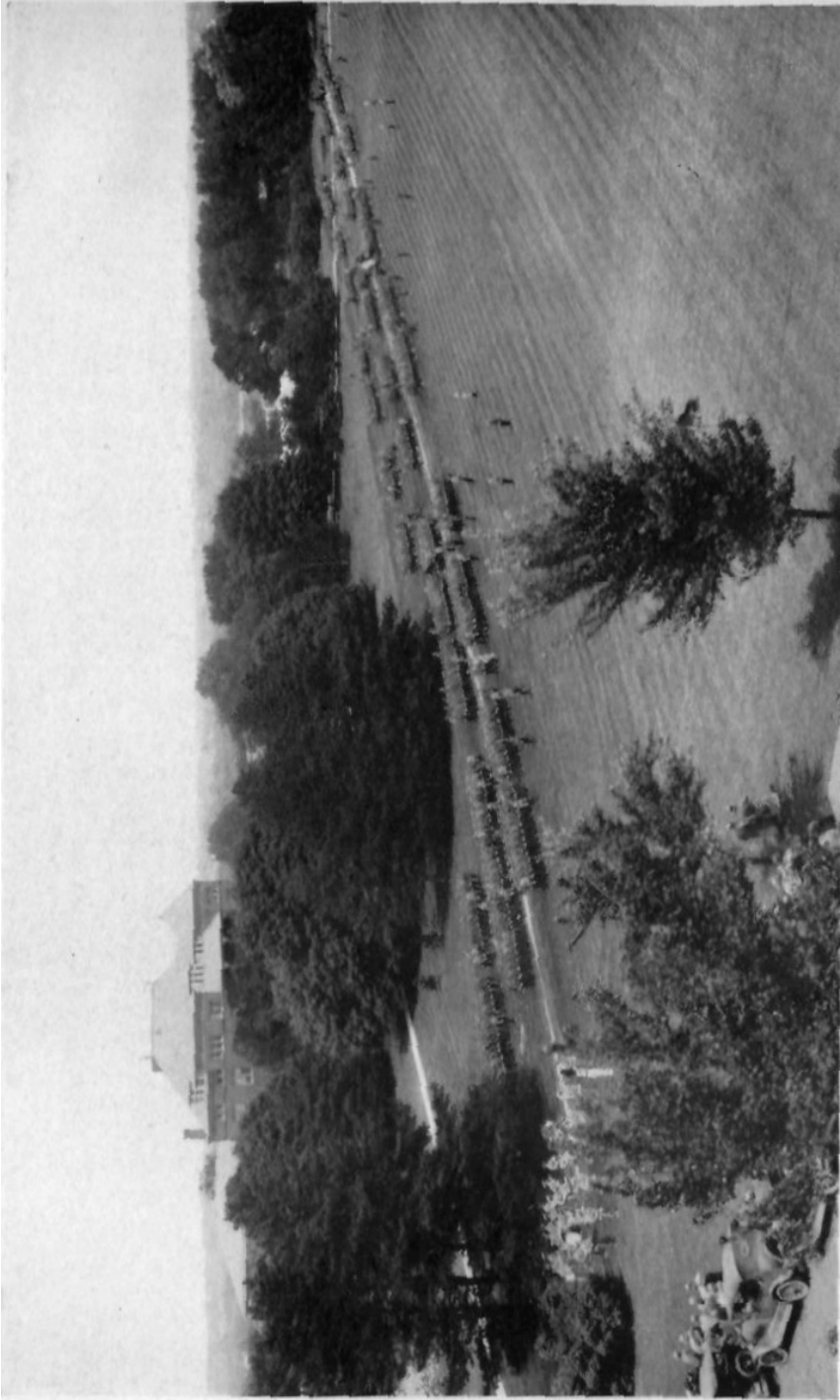


No. 1, January-February, 1932

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AUTHORS ALONE ARE RESPONSIBLE FOR STATEMENTS CONTAINED IN THEIR ARTICLES



A REVIEW OF THE FIELD ARTILLERY AND OTHER UNITS OF THE IOWA STATE R. O. T. C.

THE FIELD ARTILLERY JOURNAL

VOL. XXII JANUARY-FEBRUARY, 1932

No. 1

ARTILLERY FIRE ON FAST-MOVING GROUND TARGETS

BY MAJOR CARL C. BANK, F. A., MEMBER OF THE FIELD ARTILLERY BOARD

THE mission of delivering effective fire on fast-moving ground targets presents to the Field Artillery a problem having three phases, as follows:

First. To determine means and methods for using the matériel now on hand to deliver fire on fast-moving ground targets from positions not defiladed, using direct laying, i. e., the gunner sighting directly at the target.

