance air and ground reconnaissance and security elements. Control by march groups, check points, and through the individual initiative of drivers is indicated—a matter of doctrine and training.

b. Every effort must be made to avoid large serials of mixed speeds. Serials should not include more than 30 vehicles. Slow columns should not precede fast ones. The maximum speeds possible should be utilized and halts should be as few as possible.

c. Distances between vehicles must be large and irregular in order to avoid accidents, obtain relative security from air and mechanized attacks, and confuse the enemy. Drivers should be taught that, when they close up to less than 100 yards on the vehicle ahead, they are closing up on disaster and death.

d. Only by proper differentiation of serials travelling with large distances between vehicles can full use of roads in both directions be obtained. Furthermore, the time of march does not increase in direct proportion to the number of vehicles. For instance, a battalion of motorized artillery with 75 vehicles can move 200 miles in 8½ hours, while a regiment of 230 vehicles can move the same distance in 9¾ hours.

e. The fuel capacity of military trucks should be as large as possible. The present models should be modified to permit a run of at least 250 miles without refueling.

f. For motor units a modification of the boots and breeches uniform is needed. The present uniform restricts circulation and causes fatigue in long marches.

9. *Remarks.* The motor vehicle, unless armed and armored, has no value as a weapon and, even then, it is extremely vulnerable. It has, however, tremendous value in military operations owing to its speed and capacity. Full advantage should be taken of its favorable characteristics under conditions which at the time recognize and reduce its vulnerability.

In modern warfare, motor columns in the zone of operations are never safe from attack. They are in danger of mechanized attacks from front.

MORE MOTOR MOVEMENT

rear, and flanks, from air attacks above, and even from ground mines below. Hence they must move rapidly and in scattered formations from one protected area to another in order to present an unfavorable target. This is about the only means of protection they have, as the few anti-aircraft or antitank weapons carried by motor columns offer only a feeble and illusory means of retaliation and security. Columns of mixed speeds must be avoided; large and irregular distances must be maintained between vehicles, whether moving or halted; and halts must be rare. In other words, the traffic must *not* have a military appearance—no "guide right" or "40 inches from front to rear," no apparent order in either direction or form.

The motor offers one of the few hopes of securing surprise in modern war. Large scale motor movements, however, cannot and need not be concealed, but the only picture they present from the air should be one of confusion—an ordered confusion on our part, and one calculated to mystify and mislead the enemy. From such an apparent confusion of individual vehicles, moving in various directions by day or night, the enemy aviation will gain little correct information and find few economical targets.

But the confusion must be apparent only, and the control must be constant—a matter of planning and training. In this regard, our people have the immense

advantage of being motor minded. Everyone, from bank president to WPA worker, drives to and from business in a car through the most complicated traffic and arrives sooner or later at his destination. All are familiar with road signs, road maps, and traffic control. Drivers of this sort can be rapidly trained to handle a military vehicle and to move in war-time traffic, which will be far less difficult than the daily movement encountered in our crowded streets and roads. They are used to moving on their own initiative and this individuality should be encouraged and utilized in our training. If the ants and bees can be polarized and impelled in various directions toward a common objective, there should be some hope for our average Army truck drivers. Motor warfare requires the mentality of motorization, rapid and flexible, not the set minds and rigid formations of an era long dead, but only partially buried.

These recommendations are made here because it is believed that this Army along with most others, as demonstrated by the Brihuega affair in Spain, has not yet arrived at a true conception of motor movements and that it does not fully utilize the motor knowledge and motor superiority that we possess in such large degree.

JOHN S. WOOD,

Lieut. Colonel, 80th F. A., Commanding



148th FA (Washington) accumulates honors. Its Band (from Tacoma) won the Governor's Cup for 1938; its Battery F the Andrus trophy for outstanding unit in 66th FA Brigade. The regiment, 350 strong, visited Vancouver, Canada, July 1st, to assist in the celebration of Dominion Day, and were the guests of the kilted Seaforth Highlanders, with whom they exchanged many presents.

