

THE FIELD ARTILLERY JOURNAL

SEPTEMBER-OCTOBER, 1934

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THE UNITED STATES FIELD ARTILLERY
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September-October, 1934

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THE FIELD ARTILLERY JOURNAL

EDITED BY
DEAN HUDNUTT

MAJOR, FIELD ARTILLERY, UNITED STATES ARMY



Patron Saint of Artillery

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MAJOR GENERAL HARRY G. BISHOP

THE FIELD ARTILLERY JOURNAL

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MAJOR GENERAL HARRY G. BISHOP

On August 31, 1934, the day on which he was to be retired from the United States Army, Major General Harry G. Bishop, third Chief of Field Artillery, died at his home in Washington.

A review of General Bishop's successful career was published in the March-April FIELD ARTILLERY JOURNAL at the conclusion of his term of office as Chief of Field Artillery.

Less than two years ago General Bishop suffered a serious heart attack together with an intestinal malady. He was in constant physical agony and realized that there was no cure or relief for his condition. Through the sheer determination and iron will of a man who will not give up he returned to his office to carry on. In spite of this serious handicap he bent every effort toward the completion of his program of modernizing the Field Artillery to increase its mobility and fire power and in the development of a miniature gun to improve the technical training of Field Artillery officers, Regular, National Guard and Reserve.

During his forty-one years of service he accomplished much for the advancement and improvement of Field Artillery.

His life was one of constant and zealous devotion to service and his career an inspiration to all military men in whom burns the sacred flame of duty for duty's sake.

The Field Artillery has lost a man—a power—a brilliant mind.

BRIEF NOTES OF A LIAISON OFFICER

BY MAJOR VERNON E. PRICHARD, Field Artillery

THE development of an actual or potential factor, new in warfare, should challenge the interest of all military men. The powers and limitations of the older arms and services of the army are well known. Our peace time task is to disseminate a knowledge of them and to improve the technique of their employment and to increase their effectiveness.

There is an ever increasing demand for improvements in transport. New weapons and projectiles are being developed. Methods of fire are being simplified, organization of military units is undergoing radical changes. The thoughts concerning the strategical employment of armies are being materially changed.

The introduction of these developments and their future adoption as sound policies and practices should not be discounted nor discredited by the profession. Innovations may be fads, at the time of their inception, but may become fixtures in the near future. We may not accept, in toto, claims and statements made by proponents of any change or development, nor should we discourage those who would experiment further with new ideas.

In the Air Corps, the Army has a new agency. Whether we ground officers believe in it, like it or condemn it, an Air Force is an actuality, a reality, to play a part in any future war. As to its strategical or tactical employment, regardless of its influence, it will be present in a greater or smaller degree. It makes no difference whether it will play a major or minor part, a part it will play.

Basing the following on the above conclusion, it then follows that all of us should know the probable objectives for assignment to an Air Force. We should have a knowledge of its powers and limitations and then give it such support in its development and training as we can consistently do with our ideas of the national defense.

There are, at the present time, four classes of aviation: Observation, Attack, Pursuit and Bombardment. Of the four classes mentioned above, only one. Observation Aviation, is organically

BRIEF NOTES OF A LIAISON OFFICER

a part of the ground forces at the present time. The other three classes are assigned to G.H.Q. for employment under the supreme theater commander.

Observation Aviation is charged with the duty of securing and reporting information of hostile and friendly troops and installations. This information is obtained by an observer seeing with his eyes and through the procurement of aerial photographs taken from the observation airplane. The information obtained may be communicated to the commander by radio, by dropped messages, by maneuver signals, by pyrotechnics, or by personnel report.

Each Army and Corps will be assigned a group of observation aviation. The group consists of four squadrons of thirteen (13) airplanes each. Whether they will all operate from the Corps airdrome or from separate airdromes is an irrelevant matter to us and will be determined by the situation at the time.

It is contemplated that one squadron will be made available to each front line division for its exclusive use. A portion of the squadron, probably about twenty-five (25) per cent, will be incapacitated during combat, due to varying causes. This leaves about ten (10) airplanes for planned employment.

Of these ten (10) airplanes, some will be assigned command and courier missions, others to infantry missions and the remainder to artillery missions. These latter airplanes, namely those assigned artillery missions, will be considered here.

At the commencement of hostilities or during an advance or retirement, G.H.Q. aviation should be charged with the duty of photographing, at about 10,000 feet, all of the terrain which might be utilized in the future campaign. These photographs should be assembled at a G.H.Q. center, catalogued and prepared for rapid printing of the probable future requirements. When photographs of any area are needed, they should be furnished to the command concerned in the number required. This places in the hands of all commanders a true representation of the terrain in which they are interested.

These photographs should contain an arbitrary grid for ready reference to points or localities which it is desired to identify.

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This photograph should be used by both the artilleryman on the ground and the observer in the air.

When combat is imminent and the artillery battalions are in position, the battalion commander should arrange for an adjustment of his battalion, in case suitable registration points are not available from ground observation posts.

He should indicate to the observer the registration points upon which he desires to fire and the exact time that he wishes to execute his fires. At the designated time, one battery fires a volley, or preferably two. A report is made as to the sensings and a second series is fired, with sensings reported. If the observer does not creep in his sensings, the battery has a bracket and can then determine what its corrections should be to reduce the bracket of the target to the desired size. The data, so determined, should then be corrected for use by the other batteries of the battalion for firing upon this registration point.

The operation, on scheduled time, is repeated for the other batteries of the battalion, being sure to select registration points at different ranges and different azimuths. These registrations should be completed within fifteen or twenty minutes after the airplane crosses the line.

The battalion should have the agency for computing the data, for each reference point, for each and all of its batteries. Probably three such adjustments in a battalion zone will be adequate.

The value of artillery fire lies primarily in its prompt delivery and concentrated effect. If the necessity for prompt fire upon a target is essential, then the securing of a narrow bracket cannot be expected. (Targets of narrow width or shallow depth are not targets referred to above.)

To insure taking advantage of the target and the employment of concentrated fire, the battalion commander should direct the fires of his batteries by determining the data for them and getting fire into the desired area without delay and in considerable density. A battery concentration is not dense; it does not effectively cover an area, occupied by a target of opportunity, in a short time. A battalion concentration is dense and covers a larger area in a shorter space of time.

Hence, when an observer reports to the artillery that a target

BRIEF NOTES OF A LIAISON OFFICER

of a specific character is in a certain square on his photograph, the battalion commander should order his batteries to fire, at once, a volley at the CENTER of the designated square. The observer merely reports the location of the center of impact with respect to the target and the fire for effect commences. The description of the target will indicate to the battalion commander the method of attacking it. Upon the accomplishment of the desired effect or a change of position of the target, the observer should notify the battalion. To obtain the maximum effect of observation aviation, the field artillery should prepare its initial data from aerial photographs and require the aerial observer to report on the center of impact of a battalion concentration, which amounts to an adjustment of the firing for effect.

If precision fire adjustment is desired, it becomes a specialized operation and can be arranged between the artillery commander and observer concerned. This type of fire requires more time and sensings and should not be considered in the general use of observation with artillery missions.

If hostile pursuit aviation is prevalent in the locality, when it is desired that observation aviation function, the time the latter can spend over hostile territory will be limited. If the observer is merely directed to report on the center of impact of a large number of rounds, his task is easier and the whole operation has been simplified so that partially trained observers and poorly trained battery commanders, under a capable artillery battalion commander, can deliver effective fires, promptly and with proper fire direction.

By employing such a method as described briefly above, there will be need but for very few observers who should be qualified in the technique of artillery adjustment. The whole operation must be kept simple and as observers and battery commanders improve with experience, future development of technique will bring about improvement.

The second class of aviation to be considered is Attack aviation. This class of aviation is designed to attack light materiel and personnel by means of machine guns, chemicals and bombs. For the most part all of its activities will be concentrated outside the limit of artillery fires.

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The attack airplane is a monoplane, single engine, two seater type. Its speed varies from 200 miles per hour at sea level to about 170 miles per hour at 15,000 feet. It carries four (4) fixed .30 caliber forward machine guns that shoot parallel to the axis of the fuselage. Each gun fires at about 1,200 rounds per minute. Its usual allowance of ammunition is 600 rounds per gun. In the rear, there are two flexible machine guns of .30 caliber, with 300 rounds each, making a total of 3,000 rounds carried in the airplane.

It has two types of high explosive bombs: fragmentation, weighing about 30 pounds each, and demolition bombs, weighing about 100 pounds each. It can carry ten (10) of the 30-pound type or four 100-pound type. It is also equipped to carry (though not at the same time as the bomb load) two (2) chemical tanks with about 30 gallon capacity. It probably will be equipped with both chemical and smoke bombs.

In the employment of attack aviation, it is contemplated that the forward guns will cover the approach of the airplane to its objective. Upon its arrival at its release line, it will release bombs, either in salvo or in trail, or if carrying chemicals, commence the spraying of its target. Its rear guns will assist it to get away from the objective in case of hostile fire.

Smoke and chemicals, released from tanks, must be laid under two hundred (200) feet to be effective. The presence of chemicals prevents other airplanes from entering this area for about five (5) minutes, unless at a higher altitude than the chemical laying airplanes. The 30-pound fragmentation bomb may be released safely above four hundred (400) feet, while the demolition bomb will be dropped from about 1,000 feet.

One airplane can carry enough chemical to contaminate an area about 1,500 yards long and 200 yards wide. The spraying of gas will be visible in rear of the airplane and give warning of its release. Smoke can easily be seen and will be used to blind ground gunners and to cover the approach or getaway of the attacking airplanes.

Three airplanes make up an element or trio. This is the unit which will make the attack. The squadron consists of two flights, each flight containing three elements, or a total in the squadron

BRIEF NOTES OF A LIAISON OFFICER

of eighteen (18) airplanes. Upon approaching the target the squadron breaks up into elements (3 airplanes) and each attacks its portion of the objective. The route towards and the approach to the objective will probably be at an extremely low altitude. This not only affords protection from hostile pursuit attacks but makes it difficult to observe the approach of the attacking airplanes.

These airplanes will travel at about 300 feet per second. This will indicate the shortness of the time during which they will be under small arms fire.

Suitable targets for attack aviation are: antiaircraft artillery, rail centers, dumps, command posts, troops in bivouac or on the march, reserves, truck trains, smaller boats of a convoy and others of a like character.

The best defense is concealment from the air. Scouts on the flanks to give warning are necessary in daylight. Animals must be reduced to a minimum. During the approach, the attack and retirement, all possible fire power must be brought against the aircraft. The bombs and gas will probably do more damage than the machine guns. Attack airplanes must be fired on by ground troops to their maximum ability.

Pursuit aviation is that class of single seater aviation for aerial offensive combat. By its speed and maneuverability, it gains supremacy over other types of aircraft. It denies hostile observation and if its own observation airplanes cannot get through the hostile pursuit, it must drive off this hostile pursuit, thereby supporting observation missions. It is used to intercept hostile bombardment and attack aviation penetrations. Its speed is over 200 miles per hour and it carries one .50 caliber and one .30 caliber machine gun.

Bombardment aviation is that class of aviation for the destruction of material targets of great resistance on land or sea beyond artillery ranges. It operates both day and night. It has five (5) types of bombs weighing 100, 300, 600, 1,100 and 2,000 pounds. These bombs are made with both high explosive and chemicals. The airplane carries a load of 2,400 pounds of bombs. Its rate of speed is about 180 miles per hour and its range is about 1,000 miles.

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Concerning the airplane, certain factors must be kept in mind:

- a.* Its speed is very rapid.
- b.* Obstacles to ground forces are not such to the airplane.
- c.* It will only be in the air about 25 per cent of the time.
- d.* It cannot remain in one place in the air.
- e.* There are no defiladed areas to it.
- f.* It can carry a powerful explosive or chemical load.
- g.* It returns to centralized control within a few hours after it departs on any mission.
- h.* Its speed and radius of action permit its dispersion on the ground and concentration of effort at the target.
- i.* Its greatest use will probably be strategical.
- j.* It requires adequate protection by ground forces.
- k.* It requires antiaircraft protection for its airdrome areas.
- l.* It is particularly vulnerable on the ground from aerial attack.
- m.* It may be handicapped by adverse weather (blind flying).
- n.* It requires good landing fields.
- o.* It encounters avigation difficulties.
- p.* It is subject to mechanical failures.

Irrespective of the effect that bombs and chemicals released from bombardment or attack airplanes will have, as long as they are flying around with a load of high explosive capable of destruction, they constitute a very potential threat. If antiaircraft defenses and defending pursuit can not drive them off or materially neutralize the force of their blow, they may reach their objective with several tons of high explosive or chemicals.

The depth of the combat zone is deepened to the limit of the radius of action of hostile bombardment. Factory areas, power plants, bridges, tunnels, wharves and shipping are suitable targets for the Air Force. Pursuit and bombardment aviation do not intimately concern the ground troops, but do enter into the higher command's plans and considerations. It makes no difference whether a bomb was aimed, or not, if it destroys a vital target. The threat of its employment may be greater in the mind of a commander than its actual employment.

There may be phases of a war in which the Navy alone will be engaged. This may be equally true of an Air Force. What

BRIEF NOTES OF A LIAISON OFFICER

effect upon the outcome of hostilities or a particular campaign, the Air Force will have, is not known. Its employment must be considered and planned. In its results, it makes no difference whether a bombardment airplane, due to a forced landing, has released its 2,000-pound bomb to avoid landing with it, and the bomb strikes the aqueduct crossing the Hudson River above Peekskill, or that a planned hostile bombardment attack does the same thing. New York City's water supply is crippled. The fact is that an airplane with 2,000 pounds of bombs is near or over a vital target and might hit it.



CALIBRATION OF THE RANGE DRUM ON THE BRITISH 75 MM GUN, MODEL 1917, FOR USE WITH THE 37 MM SUB-CALIBER TUBES

BY 1ST LIEUTENANT SAMUEL A. DICKSON, STH F. A.

WITHOUT a doubt the 37 mm gun tubes, adopted either as sub-caliber or ex-caliber mounts on the 75 mm field gun provide an excellent means of training for service practice. Since the allowance of service ammunition is small, we must make the most of the 37 mm low explosive shell.

It is necessary to adjust ourselves to certain disadvantages when we use the 37 mm. The range is limited, and when the ground is wet and soft the shell splash is hard to see. In brush the smoke puff is small and only a small amount comes through, causing a great many shots to be lost. Here at Schofield Barracks the guava and lantana have been cleared from a large area in Maili Pocket so that service practice can be simulated with the 37 mm shell without a great percentage of the shots being lost.

The greatest variation from service practice encountered by use of the 37 mm sub-caliber is the false range setting that must be set on the range drum in order to have the shots land at the desired distance from the gun. If the target is 2000 yards from the guns a range of 2925 yards must be set off by the number one of the gun squad. A 400 yard jump on the range drum will give only about 240 yards range change on the ground. This does not make such a big difference in axial, bracket and precision fire, except that young officers and non-commissioned officers get a wrong impression of range estimation. We hit a big snag when we start firing small and large angle T with a resulting waste of ammunition. The shot must land somewhere near where you are expecting it to or it will be lost. Our factors will not work until we have changed them several times. If a shift is based on a 400 yard range change, and the range change on the ground is only 240 yards, the next shot may be either lost or sensed as doubtful. This causes an unnecessary waste of our small ammunition allowance.

The worst feature however, is that we teach our junior officers

THE BRITISH 75 MM GUN

to have little faith in the factors r/R , S/C , C/D and C/S , since these factors seldom give line shots until they have been changed at least once.

At Fort Sill an auxiliary range disk was made, tested, approved by the Ordnance Department and used for 37 mm ex-caliber with the French Gun. A description of this disk was published in the *FIELD ARTILLERY JOURNAL* for November-December, 1931.

Due to the difference in the construction of the Range Drum for the French and British 75 mm guns, and also to lack of proper equipment with which to work, efforts to build an auxiliary range drum for the British gun were abandoned.



By accident a very simple device has been discovered whereby the range drum on the British gun can be calibrated for use with the 37 mm sub-caliber tubes. The device consists of a piece of $\frac{1}{2}$ inch adhesive tape placed around the rim of the range drum, allowing the tape to overlap about one inch. From the 37 mm range table the different range settings for the 75 mm range drums are obtained for firing the 37 mm shell such as: 2000 (2925), 2200 (3225), etc. Opposite these range settings on the 75 mm scale, lines are drawn at right angles on the adhesive tape and the 37 mm range is written above this line. The odd ranges are indicated by drawing the line only half way across the adhesive strip, at the

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proper place; these odd ranges are not written on the tape. The lines should be inked in order to be more easily seen; the ranges can either be written in pencil or ink.

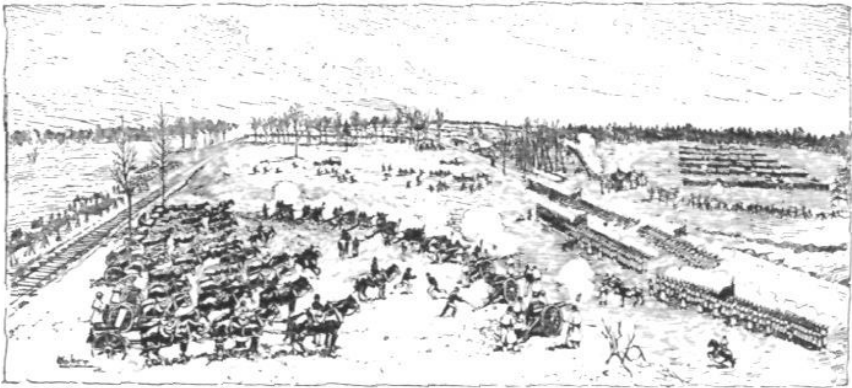
One or two coats of clear varnish will water proof the adhesive tape after the ranges have been written in so that the range drum can be cleaned without destroying the range lines on the tape.

The total time to calibrate one Battery is less than half a day. The tape will last for about one (1) year, and should then be taken off and replaced.

This calibrated range drum was used by Batteries D, E, and F, of the 8th Field Artillery in 1933 and proved most satisfactory. Two or three short pieces of adhesive tape were used to cover up the 75 ranges on the range drum so that the gunner would not get excited and use the wrong range scale.

The 37 mm ranges can be placed on the tape with a typewriter by using a piece of waxed paper on the sticky side of the tape and using a sample strip as a guide. The exact line must be placed under the range after the strip has been placed on the range drum since it should coincide exactly with the proper 75 mm setting.

This scheme is so simple for calibrating a range drum for subcaliber work that it can probably be used in a number of different ways in our service.



THE DIRECT SUPPORT OF INFANTRY IN AN ATTACK

BY MAJOR GEORGE D. WAHL, *Field Artillery*

IT has been found that the average student reporting for duty at the Field Artillery School is uncertain as to exactly what fires are needed in direct support of an infantry attack. Most of these officers are familiar with the data contained in our various artillery texts. Many have given considerable thought to the subject of these fires which, of course, is one of paramount importance to the Field Artillery. Many likewise have become confused because of a lack of a clear cut idea as to exactly how to determine what fires should be used to accomplish the result desired. The purpose of this article is to stimulate interest in this problem and to outline a method by which these fires can be determined and the time of delivery computed by a logical process of reasoning.

The mission of the Field Artillery is to assist the other arms in combat by its fire power. In order to assist anyone intelligently, we first must know what he is trying to do. Therefore, in planning fires in direct support of an infantry attack, we first must study carefully the proposed maneuver to ascertain the mission of the infantry commander and the task assigned to each of his subordinate units. We then study the available information of the enemy and estimate what each of the smaller enemy infantry elements should do to oppose most effectively the attack of our troops. Having finished these two tasks, our problem of direct support fires is simply to so place and deliver them as to interfere to such an extent with the functioning of the enemy's infantry that it will be unable effectively to meet the maneuver of our own troops.

