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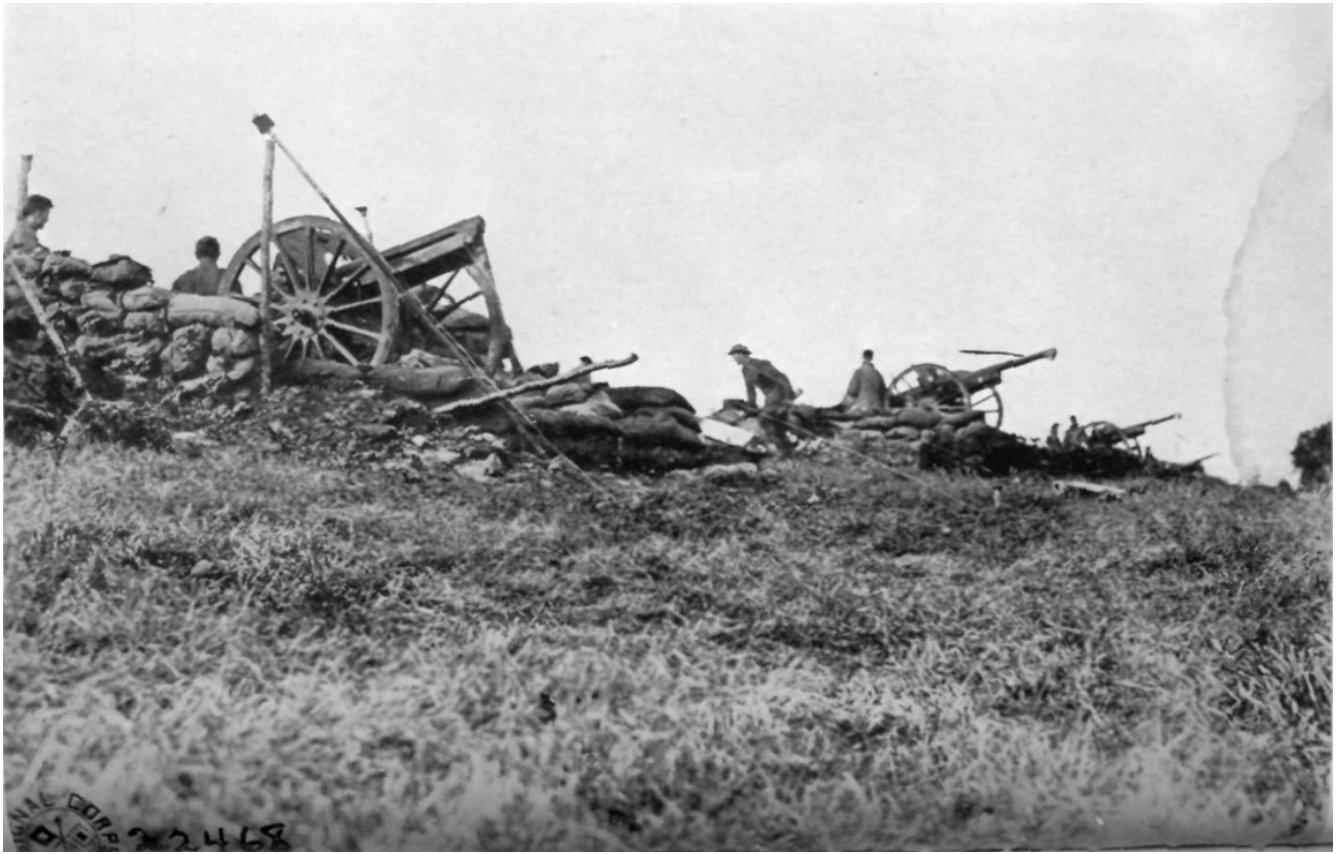
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FUSING THE THREE COMPONENTS

BY FABIAN

MOST of you will think that I have chosen a rather large subject—too large for comfortable and thorough mastication, anyway. Perhaps I have; but let's have a look at it, nevertheless. Maybe we can think of a way to bring the Three a bit closer together—to fuse them into a homogeneous whole that will answer fully the requirements they were intended to meet.

The general missions of the Three Components are relatively simple to define. The *accomplishment* of each individual mission, however, is quite another matter. The Regular Army forms the first line of defense in time of emergency, and acts as the "big brother" institution to the other two components in time of peace. The National Guard is expected to take its place alongside the Regular Army as an integral part of the first line of defense. Behind the barrier thus formed, the Organized Reserves mobilize and train the unorganized man-power of the land. The necessity for the close association of the Three is self-evident. They not only must be mutually supporting, but must have a thorough knowledge and sympathetic understanding each of the other.

Prior to 1917 there was a marked lack of understanding on the part of these same Components. The Organized Reserves were practically non-existent, but the National Guard was quite a sizable force. There was friction—and lots of it. The greater part of the Regular Service looked down upon the Guard as some sort of presumptuous upstart. To others it was an endless joke, particularly when camped beside a regular organization during a training period.

In those days the points of contact were few indeed. There were the inspector-instructors, the officers scattered around the country on duty with military schools, recruiting, or engineering duty—and that was all. The camping periods were not always points of contact; but when they *were*, they were also points of friction. The Guard and the Regulars did not understand each other—and did not seem to want to! The one thought the other overbearing and supercilious; the other regarded the former as flighty, superficial, and . . . dumb! The few regular officers on duty with the

Guard labored earnestly to bring about a better comprehension. They were handicapped, and their efforts rendered fruitless, by the apathy or open hostility of their own brother officers. As for the Guard—well, who could blame *them* for feeling like an ugly step-child?

Two things have helped to change all that; for it *has* changed and for the better, I am glad to say. The first was the experience of the Guard on the Border. There the two, Guard and Regulars, first came face to face on what was very nearly an equal footing. The Regulars were offered an unusual opportunity to help the Guard, and most of them seized upon it right cheerfully. The two became acquainted, and for the greater part firm friends. Then came the World War, and the National Guard this time actually took its place on the firing line, side by side with its regular comrades. They had their little troubles at first—who did not, in those days?—but, generally speaking, the Guard made good with a vengeance. These two events—the Border and the War—in my humble opinion formed the basis for the excellent understanding that exists to-day between the National Guard and the Regular Army.

What of the Reserve? The Great Upheaval was their first real "affair," for prior to that time they were a negligible quantity. During the war, when all officers and men were on practically an equal footing, they were offered splendid opportunities to demonstrate their worth. The case was indeed rare where full advantage of this golden opportunity was not taken—much to the edification of their regular brethren.

My own personal experience—pardon this slight lapse—with reserve officers during the war was very pleasant indeed, and reflected great credit upon them collectively and as individuals. I found them intelligent, earnest, and patriotic. Most of them were men of mature age, and all of them enthusiastic and hard-working. They took their work seriously, and did it well. They used common sense and sound judgment in attacking their individual problems. In fact, the only difficulty—and that was slight enough—that I had was in making the younger reserve officers understand that there was nothing particularly mysterious about the art of soldiering, and that applied common sense was the same the world over. Once they grasped those salient facts, their progress at once became satisfactory to the *nth* degree.

At present the attitude of the average reserve officer is much the same as it was during the war—fervor extracted, of course. He is earnest in his work, and eager to learn. He gives all the time he can reasonably spare—in many instances, more than he can afford to spare—from his regular occupation, to improve himself in the

elusive art of the soldier. He grins and plays the game—and appropriate credit therefore should be his due.

Our prospects right now for thorough understanding—for that really means fusion—were never better. We have so many points of contact—so many opportunities to meet and know the other chap, and hear *his* side of the story. At the summer camps—save the words!—we meet and rub elbows with National Guard and Reserves in friendly comradeship. We come to a better mutual understanding as each year rolls by. They see our difficulties and problems, and we in turn have a flashing glimpse of theirs.

The various Service Schools are another important source of good feeling among the Three. There a real opportunity is offered both to learn and to demonstrate one's inherent intelligence. All three components struggle through the same kind of field exercises, and fight the same variety of deadly map battles. They are, in a sense, temporary classmates—and *that* alone is always sure to originate and preserve friendly feeling.

Other points of contact should not be overlooked. R.O.T.C. duty gives the regular officer a broader outlook on life, and acquaints him with some of the problems that the civilian components are continually facing. Duty with the national guard and organized reserve regiments cannot fail to bring the Three Components into closer harmony. There the regular meets the guardsman or reservist on his own ground, and helps him to grapple with the many and intricate problems that the regular services never experience. The guardsman notes the soldierly qualities of the regular—who in turn is forced to admire the unselfish devotion to duty, in the face of many discouraging complications, on the part of both Reserve and National Guard.

So everything appears lovely—but the end is not yet, and the goal is not so easily to be attained. Various little difficulties remain to be eliminated before perfect fusion will be possible. There are still many regular officers who have never had duty with any of the other components. They still regard them as a great bore—and at times a standing joke. It is *so* easy to be over-critical! On the other hand, quite a few of the Guard and Reserve still regard the regular as an over-dressed snob, whose only claim to brilliance is the reflection from the shine on his highly polished boots. Such people only need closer association to insure better understanding. I've heard officers say, "I don't *want* duty with the Guard—all I want is straight troop duty!" Well, well—too bad, brother, but you'll *have* to take it *eventually*—why not now? The days of continuous "straight troop duty" are gone forever. Our job has been considerably enlarged, and we are much more than professional soldiers to-day—we are brothers-in-arms of the National Guard

and Organized Reserve. We have other missions in life now besides educating ourselves—we must help to educate the other Two Components. We must strive to raise *all Three* to the same standard of general excellence—for in the next disturbance (may it not come soon!) all Three will stand shoulder to shoulder to bear the brunt of battle. Think about *that,* and put away your sneers. Cease to smile because your reserve brother's coat fits him like a grain-sack, and his collar resembles a generous fence around his lean neck. Forget your complaint that the Guard cares more about dancing than training, and looks on summer camp as one great picnic. Look on the other side of the picture, and see the earnest endeavor that underlies the whole thing. Slip around at night, and watch your reservist poring over training regulations, that he may better be prepared to do his little bit. Watch your guardsman in the wee small hours trying to teach his green cook to prepare properly the old reliable beans. Then tell yourself that somebody else besides you is playing the game—and for all there's in it!

Shake off your dyspeptic gloom, and throw your own shoulder to the wheel. A kind word—a smile—can work wonders at times. Make yourself be a ray of light instead of the darkest spot in camp. Let *them* understand that you are out to *help,* and show your brother regulars that you have a *new* slogan that reads:

"I would look up—and laugh . . . and . . . LIFT!"

LIAISON WITH AND FIRE SUPPORT OF THE FRONT LINE INFANTRY

BY MAJOR G. H. FRANKE, F.A.

IT IS deemed advisable at the outset to admit that discussion of the above subject is being so restricted that it might better have been made to read "Liaison with Infantry Assault Battalions." Past experiences, in war and manœuvre, establish the truth that our liaison difficulties present no formidable obstacle as between the artillery regiment and the infantry brigade, or as between the artillery brigade and the division. However, as between the artillery battalion and the infantry regiment we find that very frequently, the local attack or defense is successful in direct proportion to the efficiency of artillery liaison with the infantry assault battalions. Upon reflection, we cannot but observe that, here, we find the greatest contributing cause to unwarranted demands for accompanying guns and batteries. Thus, it is declared, that with infantry assault battalions, the success or failure of our liaison, and consequently of our supporting fires, hinges.

Such being the situation, what then are the requirements?

Since, with the advent of the tank and great air forces, stabilized fronts will pass into history or, at least, exist less frequently and with shorter duration, and since, in any event, such conditions provide ample time for improvising to meet any liaison phase of operations, we will further restrict our discussion to operations obtaining in warfare of movement or, more specifically, to meeting engagements and the attack or defense of a position.

With a little knowledge of tactics, we recall that in attack or defense there are three general methods of employing the infantry regiment, namely: all three battalions abreast on the front; two abreast with one in reserve; or the three battalions in column. It is always advisable to consider no particular form of employment of troops as normal, bearing ever in mind that the formation adopted must always meet a particular situation. However, realizing that in many cases a regiment on the front will lose one of its battalions to brigade or division reserve, and that tactical situations will *usually* not require or dictate the use of more than two battalions of a regiment on the front at the same time, even when all battalions are available, we may safely assume that, if we provide for adequate liaison with two assault battalions, we shall only have to improvise in infrequent instances. Probabilities based on possible formations, tactical advisability and past experiences would seem to establish

this assumption, and indicate better than seventy-five per cent, of cases to which it would apply. We find likewise that probabilities indicate over fifty per cent, of cases where we shall require liaison with at least two front-line infantry battalions.

We conclude then that our requirements are: that we have available at all times in war, at least, sufficient and suitable personnel for liaison with two infantry assault battalions.

But, you may say, liaison of the artillery battalion with the entire infantry regiment is established, and now provided for, by one detail from the command post of the former to the command post of the latter and this provides for all exigencies regardless of the number of battalions on the front. In reply it is asserted that in this conception lies the cause of past failures and unnecessary demands for accompanying guns and batteries. But, you add, even though liaison is established directly with front-line battalions, it must also be established with the infantry regiment. This is conceded, but the best coördination demands, and tactical considerations will, at worst, usually permit, the establishment of these two command posts together or in such close proximity that staff liaison here inherently results. In fact, it is felt, and probably in contrast to very firmly established opinion on this point, that it should be in exceedingly rare instances, under exceedingly rare circumstances and involving unusually rare distances where this is not the case. An artillery battalion commander, who is on the job, is most frequently not to be found at his command post. He is either at an observation post, among his batteries, or conferring with infantry regimental or battalion commanders the greater part of his time, particularly during impending or real activities and his command post can function, and at the same time establish the required liaison, at or very near the infantry regimental command post, as well as elsewhere. How frequently will the situation place this position as far as 1500 yards from the area of the batteries, and, even at so great a distance, who will insist that the advantages gained will not merit the procedure? And so, in repetition, we conclude that our requirements are that we have available at all times in war, at least sufficient and suitable personnel for liaison with two infantry assault battalions, leaving the liaison at infantry regimental headquarters to be provided for, as indicated, or improvised.

Having determined the requirement, what then is the solution?

There is little to be found in our training regulations on so important a subject as liaison, though the fate of a battle may hinge upon it. In Training Regulations 430–105 we find six pages which indicate quite fully the duties of the liaison officer and which, if carefully read, may emphasize for some, how momentous is the question. In Training Regulations 430–155 we find, merely indicated, the

personnel provided for this significant and arduous duty. In other training regulations, school pamphlets and elsewhere, we find brief mention of liaison and liaison officers, with an occasional abbreviated effort to dwell upon its importance. Nowhere is there to be found available a cohesive discussion dealing with the personnel provided, their prospective duties and detailed training. If we should reflect for a moment upon the probable prospective duties of a liaison detail with an infantry assault battalion, we should be able to arrive at the probable required personnel and determine therefrom, considering war strength tables of organization, the adequacy or inadequacy of that now provided.

In a few words, the mission of the liaison detail is to see that the artillery meets the demands of the infantry with the least possible delay. This requires that the demands be reasonable and therefore consistent with the capabilities of the guns and ammunition—in other words, that there is readily available to the *infantry commander*, information covering the following: possible short, long and horizontal limits of fire; dead spaces; kinds, quantities and capabilities of ammunition available; amounts of ammunition and time required for successful execution of various missions; existing normal and emergency barrages and other defensive and offensive fires; and the like. This information should be available not only as it applies to the normal supporting artillery, but also with reference to other artillery organizations which can, in emergency, support the same infantry unit. The demands of the infantry should not be thought of as always positively expressed but rather anticipated, foreseen and determined by and within the liaison detail itself, as the result of the operation of parts of the detail with infantry intelligence O. P.'s, with infantry reconnaissance and raiding parties, with infantry battalion C. P.'s, through contact with infantry assault companies and through observation and activity independent of that of the infantry. Furthermore, in the performance of its mission, and in order that the supporting artillery may readily respond to a specific demand, the liaison detail should keep the *artillery battalion commander* informed at all times concerning: our own and enemy positions within normal and within contingent zones; targets of value to our artillery; effect of our fire and enemy fire; changes in our infantry plan; and infantry desires and complaints. We have touched upon friendly artillery information desirably available for the infantry battalion commander through the initiative of the liaison detail, on information desired by the artillery battalion commander and some of the sources of the latter, and we conclude that there must be provided the necessary personnel for its collection and transmission.

From what has just preceded, it is believed that it will be

concluded without argument that an officer, with a liaison detail accompanying an infantry assault battalion, is indispensable. A great many duties that may be expected of him, such as conduct of fire, have either not been mentioned or only inferred. To assist the liaison officer in the collection of information, determining the desires of the infantry in the manner indicated, and for the transmission of information by messenger, it is asserted that the following minimum personnel are required:

1 Sergeant,
1 Corporal,
4 Privates (one a motorcyclist for rapid messenger service between the liaison officer and the artillery battalion commander).

It may be observed that this personnel may be handled in various ways, for example: as two intelligence groups of three each, operating between points of information and the liaison officer, *i.e.*, providing their own messengers; as three groups of two each operating as indicated; as two groups of two each, operating as indicated, with two remaining for messenger duty between the liaison officer and the artillery battalion commander; or they may function in other combinations. But, we hope, in many instances, for better and more rapid means of communication than that provided by messenger service, at least from the liaison officer to the rear. The next war may find the perfected radio providing this, but in the meantime our most dependable rapid means for short messages and over distances greater than 500 yards, is the telephone. For such communication two operators, providing for two twelve-hour reliefs, and a line guard, would seem to comprise the very minimum required, particularly when the fact is considered that they may intermittently have to be used for messenger duty as well. Should the liaison detail function with their mounts at hand, horse holders will have to come from the personnel named or additional men provided.

To recapitulate then, we find the minimum personnel, required for adequate liaison with an infantry assault battalion, to consist of:

1 Liaison officer. 1 Sergeant 1 Corporal 4 Privates (one a motorcyclist)	Information and Messenger Group.
3 Privates (2 telephone operators and 1 line guard)	Signal Communication Group.

With detailed study and consideration of all imaginable activities of *one* efficient and effective liaison group, it would seem that more personnel could be profitably employed. However, a conservative

viewpoint has been courted, and an attempt has been made to make suffice as one complete group, the personnel now provided for in the light artillery battalion war strength tables of organization and in T.R. 430–105. An inspection of the above list will verify this.

There still remains to be provided a like group for the second infantry battalion, which in the great majority of cases will be found in the front lines. No reference has been made to reliefs, and the following quotation from T.R. 430–105 is made to cover this important point: "The duties of liaison detachments are, especially during movements, extremely arduous. It is, therefore, necessary to arrange for relief of the entire personnel after periods ranging from two days to a week, depending upon the conditions of service." Surely we may conclude that one group, as a very minimum, is necessary for relief.

Altogether, we find then, that we have provided for, in our tables of organization and training regulations, but one-third of the very minimum liaison personnel required, in the great majority of cases, with a supporting artillery battalion.

Even if the personnel, otherwise assigned, could be made available for liaison duty in an emergency, which it is not the purpose of this paper to discuss in detail, it would involve innumerable and variable improvisations, accompanied by divided responsibility in training, crippling of other details and worst of all, the failures of the past.

Briefly, it is hoped that this discussion will bring forcibly to the reader the insufficiency of liaison personnel now provided for in the artillery battalion and the necessity for just as detailed selection, training and instruction of such personnel as we seek for our instrument and signal details. May the result be: that this obscure, apparently avoided, but nevertheless exceedingly arduous and important duty shall have attention and, above all, improvement throughout the service.

ANENT NATIONAL GUARD

BY CAPTAIN A. H. LEE. F.A. INSTRUCTOR, 185th F.A., IOWA NATIONAL GUARD

UPON reporting for duty as an instructor of field artillery to the National Guard, one is confronted with three paramount problems:

The first is, how to most effectively and efficiently get the desired instruction to the national guard personnel, especially the commissioned officers, for it is through them as a medium that the enlisted personnel should receive the major part of their instruction, if you are to maintain the proper chain of command. The second problem, to put it tersely, is what to teach. After personally observing results obtained by different policies over a few years, it is safe to conjecture, for sake at least of argument, that the latter problem outweighs the former, in importance to the service as a whole.

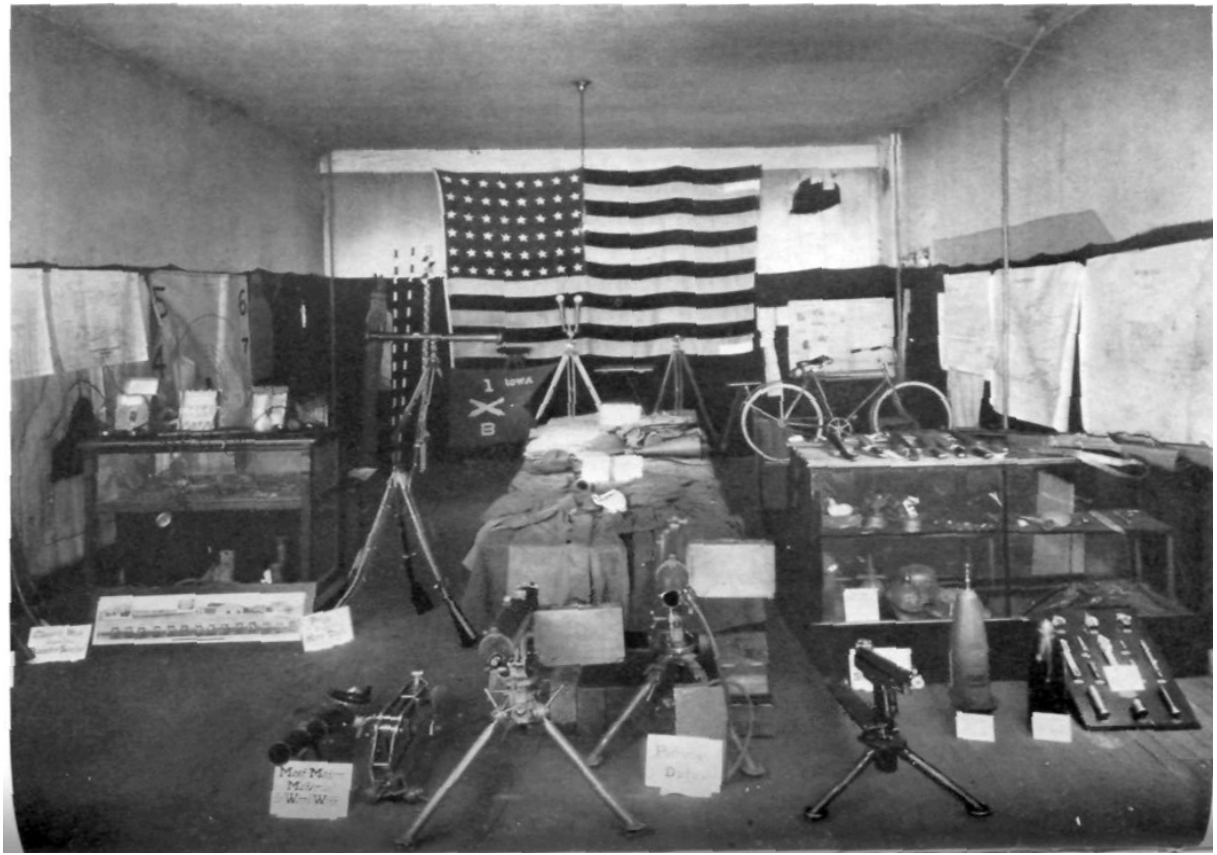
A compilation of statistics within this state indicates a *personnel problem* which no doubt is true with every locality where national guard artillery is located. This third problem, one of personnel, vitally affects the entire question of efficiency in training; in fact, it is of such importance that other questions, such as how and what to instruct, must be approached with a regard to their relative degree of importance. The personnel problem once out of the way, the other problems will solve themselves, but it remains to be coped with and it is with this problem that the writer wishes to concern himself for a few brief paragraphs.

The annual turnover, as it is called, in commissioned officers over a period of years, will aggregate twenty per cent, per annum, while the enlisted personnel shows a higher percentage, reaching almost to fifty per cent., or in other words, the instructor can count on one in five of his officers and every other man of the enlisted personnel to whom he has laboriously imparted artillery instruction, dropping out annually. From the standpoint of the national guard unit these become total losses to the organization, the only solace being in the knowledge that those lost may some day be called to the colors and their training will not have been a total loss to the service in general.

Now what does this situation mean to the instructor? It may be succinctly stated as indicating a condition requiring a constant training in the elementary subjects and basic principles of artillery. The problem of what to teach now becomes the paramount issue. Conceding the above to be true, one must first survey the ratio of favorable to the unfavorable events before arriving at the possible outcomes.

The first question confronting the national guard officer is that

OUR COUNTRY'S FIRST LINE OF DEFENSE



of earning his livelihood. This problem will occupy his attention the major portion of each week. How much time, then, can he devote to his purely military duties? These may be briefly summed up in their relative importance as recruiting, training, and administration. With the large turnover, and not even a part time recruiting service to place new material in his hands, it is readily comprehensible that this problem alone could consume much of his already limited time. Training then comes in for its share of his time. The personnel will, to start with, be one-half green. While to have two complete gun sections present in toto for two weeks successively is almost an occasion for a celebration, the instruction must of necessity be fifty per cent, basic. Last but not least is administration. The property accounting may be a big problem; however, in this regiment where steel lockers and equipment bins are provided for each individual, this otherwise burdensome duty is greatly reduced. Pay rolls, rosters, reports, etc., etc., constitute topics for voluminous discussion in themselves and all require the attention of the national guard officer.

By way of a slight digression it might be of interest to detail briefly how this regiment circumvents the recruiting problem. At certain times of the year, preferably the half-way mark between encampments, a concentrated drive for new men is made. The officers set aside their business long enough to put these over. The service clubs, as well as patriotic organizations, are called upon to lend assistance, and after a brief period of judicious advertising, stations are opened in down-town building for a few days only. This brings the bulk of recruits for the year. No further drives are made. In this way the instruction for the year may be, at least in general, progressive. Other recruits will be annexed in small numbers, probably three or four a month per unit, but the main body is now big enough to assimilate these without disarranging the scheduled instruction. It might be worthy of mention also in this connection that radio broadcasting has been successfully used in the advertising campaign.

Now to revert to the original subject, just how much time can the instructor count on for actual class periods with the national guard officers? As a whole probably not more than three or four periods a month, or a total for a year of approximately sixty hours. With this brief time in which to mold artillery officers, what should the instructor give them to most benefit the service? In the consideration of this problem it must be borne in mind that one in every five will be verdant subalterns. Experience also shows that the instruction must be progressive and a start from the beginning or A, B, C's of field artillery must be an annual event. The officer's time is so limited and the subjects in his contemplation so numerous, and

often diametrically opposed to the mathematical formulas and advanced theories of higher artillery, that a review is absolutely necessary to place the officer in a receptive mental attitude.

With these things in mind, the writer is firmly convinced that greater headway and more concrete advancement will be made where the subject matter for instruction of national guard officers does not exceed in scope the topics contained in Field Artillery Correspondence Courses "A" and "B" of the past year. Of course there are the exceptions where officers of field grades are financially situated so that they can devote the required time to the advanced subjects, but on the whole it is believed the general tendency has been to shoot over and thus get many lost or doubtful results.

Whether or not the correspondence course offers the best vehicle for conveying the instruction, the writer is not prepared to conclude, but were an opinion to be expressed, it is safe to state that one hour of personal contact should give greater results than three times that period spent on a correspondence course. The ideal situation would be to have adequate regular army personnel to combine the subject matter of the courses with the personal contact in the instruction.

THE ATTACK OF INFANTRY FORMATIONS

BY CAPTAIN HOWARD W. TURNER. F.A.

THE firing regulations outline in general the procedure for the attack of infantry formations. It is evident to all military men that no exact rule may be given to cover all possible problems of a certain nature. For this reason the study of tactics is usually difficult to the beginner. It is the purpose of this paper to endeavor to point out some of the factors that should be understood and considered, together with information that the artillery commander should obtain, in order to make an intelligent estimate of the situation that will result in a decision as to how, when and where he shall use his fire power in the attack of hostile infantry.