Second. To determine means and methods for using the matériel now on hand to deliver fire on fast-moving ground targets from defiladed positions, using indirect laying, i. e., the gunner laying the gun in direction by reference to an aiming point, aiming stake, or merely with reference to a previously determined orientation of the gun.

Third. To determine what characteristics should be incorporated in the design of new matériel, for future manufacture, in order that same may be suitable for delivering fire on fast-moving ground targets by either of the methods indicated in the first and second phases above.

The large amount of matériel now in the hands of troops and in the war reserve, coupled with the fact that new types of guns will not be available in quantity until some months after war is declared, adds emphasis to the importance of the first two of the phases described above. No matter how highly efficient new models of guns may be in this respect, this country probably will never scrap the matériel now on hand, including war reserve, and replace it with newer types in time of peace. Therefore, the problem of adapting our present type of guns for use in firing on fast-moving ground targets is immediate and of pressing importance. The development of new types for future manufacture can, and should, go on concurrently.

With reference to the first phase the Field Artillery Board has completed firings with all of the different types of light artillery

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on hand, and has determined generally the capabilities of each type in this method of fire. The results obtained have been reasonably satisfactory. However, it is realized that batteries of division artillery will normally occupy defiladed positions from which they can best accomplish their primary mission of supporting the Infantry. *Fire by direct laying from such positions will rarely be possible*, except in emergencies involving the close defense of the guns. Since the World War the Army has taught that individual guns or even batteries should be emplaced in undefiladed positions from which fire by direct laying could be accomplished in the case of a tank attack. These guns would obviously be compelled to remain silent except during an actual attack. Such use of artillery removes guns from the primary mission of supporting the Infantry. It also results in using a weapon for a highly specialized purpose for which it is not well suited. This use of guns results in a false sense of security which is not justified by any results obtained by actual tests.

With reference to the second phase, it is conceivable that if means and methods can be devised for using guns in defiladed positions to fire on fast-moving ground targets, many of the light guns of the division artillery will be available to fire on such targets as soon as they become visible to observers at the observation posts. If the fast-moving targets on which fire is to be delivered are hostile light tanks and if the enemy follows modern tank tactics, hundreds of tanks will be employed in a given sector. To stop such an attack will require the combined efforts of all elements of the defense. Every gun that can be brought to bear upon the tanks will be needed. The time available in which fire can be delivered will be very short. The artillery should be able to drop any missions on which it may be engaged and pass to fire on the tanks without a moment's delay. Clearly, then, the Field Artillery should make every effort to develop such means and methods as will render all light guns immediately available for fire on fast-moving ground targets. This field of development is now receiving serious consideration by the Field Artillery Board. Problems connected with this development are discussed in detail in later paragraphs.

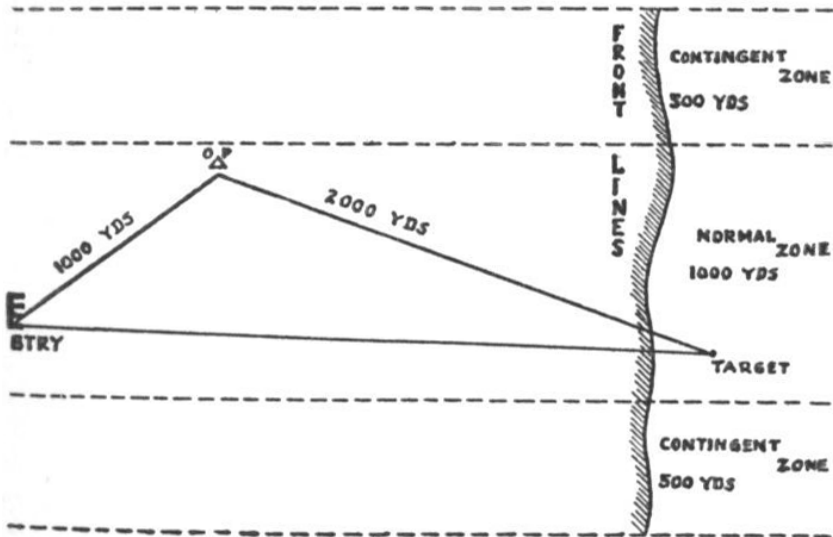
With respect to the third phase, steps are being taken to

ARTILLERY FIRE ON FAST-MOVING GROUND TARGETS

insure incorporation in the design of new weapons all the characteristics necessary for the delivery of fire on fast-moving ground targets. This field of development is important from the viewpoint of future production of new types of guns. However, results obtained cannot be readily passed on to the service at large in time of peace nor incorporated in current training programs.