Thus, when our infantry is to attack, the various artillery direct support units get in touch with representatives from the infantry units they are to support and jointly consider the proposed operation. First, they ascertain the number of battalions to be used in the front line and the general mission of each. Next, they study the particular problem facing the battalion, or battalions, which are to be supported. They endeavor to find out exactly how this problem is to be solved. Then they turn to the defense. They seek to determine from a study of the terrain and

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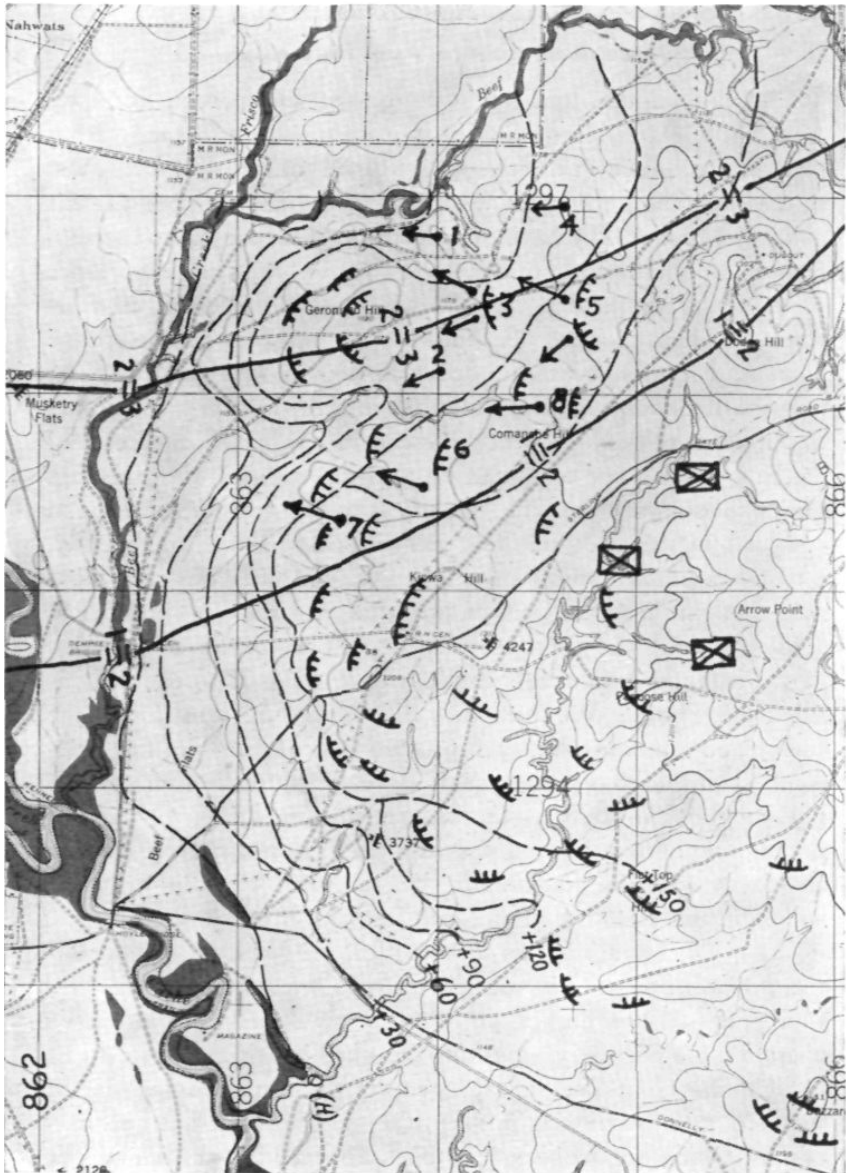


FIGURE 1.—EXPECTED DEVELOPMENT OF THE ATTACK OF THE 1ST DIVISION

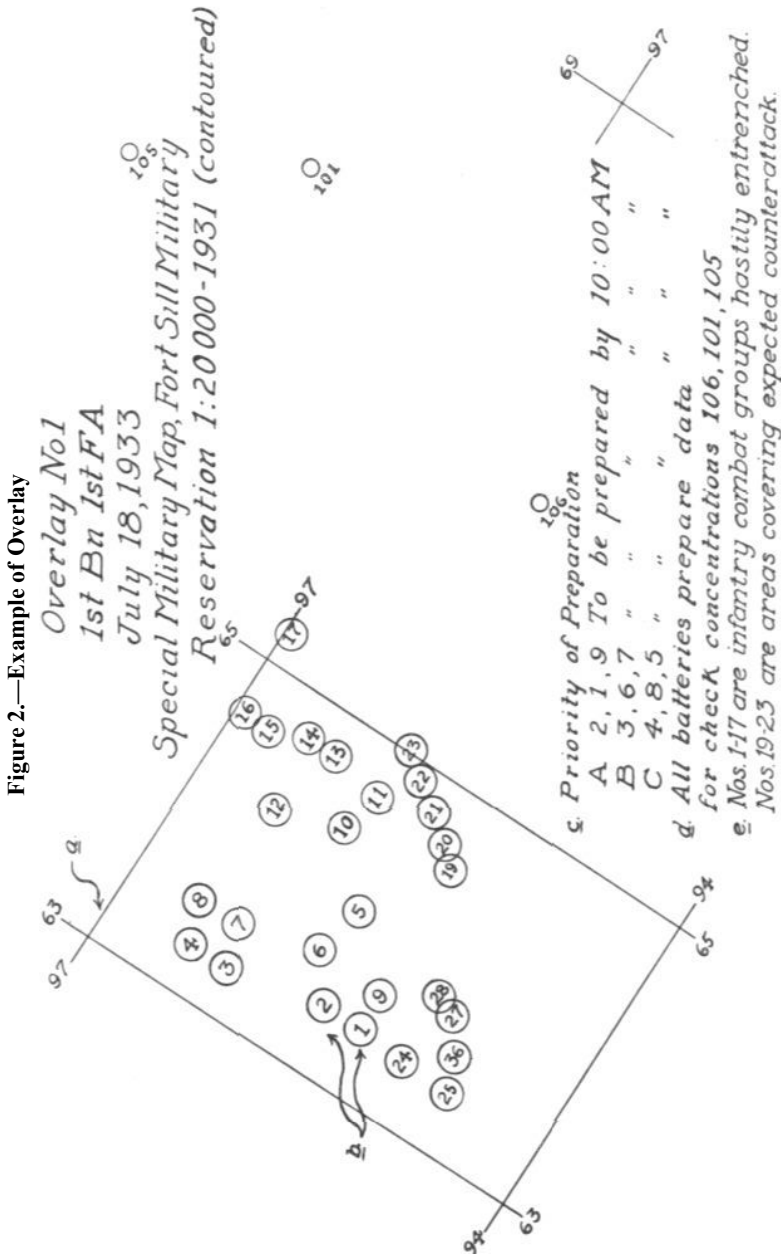
SUPPORT OF INFANTRY IN AN ATTACK

a knowledge of the enemy's strength and of his usual manner of employing his troops, how he will use them in the particular case at hand. Having solved this problem, they try to fit the attack and defense together to determine what probably will happen once the show starts.

In the problem before us, this joint consideration of the attack and defense is of the utmost importance. It must be done as carefully and with as much imagination as the solver is capable. We must imagine ourselves in our infantry front lines at zero hour. We must watch, in our mind's eye, our infantry start "over the top." Having deduced the enemy's probable plan of defense, we can visualize with little effort the first points where resistance will be met. The locations from which long range machine gun fire should reenforce the defense will also become apparent. From our knowledge of our own infantry tactics and troop leading, we estimate how our own troops will go about reducing these resistances; we determine where we can help with our fire; we figure out approximately how long it should take the infantry to complete the reduction of these points. When we have completed this analysis (or procedure), we have, in fact, determined the initial fires for the attack. Then, assuming that our infantry has overcome these initial resistances, we proceed to look for the next points which will oppose the advance, repeat the procedure outlined above and continue throughout the attack.

From this imaginative effort, we can draw up a diagram or chart showing where our most advanced elements are expected to be at certain times and the points to which special attention must be paid. This diagram might well be referred to as the expected development of the attack.¹ Using this diagram it is fairly easy to determine what points should be fired upon at any one time.

¹Figure 1 shows a marked map which pertains to a problem used at the Field Artillery School. The lines indicate the locations of our most advanced elements at the times indicated. The numbers mark the points on which artillery fire is particularly desired. In addition to the information shown on the map, a table showing the times between which fire is desired on the points numbered on the map is included in the text of the problem. In order to plan intelligently the supporting fires in any attack, information essentially similar in nature must first be obtained concerning the projected operation. An overlay and pertinent notes furnish a convenient method of recording the results of a study of a proposed operation or of a conference with the supported infantry for subsequent reference.



NOTES:

- a. Lines or points for orienting the overlay on the map, air photographs, or firing chart.
- b. Concentration areas, together with their designation by number or otherwise, are indicated by circles.
- c. If overlay is received before the time schedule (see Figure 3), the overlay should show the priority for the preparation of data, together with the type of ammunition, if a special type is required.
- d. Check points or check concentrations, for the adjustment of fire and for the use of liaison officers or forward observers in the designation of targets, are indicated.

SUPPORT OF INFANTRY IN AN ATTACK

These are those points from which fire would interfere with the movement of our troops at the time considered.

Two points warrant our particular attention while we are considering the expected development of the attack:

(1) The first point is the use that the enemy will probably make of his machine guns and other automatic weapons. These are the backbone of the defense. We must provide fires to prevent the enemy automatic weapons from firing effectively on the avenues of approach our troops will use.

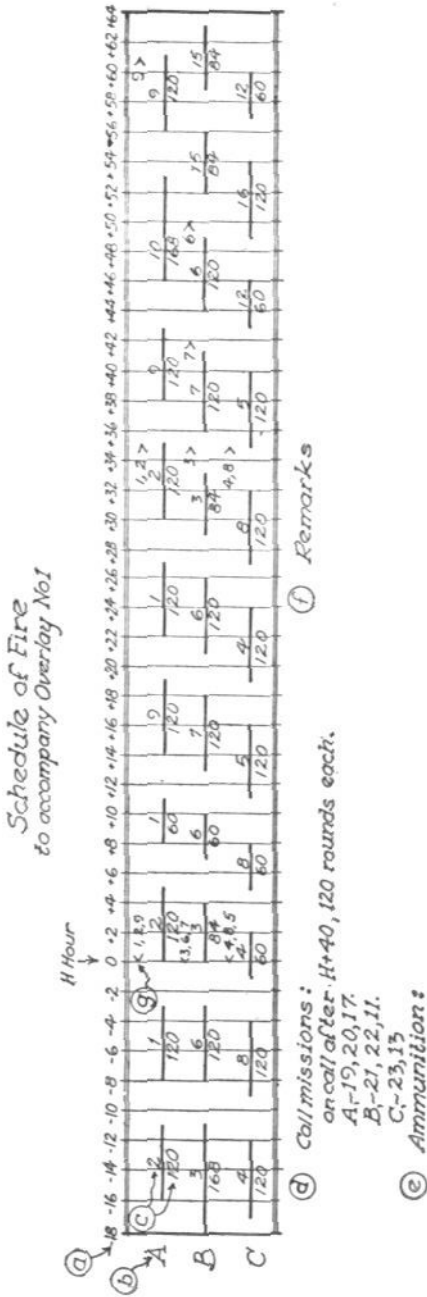
(2) The second point is the use he will probably make of his reserves. The counter-attacks of these reserves are the means on which the enemy will rely to restore his position in case our troops are successful. We must anticipate these counter-attacks. Fires must be prepared to meet them as the enemy troops move to areas from which they can attack; others, similar in purpose to the normal barrage, must be prepared to protect our troops in case the counter-attack is finally launched.

From the analysis which we have just completed, we arrive at a series of fires which are called "schedule" fires. We know the target areas and the time or the limiting times between which they should be fired upon. The assignment of these missions to batteries normally is made by means of an overlay and a time schedule. These are generally understood so no extended discussion¹ of them is necessary. Figures 2 and 3 show samples.

There is one point concerning the making of an overlay which should be mentioned at this time. That point is that the overlay should not show more fires than can be delivered by the units available. This mistake can be avoided by the use of a suitable number and variety of colored pins. For example, let us assume that we have to deal with the 1st Battalion, 1st Field Artillery, a 75-mm. gun battalion, which, in the operation at hand, is to be reenforced by the fire of a 155-mm. howitzer battery from the 3d Field Artillery. During a period of 30 minutes, a 75-mm. battery can neutralize and maintain neutralization of but two areas 200 yards in diameter; during the same period, a 155-mm. howitzer

¹A complete discussion of the use of overlays and time schedules may be found in paragraphs 151 and 152 of F. A. Book 224 if desired.

Figure 3.—Graphical Schedules of Fires



- NOTES:
- Times in minutes with respect to H (zero) hour.
 - The battery to fire.
 - A line showing by its length when fire is to begin and end. The battalion serial number of the concentration is shown above the line; the number of rounds to be fired is shown below the line.
 - A tabulation, by number, of concentrations to be fired on call, with a notation as to the time after which they may be called for.
 - The type of ammunition if special types are required.
 - Any other information such as special instructions necessary with reference to barrages, signals, calls, check concentrations, increased factors of safety for range, rates of fire.
 - The limiting times, between which numbered concentrations are most appropriate, are indicated.

SUPPORT OF INFANTRY IN AN ATTACK

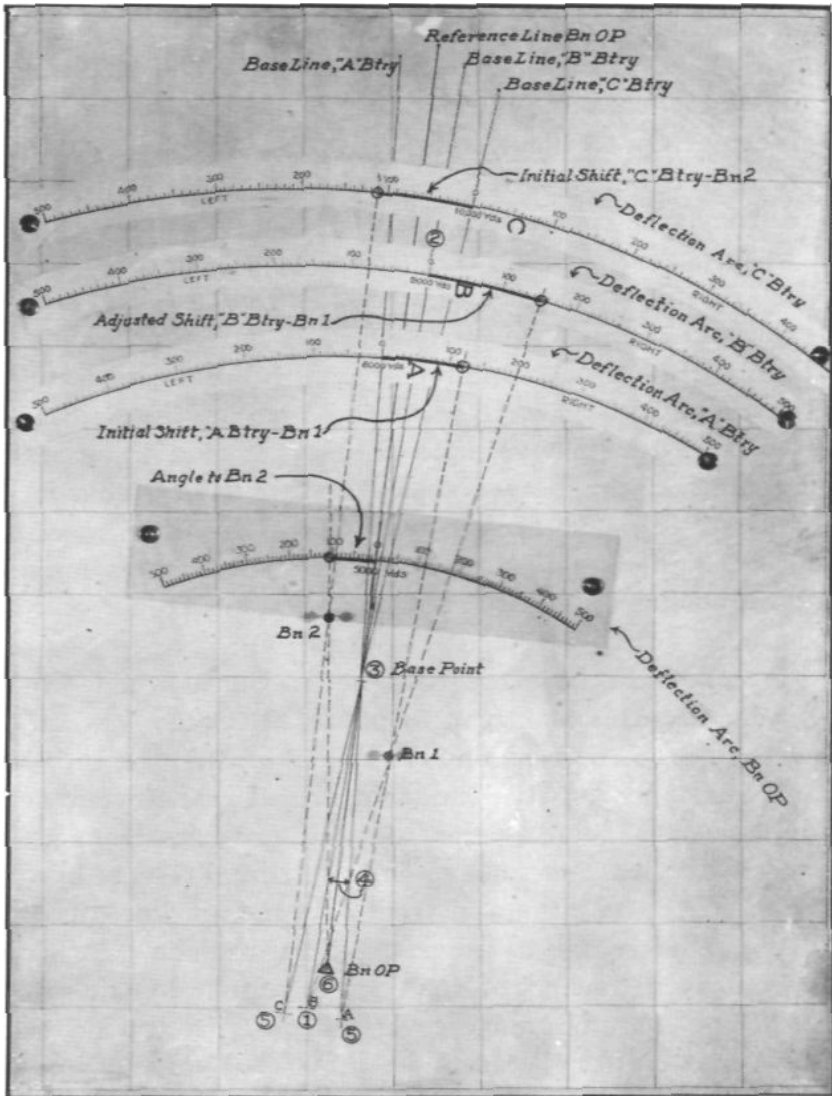
battery can perform the same missions on four such areas. Thus, if we start with two red (for A) two white (for B) two blue (for C) four yellow (for howitzer) and some green (for adjacent units), we will have sufficient pins at hand to show graphically our available fire power.¹ Turning back to Figure 1, the "Expected Development of the Attack of the 1st Division," we consider first the advance of our infantry from the 0 to the + 30 line. We stick our available pins in the map and make a tabular list showing the number of the concentration, the unit to fire, the time fire should be commenced on the target, and the time after which it should be raised. Having completed the task for the 0 to + 30 period, we proceed to a consideration of the advance from + 30 to + 60 in a similar manner, leaving in position those pins showing fires which continue beyond + 30 and replacing at a greater range such as were removed as having been raised by that time. When we have completed this operation on our entire zone of action, our overlay is complete and we have a tabular time schedule from which the fires to be requested from the howitzers and adjacent light units can be extracted and the fires intended for our own batteries transferred to a graphical time schedule as shown in Figure 3.

In making up our schedule we must be careful to provide fires in sufficient depth. This point can be appreciated readily when the organization of a battle position is considered for a moment. Ordinarily the distance between the main line of resistance and the regimental reserve line of a defensive position varies from 800 to 1800 yards. The machine guns on the regimental reserve line can be expected to fire on targets in front of the main line of resistance. Hence, if we are to prevent enemy machine guns from firing effectively on avenues of approach to be used by our troops, our fires at any one time should cover all points from which such fire can be expected for distances from 800 to 1800 yards in advance of our troops. The depth of fire in any particular case depends, of course, upon the terrain. When the country is open, thus allowing machine guns to fire effectively at long range, the fire must be deeper than when the terrain is such as to afford our

¹If a lesser effect than neutralization is to be sought, a greater number of pins can be used.

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Figure 4.—Use of the fire direction chart to plot targets and obtain initial data for observed fire.



Notes: Dotted lines are lines not actually drawn on the board, a straight edge is used to read the angles from the deflection arcs, and a plotting scale to plot or measure the range. A sharp pin or needle is used to plot the target.

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troops good cover. The fire of the more distant enemy machine guns can be very troublesome to our infantry as they are the ones against which our troops have the hardest time in protecting themselves with their own weapons.

By using the method which we have just outlined, it is obvious that many of our schedule fires will fall on points not occupied by the enemy. However, if the fires are placed on points which should be used by the enemy if he is to make the most effective use of the ground to oppose our troops, it is far from wasted. If the enemy is not there already, the fire will tend to discourage his future use of the area fired upon and thus our attack will find him at a disadvantage on inferior ground.

The scheme we have outlined looks very well on paper but it has one fault which any close student of the late war will see at once. It would be perfect if we could foresee exactly where the enemy would be at any particular moment but, of course, this is not humanly possible. Therefore, we must be prepared to take under fire those targets which, appearing suddenly in the most unexpected and unorthodox localities, can wreck the best planned maneuver unless they are promptly neutralized. These targets are referred to as "targets of opportunity." To effectively place fire on these targets, the Field Artillery School has developed the fire direction chart. This chart is shown in Figure 4. It is sufficient for our purpose¹ to note here that provision must be made for these targets and that by the use of the chart mentioned, fire can be opened on them in a relatively short time after they are reported.

In making up our schedule we should foresee the need for fires on targets of opportunity and earmark the unit or units to be used in executing them. The number of such targets to be expected will have to be estimated. If the available intelligence is ample, the schedule fires carefully planned, and a sufficient amount of artillery is available to execute them, the targets of opportunity will be relatively few. If, on the other hand, intelligence is scanty, the schedule fires hastily prepared, or the artillery inadequate, many such targets can be expected. The number of targets expected determines, of course, the number of batteries that should be available

¹If a more detailed explanation of the use of a fire direction chart is desired, it may be found in paragraphs 143 to 145 of F. A. Book 224.

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to attack them. The unit or units earmarked for this mission may be assigned additional missions either reenforcing the fire of other units on important targets or in firing on missions whose temporary discontinuance would not vitally affect the program at the moment; however, they must clearly understand that they are to be ready promptly to attack targets of opportunity on call.

Another point which should cause remark at this time is that infantry units in action rarely are exactly where they are expected to be according to schedule. Allowance must be made for this in making up our schedule. One method is to break the entire schedule up into series of shorter schedules, each of which pertain to a phase of the infantry advance. Thus, starting with zero at H hour, the first schedule could be made to include the assault on the main line of resistance. The second schedule, starting again from zero could cover the advance from the main line of resistance to include the assault on the regimental reserve line. Other schedules would cover succeeding phases. Any one series of fires would run on a fixed time schedule, the last concentrations being continued at intervals until the start of the next series is announced. The last concentrations of one series should coincide closely with the initial concentrations of the next one. The liaison officer should be required to notify the artillery at least ten minutes prior to the time when a new schedule is to start.