Questions and Answers, Conduct of Fire

PART 2

EDITORIAL NOTE: *This is a continuation of the series begun in the July-August JOURNAL, reprinted by permission of the 111th Field Artillery, Virginia, which prepared these questions and answers and published them in booklet form.*

Questions

LATERAL CONDUCT OF FIRE

GENERAL

98. When is conduct of fire termed **lateral**?
99. What is the procedure during adjustment?
100. When is range adjustment more difficult than deflection adjustment?
101. When is deflection adjustment more difficult than range adjustment?
102. How are range and deflection brackets established?
103. What is the OT line?
104. What is the **deviation** of a burst and how is it measured?
105. What is a **line** shot?
106. What does the term **d** represent?
107. What does the term **s** represent?
108. What does the term **c** represent?
109. How do you determine **c, d, and s**?
 - a. What is the value of **s** if range is to be changed by multiples of the Fork, instead of by multiples of 100 yards (modified **s**)?
110. When is deflection sensed as **short**?
111. When is deflection sensed as **over**?
112. When is the deflection considered correct?
113. When may you sense by rule?

SMALL TARGET OFFSET

PRECISION AND BRACKET

114. How does the procedure for small target offset compare with axial conduct of fire?
115. How is precision adjustment accomplished?
116. If a burst cannot be sensed for range because of its deviation, what is the procedure?
117. After you get the shot on the line and the first range sensing has been obtained, what do you do?
118. How do you correct the value of **s**, if necessary?
119. When is the value of **s** changed?
120. Does the adjustment for range continue as in axial conduct of fire?
121. When is fire for effect started?
122. In fire for effect, how are rounds fired?
123. In bracket fire should the range scale be used if possible? How about sheaf?
124. During adjustment for bracket fire, in what multiples are deflection changes made?
125. When is sensing for deflection made?
126. In firing lateral, is it necessary to consider the sheaf-obtained to be of the width provided by commands given?
127. At what range is fire for effect begun?

LARGE TARGET OFFSET

GENERAL

128. When T is large, how are shots brought to the observing line?
129. When is the deflection changed?

CONDUCT OF FIRE

130. Upon what is the initial deflection shift dependent?
131. After the first deflection sensing, how is the deflection change made?

PRECISION

132. During adjustment how is the burst sensed?
133. During fire for effect, how is a burst sensed?
134. If a burst cannot be sensed for deflection because of its deviation, what is done?
135. If the next burst is far from the observing line, how can a new value of **c/d** be obtained?
136. In order to stay on the line, what do you do when a deflection sensing has been obtained?
137. Suppose the next burst is not on the observing line?
138. After a deflection bracket has been obtained, is it split?
139. When is a **trial deflection** obtained?
140. When is fire for effect started?
141. Are any rounds fired during adjustment considered during fire for effect?

BRACKET

142. How are bursts brought to and kept on the observing line during adjustment?
143. Should the **pattern** of an air burst be sensed if possible?
144. What is the range change in hundreds of yards?
145. When is the battery brought in?
146. How long do you continue to sense deviation?
147. When is range sensed?
148. How is deflection sensed?
149. When is fire for effect started?
150. What range is used?

COMBINED CONDUCT OF FIRE

151. When is conduct of fire termed **combined**?
152. What is its main advantage?
153. What is its main disadvantage?
154. How is range adjustment made when **firing by group**?
155. **In fire by group** what is the next procedure?
156. Is a correction then made?
157. What corrections are made after the second, third, and fourth groups?
158. When **fire by round** is used, what is the procedure for the first group?
159. When is combined conduct of fire termed **axial-lateral**?
160. Which observer adjusts range and which deflection?
161. When is combined conduct of fire termed **bilateral**?
162. In this type what should be the angle between the observing lines?
163. When is a **center-of-impact** adjustment used?
164. How many observers are used?
165. Must the position of the piece and each observer be plotted accurately?
166. Is the center-of-impact then used as a check point?
167. How is preliminary data for center-of-impact adjustment obtained?
168. What is the procedure?
169. How are these data calculated?
170. When is **high burst adjustment** used?
171. Is it similar to center-of-impact adjustment?
172. Do the observers have to locate the bursts vertically as well as horizontally?
173. May the time of bursting of the fuze be varied during the adjustment by changing the fuze range or corrector?
174. How do you lay for elevation?
175. How do you obtain the preliminary data?
176. Is the procedure the same for center-of-impact adjustment?