The remainder of this article will be confined to a discussion of the problems to be solved in connection with adapting present matériel to fire on fast-moving ground targets from defiladed positions using indirect laying.

A typical set-up for a battery of light division artillery is as shown in the following sketch.



The distances, width of zones, etc., will vary with each situation. Freedom of choice in the selection of the observation post and the battery position must be allowed. There is only one fixed rule, and that is that the battery must be able to accomplish its assigned missions from the positions selected. Almost invariably, the guns will be placed in defiladed positions from which neither the observation post nor any portion of the front will be visible. All observed fire must be controlled from the observation post.

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In the control of fire from an observation post, as indicated above, the following items must be considered:

Continuous reliable communication between the observation post and the battery.

Establishing the line of fire in a given direction, or on a known point, from which it may be readily shifted to targets on which fire is to be delivered.

Changes of deflection so as to bring the *line* of fire on the target.

Changes of range so as to bring the *fire* on the target.

Of these considerations the first two are not affected by the nature or type of target. The last two, however, are materially affected when a change is made from stationary to moving targets. In the case of moving targets, these two elements of firing data change continuously according to the direction and speed of travel of the target. If direct hits are to be secured, the deflection must be accurately adjusted from moment to moment since the amount of dispersion in this element of fire is relatively small. The range, also, requires frequent adjustment. However, due to the relatively greater dispersion in range and due to the fact that the target has some height, hits may be secured even though the center of impact for the range used may not be actually on the target. The methods of fire control suitable for stationary targets have proven to be entirely inadequate for fire on fast moving targets. To send over the telephone commands for successive changes in both deflection and range requires so much time that the resulting fire is largely ineffective. Likewise, Coast Artillery methods of tracking the target, determining its course, establishing a set-forward point and firing on a time signal are too cumbersome for Field Artillery use and too slow for targets having the speed and maneuverability of light tanks. Director systems of fire control, such as have been developed for antiaircraft fire, are highly effective and indicate, in general, the line of future development for new matériel. However, the director system, in its present development, is entirely too heavy and complicated for light Field Artillery use and cannot be readily adapted for use with the standard types of guns now in the hands of troops and in the war reserve.

ARTILLERY FIRE ON FAST-MOVING GROUND TARGETS

Experiments conducted by the Field Artillery Board lead to the belief that if some means were developed for transmitting changes in deflection automatically and continuously from the observation post to the battery, the officer conducting the fire could take care of the range changes by the usual method of giving successive commands. Following this line of investigation, the Field Artillery Board is now seeking the development of equipment which will provide for the automatic transmission and reception of changes in deflection. It is obvious that such equipment will consist of three principal parts, a transmitter at the observation post, one or more electrical circuits between the observation post and the guns, and a receiver at the guns (most likely one at each gun of the battery). Specifications for each of these principal parts, should be, in general, the following:

The transmitter

It should be small, easily carried, rugged and simple in construction.

It should be capable of being attached to, or built in, a standard observing instrument, preferably the B. C. telescope, M1915.

It should automatically transmit electrical impulses or signals as the observing instrument is traversed in azimuth by an observer tracking the target. Specifically, the impulses or signals transmitted should be such that upon receipt at the guns the movement in azimuth of the observing instrument is reproduced.

There should be an adjustment feature whereby automatic correction can be made for the difference in the value of a mil as measured at the observation post and at the guns. It should be possible to apply this correction, when the relative positions of the guns, the observation post and probable location of the target become known. For example, in the sketch on page 3 the distance O. P.-Target is approximately 2,000 yards, while the distance Gun-Target is very nearly 3,000 yards. Therefore a mil at the O. P. subtends 2 yards at the target while a mil at the guns subtends 3 yards at the target. Hence, while the observing instrument at the O. P. moves through one mil while tracking the target, the guns should be moved through only

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2-3 of a mil. This relation changes as the distances O. P.-Target and Gun-Target change. Theoretically, corrections should be made continuously. However, it is believed that this is unnecessary for the following reasons: (a) a rough correction can be made as soon as the location of the guns, the O. P. and the probable target area are known, (b) the ratio changes slowly, (c) a new correction can be made by hand when it is observed that the ratio is obviously in error.