The graphical schedule shown in Figure 3 allows the schedule fires to be shifted with great facility to correspond to changes in the rate of advance. For example, suppose zero hour is 6:15 A. M. A strip of paper is prepared reading 6:15, 6:17, 6:19, etc., so that the clock time can be made to correspond with "0," "2," "4," etc., on the schedule. This strip is thumbtacked over the schedule so that the fires to be executed can be read in clock time directly. Let us suppose further that it is now 7:15 A. M. or "60;" the infantry has been delayed and the fire is way ahead. They are now only on the line originally intended to be reached at 6:45 A. M. ("30"). At 7:30 A. M. they intend to resume the advance and the infantry battalion commander wants the artillery fire brought back. The liaison officer has only to radio "7:30 is plus 30." Upon

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receiving that message, each battery commander readjusts the strip showing clock time which is thumbtacked over his schedule so that 7:30 on it now coincides with "30" and commences to fire the fires indicated, being careful to fire nothing short of the "30" line. It should not take longer than ten minutes to make this shift and commence firing the revised schedule.

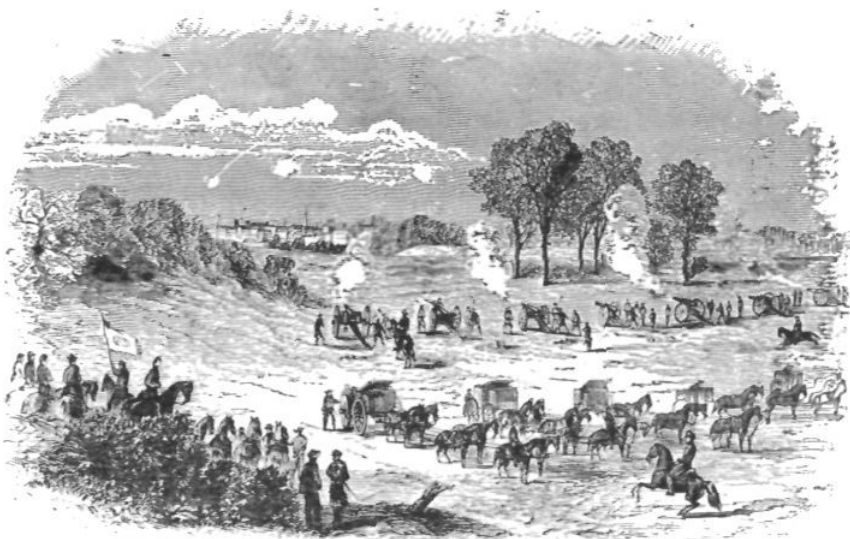
During the late war, whenever an offensive operation was in the offing, an overlay was prepared by the brigade or higher headquarters showing all the fire missions to be executed during the progress of the affair. Two things made this possible. In the first place, due to the stabilized situation on practically all fronts, time was available to prepare and reproduce the overlays. In the second place, the highly organized intelligence agencies then existing provided the information on which these fires could be planned.

This situation does not exist at the beginning of a war and stabilization may not occur soon thereafter. In a meeting engagement, for example, the artillery brigade seldom will be able to accumulate the necessary amount of information in time to be of any value. The best cooperation between the artillery and the infantry can be secured if the man who is to make the attack—the front line infantry battalion commander—assists in planning the fires which are designed to help him with his task. He can assist the artillery by giving in detail his plan of attack; his S-2 can tell us how the enemy can interfere most with this plan; his S-3 can help us by indicating the points the machine guns and automatic rifles can handle and which ones should be covered by the artillery. In order to take advantage of the assistance of this front line infantry commander, the artillery uses the light artillery battalion commander, the man who has closest contact with him, to prepare the direct support schedule fires for an attack in a meeting engagement. It is only where more time and information become available that higher headquarters can handle these missions and even then it should be left to the direct support light battalion unless other reasons make it preferable for the higher headquarters to prepare them. During the war many of our battalion commanders were too inexperienced to do this work. While this may happen again

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the artillery has failed in its mission unless it does everything possible to correct this situation. The king pin of effective direct support is the light artillery battalion commander. He should be handpicked from among the best officers of the arm.

From the above it can be seen that a really proficient artilleryman must have a good working knowledge of other arms and especially of the infantry. A great deal of information can be secured from the supported troops. However, the artilleryman should know what information he needs and take the initiative in securing it. Those who really desire to improve their knowledge of the tactical application of artillery on the battlefield can use their time to no better advantage than in acquiring a thorough knowledge of the powers and limitations of the infantry. An artillery commander who lacks this information will find himself continually at a disadvantage in the field regardless of how well versed he is in the technique of his own arm.



NOTES ON DEFENSE AGAINST AN AIR ATTACK OF A COLUMN ON THE ROAD

A general discussion and a report on a specific march made by a battalion of Field Artillery

BY CRESWELL G. BLAKENEY, First Lieutenant, 13th Field Artillery

THE chief means airplanes have for securing effect on a column on the road is by surprise. In such an attack planes endeavor to effect casualties, disorganize the personnel, and disable such of the matériel as they can. If the personnel have time to take cover the first two objects of the attack are failures. The third mission can only be overcome in the design of the equipment; horses are exceedingly vulnerable, tractors offer almost perfect protection, while the new trucks are still an unknown quantity. By means of surprise, however, planes may secure a distinct advantage in accomplishing their mission. To obviate this surprise every effort should be made to give sufficient warning to the column so that such surprise could not be secured.

It had been found in previous problems that the use of ground scouts was an unsatisfactory way of notifying the column of approaching planes; the planes were on top of the column by the time the scouts could pass information back or up to the column; it was practically impossible to get them off to the flank sufficiently to enable them to see an approaching attack; it often happened that one scout could not see the next or could not give warning to the head of the column itself.

It therefore was decided to use radio to give the warning of an impending attack, the information being sent from OPs located at commanding points along the route. At the head and tail of the column a 161 radio was set up in a Ford truck, insulated from the vibration of the truck by a large piece of sponge rubber. The two other 161 sets authorized in a battalion were sent out to commanding OPs. In order to play the game they were the first elements to clear the initial point, although a reconnaissance had been made the day before for suitable locations. One OP was on a hill on a side road about one-half mile from the main road, the other was located on the main road in a commanding position to observe the approach of planes from nearly every

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direction. This OP, however, was unable to see attacking planes in one spot and a short telephone line was run from the radio to a point where observation in the direction mentioned was excellent. Each OP had one officer in charge, two radio operators, and two observers, whose sole duty was to keep a certain sector under observation for approaching planes.

It had been found by previous experiment that it was unsatisfactory to attempt to send messages over the radio, the vibration of the moving trucks confusing the signals. In consequence definite signals were agreed upon. A series of dots meant "Planes in the vicinity to your front. Be on the alert." A series of short dashes indicated "Planes in the vicinity to your rear. Be on the alert." As soon as the observer had determined that these planes surely were going to attack the column, a long dash was sent. These signals could be distinguished without any question and they proved adequate. On each carriage in the marching column a man was posted to look to the front for signals and one to look to the rear. One of these men was equipped with a pair of semaphore flags. The flags waved over the head indicated an attack from the front. When waved to the side, the attack was to be expected from the rear.

With this set-up the operation of giving warning to the column on the road was as follows: One of the observers notes enemy planes getting into formation several miles in rear of the column and headed toward it. The radio operator begins to send a series of dashes. The planes, however, are not ready to attack and turn to the right. The radio stops sending dashes. There has been no interruption of the progress of the column and it continues on its way. Presently the planes are noticed bearing down on the column from the front. The radio begins sending a series of dots. The observer determines that this time they are headed in and are going to attack. A long dash is sent on the radio. A signalman with flags riding on each truck waves his flags overhead, which signal is passed down, and up, the length of the column. All carriages stop and personnel dismount and take cover. Automatic riflemen take position behind a caisson to *fire to the front*. All is ready for the planes when they hit the column five or ten seconds later.

AN AIR ATTACK

The two trucks, one at the head and one at the rear of the column, are necessary. To pass the information of an impending attack down the entire column from the head takes too long—the planes are on top of the rear elements before they can be properly warned. In addition there are times when, due to bends in the road, trees, traffic, etc., it is impossible to pass the information from one element to another.

There are several considerations involved in the use of the machine guns. There seems to be no really satisfactory method of mounting machine guns so they may be fired on the march. Automatic rifles, though only an experimental agency as yet, seem to have proved themselves as the ideal weapon for the actual defense of a unit on the road. Furthermore, it was thought that if the machine guns could be posted in advantageous positions in order to shoot down any attacking planes before they reached the more vulnerable column, the purpose of protecting troops on the march had been secured. To this end all the machine guns of the battalion were pooled under the battalion machine gun officer. Each pair of guns and their personnel were carried in a light cargo vehicle. The machine gun officer, who had had a two weeks' liaison course with the Air Corps and knew its attack tactics, made a reconnaissance of the route to be covered and determined the critical areas to be protected—the areas where an air attack was the most probable. On the day of the exercise he followed the radio details in clearing the initial point and proceeded to station his guns at such points as best to protect the critical areas with a view of shooting down any planes before they could get to the marching column. Upon arrival at these points both guns were taken from the truck and set up on the ground in such a place as they could get the best field of fire.

The battalion of tractor-drawn artillery was scheduled to march a distance of 15 miles, leaving at 7:00 A. M. The Air Corps had been requested to make two attacks on the column en route. At 7:00 A. M. the two radio OPs and the machine gun details cleared the initial point followed immediately by the battalion. The radio details went direct to their initial stations and the machine guns were set up to cover the approaches to the critical areas. The tractors moved along at five

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miles an hour, while the machine gun details "leap-frogged" them as they passed out of protective range of the guns. The column had just been given the signal for the first halt when notice was received from radio OP No. 1 that an attack was coming from the front. The planes, flying in threes, came in at an angle of 45 degrees to the road, circled at the head of the column, and passed on down its entire length. The radio warning came in ample time and all carriages were halted immediately and personnel dismounted. The planes flew within 400 yards of one of the machine gun stations which, with a good field of fire, should have had some effect on the planes before they reached the head of the battalion. As soon as the planes had passed, the carriages in rear took up the march and closed in to the normal halt formation.

About 15 minutes after the column moved from the first halt radio OP No. 1 noticed the six "enemy" planes in formation flying toward the head of the column. The radio began to send the alert signal of a series of dots but, due to a mistake on the part of the radio operator at the head of the column, the warning of an impending attack was given out. This caused a delay of about three minutes before it could be determined that the attack was false and "Forward" given. Actually the planes had veered to the left up a gulch to get into position to make the second attack. At about this time on the march radio OP No. 1 was unable to observe satisfactorily and it closed station and moved forward to a third commanding position on the road. The next attack came from the front again. The series of dots were sent but, due to the fact that the officer observer could not see the head of the column he waited too long to send the long dash so that the column only had about five seconds' warning of the attack. The first plane over caught the personnel of the center battery in the process of dismounting and would have produced a number of casualties—provided it had ever reached its objective. All six planes flew in column down a gulch, successfully hiding them from the battalion but making them exceedingly vulnerable to one of the machine gun stations, which was in such a position that it could fire at a distance of less than 100 yards directly down into each plane in turn. One after another each plane passed these two guns and exposed itself to fire. It would have been as

AN AIR ATTACK

easy as "shooting ducks sitting," according to the officer in charge of the guns at that point. The last one of the six planes saw the machine guns in position and turned aside to "bomb" the station. If there had been real bullets which took effect on the leading plane the others would probably have been suspicious of that point and turned aside. On the other hand, had there been actual firing the column would have been notified of the approach of the attack sooner than it was.

The exercise showed the desirability of handling the machine guns separately from the marching column to protect critical areas and shoot down attacking planes before they could reach their target. It also showed the necessity of giving warning to the column itself in order to give the personnel time to dismount and take cover. It is believed that the radio is the ideal means to give this warning and that it worked, in general, in a satisfactory manner. Such mistakes as were made were those caused by lack of training and practice in a problem of this kind and could be ironed out successfully in another march.

This problem as carried out was largely one of local application where single battalions of Field Artillery or even of Infantry may be moved from place to place. The means used to secure defense against enemy air attacks, however, could well be enlarged to include larger forces of Artillery and the problem of giving warning to a unit even as large as a Division might be made simpler by using the method as outlined above. In any case the control of the machine guns and radios would of necessity rest with the commander of the force concerned, who would coördinate the efforts of all units. It manifestly would be impossible for each battalion to have small detachments moving up and down the column to get into position to defend its limited length.

There is of course the ever present question of, "Where is the transportation for the various OPs, radios, and machine guns to come from?" The transportation involved in this particular problem was no more than that ordinarily available in a battalion at peace strength. The mission of the battalion was to march from place to place, protecting itself against air attacks. In such a case all battery machine gun trucks are available. The truck normally transporting the radio equipment and one of the liaison

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omnibuses could be used at the head and tail of the column. The other liaison omnibuses might be used for the radio OPs. In a meeting engagement, however, where all except the radio truck are on other more important missions, other transportation would be necessary. The radio truck and the wire truck which normally march with the column under such circumstances could be used for the warning trucks. The executive's car from two of the gun batteries might be commandeered for the radio OP parties. Depending on the importance of the mission, others no doubt could be made available.

In the case of the new truck-drawn artillery, the problem of giving adequate warning becomes more acute because the speed of the trucks is greater and it requires more time for them to halt and prepare to "receive their guests." The method of using radio to give this warning would seem to be the only possible solution. The handling of the machine guns offers an opportunity for further study for, with a column moving at 30 or more miles an hour, it might be impossible to "leap-frog" the column with the machine gun trucks. Therefore these details would have to be sent ahead to cover the critical areas, which would have to be selected with extreme care, as the number of machine guns would limit their use to only a few positions.

In any event there is a necessity to furnish better protection against attack aviation than is now being done. This method, as outlined above, provides a means of shooting down attacking planes before they reach their objective and gives the personnel with the carriages sufficient warning to allow them to dismount and take cover. It offers one solution to the problem and could be adapted, with obvious modifications, to any unit equipped with truck transportation.

*LET US HAVE YOUR BOOK AND
MAGAZINE ORDERS*

LIEUTENANT COLONEL J. R. BRABSON

It is with deep regret that the JOURNAL announces the death of Lieutenant Colonel Joe R. Brabson at Walter Reed General Hospital on August 13, 1934.

Commissioned in the Field Artillery in 1908, he saw service in Cuba, Philippine Islands, France and the Panama Canal Zone. While in France he served as Assistant Chief of Staff, G-3, 1st Army Corps; Chief of Staff 28th Division and participated in the Somme Defensive, Aisne, Champagne-Marne, Aisne-Marne and Oise-Aisne Offensives. He was awarded the Distinguished Service Medal "For exceptionally meritorious and distinguished services. As Chief of Staff of the 28th Division during the Marne-Aisne Offensive he rendered conspicuous service. Later as an instructor of the fourth course at the Army General Staff college at Langres he ably assisted in the instruction of a large number of officers recommended for General Staff duty. Upon completion of his duty at the Staff School he served with marked success as G-5 of the 2nd Army."

Since the war he had held many important positions. He was a graduate of the University of Tennessee, the Mounted Service School, Advanced Course The Field Artillery School, The Command and General Staff School and the Army War College.

"Joe" was loved by all with whom he served. Strict was his code of discipline but it was discipline tempered with absolute justice. He received loyalty from subordinates by his energetic example and respect by his devotion to duty.

LAYING WIRE

A METHOD USED BY THE 1ST BATTALION, 5TH FIELD ARTILLERY

BY CAPTAIN HENRY E. TISDALE, *Field Artillery*

DURING a recent tactical inspection of the First Battalion, Fifth Field Artillery, made by Major General Lucius Holbrook, Commanding the First Division, the following method of laying wire was used. The basic idea was the practical use of a commercial wall plug and socket, eliminating all cutting and splicing and thus obtaining great speed. Commercial plugs and sockets were used throughout and no attempt was made to design a special plug or socket.

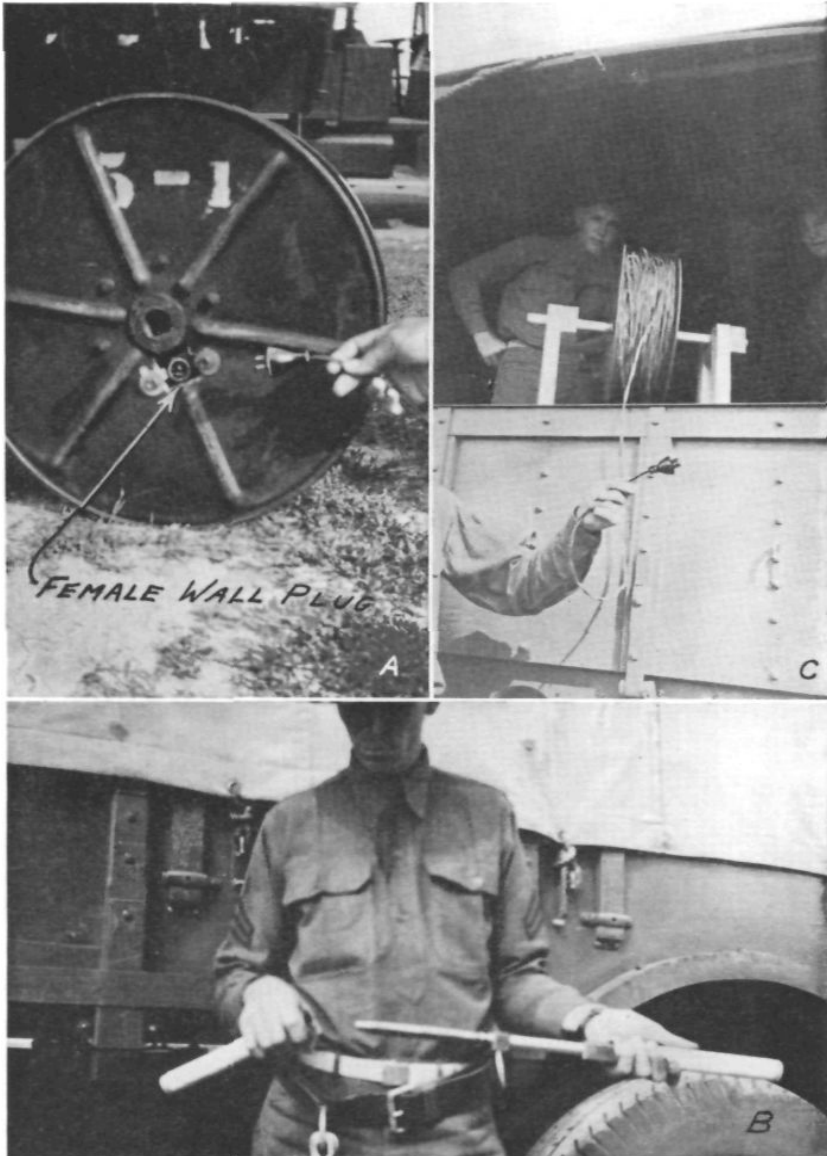
The method used was as follows: All reels, DR4 (pressed steel wire spools) were equipped with wall sockets, female. The free end of the wire was fastened permanently to a plug, male. See illustration "A". In order to prevent any strain on the connection, the wire was tied to the spool before fastening to the socket (female). The plug (male) end of the wire must be fastened in a similar manner either to a stake or to the spool to which it was desired to make a connection.

The reels were then mounted on the removable axle RL27. See illustration "B". The wire was laid over the tail-gate of the trucks from common removable wooden frames or horses. See illustration "C". The horses were loose so that they could be turned at an angle to feed the released wire directly to the side of the roadway. Three or four wires could be laid from one truck at the same time. It was also possible for two or more trucks to work simultaneously in laying wire on the same line and the wire could be taken up by trucks working together in the same manner. The men in the truck should wear heavy gloves for laying and rewinding the wire.

When the full length of wire was not required and the spool not completely laid, the unwound wire was included in the circuit. It was found that the extra resistance and consequent wear on the batteries was negligible for all practical purposes.