When hostile infantry constitutes the target, the artillery must bear in mind that the support of our infantry becomes the primary consideration. It is therefore of paramount importance that the fire of that portion of the artillery whose mission is to support the infantry, be placed on those targets which are apt, by their action, to cause losses to our own infantry.

Ever since firearms have been used as weapons, experience has established the fact that infantry cannot advance across a zone swept by fire whose intensity is equivalent to approximately three rounds, or more correctly, bullets, of small arms calibre, per yard of front per minute. An additional condition is that these bullets must sweep a vertical zone between the ground and two yards above the ground. Musketeers in the early seventeenth century first attempted to attain this condition by forming shoulder to shoulder in five ranks, each rank firing in turn while the others reloaded. By the year 1900 the magazine rifle had thinned out the firing line to one rank of one man per yard.

The attempt of the infantry to obtain for itself a fire superiority in excess of the above amount, by means of automatic weapons, led to the universal adoption of such weapons, with the result that the excessive fire power prohibited movement. The age-old remedy of thinning the ranks was applied to reduce losses and to gain the power of manoeuvre. The lines were thinned out and distributed in depth, with the natural result of a decrease in fire power and an attempt to maintain the balance by an increase in automatic weapons.

The automatic weapon has today become the basis of the plan of attack and defense. Without them the hope of gaining or holding

ground vanishes, and their destruction or neutralization is necessary before the friendly infantry can strike a decisive blow.

If the artillery assigned to support the infantry, can take under its fire the hostile automatic weapons, it will be rendering the most efficient support. The artillery is probably the most efficient weapon for this purpose because of its ability to cover an area or zone. If this alone were necessary the problem would be simple. The difficulty lies in the manœuvre power of the hostile automatic weapons, and in the fact that they are so easily concealed by trained troops that their exact location from an O. P. should be extremely difficult.

When support of the infantry constitutes the mission of the artillery, the enemy machine guns should form an extremely heavy factor in the estimate of the situation. The manner of analyzing and interpreting the available information should be taught during times of peace rather than to allow the grim school of casualties and experience teach the lesson.

If at the beginning of hostilities the enemy is poorly trained, the situation calls for no special worry on the part of the artillery. This arises from the fact that the enemy's lines must of necessity, in order to preserve control, be of a more or less rigid type and conform to the system usually practiced in peace-time manœuvres. If, on the other hand, the enemy is well trained, great difficulty will be experienced in locating his sensitive points due to their apparent lack of system.

A study of infantry tactics by the artillery officers, particularly by battery officers, will be a great help and will facilitate an early grasp of the situation. Peace-time manoeuvres, map problems and tactical rides are means to perfect the training of officers. As conducted, however, they are apt to cause fixed ideas of procedure. For example, the Reds and Blues always are organized according to the latest War Department tables. Of course that is highly desirable and instructive in the case of two-sided manoeuvres, and in the case of our own side, but it leads to a tendency to estimate the enemy according to our standards instead of his. Since no other nation has adopted our table of organization, no instruction is gained by having the theoretical enemy adopt it during a manœuvre.

The effectiveness of our artillery can reach its maximum efficiency only when the artillery officers are proficient in not only the technic and tactics of our own arm, but also are proficient in that of the enemy, from both an infantry and artillery standpoint. This condition could be approached if some agency, such as the chief of branch, could issue all available information in the hands of the War Department concerning the enemy's theory of combat, tactics, organization, etc. A great mass of this information should quickly become available after the commencement of hostilities, gathered

from the experience of our troops and from the intelligence service. This also should be gone over and important points and instructive features published to all officers.

A thorough analysis of the enemy, his organization and methods, constitutes the first step in the estimate of a situation and should be made before any meeting with the enemy takes place. This is a sort of a constant factor and, if kept up, the data should have considerable influence upon artillery methods. The next step is the study of the ground.

Study of the ground will fall in two broad classifications. First, reconnaissance of our own area and the enemy's for technical purposes, such as O. P.'s, approaches, positions, fields of fire, etc., and, second, a tactical study for the purpose of increasing in every possible manner the value of the artillery to the other troops. The first class of reconnaissance is always made in a more or less thorough manner; it is part of the technic of our arm and much of the methods and procedure employed is prescribed in training regulations. The second class is not always so thoroughly done, although it embraces many possibilities of value.

This study of the ground should be commenced by all units, from the brigade to the battery, as soon as a position is occupied, and should be continued as long as the troops are in that area. How thorough it can be, depends upon circumstances. The ideal requires a great amount of labor, but should greatly increase fire efficiency and contribute to a large extent to the discomfort of the enemy. This study finally will evolve in all headquarters a battle map containing a general outline of the disposition of our own forces and as much detail regarding the detail of the enemy disposition as possible. To this end every means available is utilized. If, then, this map is combined with a thorough understanding of the enemy methods, deductions may be made, often with surprising accuracy, as to the general location of his machine guns and the assembly points of his reserves. It is reasonable to assume that definitely located machine guns perform only a minor part in his scheme of attack or defense. It is our knowledge of their probable location that enables us to gain the element of surprise.

During a war of movement much of the information obtainable by deliberate methods will not be available. Dust, smoke, weather and unfavorable terrain will hamper observation. The present system of liaison is designed to allow targets to be quickly reported and to keep in close touch with the requirements of the infantry. One of the main difficulties with this system at present is the difficulty of accurately and quickly designating a target that is not already defined. Many systems of verbal designation have been devised, but they all fall down in some respect.

In recent years the infantry have solved their problem of target designation by adopting a tracer bullet. By this means a target may be instantly pointed out beyond all question of doubt or mistake. Some similar system employed by the artillery would be of extreme value, both because of its speed and its accuracy. For example, if an artillery liaison officer had some means of placing, say, a flare of distinctive color and of sufficient size and brilliancy to be seen by the artillery O. P.'s, on a point where fire was desired, the problem would be well on the way to solution. In a case such as suggested above, accurate fire could be placed on concealed machine guns which might escape the effect of our fire entirely if their location was described by verbal means alone.

It would probably require a definite effort to produce a suitable means of accomplishing visual target designation, but it should not be impracticable to do so. A weapon weighing say ten pounds and firing a one-pound bomb a distance of 1000 yards, would fulfill the requirements. They should be issued to artillery units only for the use of liaison officers. Two kinds of bombs would be necessary, a phosphorus bomb for use of the liaison officer in ranging, and a flare to be fired when the gun places the bombs near the target. The grenade gun that the infantry had under consideration about four years ago could be taken as the basis for developing an artillery gun. This gun fired a modified V. B. grenade a distance of 800 yards with the ordinary rifle cartridge and only weighed about ten pounds.

The recent war has verified and crystallized our ideas of the tactical employment of field artillery. However, there is a tendency on the part of our service to neglect preparations of two important duties during our drills and manoeuvres. These are concealment and organization of the battery position for close defense.

Even in a war of movement much can be done in the way of concealment in a very short space of time, either before opening fire or during a lull. A skilfully concealed battery is more apt to prove a safe battery than an exposed one. Survey methods of location, flash and sound ranging, are all dependent on the element of time, and fall down during a period of rapid movement. More attention to this phase of training should be of great advantage as it tends to gain our artillery a certain element of surprise. On the defense also an unknown and unexpected battery can give much added moral punishment to an advancing enemy infantry, especially at the shorter ranges.

Whenever the possibility of our troops acting on the defensive exists, batteries should be prepared for close defense. The machine guns should be withdrawn well to the flank and on favorable terrain somewhat to the rear. In addition to their anti-aircraft missions,

they should be cited to cover the flanks and front with cross-fire, sweeping close to the ground in the same manner as the "battle lines" of the infantry machine guns are laid in the front line battalions. Hostile troops breaking through our lines can thus be engaged and severe losses inflicted. Properly coordinated, the cited machine guns with the artillery are capable, if properly handled and resolutely manned, of slowing up an advance and forcing a halt until the enemy can be overcome by the usual infantry methods. Thus they will act as a barrier behind which our infantry may launch a counter-attack or else cover the ultimate withdrawal of our guns.

The main points underlying successful artillery tactics during the war must form the basis of the study of artillery tactics for the future. A good knowledge of the organization and limitations of our various equipment and their means of traction, both in marching and fighting, is required. Also the organization, equipment and tactics of the enemy, especially as regards his employment of machine guns and infantry reserves, must be studied. Every new invention to improve the efficiency of the artillery must be studied in order to obtain the maximum value from it. In addition to the above, it is necessary in the field to continually investigate the reason for things, and to combine this with clear and logical thought. The movements and intentions of the enemy are thereby made more apparent and tactical surprise then becomes possible for the attacker.

A SHORT DISCUSSION OF THE RIFLING OF CANNON

BY CAPTAIN R. W. DANIELS. F.A.

OF ALL the advances in fire-arms that have been devised and developed since the discovery of gunpowder, there is none of farther reaching effect, nor of more interesting technic, than the device known as rifling. It has increased the range of weapons tremendously, it has improved fabulously their accuracy, and it has enabled great strides to be made in design of projectiles for efficiency in fusing, penetrating, and bursting.

Rifling, as we have known it in modern guns, was not a sudden discovery, born of genius full grown and nicely finished; it has, on the other hand, a long history of development.

Not long after the earliest days of cannon, when, as at Crecy in the fourteenth century, ignition was obtained by a crude powder train running down inside the tube from muzzle past projectile to powder charge, or by the insertion of a red-hot wire through a touchhole vent, curious phenomena were observed in the action of projectiles—round cannon balls as they were. Their necessarily loose fit, coupled with the violent push from the burning powder, meant contact of the ball with the muzzle walls, first on one side then on another; so that the final direction of impulse was problematical. Further, there resulted a rolling twist to this ball from the same causes. And while no accurate records are available on observations of deviations from this cause, it is clear that this phenomenon set men's minds to pondering on the possible results of spin, and on the relation of the air thereto. And it was eventually decided and proved, that if the axis of a rotating projectile made any considerable angle with its direction of propagation, its flight was unstable and haphazard; but that if this axis coincided with the motion, then it became surprisingly stable and accurate. These phenomena, as we know them, are of course those of the pitched base-ball with its "shoots" and "breaks" and are exemplified in the well known, if somewhat antique, experiments of Professor Magnus; as compared, on the other hand, with the steadiness of the rifle bullet adhering to its course.

Early attempts at obtaining this desired rotational spin were made. It was first accomplished in small arms by giving to the gun various forms of cross-section such as an ellipse, or hexagon, which wound helically from breech to muzzle; or a favorite shape was as shown in this figure:

with a round, belted bullet to fit:

The irregularities in flight of such odd-shaped objects are obvious, and the escape of powder gas around the bullet while in the bore, known technically the last century as the "windage," was objectionable. There was further casting about for improvement. Numerous grooves followed, the lead bullets, muzzle loaded, being slightly flattened by pounding on the loading rod in order to make them take the rifling. The consequent deformation of the bullet, however, was again a drawback. There grew then the plan of opening the bore at the breech, and therein inserting a bullet of size large enough to take the rifling.

Thus the attempt to produce a rotational spin to projectiles brought about the practice of breech-loading, an accomplishment in itself of immense importance of course, but entirely a bi-product of this other more important attempt.

Lands and grooves had a tendency to become simpler in shape, and to be only as deep as absolutely necessary. They increased in number from three, or four, as our small arms rifle still has, to much greater numbers in cannon, so as to insure a secure grip on the projectile and avoid "stripping." In rate of twist of these grooves, it was natural at first to follow the simplest plan—namely a uniform twist throughout the length of the tube. Strangely enough this is probably the best generally accepted form today and certainly the easiest to manufacture. The porponents of varying twist argued that, the forward acceleration being greatest at some point not far ahead of the seat of the projectile, it would be best at that point to have a small amount of twist which should increase to a desired maximum some place behind the muzzle, after which, for stability's sake, it should be uniform.

The developed curve of this rifling, in practice takes several forms—first, that of the uniform twist would be of course a straight line making a constant angle (the angle of the grooves) with the axis. If the twist is to increase uniformly, the curve would take the form of a second degree curve, namely the parabola; but to equalize still further the rotational acceleration from breech to muzzle, as is usually the practice with increasing twist, a third degree curve, the semi-cubic parabola is taken.

Rotational acceleration, which is of course proportional at any one point to translational or forward acceleration, is not serious enough, as a rule, to demand an equalization throughout the travel of the projectile in the bore, such as an increasing twist tends to give. Furthermore, an increasing twist demands a relatively narrow rotating band—a serious disadvantage sometimes. The chief concern is with the rotational velocity, which depends on the angle of twist.

The effect of rifling on projectiles has given rise to great study on the part of ballisticians, concerning the familiar phenomenon of

drift, and the design of projectiles to give greatest range. Both of these phenomena, *viz.*, drift and great range, are closely connected with each other and have to do mainly with the pointing of the projectile's nose; but it is scarcely within the aim of this brief article to discuss the exterior behavior of a projectile which comes as a result of rifling. For such a discussion the reader is referred to a more extensive treatise on the "deviation" or drift, and its accompanying phenomena.

The rifling in modern canon, then, is fairly simple. In general, it can be expected to be of uniform twist, being of increasing twist only in exceptionally high-powered guns and especially those which use a propellant of high vivacity or quick rate of burning. The grooves vary from two-hundredths of an inch, as in the seventy-five, to correspondingly greater depths in larger calibres. A right section of a single land would show it, not as a rectangle with square sharp corners, but as a sort of trapezoid with fairly well-rounded corners, so as to be rugged and withstand wear well. The wear in cannon depends chiefly, however, on the character of the metal,—its compressional and tensile strength; its state of initial compression; the powder pressures to which subjected; and the nature of the propelling powder, some types being more erosive in their action than others. And wear depends also on the care taken of the bore—cleaning, proper resting during firing, cleanliness of projectile.

The chief wear in a gun tube takes place at the forcing cone or rear end of the lands, and by tearing away the steel of the lands (and grooves as well) advances the forcing cone forward. When this advancement reaches a certain limit, depending upon the calibre, a gun is declared worn out and unfit for further service unless relined. It is interesting to note that the minimum wear of the lands occurs in the seventy-five at a point three or four calibres back from the muzzle, from which point forward to the muzzle it increases again. Directly at the muzzle there is great likelihood of an exaggerated wearing away of metal on one side or another where the projectile rubs, due to a fairly well fixed angle of yaw. There is a possibility also that such wear may be augmented by careless handling of the rammer staff. When this becomes excessive, in fact, when wear at any place in the lands or grooves becomes excessive, accuracy is lost and the gun becomes useless. Upon the rifling in one's guns is one dependent to fulfill the first requisite of an artilleryman—to hit the target.

NOTES ON ORGANIZING A RESERVE REGIMENT

BY LIEUTENANT-COLONEL H. F. WANVIG, 309th F.A.,
NEW YORK CITY

EVERYONE interested in national defense believes that the present military policy of this country is the best we ever had. It provides for less than the General Staff hoped for and had some reason to expect at the close of the war, but it provides a great deal more than was thought possible before the war, and for more than a substantial number of congressmen think is necessary even now. The National Defense Act, therefore, is a compromise between what the Staff and Congress think necessary and while Congress has controlled the limiting factors, appropriations and authorization, the results show that the War Department has done more than make the best of what was given it.

In the fine progress that has been made in the development of our military resources against much opposition, reserve officers, particularly unit commanders, may find an inspiration and an answer to some of their own problems. It may be taken for granted that in the matter of organization the Reserve is far below what is expected of it by the General Staff, but that it is all or more than is desired by a very large number of reserve officers, is equally certain. We cannot look to the officers of the Regular Army for confirmation of this fact, because they came to believe long ago that their job with the Reserve requires kid gloves and they seldom take them off. However, every active unit commander sooner or later comes to feel the weight of inertia and when he does, the mark set by the War Department for the Reserve seems a long way off. At that point it may help to stop and consider the progress that the Department has made, through compromise, against inertia and opposition far greater than he faces in his own small unit. Nobody likes to compromise, but if it is understood that a middle-of-the-road course is the only one that can be followed with the Reserve at the present time, a commander may find it easier to formulate plans to fit his special situation, by which he can do a little more than make the best of what is given him.

In the beginning he will find it necessary to rely on his own self-starter. He will get help, encouragement and advice (in some cases perhaps indifference) from his R. A. executive, but no one is going to study all the intimate complexities of his situation and tell him how to pull his unit up out of inactivity and breathe life into it. He will have to do that for himself, deciding what activities will

contribute most to the welfare of his unit, and finding ways and means of putting them into effect. It will require much thought and talk, considerable patience and a little money, but the satisfaction of succeeding will be ample compensation.

At present reserve units generally are little more than lists of names—paper organizations that mean nothing to the officers in them. Very little of value can be accomplished in a concrete way until the organization has been given individuality, and until each officer has come to feel that he is something besides a name on a piece of paper. When each officer has been given a definite place and a share in the responsibility for the forward movement, any necessary schedule can be carried out. Each unit commander will find his own way of reaching this point, but from experiments observed, a general conclusion has been reached that may be of interest and value.

It is believed that more can be accomplished in less time by building an organization piece at a time than in general meetings attended by all the officers of the unit. Organization is always more or less a one man's job, but the quicker parts of the work can be delegated to others who will carry on, the sooner the work can be completed.

One regiment went about it in the following manner:

The commander first laid his plan before his executive and adjutant, giving them at the same time his ideas of the purpose of the Reserve and an interesting picture of what a well-organized reserve regiment might be. He succeeded in arousing their interest in the Reserve and enthused them with what he planned for the regiment, so that those two officers left that first meeting with a real desire to organize their own jobs just as though they were in active service. Next the battalion commanders were invited to a meeting with the colonel, while the staff officers met with the executive, and the same ground was gone over. Each staff officer was shown what he could do to contribute to the whole and was encouraged to find ways and means for carrying out his part of the plan. A start had been made and the battalion commanders readily agreed to carry on with their own units by calling their battery commanders together, who in turn were induced to hold battery luncheons and meetings. Each lower unit commander was given a definite task to perform and by gentle encouragement from time to time, where needed, the work was carried on—slowly at first, but as the unit commanders began to feel that they had real command and a definite plan to follow, the work progressed more rapidly and with more interest.

A regimental coat-of-arms was designed and approved; a regimental motto was agreed upon; regimental colors were selected;

an officer was set to work organizing a band; a particular style of uniform was agreed upon and immediately ordered by a substantial number of officers. In the adjutant's department, registration cards were prepared showing the name, rank, business and residence addresses and telephone numbers of each officer. Sets of these cards were sent to each lower unit commander. A regimental chart was prepared showing the assignment and duty of each officer, together with the special order numbers affecting him and, by keyed notations, his status with regard to regimental activities, leave of absence, etc. Proper military letterheads and envelopes were printed for regimental and battalion headquarters and correspondence with officers was sent through regimental channels. The regimental staff accumulated maps of the area, selected and arranged rendezvous points and began a study of possible regimental activities to test organization and begin training. The service battery stocked and sold to the regiment, uniform insignia, shoulder patches, individual and organization signs. At the time of writing, that battery is preparing to handle orders for all uniforms and equipment of every kind needed by the regiment.

On these lines the organization was completed, though not quite as easily as it is written about. Officers were found who were incompetent, indifferent or misfits. Transfers both within and out of the regiment had to be made and new officers brought in to fill the vacancies thus created. Others who were active were promoted as fast as they could secure their certificates of capacity. Finally, the work was completed and today the regiment is a real, functioning organization that can be mobilized for a dinner, a meeting, or for service, by five telephone calls or telegrams from regimental headquarters, with every officer accounted for by his commander or his representative. All of this is explained to new officers coming to the regiment, so that they may know what will be expected of them if they join. Thus it is hoped that the esprit and momentum which the regiment now has will carry it along, whatever changes in personnel there may be.

Regimental commanders will have their own ideas as to what they want to accomplish and will find their own ways of going about it, but the method of building an organization, bit by bit—of enlisting the enthusiastic support of officers in small lots of three or four at a time and sending them out to carry on down the line, has been tried and found successful. For whatever use they may be to others who care to try it, these notes are submitted.

THE BATTLE OF ST. MIHIEL

SEPTEMBER 12-14, 1918

A THESIS PREPARED BY OLIVER SHAW, CLASS OF '25, IN THE HARVARD R.O.T.C. COURSE

THE crisis preceding the Second Battle of the Marne—June 1st to July 18th—had necessitated the dispersal of the American forces throughout the French armies. This action having been taken, the Allies, at a conference at Foch's headquarters at Bombon, July 24th, formulated an offensive program to be undertaken in close coöperation. In this plan the American forces were to be combined as a single unit. Pershing and Petain had planned for such a concentrated force to take over a separate sector as early as May 19th, but the disaster of Chemin des Dames had thwarted this project.

The conference now decided that the American mission was to be the reduction of the St. Mihiel salient, as part of a great manœuvre between the front occupied by the Germans, and the Hindenburg Line, its purpose being to strike at the German rear communications and supply. It was necessary that the Americans complete this action before the mid-September rains, because of the marshy nature of the terrain to be fought over. Of the army corps to participate, the First was on the Vesle, the Fourth at Toul, and the Fifth not yet organized. A very difficult problem of organization and concentration, therefore, was presented to the newly organized staffs.

By August 30th the concentration of troops and supply was well under way. But then, Foch, in view of British successes near Amiens and French gains about Chemin des Dames, attempted to induce Pershing to combine with the French in an attack between the Meuse and Argonne and between the Argonne and the Souain Road. This would have necessitated the disintegration of the newly formed First Army, into several groups, and would have junked practically all the plans and material preparations already made on the St. Mihiel front. In addition, such action would have involved the greater growth of the evident disinclination of American troops to serve under foreign commanders, and the consequent lowering of their morale.

On September 2nd, however, Pershing and Petain finally agreed that the Americans were to retain their organization as a unit, the former chosing the Meuse-Argonne Sector as his part of the Allied converging operations. The First American Army was to carry their objectives at Saint Mihiel, and then make a drive between the Meuse and the western edge of the Argonne Forest—about September 25th—as part of Foch's general Ypres-Verdun offensive.

MONTSEC AS SEEN FROM NEAR THE FIRST DIVISION JUMP-OFF LINE

HATTONCHATEL

THIAUCOURT

LOOKING EASTWARD FROM THE CREST OF MONTSEC

The salient at St. Mihiel was the result, as almost all salients are, of an uncompleted operation. The Crown Prince, in order to isolate Verdun, in 1914, by cutting the city's rail communications, made a push to penetrate south, between the Argonne and the Meuse, and cut the Paris-Chalons-Verdun Railroad from the west. Simultaneously another German offensive started from Metz, aiming to reach the Meuse and cut the Toul-Verdun Railroad, the only other important line leading to the city. The Crown Prince was quickly halted, but the push from Metz up the valley of the Rupt-de-Mad reached the Meuse at St. Miheil and took the strong, elevated position of Ft. Camp des Romains. The Crown Prince advanced to the Chauvoncourt bridge head, menacing Bar-le-Duc (west of St. Mihiel) and all the French line north of St. Mihiel. But Joffre's turning manœuvre in the Santerre and the Battle of Picardy, attracted German attention to these positions, and their aggressive movement in this sector ceased.

During the next winter Joffre launched an attack on the northernmost point of the salient, and Les Eparges was captured. Later, however, a great reverse was suffered here. He again attacked in the summer of 1915, this time on the southern face of the salient, from the heights above Pont-á-Mousson to the Forest of Apremont. Loss again resulted, for in July, in one day, the Germans gained back all the fruits of a hard combat of two months. During the Verdun campaign of 1916, the possession of the salient permitted the Germans to command the Commercy-Verdun Railroad (which passes through St. Mihiel) and prevented French munitions supply from reaching the city by the Meuse Valley lines. Although a new line was constructed to Verdun from Bar-le-Duc, the Germans still cut the main Paris-Nancy Railroad at Commercy (about fifteen kilometres south of St. Mihiel) by heavy artillery fire, necessitating a twenty-mile detour about this point.

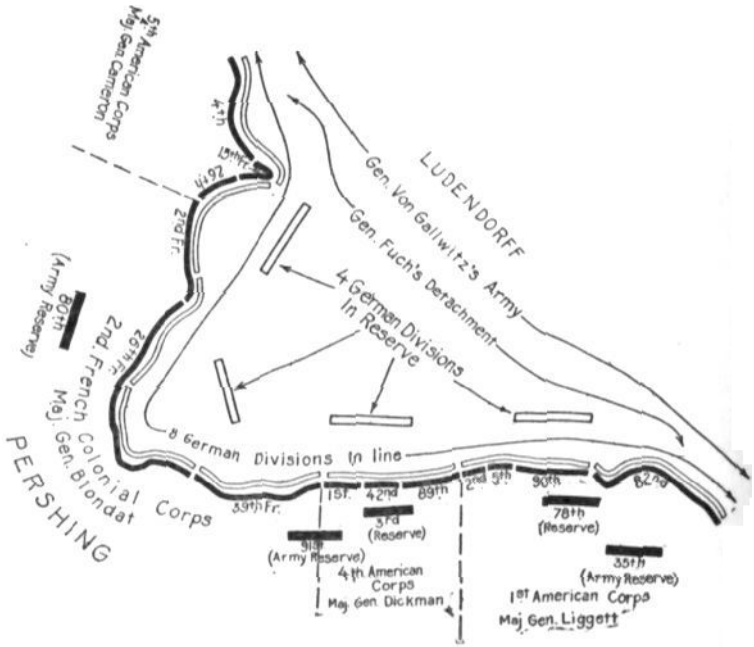
The actual scene of the battle we are now to consider, was north and east of the city of St. Mihiel. On the east bank of this part of the Meuse the terrain has a rising slope to a ridge, the Cotes-de-Meuse, some miles from the river. (See map at the end of this article.) From the crest of the Cotes-de-Meuse the ground sinks quite sharply to the Woëvre Plain, which stretches to the eastward twenty miles to the Moselle River and from thirty to forty miles north and south. The plain, flat and marshy in nature, with little lakes and ponds to the south, and crossed from northeast to southwest by the Rupt-de-Mad River, rises as it nears the Moselle, commanding that river from another crest.