FIRE COMMANDS AND THEIR EXECUTION

Answers

177. What is the prescribed sequence of announcement of the fire commands?
178. When the command **refer** is to be used, where is its proper place?
179. Where is the proper place for the command **record base deflection**?
180. In what ways may the BC direct the initial laying of the battery for direction?
181. When the BC commands **compass** (so much), what does the executive do?
182. How would he lay the battery with an aiming circle?
183. What are the various methods of fire?
184. What is the **adjusted compass**?
185. Is the adjusted compass equal to the initial compass modified by the net shift made during adjustment?
186. What is the purpose of recording **instrument direction**?
187. After registration when the direction **base - piece — base - point** is known, how does the executive record this direction as **instrument direction**?
188. What is the advantage of this procedure?
189. How is the factor *K* determined?
190. What is the application of *K*?
191. What are the units of announcement in the preparation of fire?
192. Should every officer work out a systematic method of computing firing data to avoid lost motion, delay, and omission of necessary data?
193. What is the sequence given in FA Book 161, which is applicable when an aiming point is used and a bracket adjustment is to be made?
194. What is the **declination constant**?
195. What is the use of *r/R*?
98. When the target offset (T) exceeds 100 mils. However, in axial conduct of fire, with target offset near 100 mils, an increase or decrease in range moves the burst laterally as viewed at OP, and sometimes it is sufficient to prevent sensings of rounds on a narrow target unless deflection change is made with each range change to keep burst on OT line.
99. It consists of two operations: (1) Bringing the burst into line with the target as viewed by the observer. (2) Keeping the burst in this position during the changes incident to adjustment.
100. When T is small (100-300 mils).
101. When the T is large (more than 300 mils).
102. By sensing shots which are on the OT line or which are computed thereto.
103. The observing line, joining the observer and the target.
104. It is the horizontal angle measured at the observation post between the burst and the target.
105. A burst on the observing line.
106. The change in deviation between two bursts, resulting from a 100-yard range change, the deflection being unchanged.
107. The deflection shift necessary to keep a shot on the observing line when making a range change of 100 yards. (An increase in elevation of one c.)
108. The elevation change corresponding to a range change of 100 yards.
109. From the firing tables, or roughly,
- $$s \approx \frac{1/10\Gamma}{R} \quad d \approx \frac{1/10\Gamma}{r}$$
- (When T is less than 600 mils)

CONDUCT OF FIRE

- a. s for one fork equals s multiplied by F/c .
110. When the burst appears on the observer's side of the GT line.
 111. When the burst appears on the far side of the GT line.
 112. With a target hit, a 2-mil deflection bracket, or opposite sensings with same deflection setting.
 113. When the deflection error is not greater than $\frac{1}{2} s$, a burst whose deviation is on the side of the observing line toward the guns may be sensed short for range; if on the side of the observing line away from the guns, it may be sensed over for range (**only sense by rule when burst cannot be sensed on the target or on terrain**).
 114. It is the same, except that when range bounds are made, small deflection changes are also made to keep the burst on or near the observing line. Size of range bounds are the same.
 115. By a single piece which is laid for elevation with the gunner's quadrant. Method of fire is one round. During adjustment, sense for both deviation and range. During fire for effect, sense for deflection also.
 116. The next burst is brought to the observing line by a deflection change of r/R times the deviation. If the next burst is far from the observing line, compute a new value of r/R by dividing the deflection shift you asked for by the deviation change you got. (Applicable to level ground only.)
 117. Use a range bound of the proper number of forks, making a corresponding deflection change to keep the burst on the line (which deflection change amounts to the necessary shift to place the last shot on the line) plus a shift of the number of s -bounds equal to the number of fork bounds.
 118. By dividing the total shift from line shot to line shot by the number of s -bounds.
 119. Only when it is in error by 2 mils or more.
 120. Yes, and a deflection shift of one s is made for each fork range bound.
 121. At the trial elevation and at the deflection to put the bursts on the observing line. Range may be sensed by rule. After a positive deflection sensing, the deflection is changed $\frac{1}{2} s$, or 2 mils, whichever is greater, until Df bracket is obtained.
 122. In half groups of three until the deflection is correct.
 123. Yes, because speed is important, and open sheaf is used for adjustment unless visible part of target is narrow and T is less than 200 mils.
 124. Multiples of 5 mils.
 125. Not until the battery is brought in, then for each salvo or volley as a whole.
 126. Yes, because it is not possible to measure the width of a sheaf from a lateral OP, nor is it possible to adjust distribution except on the basis of positive deflection sensings.
 127. At the mid-range of the bracket, because at this point you will probably get the best deflection sensings.
 128. By range changes.
 129. Only when a deflection sensing is obtained.
 130. On the accuracy of the initial data.
 131. It is shifted $\frac{1}{2}s$, s , $2s$, $4s$, etc., whichever one corresponds most clearly with the estimated error in the initial deflection.
 132. For deviation and deflection, but need not be sensed for range.