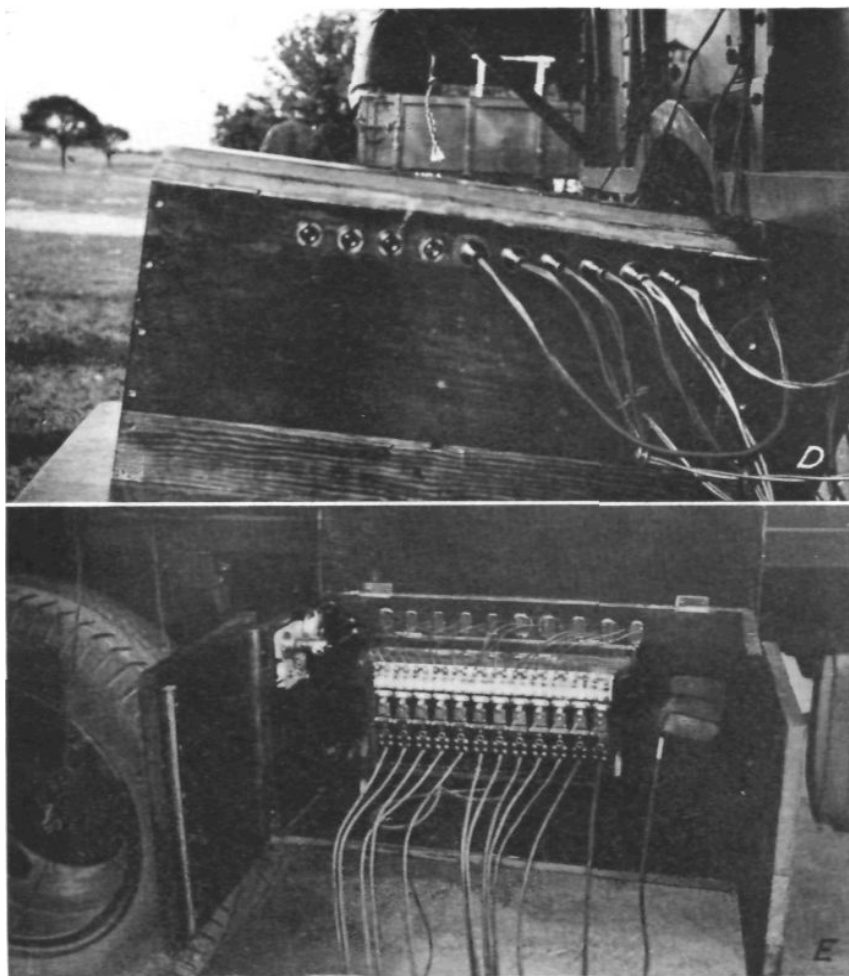
When laying short lines and in places where a truck could not go, two men carried the reels. The Battery had several pieces of wire, fifty feet long with plugs (male) on each end. These were

LAYING WIRE



used for crossing roads, short extensions and general utility. There were also some pieces with one plug and one free end which were used for connections to lines not using this system.

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The switchboard, which was of home construction, was equipped with sockets (female). See illustration "D". It was supported on the outside of the truck by a removable angle iron frame. See illustration "E". All telephones were equipped with sockets (female).

The C.P. truck was permanently wired for three telephones. The ends of the wires had male plugs attached for connecting to the switchboard.

In recovering the wire the men turned the spools by hand. This would appear extremely laborious but from personal observation the writer found that such was not the case.

LAYING WIRE

The following table, which is the actual log kept on the installation made during our inspection by General Holbrook, shows the speed with which wire can be laid.

Time of departure from Madison Barracks, 9:35 A. M. Distance traveled to rendezvous $7\frac{1}{8}$ miles.

Line	Wire Laid	Time Completed and Connected	Method
O.P. to C.P.	8 reels (about 4,800 yds)	10:25 A. M.	1 truck
"A" Btry to C.P.	2 reels (about 1,100 yds)	10:26 A. M.	1 truck
"B" Btry to C.P.	4 reels (about 2,100 yds)	10:30 A. M.	1 truck
C.P. to Airplane Radio (109) set	2 reels (about 900 yds)	10:38 A. M.	Hand

C.P. TRUCK 3

lines to M.C.,

C.P., C.O.,

Installed and Connected 10:20 A. M.

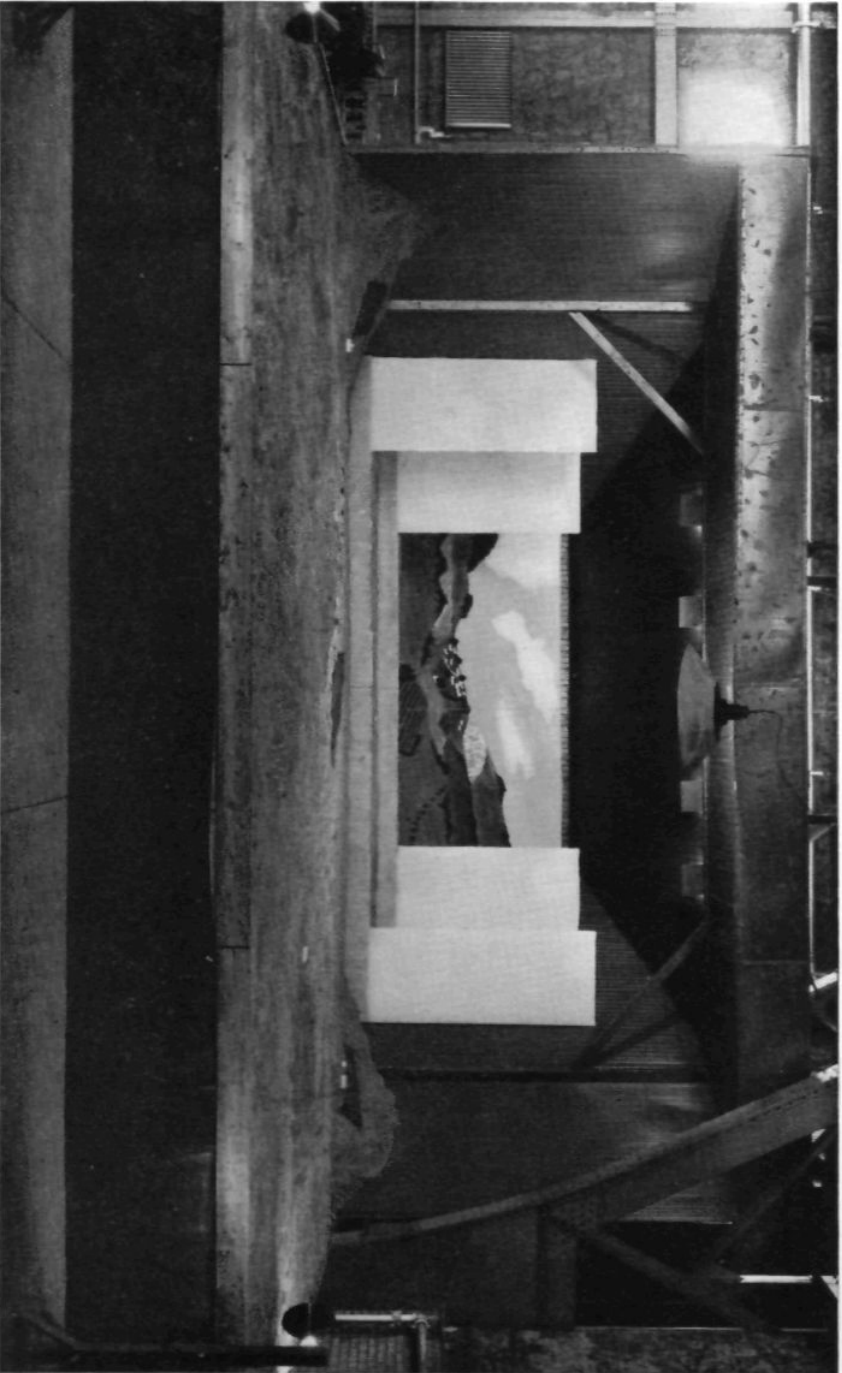
Note: All reels had about 600 yards of wire. (They are supposed to hold 700 yards, factory wound.)

The four radio sets, loop type 161, were placed in operation immediately upon arrival at the position. One was placed at the O.P.; one with the Seventh Field Artillery; one at the C.P.; and one with the firing Battery, which in this instance had an unusually long telephone line to its O.P.

Reconnaissance had been previously made and the Battery left Madison Barracks in a truck column as a unit.

From the above table it is obvious that the wire installation was rapidly completed. In less than an hour the wire net was in operation. A tractor and reel which left Madison Barracks at the same time as the truck column appeared at the C.P. position one hour and twenty minutes after our setup was in place and operating. The contrast in time shows the advantage obtained by using the method outlined in this article.





INDOOR TARGET RANGE AT CORNELL UNIVERSITY

THE USE OF THE FIELD ARTILLERY TRAINER AT CORNELL UNIVERSITY

BY CAPTAIN W. H. E. HOLMES, Field Artillery

THE new Field Artillery Trainer was most useful in teaching the preparation and conduct of fire at Cornell University. It was received in time to be used during the spring term. Due to the unsettled weather conditions in Ithaca, it was necessary to construct a terrain board in one corner of the Drill Hall. There were a number of vertical pipes, easily identified, around the Drill Hall at various distances up to 100 yards, which when converted to use on the Trainer corresponded to aiming points 10,000 yards away.

The student was given the usual class room instruction in the preparation of firing data. Then he was taken up to the terrain board and given practical problems. A target on the terrain board was designated as well as an aiming point. At first the ranges were given, the data was computed and trial shots fired by the Trainer, demonstrating the accuracy of the student's calculations. Within a very short time, the students were able to estimate their own ranges.

The class was shown the actual effect of the various steps in the calculation of the data. To demonstrate the effect of the target and aiming point offsets separately, the observation post (a battery commander's telescope) was established on the aiming point—gun line and on the target—gun line respectively. The measured angle was set off on the sights, the gun was fired and the deviation was measured. The target offset (aiming point offset) was calculated and checked with the deviation by firing with the change set on the sights. The observation post was moved so that both offsets had to be calculated. This was demonstrated by firing the Trainer with the measured angle only set off on the sights. After firing with this setting, the deviation from the target was measured. The aiming point offset was calculated and applied to the gun. The deviation was again measured. Next, the target offset was computed and applied to the settings. The Trainer showed very accurate results.

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After carefully bore-sighting the guns, it was possible to demonstrate the different types of sheafs and the necessity of figuring deflection differences. An aiming point about 20 yards from the guns was selected for this purpose. The effect of opening and closing the sheaf was easily illustrated as well as the effect of the aiming point to the front, rear, and flank.

The change in site was also shown to the class by firing one gun with the same range setting and changing the angle of site. Care was necessary in this demonstration that the gun was clean before each round was fired. Variations in the propelling charge sometimes required that rounds be eliminated from consideration as they were obviously erratic. This was also true in the firing of problems.

On the whole the Trainer was very accurate. In a number of bracket problems, two hits were obtained in one salvo. While in precision problems, the target was destroyed in several cases. The best results were obtained when the wire brush was used on the tubes after each round and the reamer after every third round.

In order to demonstrate indirect laying, a portable blackboard was placed between the guns and the target area. The students were placed on the flank so that their view of the target was not impeded.

In the conduct of fire, the target and the aiming point was designated. The student was required to estimate his ranges and compute his data. In some problems only the target was designated.

The firing of problems was expedited by setting up two B. C. telescopes, thus forming two observation posts. Targets were designated to each O. P. and assigned to students. While one problem was being fired, the data for the next problem was being prepared at the other O. P.

As the terrain board was in a fixed position, the firing point was varied daily. The location of the targets and the terrain features were also changed, thereby creating a new target area over which the student had never fired. Ranges and angles were varied accordingly.

Much more interest was shown by the students in the Trainer

TRAINER AT CORNELL UNIVERSITY

than in either the "Train-Board" or the large electrical terrain board as they could see the practical results of their calculations as well as firing the guns. With very little instruction the Trainer was served quickly and accurately.

The indoor terrain board used with the Trainer consisted of a large portable stage and a platform. The stage, which was 18 feet deep, was 30 feet wide at the front and 20 feet wide at the back. The sides tapered to the rear and the roof sloped towards the back, making it an excellent backstop. It was mounted on wheels as it was used in different parts of the Drill Hall for entertainments. The platform, which was 30 feet wide and 20 feet deep, was placed in front of the stage. The platform was made up in six 10-foot square sections, similar to tent floors, and mounted on trestles so that it could be readily moved in case the floor space was required for other purposes. The trestles were graduated in height so that there was a slope of one foot in the 20-foot depth. The front of the board was 2½ feet from the floor and the stage was 3½ feet high. Three 10-foot trestles of each height were made and locked together with pins. A set of trestles thus extended the entire width of the board. They were spaced five feet apart in depth.

The floor sections were made of one-inch flooring nailed to 2 by 4's laid on edge. The two center sections did not have the 2 by 4 joists on the edges. The inside edges of the outside sections had 2 by 4's projecting beyond the flooring forming a rest for unsupported edges of the center sections when the platform was set up. The outside sections used five 2 by 4's while the center sections only had 3 pieces. The joists under adjacent sections in depth were spaced so that they could be pinned together using 30-penny spikes. The front and sides of the platform and trestles were covered with a dark green burlap, which also acted as a stop for any short shots.

Wooden frames covered with target cloth upon which a landscape was painted were placed on the stage producing a more realistic background. As the stage had two steps on it, the risers would have a landscape, blending it with the "back-drop." These risers were padded with rug padding, one inch thick, over which was placed the target cloth. The padding prevented the shot from

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bouncing. Wings set on the steps were to be painted also with a blending landscape. (In the photograph, the wings and the risers show as white panels as the artist had not finished his work.) The painting was done with calcimine over a filler painted on the target cloth. The terrain was blended into the painted scenery. It was necessary to have the scenery movable in case the stage was needed for other purposes.

The floor of the stage and platform was covered with about three inches of sand and sawdust which could be raked easily into the desired hills and valleys. This mixture gave a well defined burst, the size of which could be varied by sprinkling with water. Powdered paint sifted over the ground gave the necessary color to the terrain. Green paint was used for fields and yellow paint for roads. In addition, strips of dark green burlap laid on the ground appeared through field glasses to be patches of woods. Large piles of sand formed "mountains" at the sides of the stage.

Houses were made to the scale of one to a hundred and painted. Infantry targets were represented by sticking into the ground toy clothespins. Small blocks of wood made to scale formed gun sections of an artillery battery. Tanks were cut out and "pill-boxes" were made from wood. Very small metal toy "Army" trucks were placed on the roads to form truck trains.

One battery target was constructed so that it would appear to be firing. In each of the blocks of wood, representing a gun, was drilled a hole into which was inserted an electric light. A long cable terminating in a switch and battery box permitted the operator to flash each gun separately and also to flash all guns simultaneously, thereby giving the effect of a battery firing salvos or volleys. In the box were five rotary switches with levers. Four switches each controlled the light in one gun, while the fifth switch was connected to all four guns. The cable was made of six pieces of double cotton covered copper wire, tied together. The four guns were mounted on a strip of wood which could be buried in the sand. The cable was also buried. When the battery was to be fired upon, the operator was signalled to flash the guns. The target was designated as, "An enemy battery is firing on our infantry. You can see the flashes. Take it under fire."

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The entire terrain board was lighted by a 1500-watt lamp placed overhead. This was supplemented with four portable 100-watt lamps placed on the front flanks and five 75-watt lamps fixed to the top of the stage and illuminating the scenery. All lights were fitted with reflectors shielding the glare of the lights from the observers.

As the terrain board was above the floor of the Drill Hall, the Trainer was mounted on a stand allowing the gun crews to sit behind their guns. The observers stood in rear or on the flanks of the battery, depending on the type of instruction. A maximum range of 75 yards was obtained without interference with the roof. The usual ranges fired were from 35 to 50 yards.

During the next year, it is expected to finish the painting of the landscape and also to increase the size of the board so as to give a greater depth of target area.

LET US HAVE YOUR BOOK AND MAGAZINE ORDERS



INFLUENCE OF INDUSTRIAL PRODUCTION ON MILITARY OPERATIONS

FROM A LECTURE GIVEN BY COLONEL MENU AT THE CENTRE DES HAUTES
ETUDES MILITAIRES

FOREWORD

This paper is a translation from a lecture prepared by Colonel Menu of the French Army. I am deeply impressed by the clarity with which it presents the effects on military actions of the French Army in the World War by these two factors:

- I. Matériel production lagging behind predictions and thus crippling planned military operations.
- II. Confusion and delay in matériel production caused by changes in military equipment policies immediately preceding and while campaigns were in progress.

I believe that a careful study of Colonel Menu's lecture will prove of interest to all officers of the Army.

HARRY H. WOODRING,
The Assistant Secretary of War.

February 8, 1934.

THE object of this study is to seek, in the light of the events of the last war, the connection which exists between the manufacture of war material and the conduct of military operations.

We shall see that during the period which extends from September, 1914, to November, 1918, that is to say during 50 months of operations out of 51, the problem of manufacture weighed heavily on the decisions of the command;

That at no time during the war did the Commander-in-Chief have at his disposal the material which he needed and which was indispensable to him in order to conquer the adversary;

We shall see how the material means which he counted on in 4, 5 or 6 months' time and on which he had based and prepared his operations, failed him at the time that these plans were to be executed;

How he never had the possibility of knowing the material power of which he could dispose to fight the battles which he anticipated.

Was this state of things special to the last war? Was the interdependence between manufacture and operations a special characteristic of that conflict which many call "unique in history?"

At first we can answer "no," for if the war of 1914-1918 obliged France to put into action all her forces, we know that wars at all times have called on all the resources of nations.

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All wars have been big wars; only the sizes of "big" have differed.

And if the military historians had looked in the right place, they would have given us valuable information. But they looked elsewhere.

How can we in the Russo-Japanese war understand events and judge the actions of a chief if we do not know how the supply services were echeloned along this immense ribbon which required a ten-day journey to cover, if we ignore under what conditions the sources of these supply depots were replenished by the country?

Still nearer to us in the war of Secession we can affirm that the question of manufacture dominated everything. The two adversaries started with nothing and each was obliged to produce everything. The will of the chiefs was entirely subordinated to the working of factories and their output. The armies stopped when they no longer had ammunition; they resumed operations in the measure that production allowed them.

In the study of the Franco-German war of 1870, nobody ever paid any attention to the serious problem of ammunition which occurred at the time of the battles of Bapaume and Coulmiers. I do not believe that under these conditions we can fully understand what the operations of the Faidherbe and the Loire armies have been.

Precedents could have been found in the Napoleonic wars if men who have written the history of the campaigns of the First Empire had had the same eyes as General Tournés when he consults the records of the year 1813.

He tells us that at the battle of Leipzig, artillery ammunition was lacking. I do not believe that this fact should be overlooked.

At Lutzen, because the shell was hastily made, a third of them did not explode (Napoleon's letter to Clarke).

On April 27, the armies were in need of 332,000 rifles and the supply depots could only furnish 283,000, a deficit of 50,000. The Minister of War who gave this answer to the Emperor stated that between April, 1812, and April, 1813, or in one year, there was distributed 880,000 rifles, which is equal, he says, to the production of plants during six years.

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Alas! . . . It is a pity that we cannot learn more. We realize then that we lack many essentials in order to understand.

For all wars, identical things can be said. And we could go back to the time of Caesar.

Meeting the compact, tenacious and disciplined legions, the impetuous Gauls, history states, incapable of perseverance, were vanquished. This is true, but how much more satisfied we are when we learn that the swords of the soldiers of Vercingetorix, made of soft iron, became blunt and bent against the hard steel of the Roman shields, leaving our valorous ancestors disarmed and powerless against the adversary.

Why do we pay so little attention to these arguments of a material order? We cannot say that they explain everything, but they bring important light on the situation.

It seems therefore that the study of the war of 1914-1918, with the aid of documents from the 1st Bureau and the Minister of Armaments, may help us to understand certain events which tactical and strategical considerations cannot fully justify.

August 1914! . . . The war manufacture provided for in the Mobilization Plan is being started. For, contrary to what has been affirmed, there had been provided and organized an industrial mobilization. It contemplated a daily production of:

13,600 rounds for 75's,
465 rounds for 155's,
2,470,000 infantry cartridges,
24 tons of B powder

to be produced in about 30 establishments, State as well as private ones, 50,000 workmen and workwomen.