The German line ran convexly from the heavily wooded Moselle Hills north of Pont-á-Mousson, out across the Woëvre Plain, reaching the Meuse by turning slightly to the south of the Meuse Hills at

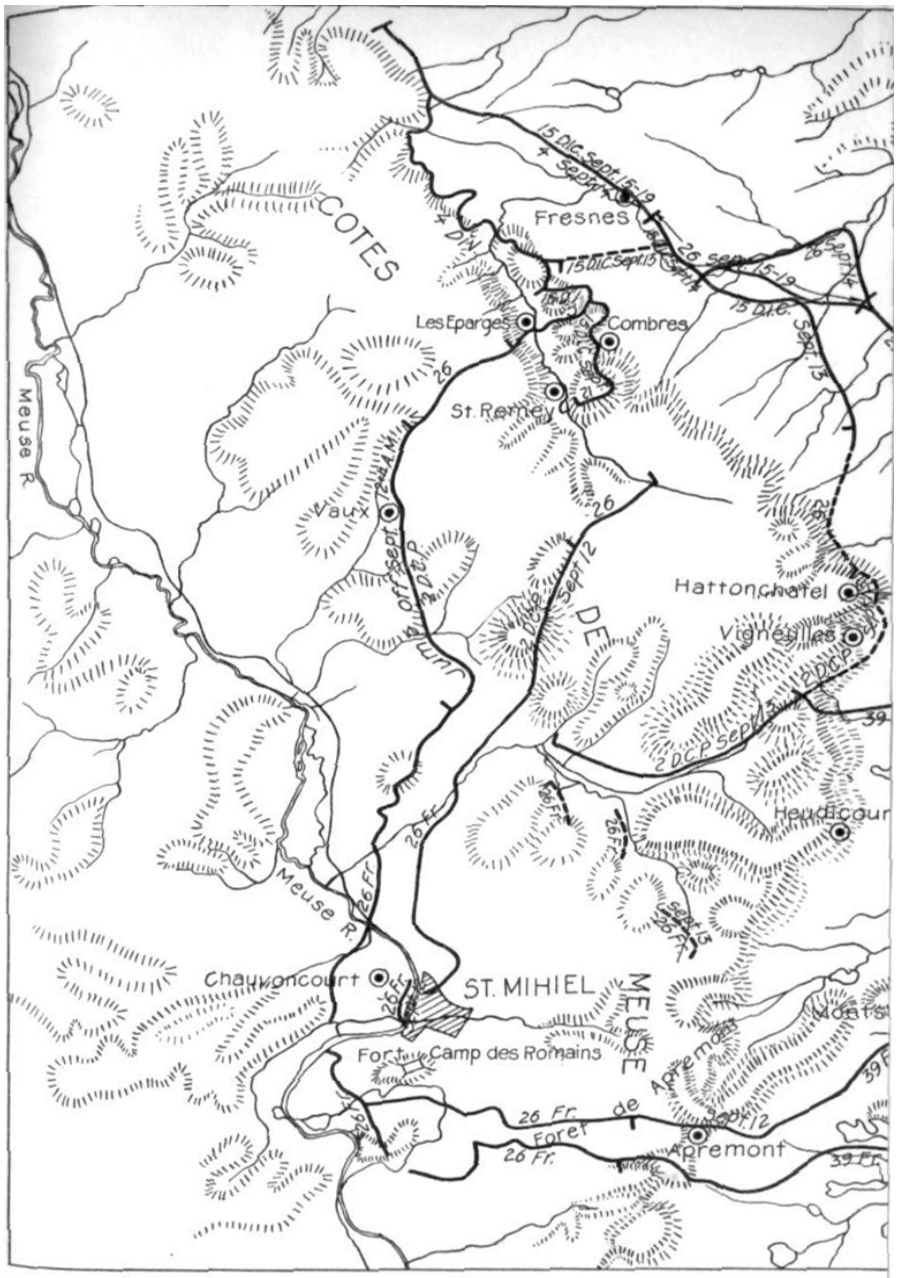
Apremont, and skirting Ft. Camp des Romains. Then veering north, it crossed the river in front of St. Mihiel to include Chauvon-court; then turning northeastward back across the river, it cut the Meuse Heights diagonally and returned to the Woëvre Plain near Les Eparges.

Unlike most convex positions, its weakness lay on the flanks between Apremont and Pont-á-Mousson, where the terrain was open and fairly level. The usual weak centre point of the convex formation, was, in this case, the extremely strong and advantageous position of Ft. Camp des Romaines, which commanded an extensive view of the American lines up and down the Meuse Valley. Pershing and Foch saw this point was practically invulnerable, and planned a double penetration on the flanks. From the American concave formation, such an attack would pinch off the salient and capture all within it.

The enemy had two observation points on the east of the Cotes de Meuse, one was Hattonchatel Church Tower, commanding the Woëvre



Plain; the other was Montsec, an isolated hill rising out of the Plain and dominating the whole of it by observation posts reached by inside tunnels, from which all movements to the south could be seen. This latter post could not be taken directly, as it was honeycombed with machine-gun pill-boxes and other fortifications. It was planned to neutralize the Montsec observation by smoke, and deluge it with artillery fire till the troops had passed it and taken it

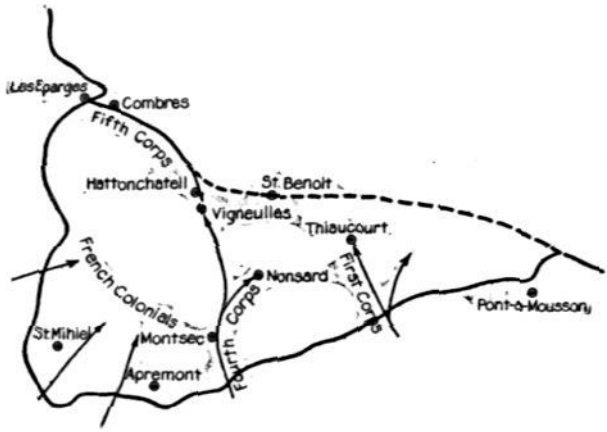


——— Front lines as of Midnight at the and of the day indicated

– – – – Front lines of which there is some doubt

Fr.=French D.I.C = French Colonial Division

by envelopment. An accompanying sketch shows the location of the opposing commanders and their forces. The second sketch shows the line of attack and the objectives reached by the different army corps. Later on in this paper I shall take the two divisions which bore the brunt of the action and advanced farthest, to illustrate more in detail how the movement of penetration was followed through.



There were engaged 216,000 American and 48,000 French, although some writers estimate the French strength at 70,000—that number probably being air forces, tanks and reserves as well as active troops. The American reserves numbered 190,000, which, with British bombing squadrons and our own air force—the largest aerial combination in one operation up to that time, bring the active and reserve allied forces to about 600,000. The German force consisted of eight divisions in line and four in reserve.

Despite all efforts to the contrary, the Germans expected the attack, and early in September had begun the withdrawal of their heavy guns. Plans for total evacuation were going forward, but General Pershing's attack forestalled this action by Ludendorff. Treating the engagement in a general manner at first, it suffices to outline the attack as a whole.

On September 12th, at 5 A.M., the First and Fourth Corps attacked; at 8 A.M. the Fifth swept forward. This advance took place only after an artillery preparation on a gigantic scale, beginning at 1 A.M., in which about one million rounds were fired and in which the largest air force yet used was employed for observation and combat. The American divisions advanced in successive waves under a perfectly managed, rolling barrage, which gave the troops splendid protection and a feeling of constant support, falling on the demoralized enemy in the fog. The First Corps quickly took Thiaucourt, while the Fourth on the left reached Nonsard after enveloping Montsec, suffering a heavy fire from its pill boxes in passing, but soon cutting off and subduing the enemy therein. On the other side, the Fifth Corps carried the ridges and Eparges and Combres,

repulsed a counter-attack, and joined the patrols of the Fourth Corps (Twenty-sixth Division meeting First Division) at dawn on the 13th at Vigneulles and Hattonchatel, about eighteen kilometres northeast of St. Mihiel. At the tip of the salient the French Colonials gradually swept in, and with their infantry and cavalry cleaned up the Germans caught in the trap and, at the same time, protected the flank of the Twenty-sixth Division. On the evening of the 13th, the line ran like the dotted line on the second sketch, and on the 14th the salient had been obliterated; the enemy fell back to the so-called Michael Line, which had been prepared for such an emergency, and took up permanent position there.

To show in detail the problems confronting the American forces and the manner in which they were successfully met, I shall follow through the advance of the Twenty-sixth and First Divisions, which served, respectively, as the cutting edges for the Fifth and Fourth Corps.

The Twenty-sixth Division was placed, as can be seen by the sketch, with the 2nd French Dismounted Cavalry Division on its right and the 15th French Colonial Infantry Division on its left. Artillery was everywhere, the 75's and 155's in new positions since the Germans had their old emplacements registered. Three regiments formed the line of attack, each assaulting battalion being accompanied by a machine gun company and by Stokes' mortar and 37-mm. gun platoons, by a section of smoke and thermite troops, by one-half a company of engineers, and by a section of 75-mm. guns. Each of these battalions was, therefore, a complete offensive unit in itself, competent to cope with the resistance of machine-gun nests and any other small fortified places in its way.

A large and supplemented artillery force cut five gaps in the enemy wire with great efficiency. Through these openings, the Twenty-sixth advanced under a barrage which jumped 100 metres every four minutes, gaining one kilometre before resistance was met. The Germans retired down the Grand Trenchée de Calonne to their second line trenches, where our 101st Regiment was held up for a while. Pushing on through the fog and drizzle, the Vaux-St. Remy Road was reached on scheduled time (10:15 A.M.). Under the cover of the halted barrage, the troops stopped for a half hour to reorganize. There had been short halts before of ten minutes (5 A.M. and 7 A.M.), to rest the men and permit sound ranging, new reserve guns joining in the fire at each of them. At 10 A.M. the 104th Regiment lost touch with the French, exposing that flank, but no disaster came of it. By 7 P.M. the 52nd Brigade gained its objective at the edge of the Plain. It was now a race between the Twenty-sixth and First Divisions with Vigneulles as the goal, the former winning by reaching that place by 2 A.M. on the 13th,

MONTSEC. A STREET IN NO-MAN'S-LAND
Drawn by Captain J. André Smith.

THE TANKS AT SEICHPREY
Drawn by Captain Harvey Dunn.

whereas the later did not arrive till 9 o'clock. Guards were thrown across the Grand Trenchée de Calonne (road leading through Hattonchatel to the German rear) to stop escaping prisoners, but many percolated through the lines. Artillery movement was delayed till a road was constructed across No Man's Land, permitting a few pieces to get over on the 12th and all three of the artillery regiments (101st, 102nd, and 77th) to take up their advanced positions on the next day. The Division captured thirty-five officers and twenty-two hundred men.

A still more difficult situation confronted the First Division in its advance. On the forward slopes of the hills facing the Division, the Germans held a succession of deep trenches and concrete machine-gun pill boxes protected by great masses of wire all along the front. On the reverse slopes deep galleries provided shelter for supporting garrisons. From the point where the hills joined the southern boundary of the Woëvre Plain, westward to the Moselle, the line passed through low marshy lakes, across deep gullies and through thick woods. All this terrain was commanded by the butte of Montsec.

It was required of the First Division, not only to overcome the enemy, but also to move with its left flank exposed; and to protect not only that flank, but that of the whole advance on the southern face of the salient. Thus the advance of the Division exposed its flank to Montsec, which stood threatening on its left. There was heavy wire and several lines of trenches about Nonsard, in front of which was the Madine River of considerable depth and with steep banks. This position, which was beyond range of the first American gun position, was mined and protected by several batteries. Between the American and German lines was the Rupt-de-Mad creek, reported as unfordable and well commanded by enemy machine guns and observation.

It was planned, since the artillery could not damage the wire enough in the four hours allotted for the preparatory bombardment, to have the advancing infantry platoons accompanied by engineers specially equipped to destroy wire. To protect the wire cutters, automatic riflemen were to accompany them. Other details were to carry Bengalore tubes to blow lanes in the wire, in case it could not be cut. A third detachment was to carry bridge parts to span the Rupt-de-Mad. The First Engineer Regiment was to prepare a way for the advance of tanks and artillery. In the attack, the 18th Infantry Regiment was designated to protect the left flank—a mission ultimately employing the entire First Brigade, of which it was part. Accompanying the leading battalions were 37-mm. and Stokes' Mortar sections, and the guns of the 6th and 7th Artillery were ordered to follow the assault closely. The divisional artillery was

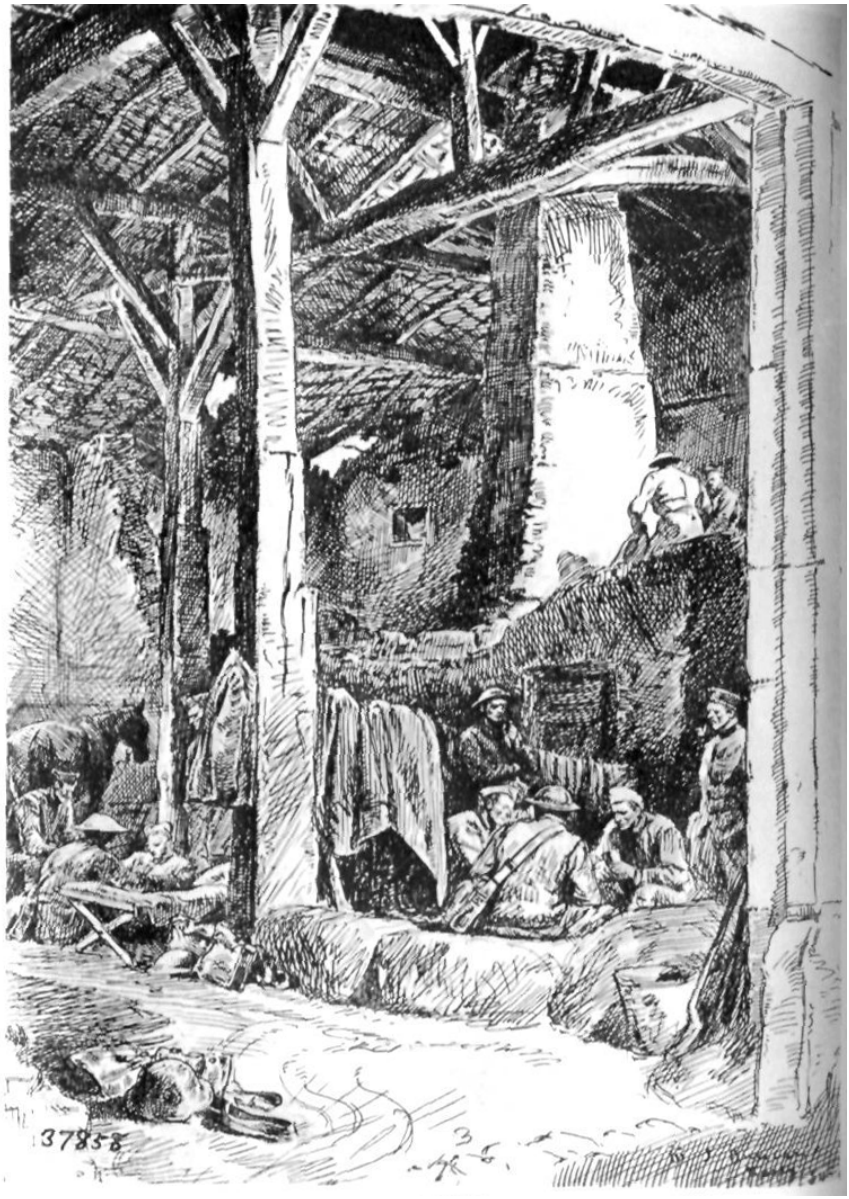
supplemented by four artillery regiments and one battalion of eight-inch howitzers of the 42nd Coast Artillery. A battalion of forty-nine tanks from the 1st Tank Brigade took part, five of which were to move forward with the infantry to the Rupt-de-Mad to break lines in the wire and fire on the machine guns on the opposite bank. The rest were to cross the stream behind the French lines on the left, proceed along the north bank, and then to swing in line with the infantry advance—their special mission being to cut the wire and to silence the enemy machine guns on the edge of the Joli Bois and the Bois-de-Rat. The 8th Aero Squadron and the 9th Balloon Company assisted the movement.

That secrecy might be kept, the preliminary preparations were made behind the wide screen of the 89th Division. The First Engineers cut gaps in the American wire to permit egress from our lines, the space between the gap being marked by white tape to guide the infantry in the dark. The overflow of the lake at Bouconville into the Rupt, was dammed to lower the water level of that stream and thus facilitate the passage of troops.

At 1 A.M. on the 12th the general bombardment was turned loose. In this sector every known battery or machine-gun position was sprayed with gas shells by at least two heavy guns. Shells were concentrated on all enemy works. At 5 A.M. the 75's took up a rolling barrage of 100 metres every four minutes, which the infantry followed in perfect formation. Montsec was the target of eight-inch howitzers, and one battery of 75's, firing smoke shell to prevent observation from its heights. The American air force spotted the enemy guns yet unsilenced, giving the data necessary to put them out of action. The efficiency of the enemy artillery on our infantry was thereby greatly lessened.

By 5:30 A.M. the first objective, the southern bank of the Rupt, was reached. The barrage was then turned on the German trenches for twenty minutes to cover the crossing of the stream. In still unbroken formation the troops then attained their second goal, a line north of the old German trench system, as scheduled; and there halted to reform under cover of the barrage, which in its turn stopped advancing. Next came the assault of the German strong point, a line from east to west along the edge of the Bois-de-Rat, where he was very strongly placed and protected by excellent machine-gun nests and mazes of wire newly attached to the trees. With the tanks rendering valuable aid, the position was charged and taken. Meanwhile the 18th Infantry swung around to protect the flank, and by 11 A.M. the artillery had advanced in echelons and had taken position so as to cover further infantry advance. Working smoothly, the sanitary system was getting all wounded back to field hospitals.

ON THE TRAIL OF THE GERMANS IN THE ST. MIHIEL DRIVE



A QUIET GAME IN ESSEY
September 15, 1918. Drawn by Captain H. J. Duncan.

At 11 A.M. came the advance on the third objective, positions of the enemy which were partially prepared, running through La March and Nonsard to the Bois de Gargantua. Crossing the Madine River, this line was carried by 12:20 P.M., and here the troops dug in and organized in depth, to keep the ground gained. At 1:35 P.M. the advance again began, and by 5:20 the 2nd Cavalry Squadron had advanced along the Nonsard-Heudicourt-Vigneulles road, their purpose being to gather in any fugitives of whom they caught a few. The light artillery was brought up to cover the advance. At 5:45 the advance again commenced, and by 7:45 the Decauville road was taken, through the Bois de Vigneulles and Bois de Nonsard. At 10 P.M. the Vigneulles-St. Benoit road was taken, and the new line was extended north to the Bois de la Belle Oziere.

The march through the dense woods was by compass only. Line formations were impossible, single file up to the objective being used. On the 13th at 3:15 A.M. the work was again resumed, and at 7:15 a scout platoon reached Hattonchatel, where it came in contact with troops of the 26th Division. At 9 o'clock the 26th was again met at Vigneulles. During this morning the French Colonials moved up to Vigneulles, cleaning up the salient as they came.

The First Division advanced 14 kilometres in nineteen hours over marshy country, extremely irregular terrain, and through thick woods strongly fortified by the enemy during their four years of occupation. Five officers, 1190 men, 30 field guns, and fifty machine guns were captured, with a loss of 13 officers and 531 men.

The salient taken, the Germans feared for the safety of the Briey iron fields just northeast; which, in turn, led to misjudgment on their part as to where the next American attack would fall. Ludendorff was anticipating an attack to the east of the Meuse within a fortnight, and moved his reserves to protect the Briey sector, but Pershing closed in to the west of the river and caught him without reserves.

In criticism it can be said that an American force, working together as a unit for the first time, successfully attained its objective by the principles of modern warfare as planned by our military experts. Perfect coöperation between the infantry and artillery was attained, securing a maximum degree of fire and attack efficiency. Our army, though still comparatively green, showed it was a real fighting force. The line of supply did break down, but this was to be expected under conditions in which a new unit was operating—and had no serious consequences. The Americans showed Foch their ability and worth as a national force and convinced him of the wisdom of maintaining the American arms as a fighting unit coördinate with those of the other allies.

In all about 17,000 prisoners, 446 guns, and vast stores of arms, ammunition, and military supplies were captured. About 175 square miles of territory and 70 villages were taken.

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IN THE SERVICE OF THE PIECE

BY MARTIN GALE

To Corporal Kelley life was a simple matter. He bothered not with isms or complexes, with economics or ologies. He might have defined his beliefs in Service's words:

> "For I hold with a simple faith there's no denying
> A soldier's life is the only life worth trying,
> And a soldier's death the only death worth dying."

Neither the World War nor the following years had ever upset that faith. To Kelley his regiment was the best in the army, his battery best in the regiment, and his gun a lady to whom he gave an undivided allegiance. Let others find joy in women and wine, Kelley spent his time and money on his sleek, brown mistress. Every day he devoted at least an extra hour to her care—polishing, oiling or burnishing. And she was varnished as often as he could get permission. His squad learned to keep unsaid their objections to overtime labor, for Kelley possessed a hard fist; in time they began to share his pride and boast of their 75—a healthy frame of mind.

When the Horse Show came around of course Battery A had an entry. The horses were chosen from another section, but it was a foregone conclusion that Kelley's gun would go in the ring. Competition was keen that year, the horses were evenly matched, and after the judging was over, while Battery A's victorious section was parading the ring, the battery commander called Kelley to him.

"Kelley," he said, "Major Durmil tells me that our horses and harness broke even with C's, and that we won on the condition of our gun. Fine work you did, and we owe our win to you."

Kelley turned pink with pleasure. "Thank you, Sir. She's a good gun. I'm glad she won."

"So am I. And to show you how glad I am, I'm going to give you a fifteen-day furlough. If you need money, I'll lend you twenty."

The colonel approved—he had seen the show—so Kelley departed toward the city for two weeks of pleasure. Three days later a familiar figure entered the orderly room.

"Kelley!" cried the battery commander. "You back! You have twelve days to go. Did you run out of money?"

Kelley smiled sheepishly. "No, Sir, but I got to thinking about Private Bowler taking care of my piece and I know he won't do what I want, so—so I thought I'd better come back and do it myself."

In the spring Sergeant Kelso of the first section unexpectedly fell heir to a chicken ranch and bought out. On the day he left the captain called Kelley into the office.

"Corporal," said he, "I've been watching your work. There's no man in the battery who deserves a promotion more. I'm going to put this in today." He handed Kelley a letter and the corporal read: "To be sergeant, Corporal John Kelley, vice Kelso discharged. To be corporal, Private Bowler, vice Kelley promoted." He held the letter a moment while he thought it out.

"Thank you, Sir. Does that mean I get the first section?"

"Yes, you'll take the first. I'm not going to shift section chiefs. Bower'll take your place."

"With the captain's permission, I'll stay where I am. I'd rather be on my gun than first sergeant, and Bowler don't know how to take care of her like I do."

Summer brought a trip to the range and service practice. Here Kelley's extra work gave to him and the section a rich reward. There was no more even-shooting gun in the regiment and no crew so fast or so accurate. They could lay to a fraction of a mil, and the deflection never varied. The colonel himself complimented the section on their shooting.

They were firing shell when the accident occurred. Under the safety regulations the gun crews are required to take cover behind sand-bag emplacements as each shot is fired. All of Kelley's crew were under cover when the command "Fire" was given. Number one pulled the long lanyard. Nothing happened. He pulled again with the same result. Unthinkingly Kelley sprang out from behind the sand bags to see what was wrong with his pet. Just then there was a sound like a heavy thud; the gun was torn apart, vomiting pieces of steel that fell like rain for yards around. Kelley collapsed on the ground. When the executive and his chief of section reached him his breast was covered with blood, but he had strength enough to sit up in the sergeant's arms.

"Lieutenant," he muttered, "it wasn't her fault. It was that damn shell. She wouldn't do a thing like that."

INSTRUCTIONS TO A RESERVE CAPTAIN ON WHAT TO DO TO ORGANIZE A NEW BATTERY FROM DRAFT PERSONNEL

BY MAJOR JOHN E. SLOAN, F.A.

INTRODUCTORY NOTE: This study is based upon two and one-half years' experience with the Organized Reserves as a field artillery executive and as a division staff officer. In order to present a complete picture, it is brought forward in a narrative form from 1921, when our Organized Reserves were first being organized. An effort has been made to present conditions from a practical point of view as they actually exist, or will exist. For this purpose an average piece of America has been selected—not a densely populated district nor a sparsely settled territory. Where applicable, Army Regulations 135-10, 140-5, 140-10, 140-15 and 140-20 have been used as references; at the date of writing, the new regulations for the Enlisted Reserve Corps have not been received, so Special Regulations No. 48, 1921, had to be used.

* * * * * * *

After having been for some two years the more or less proud possessor of a commission as First Lieutenant, Field Artillery Officers' Reserve Corps, Lieutenant Jack R. Walker, promising young attorney of Knoxtown, received on November 15, 1921, a very bulky and impressive looking official communication. Upon operating it, it was found to live up to its bulkiness, but its impressiveness was sadly decreased by its length and the character of the mimeographing. However, he waded through it and found the gist of it to be that under the provisions of the amended National Defense Act of 1920, the 811th Division (the Catamount) had been allocated to his state and the one adjoining it on the east; that Knoxtown had been designated as division headquarters; that a group of regular army officers had been assigned to duty at division headquarters with instructions to organize the division; that they were anxious for his coöperation in this matter and would appreciate a call from him; and that he, personally, had been assigned to Battery "B," 1317th Field Artillery (75-mm. horse-drawn).

Walker had graduated from the law school of his state university in 1915. He was a believer in preparedness and joined the local national guard field artillery shortly after his graduation. He accompanied it to the Border and upon declaration of war with Germany, he applied to be sent to an officers' training camp; his application was approved. He did not stand as high at the camp as

he would have liked, but graduated and was appointed second lieutenant. He was later assigned to a regiment, not his old one; he was sent to the War Course at Fort Sill and later went overseas with his regiment, getting into the last engagements of 1918. Just before the Armistice he was promoted first lieutenant and discharged on April 16, 1919. Since that date, he had been hard at work getting his law practice reëstablished and incidentally had taken on family responsibilities during this same period, so that he had additional demands made on his available time. Many times he had felt that he wanted to go back into the Guard, but he did not feel that he could spare the time that he knew it would require; still he believed that national defense is a responsibility of every citizen and he was anxious to do something definite to promote it. His reserve commission appeared to be a rather indefinite proposition; he had held it for over two years and had not been called on to do a single thing.

This was the state of his mind on November 15, 1921, when he started reading the initial communication from the Headquarters, 811th Division. After he had finished reading it, he became more hopeful, and at the first opportunity he called at division headquarters where he found the staff most cordial and fixed up in offices very much like any other business concern. This was quite a contrast to the division headquarters of 1917–18. Everyone was courteous, anxious to serve and appreciative; there was no indication of the intensive, nerve-racking, war-time schedule by which our Country was attempting to build up an army of four million men in almost as few months; everything appeared to be going along in just a normal, business-like manner. The civilian clothes of both officers and men gave no indication of the military; the occasional "Sergeant, bring me the 201 file of Lieutenant Joseph A. King," or, "The Colonel is wanted on the 'phone," were the only indications that this was the headquarters of a division of the United States Army.

Walker rather liked it; he became a frequent caller and soon numbered all the staff from the chief down as personal friends; he met other reserve officers there and a division esprit began to grow.

In so far as Battery "B" was concerned he learned the following:

(1) That he was the senior officer assigned to it and, by virtue of his seniority, that he was battery commander.

(2) That the other officers assigned were:

First Lieutenant James A. Jenkins, an officer who had served through the World War as a second lieutenant and, upon discharge, had been given a commission as a first lieutenant in the Reserve Corps; he was forty-two years old; his record indicated lack of initiative and interest—not a very promising officer.

Second Lieutenant Thomas J. White, who had gone to France

with his national guard regiment as a sergeant and had won his commission over there after attending one of the artillery schools. His record showed him to be a young officer of considerable initiative and leadership ability as well as of considerable artillery experience.

Second Lieutenant Joe T. Turner, who was a candidate at the Field Artillery Central Officers' Training School on the date of the signing of the Armistice; he stayed until he had completed the course and obtained his commission. He was specially recommended for horsemanship and reconnaissance.

(3) That the colonel of the regiment was Colonel Frank T. Jones, 705 Peach Street, Nashburg, and that his battalion commander was Major Wade F. Watson, 1001 Forest Street, Morganville.

(4) That no regular field artillery officer had been assigned as executive but that one was expected about February first.

The chief of staff had suggested to him that he get in touch with his colonel, his battalion commander and the officers of his battery, but that he go slow on any definite plans for his battery until the arrival of the executive. He was given copies of the regulations for the Officers' Reserve Corps, for the Enlisted Reserve Corps and General Policies and Regulations for the Organized Reserves and told him that he might begin to look around and size up some prospects for enlistment in his battery, as he would eventually be authorized to enlist:

One first sergeant.

Ten sergeants (supply, mess, stable, instrument, signal, and five chiefs of section).

One corporal (battery clerk).

Five privates (chief mechanic, two cooks, horseshoer, saddler).

On one of his visits, the G-1 had let him know that there was quite a shortage of qualified field artillery captains in the Reserve Corps and that, counting his war service, he now had in sufficient service to make him eligible to apply for examination for promotion.