THE FIELD ARTILLERY JOURNAL

133. For range also.
134. The next burst is brought to the observing line by an elevation change equal to the deviation multiplied by **c/d**.
135. By dividing the elevation change asked for by the deviation change you got.
136. Make a shift of the proper number of **s**-bounds, making also a change in the elevation of the same number of fork bounds.
137. It is brought to the line by an appropriate range change.
138. Yes, and the bursts are kept on the line by splitting the range bracket between actual and computed line shots.
139. When the deflection gives a target hit, **or** is the center of a 1-s deflection bracket, **or** the center of a 16-mil or less deflection bracket when **s** is greater than 16 mils.
140. At the trial deflection and at the range to put the shots on the observing line.
141. No.
142. By the same methods used in precision adjustment except that range changes are made in hundreds of yards unless smaller changes are necessary.
143. Yes, and if the pattern is not visible, don't forget that a change of 5 points in the corrector displaces the burst approximately 100 yards (changing deviation one **d**) and that your purpose is to get a shot on the line.
144. The deviation divided by **d**.
145. When a 2-**s** deflection shift is made. Sooner, if necessary, to obtain a sensing.
146. **Only** as long as fire is continued with one piece.
147. When the battery is brought in.
148. For each round as long as adjustment is by one piece, thereafter as a whole for each salvo or volley.
149. When a deflection bracket approximately the width of an open sheaf is split.
150. The range to the center of the appropriate range bracket.
151. When there are two or more observers placed so that their observing lines intersect at an appreciable angle.
152. Economy of ammunition.
153. Long lines of communication, and difficulty of directing each observer on the same target.
154. If the error of a shot can be measured, compensating deflection and range corrections are made to bring the next shot to the target.
155. A group of shots, usually six, is fired to determine the error of the range center.
156. Yes, for the purpose of moving the center-of-impact to the target, after which a second group is fired.
157. After the second group, $\frac{1}{2}$ of the indicated correction; after the third group, $\frac{1}{3}$; after the fourth and later groups, $\frac{1}{4}$.
158. Fire one shot and make correction. Number the succeeding rounds in order, and thereafter, after each round make the correction determined, by dividing the error by the assigned number of the round. The group should not exceed six numbered rounds. **(This procedure applicable to heavy caliber and given here only for information.)**
159. When one observer is on or near the line of fire and the other is displaced more than 300 mils.
160. The lateral observer adjusts range by reporting deviations and the axial observer adjusts deflection.
161. When two or more observers are used, all in the lateral positions—preferably on opposite sides of the line of fire.