There would be no manufacture of material, but simply making spare parts in view of repairs to artillery material and portable arms.

Let us, first of all, examine the ammunition for the 75.

The war production is supposed to be reached on the 61st day for powder and on the 81st day for projectiles, which after 7 weeks will only be manufactured in the quantity of 11,800.

In order to provide for this delay in attaining quantity production and satisfy the first needs of the armies, there had been constituted a supply service which amounted to 1,000 rounds per

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piece, echeloned between the line of battle and the arsenal echelon.

At the rear, continuing this first supply, unfilled 800,000 rounds of 75 with the powder necessary are ready to be charged and assembled: 240 rounds per piece.

Further to the rear stocks of raw materials are awaiting:

Metal for 600,000 shells for 75's (170 rounds per piece);

Chemical products in sufficient quantity to assure manufacture for sixty days.

Moreover contracts have been passed in view of assuring the production or the importation of this raw material when stocks are consumed.

Thanks to this ensemble of measures there are assured on the one hand the initial supplying of the armies; on the other, a continued manufacture.

It would appear that in these provisions explosives have been forgotten. Not at all.

These products coming almost entirely from Germany, there had been constituted a war reserve amounting to 2,400 tons.

While the armies are being organized, all the rest has been set into motion; everything functions normally.

Powder manufacture, owing to the abandonment by the Navy of the quantity to which it is entitled and also thanks to favorable circumstances, is quite superior to the provisions, giving to the war from August 20, 31 tons instead of 10.

Thus, when at the beginning of September, the Government left Paris, the Artillery and Powder Directions had no preoccupation whatever regarding the supplying of the armies in ammunition.

This state of things did not last long.

On September 9, the General in charge of the Rear telegraphs to Bordeaux that the general reserve depots are getting very low in shell for 75's. He requests that the armies be supplied with the greatest urgency and limits the deliveries of shell to the units at the front.

On September 15 the resources of these depots were reduced to 120,000 rounds.

On September 19 the French artillery during thirty days of efficacious operations consumed half its resources. The depots

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are empty.

I believe it to be useful to reproduce in full the letter which General Joffre wrote to the Minister at that time:

G. H. Q. September 20, 1914.

General Staff

1st Bureau

6.284

The Commander in Chief to the Minister of War:

According to information received to date and which has been communicated to you by telephone message 4289 of September 19 by the General in charge of the Rear, the armies have consumed to date half of their supply in artillery ammunition, or an average of 20 rounds per piece per day since the beginning of hostilities.

If the consumption continues in this proportion, the total supply will be consumed in six weeks.

I reiterate to the army corps, in the most pressing manner, the recommendations which I made to them in view of avoiding a waste of munitions. But I do not hide that if active operations are going to continue with the same intensity, consumption cannot be reduced very much.

It is therefore necessary for the Government to face the situation such as it is:

Either the manufacture of artillery ammunition must be considerably increased,

Or we shall not be able to pursue war operations actively after the 1st of November.

I estimate that in order to continue operations in an active manner, the needs of the armies would amount to at least 50,000 rounds per day (about 12 rounds per piece).

Present manufacture is about 12,000, which the Artillery Service hopes to increase to 20,000 in one month.

If everything has been done by national manufacture, an appeal made to foreign industry (U. S., Great Britain, Italy, etc.) might perhaps give results whatever be the sacrifices to be made.

This consideration does not however apply to us alone.

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Are the contingents which our British allies have furnished us, especially those they are going to form and send to us, equipped for a longer period than ourselves, or vice versa? The same question occurs for the Russian armies. This should, it appears, be examined diplomatically in order that the allied governments may have no surprises and understand exactly what are the means which they have at their disposal to continue the war.

Our difficulties suggest that if hostilities could be transferred later to Westphalia, Germany deprived of her largest factories, Krupp especially, might be placed under the obligation of seeking for peace. The intervention of a Japanese army might, from this point of view, have decisive results.

These considerations are so important that I deemed it advisable to submit them to you."

JOFFRE.

This letter is dated September 20th. This is the day when Mr. Millerand, Minister of War, convened the manufacturers at Bordeaux; the next day he telephoned to General Joffre that he hoped to be able to give 30,000 rounds per day "in three or four weeks."

For the moment production does not surpass 12,000. It was then that on September 24th, the following telegram addressed to the generals commanding armies was sent from the G. H. Q.:

"Rear at present exhausted. If consumption continues same rate, impossible to continue war failing munitions in 15 days. .
. Cannot draw too much your attention to capital importance of this condition on which depends the fate of the country.
Acknowledge receipt."

JOFFRE.

On the other side, facing us, the situation is the same; ammunition is getting scarce. But the situation of the two adversaries is not the same: to an identical cause must correspond different effects.

The Germans wish to stop our advance. Artillery munitions are lacking if a victory in the open is to be obtained; they start building entrenchments and fortifications; not wishing to lose what they have conquered, they cling to the ground which they have gained.

Joffre, on the other hand, must follow his movement forward.

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What is he going to do?

To the 2nd Army is confided the task of searching for a decision by enveloping the enemy's flank.

On September 26, Joffre telegraphs to the generals commanding the 3rd, 4th, 5th, 6th and 9th armies that:

"They must not start offensive movements against organized positions necessitating a large consumption of ammunition for a result of minor importance. It is necessary to reserve ammunition for repelling attacks."

The next day, on September 27, he confirms that they must not count on any new supply before October 20th and he orders:

To stop attacks and to reinforce the front in order to make it impregnable.

Siege organization is apparent.

To the 2nd Army he telegraphed on September 26th:

". . . I can only give you between now and three weeks a very small amount of ammunition. If you find before you fortified positions, it is not with the 75 that you will destroy them, but by maneuver."

The man against entrenchment. The drama has begun.

And the shells are being removed from places in the interior, from the army zone and the entrenched camp of Paris.

The order is given to stop all target practice and to send to the battlefields shell used for that purpose (cast iron and black powder).

A message from Bordeaux on September 29th announces that they must not count on 30,000 rounds in the middle of October but only 20,000 and this only at the beginning of November.

Again the decision is taken by Joffre to suppress some of the batteries of 75 as there is no ammunition for them.

He writes to the War Minister on October 14th:

"It will be necessary to send as quickly as possible one hundred 90 mm. guns, complete with material which will be served and teamed by the personnel of the batteries of 75 which are to be replaced."

The battles of the Yser and Ypres are about to start.

The daily production of the interior is still 13,000 rounds only.

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But according to a recent communication received from Bordeaux it would appear that in November the daily average production will reach 33,300 rounds.

Joffre hastens the battle. He writes to the Minister that in accordance with the information given him he is making plans and giving orders; he has called the attention of the Government to the seriousness of the situation if this minimum is not obtained.

In Flanders, fighting is intense; batteries receive munitions and use them lavishly.

On November 4, in the middle of the battle, an order is sent to Marshal Foch telling him to place the armies on the defensive. What has happened?

Certain authors state that Joffre has stopped the battle because he had other plans. But in the records we find a telegram received on the eve, September 3d, by the Commander in Chief, according to which the average daily production for munitions of 75 will in November amount to only 23,000 instead of 33,300. Why look further? Joffre in his Memoirs confirms this fact.

Let us, he writes to Foch, try to stop enemy attacks until the day which is near when the ammunition situation will enable us to take the offensive energetically in well chosen regions.

The day is near? . . . On November 14 another message arrives from Bordeaux. It is not a daily production of 23,000 that will be obtained in November, but only 18,000.

Will these 18,000 be obtained? No. When December comes, the production will still be 13,000.

Joffre had written on October 13:

"Daily experience has shown that any economy in artillery ammunition corresponds to a loss in human lives."

On November 16th he wrote:

"For two months the lack of munitions has prevented us from extending operations. This situation will last for a long time yet and the longer it lasts the more the enemy reinforces himself, the more he takes the initiative in operations and the more it will be difficult for us to drive him out of the country."

Before our armies, the strength of fortified positions is increasing.

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This initial delay will never be made up; it will weigh very heavily on the whole war.

To obtain the 50,000 rounds which he asked for on Sept. 19, 1914, Joffre will have to wait until March, 1915. But since January 2, his requests have amounted to 80,000, and when he has these at the end of the month of September, 1915, it is 150,000 which he needs by that time.

Every time that the munition objective is nearly reached, it seems that a new and higher goal is set.

In April, 1916, only, after 20 months of effort, the production of projectiles for 75's will reach the rate which satisfies all requirements.

We can easily imagine the repercussions which such a state of affairs may have had on the battles of the year 1915.

Let us now examine the strategical plan.

From the first days of January, 1915, the question arose of supplying the Russians with munitions for 75's.

Joffre was then saying to the Minister:

"There is a capital interest for us not to let our Allies lack munitions, this might have a decisive influence on the issue of the war."

On February 8, the Austro-German masses hurl themselves against our Allies, engaging in combat on the two flanks. The Russians must sustain the shock on a front of 700 kilometers. Their industry gives them hardly 20,000 rounds for 75's per day, and the average consumption surpasses 40,000.

For the second time the crushing of the Russian armies may decide the fate of the war. Joffre cannot send to the Grand Duke Nicholas the munitions which would allow him to fight on an equal basis. He can only cooperate by attacking himself, so eight days after, on February 16, he throws his divisions into the battle.

"The attacks carried out in Champagne since February 16, he writes on March 7, have already taken the aspect of a big battle and have already given a part of the desired results . . . The German offensive has stopped in Russia. The Champagne operation has had its part in influencing this either because it compelled our enemies to transfer

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to that region the maximum effort regarding their production in projectiles, or because according to certain communications from the Russian G. H. Q. they are again transporting forces to the western front. . ."

While our Allies are heroically supporting heavy losses, Joffre tries to help them by employing the sole means at his disposal, that is, preventing the German Command from sending to the east munitions, from which event he was expecting a final break in his favor. Joffre diverts the attention of the enemy back to his own troops and sacrifices his infantry.

When he wrote in October, 1914: "Any economy in artillery ammunition corresponds to a loss in human lives," I do not believe that the Commander in Chief thought that events would prove his word to that extent.

What have these February battles been?

Instruction No. 8 of December 8, 1914, fixing the directives for the offensive, had provided for two army attacks (Artois and Champagne) accompanied by five secondary or diversion attacks.

On February 16, the Fourth Army in Champagne alone takes the offensive. On Artois the Tenth Army can only join others which carry out a diversion attack.

The front is active. The consumption of the armies amounts to 65,000 rounds per day; the average supply is about 30,000 including projectiles destined for instructional purposes.

Three days after, on February 19, comes from G. H. Q. a message for the Tenth, Second, Sixth and Fifth Armies, stating

That in order to be able to supply ammunition for the battle of Champagne, the order is given to stop artillery operations contrary to the orders previously given.

In the provisional Group of the East, the First Army alone carries on its secondary attack.

On February 26, the ammunition supply has diminished by 550,000 and the front consumes daily more than double what is produced in the interior. On the 6th of March Joffre is compelled to

Make temporarily serious economies in the armies engaged in secondary operations in order to give more to

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the one which is carrying on the main action.

The immense French front is all of a sudden reduced to a very small front of 8 kms. It is very small, yet still too much for our means.

The consumption of ammunition has been considerable. It does not permit, without endangering the future, the temporary continuation of the fight with the same intensity.

This letter from Joffre to the Minister is dated March 17. On the same day the battle of Champagne is stopped.

And it is at this very moment that there is some talk about an expedition to the Dardanelles. It is easy to understand why Joffre opposed it energetically, he who has been obliged to refuse ammunition to his Allies in danger and to sacrifice his own infantry.

But the damage caused by the lack of ammunition for the 75 is not the only one, for next to quantity comes quality.

Here again the records furnish us very interesting information. For this of course the smallest details must be studied but a good deal of information is obtained.

First of all here is the text of a letter written by Joffre to the Minister, dated Nov. 22, 1914:

". . . Owing to the development of the war operations actually being pursued by our Allies, it is important for us to envisage in the future and at any moment the eventuality of an offensive action. This action should start eventually on the greater part of our front by the attack of German barbed wire defenses, and the possession of weapons for this purpose would greatly facilitate results while allowing the end to be attained without too heavy losses. . ."

The truth is there. Against barbed wire defenses, we have nothing. Varied and ingenious solutions have been adopted; files, scissors, rupture by means of rifle bullets, guns equipped for firing an anchor and rope to engage enemy wire and pull same, prolonged fire by machine guns, trucks carrying bombs, shield barrows, crushing by compressors.

The battles ordered by Joffre commence on December 17: the

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attacks are carried on by means of scissors and grapnels. On the same day, Dec. 17, at the rear, in the camp of Chalons, the explosive shell for the 75 is tested.

". . . The explosive shell for the 75, writes Joffre on December 25, is, of all the means employed, the one which is the most effective."

Shell for the 75? These are already in insufficient numbers to accomplish the normal work.

The question also arises as to what they will really give in this new mission. Let us examine the records further.

On November 16, 1914, a letter retains our attention.

Joffre states to the Minister that for ranges beyond 4000 meters, because the shells are equipped with delaying percussion fuses and also because the ground in autumn is soft, a large number of them explode with too great a delay to be efficient; he insists upon the serious repercussions which such a state of things might have on the efficacy of our material in Champagne, should it continue.

At shorter ranges the results are, alas, no better. The General Commanding the Eighth Army writes on December 4 to the Commander in Chief:

"Projectiles for the 75 are nearly all powerless against trenches and shelters of all kinds in which the adversary hides himself. On the other hand, as heavy guns are in limited numbers and cannot suffice for all the needs, we remain too often powerless before the enemy lines. . ."

We knew already that French artillery was strictly limited in its consumption; we know now that when it was fired it was almost harmless.

In order to put an end to this dangerous situation. Joffre asks for detonating combination fuses. Time fuse fire will restore to the explosive shell its efficacy. These fuses, however, the manufacturers could not furnish.

Since the beginning of the campaign the battery commanders had constantly refused to utilize shrapnel, and the Minister in order to push to a maximum the production to the factories in percussion fuses (explosive shells were greatly needed) has ordered that the machines which served for the manufacture of combination

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fuses be dismantled and transformed. Now there is nothing and in order to install these again material will have to be obtained from abroad and this will require a delay of 5 or 6 months at least.

They try to overcome this difficulty by developing instantaneous fuses which will burst on contact and which will be efficacious against obstacles.

We are now at the beginning of December, 1914.

On January 6, 1915, Joffre announces to the armies the early arrival of these fuses. Deliveries are very slow. Let us now examine the consequences.

On February 23, 1915, we find the following from the General Commanding the First Army:

"Operations at present taking place against the fortified position of the Eparges have emphasized the importance of the use of instantaneous fuses for the preparation of attacks.

"We have observed that while the attacks of the 17th and 19th February were successful due to the employment of SR fuses (*) which allowed all flanking defenses to be destroyed, the artillery preparation of the attack of the 20th was insufficient because the VI Army Corps did not have SR fuses (some of the last deliveries did not contain any of these fuses. . .")

A month later, on March 27, the following is found from the same Commander:

"The last attacks have proved that the proportion of SR fuses existing in the deliveries of munitions for the 75 is absolutely insufficient for destroying barbed wire defenses and trenches. . ."

Thus between November, 1914, and April, 1915, during five months when the two winter offensives were carried out. Joffre had at his disposal artillery almost incapable of destroying the works which the enemy had erected on the battlefield to protect himself against our attacks.

*Note: SR is "sans retard," i.e. "without delay." This fuze however is slower than the instantaneous fuze.

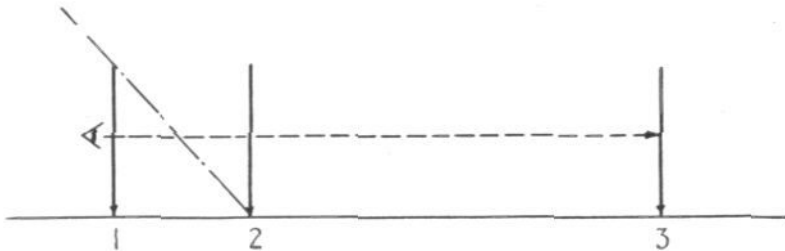
(To be continued)

"SOLAR SHADOW" ORIENTATION FOR FIELD ARTILLERY

SECOND LIEUT. JAMES J. A. KELKER, Field Artillery, Organized Reserve

PRACTICALLY every Field Artilleryman appreciates the difficulties incurred in laying artillery by the use of magnetic means of orientation.

In the January-February, 1934, issue of THE FIELD ARTILLERY JOURNAL, pages 174-78, Major Erwin H. Falk, 185th Field Artillery, Iowa National Guard, discusses a method of eliminating the magnetic factor by the use of a plane table method of "solar shadow" orientation. The greatest objection, as this writer sees it, to Major Falk's method being in the necessity of having an additional plane table above the normal equipment of a firing battery and two plumb bob hangers of the Major's design. The present trend in the Field Artillery is to simplify methods and reduce the necessary equipment for conducting fire, which is the logical step toward increasing the effectiveness of fire.



The purpose of this paper is to advance a method that accomplishes the same results as the plane table method and requires no additional equipment. The procedure is as follows: As with the plane table method, observations for the orienting line both at gun position and observation post must be made simultaneously due to the apparent motion of the sun. As in the figure, an aiming stake or other suitable straight pole is held vertically at (1) by balancing it between the tips of the fingers. A second aiming stake or suitable pole is placed at the point of the shadow cast by the first pole, as at point (2). The operator next places himself behind the first pole and "lines in" a third pole at (3) at any convenient distance, preferably about 300 feet

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using poles (1) and (2) as a type of enlarged alidade. Short stakes driven into the ground at points (1) and (3) will form an orienting line that may be used as long as the position is occupied. An aiming circle or B. C. scope set up over point (1) and sighted at (3) will be oriented with an instrument so set at second station. Short moves in position may readily be made by traversing with either the aiming circle or B. C. Scope.

By the use of this method magnetic differences in instruments are eliminated and declination constants are unnecessary. Units of any size may thus be readily oriented one with the others.

THE UNITED STATES FIELD ARTILLERY ASSOCIATION

In compliance with Article VII, Section 1, of the Constitution, notice is hereby given that the Executive Council has fixed 4:30 P. M., Wednesday, December 12, 1934, as the time of the annual meeting of the Association, to be held at the Army and Navy Club, Washington, D. C.

The business to be disposed of will be the election of three members of the Executive Council. Of these, two are to be elected from the Regular Army and one from the Field Artillery Section of the Officers' Reserve Corps and the transaction of such other business as may properly come before the meeting.

In view of the fact that the Constitution requires fifty per cent of the members in the United States to be present in person or represented by written proxies to constitute a quorum, it is urgently requested that the return post cards which will be mailed to the members of the Association be filled out and returned to the Secretary of the Association.

THE MYSTERY OF LUTZEN

BY FLETCHER PRATT

IT IS curious how great battles seem to come in matched pairs, of which the second reverses the verdict of that which preceded it. At Marignano, King Francis demonstrates that nothing on earth can stand before massed batteries supported by foot and flanked by heavy cavalry; at Pavia, the Marquis of Pescara finds one thing on earth that will not only stand up before such a combination, but hurl it to annihilating defeat. Gustavus Adolphus sweeps across the plain of Breitenfeld with his mobile combat-groups and the most perfect defensive system in military history is shattered forever; yet a year later the same defensive system withstands these combat-groups so well that only a last-minute outburst of Viking fury saves the Swedish army. Or does it?—or was it? For there is no certainty. About Lutzen, more than any other great battle, there hangs a fog of war so impenetrable that the great figures who met there move like the shadows of a dream. Even Schiller's account of that huge combat is more poetic than precise; even Dodge, usually so certain, is not quite sure either of the sequence of events or their explanation.

Perhaps this is because both of them depended principally on the German accounts, which are not only in disagreement with each other, but also frequently self-contradictory. Of course, this is in itself hardly surprising; three centuries have afforded insufficient time for the Teutonic mind to recover from the emotional impact of the struggle. The personalities of Lutzen were of an absorbing interest; the fate of millions of people and, what is more, of millions of ideas hung on the issue; in itself a climax, it possessed an artistic structural unity. It was a symphony written on a play by Euripedes and orchestrated for the music of the spheres; a drama on the heroic scale—and the Germans have been so absorbed in that drama that they lost sight of the facts.