There should be an additional adjustment feature whereby the transmission of impulses or signals can be made to occur without traversing the observing instrument. For example, if the observer notes that the projectiles are striking 20 mils in rear of the target, he should be able by turning a knob to advance the transmission of signals so that the indicator at the guns will advance likewise. This feature will permit the observer to correct for displacement of the target occurring during the time of flight, for drift, wind and errors in the ratio of the mil as explained in the previous paragraph.

The transmitter should be able to indicate the direction in which the observing instrument is traversed, that is, right or left (clockwise or counterclockwise). If the target changes its course, so that after tracking it in one direction the movement of the observing instrument must be reversed, the transmitter should indicate such change without difficulty.

The Electrical circuits between OP and Guns.

The ideal means of transmitting the electrical impulses from the O. P. to the Guns would be to superimpose them upon the telephone line without interfering with telephone use. Radio transmission is considered too complicated. Normally there will always be a direct telephone circuit from the O. P. to the Guns. At the present time this will consist of twisted pair of 11-strand field wire having a resistance of about 54 ohms per mile in each wire of the pair.

It is now contemplated adopting as standard, for future manufacture and use, 7-strand twisted pair field wire having a resistance of about 164 ohms per mile in each wire of the pair.

If the necessary electrical signals cannot be superimposed upon the telephone circuit, the number of special circuits to be

ARTILLERY FIRE ON FAST-MOVING GROUND TARGETS

used should be reduced to a minimum and standard twisted pair, 7-strand, field wire should be used.

The circuit or circuits from the O. P. should run to a junction box at the battery from which lines can be run to each gun.

The current required should not exceed that which can be supplied by a reasonable number of standard dry batteries which should be located, preferably at the junction box at the battery.

The Receiver at each gun.

The receiver at each gun should consist of a simple rugged device which can be attached to the gun and which will withstand shock when the gun is fired. The receiver should indicate changes in deflection in mils, preferably by a pointer moving at the center of a dial graduated in mils. To avoid having a large dial graduated to 6,400 mils a dial having graduations from zero to 100 with an additional index reading hundreds would be sufficient. With our present standard weapons, the maximum sector that can be conveniently covered is limited to 800 mils. If a base point were chosen somewhere near the center of the sector, a shift of 400 to 500 mils in either direction would be the maximum shift possible. Any device which will indicate shifts up to this amount from a zero set on base deflection will be satisfactory, provided the graduations are large enough so that the gunner, in poor light, can read distinctly the 5-mil divisions, at least.

NOTE: The mounting of the receiver on the gun is a problem that must be solved for each type of gun. With box trail types of gun carriages the receiver will probably be mounted on a stake near the end of the trail, since it seems more than probable that in such cases deflection changes will necessarily be made by shifting the trail along a graduated arc. With split trail carriages, some addition will have to be made to the traversing mechanism whereby a pointer, or moveable index, can be made to move around the dial as the gun is traversed. In this way, all that will be required of the gunner will be to keep the two pointers coinciding (match the pointer system).

The receiver should have a device whereby all of the pointers can be set at zero after the guns of the battery have been initially laid on a given base deflection.

The mode of operation proposed is as follows: As soon as the guns are established in position and the observation post selected and occupied, the battery commander will have the battery laid for parallel fire on a base point somewhere near the center of the

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sector. All pointers at the guns will be set at zero. The observing instrument at the O. P. will likewise be turned on the base point with all settings at zero. The correction for relative location of O. P. and guns will be set. From then on, for all fire missions involving observed fire (stationary targets or otherwise), the observing instrument at the O. P. will be turned on the target, causing a corresponding movement of the pointers at the guns. If the objective is a moving target, the observer, using the adjustable feature of the transmitter, will increase or decrease the indicated deflection shift by an amount estimated to be necessary to correct for the speed of the target, etc. The observer will send the range to the guns by telephone. He will track the target, keeping the cross hairs of his instrument on the target, which action will automatically cause the pointers at the guns to move correspondingly. When the bursts appear, if the deflection is not correct, he will correct it by turning a knob the necessary amount to cause the pointers at the guns to move forward or backward a corresponding amount. The range will be corrected by sending the necessary correction (plus or minus) over the telephone. The method of fire will normally be continuous fire at the maximum rate. Since the gunner does not need to put his eye to a sight, the operations of loading, setting the range and firing can go on independently of the laying for direction by the gunner. All of this presupposes a stable gun carriage. Our split trail types approximate this very closely. For box trail types, a secure platform and graduated trail log (arc) will be necessary.