CONDUCT OF FIRE

162. At least 500 mils.
163. It is used for registration when a precision adjustment on an accurately located check point is impractical, either because a suitable check point is not available or because of darkness at time of registration.
164. Two, when observing lines intersect at 500 mils or more.
165. Yes, with the same data.
166. Yes.
167. A point is selected in the center of the target area which is visible to both observers. Firing data are computed to place a burst on the point selected, and an instrument direction from a reference point is determined for each observer, so that the burst will appear in his field of view.
168. Each observer lays his instrument in the direction ordered. An orienting round is fired. Each observer reports its deviation from the reference point. Then six rounds are fired for effect without change of data. If altitude cannot be determined from a map, one observer reports the site of each round.
169. The mean deviation of the rounds for effect is figured and plotted excluding the orienting round and rounds not reported by both observers. The intersection of the two rays is the map location of the check point. The adjusted deflection is the deflection at which the rounds for effect were fired. The adjusted range is the range corresponding to the quadrant elevation at which the rounds for effect were fired, less site.
170. For registration when registration on a ground check point is impracticable.
171. Yes, except that the check point is in the air.
172. Yes, and the burst center of the group of rounds is then located, which center is taken as the position of the check point.
173. Yes, without affecting the results.
174. With the gunner's quadrant.
175. (a) Deflection—from firing a shot corrected for drift.
(b) Corrector, usually, the center of the corrector scale.
(c) Fuze range—the range setting to the nearest 50 yards equivalent to the map range.
(d) Quadrant elevation — elevation corresponding to map range plus a site necessary to place the burst at a suitable height.
(e) An instrument direction from reference point and site to the computed burst center for each observer.
176. Yes.
177. (a) Special methods of adjustment for particular missions.
(b) Direction.
(c) Converging sheaf.
(d) Deflection difference.
(e) Site.
(f) Corrector.
(g) Projectile.
(h) Fuze.
(i) Pieces to fire.
(j) Method of fire.
(k) Use of quadrant.
(l) Range or elevation.
178. It follows the announcement of the aiming point.
179. When used with **refer** it follows refer, otherwise it may follow the command for laying; it is usually the last element announced.
180. (a) A target and a deflection.
(b) An aiming point and a deflection.
(c) A Y-azimuth.
(d) A base angle.
181. He does not repeat the command, but lays the battery with either a

THE FIELD ARTILLERY JOURNAL

- prismatic compass or an aiming circle.
182. Lay the 0-3200 line of the aiming circle on the announced Y-azimuth by:
- (a) Subtracting the announced Y-azimuth from the declination constant of the aiming circle (adding 6400 to the declination constant, if necessary.)
 - (b) Setting the remainder on the azimuth and micrometer scale of the aiming circle.
 - (c) Releasing the compass needle and centering it with the lower motion.
 - (d) Clamping the needle and laying each piece reciprocally on the aiming circle.
183. (a) Salvo fire.
 (b) Volley fire.
 (c) Volley fire sweeping.
 (d) Continuous fire.
 (e) By piece at my command.
 (f) Fire at will.
184. It is the Y-azimuth of the plane of fire, after the battery has been adjusted on the base point.
185. Yes.
186. To provide an accurate means of checking and correcting the computed (or scaled) deflection shift for delivery of schedule fire.
187. By referring it to any convenient reference point.
188. The executive is able at any subsequent time to lay the 0-3200 line of his instrument on the base point.
189. As a decimal, by dividing the adjusted range by the map range; as a correction, expressed in so many yards per thousand, by dividing the difference between the adjusted range and the map range, by the map range in thousands of yards.
190. After *K* is determined, it is applied to map ranges to determine initial ranges.
191. (a) Deflection compass or shift to the nearest 10 mils.
 (b) Convergence to the nearest 500 yards.
 (c) Deflection difference to the nearest mil.
 (d) Site to the nearest 5 mils.
 (e) Corrector to the nearest 5 points.
 (f) Range to the nearest 100 yards.
 (g) Elevation to the nearest 10 mils.
192. Yes, and such methods should be adaptable to all types of preparation of fire with instruments.
193. (a) Measure or estimate the distance from O to the base piece.
 (b) Find the difference in altitude between O and the base piece and determine the vertical offset.
 (c) Announce the aiming point.
 (d) Lay the instrument on the target with zero settings. Measure the site. Estimate *r*, or have it measured. Estimate the perpendicular from G to OT; determine the target offset (T) and apply it on the instrument or make a note of it.
 (e) Turn to the aiming point; estimate the perpendicular from G to OP; determine the aiming-point offset (P); apply P on the instrument, or make a note of it.
 (f) Read the firing angle if it has been determined mechanically. Otherwise, apply the offsets to the measured angle, and determine the firing angle. Convert the firing angle to deflection and announce it.
 (g) Decide what width of sheaf is desired initially. Converge at the range, which is a multiple

CONDUCT OF FIRE

of 500 yards nearest the initial range, and determine and announce the deflection difference to form the proper sheaf on No. 1.