Fortunately, within recent years, an eye-witness account of the battle by one of those wide-wandering seventeenth century Englishmen has come to light. He was a brother of the baronet who was King's Cupbearer to James the First of England; his name was George Fleetwood, and though for the most part his letter

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to the stay-at-home brother goes over the old ground, with the usual absence of relevant and profusion of unimportant detail, there are two pregnant sentences that clear up, once and for all, the famous mystery of Lutzen.

. . . The opposing generals were Gustavus Adolphus and that most fascinating and ineluctable of desperadoes, Graf Wallenstein. A good deal has been made of the "riddle" of Wallenstein's personality, but there is no reason why it should puzzle anybody who does not deliberately set out to let himself be puzzled. He was simply a medieval, born three centuries too late. His vanity, his treacheries, his caprice, his ruthlessness, his extraordinary skill in the minor details of military service, combined with a narrowness of outlook that made him consistently to overlook large questions, his genuine intelligence whenever he had no formula to guide him and his unprotesting acceptance of every formula, even including those of astrology and magic—all are perfectly consistent with this theory and with no other. His combinations were wide enough to include a continent, but he had no theory of war beyond that of raiding the enemy's territory; he could arrange a battle like Julius Caesar, but he would not fight one unless the stars were in the proper aspect. You can find a hundred like him floating on the high tide of the Middle Ages. Richard of the Lion's Heart and wolf's character was just such an officer; Friedrich Barbarossa was another, so was the Cid Campeador, and nobody found anything obscure about them, then or later.

This, then, was the relic of the Middle Ages who had come to the head of the Imperial armies after Gustavus had shown that to dispute a river passage may be more dangerous for the defender than for the attacker and slew Father Tilly in the demonstration. It was characteristic of Wallenstein that he made not the slightest effort to bring the Imperial army into line with the new principles of war introduced by his opponent. Strategy, light artillery, the combat-groups, the control of morale through discipline, he regarded as so many prestidigitator's tricks to amuse the vulgar. They had baffled old Tilly because his was essentially a peasant intelligence; he had allowed himself to be rushed into making mistakes. When the smoke cleared, the invincible tertiaries

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would remain invincible; the only thing necessary was to keep a clear head and not allow oneself to follow this Swedish morris-dancer in his fantastic poses.

Wallenstein began the campaign by a practical illustration of how easy it was. When the Swedes invaded the Imperial homelands, he resolutely turned his back and led his army into the King's allied Saxony. The result of such a policy, carried to its limits, would have been the destruction of both territories, but no one knew better than Wallenstein that it would not be carried to its limits. He regarded his army in the medieval fashion—as a self-existent entity. He was quite careless of what happened to any civil population, friend or unfriend, whereas the King of the Swedes suffered from the new-fangled notion that an army was an excrescence on the life of a nation, bound to protect civilians before conquering enemies. He came back to defend Saxony as Wallenstein had foreseen he must.

The Imperial commander took up a strong position on the Altenburg and waited Gustavus' attack. There was nothing in the least original about the position, the tactic or the organization of Wallenstein's forces; their artillery was the same twenty-horse artillery, their cavalry the same trotting and pistol-firing cavalry, their infantry the same ice-house of pikemen surrounded by skirmishing musketeers, that enabled the Spaniards to dominate Europe for a century. Gustavus made the assault, but his mobile light artillery could not ascend the heights, his cavalry lost its swing attempting the same obstacle and his foot lacked the firepower to accomplish anything alone. He met a bloody repulse and Wallenstein's system was justified.

The Imperial commander made no move to follow up the subsequent retreat. The Spanish system, based on safety, did not provide for pursuits, which might end in dangerous rallies. It aimed at the destruction of the enemy by exhausting his military resources in bootless attacks and his economic resources by careful devastation; a method infinitely slow but sure of reaching its objective unless Gustavus could bring off a successful attack. And with each day of the campaign this seemed less likely, for when Wallenstein left the heights he progressed in frog-like bounds through a chain of fortified cities, his latest acquisition

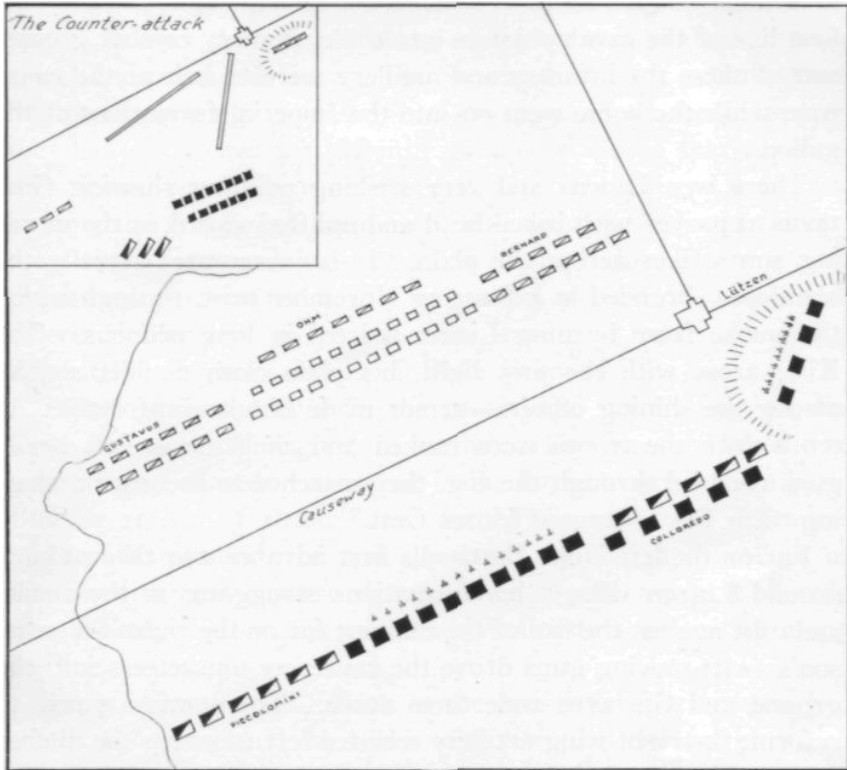
being Leipsig, surrendered by "the brave Gouvernour, whoe is skilfull at betraying townes (being the same that last gave it upp)" as Fleetwood remarks acidly.

Gustavus followed; the Imperial army swung to a stand on the Saxon plain not far from Breitenfeld of glorious memory and, his astrologer approving, Wallenstein concentrated for battle. He had 28,000 men with Pappenheim and 8,000 cavalry rushing from the rear by forced marches.

The position selected was strictly defensive, behind the road that crosses the plain as a causeway. Ditches on both sides were deepened and lined with musketeers to take the fire out of an attack. The left was covered by the Flossgraben, a fordable but difficult stream; the right by Lutzen village and the lofty Windmill Hill behind it. The village Wallenstein fired at dawn; the thatch burned slowly, drifting smoke through the day; the hill he crowned with a battery of heavy guns supported by pikemen. Next to them in line stood Coloredo, with the Spanish cavalry of the right wing, based on more pikemen; then the infantry center, the tertiaries in their solid blocks, and on the left, next the Flossgraben, Holcke and Piccolomini, with the "Black Devils," the Austrian and Polish cuirassiers. One thing the new commander had learned from Breitenfeld and one only and the symptom of that lesson was another battery of heavy cannon across the infantry center—to keep the Swedes from delivering any such cavalry thunderbolt as that which had broken Tilly. It was nearly as perfect an arrangement, considered by itself, as could well be imagined but—mark the limitation of the Wallenstein mind—its left flank was a prolongation of the only line of retreat, toward Leipsig.

Beyond the causeway Gustavus was fretting about the defections from his cause since the defeat at the Altenburg. He had but 18,000 men; Saxony was due with as many more, but "that morneing, insteade of the Duke of Saxon's ioyening with him, hee receaved lettres that their armies weare first to ioyne at Maydenburg, at which the Kinge was infinitely discontented, but hee swore they should see hee durst fight the enemie though they weare twice his strength"—and marched out of camp in battle array, the boldest act of the age, for he was about to attack an

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enemy of twice his strength, led by a commander of undoubted genius who had already once repulsed him, and under such strategic conditions that nothing but complete victory would serve. A draw would be as bad as a defeat and a defeat would be destruction.

In the Swedish center General Brahe commanded the first line of infantry, Marshal Kniphausen the second; the reserve, Ohm's cavalry, formed a third line. Young Torstensson had the artillery, all along the front. Leftward, Duke Bernard of Saxe-Weimar, in his first great battle, faced the hardest task, for he must hold head against the Windmill Hill battery on a heavily-overlapped flank. But the main blow was intended for the other wing, where the King in person led the famous Stalhanske Horse. He meant to smash in Wallenstein's strategic flank with a direct frontal charge. The sweep of a grand tactical conception was lacking, but Gustavus' minor tactics are always interesting, and

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none more so than those of Lutzen, for he had organized only the first line of the cavalry wings into the customary combat groups, and of these the infantry and artillery were to halt at the cause way, while the horse went on into the Imperial formations at the gallop.

There is a famous and very striking painting showing Gustavus at prayer with bared head and uplifted sword as the morning sun strikes across the plain. It is inaccurate; actually the scene was shrouded in a freezing November mist, through which the smoke from burning Lutzen drifted in long pennons. The King arose with the first light, his plain cloth doublet shabby among the shining officers—armor made him uncomfortable. At ten o'clock the troops were ranked and as Wallenstein's heavy guns rumbled through the fog, they marched to the attack, singing "Ein Feste Berg 1st Unser Gott."

Far on the left Duke Bernard's first advance was thrown back around Lutzen village, his formations struggling in the smoke and mist against the fire of the cannon; far on the right Torstensson's swift-moving guns drove the causeway musketeers into the ground and Gustavus rode them down. There was a pause to reform; the right-wing artillery wheeled left to sweep the ditches out; the Swedish infantry went over them at a hundred points at once, and went flying down on the Imperial center, just as the King brushed aside a cloud of irregulars and let the Stalhanskes in on Piccolomini.

The Black Devils made a counter-charge and a furious defence, but they were all one mass, while the Swedes came on in successive echelons. The first Swedish squadrons were borne back, then the Austrians lost their momentum, and as more and more of the little squadrons struck them, front, flank and even rear, in shock after shock, Piccolomini's men could not stand it. They were broken, scattered and driven from the field.

Meanwhile in the center the Swedish infantry poured right in past Wallenstein's battery of slow-firing heavy guns. A few rear ranks fell out and says Fleetwood—mark this point!—"nayled the gunnes." But the flexible formations lost not a bit of their cohesion in the movement, and went right on to attack the invisible Spaniards, who stood quietly waiting to receive the charge of the Swedish foot as they had received that of the

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horse at Breitenfeld—confidently, with closed ranks and lowered pikes. It was the old, old story of legion and phalanx, nimble attack and passive defence. The Spaniards made a gallant stand, but their covering musketry had disappeared at the causeway, they had no answer for the little groups of Norse sharpshooters who flowed round them on every side. Their officers went, one by one, the front-rank men went, and disorganized and shaken, they were driven rearward and out of the fight. Brahe swung the infantry round in a half-left wheel toward Windmill Hill where Wallenstein in person was leading a battle of giants against the furious assaults of Duke Bernard.

Twice, while the fight in the center had been going on, the Duke had rallied and gone up the hill. The pressure become so severe that Colloredo had to put in his horse to drive them back. But the arrival of Brahe's men turned the scale; the defenders of the hill, outnumbered and smothered by the rapid volleys of the Swedish center, were driven down it and away; Colloredo was broken, the battery won, and Wallenstein beaten all along the line.

But now came a lull. Back at the causeway, Torstensson had ceased fire, uncertain in which direction the enemy, in which direction his own people lay. Brahe and Kniphausen, their lines somewhat disordered, stood at an angle to the causeway, half-facing Windmill Hill, where Duke Bernard had turned the heavy battery on his retreating foe. Critics have wondered why Gustavus did not lead his horse down on the shaken Imperial infantry and complete the victory; they have even invented different stories of the battle to account for it. Only Fleetwood is clear—at the moment of contact "as the battaile was ioyned there fell soe great a miste that wee cold not see one thother, which if it had not bene, I beleave wee had quickly made an ende of them (but all must be as God will have it.)" Gustavus was out on the right wing, groping through the murk for vanished Piccolomini; he had no eyes, no means of knowing that behind the curtain to his left Graf Wallenstein was riding along the line, organizing the Spaniards for a counter-charge, or that Pappenheim and eight thousand fresh cavalry were only half an hour away and coming like a whirlwind.

The first news the Swedes had of either was when the

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Spaniards came swinging through the fog onto Brahe's flank in their ponderous phalangial charge, surrounded by whatever musketeers and dismounted horsemen Wallenstein had been able to gather. The blow was a complete surprise; Brahe's whole line crumpled from right to left. Kniphausen's, not so deeply committed to the turning movement, had a moment's warning, and beat an orderly retreat for the causeway. But the Swedish artillery was both blanketed and blind, and Kniphausen alone could not withstand the Spanish advance. One ditch of the causeway went, then the other; it was only by putting in Ohm's reserve cavalry in a sacrificial charge onto the spears that Kniphausen managed to get the guns out. A message had been sent off to the King when the blow fell; he was found just as the counter-attack attained the causeway, and started for that point through the fog with a single company. On the way he rode into an Imperial formation and was instantly killed.

And now, with the Swedes leaderless, their center beaten, their artillery unable to fire, their left and right stationary in the fog, Pappenheim came riding onto the field with his eight thousand. "Where is the King?" he asked, anxious to revenge his defeat at Breitenfeld, and being told that Gustavus was on the Imperial left, led his whole band against the Stalhanskes. He "gave so brave a salvo that the whole day wee had not the like;" the Swedish horse, caught stock-still, doubly outnumbered, were flung back across the causeway, decimated and broken.

It was five o'clock. The mists that had served Wallenstein so well lifted and cleared to show him a Swedish army worn, disordered and retreating. He had only to stretch forth his hand to take them all. The big battery in the center was ordered up to the causeway to play on their infantry; the Spaniards were to follow the cannonade. Pappenheim swung forward in another charge on the left. But the "gunnes" were "nayed;" not one of them would shoot; with the coming of more light Torstensson opened up again, and the tertiaries could make nothing of the center without artillery support. The Windmill Hill battery enfiladed them from their right and they came to a halt. Pappenheim, riding in the flood of his charge was killed by a volley; the Stalhanskes had rallied, and broke up his advance with a counter-attack that saw the bitterest fighting of the day. The

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early November evening began to close down on a drawn battle.

Old Marshal Kniphausen, satisfied that the position would hold now, rode out to the left to find Duke Bernard and inform him that the King was killed, but that he thought the army could still make good its retreat.

"Retreat!" cried the Duke, when he heard it, "This is not the time to talk of retreat but of vengeance!" and snatching off his helmet, rode down the line in the fading light, his blonde hair streaming like a crest as he shouted in a great, hollow voice, "Swedes! They have killed the King."

It touched off a mine. The weary troops who had fought all day with an enemy twice their strength, back and forth across that bloody field, answered with frantic yells of rage; the whole line, infantry, cavalry, artillerymen, without any certain order, without heed to their officers, went forward shoulder to shoulder in one of those tremendous surges like that which carried Missionary Ridge. Pappenheim's cavalry tried to stop them with a charge; Pappenheim's cavalry was demolished. The phalanx of spears in the center was attacked by a storm of wild men who rolled under the points to hamstring the pikemen, or beat down the lances in front to get at them with clubbed muskets. The Vastergotland regiment threw away spear and gun and went for the Spaniards with daggers; after the battle Imperialists were found who had been throttled and even bitten to death. It was splendid and appalling. Somebody set fire to one of the Imperial ammunition wagons, the whole park of them went off like a string of firecrackers, and then "the soldyers flonge down theire armes and ran away, and the officers cold by noe means make them longer stande; ffor here Hertike Bernerde charged himself the enimie soe sore."

Wallenstein's whole elaborate position was destroyed, his army was destroyed, it fled through the night and never stopped till it reached the confines of Bohemia, where we hear with one final thrill of horror that "the wilde bores cut off manie of them in theire flyght" and then it, and its master vanish from history forever.

. . . The interesting thing for the military student is not the story of which event followed which, for Fleetwood has given us a clue to the two capital difficulties; why Gustavus did not break

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up the Imperial center, and why the resurgent Imperial center did not strike home in the evening. The real mystery of Lutzen lies in the question of whether under the special conditions of the day, Wallenstein's passive defence was not, after all, a better policy than Gustavus' attack; and if this be admitted, it is difficult to see where the admission will stop, for an intelligent defender can always find or make favorable conditions. It is true that Duke Bernard's final charge and the desperate rally of the Swedes was somewhat in the nature of a military accident; but for that matter so was the fact that Wallenstein's counterstroke caught Brahe's line in flank. (The fog cannot be treated as an accident if we accept it as part of the special conditions of the battle.) Accident cancelled accident and left the result unchanged.

Gustavus' tactics as usual, were not of the best (Dodge has remarked acutely how Frederick of Prussia would have punished a commander who took up a position parallel to his line of retreat) but it is rather remarkable that they were so good in an age when grand tactics hardly existed. And if anything said heretofore gives the impression that Wallenstein's tactics were bad, that impression needs correcting. They were dull, they were unenterprising, but Graf Wallenstein was probably the greatest man who ever made a fine intelligence the slave of a system. He perceived very clearly that the strength of his opponent lay in mobility and in that fast-moving, hard-hitting artillery. The latter he discounted by disposing his great vulnerable masses far to the rear, out of range of Torstensson's guns, with the causeway line of musketeers, too dispersed to be a good target, in the first line. The Swedish mobility he sought to overcome by defense in depth and by counter-attack at the moment when the Swedes were most disordered. The whole thing has a strangely familiar ring; translated into 1917, it is nothing less than Erich von Ludendorff's plan for halting Allied advances, the highest development of which any defensive system is capable. And it was finally broken in 1632 by the same thing that broke it in 1918, which is not, fundamentally, mobility, but the difficult-to-explain moral superiority of which mobility is only the symptom. So history swings full circle, and what has been shall be and only the spirit of man is eternal.

THE HISTORY OF BATTERY "D", 1ST FIELD ARTILLERY—1792-1934

BY D. S. BABCOCK, 1st Lieutenant, 1st Field Artillery

Illustrated by R. E. Chandler, 1st Lieutenant, 1st Field Artillery

Since the majority of the units of our army are of quite recent origin we are apt to assume that this is true of all units, but such is not the case. One existing battery of Field Artillery is the oldest unit in the Army and can be traced back to the Revolution. Another, which is the subject of this sketch, came into being during the administration of our first President—if not earlier. This battery was present with Anthony Wayne in his expedition against the Miami Indians in 1792-94; it fought against the British in 1812; helped subdue the Seminoles in Florida; was with Zachary Taylor in Mexico; was besieged in Fort Sumter in 1861; was present at Antietam, Chancellorsville and Gettysburg; was active before Santiago in '98 and aided in putting down the Philippine Insurrection. Truly here is a battery which has helped to make American History. It has now been in existence for 142 years and has a record of which all can be proud. Its story is here set down in the hope that it may prove of interest and inspiration to all who may read it.

IN the late summer of 1792 there slowly assembled outside the little frontier town of Pittsburgh a force known as "The Legion of the United States." The basis of this force was the lone regiment of infantry and the battalion of artillery which had constituted the Army of the United States since 1786. Reorganized and increased in size by Congressional authorization to 5,120 officers and men; this force was to be sent out against the Ohio Indians who had in the two preceding years inflicted as many defeats on our valiant but outnumbered army.

The defeat of the preceding year had been particularly humiliating. The usually calm Washington, then in the third year of his presidency, had exploded with wrath when word was brought to him of General St. Clair's retreat. He had been particularly anxious that the savages north of the Ohio River be given a display of the might of the "Thirteen Council-fires" that they might once and for all cease their depredations on the white settlements growing by leaps and bounds along the Ohio. He had commissioned the Governor of the Northwest Territory, St. Clair, a Major-General and his last instructions to him had been to avoid a surprise. What had now taken place was just that. Advancing recklessly and without scouts or patrols, St. Clair had come unexpectedly upon a large body of allied Indians, among whom Miamis predominated. Completely surrounded, they had been forced to cut their way through the circle and flee helplessly to the protection of the nearest fort.