Like hundreds of other enthusiastic reserve officers, Walker took all this good news home to young wife and baby; needless to say it was received just as it had been received by hundreds of other young wives, in whose minds those long, lonesome days of 1917–18, with only an occasional censored letter, Red Cross work and Liberty Loan Drives to keep up their spirits, were still fresh memories. Anything connected with the army, or war, brought up the same old horrors in Mrs. Walker's mind. It took Walker some time to convince her that the American Army is not a war-making body, but a lot of peaceable citizens who have bonded themselves together in an organization to maintain peace and to preserve law and

order—only going to war as a last resort, and then with the idea of making it just as short and merciful as possible. He finally gained her passive approval when he carefully explained the responsibilities of every individual to the Nation: that the Nation, if it is to exist as such, must provide a National Defense and hence each individual should bear his share of the burden if he is worthy of the name of citizen; that he had gained valuable experience and training in the recent war and that he owed it to the younger men, who would fight the next war, that his experiences and training should not be lost, but should be passed on to them through the Organized Reserve. He finished up with the statement that the fact that we had a Regular Army and a National Guard backed up by an efficient Organized Reserve, would do more than any other one thing to keep us out of war.

Later, Mrs. Walker attended a dinner, with Walker, given by the local Reserve Officers' Association. The local regulars and their wives were guests; a few short after-dinner talks were made, but the best part about it was that everybody got to meet everybody else and to talk things over. Mrs. Walker began to realize that the other wives were taking pride in what their husbands were doing in the Reserves; in the fact that their vision was broad enough to see beyond the local horizon, and the winning of Mrs. Walker was concluded when Walker was called on for a few remarks from the Field Artillery.

The field artillery executive arrived on February 1st. Walker dropped in at the first opportunity; the families exchanged calls and soon became good friends. The Correspondence School Courses were initiated; Walker not only enrolled but also encouraged the officers of his battery to do so; all except Jenkins did. They all did well and by May 1st, Walker felt that he was ready to tackle his promotion examination. He passed, and after a short delay was promoted to captain and reassigned to Battery "B."

About this time, the executive notified him that he was authorized to accept enlistments for his battery in the grades which the chief of staff had previously given him. All of his men were to come from Nox and the five adjoining counties. Walker had been looking around for prospects, but had met with very little encouragement—all the men whom he thought qualified for enlistment, wanted to be officers. His other officers had been assisting him with similar results. Jenkins, however, had done very little and continued to show a general lack of interest.

By the end of the year, Walker had enlisted five men: a prospective first sergeant who had served as a battalion sergeant major during the war; a signal sergeant, a local telephone man who had a good record in France; one chief of section who had served as

such in the Regular Army; one corporal, battery clerk; and one horseshoer.

The battery had begun to take on a definite form when, on January 15, 1923, Walker received the instructions and the necessary blank forms to prepare the sub-unit mobilization plans for his battery. With the assistance of his other officers, Jenkins still failing to coöperate or to show interest, he studied the instructions and regulations on the subject and started the preliminary work of preparing the plans. The plans with a few minor changes were approved as follows:

Organization: Battery "B," 1317th Field Artillery.

Authorized strength: Officers 4, enlisted men 136, animals 142.

Rendezvous Point: County Courthouse, Noxtown.

Mobilization Point: Noxtown.

Quarters: Until equipment arrives, men residing in Noxtown will be permitted to sleep at home; other men will be quartered in the City Hotel (at a cost of 75 cents per day per man)—owner, J. P. Clark, 2060 Main street.

Battery office in the same building. One room will be supplied for this purpose at 50 cents per day.

After arrival of equipment, entire battery and office will be quartered in the Nox County Fair Ground buildings, rental no cost—owned by Nox County; water rental $10.00 per month, flat rate; electric current for lighting purposes, 5 cents per kilowatt hour. Both water and current supplied by the Nox Power and Light Company.

Rations: Until arrival of equipment, all men will be rationed in the Busy Bee Restaurant at 85 cents per man per day—owner, Oscar White, 2052 Main Street.

After the arrival of equipment, rolling kitchen will be established at Fair Grounds and a battery mess started.

Medical Service and Hospitalization: Dr. Jack Ford, City Sanitary Inspector, will make the contagious disease examination on M day without charge; after that reserve medical personnel will be available from division headquarters.

Space available in wards of Nox City Hospital at $1.50 per man per day for hospitalization.

Stable space: Sufficient available in County Fair Grounds.

Gun sheds and storage space: Sufficient available in County Fair Grounds.

Drill areas: Sufficient for battery manœuvres in the County Fair Grounds, but no area suitable or available for artillery firing. Pistol and machine-gun practice can be held on the national guard rifle range five miles northwest of the city. After the departure of the

national guard units, this site will be taken over by reserve infantry units.

Agent Finance Officer: Captain Jack R. Walker, F. A. Reserve.

Animals: Sufficient mounts, draft horses and mules for training purposes can be obtained upon ten days notice from the Empire Feed and Sales Stable at $1.00 per animal per day, without feed—$1.50 per day with feed; owner, Charles L. Wilson, 2122 Hill Avenue.

Veterinary service: Dr. Tom Smith, 201 Moss Street, at 50 cents per visit per animal.

Local supplies: Ration articles, subsistence stores, fuel, forage and regular supplies can be obtained by local purchase upon short notice in sufficient quantities at the prevailing market prices.

Drayage and hauling: The Hancock Transfer Co., 102 North Street; owner, James T. Hancock; rates, $5.00 per two-ton truck load, or one cent per pound for a minimum load of 100 pounds.

Clothing altered: Charles T. Rinehardt, 223 Jackson Avenue; sleeves shortened, 50 cents; collar alterations, 75 cents; blouse cut down, $1.50; breeches cut down, $1.00; breeches waist cut down or extended, 50 cents.

Shoes repaired: Joe C. Smith, 561 Jackson Avenue; half sole tacked, 50 cents; half sole sewed, $1.00; full sole, $1.50.

Training program: Herewith attached, covering a period of twelve weeks (omitted from this article).

This plan has been coördinated with the other sub-unit plans of organizations scheduled for local mobilization in the same priority as Battery "B," and no conflicts appear to exist.

(Signed) JACK R. WALKER,
Captain, F. A. Reserves.

During the summer of 1923, Walker and Turner both attended the fifteen-day training; White could not get away from his work at this season of the year—he was anxious to go, but could not afford to give up his job, so he was excused. Jenkins did not reply to the questionnaire sent him from division headquarters, in fact, it was unusual for him to reply to official correspondence. This neglect was noted on his record for future reference without any other action at this time.

While at camp, Walker and Turner took full advantage of the training and thoroughly enjoyed it. They met a great many other officers of the division and exchanged experiences and ideas with them. They also visited the C.M.T.C. and the R.O.T.C. Camp, which were being held at the same time and place.

At both these camps they kept their eyes open, sized up the young men, talked to the instructors, and before they left they had

five good prospects lined up for enlistment in the battery just as soon as the consent of the parents could be obtained.

In addition, Walker had met second Lieutenant Roy T. Rice, F. A. Reserves, a R.O.T.C. graduate, 1923, who was an instructor in the C.M.T.C.—an engineering graduate who had all the earmarks of a promising young officer. He had not received his assignment yet, but understood that he would be available for assignment to the "Catamounts."

That evening, Walker dropped in to see the executive of his regiment, who was one of the instructors in the organized reserve camp, and told him about Rice. He inquired if there was not some way that he could get rid of Jenkins, get White promoted to first lieutenant, and get Rice in the vacancy as second lieutenant. The executive, after a short search of his records, saw that Jenkins' record was below average, and also that his commission expired January 22, 1924; that White's record was good, that he had completed five subcourses of correspondence school work and that he had otherwise shown interest and that, from length of service, he was at present eligible for examination for promotion. He had no record of Rice as he had not been assigned to the regiment. The executive told Walker that he would have Jenkins relieved; that it would be necessary for White to apply for examination for promotion; that his application would be approved, and that a letter would be written requesting the assignment of Rice.

Before the end of September, Jenkins had been transferred, White promoted, Rice assigned to the battery and four of the five C.M.T.C. prospects enlisted, all as sergeants (chiefs of section).

The newspapers were beginning to carry articles that indicated a possible national emergency; the regulars and national guardsmen were not saying much. The activities around division headquarters were considerably increased; the regular officers' families had quietly disappeared; senior reserve officers were called to division headquarters for a conference; a member of the corps area commander's staff was present; nothing was given out.

Walker was sensible and asked no questions, but took it all in; he got his officers together one evening and talked things over with them. He told them that, judging from all indications, his opinion was that something serious was going to break loose very shortly and that he was going to begin to shape up his personal affairs so that they could be left on short notice. He did not believe that the regulars and National Guard could handle the situation and that the Reserves would probably be mobilized.

Things began to happen fast; on November 16th the regular army was ordered recruited up to full strength, and the inactive units re-constituted; on November 20th, the Congress declared that

a national emergency existed and authorized the President to use the necessary naval and military forces as he saw fit; he was also authorized to put in effect the Selective Service Law.

On November 22, the National Guard was called and later drafted into the Federal Service. On December 26th, the selective service boards began operating. On January 5th, Captain Walker received the following letter:

Confidential.

From: The Chief of Staff, 811th Division.

Subject: Mobilization Warning Orders.

1. You are informed that it is anticipated that the President will order this division mobilized at war strength in the near future.

2. You will immediately take steps to verify your sub-unit mobilization plans and to bring them up to date.

3. It is probable that some of your officers and men will be ordered to schools before M day. You will warn them of this fact.

4. The ration value for mobilization purposes is announced as 35 cents. You will be authorized to expend three times this amount per ration until such time as you can establish your organization mess.

5. All volunteer enlistments were stopped on December 26, 1923.

6. You will inform this office of any special developments of interest from a military point of view in your locality.

7. You will inform all of your officers of the contents of this communication and of your mobilization plans; you will inform your enlisted personnel of the parts that pertain to them.

(Signed) JOEL M. MILLER,
Colonel, Infantry.

On January 15th, Captain Walker and First Lieutenant White were ordered to active duty and to the ten weeks, battery officers' course at the replacement centre at Fort London. The names of enlisted men recommended to take the following specialist courses were also called for:

1 Instrument Sergeant,
1 Signal Sergeant,
1 Supply Sergeant,
1 Stable Sergeant,
1 Mess Sergeant,
1 Battery Clerk,
1 Mechanic,
1 Horseshoer,
1 Saddler.

There was no one available for the mechanics or saddlers' courses, but men were recommended for all the others. They were

ordered to active duty on January 25th and to the school for specialists.

Walker and White finished their courses the latter part of April and were returned home. In the meantime all the enlisted men of the battery had completed their courses and had been returned. As soon as Walker got back, he started night classes for the two officers who did not get to the school and also for the enlisted men. He also got in touch with the local draft board and looked over the registration lists for possibilities for his battery. He was especially anxious to get some good material for mechanics, a saddler, cooks and as many men as possible who had had some experience with horses. The chairman of the board told him that, of course, he could not pick his men, but that when the time came to fill up Battery "B" he would coöperate in every way possible. This was all that Walker wanted, for he knew that where there is a will, the way can be found.

On May 5th, the expected telegram came:

"M day, 811th Division, 12:01 A.M., 7 May, 1924."

Within an hour every officer and man of Battery "B" had been notified to report to the rendezvous point at 8:00 A.M., May 7th. The city sanitary inspector was notified, and requested to be present at that time, to make the preliminary physical examination for contagious diseases. The hotel keeper and the restaurant operator were notified as to the number of men expected.

The hotel keeper informed Captain Walker that a box had already been received addressed to him. It proved to be a battery field desk with three months supply of blank forms, a file of Training Regulations, Army Regulations, Manual for Courts-martial, etc. The next day two bulky envelopes were received, one for the Agent Finance Officer with instructions and blank forms and one with blank forms and instructions for property accounting and receiving the initial equipment, tables of allowances, etc. The finance instructions were practically those contained in A.R.'s 135–10 and 35–320; the supply instructions, in addition to those contained in A.R.'s 135–10, 35–6520 and 35–6560, contained in substance the following:

A supply point had been established in the warehouse section of North Noxton. All supply departments and the Finance Department would have representatives at the supply point who would be charged with the responsibility of providing for the requirements of all units mobilized in that locality. The initial individual and organizational equipment and clothing was to be supplied automatically without requisition, in quantities given in the Tables of Basic Allowances for war strength organizations, with the exception that artillery vehicles, guns and harness were to be reduced 50 per cent. where more than one vehicle of a type was supplied an organization.

(*a*) The clothing (less shoes) to be supplied not later than M plus ten days; woolen coats, breeches and cotton underwear to be supplied; clothing to be issued according to size tariffs; alterations to be made locally; shoes to be shipped promptly upon receipt of list of sizes required; sizes to be determined as prescribed in A.R. 850–125; a set of try-on shoes to be shipped with clothing. These shoes will be issued when no longer required for try-on purposes.

(*b*) Individual and organization equipment, except artillery vehicles, guns and harness, to arrive not later than M plus fifteen days.

(*c*) Artillery vehicles, guns and harness (50 per cent. war strength allowance) to arrive not later than M plus twenty days.

(*d*) Authority for local purchase of ration articles, subsistence, fuel, forage and other expendable supplies in such quantities as may be required, up to and including M plus twenty days, is authorized. After that date, local purchases will be authorized only in individual cases, for such items as the Supply Point cannot furnish. The approval of the division commander will be required in all such cases.

(*e*) It is anticipated that the first part of draft quotas will arrive on M plus five days, and that the quotas will be completed by M plus fifteen days.

After reading through the above instructions, Walker decided that his work was laid out for him. He got his officers together on the evening of May 6th, ran through the instructions with them and assigned them tasks as follows:

White—to have charge of getting the quarters and storeroom ready, checking and receiving all supplies. To be assisted by the supply sergeant, the instrument sergeant and the signal sergeant.

Turner—to have charge of getting the stables, sheds and drill grounds ready. To be assisted by the stable sergeant and the horseshoer.

Rice—to have charge of getting the mess ready, checking meals at the restaurant and the quarters in the hotel. To be assisted by the mess sergeant.

Walker himself, assisted by the first sergeant and the battery clerk, decided to handle all financial transactions as agent officer, to initiate the administrative work of the battery and to supervise and coordinate the whole. He designated White as summary court, Turner as exchange officer, and Rice as athletic officer.

M day came; everything passed off as scheduled; by 10:00 A.M. all officers and men had reported, had been examined for contagious diseases and found free therefrom. Battery "B" was assembled in the battery office; Walker gave a short talk in which he outlined his plans and told what he expected of all members of his battery

and then he sent out the groups to look over their assignments with instructions to be prepared to give him their suggestions and recommendations at 4:00 P.M.

Walker with the assistance of the first sergeant and the battery clerk put in the remainder of the day getting his offices organized. He informed the first sergeant that he was to be his general assistant; that the clerk would be the office man, and that the first sergeant would have general supervision over him. He started the clerk to checking through the field desk and started him on the following initial records (paragraph 40, A.R. 135–10):

Morning Report (A.R. 345–400).

Sick Report (A.R. 345–415).

Initial Return (A.R. 345–55).

Initial Roster (A.R. 345–900).

It was immediately seen what a great help the training that the clerk had received at the replacement centre was going to be; he had been instructed in making out all the above forms as well as the other battery forms and individual records.

The first sergeant was told to have one man sleep in the battery office, and that either he or the clerk would be in charge of it during the day, from 7:00 A.M. to 6:30 P.M.; that for the night duty the men of the battery would be detailed by roster and for this reason the duty roster (A.R. 345–25) should be started.

During the afternoon, the captain spent most of his time checking through the following Army Regulations to see that everything was being provided for:

35–320, Agent Officers.

35–6250, Property Accountability and Responsibility.

35–6540, Requisitioning Property.

35–6560, Receipt, Shipment and Issue of Property.

35–6640, Lost, Destroyed, Damaged, or Unserviceable Property.

35–6700, Property Records.

35–6720, Blank Forms pertaining to Property Accounting.

120–10, Mobilization of Man Power for Military Purposes.

135–10, The Organized Reserves, General Principles.

210–50, Unit and Other similar Funds.

345–15, to 345–900, Military Records.

850–5, Marking of Clothing, Equipment, etc.

850–125, Fitting of Shoes and Socks.

At 4:00 P.M., all the officers joined the captain in the battery office and made their reports. After listening to their suggestions and recommendations, the captain decided upon the scheme of receiving the drafted men upon arrival, assignments to quarters, storage of supplies and equipment, establishment of a mess, issue

of individual equipment, shoe fitting, etc.; all possible details were anticipated and arranged for. He directed Rice to see the local newspapers and to request them to give all possible publicity to the fact that all men reporting should bring with them sufficient clothing to last at least ten days, as well as toilet articles. A suggested list of clothing was one good suit of outer clothing (not new), one good pair of shoes, six pairs of socks, three suits of underwear and a suit of overalls, with any other articles that the individual might feel the need of. He told White that he was going out to visit the supply point and the selective service board in the morning and that he wanted him and the first sergeant to accompany him and that later during the day he would visit the other officers at their respective scenes of activity.

The next day Walker found out from the chairman of the selective service board that the requisition for the men for Battery "B" had been received; that he could expect the Nox County quota of fifty men on the 12th, and that those coming from the other counties would follow shortly. The chairman could not give the qualifications of any of the men, except those from Nox County, which included two cooks, one saddler, three men of mechanical ability, ten men of high school education or better, ten men of grammar education or better, and the remainder, men of experience in handling horses. This line-up looked encouraging to Walker.

At the supply point, everything was on the jump, so about all that he got from his visit was the location of the various storehouses and offices. They averaged about three miles from the Fair Grounds and about one and one-half miles from his present battery office.

The next few days were spent in preparation for the reception of the drafts. The Nox County quota arrived during the morning of the 12th; a medical officer from division headquarters was present to make the physical examinations, identification records, to vaccinate and to give the first triple typhoid inoculation. The battery officers, with the assistance of the noncommissioned officers, worked on the individual records, *viz.*, service records, pay cards, individual equipment records, bunk and section assignments. The assignments to sections were made by the captain after looking over the board's qualification record and after questioning in person each man. He went on the theory that he might make some mistakes in his immediate assignments, but even so it was better to get an organization started with a nucleus for each section. In looking over the records, he selected ten of the most promising of the men who had had some C.M.T.C. or R.O.T.C. experience and made them acting corporals. He gave them a talk on the responsibilities of their appointments

and told them that their future depended upon whether or not they produced the goods in their acting capacities.

By the 16th, the battery was practically filled up, all individual records started and each day after the 13th, the men who were not actually busy assisting in the preparations to receive the supplies, equipment and animals, had been given some preliminary instruction in physical exercises, foot-drill, guard-duty, customs and courtesies of the service, and organization. Just enough was given at first to keep them occupied and interested.

On the 17th, Captain Walker started in on his twelve weeks' program of training as laid out in his mobilization plan; at the beginning of each week, he submitted a copy of his detailed schedule for the week following, to his battalion commander.

During the day, the clothing for the battery was received, sorted by sizes and prepared for issue on the 18th. This issue was made by sections. The clothing was fitted in the presence of an officer and also shoe sizes determined and recorded. Any alterations necessary in the clothing were noted and the civilian tailor, who was present, started work on them that night.

Between the 18th and the 27th, the battery equipment all arrived and also authority to hire locally, 72 draft and 20 riding horses, which were to be maintained by the battery in its stables—forage to be supplied from the supply point. The shoes for the men also arrived. Everything was carefully checked and stored as received. The individual equipment was issued to the men and entered on their individual equipment records.

By the 30th, Captain Walker had made all arrangements for starting his organization mess and for lodging all of his men in the Fair Ground buildings. He closed up his accounts with the hotel and the restaurant as of that date and submitted them to the finance officer at the supply point for payment.

Training now started in earnest; the livery stable was notified that the horses authorized should be delivered between the 5th and the 10th of the next month, that Captain Walker would pass on each one before it was accepted and that all animals must be neatly clipped and shod before delivery.

Walker supervised the training, kept it coördinated, and conducted the officers' and noncommissioned officers' school. He assigned Rice as reconnaissance officer, put him in charge of training the battery detail and in charge of the mess; White was made executive and was charged with the training of the gun sections and the quarters were put under his charge. Turner was put in charge of the mounted training and the stables. Noncommissioned officers were appointed from time to time as good material appeared and specialists made. Inspections were made both by the battalion

and regimental commanders at irregular intervals. They assisted and encouraged Walker greatly; they kept him informed of what the other batteries were doing and showed him where he could improve his methods and increase the efficiency of his unit. Numerous reports were called for by regimental headquarters; all these Walker was very careful to have in on time and accurate.

As the training progressed, tests were prescribed to determine whether or not the unit had reached its objective for the date of the test. At the end of the twelve weeks. Walker felt that he had a battery that could be depended on. At the beginning of the thirteenth week, orders were received for the concentration of the division in rear areas under control of G.H.Q. for combined training.

* * * * * * *

In the preparation of this study an effort has been made to bring out the fact that the organization of a reserve unit starts from the date of its inception, and not from "M" day; also an effort has been made to show the demands that are made upon the reserve officer's time. Due to the length, a training program was not included. A very excellent one is contained in Methods of Instruction, Nos. 4 and 5, issued by the Department of Tactics, Field Artillery School, on December 11, 1924.

THE 155-mm. HOWITZER BEHIND THE LINES

BY LIEUTENANT ROBERT H. KNAPP, F.A.

MONOTONY was one difficulty which was surely eliminated from the list of obstacles present with the training of our national army artillery soldier for the American Expeditionary Forces. The facts relative to this state of training and his knowledge of things military, upon his arrival over-seas, are very well known.

For the great majority, the artillery soldier was such rather by chance than by choice. His increased burden of guns, horses, and instruments became no burden at all, but rather another means of providing variety. No sooner than he was introduced to such unfamiliar terms, as goniometer, panoramic sight, quadrant, howitzer, etc., he was presented with an assortment of these articles, and not only that, but he was asked to be familiar with the manipulation of these objects and to know how to coördinate their use.

Many very interesting stories attending the process of transformation of farmer, mechanic and clerk into artillerymen, and the sources of supply incident to the formation of the background framework, have been smothered in a maze of statistics or hidden by interminable sums. Some of these outstanding features relative to the artillery program are presented here.

For many months prior to our entry into the war, the United States had been engaged in the supply program of the combatants. The conflict had long since become one of materials almost as much as of men. The participants had mobilized their industrial resources and had geared them to a speed believed to be impossible in peacetime. Their store of raw material had been replenished from our stock time and again, and still there were great deficiencies in supplies for their programs. Also huge orders had been placed in the United States for every sort of finished product, and a continuous stream of ammunition, supplies and food was flowing into the front lines. Just as soon as the United States became a belligerent, immediate plans were formed to mesh all of our resources with those of our allies.

In working out the details of utilization of cargo space, comparing the shipment of raw materials to that of the finished product, it was found that the solution was all in favor of the finished product shipment. Of course these finished products had to meet a very high technical requirement. Our machinery was designed for an entirely different system than what was now demanded. The big manufacturing

problem to American industry had been to reduce the cost of the finished product by means of labor-saving devices; the cost of labor was always the outstanding feature and we had foregone to some extent the niceties of manufacture so essential now in the output of guns and ammunition. The supplies now required, as catalogued by the ordnance department, comprised more than 100,000 separate and distinct noncommercial items. In order to reproduce, almost all of these items involved the drawing of special plans and the manufacture of special tools. Thousands of these items were designed and produced principally for the replacement of similar parts, heretofore produced only in France. Attention to minutiæ was therefore the prime consideration. In the translation of French plans it was necessary to stress exact measurements and rigid tolerance. The French did not know the American quantity-production methods. The French artisan sees always the finished article, and he is given discretion in the final fitting of the parts and in the assembly room, while the American mechanic sees only the part which he is a specialist in making, working to strict tolerances, and producing pieces which require little or no fitting in the assembly room.

Complete French drawings were in numerous cases nonexistent, the French practice relying for small details upon the memory of the craftsman. And even when the drawings were obtained complete, the American ordinance engineer was confronted with the choice of either revolutionizing the entire machining industry, by changing our whole system and equipment to conform to the metric system, or of transforming the French designs into terms of standard American shop practice. The latter was the process determined upon, and its accomplishment, in numerous cases, required weeks and even months of time on the part of whole staffs of experts; it involved, to a degree that surprises the layman, the making of drills, reamers, taps, dies, and other machine shop tools that would produce the results called for by the French ordnance drawings in the metric system.

Here was a colossal problem indeed, for upon the accuracy of these translations depended the extent and effectiveness of American participation as a war-time producer of ordnance. Also this determined how much of our vast industrial machinery could be utilized in the coöperative program of the Allies and the United States. American officers and engineers were familiar only in a general way, with the carefully guarded military secrets, for these had heretofore been carefully protected and hidden away in these French ordnance drawings. As soon as the United States became a belligerent, the Allies gave freely and fully of their abundant store of knowledge, plans, specifications, working models, secret devices, and complete

manufacturing processes. This, in no small way, contributed to the accuracy and speed in the accomplishment of the numerous undertakings.

Included in this baffling assortment of drawings was that of the 155-mm. Schneider howitzer. The United States bought the plans for this howitzer from Schneider and Cie., in the spring of 1917, immediately drafted measures for its reproduction and placed the specifications in the hands of our staff of ordnance experts for interpretation. In its development the French had so strengthened its structure, perfected its mechanism, and increased its range that it was now considered one of the two best known and most efficient weapons of the Allies, the other being the celebrated 75-mm. gun. To facilitate the manufacturing proposition this weapon was divided into three groups—the cannon itself, the carriage, and the recuperator or recoil system. Each group was placed in the hands of separate contractors. Many obstacles were encountered in the manufacture, for the reasons already pointed out, but finally a remedy was found for each difficulty and the first carriages were ready for testing in June, 1918, and the first recuperators were delivered early in July, 1918.

The gun-body was not nearly so strange to our manufacturers as the carriage and recuperator, and as a matter of fact the output of complete howitzers depended entirely upon the quantity of recuperators furnished. By far the most delicate part of the howitzer is this hydropneumatic recoil system. The steel required for this system was of special composition and called for special treatment. The mechanism itself has been compared to the fineness of a watch. It has few adjustments which can be made in the field, and depends entirely for its wonderful operation upon the extreme nicety of its parts. Even after the most careful preparation, certain alterations were required before the first models could be made to function. The interior of the long recuperator bores were polished to a mirror-like glaze; extreme accuracy was necessary to obtain this finish and at the same time prevent the leakage of oil past the pistons, which fit into these bores.

The various parts of this weapon were assembled into complete units and tested at the Aberdeen Proving Grounds. After being assembled and tested the whole unit was taken apart and packed into crates especially designed for shipment overseas. Each crate held two howitzer carriages with recuperators and took up less space than would have been occupied by one carriage on its wheels. None of these American made guns reached the A.E.F., due to the abrupt cessation of hostilities. The French had supplied all of our units equipped with this sort of weapon, which supply up to the time of the armistice, totaled 747 pieces. However, our quantity production

was just beginning to be realized. Of the 3120 recuperators contracted for, 898 had been finished when the armistice was signed, and this quantity was increased to 1238 one month later. In other words, we were now turning out an average of about sixteen recuperators a day.

One hundred and fifty-four carriages had been delivered when the armistice was signed, and in this department also production was moving along rapidly now, for one month later this figure had been increased to 230.

The American-built 155-mm. howitzer was practically identical with that built in France. Any of the important assemblies of the American weapon were interchangeable with those which had come from the Schneider factory. The wheels on the American carriage were equipped with rubber tires, and the shield of armor plate was straight instead of being curved, as was the French model. As thus perfected this howitzer weighs about four tons. It is extremely accurate, easily manœuvred, and is very mobile for a piece of its size. The 95-pound projectile can be hurled well over seven miles, and this repeated several times a minute. With the gun pointing upward at an angle of 42 degrees, the recoil mechanism will restore it into battery in less than five seconds. The carriage is built of pressed steel parts that incorporate many ingenious features which are designed to withstand use and reduce the weight. It is extremely light, rugged and well built.

The fundamental axiom of mechanics that action and reaction are equal, has a peculiar emphasis when applied to the firing of a modern piece of field artillery. The force exerted to throw a one-hundred-pound projectile a distance of seven miles from the muzzle of a gun is equally exerted toward the breech of the weapon in its recoil. Some of these forces, handled easily and safely by mechanical means, are almost beyond the mind's comprehension. It involves a seemingly miraculous union of fineness and strength. Viewed in this light, the battle performance of the 155 howitzer becomes the subject of increased admiration.