- (h) Apply the vertical offset to the measured site and announce the site.
- (i) Announce the projectile, charge and fuze, or the corrector setting if shrapnel is to be used.
- (j) Announce pieces to fire, and method of fire.
- (k) Estimate R , and announce it as range setting if the range scale is for the projectile used. If the gunner's quadrant is to be used, convert range to elevation and add the site.
- (l) Measure the width of the target and determine the

method of handling the sheaf in fire for effect so that there will be no delay when the adjustment is completed.

- 194. It is the Y-azimuth of the north direction indicated by a compass—a clockwise angle from Y-North to compass north for the particular instrument.
- 195. When the observation post is in front or rear of the battery position an appreciable distance, the deviation observed will differ from the deflection error. A burst is brought to the OT line by a deflection change equal to the value of the deviation multiplied by the factor r/R where r is distance (in thousands of yards) observer — target, and R is distance (in thousands of yards) piece—target.



Gas!

During its recent service practice at Indiantown Gap, the 111th Field Artillery, Virginia National Guard, simulated some combat conditions by arranging to have tear-gas candles set off at the gun positions at a time when the personnel, although prepared for the emergency, did not expect it.

Firing was uninterrupted by the hasty

donning of masks, the crews having been previously practiced in reading the battery executives' arm signals for transmission of data. Colonel William H. Sands, regimental commander, writes: "It is astonishing how much density and effect is given by one candle . . . four were used for each battery . . . when the wind shifted, everybody had a good time."



Field Artillery Association Medalists

Additional winners of the Field Artillery Association Medal in Field Artillery senior R.O.T.C. units were the students pictured

below, who were selected as "outstanding in soldierly characteristics" in their respective units of the arm.

ALABAMA POLYTECHNIC INSTITUTE



JULIAN N. FOWLER

Pell City, Ala.; Cadet Colonel, FA Brig. Comdr.; Sigma Nu; Scabbard and Blade; Omicron Delta Kappa; QB. Football.

VIRGINIA MILITARY INSTITUTE



EDMUND J. TICE

587 Arlington Road, Roanoke, Va.; Medal presented by Col. J. L. Collins, commanding Fort Hoyle, Md., at conclusion of ROTC camp.

UNIVERSITY OF NEBRASKA



HARRISON A. EPPERSON

1729 Patterson St., Sioux City, Iowa; Cadet Lt. Univ. Honor Roll, '36, '37, '38; Inter Fraternity Council; Captain Red Guidon Association, Scabbard and Blade, Pershing Rifles, Pi Mu Epsilon.

In addition to those pictured, Princeton University reports the award, on July 27th, of the Medal to Mr. Ralph Hansl, Jr., of Greenwich, Conn. Mr. Hansl is a member of the football squad, Colonial Club, and Junior Prom Committee. The winners of this award, thirteen of which were reported in the July-August number, are outstanding in academic, athletic, and cultural pursuits, and the JOURNAL anticipates the pleasure of reporting their achievements in the post-graduate field ten years from now.

Packsaddle Weddings



AN INFORMAL memorandum (very formal in verbiage) of Headquarters First Battalion Second Field Artillery (Pack), Fort Clayton, C. Z. (Lt. Col. G. H. Franke, Head Man), prescribes the ceremony by which newlyweds will be inducted into its ranks. "As Those Jugheads Go Joggin' Along" is the theme song which paraphrases "Keep 'Em Rolling."

Packmaster procedure includes counterweighting the groom (hereinafter referred to as the heavier party) with—but we quote: "The ballast will be in the form of a piece of scrap iron appropriately painted, dated, and bearing the name of the lighter party, to be presented to the lighter party at the conclusion of the ceremony," apparently for such use as may, from time to time, occur.

The illustrations portray, in the following order: The escort; Lieut. and Mrs. Harry J. Lemly, Jr., in front of the club, being fanfared with trumpets at the right, and escorted by Lt. Col. Franke at the left. (Lt. Lemly and the former Miss Peggy Cusack were married June 15th, 1938); last, two sets of grooms, each complete with lighter party, the latter being presented with the souvenir ballast. On the left, 1st Lieut. and Mrs. James E. Berry; on the right, 1st Lieut. and Mrs. Cam Longley, Jr.