BATTLE OF "FALLEN TIMBERS"—1794

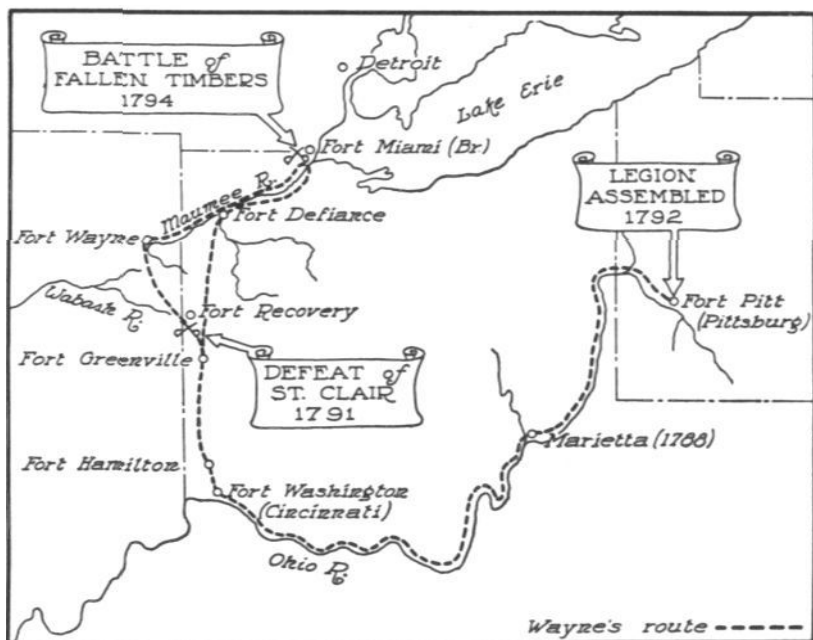
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President Washington was determined to prevent the recurrence of such a disaster. He now chose Anthony Wayne, a Revolutionary general, to organize a force and suppress the rapacious tribes in the west. Wayne arrived at Pittsburgh and began a work of discipline and training that was to last almost a year. As the basis of his Legion he had the remnants of St. Clair's force. Recruits were hard to get. Little inducement was offered to persuade men to volunteer for service against Little Turtle, for the pay of a private was only \$3 a month and the life was hard. Altho Congress had authorized him 5,120 men he was forced to content himself with 2,500. These he divided into four sub-legions with one of the four companies of artillery attached to each.

With the history of one of these artillery companies we are particularly concerned, for it is the subject of this sketch. Records still on file in the War Department show at Pittsburg, Pennsylvania, in the summer of 1792, attached to the 3rd Sub-Legion of the United States, a company of artillery, called, as was customary at the time, after its commander, Captain Moses Porter's Company of Artillery. It is this company which is today Battery "D," 1st Field Artillery. Exactly when and where this company was organized we cannot say for many records have been lost in the intervening years. We know definitely that it was in existence in 1792. The four artillery companies which had been present with St. Clair in 1791 had been so badly shot up at that disastrous defeat that they were reduced by transfers to three; when a fourth company was again organized in 1792 and command given to Captain Moses Porter, it remains a question whether it should be considered a new company or as one of the old ones re-organized. The records are not clear. In any event let our story begin at Pittsburgh in the year 1792.

General Wayne knew his job and by the summer of 1793 he possessed a well-disciplined and trained force. Placing his army on flatboats, he poled down the Ohio, debarking at Fort Washington, where now stands Cincinnati. Leaving the river, he began the long march north towards Lake Erie. Determined not to risk defeat, he took every precaution. He was forced to build

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ROUTE OF WAYNE'S EXPEDITION

and garrison a chain of forts to protect his line of communications. He made an unsuccessful attempt to negotiate peace with the Indians. It was therefore August of 1794 and his force had been reduced to about a thousand men as he neared the mouth of the Maumee River. Here where now stands the city of Toledo, Ohio, he found the Indians awaiting him. They had chosen for their battlefield a forest in which the trees had recently been uprooted by a cyclone. It was the nature of this position which gave its name to the ensuing fight, which is known in history as the "Battle of Fallen Timbers." Nearby stood Fort Miami, garrisoned by the British, who despite the Treaty of 1783, had not yet evacuated their Great Lakes fur-trading posts. Here the Legion of the United States defeated and routed, at the point of bayonet, 2,000 painted and half-naked savages, led by their chief, Little Turtle, and advised and assisted by British soldiers. It was a decisive victory for the Americans. As a consequence, the spirit of Indian resistance was broken and the frontier settler lived in peace for a long time.

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General Wayne's instructions had been not to molest the British at Fort Miami but now with definite knowledge that they had participated with the Indians at "Fallen Timbers" he was not well disposed toward them. He spent three days demonstrating in front of the British fort hoping to provoke their fire so that he might drive them off American territory. He paraded his troops under the very walls of the fort, but the British refused to be provoked. Wayne now marched without hindrance to the source of the Maumee River and there erected Fort Wayne, in what is now Indiana. Captain Porter's Company made up a part of the garrison for here we find the company being mustered in 1796. Wayne next went to meet the Indians and made a treaty with them. By the terms of Jay's Treaty with Great Britain (1795) the British now agreed to withdraw from their fur-trading posts on United States soil and in July, 1796, we find Captain Porter's Company moving into Detroit as the British garrison moved out. Later the same year the company moved to take over Fort Mackinac, 275 miles farther north at the head of the lake. By now the Legion organization had been abolished and our company had become a part of the Corps of Artillerists and Engineers.

In 1800 Captain Moses Porter was promoted to Major and given command of the battalion. This interesting character, Battery "D"'s first battery commander, deserves a paragraph by himself. Moses Porter was born in Massachusetts. He first entered the military service as a private in 1775 and fought at the Battle of Brandywine, Pa., where he so distinguished himself that he was selected among others to form part of the garrison of Mud Fort (later Fort Mifflin, S. C.). Here he attracted the attention of his superiors by his bravery during the prolonged and desperate defense of the place against a large British land and naval force in 1777. For this he was recommended for and obtained a commission. At the end of the war he was mustered out but was again appointed a Lieutenant of Artillery in 1786. He became a Captain in 1791. At the outbreak of the War of 1812 he was made a Colonel and commanded our army's first regiment of light artillery. In 1813 he was breveted a Brigadier-General for his gallant services on the Niagara frontier.

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He was Colonel of the 1st Artillery* when he died in 1822. Of Moses Porter, Lieut. General Winfield Scott has this to say:†

"Though deficient in science, yet by his gallantry in front of the enemy, his great practical ability in the laboratory and workshops, combined with fine soldierly habits and bearing, he made himself invaluable."

It is impossible to leave the subject of Moses Porter without one further quotation, that of an officer who served under him in 1821:

"General Moses Porter, the colonel of the regiment, was a soldier 'all of the old time' and particularly averse to all womankind, unusually profane and not over liberal in his mode of life. He was a severe disciplinarian and was the terror of the volunteers and militiamen. From his indulgence in the habit of swearing he obtained the name of 'old blowhard.' He was altogether a character and his sayings were proverbial throughout the army."

We next find our company in 1801 under Captain Theophilus Elmer at Fort Niagara, near Niagara Falls, New York. In 1802 it underwent its first reorganization being consolidated with the company of Captain James Sterrett and a detachment of the company of Captain Alexander Thompson. Captain Elmer was deranged (i. e. discharged) and command of the company was given to Captain James Read. The company remained at Niagara from 1801 till 1813. In 1804 Captain Nathaniel Leonard took command which he apparently retained until 1813.

The beginning of the War of 1812 with Great Britain found the company at Niagara where it formed a part of the force protecting the Canadian frontier from invasion. It was distinctly a coast defense battery manning heavy cannon within the walls of the fort. It is on record that Captain Leonard requested carriages to give his guns mobility but he did not receive them. In October, 1812, occurred the Battle of Queenstown Heights. An American force of regulars and militia had been assembled at Lewistown on the New York side below the Falls. After some

*Not to be confused with the 1st Field Artillery which did not come into being until 1907.

†In his "Autobiography."

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delay about 225 regulars crossed the river and assaulted the heights driving the British from their stronghold. They were soon overpowered by superior numbers and driven out while a large body of American militia stood on the American side and refused to cross to their assistance, in spite of the entreaties of their elected officers. During this battle, Captain Leonard's Company manned the guns at Fort Niagara and subjected Fort George and the town of Newark across the river to a heavy shelling to keep them from sending reinforcements to the main fight. This fire destroyed many buildings in Newark, including, according to a British report, the jail and the brewery which "were fired by hot shot and consumed." Fort George's counterbattery work however, was apparently superior as Captain Leonard was forced to abandon Fort Niagara temporarily. The enemy not crossing he soon returned.

In the spring of 1813 the American Army began another offensive which ended in the occupation of the entire Canadian side of the Niagara River from Fort George to Fort Erie. Fort George was completely demolished by artillery fire from Fort Niagara after which the infantry under Colonel Winfield Scott occupied it with ease. Captain Leonard's garrison was officially commended for this invaluable assistance. The field of operations now shifted to the north along the St. Lawrence, our company remaining behind to garrison Fort Niagara.

In addition to commanding his company, Captain Leonard was in the fall of 1813 in command of Fort Niagara. On the morning of December 19, 1813, however, he was absent from his post visiting friends. Attacking before daylight, a British force of a full regiment and two flank companies, commanded by Colonel Murray, surprised and captured the little post. Says Gardner's Dictionary "A body of infantry of sick and invalids (no Captain present) were bayoneted in their tents; but 20 escaped, part wounded. Our loss was 65 killed, 14 wounded and 344 taken prisoners. . ." Captain Leonard was later tried for negligence as a result of this capture; what the outcome of his trial was we cannot say. What little we know of this unfortunate event does our company little credit but it is far from being the most inglorious event in this most inglorious of wars. Except

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for some splendid sea victories, the War of 1812 is a dark page in our military history. Suffice it to say that in May or June, 1814, the captured members of Captain Leonard's company were returned by the British and were divided among two artillery companies stationed at Plattsburg, N. Y., the companies of Captain Alexander S. Brooks and of Captain George H. Richards. Since these two companies were in 1814 consolidated to form the company which later became Battery "D," 1st Field Artillery, the line from 1792 to today continued unbroken.

The consolidation mentioned above was effected in the general reduction of the army which occurred in July or August, 1815. Command of the consolidated company was given to Captain Sylvester Churchill. In 1816 we find the company for the first time given an alphabetical designation. It now became Company "N," 2nd Battalion, Northern Division. At about the same time it was moved to Fort Columbus (now Fort Jay) on Governor's Island, N. Y. It alternated for some years between this station and Fort Wood, on Bedloe's Island (where the Statue of Liberty now stands). In 1821 we find its designation changed again. It was now known as Company "E," 1st Artillery, a name it retained for the next 80 years. It still remained under the command of Captain Sylvester Churchill.* Here in New York Harbor the company stayed until 1827.

Company "E," 1st Artillery, went south in 1824, and except for two short periods at Fort Trumbull, Conn., spent the next twelve years in coast defense garrison duties at Annapolis, Md., Fort Monroe, Va., and Charleston Harbor, S. C. Since this period was just 100 years ago, let us digress for a moment to consider a few aspects of the army at the time. The infantry for the most part occupied border posts, putting down sporadic Indian uprisings; the artillery defended our coasts, from time to time being called on to assist the infantry in the interior. Company "E" at Charleston nearly saw service as a result of South Carolina's Nullification Proclamation. In 1833 the pay of a private was increased to \$6 per month. Discipline was maintained with an iron hand. Desertion in one instance met the

*Colonel Sylvester Churchill was Inspector-General of the Army 1841-61.

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following fate, as evidenced by a general court-martial order of 1833:

"The court found him guilty and sentenced him to be tied to a stack of arms and to receive ten lashes for five successive mornings with a cat o' nine tails on his bare back in the presence of the command, to have his head and eyebrows shaved, to forfeit all pay and traveling expenses and to be drumd out of the service."

In December, 1835, the Seminole Indians in Florida began to cause trouble and the army was called out to avenge Dade's Massacre. The 1st Artillery was the first regiment to reach Florida from the north in order to reinforce the small command already there. The Seminole War was a trying one and brought little glory to any who took part in it, the difficulty being not to fight the enemy but to find him. Moving from swamp to swamp in search of an enemy that rarely appeared, dying by battalions with fever and exposure, never able to bring on a decisive engagement with the elusive natives, the little army of less than 1,000 regulars tried valiantly to clean out a country occupied by over 3,000 Indians. Nevertheless, the army accomplished its mission and Company "E," 1st Artillery, played its part. The company served as infantry during this campaign, although for a time they were mounted as cavalry. The numerous engagements will not be discussed here but will be found listed in the Appendix.

In 1838 the battery was again sent north, this time to Maine. War was threatened between the United States and Great Britain over a boundary dispute and the battery was sent to the boundary line between Maine and New Brunswick, Canada, to prevent an outbreak, the Governor of Maine being apparently desirous of declaring war on England single-handed. This dispute was settled amicably in 1842 by the Webster-Ashburton Treaty. Nevertheless, the battery remained in Maine until shortly before the outbreak of the Mexican War, when it was sent to Corpus Christi, Texas, where General Zachary Taylor was forming an "Army of Occupation." It was soon joined by other companies and an artillery battalion of twelve companies was formed to serve as infantry since there were not enough light guns and horses with which to equip them.

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Conditions at Corpus Christi in 1845 were not of the best. Taylor's camp was far from comfortable, the canvas being little more than mosquito bar. A "norther" would one minute pour frigid water through the seive-like tent and a torrid sun would steam the occupants the next. There was little or no amusement. Sickness abounded and spirits were low. Even a march offered the relief of activity and a change of scene. Dressed in his thick blue-cloth uniform and carrying a heavy knapsack, blanket, musket and cartridge box, the soldier underwent unexpected physical torture under the burning sun.

The first decisive battle of the Mexican War took place on May 8th, 1846, at Palo Alto, near Brownsville, Texas, where General Taylor defeated the Mexicans in a hard-fought battle. The following day at Reseca de la Palma he drove the enemy across the Rio Grande. Crossing the next day the American forces occupied Matamoros. In all of these battles, Company "E," 1st Artillery, was engaged as well as in the Battle of Monterey in September of the same year. Not the least bit daunted by having to serve as infantry, the records show that the company performed creditably. In 1847 it was rewarded by an order which transformed it into heavy artillery and directed it to join General Taylor's force at once, as Santa Anna was gathering a large force at San Luis Potosi and preparing to give battle. The armament consisted of two long iron eighteen pounders and two brass eight-pounders. The company drew horses and started to march the same day to join General Taylor, forty-two miles away. A long hard march was made without rest and in the face of hostile troops, but the company arrived too late to participate in the Battle of Buena Vista, Santa Anna having retired during the night to face General Winfield Scott in the South. The company remained at Saltillo, Mexico, until peace was declared in 1848.

The Mexican War over, the 1st Artillery was rendezvoused at Governor's Island, N. Y. Here Company "E" stayed for about two years, after which it was again sent against the Seminoles, who were still resisting the government's efforts to move them west of the Mississippi. From this unpleasant duty it was rescued in 1853 only to return again in 1857. Company

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"E" 's experience in Florida is typical of the valiant service performed by our army from its very beginning in making the United States habitable. Florida today is a garden-spot, the winter playground of the wealthy. It is hard to reconcile the present with the fever-infested swamplands that Company "E" knew in these early days. The company finally headed north again in 1858 and took station at Fort Moultrie, S. C., where we find it still in 1860.

South Carolina seceded from the Union in December, 1860. Within six weeks six other states followed her out of the Union. Grave fears were entertained that the army posts in the southern states would be siezed. Major Robert Anderson, 1st Artillery, moved two batteries, "E" and "H," which were under his command from Fort Moultrie to Fort Sumter, also in Charleston Harbor. Before leaving Fort Moultrie the batteries spiked the guns they were forced to abandon there, burned the gun carriages, cut down the flagstaff and blew up some earthen fortifications which they had erected. Company "E" was at this time commanded by Captain Abner Doubleday, later Major General and commander of the 5th Army Corps, Union Army. It was not long after this that actual warfare commenced. Brigadier General Beauregard, formerly an officer of the 1st Artillery, was in command of the provisional army of Confederates at Charleston. He made several demands upon Major Anderson to withdraw from Fort Sumter without bloodshed. At length provisions began to run low at Sumter. Beauregard had so strengthened the surrounding batteries that Major Anderson reported that it would require 20,000 men for him to maintain his position. President Lincoln notified the Governor of South Carolina that he would attempt to supply Fort Sumter with provisions, whereupon General Beauregard served Major Anderson with an ultimatum. Major Anderson refused to abandon his post and General Beauregard prepared to reduce Fort Sumter by cannon. Before dawn on the 12th of April, 1861, a shell rose from the mortars of Fort Johnson and, screaming over the harbor, burst just above the fort. It was the signal for a general bombardment. In a few minutes, fifty cannons were pouring shot and shell upon Fort Sumter. The Federal garrison held its



EVACUATION OF FORT SUMTER, 1861

fire until almost eight o'clock and when it did reply Company "E," at Captain Doubleday's direction, fired the first shot, and hence the first Union shot of the Civil War. Anderson and his brave garrison stood the terrific bombardment for two days, while Northern steamers lay rolling in the heavy weather outside the bar, unable to come to his rescue. Finally, when the fort

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had been battered to ruins and was afire from redhot shot, Anderson surrendered. Major Anderson's official account of this immortal incident was as follows:

Steamship Baltic, Off Sandy Hook,
April 18, 1861.

Hon. S. Cameron, Secretary of War,
Washington, D. C.

Sir: Having defended Fort Sumter for thirty-six hours, until the quarters were entirely burned, the main gates destroyed by fire, the gorge wall seriously injured, the magazine surrounded by flames and its door closed from the effects of the heat, four barrels and three cartridges of powder only being available and no provisions but pork remaining, I accepted the terms of evacuation offered by General Beauregard, being the same offered by him on the 11th inst., prior to the commencement of hostilities, and marched out of the fort Sunday afternoon, the 14th inst., with colors flying and drums beating, bringing away company and private property, and saluting my flag with fifty guns.

ROBERT ANDERSON,
Major, 1st Artillery.

The bombardment of Fort Sumter opened the Civil War. Its importance was greater than this however, as it had the effect of making the North understand for the first time that the Union must be maintained by force of arms. Public opinion before Sumter had been inclined to let the Southern States secede; now Lincoln's call for volunteers met with popular acclaim and the valiant defenders of Fort Sumter were the heroes of the day.

Company "E" now departed for the field of operations about the nation's capital. During the first Battle of Bull Run it formed part of a seige train of heavy artillery holding the Confederate General Johnston in check while McDowell attacked Manassas. The need of light artillery was soon seen and our company was now for the first time organized as horse-drawn light artillery. Because of the difficulty of getting recruits for regular army units, Companies "E" and "G" of the 1st Artillery were consolidated and remained so throughout the war. Command of the battery was given to Company "E" 's commander, Lieut. Alanson M. Randol and the consolidation was known as Randol's Battery or Battery E-G. It was armed initially with smooth-bore twelve-pounder "Napoleons." These guns fired grape (balls chained together) and the round cannon balls still found on so many village squares today.

The battery was assigned to General McClellan's Army of the Potomac and went into camp near Washington for a long period of training. It was almost a year before McClellan was ready to

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risk his command in battle. The Peninsular Campaign began April 5th, 1862, with the siege of Yorktown, Va. In all of the battles of this campaign Battery E-G was engaged, aiding materially in driving the Confederates back to Richmond. The campaign failed however and McClellan withdrew after coming within sight of Richmond.

Before the campaign ended, Battery E-G met with misfortune. At White Oak Swamp, near Glendale, Va., on June 29th, 1862, its guns were captured by the Confederates. According to Lieut. Randol's own account this was due to the cowardly panic of his militia supports and this account is corroborated by the report of a Board of Inquiry which investigated a month later. The tactics of the day placed the artillery up close to the front line with infantry at the battery position for support. When the enemy charged the infantry would rush out and attempt to drive them back. Failing in this, the support was supposed to fall back, unmasking the battery, which would then open fire on the enemy. On this occasion the volunteer infantry rushed out to meet the Confederate attack but became panic-stricken and retreated at a run up to and through the battery position. Unable to fire and with no time to bring up his limbers, Lieut. Randol was forced to witness the capture of his guns, although his cannoneers fought to the last with rammer-staffs and bludgeons.