BATTERY ADMINISTRATION IN THE NATIONAL GUARD

BY LIEUTENANT JOHN J. TURNER, F.A.,
INSTRUCTOR, 147th. P. A., SOUTH DAKOTA, NATIONAL GUARD.

HAVING been on duty with the National Guard for a period of several years, I have been in a position to observe, and to obtain first-hand information concerning the various trials and tribulations which confront the average battery commander. One outstanding difficulty is the proper division of responsibility in the administration of the organization. In this connection it is of greatest importance that all ranks should be trained to

DIVISION OF ADMINISTRATIVE RESPONSIBILITY
OF
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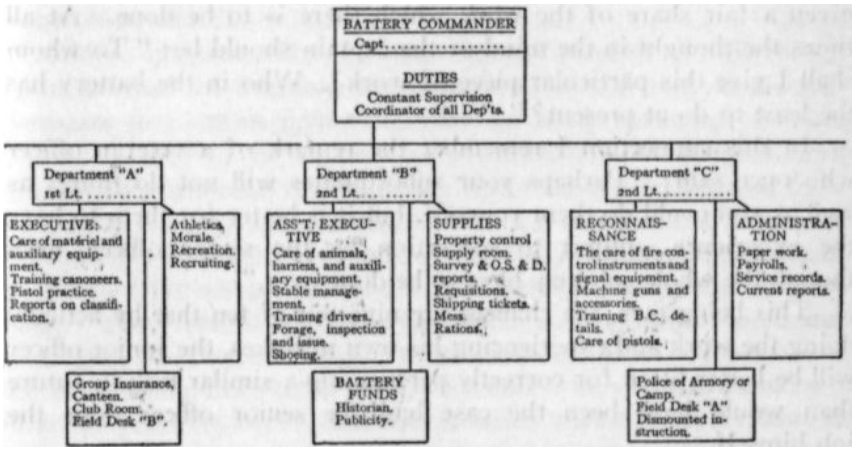


take their proper share in such administrative work.

From time to time in the past many officers have studied the question of administration, and of the various solutions found by them, some were good and others less so, but the subject still seems to be one which is open to discussion. In many cases I have found battery commanders personally doing nearly all of the administrative work of their organizations, particularly the paper work. Sometimes I have even found them straightening up the property in their supply rooms, instead of having the work done, as it should have been, by almost any soldier in the organization. In such organizations, at the same time, I have found lieutenants all dressed up and walking around, apparently with nothing to do.

I fully realize that one should make none but constructive criticisms

and that, even if the criticism be constructive, it ought to carry a solution with it. Whether my suggestion, for which no originality is claimed, regarding the situation mentioned above will prove a solution or not, remains to be seen, but at any rate I will offer it. I suggest that the accompanying chart be copied and posted in the battery orderly room.

After a study of this chart, the captain of the battery ought to have a clearer idea of how to divide the responsibilities of administration, to the advantage both of the organization and of the individuals upon whom those responsibilities will be placed. I may say that when the battery reaches such a point in administration training that the captain finds himself the one who is able to walk around all dressed up, rather than the subordinate officers, the organization will be well on the way to success; also it should be borne in mind that the efficient administration of a battery greatly facilitates its government.

In apportioning the responsibility for the administrative work, there is no intention of "passing the buck" to the junior officers, but it is intended that not only they, but every man in the battery be given a fair share of the work which there is to be done. At all times the thought in the mind of the captain should be: "To whom shall I give this particular piece of work? Who in the battery has the least to do at present?"

In this connection I remember the remark of a veteran officer who once said: "Perhaps your subordinates will not do things as well as you could do them yourself, but it is better for them to have the experience, subject to correction by the senior officer, even though the whole job may have to be done over."

This being true, the chances are nine out of ten that by actually doing the work and experiencing his own mistakes, the junior officer will be better fitted for correctly performing a similar task in future than would have been the case had the senior officer done the job himself.

NOTES ON CALCULATING DEFLECTIONS

BY FIRST LIEUTENANT WILLIAM P. BLAIR, F.A.

THIS article treats in a general way with the deflection question in the rapid preparation of fire. By the phrase "rapid preparation of fire," we mean those cases in which deliberate and complete preparation cannot be undertaken because of such conditions as a lack of meteorological data, no firing tables, loss or poor condition of instruments, a tactical situation demanding early effect, and sundry others. In such cases, the battery commander must adapt himself to the situation and promptly overcome difficulties. He must attain speed and accuracy in computing his firing data and in the conduct of fire. One of the first problems which confronts him is that of calculating the correct deflection. Therefore, let us presently centre our thought on this problem of deflection in an effort to devise some means for aiding the average officer in arriving at speedy and accurate results.

How often it is, that we see at service practice the officer who is to conduct the fire, take an unpardonably long time to calculate a simple problem in deflection, only to finally announce a setting which, if used by the battery, gives bursts fifty or more mils off the target. In actual battle, what could be more detrimental to his ammunition supply, his self-confidence, the morale of his men, and less so in every respect to the enemy? In battle conditions, the chances of his making errors are considerably greater than in peace time. Therefore, it behooves each field artillery officer of a rank such that the conduct of fire might fall to his lot, to become an expert in computing deflections. Naturally, this should be done in time of peace in order that the mistakes incident to his learning may be least costly.

But how is he to become such an expert? The answer is simpler than its execution—by practice, constant and regular. On the start, assume different positions of the guns, the observation post, the aiming point and the target on paper. After becoming an adept in calculating deflections on paper, assume situations on the terrain. This can be done with field glasses in hand while he is walking from his quarters to the office or to stables in the morning and again when returning to his quarters. After having calculated a deflection thus, the actual deflection should be determined later, when opportunity exists, by setting up an angle measuring instrument at the assumed gun position (this in case the target can be seen from the gun position chosen). Check may also be had from a map of the post.

This result should be compared with the result computed, and the reason for any great error in the calculation should be determined.

At first, much practice will be needed, as already stated, to gain facility in correctly computing deflections, and then regular but perhaps less frequent application is necessary to keep the mind in trim for the task.

Many commissioned officers who should improve themselves in this important direction, already appreciate the value of the above suggestions, but they procrastinate putting them into execution in their own particular cases. If you belong to this category, make up your mind to start *now*, and thereby take the first step to becoming a "dead-eye Dick" with a field piece battery, and to being worthy the name "field artilleryman" and a member of one of the most fascinating branches of the service.

Most officers, and some R.O.T.C. students, are able to work deflection problems in the classroom, but many of these upon getting outdoors in a real situation, become hesitant and puzzled. This proves that practice in solving actual problems on the terrain is necessary in addition to understanding the theory of the process. All that these individuals require is more outdoor practice. If this can be obtained, at first, under intelligent supervision, so much the better.

The training regulations give rather broad instructions in the manner of computing deflections, leaving the exact order of procedure and the solution of special situations to the officer concerned. It is manifest that for the best interests of speed and accuracy, a standard method of procedure by each officer will yield the best results. It is not necessary that every officer practice identical methods as to the sequence of operations and short-cuts involved. However, it is advantageous for each officer to practice consistently a certain method and sequence of operations suited to his own peculiarities of mind and manner of thinking. By so doing, his mind will soon automatically perform many of the various functions necessary for any particular calculation.

The aids described below for computing deflections have been compiled partly as a result of personal experience and observation at Fort Sill, and partly from ideas assimulated from association with other officers. The advantages to be gained from their application really apply only to those cases wherein there is no angle measuring instrument, such as a B.C. telescope or an aiming circle at the observation post, for measuring the angle between the target and the aiming point—that is, when the individual who calculates the deflections, has at his disposal for measuring angles one of the following only: a pair of field glasses, a B.C. ruler, or his fingers, knuckles and hands which have been previously calibrated. However,

the only real instance when the methods given below will be outclassed by a conventional method, is that in which a French aiming circle is available for calculating the deflection for French guns. The writer has found these aids to be of benefit to himself and to R.O.T.C. students. They are offered with the belief that they will be of some help to those officers who have been recently transferred or assigned to the field artillery, but who have at least an elementary knowledge of gunnery.

Before going further, it will be well to quote and discuss briefly two definitions taken from the "field artilleryman's Bible," T.R., 430–85. The first definition is that of the "firing angle" as follows: "The horizontal angle between the plane of fire and the line of sighting measured in the same direction as angles are measured by the sight." Since both our panoramic sight and the French Model 1901 sight are graduated clockwise, the firing angle will, by definition, be measured clockwise from the adjusting point of the target to the aiming point. Hence our field artillery angle measuring instruments, such as B.C. telescopes, aiming circles, etc., are all graduated clockwise to facilitate the measurement of firing angles.

If the observation post is an appreciable distance away from the guns, to obtain the firing angle, the parallax of the aiming point and that of the target must be added algebraically to the angle measured clockwise from the adjusting point to the aiming point when the latter angle is measured at the position of the observation post. The sign of the parallax of the aiming point depends upon whether the observation post is on the right or the left and whether the aiming point is to the front or to the rear of the guns. The sign of the parallax of the target depends only upon whether the observation post is on the right or on the left of the guns, as naturally, the target must always be considered in front of the guns.

Skill in correctly estimating distances must be attained to make it possible to correctly calculate parallaxes. This skill must be obtained by practice also. A very good method for such practice is for the aspirant to occupy a point on the terrain from which a number of other points varying in distance of from a few hundred to a number of thousands of yards, are visible. Both the point occupied and those visible should be indicated on a map in order that the magnitude of estimations may be compared with the real distances determined by scaling. As different types of terrain and conditions of atmosphere effect the apparent distance of objects, the observer must practice distance judging under as many different conditions of atmosphere and types of terrain as possible. Inasmuch as the subject of parallex is covered rather completely in T.R. 430–85, nothing further will be given here concerning its reckoning.

Now for the second definition, that of "deflection," which is

described as, "The setting on the deflection scale of the sight such that when the line of sighting is on the aiming point the piece is laid for direction." To the student or officer new to the subject of gunnery, it will often appear that the firing angle and the deflection are one and the same. But such is rarely the case. In nearly every instance the firing angle, which is the angle we first obtain, must be modified considerably in order to get the real deflection. For instance, to the firing angle must be applied the proper corrections for drift and cant of the trunnion axis. These are called *position corrections*. Also, a correction must be made for any cross-wind. The latter one is known as *a weather correction*. Again in firing with a gun equipped with the French model 1901 sight, the deflection constant of 100 mils must be added to the firing angle to obtain the deflection. The deflection constant is "the deflection setting which must be set on the sight to bring the line of sighting parallel to the plane of fire." It is zero for the American panoramic sight. In the rapid preparation of fire, the position and weather corrections are usually ignored, reliance being reposed in observation, to indicate the required corrections. However, the deflection constant, which is large if it exists at all, must always be considered when the model of sight used occasions its use.

As a rule the most trouble to officers is encountered in working with the French model 1901 sight. Some are wholly confused by it, while others are merely slowed down considerably in their estimations. Let the latter pull on their hip boots and the former don their water wings, in order that each may venture out the proper distance in the sea of endeavor to grasp his own precious raft of understanding. Meanwhile, let anybody pray, who will, that the writer is not mobbed by would-be deflection computing experts because of the explanations that follow.

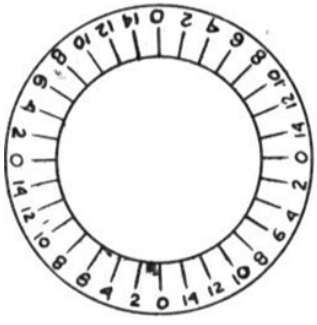


FIG. I

Figure I gives a top view of the plateau, with the sight column removed, of a French model 1901 sight. Figure 2 gives a side view of the plateau with the sight column in position. An examination of figure I shows that the bevel, disk-like surface of the plateau is divided into four equal quadrants, each of which is graduated clockwise by graduations each 200 mils apart. That is, each quadrant is divided into eight equal spaces. The division lines of the plateau are numbered in the following sequence: 2, 0, 14, 12, 10, 8, 6, 4, 2, 0, 14, etc. In place of the zeros we could just as well have 16's, as follows: 2, 16, 14, 12, 10, 8, 6, 4, 2, 16, 14, etc. But with this sight we must set off plateau

0 drum 100, in order to cause the line of sight to be parallel to the axis of the bore. If we consider the plateau the way it is actually graduated, we may call this setting simply *100*. But if we consider the zero on the plateau as a sixteen, as we may correctly do, then our setting will be plateau 16 drum 100 or *1700*. Thus the setting, plateau 0 drum 100, may be considered as either 100 or 1700, depending upon which better suits a particular case. Presently we shall see why it is sometimes more expedient to call it *100* and at the other times *1700*.

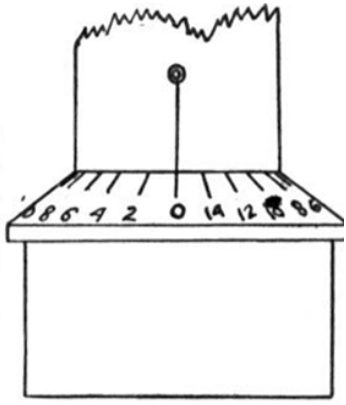


FIG. II

In order to take a simple case first, we will assume an observation post, O (see figure 3) so near the gun position that the parallax of the aiming point at A.P., and that of the target at T, are pracically negligible. The aiming point is selected to the front as is best when using a French sight. If we should set off a deflection of plateau o drum 100, and then traverse the piece until the line of sighting was on the aiming point, the plane of fire would pass through this aiming point (ignoring drift, etc.). Let us assume that the target on which we desire to open fire, is found to be 420 mils to the right of the aiming point, by means of field glasses, B.C. ruler, or by calibrated knuckles. Since decreasing the deflection reading throws the plane of fire to the right when the line of sighting is kept on any one aiming point, we must decrease by 420 mils the deflection reading which causes the plane of fire to pass through the aiming point. That is, we must subtract 420 mils from plateau o drum 100. In order to avoid confusion, we substitute for this deflection reading its designation 1700 derived in the preceding paragraph. Then we have, 1700–420 = 1280 = plateau 12 drum 80. Thus this operation can be done mentally and more expeditiously than in the following conventional method, *viz.:* the angle measured clockwise from the target to the aiming point would be 5980 miles for an angle measuring instrument graduated from 0 to 6400, or 2780 for one graduated from 0 to 3200 twice. Let us take for example the value 2780. To

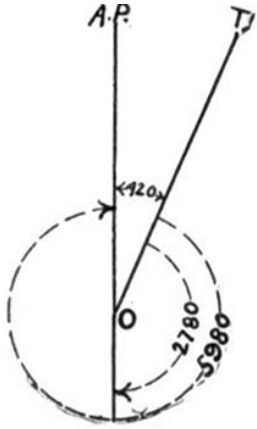


FIG. III

this, add the deflection constant, 2780 + 100 = 2880. From the latter number subtract as many multiples of 1600 as is possible. 2880–1600 = 1280 = plateau 12 drum 80. Thus by this more laborious process, we finally arrive at the same result that was so simply obtained by the first.

If we had measured the angular distance of the target to be, for instance, 417 mils to the right of the aiming point, we still would have subtracted the value 420 from 1700 because in the rapid preparation of fire, the initial deflection should be announced as the multiple of 10 nearest to the determined value.

FIG. IV

Now we will assume that we have a target which measures 420 mils to the *left* of the aiming point (figure 4). Increasing the deflection reading throws the plane of fire to the left when laying with the use of any one aiming point. Hence we must add 420 to plateau 0 drum 100. 100 + 420 = 520 = plateau 4 drum 120.

From the foregoing, it is seen that if the angular distance in mils between the aiming point and the target is x, the values $(1700 - x)$ or $(100 + x)$, each reduced to plateau and drum, will be the deflection, depending, respectively, upon whether the target is on the right or the left of the aiming point. But it must be remembered that if the observation post is at any appreciable distance from the guns, these values must be treated with the proper corrections for parallax.

In calculating deflections for a panoramic sight Model 1917, the matter is still simpler. The deflections will then be $(3200 - x)$ or $(0 + x)$, there being no plateau and drum conversion to make and no deflection constant to worry about.

The preceding remarks take care of those situations in which the aiming point is to the front. The reader has perhaps already begun to wonder what is to be done when there is an aiming point to the rear. The procedure followed for front aiming points, is used with a slight amplification. For rear aiming points, it is necessary for the individual computing to be able to designate the direction, to the front, which is in prolongation of the line joining any particular aiming point to the rear, and himself. That is, he must be able to measure off 3200 mils from any given direction. When there is no regular angle measuring instrument at hand, this must be done by improvised means. It may be readily accomplished by sighting along a straight stick of any nature, such as a pencil, which had first been placed on the ground along the direction observer—aiming point. Another method is for the observer to sight along his arms

outstretched from his sides. With a little drill, any man can soon become quite accurate at this. A good exercise for practice in this accomplishment may be had by placing an aiming stake a few yards from a building and in prolongation of one of the walls. The candidate places himself on the line between the wall and the stake with his arms outstretched horizontally. Glancing toward the wall, he should place his extended arm and hand in the vertical plane of the wall; then, without moving his body, he turns his head toward the stake and lines in the extended arm and hand on that side. His extended arms now point out for him a desired straight line through his body. In this exercise the palms of the hands should be to the front, the fingers extended and joined and as nearly on prolongation of the arm and forearm as possible. After carefully performing this exercise several times, one can produce any direction through himself with a fair degree of accuracy.

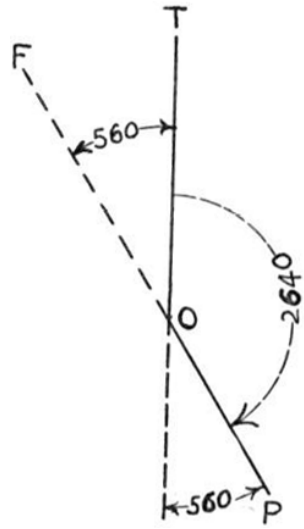


FIG. V

Let us now assume a specific problem as is indicated in figure 5, and work it out. Let O be the position of the observer. Consider the guns so near the observer that there will be no parallax large enough to warrant the determination of it. Let OT be the direction of the target, and OP the direction of an aiming point to the right rear. By one of our improvised means, produce the line OP through O, and on this direction to the front note some definite point F on the terrain. We will call the point F the "Fictitious aiming point." Now measure the angle between F and T by use of your field glasses, B.C. ruler or other means at hand. We find that T lies 560 mils to the right of the fictitious aiming point. Our deflection will then be 1700 – 560 = 1140 = plateau 10 drum 140. The entire operation can be easily done mentally in the space of a few seconds.

Suppose that as a matter of comparison, we work the above problem by the conventional method. We must measure the angle clockwise from T to P. Unless we have an aiming circle, or equivalent angle measuring instrument, it will be almost impossible to directly ascertain such a large angle accurately. This angle, if accurately determined, would be found to be 2640 mils. Add to this the deflection constant 2640 + 100 = 2740. Subtract as many multiples of 1600 as is possible: 2740 – 1600 = 1140 = plateau 10 drum 140.

If the aiming point lay to the left rear, the target would appear to the left of the "fictitious aiming point" and as before the deflection would be (100 + *x*) reduced to plateau and drum.

Practical application of the aforementioned expedient has been utilized in assisting the caisson corporal of the fifth section in the calculations incident to performing the duties as recorder at the battery. In case the deflection for No. 1 gun at a certain time was plateau 2 drum 30 and then the command from the B.C., "Right 350" was received, the recorder might become confused if he had the deflection noted on his record in plate and drum. But if he had it noted 1830 (pl 16 + 2 Dr. 30), then he could easily subtract 350 from 1830. 1830 – 350 = 1480. This he can give immediately as plateau 14 drum 80, if asked by the executive the deflection of Number 1.

COMMUNICATION WITHIN THE FIELD ARTILLERY BRIGADE AND THE DIVISION

BY CAPTAIN EDWARD S. OTT, F.A.

THE necessity for better means of communication, and for better use of existing means, has had a steady development along with other features of artillery, going hand in hand with the increase in range of cannon, use of lateral, flank and forward observation in the conduct of fire, liaison with the infantry and adjacent artillery, and the newer developments in the tactical employment of field artillery, as in the defense of a defensive zone. Each development in warfare has called for an enlargement and improvement in communications, and the part of communications in the winning of battles in modern warfare was given full recognition in Field Artillery Training Memorandum No. 9, 1923, when it was made one of a paramount trio—communication, fire power and mobility.

No commander today can be satisfied with anything less than the full exploitation of all available and practicable means of communication at his disposal. He may rely upon his technical staff for the installation, operation and maintenance of the various systems, but he has a clear picture of the results he desires, and will demand this result. If he does not understand fully the possibilities and limitations of each technical means of communication, it will devolve upon his staff to see that the fullest use is made of the various means, and that no impossible standard in their functioning is demanded. From the above, it can be seen that each junior officer of field artillery must be equipped with definite knowledge of the installation, operation, and maintenance of signal communications; how good communications are secured in a unit; how maintained; and the possibilities and limitation of each means.

What is good signal communication in a unit of field artillery? Briefly, it is that condition, resulting from training, practice, and coördination, which will insure the rapid and accurate transmission of military messages between individuals in the same or different units. It is secured by slow, careful training of the individual, and by progression into team work after the individual has grasped thoroughly his duties and responsibilities. The task begins with the selection of suitable men, and it never ends.

The task of the battery commander is to train his signal detail in the fundamentals, such as splicing wire, connecting up a switchboard,

testing a telephone, or transmitting properly a message. The battalion commander must supervise and coördinate the work of his batteries, and must be insistent in his demand for uniformity, accuracy and speed. He usually does this through his communications officer. In the regiment, supervision and coördination must again be in evidence, especially in the regulation of message centres, radio nets, and communication systems serving the artillery and supported infantry units. The artillery brigade should coördinate the work of the regiments, supervise the communication with the air service, and should take the initiative in securing opportunity for team work and practice between artillery units and units of other arms, especially the infantry. Finally, the division must demand excellence in each system of communications within each arm of the service, and must provide for coöperation and regular practice between the different arms.

Good communications having been once secured in any unit, its maintenance depends upon regular and varied practice, under situations both adverse and favorable, in all kinds of weather, by day and by night, and by a far-sighted policy of training replacements for signal details in excess of the normal losses expected.

Artillery communications systems vary from that in the open warfare, or warfare of movement type, where the command posts and observation posts of the batteries are combined, with the battalion observation post usually with the observation post of one of its batteries, and its command post nearby, and with all observation posts close together, to that type in the position defense, or defense of the defensive zone, with its multiplicity of widely scattered observation posts and its sheltered command posts well in rear of the gun positions. In the former, the battery wire system, for example, may consist of a single command line from battery commander, at the observation post, to executive at the guns, while the battalion system may consist solely of its line to the supported infantry unit. This is the extreme case of simplicity. In the other case of position defense, or defense of a defensive zone, each battery unit will have the complete net as contemplated in T.R. 160–5 (Signal Communications for All Arms), with lateral lines, lines to adjacent units, and auxiliary lines over separate routes in shell-swept areas. This is the extreme case of complete systems. In each situation that faces an artillery commander, a decision must be made as to the type of installation necessary to allow him to best fulfill his mission.

Each officer upon whom the duty of training a communication detail or conducting a school for communications personnel falls, should know how to find in the regulations and pamphlets issued by the War Department and other sources, the subject matter he

desires to cover. A partial list, covering those most frequently used, follows:

Tables of Organization—Communication personnel.
W.D. Circular 152, 1924—Allowance of communication equipment.
T.R. 160–5—Signal communication systems, message centres, codes and ciphers, panels, and plan of signal communication.
T.R. 430–105—Means of signal communication, systems and their employment in the artillery, and the relation of the communication system to the tactical situation; message centres.
T.R. 165–5—Installation and maintenance of wire axis within the division.
Signal Handbook, 1916—Visual signalling.
Training Pamphlet No. 1—Elementary electricity.
Electrical Engineering, Pamphlet No. 3, Signal Corps
Tactical Document No. 7, Field Artilllery School } Type EE-5 Telephone.
W.D. Document 1081—Monocord switchboards.
Training Pamphlet No. 7—Primary batteries.
Training Pamphlet No. 8—Storage batteries.
Radio Communication Pamphlet No. 1—General principles of radio.
Radio Communication Pamphlet No. 40—Advanced radio principles.
Radio Pamphlet No. 2—Antenna systems.
Radio Communication Pamphlet No. 28—Wavemeters and decremetres.
Radio Pamphlet No. 3—Vacuum tubes as detecters and amplifiers.
Radio Communication Pamphlet No. 6—S.C.R. 77-A radio set.
Radio Communication Pamphlet No. 17—S.C.R. 79-A radio set.
Radio Communication Pamphlet No. 27—S.C.R. 109-A radio set.
Tactical Radio Procedure, Signal School—Radio net operation.

Each unit is supplied certain systems of communications, designed to serve its needs during practically any situation, provided each system is developed and used to its best advantage. The communications officer in the higher units, and the battery commander in the battery, is responsible that each system carries its proper, proportionate share of the traffic. He must utilize each means during normal traffic periods, in order to assure himself that each means will function during an emergency. The communications officer does this through his message centre chief, the latter being responsible as to what means shall be employed to transmit the normal message passing through his headquarters.

The message centre has an important service to perform. It is essentially a service unit for the orderly, rapid, and accurate transmission or delivery of all incoming and outgoing messages, except certain specifically exempted classes, at the headquarters it serves. If it is not at one and the same time rapid, accurate and orderly, its value become extremely doubtful. Communications officers and message centre chiefs should keep this fundamental principle in mind.

The systems of communications in the field artillery brigade and in the division are familiar, in general, to all officers in the artillery. However, some outstanding characteristics and uses of each can well be emphasized. The telephone system is the backbone of the communication

system, providing reliable and rapid communication between all units, from the highest to the lowest, except between airplane and ground. Its installation is fairly rapid, but its maintenance in actual war is difficult in forward units. Radio provides a less reliable and slower means of communication between units higher than the battery, and finds an especial use in work between airplanes and ground stations, between infantry and supporting artillery, and in the transmission of certain messages to all units, such as the meteorological message. Its efficiency is affected little, if any, during actual war. Rapid strides forward, such as radio-telephony, in the science of radio-communication, point to a place of greater importance for this means of communication in future wars.

Couriers and messengers provide a sure means of communication, but slow, even when using motorcycles, unless the units desiring communication be close together. Their especial use is found in transmitting reports, especially lengthy ones, extremely long messages, confidential messages, and such messages as have appended charts or maps. Visual signalling, except in unusual situations, finds little use outside the battalion. At best it is slow and difficult to operate over much distance. Its best use would be over heavily shelled or impassable areas. These remarks apply to visual signalling in general. However, under visual signalling we find two means with distinct and important functions—panels and pyrotechnics. Panels are used by ground stations and infantry front lines to communicate with airplanes. Pyrotechnics provide a rapid and efficient method of communication between infantry and supporting artillery. The use of pyrotechnics is limited, in general, to use at night. The comparatively small number of distinctive colors possible of manufacture, combined with the danger of misinterpretation, if too complex a system is attempted, limits their use to calls for certain types of fire, notably the normal barrage, for the lifting of artillery fire, and for notification when friendly troops are suffering losses from our own artillery. All of these uses are most important.

No discussion of communications in the field artillery brigade and the division, can be completed without comments on the duties and responsibilities of the communications officer. He must be technically qualified in his work, and must have a sufficient grasp of the tactical employment of field artillery to be able to foresee what will be required as rapidly as the situation changes. He should have the full confidence of his commander, and should always be on the alert to gain all the information possible as to the present situation and to possible future developments. He should have initiative in securing this information and, either acting on it promptly, or recommending appropriate action, as affects signal communications, to his commander. He should be ready to begin

installations on the barest minimum of information, and continue the work as his initiative and resourcefulness adds to his knowledge of what is wanted or needed. He must bear in mind that the installation, operation, and maintenance of all of his available means of communications needs his supervision, and that all must be carried on at the same time, and during it all he must be ever watchful for any new or additional information that will assist him in the proper performance of his duties. He must be tactful, painstaking, thorough and methodical, and must personally run down any fault, failure or mistake discovered by himself, his commander, or other members of his staff. In carrying out the supervision of the communication systems of the units pertaining to his own headquarters, he must assume the attitude of helpfulness, and unless directed otherwise, his criticisms of the systems of subordinate units should be made to his own commander. In each case, he should be able to recommend the remedy for the trouble. He must be imbued with the responsibility his particular work bears to the winning of battles, and should be as anxious to have all his means of communication function properly as the battery commander is to have his projectiles hit the target.