It will be noted that all members of the wedding party, including the CO, ride mules. This supports the contention of the pack artillery that it can go anywhere a parson can.

Lines of Communications

TO THE EDITOR:

1. In the July-August, 1938, number of THE FIELD ARTILLERY JOURNAL there appears, on page 318, as part of a most interesting article on Counterbattery by *Ut Proxim*, the following:

"Often in lulls, writes Colonel Lanza, . . . when one of these fires, in the Bois de Barricourt, had delivered 500 projectiles, it was found that three hostile batteries showed slight damage (although, one lost all its animals) while two suffered severe damage, but could have gone back into action within a reasonable time.

"The point is: If these were the batteries which were doing so little damage to our own artillery, was the game worth the 500 candles which might have been burnt on the hostile infantry?"

2. As to whether the batteries mentioned fired on our artillery rather than on some other target, I am unable to state. To determine this it would be necessary to examine the retained firing data, which may be on file in the German archives. This I have not done.

3. But the facts are that the batteries were neutralized, and during the battle fell into our possession. Some of the batteries, as stated, were not badly damaged. But the cannoners were gone—dead, wounded, dispersed; our infantry escaped the losses these enemy batteries might have occasioned. Primarily, our fire was not to stop hostile counterbattery service, but to save doughboys. Artillery caused our infantry from 75% to 85% of their losses; neutralizing the enemy's artillery was a most important duty. In the instance cited, it caused the expenditure of 500 155-mm. shell—maybe \$36,000 worth of ammunition. This was better than expending lives, and possibly losing the battle, from failure to stop enemy artillery fire on our own infantry.

CONRAD H. LANZA,
Colonel, Field Artillery.

(EDITORIAL NOTE: The fault lies with the editorial department, which, in editing the manuscript, did not disassociate, decisively, the first paragraph mentioned from the second one. The first paragraph summarized a statement from Colonel Lanza's quoted article; the latter one was *Ut Proxim's*, and it was not

made sufficiently clear that the second statement was the purely personal opinion of the author, and not a continuation of Colonel Lanza's views.)

TO THE EDITOR:

It is believed that the Field Artillery section of the ROTC Camp recently concluded at the Presidio of Monterey established a new record for number and variety of service practice problems fired. One hundred and twenty trainees fired 329 separate and distinct problems classified as follows:

Axial Precision	63
Axial Percussion Bracket	56
Lateral Precision (Small and large angle offsets)	88
Axial and Lateral Precision from Advanced OP	40
Axial and Lateral Percussion Bracket from Advanced OP	35
Axial Time Bracket	13
Lateral Time Bracket	23
Liaison Method	10
K-Transfer	1
Total	329

In addition to the above, all trainees observed two battery concentrations and one battalion concentration fired by liaison officers using the radio telephone for communication to the battalion fire-direction center.

The ammunition used throughout the training period consisted of the following:

2,424 rds. 37-mm. L.E. Shell
300 rds. 75-mm. A.A. Shrapnel
86 rds. 75-mm. Common Shrapnel
278 rds. 75-mm. H.E. Shell

All of the work at the gun positions was performed by students, except for the three concentrations indicated above, during which the guns were manned by regular personnel of the 2nd Bn 76th FA.

The Field Artillery Officers in charge of the training at the camp were Lt. Col. C. C. Bank, Major George H. Duff, Major Harry B. Allen, Captain James R. Wheaton.

C. C. BANK,
Lt. Col., FA.

Some Forward Observations



IT IS SUGGESTED to other observers that they join us in concern over our communication maintenance. An artilleryman (but World War infantryman) mentioned, just the other day, the time he went out on patrol, sans equipment, and wanted a lanyard for his pistol. He cut a piece of artillery wire conveniently nearby, it being dark and the presence of Germans more ominous at the time than any other consideration. A dazzling new theory of fire-direction expired the moment he mentioned the incident. At any rate, it substantiates a belief that Captain George D. Vanture's article in the last issue of the JOURNAL, "The French Had a Word for It, Too," should be made required reading.