The problem indicated in the preceding paragraphs is, first of all, a problem in automatic transmission under rather difficult restrictions as to *distance, wire, power* and *weight*. It should operate over distances up to 3,000 yards. The difficulties of laying and maintaining wire lines on the battlefield are so great that such lines must be limited to a minimum and must consist of such wire as will be readily available. The power required is important. Wet batteries are highly undesirable. Hand or motor driven generators add much weight, require additional personnel and introduce technical complications. The weight of that part of the apparatus at the O. P. is of the greatest importance, since it must be carried long distances by hand. Weight of the apparatus at

ARTILLERY FIRE ON FAST-MOVING GROUND TARGETS

the guns is relatively less important. However, it should not exceed several hundred pounds.

While the experience and knowledge acquired in the development of the antiaircraft director system of fire control must prove valuable in the study of this problem, it is believed that the solution should be attempted from a new starting point, working from simplicity in equipment to complexity only where absolute necessity demands, rather than attempting the adaptation of the present forms of the director to the requirements of his particular problem.

This discussion indicates, in general, the present thought of the Field Artillery Board on the problem of firing on fast-moving ground targets with weapons which are now on hand in considerable quantities. Constructive ideas on this problem are greatly desired.

GENERAL LEACH NEW CHIEF OF MILITIA BUREAU

George E. Leach, until recently Brig. Gen., Minn. N. G., has been appointed Chief of the Militia Bureau to fill the vacancy created by the resignation of Major Gen. Wm. G. Everson. General Leach is an old Field Artilleryman having begun his service as 2nd Lieut. F. A., Minn. N. G., in 1905. He was in the Federal service as Major and Colonel, 1st F. A., Minn. N. G., on the Mexican border and during the World War he was promoted Brigadier General. He participated in many engagements in France where the marked success of his regiment caused him to be recognized as an experienced and expert artillerist.

THE FLORIDA UNIT TAKES ITS PLACE

BY CAPTAIN E. T. BARCO, FIELD ARTILLERY (DOL)

THE Field Artillery Unit at the University of Florida has reached out and taken its rightful place in the sun. This baby unit, established just three years ago, will graduate its first advanced classmen this year, and as that event becomes imminent, it pridefully reviews its record of accomplishment during the brief period of its existence.

An ideal climate which permits outdoor drill the entire year round, the wholehearted support it has received from both the university officials and the Regular Army officers on duty with the crack Infantry unit that was already here when the Artillery came, together with the ever-increasing enthusiasm of the Artillery students, have made it possible for the unit to reach its present state of efficiency.

When the unit was established three years ago, all that the team of officers sent to install the unit found in the way of equipment was three hundred "raw" freshmen and enough uniforms to cover their greenness. Schedules had to be planned to meet the deficiency in equipment, and these green men had to be drilled and instructed and changed from a more or less demoralized group into something resembling an organized body of men. There were no second year artillerymen or upper classmen to assist and consequently the work rested entirely on the shoulders of three Regular Army instructors.

The greatest problem that first year was one of morale. The morale of these boys, in most instances away from home for the first time, had to be kept up. As freshmen they were subjected to all the established forms of hazing, and in addition the second, third and fourth year infantrymen never lost a chance to let them know that they were a thing apart and like the leper, something to be avoided. At the first parades, like men in rout, they hurried along, their half-formed lines wavering past the reviewing stand amid the good-natured boos of the upper classmen, who had come out to view the parade. It took a great deal of cheerfulness, tact and encouragement on the part of the Regular Army instructors to keep them from becoming completely routed.

THE FLORIDA UNIT TAKES ITS PLACE

But gradually they began to learn how to march and by the end of the year they were holding their heads high and were quite often referring to the infantrymen in the same manner the professional Southerner refers to the Yankee. They were becoming proud of being in the Artillery.

Then came annual inspection. What the inspector saw that first year was not particularly impressive, but he was most charitable and gave the unit a satisfactory rating.

With the coming of the second year, the task became easier. Guns and horses had arrived, and the problem of morale was of the past. The artillerymen had found themselves, and were acquiring an esprit de corps. Had the opportunity presented itself, there would have been very few to avail themselves of a transfer to the Infantry.

But there were still many problems to be met. Sixty horses had been shipped in from Kansas during the summer, and whether it was due to conditions resulting from acclimatization and new environment, or whether it was due to insufficient training, or whatever it was, they were as a whole about as wild a bunch of horses as were ever ridden by a beginners' class in equitation. Matters were further complicated by the fact that the enlisted detachment had been recruited from Infantry regiments and motorized Artillery regiments, and there were not more than three of them who had ever ridden previously. With only an interval of a month between the arrival of the horses and the opening of school, it meant that the regular officers and the few enlisted men who could ride, had to spend about six hours a day in the saddle. Even then, the job was far from accomplished by the opening of school.