MOTOR MAINTENANCE

BY CAPTAIN C. C. PARK. F.A.

THE necessity for continuously maintaining the automotive matériel of a motorized organization in an efficient condition scarcely requires discussion.

In this connection nothing can be quoted which is more emphatic or authoritative than Field Artillery Memorandum No. 9, November 16, 1923, from the Office of the Chief of Field Artillery, which states: "There are three essentials to field artillery efficiency, *viz.:* mobility, fire power and signal communications. They are of equal importance."

Mobility is here quite logically mentioned first as it is the first of these three essentials to be tested. A battery cannot fire until it reaches its position upon the battle field. From the viewpoint of an organization depending upon horses for its motive power, this has long been recognized in our service as axiomatic. However, there has often been an inclination in all grades of our service to consider the demands of motor maintenance as less exacting than those of maintenance in a horsed organization. It is not the intention here to broach the much-mooted question of the motor *versus* the horse; but if an officer approach the maintenance problem in a motorized organization with the thought that his duties will be any less exacting than in a horsed organization, it may be taken as certain that his organization will not be one which, for tactical mobility, can be favorably compared with the average horsed organization.

The training regulations upon care, conditioning and handling of horses, and the training of drivers, are quite complete and comprehensive, and emphasize the relation of this training and preparation to mobility. Every field artillery officer is expected to be interested in horses and familiar with these features of training. Every field artillery officer should likewise feel it incumbent upon him that he cultivate an interest in motors and acquire a degree of technical knowledge concerning them at least equal to the knowledge of the horse possessed by the average officer.

The subject of motor maintenance has not been covered in detail by training regulations. But, with reference to mechanical adjustments, repairs and lubrication, the handbook of the particular vehicle will usually be found sufficiently detailed and thorough.

In any discussion of motor maintenance it is difficult to avoid some reference to administration, inspection and operation. Maintenance is essential to operation. Inspections of maintenance work are necessary in order to ascertain whether it provides for satisfactory

operation. Skillful operation greatly simplifies the maintenance problem. All three are dependent upon good administration. The desired standard of MOBILITY is only obtained by the efficiency and coördination of administration, maintenance, inspection and operation. Reference will be made herein to details of administration, inspection and operation, only in so far as they may have a direct relation to maintenance.

Space does not here permit of a discussion of the maintenance features peculiar to different types of motor vehicles, or of the mechanical details involved; but an attempt will be made to outline general methods which have given good results, and which may be of assistance to officers of little or no experience with motorized field artillery.

WHO INSTRUCTED

In a motorized organization *all men* should be given both *theoretical* and *practical* instruction in the care and handling of motors, as a part of their basic instruction. This instruction should correspond in interest and thoroughness with that given recruits in a horsed organization. Any member of a motorized organization may be required, in an emergency, to drive a motor vehicle. Special, detailed instruction must be provided for those who are to be concerned principally with maintenance work.

INSTRUCTION AND TRAINING

Instruction and training should be made progressive, diversified and interesting. *Attention* can, and should be required; but *INTEREST* must be *created* and *maintained*.

If a definite, high standard of organization training is aimed at, and a course of motor instruction mapped out by which to attain it, interest is easily maintained; each instruction period will then mark definite progress toward the desired goal. Without such a plan, instruction is aimless; it is seldom in proper sequence; the instructor is insufficiently prepared; interest lags; and the time spent is largely wasted. Field Artillery Training Memorandum No. 7 furnishes an excellent guide for a training program.

Once the outline of training has been prepared, the details fall logically into place. This plan should be discussed with the battery officers, the first sergeant, the motor sergeant, etc., and certain subjects assigned for study to various members of the battery in accordance with their individual adaptability. Specially qualified noncommissioned officers are often available who, with advance preparation, are quite capable of conducting periods of practical motor instruction with much profit to the battery. An officer should be present during at least a part of each period. Such practice increases

the interest and self-respect of the N.C.O. and the respect in which he is held by other members of the organization. The well-qualified enlisted man often can, due to his intimate contact with the work, present a subject (*e.g.*, trouble-shooting) in a more interesting and instructive manner than can the average officer. The writer has found it easier to maintain the interest of enlisted men in motors than in any other subject.

Proper attention to driving, adjustment and lubrication will obviate many of the motor troubles frequently encountered and greatly reduce the amount of repair work necessary to keep the vehicles in good running order. General instructions will not give desired results. For each type of vehicle the instruction must be detailed. In regard to drivers' inspections and lubrication it has been found best to prepare and issue to each driver a typewritten sheet or chart of instruction, based upon his particular vehicle, listing those things which experience shows, require regular attention. Even when a handbook is available for each driver, he will seldom refer to it until in difficulty; and the things requiring frequent attention are often not so grouped as to be easily referred to.

Following is a driver's daily inspection sheet used for the five-ton tractor:

1. Inspect gasoline supply.
2. Inspect oil supply in crankcase.
3. Inspect fan belt tension.
4. Note radiator water supply and inspect radiator hose connections and water pump for leaks.
5. See that lamps are cleaned and serviceable.
6. Wipe off magneto and spark plug porcelains and inspect wiring terminals for tightness.
7. See that fuel is turned on and inspect gas lines and connections for leaks.
8. Tighten all loose bolts and connections.
9. Turn on ignition and start engine (clutch disengaged).
10. Release choke.
11. Note whether oil pump is working properly.

It will be noted that the list directs attention only to essential points which should be looked after each time the vehicle is operated, regardless of its condition and care; also that if the vehicle has been previously prepared and all is found satisfactory, the inspection can be completed, in order, by passing once around the vehicle.

Following this was a weekly and a monthly maintenance routine. The lubrication chart was issued separately.

Regular attention to these details in this order will tend to obviate difficulty in starting, prevent road troubles and make extensive

repairs unnecessary. It will make the driver familiar with his vehicle, which is very necessary to efficient care.

Drivers should be taught to observe and report any unusual noise or behavior of the vehicle. When a motor vehicle which has been running well, suddenly fails to function properly, its misbehavior has a cause just as potent, and usually as easily remedied, as that which causes a well-behaved horse to prance, buck or balk. Failure to discover and report any disorder to the chief of section is a neglect calling for disciplinary action. In case of lost tools or accessories or damage to a vehicle, it is not good policy to give the driver the benefit of the doubt. If any one is at fault, that fact should be discovered and appropriate action taken to prevent a recurrence.

ASSIGNMENT AND TEMPORARY RELIEF OF DRIVERS

Much care should be exercised in the assignment of drivers, keeping in mind the individual's progress, his adaptability, and his probable future usefulness in the organization. An assignment once made should be considered as permanent, and changed only for a very good reason. A driver's interest in his vehicle will (or should) be greater the longer it continues. He should know the vehicle's peculiarities and weaknesses as a horseman knows his horse.

If the driver is unavoidably absent (*e.g.*, on guard or sick), it is better from the viewpoint of morale to leave his vehicle in park. If a march or drill requires that that particular vehicle be operated, care should be taken that the emergency driver be one about whose ability to operate, and interest in that particular vehicle, there can be no doubt, preferably a mechanic, or a noncommissioned officer of the same section as the driver.

This is a matter of much more importance than usually believed. If this vehicle should become out of order during or shortly after its operation by an emergency driver, the regular driver is very likely to allege and to believe, that the vehicle has never been the same since that operation, and to blame succeeding troubles upon its operation during his absence. This tends to decrease his interest and pride in his vehicle. If an incompetent driver has been in charge there is frequently little ground for doubting his assertion.

This may seem a trivial matter which good discipline alone would solve. Stern discipline may prevent the matter from being brought to the attention of an officer; but that will only cause it to more seriously affect that intangible quality, morale; and morale is fully as important in a motorized organization as in a horsed organization; perhaps more so. A mounted soldier may be spurred on by humane consideration for his horse, where a sense of duty only would permit him to lag; but with motor matériel, pride in his vehicle must take

the place of both pride in the horse and humane consideration for him. In the opinion of the writer there is no single factor in the administration of a motorized organization which more vitally affects the *morale,* and resultant efficiency, than the method of assignment and temporary relief of drivers.

CHAIN OF RESPONSIBILITY, INCLUDING: PROCUREMENT AND REPLACEMENT OF SPARE PARTS AND TOOLS, AND FUNCTIONS AND DUTIES OF NONCOMMISSIONED OFFICERS AND MECHANICS AND DRIVERS

Here in a related group are listed some of the most troublesome problems facing the commander of a motorized organization. Who, if anyone, besides the driver is to be held responsible for the condition of a particular vehicle? Who should see that the driver gets a new pair of pliers; that a lost lamp is replaced and how; or that the clutch is adjusted? A vehicle has been repaired and soon thereafter develops the same or a related trouble; the driver blames the mechanic; the mechanic blames the driver; the motor sergeant told one or both of them just what to do to avoid it; the chief of section is a passive bystander; the motor officer knew nothing about it; a case which has been oft repeated, and which indicates a manifestly unsatisfactory condition. How may the commander prevent endless recurrences of such questions and incidents?

To quote from the teachings of the Gunnery Department of the F. A. School, "there is no 'cut and dried' procedure. Each problem must have its own 'best' solution." Much depends upon the personal equation—of the commander, as well as of his subordinates. However, certain principles may be considered as fundamental; for example, it is evident there must be a link, or links, in the chain of responsibility between the driver and the commander. It is apparent that the captain cannot act as a squad leader, in charge of the drivers. Neither can the motor sergeant perform all of these duties.

THE MOTOR OFFICER

Where a motor officer is available, he becomes the first link. Care of the motor matériel, and instruction, training and supervision of drivers and mechanics in a motorized organization is a task worthy of the best efforts and undivided "full time" attention of an officer; and in no other department will he be enabled to display more initiative and ability to handle men than here. He should be given a free hand. By this is not meant an unguided hand, but freedom to make decisions, initiate new work and give effect to his own ideas, in accordance with the general plan of the commander. The matter of relief and assignment of drivers is one

which should invariably be taken up with the commander, for reasons before stated, and to insure the coördination of duties within the battery.

The procurement and proper utilization of spare parts, tools and supplies is a problem of no mean importance. The supply sergeant is, of course, the proper medium for the preparation of requisitions for, and records of, all property. But he will seldom be found to be qualified by his training, and never by his duties, to be entrusted with the procurement of the necessary supplies. He is not in sufficiently close touch with the motor work. Moreover, though the supply of organizations upon formal requisition is usually considered as a routine matter, the writer has seldom found it to be so.

Particular items of motor supplies, the replacement of which is not foreseen, or of which it has been impossible to procure a reserve, are continually being needed. The supply departments seldom have a complete stock on hand. If the requisition is allowed to follow the routine course it *may* eventually be filled; but some items will be received days, weeks, or even months after the need for them has become urgent. It should be the duty of the motor officer to supervise the work of the supply sergeant in regard to replacement of motor supplies, and to maintain the closest liaison with the supply departments. Nothing can take the place of frequent personal conferences, tact, and cordial relations. The easiest action by the supply department is a mere statement that the articles desired are not available for issue. This statement is seldom a safe excuse for the commander to advance for his vehicles being out of commission; though it can seldom be disproved. But tactful visits by an officer will usually derive the information that the supplies desired, if urgently needed, *may* be obtained from salvage, from some other department or organization, or that supplies are in stock which may be improvised instead of those desired.

THE MOTOR SERGEANT AND MECHANICS

We now come to the difficult problem, and one in which the practice varies greatly in different organizations, *viz.:* the respective duties and responsibilities of the chiefs of section, the motor sergeant and the mechanics, and the line of demarcation between them. They all are, or should be, interested in maintaining the matériel in good condition; but divided responsibility leads to shirked responsibility. Hence it is necessary to formulate and announce a definite policy in regard thereto.

Mechanics are not N.C.O.'s and it is not good policy to place them in authority over others. They are primarily assistants to the motor sergeant, and he should assign their work and be held responsible for its proper performance.

The motor sergeant is the maintenance chief, and should be carefully selected for his forcefulness and ability to organize work and duties, as well as for his mechanical knowledge and skill. He should be in charge of, and responsible for, all repair work and all adjustments pertaining to power plants of the vehicles. The driver of a vehicle under repair should act as assistant to the mechanic, thus familiarizing himself with the vehicle, and knowing just what repairs were necessary and how made.

CHIEFS OF SECTION AND DRIVERS

Responsibility for the instruction of drivers and proper operation, lubrication and care of their vehicles is ordinarily a function of the *chiefs of section,* and not of the motor sergeant. The motor sergeant will of course be interested in reducing repair work by proper operative maintenance, and will ordinarily be able to give many helpful suggestions which should be encouraged and considered.

Chiefs of section should be required to inspect the vehicles of their section and actively take charge of the work of drivers in inspection, lubrication, cleaning, and minor adjustments. This work should be performed under the immediate supervision of an officer. Where necessary on account of limited time, cannoneers and spare men should be required to assist in the cleaning.

In this connection I desire to emphasize the necessity of allowing a sufficient and definite time for this work. This is a point frequently overlooked by higher commanders, and one which should be emphasized to them. Motors in our service generally do not get a fair chance. In a horse-drawn battery the entire personnel is usually utilized for grooming, and frequently extra personnel (in addition to the permanent stable force) for feeding and watering. A large part of the organization is utilized for "horse exercise" when mounted drills are infrequent. On Sundays and holidays the regular routine continues. But in motorized organizations it frequently happens (and sometimes is so scheduled) that the batteries continue mounted drill until barely sufficient time remains to get to "chow." Most of the personnel leaves the park at once, and the drivers soon follow; in the afternoon all men, including drivers, are considered as available for fatigue. Under such conditions, even drivers who may not be on other duty, will seldom work on their vehicles unless carefully supervised.

Much of the work of lubrication can be taken care of at halts, if the men are properly supervised. However, after each period of operation, a minimum of thirty minutes should be allowed (and provided for in drill schedules) for checking equipment, inspection, adjustment, cleaning and lubrication. This does not permit of

a cleaning of the exterior of the vehicles. Where orders require this daily, additional time (usually about one hour) should be allowed. If this additional time is not allotted for cleaning, it will be done at the expense of neglected maintenance. Schedules should of course provide additional time for the weekly, monthly and quarterly maintenance routine.

A common fault among insufficiently trained or inadequately supervised military motor vehicle operators, is needless, tinkering adjustment by incapable men. Many drivers like to take down certain assemblies, *e.g.*, the vacuum tank and carbureter (which are seldom at fault unless they have been meddled with) ostensibly to correct some supposed defect, but often principally to see what the inside looks like. They frequently do not have, or use, proper tools, and are unfamiliar with the disassembly and assembly of the part. As a result, nuts are rounded, threads stripped, parts bent or broken, and frequently the attention of a good mechanic and replacement of parts are necessary to again get the vehicle to functioning properly.

An officer who, in France, had charge of many motor convoys, and who had some Chinese truck drivers under his charge, stated that they made excellent chauffeurs. They did not presume to meddle with the mechanical adjustments of their trucks. Though a mechanic had occasionally to be sent to help them in, on account of some trivial difficulty, few extensive repairs were necessary and maintenance was easy. Curious meddling is one of the besetting sins of the American soldier chauffeur, which must be guarded against.

NEED FOR ARTILLERY REPAIR TRUCK

Modification of parts and repair work in general could be much more easily effected if the artillery repair truck were still a part of the peace-time equipment of a motorized regiment. It is believed unfortunate for the Field Artillery that this mobile repair shop is no longer authorized, and it is hoped that sentiment in our branch of the service may so form in favor of its return, that it may be restored to each motorized regiment, separate motorized battalion or similar unit.

During the time these trucks were in use it was the writer's fortunate experience to be in charge of the regimental repair work in a heavy motorized regiment, both with ordnance enlisted personnel, and with almost exclusively field artillery personnel. In France, on one occasion, the day before a move requiring the operation of all vehicles, it was found necessary to replace a steering knuckle bushing on a White staff observation car, which was being used by the regimental commander. Spare parts were generally plentiful

in France and easily obtainable. But the nearest source of supply was about 60 kilometres away, and even there, supply was not assured. We had in stock no bronze tubing of proper size, but we had solid bronze stock. The machinist and two motor mechanics, working until midnight, turned out and installed a new bushing, and next morning the car ran as usual. This is but one of many examples of the usefulness of the repair truck in maintaining our matériel. With it there were few repairs which could not be accomplished promptly and satisfactorily.

True, it is planned to attach these trucks in time of war; but repairs are about, if not quite, as difficult in time of peace, with our old war issue equipment, shortage of spare parts, no replacements of vehicles, and no prospect of anything better in the near future.

The present scheme is circuitous and cumbersome. The artillery commander cannot give priority to his own work. The ordnance personnel in most cases coöperates as efficiently as possible; but it is often very difficult to procure machining, drilling or welding work for motor vehicles other than tractors. As a result of strong recommendations on the part of the Commanding General, Hawaiian Division, F. A. Brigade, an artillery repair truck was returned provisionally to each of the three regiments of that brigade, with ordnance enlisted personnel and a field artillery officer in charge of each. Results have justified the wisdom of that special dispensation.

However, it is believed preferable to have field artillery personnel exclusively upon these trucks. The F. A. School is prepared to give adequate training to the necessary number of enlisted specialists, to man the trucks in time of peace. In an emergency the Field Artillery would perhaps have less difficulty than the Ordnance in filling specialist positions, due to the larger number of men from which to select. It is believed the field artillery repair personnel will have a more thorough appreciation of the field artillery needs; have a higher esprit de corps, and rise to an emergency requiring extra work, with keener interest, higher morale and consequently greater efficiency than personnel attached from another branch.

RECORDS

TOOLS

It would seem scarcely necessary to emphasize the necessity of having on file in the organization an up-to-date signed receipt for the tools and easily removable equipment of each vehicle. This is necessary in order to keep equipment complete, prevent loss, fix responsibility, and enable the commander to account for lost items. Yet it is a fact that in some cases such lists have not been kept, and in many organizations they are so incorrect, when checked, as

to be valueless, either for fixing the responsibility for loss or to ascertain the probable circumstances of loss. These lists should be prepared in duplicate and a copy furnished the driver. They should be kept as accurately and punctually and in much the same manner as a form 637. *At the time* drivers are changed, a formal check-over of the vehicle, tools and equipment should be made by both drivers, in the presence of an officer whenever possible, otherwise in the presence of the supply sergeant. Discrepancies should be adjusted *at that time* and a new receipt accomplished. Complete equipment increases the driver's interest and efficiency in maintaining the vehicle.

MAINTENANCE RECORDS

Comprehensive and self-explanatory motor vehicle books are issued by the Ordnance Department for tractors, which, if properly kept, will furnish valuable records of the vehicles. In some commands, motor vehicle books are required to be kept for each vehicle, showing by date, the amount of gasoline issued, and by trip and date, the mileage covered; also a log book (which may be the same book) in which is entered, by dates, all repair work, mishaps to the vehicle, especially hard duty, changes of oil, etc.

It is difficult to obtain detailed record keeping on the part of drivers, and it should be reduced to the minimum. However, whether or not the above records are kept, a journal record should be kept by the motor sergeant of all repair work done, showing date, vehicle number, the exact nature of the work, and the mechanic who did it. Where vehicle log books are kept, he should make a similar entry in the log book at the same time. Where they are not kept the motor sergeant should be provided with a separate book in which several pages should be devoted to each vehicle in the organization, and the record of repairs should be promptly posted to its vehicle record.

This simple record enables the motor officer or battery commander to keep a check upon the work being done by the motor sergeant and mechanics, upon its results, and upon drivers. A study of the journal will show whether certain repairs are common to a number of vehicles. A glance at the record for a particular vehicle will show whether many repairs are being made upon it, and whether the necessity for them recurs. Valuable information may be thus gained as to the immediate maintenance problem, and investigation readily made to determine whether the fault lays in workmanship or in operation.

MOTOR INSPECTIONS

Inspections must be discussed but briefly here. All motor inspections have two ends in view: (*a*) to ascertain whether the matériel is in proper condition and receiving proper care, and (*b*) to remedy any defects disclosed, either in condition or in methods.

Inspections should be constructive and not merely critical. The driver who discovers his wheels to be out of alignment and does nothing about it, is scarcely more to be blamed than the officer who discovers the same thing, and who merely calls the attention of the driver to it. The primary purpose of an inspection has not been accomplished until the defects disclosed thereby have been remedied. *Corrective measures must be INDICATED at once to the PROPER PERSONS,* and a *CHECK MADE* subsequently to *see* that they *have been applied*.

It should be impressed upon all that they should take corrective measures upon their own initiative, without awaiting discovery at a later inspection. Any person making an inspection of matériel under his charge has it within his power to take certain remedial measures in connection with defects noted. If he cannot have them remedied, it is his duty to bring the matter to the attention of the next senior in the chain of command. It is only by constant attention on the part of all concerned—drivers, chiefs of section, the motor sergeant, the officer in charge of motor matériel, and the battery commander, that the motor equipment can be kept in efficient condition without frequent and extensive repairs, for which facilities are usually very limited.

The following may be taken as the general scope and purpose of maintenance inspections by, and requirements of, the various persons in the chain of command:

(*a*) By the driver: To see that there is a sufficient and proper amount of water, gas and lubricant; that his vehicle is in a proper state of adjustment and cleanliness.

(*b*) By the chief of section: By applying his broader experience and higher sense of duty, to see that the driver *understands* and *carries out* the duties expected of him.

(*c*) By the motor officer (assisted by the motor sergeant): To indicate the desired standard and methods, and supervise the work, giving special attention to the nicety of mechanical adjustments and to lubrication. He should make a complete technical inspection of each vehicle once per month.

(*d*) By the battery commander: To see that the required standard is attained, both as to individual vehicles and as to the organization as a whole, and that the scheme of administration (supply of cleaning and preserving materials, spare parts and tools, and the assignments to duty and allotments of time) is working out satisfactorily.

Time will not usually permit the captain to make a very detailed formal inspection of each vehicle. It will generally be found best to prepare himself to make a minute inspection of several particular

things, and as detailed an inspection of the balance as time may permit; *e.g.*, at one inspection, special attention may be given to completeness and condition of tools and accessories; at another, to tightness of spring clips and adjustment of steering gear; at another, to adjustments of brakes and wheel bearings; and at another, briefly question drivers to ascertain their knowledge of maintenance routine pertaining to their respective vehicles.

The full morning formal inspection gives the battery commander the best opportunity to exert his leadership and impress his men—not necessarily with his mechanical knowledge—but with his understanding of their problems and *interest* in their work, and with the standards he requires.

In this connection I wish to emphasize that drill schedules should permit the battery commander, at *least once every two weeks*, to devote a full morning to the uninterrupted inspection of his motor matériel in *any way he sees fit*. Where this is not done, organization commanders owe it to the service as well as to their organizations and themselves, to emphasize its necessity to battalion and regimental commanders. A half hour per day, or an hour every two or three days, supervising men in the park, who are busy preparing their equipment for drill or going over it upon return from drill, with perhaps 30 per cent, absent, does not give the commander a view of his organization "as others see it." Both his attention and that of the men are given primarily to "getting out," or getting done and to "chow."

If the B. C. knows he can prepare his own Saturday morning schedule every other week, he can utilize these periods to test out and familiarize himself with his organization. From the more detached viewpoint of an inspector, he will notice defects for which the remedies are obvious. As merely the "inspected," these same defects may long escape his notice, and even if pointed out to him he may not get a proper perspective of them.

INTEREST

One of our noted generals has often repeated the statement: "As the officers *think*, so their men think." Nowhere is the validity of this statement more apparent than in the care of motor matériel. The battery commander must *have* and *display* a genuine INTEREST in each vehicle and in the driver's problems concerning it, if he would have the driver maintain a keen interest in it. Good work should be rewarded with a word of commendation; mediocre work with explicit instruction. Disciplinary action should only be taken where instructions have gone unheeded. It should then be taken unhesitatingly and invariably.

It is not difficult for an officer to cultivate a memory for incidents concerning the care and operation of the different vehicles. In passing the men, a question to Jones, as to how his clutch works since it was relined; to Brown, as to whether his dragging brake has been adjusted; to Smith, that you notice that he has stopped that gasoline leak, etc., takes no time, but from it the man realized that the officer is interested in "his" particular vehicle, and his own interest will increase correspondingly.

If an officer will give the same unremitting attention to duty, and exhibit and *have* the same keen *interest* in his motors, which he would expect to display toward his motive power in a horse-drawn organization, he need have no misgiving concerning duty with a motorized unit.

FOREIGN MILITARY NOTES

FURNISHED BY
THE MILITARY INTELLIGENCE DIVISION, GENERAL STAFF

CHINA

Reorganization of Fengtien (Manchurian) Army.—Following the fighting of the fall of 1924, Marshal Chang Tso-lin decided to reorganize his armies along the most modern lines, using a combination of European and American systems. His purpose was twofold: (*a*) to make each unit practically independent, thereby allowing for greater mobility and facility in administration, and (*b*) to promote many officers who had shown remarkable ability during the recent campaign by giving them added responsibility.

In December, 1924, an Army Reorganization Bureau was constituted at General Headquarters in Mukden and General Chang Hsuch-liang (the youthful son of Marshal Chang Tso-lin) was placed in direct command. As a result of three months' work of this Bureau, on March 27, 1925, a General Order was issued giving the following outline of the "Armies of the North East":

There are 16 divisions of infantry, 2 divisions of cavalry and 2 artillery brigades.

Infantry Division.—Each of the 16 infantry divisions is organized as follows under the command of a major general:

Two brigades, each commanded by a brigadier general, totaling 5400 officers and men each.

Three regiments in each brigade, each regiment commanded by a colonel and totaling 1800 officers and men per regiment.

Three battalions in each regiment, each battalion commanded by a major and totaling 600 officers and men per battalion.

Four companies in each battalion, each company commanded by a captain and totaling 150 officers and men per company.

Three platoons in each company. One first lieutenant and two second lieutenants command the three platoons. There are noncommissioned officers, usually one sergeant and two corporals to every two squads, one squad totaling eight men.

Auxiliary Regimental Units.—Each regiment (Inf.) has attached to it:

One machine-gun company of 6 guns and totaling 40 officers and men.

One trench mortar company of 6 three-inch Sutton Mortars and totaling 100 officers and men.

One special batalion including pioneers, engineers, sanitary and hospital units, and replacements, 700 officers and men.

Total Strength Infantry.—It will be seen therefore that the total strength of each division of infantry is 11,640 officers and men and that the total strength of 16 divisions of infantry is 186,240 officers and men.

Cavalry Division.—Each of the two divisions of cavalry is organized as follows under the command of a major general. The total strength of each division is 3200 officers and men.

Two brigades, each commanded by a brigadier general, totaling 1600 officers and men.

Two regiments in each brigade, each commanded by a colonel, totaling 800 officers and men each.

Four squadrons in each regiment, each commanded by a major and totaling 200 officers and men each.

Three troops in each squadron, each commanded by a captain and totaling 70 officers and men each.

Three platoons in each troop, each under the command of a lieutenant.

Artillery Brigade.—Each of the two artillery brigades is organized as follows under the command of a brigadier general. The total strength of each artillery brigade is 2700 officers and men and 108 field guns:

Three regiments in each brigade, each commanded by a colonel and totaling 900 officers and men and 36 guns.

Three battalions to each regiment, commanded by a major, totaling 300 officers and men and 12 guns each.

Three batteries in each battalion, each commanded by a captain, totaling 100 officers and men and 4 guns.

Two sections in each battery, commanded by one first lieutenant and two second lieutenants, two guns each.