The disgrace of losing its guns, while due in no way to lack of bravery on the part of its men, was keenly felt. This blot was subsequently wiped out by the battery's glorious behavior at Chancellorsville and Gettysburg. The battery was issued new guns and rejoined McClellan. During the remainder of 1862 it participated in the 2nd Battle of Bull Run in August; in September in the Battle of Antietam and in November the Battle of Fredericksburg.

In April, 1863, Battery E-G took part in the Battle of Chancellorsville where it performed valiant service. In May it was organized as a horse battery with all cannoneers mounted and with four three-inch rifles as armament. With this superior equipment the battery was effectively engaged in June near Aldie, Va., and on July 3rd participated in the Battle of Gettysburg. Here it was posted on the right flank with Gregg's and Custer's

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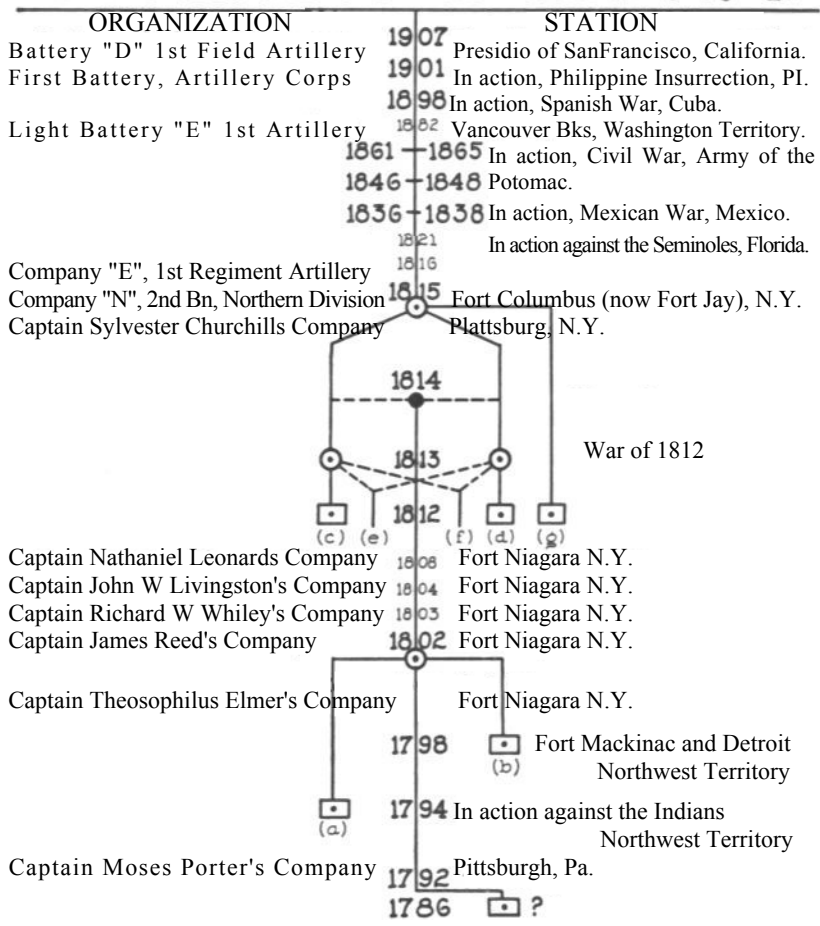
cavalry brigades and aided them in repulsing the cavalry charge of the Confederate General Stuart which nearly succeeded in turning the Union flank. Taking place at about the same time as Pickett's infantry charge but at a different part of the field, this was as much a turning point in the battle as was the immortal repulse of Pickett. On the field of Gettysburg, Battery E-G fully redeemed its loss of its guns at Glendale a year before. Captain Randol left the battery in September of '63 and the command fell to Lieut. Frank F. French. The battery participated in three more engagements that year.

In the spring of 1864 Battery E-G began the march south with General Grant. It was not engaged in the Battle of the Wilderness but in a series of engagements on the North Anna the battery was very active. It fought its last battle at Sharp's farm on the 3rd of June. By this time its strength had been so depleted by casualties that it could muster but seventy men. Its horses and baggage wagons were now turned in and with its guns only, the battery left Virginia for Washington on the 18th. Battery E-G was now stationed in the defenses of the capital, where it remained until the war's close.

The years after the Civil War saw the battery, now Company "E" again, performing varied duties. It took station in New York Harbor. In 1866 and again in 1870 the company was called out to suppress a Fenian uprising. This was an abortive attempt on the part of Irish agitators to bring about the independence of Ireland by capturing Canada. Needless to say it was put down without a great deal of trouble. During this period the company was also called out to raid a number of whiskey stills in Brooklyn and aid the Treasury in collecting its liquor taxes. Once more the company was ordered to Florida, arriving in 1872. After three years there, in which the ranks were greatly diminished by an epidemic of yellow fever, welcome orders came for the company to proceed to Rhode Island. Shortly after arriving the company was dispatched for a period of some months into the Indian Territory, now Oklahoma. After this short detail it returned to Rhode Island and to the District of Columbia for four years ending in 1882.

In 1882 the War Department authorized an additional light

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battery in each artillery regiment and Battery "E" was selected for that of the First. Once more our battery was mounted, becoming a horse-drawn light battery which it has remained to this day except for a short period of motorization after the World War. By the same order it was moved to Vancouver Barracks, Washington Territory. The ensuing nine years were passed on the Pacific Coast in Washington and California, the battery now known as Light Battery "E," 1st Artillery, being stationed for a part of the time in the vicinity of San Francisco.

THE HISTORY OF BATTERY "D"

Late in 1890 the battery, armed with the light Hotchkiss guns (1.65 in. breech-loading rifles) it had been issued in 1882, was dispatched with other troops to quell an uprising of the Sioux Indians in South Dakota. In December occurred the Battle of Wounded Knee, at the end of which two hundred Indians and sixty soldiers lay dead on the field. Wounded Knee was the last pitched battle between the Indians and the whites within the limits of the United States. It is of some interest to note that Battery "D," 1st Field Artillery, which began its career fighting the Indians and had participated in so many campaigns against them should have been present at this battle.

In 1891 Light Battery "E" proceeded to Fort Sheridan, Illinois, where it remained for five years. From this latter post the battery was again ordered to the District of Columbia, where it remained until the outbreak of the War with Spain.

The battery was immediately ordered to Tampa, Florida. It was decided that the first transports bound for Cuba could carry only four batteries of field artillery, so lots had to be drawn to see which batteries would go. Light Battery "E," commanded by Captain Allyn Capron, was one of the lucky ones and was assigned to General Lawton's Division. It disembarked at Daiquiri, Cuba, June 20th, 1898. The battery was equipped with the new (1890) 3.2 inch gun, the last of the old non-recoil material our army was to use. It was the only battery engaged at El Caney. Although its unfixed black powder ammunition readily gave away its position and caused it and the surrounding infantry to be subjected to heavy Spanish fire, the battery was of considerable aid in furthering Lawton's advance. Early in the engagement it broke up a stone blockhouse on a commanding position above El Caney, forcing the Spaniards out into the open. Later on it bombarded Santiago at close range, gradually silencing much of the hostile fire.

The battery did not remain long in Cuba, leaving there in August, 1898, and returning to New York. It now set out on the long journey to the Philippines, where it was to help quell Aguinaldo's Insurrection. It battled the Philipinos on twenty-one occasions which will not be enumerated here but may be found listed in the appendix. On July 16, 1901, the battery

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CAPRON'S BATTERY AT EL CANEY, 1898

departed from the Philippines and proceeded to the Presidio of San Francisco. Another reorganization of the Army took place in 1901 and our battery which for eighty years had borne the designation as "E" of the 1st Artillery, now became the "First Battery, Artillery Corps."

While stationed at the Presidio the battery was called on for an exhibition of the peace time type of service for which our army is famous. The San Francisco earthquake of 1906 and

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the resulting fire had shocked the country and had spread lawlessness throughout the city. General Funston took charge of the city and gathering troops from all nearby points, the city was policed and the starving and homeless multitudes cared for. The army fed the starving populace, gave havens of comfort, killed looters, opened stores, supervised hospitals and got the fire under control. Many an officer and soldier did not sleep while the constant need for them existed.

In 1907 there came a complete reorganization of the artillery of the army, coast artillery being separated from field artillery. The field artillery was to consist of six regiments of six batteries each. The First Battery, Artillery Corps, still stationed at the Presidio of San Francisco, now at long last became Battery "D," 1st Regiment of Field Artillery, and the 1st Field Artillery was born. This was a momentous change and one for which there had been agitation for many years. The war of 1812 had seen a Regiment of Light Artillery, but it had been broken up at the end of the war. Until this time the army had gotten along with two light batteries in each artillery regiment, otherwise heavy or coast-defense batteries. Now field artillery and coast artillery were definitely separated.

The history of Battery "D" from 1907 on is the history of the 1st Field Artillery Regiment and is familiar in large part to some still with the regiment. It will be possible to give only a brief summary of it here. Battery "D" with "E" and "F" of the 2nd Battalion remained at the Presidio until 1910, when it came for the first time to Fort Sill in the newly admitted state of Oklahoma. In June of 1911 the battery proceeded to San Francisco and thence to new station at Schofield Barracks, Hawaiian Territory. In 1913 the entire regiment was assembled at Schofield Barracks, remaining there until 1917.

In 1916 the policy of consolidation and merger which had always existed previously was reversed and a large number of officers and men from the First were transferred to make up a new regiment, the Ninth Field Artillery. In September of this year, Colonel William J. Snow, later the first Chief of Field Artillery assumed command of the regiment. In December of 1917 the 1st Field Artillery embarked for the United States in preparation,

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it was hoped, for service overseas. But the war department was to dash all such hopes. This regiment, for all the glorious history of its several units and its priority in number, was destined never to get to France. It arrived at Fort Sill, December 28th, 1917, and there it has remained till this day. Its participation in the World War was as a firing and instruction battery for the School of Fire. As always, however, it accomplished its mission, and aided materially in the instruction of the thousands of artillery officers put through the School of Fire and sent overseas. Had the war lasted somewhat longer, Battery "D" might have participated in this war as it had in all others for, a few days before the Armistice, the 1st Field Artillery was assigned to the Nineteenth Division with which it was slated for overseas service. The signing of the Armistice caused the cancellation of this order and the regiment's last chance for active service in the World War disappeared.

In 1919 the entire 1st Field Artillery was motorized for experimental purposes. In 1921, the 2nd Battalion, including Battery "D" turned in its motor equipment and again became horse-drawn. This brought about the unusual condition of a regiment consisting of one motorized and one horse-drawn battalion. This condition has existed from 1921 to date. At the present writing Battery "D" is still a horse-drawn battery equipped with American 3-inch guns and is occupied in normal peacetime training and in work for the Field Artillery School.

This battery has been commanded or has had serving with it as lieutenants at one time or another in its varied career, such famous generals as "Stonewall" Jackson, Joseph Hooker, Abner Doubleday and William H. French, the latter two commanders of Union Army Corps in the Civil War. The battery has at various times in its career served as infantry, cavalry, coast artillery, seige artillery, horse artillery and tractor-drawn artillery.

Recent orders have issued which will, upon receipt of equipment, make one more change in Battery "D", 1st Field Artillery. It is now to become a truck-drawn 75mm gun battery, equipped with the latest commercial model four-wheel, four-wheel-drive trucks and station wagons. We cannot help but wonder what the

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"unscientific" Captain Porter, whose guns were hauled by sled and by hand, would think of this development. It seems certain, however, that he would be proud of the record his old battery has made in 142 years of courageous service to its government.

BATTLES AND ENGAGEMENTS

PARTICIPATED IN BY BATTERY "D," 1ST FIELD ARTILLERY

Date	Battle
	AGAINST THE MIAMI INDIANS
1794—Aug. 20	"Fallen Timbers" (near Toledo, Ohio).
	WAR OF 1812
1812—Oct. 13	Queenstown Heights, Canada.
1813—May 27	Capture of Fort George, Canada.
—Dec. 19	Capture of Fort Niagara, N. Y.
1814—Sept. 11	Plattsburgh, N. Y. (Capt. A. S. Brooks' Company)
	SEMINOLE WAR, 1835-42
1836—Mar. 30th	Okahumpka Swamp, Fla.
—Apr. 12	Fort Barnwell, Fla. (det.)
—Aug. 21	Fort Drane, Fla.
—Nov. 21	Wahoo Swamp, Fla.
1838—Mar. 23	Skirmish in the Everglades, Fla.
	MEXICAN WAR, 1846-48
1846—May 8	Palo Alto, Texas.
—May 9	Reseca de la Palma, Tex.
—May 10	Matamoras, Mexico.
—Sept. 21-23	Monterey, Mexico.
	CIVIL WAR, 1861-65
1861—Apr. 12-14	Fort Sumter, South Carolina.
1862—Apr. 5	Yorktown, Va. (Siege).
—June 1	Fair Oaks or Seven Pines, Va.
—June 30	Glendale or White Oak Swamp, Va.
—July 1	Malvern Hill, Va.
—Aug. 29-30	2nd Bull Run (Manassas) Va.
—Sept. 16-17	Antietam, Md.
—Sept. 19-20	Shepherdstown Ford, Va.
—Dec. 11-15	Fredericksburg, Va.
1863—May 1-3	Chancellorsville, Va.
—June 17	Aldie, Va.
—June 21	Upperville, Va.
—July 3	Gettysburg, Pa.
—July 16	Shepherdstown, W. Va.
—Sept. 12-15	Brandy Station, Va.
—Nov. 26-Dec. 2	Mine Run Campaign, Va.
1864—Mar. 1	Mechanicsville, Va.
—May 21	Millford, Va.
—May 23	Chesterfield, Va.
—May 26	Polecat Creek, Va.
—June 3	Sharp's Farm, Va.
	AGAINST THE SIOUX INDIANS, 1890-91
1890—Dec. 29	Wounded Knee Creek, South Dakota.
—Dec. 30	Catholic Mission, near White Clay Creek. S. Dak.
	SPANISH-AMERICAN WAR, 1898
1898—June 22	El Caney, Cuba.
—June 22-	
—July 17	Siege of Santiago, Cuba.

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PHILIPPINE INSURRECTION, 1898-1901

1899—May 17	San Luis, P. I.
—June 3	Marong, P. I.
—June 10	Guadelupe, P. I.
—June 10	Las Pinas, P. I.
—June 10	Paranaquo, P. I.
—June 13	Bacoor, P. I.
—June 13	Zapote Rver, P. I.
—July 26-30	Calamba, P. I.
—Aug. 9	Calulut, P. I.
—Aug. 10	Near Angeles, P. I.
—Aug. 13	Near Angeles, P. I.
—Aug. 16-18	Angeles, P. I.
—Aug. 19	Near Angeles, P. I.
—Sept. 16	Near Angeles, P. I.
—Sept. 28	Near Angeles, P. I.
—Oct. 11	Angeles, P. I.
—Oct. 13	Angeles, P. I.
—Nov. 5	Magalang, P. I.
—Nov. 7	Mabalacat, P. I.
—Nov. 11	Bamban, P. I.
1900—June 11	Balubad, P. I.



FIELD ARTILLERY NOTES

24th Field Artillery Participates in Fourth of July Parade in Manila

The 24th Field Artillery stationed at Fort Stotsenburg recently took part in a Fourth of July parade held in Manila. Many Field Artillery officers will remember that it normally required three days to cover the distance from Fort Stotsenburg to Fort McKinley when the 24th Field Artillery was a pack regiment. A recent letter from the Philippines shows that with its new equipment the regiment was able to make the entire trip from Fort Stotsenburg to Fort McKinley and return, by a combination march and entrucking movement, in a total marching time of twenty-one hours. An extract from the letter is given below:

"On the morning of July 2, at 4:00 A. M., the 2nd Battalion, entrucked, left the post followed at 5:00 A. M. by the 1st Battalion, marching. On account of the load limit of the Calumpit Bridge, the tractors and guns had to be unloaded there, crossed separately and reloaded. We allowed an hour and a half for this without seriously interfering with civilian traffic. We used both sides of the bridge. The 2nd Battalion was unloaded at the Balintawak Monument commencing at 8:30 A. M., leaving that point at 9:10 A. M., and marching to Fort McKinley, arriving at our camp site at 12:15 P. M. The trucks turned around at Balintawak Monument and went back to Calumpit and found the 1st Battalion had just completed its crossing of the bridge at 10:25 A. M. Being tractor drawn only one side of the bridge was used. We waited there long enough to allow the noon day meal (sandwiches) to be eaten and trucks to be gassed. The entrucked column left there at 12:20 P. M. and pulled into our camp at Fort McKinley at 3:15 P. M. The next day we spent in shining up for the parade and getting oriented on the detailed plans for it. Our assembly area was in the Walled City. Our initial point was just beyond the Quezon Gate near the Post Office. Here we had to form masses from column. Each battalion was formed in line of battery section columns. We marched along P. Burgos, in front of the Legislative

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Building, past the Manila Hotel and by the reviewing stand, which was on the New Luneta facing west, and then past the Army and Navy Club and back to Fort McKinley via Taft Avenue. In front of the Army and Navy Club we had to get back into column of sections again and had to do this without stopping the troops in rear. We did this by halting, shifting from second to third gears and speeding up successively by battery. It required snappy work on the part of all concerned but we got away with it very successfully.

We were very fortunate. Our first tractor fell out with a broken gas line just beyond the Elks Club where we had some spare tractors located. The march in the parade was at the rate of two and one-half to three miles an hour and I feared we would have some overheating and fouled spark plugs. But every one was on the alert and good fortune was with us.

The afternoon of the Fourth we spent overhauling, greasing, etc., and entrucking our 2nd Battalion. On the morning of July 5, the 2nd Battalion left Camp at 5:00 A. M. in trucks followed immediately by the 1st Battalion marching. The 2nd Battalion was detrucked just south of Calumpit at 7:55 A. M., left at 8:37 A. M. and marched to Stotsenburg, arriving at 2:20 P. M. The trucks returned to Bocawe and picked up the 1st Battalion at 10:00 A. M. This battalion was loaded, trucks gassed and departed at 11:00 A. M. We had to repeat the detrucking and entrucking process at Calumpit. The 1st Battalion reached its gun park at 3:00 P. M.

The total distance of the round trip was 140 miles."

Memorandum of Executive Council Meeting August 29, 1934

At a meeting of the executive council of the United States Field Artillery Association held this date, Major General Upton Birnie, Jr., United States Army, was elected to fill the vacancy in the executive council and as president of the United States Field Artillery Association caused by the retirement of Major General Harry G. Bishop, effective August 31, 1934.

FIELD ARTILLERY NOTES

The New Weapon for the Horse Artillery

The 75mm howitzer has been adopted as the principal weapon of the field artillery regiment of the Cavalry Division. The first battery, destined for the 82nd Field Artillery, is nearing completion, and additional batteries are under manufacture.

The Field Artillery With the Mechanized Cavalry

The basic weapon contemplated for the field artillery operating with the Mechanized Cavalry is the 75mm howitzer. Until these weapons are available the 2nd Battalion, 19th Field Artillery, at Fort Knox will be equipped with 75mm guns M1897A4, the French 75 with high speed adapters. This battalion is to be provided with half-track trucks for transport of personnel and ammunition and for towing, and scout cars for command and reconnaissance personnel. The battalion section of the service battery will be furnished with four-wheel drive trucks. In the interest of simplification of maintenance and supply and of uniform tactical mobility all these vehicles are to be as nearly identical with similar vehicles in the cavalry as is practicable.

Tractors

The present thought in motorized artillery is to include at least four light tractors in a truck-drawn light battalion, and four medium and one heavy tractor in each 155mm howitzer battalion. The method for portée of these tractors has not been worked out conclusively but is a subject of active study and experiment.

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MILITARY BOOKS

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

	<i>Price</i> (Domestic postage included)
INFANTRY IN BATTLE.....	\$ 3.00
ITALY'S PART IN WINNING THE WORLD WAR— <i>Colonel G. L. McEntee</i>	2.00
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