THE JOURNAL would like to get in touch with any members who have copies of the first year of issue, 1911, and would be willing to dispose of them. Incidentally, save those January-February, 1938, copies. They are collector's items right now.



SOMEONE with time, experience, research ability, and a file of old JOURNALS at his elbow will find himself in the middle of an interesting subject if he will write an article tracing the influence those now-yellowing pages have had on the progress of the arm. Nearly all the changes, major and minor, were first forecast therein. This is not to argue that solutions advanced in JOURNAL articles are always the correct ones. The U's get found out sooner or later.

By JOURNAL authors, too.



A RECENT Sunday-supplement article

takes us all to task for being behind the times. Ho, hum. The writer inveighs against officers who design guns with horse transport in view. Now we hope that some, at least, of this concern is justified, and we know a number of horses who share our views. The writer thinks if we had some git up and git about us, we'd equip ourselves with bigger but lighter-weight guns, throwing bigger but lighter-weight shells by using more powerful but lighter-weight charges of powder. He thinks a reduction in weight for a six-inch projectile from about "108" pounds to about "50 or 60," would be pretty good. It might be good if it penetrated and threw fragments—but would it?

And he quotes an unnamed former American artillery officer as saying that the AEF held the German 77 in contempt, and that the efficiency of the French 75 was greatly overrated.

Now this is ground that has all been covered before. We knew this even before we turned to that ever-present help in time of trouble, the old files of THE FIELD ARTILLERY JOURNAL. On page 361 of the 1925 volume there begins an article, "What the Germans Think of the French Artillery." It quotes von Kluck's chief of staff, General von Kuhl, as follows: "The war has once more confirmed the experience of all campaigns—in time of peace, mobility is the important desideratum; in war, ballistic efficiency is of greater importance than lightness of material. The French piece [75-mm.] was superior to ours—we learned this from hard experience." The same article quotes the great German artillerist, General Rohne: "If the German field artillery

THE FIELD ARTILLERY JOURNAL

was able to hold its own, it owes it in part to the superiority of our heavy artillery."

Evidently 75's also fired.

The purpose of the newspaper writer was laudable. He argued that we needed more and bigger guns. We do. But it hardly seems necessary, in order to promote the realization of the necessity, that the people's armorers be charged with gross dumbness.

Incidentally, the feature writer, whose opinion of any kind of small caliber appears to be tolerably low, deprecated what he thought was a backward step in arming the infantry with the new autoloader, whose caliber, he wrote, is .276. This will explain to those who have been stuffing it with caliber .30 why they've had so much trouble getting bullets into the thing.

EIGHTY-FOUR regiments of Field Artillery, Reserve, are identifiable in our membership. Reserve membership is pushing 500 very closely. The 316th Field Artillery continues to lead. Among National Guard regiments, the 111th Field Artillery is 100 per cent for the second consecutive year. The 124th Field Artillery is in the middle of its first 100 per cent year. Every regiment save one is represented. The 119th Field Artillery, with 36, the 176th, with 30, are among the leaders. New forgers-to-the-front are the 107th, 160th, 157th, and 182d, all of whom have recently made large gains. Among field artillery brigade headquarters the 53d and the 70th are tied, with seven each. National Guard membership is 522, not including 148 organizations which receive the JOURNAL.



An Appreciated Comment

"U. S. FIELD ARTILLERY JOURNAL

"This is published bi-monthly by the United States Field Artillery Association. The May-June number has just come to hand and is of interest well beyond the range of even the best Field Artillery. Of this arm, by the way, the U. S. Army has a larger corps of officers than British readers may realize.

"The contents of this number are thoroughly satisfying, especially to a



ALL I KNOW IS—THE CAPTAIN SAID TO BUILD A DUMMY BATTERY.

gunner, where they deal with fire direction, communication within the light battalion and cognate matter. Of wider interest is an article, 'Lessons from Spain,' by Col. Conrad H. Lanza, FA. Amusing is the query treated with a very pretty wit, 'Are Private Soldiers Necessary?'"—*The United Services Review* (Great Britain) July 21, 1938.

The United States Field Artillery Association
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