Engineers.—There is one regiment of engineers under the command of a colonel, and divided into 5 battalions, each commanded by a major. There are 600 officers and men in each battalion, or a total of 3000 in all.

Recapitulation:

16	divisions, infantry, 11,640 each	186,240
2	divisions, cavalry, 3,200 each	6,400
2	brigades, artillery, 2,700 each	5,400
1	regiment, engineers	3,000
	Total	201,040

ITALY

General Staffs of Defense Forces.—Since the assumption of the portfolios of Minister of War, Navy and Aviation, by Premier Mussolini, several changes have occurred amongst the officers holding the positions of chief of staff of the three services. The new

chief of staff, general staff of the army, is General Badoglio, with General Grazioli as assistant chief of staff. Vice Admiral Acton and Captain Cantu are, respectively, chief and assistant chief of staff of the navy. For aeronautics, General Piccio is chief of staff, with Lieutenant-Colonel Cassone as assistant chief. The decree for the creation of a general staff for the Air Service was signed by the King on May 7th last. General Piccio was formerly general commander of the G.H.Q. Military Air Service and later Italian air attache at Paris. He is an Italian ace, who was promoted three times during the War for exceptionally meritorious service.

Recent reports from Italy are to the effect that the Ministry of Finance has approved the immediate increase of ninety million lire in the 1925–26 aviation budget in view of the planned reorganization of the Air Service. The present budget amounts to 449 millon lire and with this new increase will total 539 million.

In presenting the bill covering the Supreme Command of the Army, to the Senate, Premier Mussolini stated in part:

"The Bill therefore determines the activities of the higher military authorities.

"It institutes the Chief of General Staff as the person who will provide for the organization of the land forces, for the preparation for war, and for the military subdivisioning of the territory of the State.

"Inasmuch as there must be only one man to preside over the technical-military preparation, only one to draw up the general plans for war operations, the Chief of General Staff will outline for the Chiefs of Staffs of the Navy and Air Service also, the general plans for the coöperation of the Air Service and Navy in attaining a unity of purpose.

"This means a return, amplified according to the increased exigencies of the times and to the experience of the World War, to the appointment of Chief of General Staff, by which the Army, through the political vicissitudes of our recent history, achieved the unity of Italy and the triumph of Vittorio Veneto.

"From the Bill it is clear that the Chief of General Staff is vested with the necessary authority so that, while directly under the Ministry of War, he may develop activities of a technical character to the end of securing in the military provisions, uniformity of trend without discontinuity and without venturing on too radical and consequently dangerous changes.

"Hence, the Chief of General Staff may, if necessary, avail himself of the competence of the senior military authorities forming the advisory assembly known as the Council of the Army.

"Where questions of exceptional importance are concerned, the Chief of General Staff may consult with the present Marshals of

Italy and the Grand Admiral as authorities who, because of their vast experience and personal value, can contribute efficiently to the solution of the most arduous military problems.

"The purposes of the Bill are substantially the following:

"(*a*) Unity of responsibility and of execution where technical provisions appertaining to the Army are concerned.

"(*b*) Continuity of technical trend with respect to such provisions.

"(*c*) Coördination of the general defensive organization of the State—the different forces retaining the necessary independence of technical preparation and of employment—and coördination of eventual war operations."

JAPAN

Reorganization of the Army.—According to the Jiji of May 1, 1925, in conformity with the reform program, the peace establishment of the Japanese Army is to consist of 198,800 officers and men, organized into seventeen divisions. This is a decrease of four divisions, totaling 37,000 in personnel.

All the transfers, retirements and discharges from active service, resulting from the modernization and reorganization program, will probably have been accomplished by the end of the fiscal year, that is, by March 31, 1926. Should no increase be made in the meantime, the Army would consist of 15,540 officers and 183,260 warrant officers, noncommissioned officers and men. However, as a consequence of the creation of some new units, such as anti-aircraft battalions and tank companies, and the expansion of other units, such as the Air Service, the strength of the Army will be between 198,800 and 205,400 at the end of the present fiscal year. The modernization and reorganization program which is to be carried out by April 1, 1930, calls for the addition of 6,600 officers, warrant officers and noncommissioned officers and men, giving a total of 205,400.

Upon the completion of the Reform Program the Japanese Army, according to the Jiji, will be composed as follows:

Infantry	70 Regiments	706 Companies	
17 Divisions of	4 Regiments of	10 Companies	680
1 Formosan Regiment of		10 Companies	10
4 Battalions Manchurian Ry. Guards		4 Companies	16
			706

Cavalry	25 Regiments	70 Troops
17 Divisions	1 Regiment of 2 Troops	34 Troops
4 Ind. Brigades of	2 Regiments of 4 Troops	32 Troops
1 Mach. Gun. Troop per each Ind. Cavalry Brigade		4 Troops

Field Artillery (light)	15 Regiments	90 Batteries
15 Divisions	1 Regt. of 3 Bns. of 2 Batry.	90

(The 9th and 11th Divisions have mountain artillery instead of light artillery.)

Mountain Artillery	4 Regiments	22 Batteries
2 Regts. of 3 Bns. of 2 Btry.		12 Btry.
(9th and 11th Regts. in 9th and 11th Divisions)		
1st. Ind. Moun. Arty. (Takata) 2 Bns. of 2 Btry.		4 Btry.
3d Mount. Art. (Ind.) (Kurume) 2 Bns. of 2 Btry.		4 Btry.
Formosan Moun. Arty. (Taihoku) 1 Bn. of 2 Btry.		2 Btry.

Horse Artillery	1 Battalion	2 Batteries

Heavy Field Artillery	8 Regiments	44 Batteries
6 Regts. of 2 Bns. of 3 Btry.		36 Btry.
2 Regts. of 2 Bns. of 2 Btry.		8 Btry.
(7th and 8th Regts., motorized, have only 2 Btry. per Bn.)		

Engineers	17 Battalions	48 Companies
14 Divisions 1 Bn. of 3 Companies		42 Cos.
3 Divisions 1 Bn. of 2 Companies		6 Cos.

Railroad Troops	2 Regiments	16 Companies
2 Regiments of 2 Battalions of 4 Companies		16 Cos.

Heavy Artillery

3 Regiments	8 Independent Bos.	34 Batteries
3 Regiments of 3 Bns. of 2 Btrys. equals		18 Batteries
	8 Bns. of 2 Btyrs.	16 Batteries

Telegraph Troops	2 Regiments	15 Companies
1 Regt. of 3 Bns. of 3 Cos.		9 Companies
1 Regt. of 2 Bns. of 3 Cos.		6 Companies
(The 1st Telegraph Regt. has an additional Bn., a wireless unit)		

Air Service	8 Regiments	26 Sq. (Cos.)
	Pursuit Squadrons	11
	Reconnaissance Squadrons	11
	Bombing Squadrons	4

(Only the first 6 Air Service Regiments, with a total of 16 squadrons, are actually in existence, although the establishment of the 7th and 8th Regiments on May 1, 1925, has been officially announced. The 8 Regiments are to be completed by April 1, 1929 or 1930. All Regiments, except the 7th, which is the bombing unit, will probably be composite units and have both pursuit and reconnaissance squadrons).

Balloon Corps	1 Corps	2 Companies

(Only one company is actually in existence. Another Company is to be added as a part of the Air Service expansion program embodied in the modernization budget.)

Transport	15 Battalions	30 Companies

(The 19th and 20th Divisions in Korea do not have Transport Bns.)

Tank Troops	2 Companies	40 Tanks

(One Company officially established May 1, 1925, at Korauchimura, Fukuoka Prefecture. Tank Units are to be completed by April 1, 1928 or 1929.)

Anti-aircraft Troops	2 Battalions	6 Batteries

(First Battalion officially established at Field Artillery School on May 1, 1925, and removed to Toyohashi on May 7, 1925. Antiaircraft units are to be completed by April 1, 1930.)

Military Program.—The Jiji of April 7, 1925, states that the principal object of the Japanese Army is mobile warfare; "that infantry, in spite of the experiences of the European War, will remain the principal arm; that each infantry company is to be equipped with six (three at present) light machine guns (automatic rifles with tripods), effecting a total increase of 1908 (sic) light machine guns; that the odd numbered cavalry regiments belonging to the cavalry brigade are to be equipped with 16 machine guns each, four to each squadron; that range of field guns will be increased from 8,000 to 10,000 metres; that new guns will be furnished the field artillery; and that the supply of the foregoing arms is carried by the item in the Army Modernization and Reorganization Program for 'Improvement of Light Machine Guns, Ordnance, and firing material.'"

Army Training Schools.—The month of April brought a general revision of the regulations governing the tactical schools of the Japanese Army. The following remarks concerning field artillery schools, are believed to be of general interest to our service:

The Army School of Field Artillery has as its mission, to instruct students in firing, tactics, and the art of observation and communication; driving; to conduct researches and studies in order to insure progress in instruction of field artillery and anti-aircraft artillery or anti-aircraft gun personnel in the case of heavy artillery; to make experiments and studies regarding weapons, appliances and stores used by field artillery or anti-aircraft artillery. There are five classes of students, admission being usually once a year:

Class a: Captains of artillery—7 months' course in firing and tactics.

Class b: Captains and lieutenants of artillery—5 months' course in firing.

Observation and communication students: Lieutenant of artillery—6 months' course.

Driving students: For lieutenants of artillery—an 11 months' course in horsemanship and driving.

Anti-aircraft gun students: A 5 months' course for lieutenants of artillery.

The School of Heavy Artillery has as its mission the instruction

of students in firing, tactics, the arts of observation and communication, turret service and the art of operating fortress searchlights; to make researches and studies in order to insure progress in the instruction of heavy artillery; to afford practice for noncommissioned officer students; and to make experiments and studies regarding weapons, appliances and stores used by heavy artillery. There are three classes of students, admission being usually once a year:

Class a: Captains and lieutenants of artillery—a 7 months' course in firing and tactics.

Class b: Lieutenants of artillery—a 6 months' course in firing and turret service.

Class c: Lieutenants of artillery—a 6 months' course in observation, communication and operation of fortress searchlights.

There are also three classes for noncommissioned officers from heavy artillery units in turret service, communication service and searchlight service. These courses are from 5 to 7 months in duration.

Among the other schools of the Japanese Army are the Army Infantry School, the Army Communication School, the Army Flying School, the Army Automobile School, and the school for instruction and training in gymnastics, sword and bayonet exercises, bugle calls and general military training.

INDIA

Strength of Army.—The following tabulation shows the authorized strength of the Army in India on April first of each year, and the proportion of British and Indian troops; the actual strength varies slightly from month to month:

Year	British	Indian	Proportion of British	to	Indian
1919	85,989	228,295	27		73
1920	65,926	253,455	21		79
1921	69,559	150,822	32		68
1922	68,411	144,615	32		68
1923	68,563	143,446	32		68
1924	60,514	137,088	31		69

The total annual military expenditure in India during the years in question has been:

	Crores of Rupees	Approximate value in U.S. currency at present rate of exchange
1919–20	83.00	$298,800,000.00
1920–21	81.75	291,870,000.00
1921–22	62.20	223,900,000.00
1922–23	67.75	242,100,000.00
1923–24	62.00	223,200,000.00
1924–25 (estimated)	55.48	198,900,000.00

FOREIGN MILITARY JOURNALS A CURRENT RÉSUMÉ

FRANCE

"Revue d'Artillerie," January, 1925

"How Many 'Future Points' are There?" by Colonel L. Rougeul. The "future point," in anti-aircraft fire, is the predicted position of the target at the instant of burst of the projectile. The author discusses the various trajectories which may be used to reach the target, his conclusion being that the usual method of using the shortest trajectory is the best.

"Fire Direction in Groupements" is the concluding installment of General Challeat's description of two field exercises held in September, 1924. The exercise taken up in this paper was the pursuit of an enemy who is fighting a rear-guard action—attention being especially directed to groupement concentrations.

The fire problems for the divisional artillery (this includes 155-mm. howitzers) consisted of:

Neutralization of enemy units in the zone of action of the supported infantry, at the end of a long advance.

Neutralization of these targets in spite of vague designation.

Support given to the artillery directly supporting the infantry by the general support artillery, "attached technically."

Attack of a poorly camouflaged "orchard formation" of enemy batteries, reported by airplane observation.

Displacement of a direct support battalion with the assistance of a general support battalion, "attached technically."

For the long-range artillery:

Priority of missions in favor of the division, and functioning directly with it.

Conduct of fire by airplane.

For all the artillery there was an exercise which required simultaneous concentration of all guns on a given objective.

The "technical attachment" of a general support battalion to a battalion supporting the infantry directly, consisted of keeping the former informed of the initial and adjusted data of the directing piece of the latter, for each objective. The location of the directing pieces of each battalion being plotted, the data for the "attached" directing piece, and consequently the battalion, could be computed on the principle of a transport of fire—the shift being the distance between the respective directing pieces.

The most effective method of neutralizing the "orchard formation" was found to be the adjustment of the howitzers on visible pieces by air observation, and a general neutralization of the area with the light guns.

The author, in his general comments, brought out the fact that to make a terrain exercise interesting and instructive, the problem must be most carefully prepared, and checked with the terrain over which it is to be held; that the reality for the troops must be sacrificed somewhat by the safety precautions which are necessary in times of peace; that a very good telephone system—outside of the tactical net—is essential, to allow the umpires to maintain the necessary control; that the troops and staffs should be at full strength if possible.

"Concentrations" is an annonymous response to a previous article on this subject appearing in an earlier number. The writer states that concentrations, while valuable under some conditions, do not compare in value in the majority of cases, with a shorter concentration followed by slow continuous fire.

The concluding installment of "Anti-aircraft Fire," by Major P. Vauthier, takes up the circulation of deflections, methods of fire, methods of laying—direct or indirect—secondary corrections—wind, meteorological, etc., and then describes the general procedure in the preparation and conduct of fire.

"The Precision of Fires Prepared Entirely from the Map," by Captain J. Courbis, considers the probable error due to each step in the preparation of firing data, under the heads of firing tables, meteorological data, muzzle velocity and topographical data. The author finds that with the 75-mm. gun at 25º elevation, the probable error of a complete map preparation, is 1.63 probable errors; if the characteristics of the powder are not known exactly, 1.98; and if the meteorological data is not available, 3.69. The probable error for direction varies from 3.5 to 6.5 mils for different ranges.

"Revue d'Artillerie," February, 1925

"A Talk on Artillery," by Major E. Munier, is an extract from a conference discussing the action of the artillery in a three-day exercise held near Camp de Bitche in October, 1923. The force studied was a division, which acted as part of a detachment consisting of two corps and attached army troops. The organic artillery of the division was three battalions of 75-mm. guns and two battalions of 155-mm. howitzers. The pertinent orders of the various units engaged are given, and the action of the artillery commented on.

The first day's exercise consisted of an approach march and gaining contact with the enemy, the division acting as the advance guard of the main force. The infantry regiments, three in number, marched abreast, with a battalion of 75's in direct support of each regiment; the 155-mm. howitzers supported the division as a whole. The advance of the artillery was made by bounds, at least one battery of each battalion being in position, ready to support the infantry, at all times. Liaison was maintained by the proximity of artillery and infantry commanders, by the prompt establishment of communications, and the detail of reconnaissance and observation parties from the artillery.

The second day, the division pushed ahead to outline the enemy main line of resistance. The advance was preceded by a fifteenminute preparation, and was supported by successive concentrations. Only two battalions of 75's were assigned to direct support of the infantry, one being held in the general support groupement. The flanks of the division were screened by smoke at the beginning of the action.

On the third day there was a general attack. The division artillery was reinforced by two battalions of 105-mm. guns, corps artillery, and two battalions of 75-mm. porteé and one battalion of 145-mm. guns (long range), army artillery. One battalion of the divisional seventy-fives was broken up into accompanying units, and attached to the infantry, and one of the porteé battalions was assigned to the direct support groupement. The howitzers and one battalion of the porteé artillery made up the general support groupement, and the corps and army long range guns were given the missions of counterbattery and interdiction. The attack was begun with a fifteenminute rolling barrage, thereafter support being by successive concentrations.

The conclusions of the author are summed up as follows: The essential mission of the artillery is to give the infantry its fire support to the limit of its power. To accomplish this, the divisional artillery should always be ready to bring its whole force to support the infantry, by means of close liaison, the use of every possible means of communication, the efficient operation of reconnaissance, observation and liaison detachments, and a careful study of the plan of displacement by echelons. The corps artillery should be pushed well forward, in order to come into action rapidly, and the army artillery should be as far forward as possible so that it can be placed at the disposal of the units to which it will be attached, early in the action.

"Recollections of an Artilleryman, 1874–1914," completes Lieutenant-Colonel Emile Mayer's story of the "old artillery" and the methods of training then in use. The officers had small chance of

getting a thorough training, as recruit instruction was carried on by a small number of specialists, and the regiment was so reduced in strength that only three or four batteries, out of the twelve, could be equipped and horsed. The mobile batteries for one period were commanded by the senior captains, with their lieutenants and noncommissioned officers, and the work was supervised by the senior major. For the next period, the next ranking captains were in command, with the next major for supervision. While the lieutenants always had the same battery commander, there was always a different major, so the higher direction brought little but confusion and a succession of personal hobbies.

Marching and march discipline were rudimentary, each officer in command putting his personal ideas into practice. It was believed that there should be no trotting on any slope. As there was an interval of from ten to fifteen metres between carriages, and each unit took up the trot as soon as it found level ground, the surging in the column may well be imagined. One invariable rule was a halt of an hour or so, just before getting to camp, to feed horses and men. It was considered essential to the proper care of animals and matériel, establishment of the bivouac, etc., that the anticipation of a meal did not lead to the slighting of the work.

Small arms practice was looked on as useless in a branch whose arm was the field piece, and the main object was to shoot up the ammunition as quickly as possible. Construction of emplacements and field engineering were no more popular, as protection was not considered necessary for the light artillery.

Target practice was conducted on a range similar to the small arms range, at fixed targets at known distances. The officer conducting the fire estimated the amount over or short that the shot fell, and made the correction accordingly. The shell, which were inert, were recovered, rebanded, and used again. To facilitate recovery, cannoneers were placed to the flank of the target to note the point of fall. This led to the establishment, by an ingenious battery commander, of a line of cannoneers at set intervals, and the one opposite whom the shot fell signaling to the firing point. This eliminated all necessity for estimating the amount of error of the shot, and gave greatly increased accuracy!

The general inspection was the culmination of the year's work. The time allotted for the inspection was so short that the inspector could examine for only one or two items. If the battery commander were fortunate enough to ascertain what these were, his inspection proved a "max."

The grand manœuvres came after the inspection, but afforded opportunity for a limited number, as only the equipped and horsed batteries participated. There was no continuity of situation from

day to day, the troops using the same camp each night and working over the same terrain, with slight variations in the situation.

Upon being promoted to the grade of captain in 1878, the author was placed on detached service, and it was eight years before he returned to troops, to command the 7th Battery of the 26th. He found that there had been a great change in the spirit of the army, a complete reorganization, and that the men who had been captains and lieutenants during the war were now in a position to direct policies.

The battery was a self-contained unit, and the battery commander was responsible for the training of his unit, as well as the administration. It was a time of flux, with regulations in the course of preparation, or just issued. The young battery commander, full of enthusiasm and ideas, tried many experiments with the training of his men, endeavoring always to make the training practical, and the men willing and loyal.

In closing, the author emphasizes the necessity of keeping in touch with the spirit of the troops, and the great importance of morale in peace as well as in war. Instruction cannot be accomplished without following the approved principles of pedagogy, and a man who wishes to be a true leader cannot violate the laws of psychology.

"The Thompson Auto-rifle, Model of 1923," is a description of this weapon in some detail, with a number of illustrations.

"A Study of the Best Distribution of Bursts in Zone Fire," is an answer by Captain G. Revers, to an article by Captain Royal, in which the latter deduced the fact that fire for neutralization should all be made at one range, the most probable range of the target—this, of course, in the case where dispersion would cover the desired area if the centre of impact were properly placed. The author of this article admits that Captain Royal's contention is true mathematically, but that due to the errors which may creep in, in the preparation of fire, and which cannot be taken into account accurately, the regulation method of firing at several ranges is the most satisfactory.

"Notes on French Artillery History," by M. Jean Barrada, gives the payrolls of an artillery unit in 1569 and in 1675. These old documents show that at that time "the artillery forms a complete and self-contained unit, with its own finances, its sanitary service, its own dispensation of justice, its own police, its own mounts and the manufacture of its own matériel. The captain general has the greatest powers, his authority covering, in part or in toto, the engineers, wheeled transportation, the naval artillery, and the naval engineers."

La Revue Militaire Francaise, May and June, 1925

The article "Is Germany Working Towards an Army of Militia," signed "C," discusses Germany's military policy. In answering this question, the author contends that an army of militia, such as the citizen army of Switzerland, is not sufficient in case of a sudden outbreak of war; that Germany realizes this and is in reality awaiting a favorable moment to expand her present force into an organization very similar to the old imperial army.

The militia system requires of the army only one mission, the military instruction of the nation. General Von Seeckt, the Commander-in-Chief, has assigned to his army, presumably one of 100,000 military police, three other tasks: to serve as a model standing army, to maintain the traditions of the old army, and to prepare and facilitate the reconstruction of the old organization. By his order every regiment in the old army is represented in the present army by a company, squadron, or battery, charged with the duty of conserving its memory and perpetuating its tradition.

According to the budget report for 1925, the personnel in the army of 100,000 included: 3797 officers; 58,297 noncommissioned officers; 36,499 privates; and 1407 clerks and employees. General von Seeckt explained this unusual number of officers and noncommissioned officers by his statement: "Our purpose is not to organize a small standing army but to provide leaders for the people in the moment of danger."

As before the war, physical instruction is compulsory in all schools, providing for not only individual gymnastic exercises, but also for close order drill. Since the war Germany has required all university students to undergo military instruction. Military instruction is continued in the political and social clubs. Whether the club be monarchist, republican, or socialist, it gives its members a serious military training in target practice, close order drill, and field manœuvres. Moreover, during the last three years, in violation of the Versailles treaty, many young men, mostly students, have been receiving training for a period of from two to nine months in the various regiments of the army. For this purpose, leaves are granted from the universities.

The monarchist spirit still prevails in the army. The absolute authority of the Kaiser has been taken over by General von Seeckt. The Minister of War is in reality a subordinate. As before the war the advancement, except for general staff officers, is by seniority. The commanding general retires officers unfit for promotion.

As proof that an army of militia cannot replace the present type of European army, the author quotes General Wille, the Commander-in-Chief

of the Swiss forces between 1914 and 1919. In addressing the Swiss Assembly, General Wille stated: "If the mobilization of the army was a success it was due to the fact that no enemy attack disturbed it—these mobilized forces did not possess the degree of military valor and readiness for combat necessary to stop an invasion—after the mobilization, five weeks were necessary for a brigade to become an instrument of war."

Colonel Alléhaut continues in this issue "Concerning a German Judgment of French Military Principles," a résumé of the book *Matériel versus Morale*, by General von Taysen. The German author believes that the French infantry is in danger of assuming a rôle subordinate to the arms of matériel, such as the artillery and the tank. The infantry regulations too frequently emphasize the necessity of destruction, or at least neutralization, of the enemy position before an infantry can attack, and the regulations almost intimate that this fire superiority can be obtained only by the artillery or the tanks.

In the organization of the infantry company the importance of matériel is again stressed; here it is automatic rifle. The thirteen men of the combat group have as their chief mission the protection and service of that weapon. The French company has twelve automatic rifles whereas the German and English companies have only six. The German author believes that this organization seriously affects the French infantry's capacity for manœuvres.

Captain Perré, in his article "The German Command and the Tanks," describes how the Allies took the initiative in the use of tanks, and how they kept in the lead until the end of the war. From February, 1916, when the first French tanks (400 Schneider) were ordered built, until November, 1918, the French Government had given orders for the manufacture of 5000 tanks. Germany's total was only 800.

The author attributes Germany's weakness in tanks chiefly to the indifferent attitude toward that weapon of the German command itself. Although the German command ordered the construction of a few tanks and anti-tank arms, they had but little respect for the tank, and by means of considerable propaganda, tried to persuade the German troops that they had no cause to fear their attack.

In the spring of 1917, the allied tanks were not successful. At Craone they advanced in deep columns, were easily observed, and were stopped by indirect artillery fire. A number caught fire due to inexperienced handling. At Ypres in July, 1917, they were halted by the mud and rain. The German command again loudly

proclaimed the tank a failure, failing to recognize the abnormal conditions it had encountered in these battles. From that moment however the tank fought with more success. After Malmaison (October, 1917), the German command admitted their moral effect, but felt that they could be stopped in the future by direct artillery fire. West of Chateau-Thierry on July 18, 1918, 500 French tanks advanced over a front of 30 kilometres; and on August 8th the British advance was preceded by a mass of tanks. The German infantry, finding themselves powerless to stop the tanks with infantry weapons, seeing them pass over and through their lines, and fearing their attack from the rear, were panic stricken and surrendered in ever-increasing numbers.

In spite of this, until the very end of the war, the German command failed to realize the full importance of the tank. Ludendorf later admitted that he could have ordered more tanks by lowering the output of trucks and ammunition. The Allies preferred to cut down on the production of these articles in order to turn out tanks. Results proved the wisdom of their policy. The author concludes that the German command in this instance showed a lack of intelligence and imagination.

In the May and June issues Colonel Normand, an engineer officer, discusses "French and German Fortifications." The author believes that France should maintain a well-organized system of permanent fortifications. He points out Verdun as an exemplification of the true rôle of a permanent fortification: "to gain time; to guard a strong point; to economize personnel and to thus permit the army to organize and assume the offensive."

Other articles in the May and June numbers are entitled "Anti-Avion Fire," "Powders and Explosives," "A Meeting Engagement (Virton)," "The British Empire in 1924," "Was the Battle of the Marne Begun Twenty-four Hours too Early?", and "Attrition of German Strength in 1918."

ENGLAND

"The Journal of the Royal Artillery," April, 1925

THE AIR REQUIREMENTS OF THE ARMY, BY MAJOR-GENERAL SIR W. E. IRONSIDE

This is a lecture, in which General Ironside emphasizes the importance of the air service, especially in the initial stages of a war. He says that the commander of the future must understand air action just as he understands the action of any other weapon of war. There is bound to be a great expansion of the air service as soon as

the next war begins. He said that in the World War the rate at which pilots and observers were required, owing to casualties and expansion, was so great that the British ran out of them. An army going into the field with unsuitable air equipment will certainly suffer defeat. Without the British Navy, the Allies would not have won the war. The Navy protected the home bases. War will commence with intensive air action. While air action, like naval action, can not finish a war, it can protect the bases at home. Then the war can be brought to a successful conclusion by the army. During the time that the army is getting into the scene of action and the navy is active, the bases must be protected by the air service. Of course when the army has started, the centre of attraction is the army in the field. General Ironside sums up the rôle of the Air Force as follows: guaranteeing the safety of the main reserve of men and material; guaranteeing the freedom of action of the Navy; and preparing the way for action of the army. These apply mainly to the case where an enemy would bring air action to bear against Great Britain.

When the enemy is not able to bring air action to bear against Great Britain, the air force will protect the navy bases, but in addition aerodromes must be established within striking distance of suitable targets. Airplanes should be able to fly from the decks of ships to the aerodromes established. While it is difficult to give air support to an army landing in the face of an enemy, it is essential that an army should not be deprived of its eyes at the critical moment. The army depends largely upon the air units to give the necessary information upon which to base its battle plan. A staff officer should be sent up in a plane to make the reconnaissance and he should be thoroughly trained in airplane work. He should direct his attention mainly against the rear of the enemy fighting, troops. Suitable targets will be enemy troop concentrations, depots, and columns of transport and reserve.

General Ironside takes up the question of observation and command. He says that artillery observers should all be artillerymen. He does not think that the artillery commander should take the air, but he does think that a senior artillery officer should be up, and should have authority to switch off large numbers of guns should the occasion arise. There can be objection to battery commanders commanding from the air.