No one who participated in that first week of equitation will ever forget it. The thirty thousand dollar stables erected by the state for the unit had just been completed, but as yet no riding pen had been constructed. It was necessary, therefore, to hold the class in equitation on the large sand lot in front of the stables. That first week sophomores and horses were scattered all over the west end of Gainesville. One must admire the pluck and determination of those two hundred and forty boys, two hundred and fourteen of whom had never been on a horse before. Not once

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was there a sign of the white-feather and not once did any man display an unwillingness to mount again—a reluctance perhaps, but nevertheless, they always got back upon their horses. A Prince of Wales club was formed, but so many "bit the dust" that first month, that it was decided to make the whole sophomore class honorary members of it. Fortunately Florida sand breaks no bones, and although these boys left their horses in every conceivable fashion, no one was hurt. In fact it has been the good luck of the unit never to have had anyone seriously hurt.

In the meantime other activities were not being neglected. The freshmen were advancing rapidly in the school of the soldier, in the study of materiel, pistol marksmanship and gun drill. The sophomores took to signal communication like ducks to water—and the time for inspection drew near.

The inspector came and went, and then came the pleasing news that in the second year of its existence the unit had attained the rating of excellent.

The third year rolled around and brought with it the first Artillery juniors—only fifty in number out of a sophomore class that ended two hundred strong, but the cream of the lot. A few excellent men were lost due to failure to return and to inability to fit their schedules and in isolated cases to a lack of desire to enroll, but all in all the unit got the men it wanted.

Each succeeding year brought fewer problems. The Artillery juniors were of great help in the dismounted instruction, the horses were now fairly well trained, riding pens had been constructed, and the sophomore equitation class "bit the dust" with less and less frequency.

The most serious problem this third year—incidentally a hangover from the preceding year—was the question of draft. The horses attached to the unit are more of the saddle than of the draft type. They did not know how to pull and, handled by green riders, they frequently stalled. Nothing had been done to the sand lot in front of the stables and that was the drill field. Towards the end of the school year when the dry season began, the sand was so heavy that the wheels of the gun carriages would sink about one foot into the ground—a problem in draft that

THE FLORIDA UNIT TAKES ITS PLACE

would have proved of great concern to a more experienced personnel and much heavier horses.

The sophomores really deserved a better ending to that year of draft. All of them could interpret arm signals as fast as they could be sent, and all of them were well versed in the various movements of maneuvers limbered, but when the day of inspection arrived, it was terribly hot and there had been no rain for weeks. The drill which had been planned to be executed at a trot resolved itself into a matter of keeping the teams from stalling. That was the only rating below excellent that the sophomores received that year, and in giving them satisfactory rating the inspector commented on the unsatisfactory nature of the drill field.

This year with most of the departments running with machinelike smoothness, the unit really pointed for inspection. And, in plain English and vulgar vernacular, the inspector "had his eyes knocked out." He was shown everything short of pulling the proverbial rabbits out of the hat. To cite an instance: A battery displacement was planned as a part of the inspection. The unit formed as a battery, displaced a distance of one mile, laid a complete battery telephone net, computed firing data, sent it over the telephones and laid the battery with the data sent. From the time the movement started until the command was given for the cannoneers to form in rear of their pieces, only twenty three minutes elapsed.

This year the unit received the following ratings:

FIRST YEAR BASIC

Military Hygiene and First Aid	Excellent
Organization of the Battery	Excellent
Ordnance and Matériel	Excellent
Field Artillery Ammunition.....	Satisfactory
Elementary Gunnery	Excellent
Service of the Piece	Excellent
The Firing Battery	Excellent
Gunner's Instruction	Excellent
Pistol.....	Excellent

SECOND YEAR BASIC

Care of Animals	Excellent
Reconnaissance and Occupation of Position	Excellent
Fire Control	Excellent
Battery Communications.....	Excellent
Equitation	Excellent
The Field Artillery Driver	Excellent
Maneuvers Limbered.....	Satisfactory

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FIRST YEAR ADVANCED

Communications for Field Artillery	Excellent
Gunnery	Excellent
Dismounted Drills	Satisfactory
Equitation and Horsemanship.....	Excellent
Preparation of Fire.....	Excellent
Terrestrial Observation.....	Satisfactory
General rating of the Unit.....	Excellent

During the third year many extra-curricular activities were started. A polo organization was formed and during the summer months the drill field was almost completely leveled, clayed and sodded, part of it being set aside for the polo field. A pistol team is in the embryo, and this year it is intended to have polo games and pistol competitions with other schools.