General Milne, who was present at the lecture, added a few remarks about the importance of the artillery observer knowing gunnery and knowing what to do when things went wrong. In the next war we shall be firing at 25,000 yards according to General Milne's belief, and it will take the best man in the battery to fire and observe, and that will be the battery commander from the air.

THE EVOLUTION OF ARTILLERY IN THE GREAT WAR
BY LIEUTENANT-COLONEL A. F. BROOKE

Before the War we underestimated the effect of fire power and during the War the demand for increased artillery power became apparent. Colonel Brooke divides his subject into three parts: guns, ammunition, and accessories.

The field artillery gun has had several defects, such as insufficient recuperation, insufficient traverse, and insufficient range. Of course, the recuperation trouble is being remedied by the use of air instead of springs. The lack of traverse began to be fully realized with the advent of the tank. All the countries of the Allies were lacking in long-range guns and the British had to employ six-inch coast defense guns and mount them on carriages for the field. The development of longer ranges was hampered by the resources available. In the superartillery, the railway mount was quite well developed and ranges obtained up to 15,000 yards. The Germans advanced most in this respect, and at the end of the War were firing at a range of 75 miles. Trench warfare brought about the revival of the mortar, and the re-introduction of this weapon provided a suggested solution to the increasing difficulties of artillery close support in more mobile operations.

As regards ammunition, the British started the War with nothing but shrapnel for their field guns, and for the war of movement at the start, the selection was correct. But with the advent of trench warfare and the lack of heavy equipment, the need for high explosive shell was felt. Smoke shell at first was provided for the Stokes mortar, but in 1918 all field guns were using it, and it was found necessary to increase the bulk. When gas began to be used, preference was given to cylinder gas, but the German use of a high explosive shell with lachrymatory gas, turned attention in that direction. The Germans came along with mustard gas, too, and seemed always to be leading. As for fuses, increased ranges made an increase in the time of burning of time fuses necessary, and a search was made throughout the War for some efficient sort of mechanical time fuse. The use of the long instantaneous fuse is a distinct landmark in artillery and it made the H. E. shell very effective against personnel and barbed wire. It conferred a far greater mankilling power on the heavier types of artillery.

The author then goes on to the third part of his subject, namely, accessories. Air observation, on account of the small resources available, never made serious coöperation with artillery possible. The absolute necessity for close coöperation between the air and the artillery was early realized by all belligerents. But the coöperation never got beyond the stage of actual observation of fire as opposed

to control of fire. It remains for us in the future to develop control of fire from the air. In communications, the Armistice left us with the telephone developed to a high state of efficiency and the wireless still in its infancy, but with a brilliant future. Flash ranging was highly developed during the period of trench warfare, but when the mobile operations of 1918 set in, it could not move fast enough. Sound ranging was also much developed, and could actually be used for ranging the heavier types of artillery. The calibration of guns was made accurate by screen calibration. Meteorological reports became important and useful. The necessity for accurate maps was apparent and the gridded sheet supplied the need. In conclusion, the author states that he has made only a mere outline of the changes brought about by the War, but that that is sufficient for our present purpose. A closer study of the subject might defeat its own end; we might lose sight of the forest for the trees.

CURRENT FIELD ARTILLERY NOTES

Knox Trophy Entries

THE batteries to compete for the Knox Trophy have been selected at a number of the stations. Those so far known are as follows:

Madison Barracks	Battery D, 7th F. A.
Fort D. A. Russell	Battery B, 76th F. A.
Camp Knox (Fort Benjamin Harrison)	Battery A, 3rd F. A.
Fort Bragg	Battery B, 17th F. A.
Sparta (Fort Sheridan)	Battery B, 14th F. A.
Second Brigade (Fort Sam Houston)	Battery B, 12th F. A.
Fort Benning	Battery B, 83rd F. A.
Fort Hoyle	Battery A, 6th F. A.

The terms of the contest require that competing batteries be given no preferential treatment over other batteries at the post. This requirement might be violated by permitting the selected battery to depart from the normal drill program of the post, by excusing the entrant from normal fatigue duties, etc., etc. To assure fairness in this respect, cautions are being sent out.

National Guard and Reserve Courses at Fort Sill This Year

The fall course for national guard and reserve battery officers at Fort Sill will be September 15th to December 12th this year. The spring course, a repetition of the fall course, will be February 23rd to May 23rd. The course for national guard field officers will be from January 5th to February 19th. The national guard officers to take these courses are selected by the respective state authorities; the reserve officers are selected by the corps area commanders.

The national guard, enlisted specialists courses for motor mechanics and horseshoers will be from September 15th to January 31st. The saddlers, battery mechanics, and communications courses will run from February 8th to June 11th.

One Hundred and Eighteenth Field Artillery, Georgia National Guard

For the third successive year, 100 per cent. of the officers of the One Hundred and Eighteenth Field Artillery of Georgia are members of our Association. We have other 100 per cent. organizations, and many which have had over 90 per cent. for several years, but no regiment has yet held a perfect score for three years.

Field Artillery Board Notes

Only two tests have been completed during the last two months, although much work has been done on several others.

The most interesting of the two completed is that on "Firing from Airplane Photographs." During this test, all types of airplane photography were used, from the single photograph up to the finished control sheet. The cameras used were the single and tri-lens. It was desired to use the four-lens, but the Board was unable to obtain one. The tests have occupied nine months and have included the firing of over 20 problems. The report was forwarded in July. Pending its approval, the details of the methods used are withheld. In general it can be said that several of them were as accurate as the average map-firing methods.

The other test completed was that of different types of helmets. These included two general shapes, one the British—or War-time American—, the other a helmet of the German type. Both were made up with and without gutters and with and without coats of arms. The helmets were tested for comfort and protection, the latter by placing them on wooden figures and actually firing at them. The Board concluded that the German type was both the more comfortable and the better protector.

Included in the work of the last month is a report on signal equipment with recommendations. The big changes recommended are:

1. An increase in telephones.
2. An increase in reel-carts.

For each of the units up to the brigade, two reel-carts were recommended and for the brigade, three. It was recommended, also, that a new light wire and light reel be designed.

Since the first of June, the field work of the Board has been greatly restricted by summer training.

The status of some of the tests on hand is as follows:

Training Regulations:

Dismounted Drills and Ceremonies has been undergoing writing and rewriting for the past year in the endeavor to obtain a distinctive F. A. drill which will keep the section intact.

F. A. Instruction and Training has two sections written and is progressing only slowly, due to the press of other work.

Service of the Piece, 240-mm. Howitzer, is being completely rewritten. The rough draft is now being tried out by the 5th F. A.

Tractors:

The Board is submitting a progress report on the T-35 Holt. This report covers the testing of this tractor with two-axle loads;

i.e., a gun and caisson, or two caissons, all loaded (except the gun). The Board is unable to agree with Captain Dunwoody's article in the last JOURNAL. In all tests conducted with these heavier loads, this tractor has proved totally incapable of handling them in bad going or up steep grades. While it has plenty of power, its weight is too light to give it traction. It failed in terrain of a rough or soft character, where horse teams and the Best "30" had no trouble. The Board, therefore, does not believe the T-35 is capable of handling these two-axle loads.

Equipment:

The Moeller field glasses have been recommended for field test by the service.

Mounts for anti-aircraft machine guns are under test, but no completely satisfactory solution has been reached.

Guns and Ammunition:

The tests of the 1923 75-mm., the 1920 47-inch, the 8-inch howitzer, and the 155-mm. gun, are held up by summer training and will be resumed in the fall. This is likewise the case with the flash-less powders for the 75 gun and 155-mm. howitzer; and the new 75-mm. gun ammunition.

Polo

International Military Championship:

Our Army Team has successfully defended our title, won two years ago, to the International Military Championship. We are proud to congratulate our men on the team; they faced the final test and merit every praise. Not only have they proven their metal on the playing field; their work before they left America was a credit to our Army, and the English Press reflects an impression which we well may wish our representatives to create. This latter phase of the contest, alone,—a better understanding between the two great English-speaking nations, which is bound to lead to friendships,—is worth all the efforts of both sides.

From the practical, military viewpoint, the benefits do not go only to the men on the team by any means. General Bullard has said: "Polo combines, as does no other game, the unity of action between two living things—a horse and a man. It requires not only the skill of the player and the training of the horse, but that close coördination between the two which makes them act as one. . . . It develops team-work and self-restraint, strength, endurance, dash, quickness of decision, and courage. It brings into play all of these qualities and more; in fact, almost every requisite for a successful leader of

men. In the Army we have long recognized this and have fostered polo, both as a sport and a training. If the soldier were never again to mount a horse in war—and we know he will—polo will still be for him the most valuable instruction any game offers." Of these benefits, all our army, from the rawest dub on the battalion or regimental team on up, have partaken. For it is from all the widely scattered units that our Army team was selected, and to these scattered units will the lessons of the recent contest return.

The score of the first game, played at Hurlingham, England, on June 20, was 8 to 4; the score of the second game on June 24 was 6 to 4—both in our favor. Major A. H. Wilson, Cav., played number 1 on our team; Captain C. H. Gerhardt, Cav., number 2; Captain P. P. Rodes, F. A., number 3; and Major L. A. Beard, Q. M. C. (Remount Service), back. Lieutenant E. McGinley, F. A., and Lieutenant J. A. Smith, F. A., were our substitutes for forward and back, respectively, but neither got into the two games.

On the British team were: Captain R. McCreery, number 1; Lieutenant W. S. McCreery, number 2; Captain J. P. Dening, number 3; and Major D. C. Boles, back. Major Vivian Lockett replaced R. McCreery in the fifth period of the second game when the latter was injured. Lieut.-Col. E. D. Miller, writing in the *London Morning Post*, describes the first game as follows:

"Our hopes rose high when within one minute of the throw-in the ball was rushed down to the American goal by Boles—a very good bit of work—and Dening scored with a neat shot. But the Americans quickly proved that they were not to be caught napping. They retaliated with a strong combined attack, resulting in a goal by Rodes.

"Wilson then made a fine run and was only prevented from scoring by Boles with a powerful back-hander, but this was met by Beard, and from a scrimmage in front of goal, Rodes again found the mark with a capital back-hander (2–1). From the throw-in England gained possession. Dening passed up to R. McCreery, who in turn sent it to his brother, and the latter put the ball through the centre of the goal (2–2).

"Then the Americans attacked strongly, but Dening saved the situation, and Beard just afterwards missed a shot at goal. But the next five minutes practically decided the match. With tremendous dash and energy the U. S. A. players swept away all opposition and scored three goals, one by Rodes and two by Wilson.

"What the critics who had watched all the trial games feared had happened. Wilson (America's No. 1) proved himself altogether too quick for Boles, and the hitting and backhanders of the Americans were harder, crisper, more certain and accurate than those of our men. We now felt that we were up against a better team,

JUST BEFORE THE FIRST GAME
Left to Right: Capt. Rodes, Capt. Gerhardt, Maj. Wilson, Maj.
Beard and the King and Queen of England.

TURNING THE PLAY
A Scene in the Games at Hurlingham.
The American Players are Dressed in White.

THE WORLD'S CHAMPION MILITARY POLO TEAM

COMING THROUGH
A Play in the Games at Hurlingham.

and that it was scarcely likely that the Englishmen could pull themselves together sufficiently to get on terms. Beard had proved himself an exceptionally fine player, and had not made a mistake. Rodes and Wilson had shown themselves to be full of confidence and to be playing at the very top of their form; and their No. 2, Gerhardt, was doing his job right well.

"The third period went better for the British side, and Selby McCreery found the goal after a fine run by Dening; but even this stage of the game was not impressive from our point of view, for our players were hardly pressed in the early part of it, the Americans missing the goal three times. (Score at half-time, 5–3.)

"During nearly the whole of the fourth period the Americans were attacking and the British Army forwards broke away only twice. Wilson, who scored one goal out of a scrimmage (6–3), had a nasty fall over the boards in the course of this chukker, and it looked as if he was hurt, but he was soon going again at full pressure.

"In the fifth period, indeed, Wilson proceeded to play better than ever. With a beautiful stroke he centred the ball from near the Pavilion to the front of the Chestnuts' goal and scored again with a very neat shot (7–3). However, before the change of ponies, Selby McCreery made a good run, and, passing to his brother, enabled him to score with a nice shot.

"During the sixth period three possible goals were missed by the English players, two of them apparently simple ones. There was no score in this period, of which the British side had the better, but they had not taken their opportunities. The last period was also fairly even, but now there was no time to win. Two more chances were missed by our side, whereas Rodes scored for America with a fine near-side shot (8–4). And so the match was won."

Colonel Miller described the second game, in the *Morning Post*, as follows:

"The start of the game was, from the British point of view, most inauspicious. Wilson dashed away from the throw-in and brilliantly scored for America in less than one minute. During the remainder of the first period, too, except for very occasional breaks-away, the English players were penned close to their own goal-line. The Americans, however, missed three shots at goal, and we hit behind four times in addition, so that Dening had to hit out no fewer than seven times. Just at the end Wilson at last scored again, America thus leading by 2–0 when ponies were changed.

"The British players improved in the second period, but a good drive by Dening went behind, and Selby McCreery, after a fine run, failed in his shot at goal. However, the last-named player redeemed his mistake, for a brilliant stroke by him from the hit-out found the mark. It could be seen that, in spite of their bad beginning,

the British soldiers were in form, especially Boles and Selby McCreery. The former made a great run, but failed at goal, and immediately afterwards from a long angle shot Dening unfortunately hit the post.

"Early in the third period Dick McCreery set up a great attack, but missed, and soon afterwards he hit the post again. It was hard luck. Our players were certainly improving, though their formidable antagonists were in great form. Gerhardt was more brilliant than ever before; Rodes never made a mistake; while Beard gained the admiration of everyone by the wonderful way he could meet the ball on the near-side and carry it on with hard near-side strokes, no matter how closely Dick McCreery stuck to him.

"America's No. 1 was not quite so certain, and missed many chances; but it could be seen that the visitors' ponies were handier and faster than ours, and that the strokes of all four players were more consistent. Notwithstanding all this, the British Army were now holding them, and towards the end of the chukker Dick McCreery, by a fine piece of play and near-side hitting, scored a very neat goal (2–2).

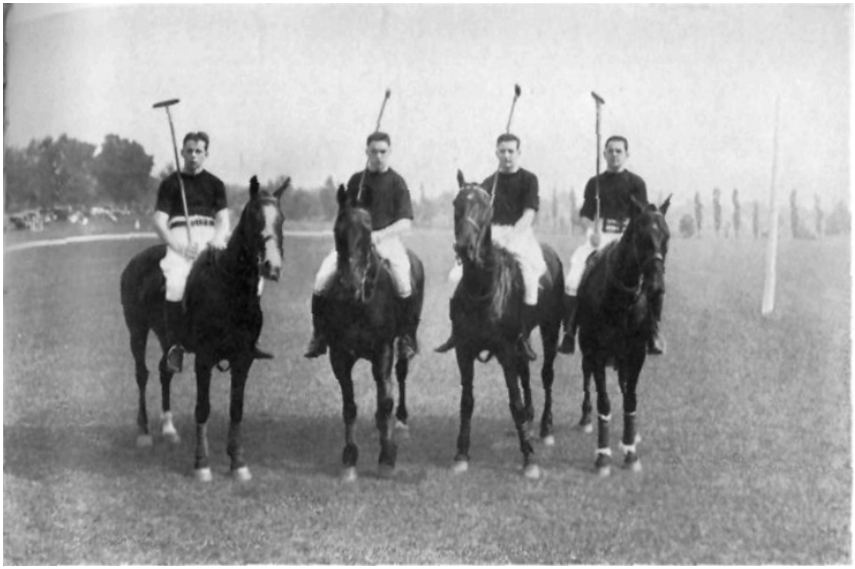
"The opening of the fourth period was noticeable for a fine stroke by Rodes, which Wilson picked up, to give America the lead once more. But afterwards came a great gallop by Selby McCreery, two powerful straight drives, and a bang through the centre of goal, a splendid bit of work (3–3). The period finished with a foul given against America. It was not easy to see exactly what happened, but one of the Americans turned in front of Boles. However, it was not considered a dangerous foul, so America hit out from between their own posts, and there was no result.

"Wilson had a long, clean drive at goal which curled in the air, but he scored immediately afterwards from a scrimmage (4–3). In this period the Americans had much the better of the play.

"Matters were more even in the fifth period, and it yielded a fine exhibition of good polo up and down the ground, every man playing well. Rodes scored America's fifth goal. Boles was conspicuous in effecting some magnificent saves with powerful backhanders.

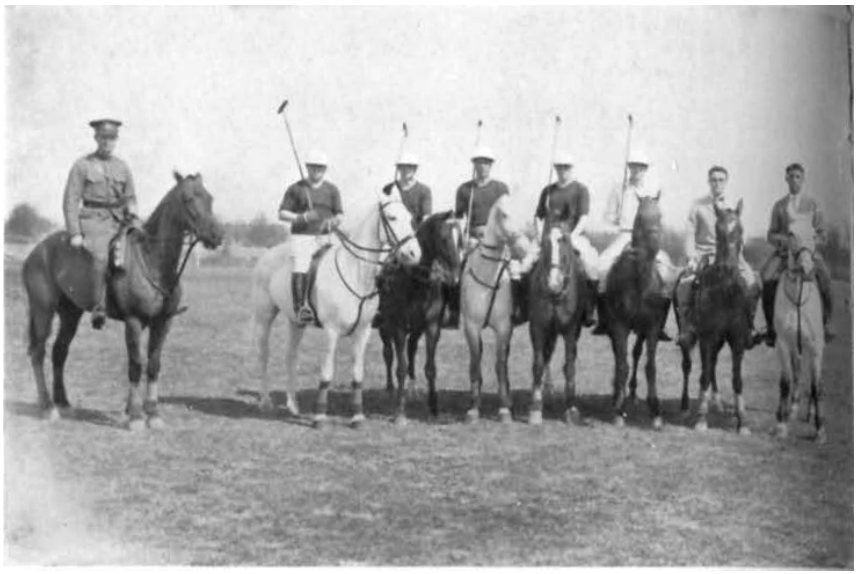
"Then came the accident to the British captain. Dick McCreery was making a good run when his brother's pony slipped and Dening fell over him—two men and two ponies on the ground. Dening was knocked out, sustaining slight concussion, and after some delay Major Vivian Lockett took his place. It was delightful to see Lockett come out and play in his old form. It is no light trial to be brought out as a substitute at a moment's notice in a tight match. His first stroke was a capital backhander which stopped Wilson's run.

"Features of the sixth period were a foul awarded against



HARVARD
The Intercollegiate Polo Champions.
White, Back; Pinkerton, No. 3; Shaw, No. 2; Stranahan, No. 1.

YALE
Back Row: Major Arnold, Olds, Barrett, Simonds, McGregor (Manager).
Front Row: Guest, Hunt, Baldwin (Captain), Hewitt, Herold.



PRINCETON
Left to Right: Captain F. B. Prickett (Coach), W. L. Colket, H. R. Erdman,
I. H. Clothier, 3rd (Captain), E. B. L. Waterhouse, C. M. Taylor, H. H. Wilson (Manager)
J. W. Eben (Assistant Manager).

VIRGINIA MILITARY INSTITUTE
Back Row: B. G. Jones, H. Wilson, H. Gibson (Manager), J. Adams, T. W. Bruton.
Front Row: J. Wise, M. K. Kellogg, Lieut. H. H. D. Heiberg (Coach), W. McD. Saunders, R. Freeman.

Beard, which Boles failed to make good use of, and a grand run by Selby McCreery ending satisfactorily with a fine goal (5–4). It really began to look like "anyone's game," but the Americans pressed very hard in the seventh period. They missed two easy chances, and then Wilson's pony appeared to me to kick their sixth goal out of a scrimmage. And so the match ended 6–4 in favor of America."

In commenting on the first game Colonel Miller says: "In one particular this match, so far as my long experience goes, is an absolute record; and I did not once hear the whistle blown, and I did not hear appeal for a foul. It was the cleanest and fairest game that I have ever seen, and undoubtedly the better team won." Commenting after the second game, he says: "Our visitors have been very welcome; the games have been good and hard, and played in the right spirit; and the contest has given opportunity to officers of both armies to make many friends they could have made in no other way."

Intercollegiate Polo Championship:

The Intercollegiate Polo Tournament was held at the Westchester-Biltmore Country Club, June 13th to 20th. This is the third successive year that this event has been held, it having been instituted in 1923 by Major-General R. L. Bullard, who was then commanding the Second Corps Area. General Bullard donated "The Robert Lee Bullard Perpetual Challenge Trophy" which was won by Yale the first year; last year Princeton won it, and in the tournament just completed, Harvard has carried off this mark of victory.

Instituted by a military commander, and fostered in most cases by the R.O.T.C. units, intercollegiate polo is coming to be recognized, and properly so, as one of the regular college sports. There were many who questioned such a possibility when General Bullard first initiated the movement. For two years the finals were played at Fort Hamilton, quite under military tutelage. Results were so successful and the future so promising, that this year the event was fostered by the American Polo Association and the finals played at the Westchester-Biltmore Club.

Seven colleges entered teams this year. The scores are shown below.

West Point	18			
Virginia Mil. Institute	0			
West Point	17			
Norwich	1			
Yale	16			
Pennsylvania Mil. College	5			
		Harvard	6	
		Yale	5	
Harvard	14			
Princeton	0			
				West Point 3
				Harvard 8

Sixteenth Field Artillery Polo:

In June, 1924, polo in the 16th F. A. consisted of approximately seven players, only one of whom was rated at one goal—the ponies were practically worthless, with no green ones or remounts in training. Major R. E. D. Hoyle took command of the Regiment in July, 1924; he realized the hopelessness of trying to build up a team before the summer of 1925, and so devoted his efforts toward this end. However, a team was formed and entered the fall tournaments in Washington, and managed to win the low goal event. The team of 1924 consisted of No. 1, Lts. Kitts and Bevans; No. 2, Lt. Hood; No. 3, Capt. Tate; and No. 4, Major Hoyle.

During the early winter, practice on worthless ponies was held three times a week in the riding hall, principally to build up interest in polo and for the instruction of recent graduates from West Point. There were six indoor teams in the battalion. A regimental indoor polo handicap tournament was held, the cup being won by the highest handicap team, composed of: No. 1, Kitts; No. 2, Tate; back, Hoyle.

In February, 1925, eight polo remounts were received from Fort Reno, and thirteen from Front Royal. These, after the period of quarantine, were assigned to the officers most capable of training them, some getting three to work on, others but one. At this time, the eight ponies from the old string, which it seemed would have to be played in 1925, were pastured, and all efforts put on new ponies.

The benefit derived from indoor work was most marked, both for ponies and men. The officers had gone to a lot of trouble and effort during the winter and now there are seventeen playing ponies privately owned in the battalion. Several of the remounts showed particular promise of early development, and these were forced in their training more than ordinarily considered desirable. In a tournament in Richmond in April, which the 16th Field Artillery won from teams such as the War Department, Charlotte, Fauquier County, V. M. I., 111th Field Artillery, Fort Bragg, and V. M. I. Club of Richmond, two of these remounts played.

In the Philadelphia tournaments, one of which the Sixteenth won (the Morrell Fund Cups), and the other for the Southeastern Circuit 12 goal championship, which was lost in an extra period by a score of 9:8, six ponies played their first real polo—and against such teams as the Philadelphia Country Club, Rumson, War Department, Bryn Mawr, and the Ramblers; all these teams being particularly well mounted.

Lieutenant G. C. Benson joined in April, 1925, and the 1925 spring tournament team lined up as follows: No. 1, Lt. Benson; No. 2, Lt. Kitts; No. 3, Capt. Tate; No. 4, Major Hoyle. Lieutenant F. D. Sharp has just reported from School at Fort Sill, replacing

Lieutenant Kitts, who leaves the Regiment, and it is probable that Lieutenant Sharp will take Lieutenant Kitts' place at No. 2.

In addition to the first team, there are very creditable second and third teams, with a substitute for each.

The tournament games played are as follows:

Richmond Polo Tournament (Handicap). Richmond. Va.

Teams entered: War Department, 1st Team; Fauquier County C. C.; Charlotte, C. C.; Fort Bragg; Virginia Military Institute; 111th F. A.; V. M. I. Club of Richmond; and the 16th Field Artillery.

First Game: 16th F. A.: Goals earned, 14; by handicap, 0; total, 14. Fauquier County C. C.: Goals earned, 0; by handicap, 7; total, 7.

Second Game: 16th F. A.: Goals earned, 4; by handicap, 3; total, 7. War Dept., 1st Team: Goals earned, 5; by handicap, 0; total, 5.

Final Game: 16th F. A.: Goals earned, 17; by handicap, 0; total, 17. Charlotte C. C.: Goals earned, 3; by handicap, 8; total, 11.

Morrell Fund Cup Tournament, Philadelphia, Pa., June 2, 1925.

16th Field Artillery		*vs.*	Philadelphia C. C. Ramblers	
1. Lt. G. C. Benson	3		1. W. F. Reeves	2
2. Lt. I. L. Kitts	1		2. W. Randolph	4
3. Capt. J. S. Tate	2		3. B. McFadden	4
4. Maj. R. E. D. Hoyle	3		4. A. A. Biddle	1
Handicap	9			11

16th Field Artillery: 5—2—0—3—0—0—1—0: 11 goals.
Philadelphia C. C. R.: 0—1—3—0—0—1—1—2: 8 goals.

Morrell Cup Finals, June 6. 1925.

16th Field Artillery		*vs.*	Bryn Mawr	
1. Lt. G. C. Benson	3		1. G. J. Harding	1
2. Lt. I. L. Kitts	1		2. G. H. Earle	4
3. Capt. J. S. Tate	2		3. B. K. Gatins	5
4. Maj. R. E. D. Hoyle	3		4. J. Converse	2
Handicap	9			12

16th F. A.: Goals earned, 11; by handicap, 3; total, 14 goals.
Bryn Mawr: Goals earned, 8; by handicap, 0; total, 8 goals.

The Rumson 12-goal team and the War Department 12-goal team were eliminated in this tournament in preliminary games.

Southeastern Circuit 12-goal tournament, Philadelphia, Pa., Bala Field, June 9, 1925.

16th Field Artillery		*vs.*	Philadelphia C. C.	
1. Lt. G. C. Benson	3	1.	Smith	0
2. Lt. I. L. Kitts	1	2.	G. H. Earle	4
3. Capt. J. S. Tate	2	3.	E. L. Stokes	4
4. Maj. R. E. D. Hoyle	3	4.	A. A. Biddle	1
	—			—
Handicap	9			9

16th F. A.: Goals earned, 12; by handicap, 0; total, 12 goals.
Phila, C. C.: Goals earned, 6; by handicap, 0; total, 6 goals.

Philadelphia, Pa., June 15, 1925.

16th Field Artillery		*vs.*	Bryn Mawr Ramblers	
1. Lt. G. C. Benson	3	1.	W. F. Reeves	2
2. Lt. I. L. Kitts	1	2.	N. Wyman	2
3. Capt. J. S. Tate	2	3.	W. Randolph	4
4. Maj. R. E. D. Hoyle	3	4.	B. McFadden	4
	—			—
Handicap	9			12

16th F. A.: 3—1—0—0—3—0—1—3: 11 goals.
Bryn Mawr Ramblers: 1—1—1—2—0—1—1—1: 8 goals.

Philadelphia, Pa., June 17, 1925.

Bryn Mawr		*vs.*	16th Field Artillery	
1. Harding	1	1.	Lt. Benson	3
2. Collins	4	2.	Lt. Kitts	1
3. Gatins	5	3.	Capt. Tate	2
4. Converse	2	4.	Maj. Hoyle	3
	—			—
Handicap	12			9

Bryn Mayr: 1—2—0—1—0—2—2—0—1: 9 goals.
16th F. A.: 3—1—0—0—2—0—0—2—0: 8 goals.

Extra period game because of tie.

In this tournament the War Department team was eliminated by the Bryn Mawr Ramblers 9–8.

Considering the fact that the 16th Field Artillery team has only been organized one season, and is composed of the officers of one battalion of field artillery, its record is very encouraging. Few, if any, battalion, or even regimental teams, have ever before beaten civilian twelve-goal teams on the flat.