In order to stimulate interest over the state in the unit, a small, four hour horse-show was held toward the end of the last school-year. Preparations for it involved a considerable amount of work but its success far outweighed the work involved. Approximately three thousand people attended it, which possibly more than any other one thing indicates the interest it attracted.

The Unit is now well in its fourth year, and from the time those first three hundred were formed into three batteries, it has steadily grown until today, doubled in size, it stands as a regimental organization of six gun batteries. For the first time it has its own cadet officers and non-commissioned officers. Seniors, juniors, sophomores and freshmen are all carrying on their respective studies with a Reserve commission as their goal. Over fifty per cent of last year's sophomore class enrolled for advanced military science and the unit's prospects are very bright. This year should prove even more successful than the preceding ones.

Duty with the Reserve Officers' Training Corps at any place should prove not only exceedingly interesting but instructive as well. When such duty takes one to a land of perpetual sunshine to live among a courteous and hospitable people, it makes it a detail particularly to be desired. Duty with the R. O. T. C. at the University of Florida possesses all the attributes of a good detail. To you good artillerymen who are contemplating going on R. O. T. C. duty the Florida unit beckons.

THE UNITED STATES FIELD ARTILLERY ASSOCIATION

IN accordance with the call of the Executive Council, the twenty-first annual meeting of the U. S. Field Artillery Association was held at the Army and Navy Club in Washington, at 4:00 P. M., on December 9, 1931, with Major General Harry G. Bishop, President of the Association, in the chair. The Secretary-Treasurer read the call for the meeting, which he stated had been sent by mail to every active member of the Association. He reported that a quorum for the transaction of business was present in person or by written proxy.

The Secretary-Treasurer presented and read his annual report and financial statements, appended hereto and made a part of these minutes.

The President announced that he had appointed a committee consisting of Major J. M. Swing, F. A., and Captain A. F. Kibler, F. A., to audit the financial statements of the Treasurer. Major Swing then read the report of the committee which stated that the auditing had been performed and the financial statements had been found to be correct. A motion was then made, seconded, and adopted, approving the report of the committee.

The chair stated that there were eight vacancies in the Executive Council; four to be filled from the Regular Army, two from the National Guard, and two from the Reserve Corps. The vacancies were caused by the expiration of the terms of office of Major General Harry G. Bishop, U. S. Army; Brigadier General H. M. Bush, Ohio National Guard; Brigadier General William S. McNair, U. S. Army; Colonel Robert C. Foy, U. S. Army; Colonel Edward C. Rose, New Jersey National Guard; Colonel LeRoy W. Herron, Reserve Corps; Colonel Noble B. Judah, Reserve Corps, and Lieutenant Colonel William Bryden, U. S. Army.

The following officers were elected to fill the vacancies, the Secretary being directed to cast the unanimous ballot for them: Major General Harry G. Bishop, U. S. Army; Lieutenant Colonel Robert M. Danford, U. S. Army; Colonel Augustine McIntyre, U. S. Army; Colonel C. D. Herron, U. S. Army; Brigadier General

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Allison Owen, Louisiana National Guard; Colonel Stephen Elliott, Pennsylvania National Guard; Colonel LeRoy W. Herron, Reserve Corps, and Colonel Paul V. McNutt, Reserve Corps.

ANNUAL REPORT OF THE SECRETARY-TREASURER

Assets—November 30, 1930:		
Cash on hand	\$5,457.82	
Securities on hand.....	23,000.00	\$28,457.82
Assets—November 30, 1931:		
Balance, checking account	3,066.67	
Savings account	3,060.00	
Securities on hand.....	23,000.00	29,126.67
		\$668.85

A detailed statement of the receipts and expenditures during the last fiscal year is as follows:

RECEIPTS

Membership dues and subscriptions	\$ 6,420.49	
Advertising	1,329.64	
Interest	1,361.97	
Books, magazines and binders	1,263.92	
Miscellaneous	1.11	
	\$10,377.13	
Cash on hand November 30, 1930	5,457.82	\$15,834.95

EXPENDITURES

Printing and mailing F. A. Journal	\$4,597.37	
Office supplies	77.70	
Postage, express and telegrams	134.10	
Rent and Telephone	508.94	
Services	1,869.44	
Authors, engravers, photographers	1,161.98	
Books, magazines, binders	1,068.19	
Insurance	11.00	
Trophy	25.00	
Miscellaneous: copyright, refunds, collection charges, etc.	254.56	
	\$9,708.28	
Cash on hand November 30, 1931	6,126.67	\$15,834.95

Total receipts for the year ending November 30, 1931, were		\$10,377.13
Total expenditures for the year ending November 30, 1931, were or a	9,708.28	
gain of		\$668.85

Outstanding obligations and amounts receivable are approximately the same as on November 30, 1930. The only outstanding

THE UNITED STATES FIELD ARTILLERY ASSOCIATION

obligation of any importance is the printer's bill for the November-December, 1931, number of the JOURNAL, which had not been received. The same obligation was also outstanding on November 30, 1930. Small amounts are receivable consisting of dues and book department bills.

As regards membership there has been an increase of 33 Regular Army members and a decrease of 41 members from the National Guard and Reserve. The associate membership (officers of other arms, etc.) has increased by 5. Subscriptions from public libraries and colleges have increased by 13, from military organizations by 11 and from government entities, both foreign and United States, by 30. The total paying dues and subscriptions has increased from 2,334 to 2,360, an increase of 26.

The Army Appropriation Bill for the fiscal year ending June 30, 1932, contained the following provision:

"No appropriation for the pay of the Army shall be available for the pay of any officer or enlisted man on the active list of the Army who is engaged in any manner with any publication which is or may be issued by or for any branch or organization of the Army or military association in which officers or enlisted men have membership and which carries paid advertising of firms doing business with the Government; provided, however, that nothing herein contained shall be construed to prohibit officers from writing or disseminating articles in accordance with regulations issued by the Secretary of War."

In order to comply with the above legislation THE FIELD ARTILLERY JOURNAL has contained no advertising since the January-February, 1931, number, which was the last number to be issued before the passage of this provision. Thus the Field Artillery Association is obeying strictly the spirit as well as the word of the law.

On July 22, 1931, the Executive Council of the U. S. Field Artillery Association met and the Secretary-Treasurer read a statement explaining the effect of the legislation referred to above on the finances of the Association and the publication of the JOURNAL. He submitted plans for reduction of expenditures whereby receipts and expenditures for the year 1931 could be made to balance approximately. He also laid before the Council

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the following plans whereby the publication of THE FIELD ARTILLERY JOURNAL, without advertisement, could be continued with a reasonable certainty of balancing receipts and expenditures: *a.* to increase the membership dues; *b.* to reduce the number of issues from six to four per year; *c.* to combine with one or more other service journals. The Council, after discussing the situation and taking into account the healthy financial condition of the Association as regards reserve funds, directed the Secretary-Treasurer and Editor to proceed with the publication of the JOURNAL making the reductions in expenditures he proposed and to publish THE FIELD ARTILLERY JOURNAL in approximately its present form, bi-monthly, the membership dues to remain the same and the JOURNAL to maintain its independence by not affiliating itself with other periodicals.

The importance to the Association of increasing its membership among Field Artillerymen of the Regular Army, National Guard and Organized Reserves, is obvious. The more members we get the better we are accomplishing our mission of disseminating professional knowledge. The help of our present members in interesting prospective members is most important. A few personal words will do more than many letters from the Secretary.

J. M. EAGER, *Major, Field Artillery, U. S. Army,*
Secretary-Treasurer.

After an informal discussion of the affairs of the Association and the policies of THE FIELD ARTILLERY JOURNAL, the meeting adjourned at 5:15 P. M.



AN ARTILLERYMAN OF 1812

THIS STORY IS HISTORICALLY CORRECT
WILLIAM H. ZIERDT, LIEUT. COL., F.A., Pa.N.G.

THE articles of war forbid cruel and unusual punishments. However, the punishment which is cruel today may not have been so considered a hundred years ago. Each of our wars has been followed by greater interest in military justice forcing the discontinuance of arbitrary "punishments not in accord with the spirit of the times."

The traditions of the 109th Field Artillery and the people of its home station in the Wyoming Valley include this story in honor of a private soldier. When the Governor called for volunteers in 1812 the official phraseology was embellished with fervid grandiloquence intended to obviate the necessity for a draft by stirring the patriotism of the militia to the point of volunteering. Proud of its efficiency the artillery company of the regiment tendered its services in a body and after a long year of tedious waiting it was ordered to march to Erie.

They started on a board raft which was floating down the Susquehanna River on its way to market. All of his men but one having embarked, the captain became impatient and went ashore where he saw the delinquent held by his wife and children crying bitterly and clinging to him. The sight so moved an onlooker, James Bird, that he said, "give me your uniform coat and I will go in your place." The exchange was made in silence, Bird and the captain boarded the raft and they started on their way.

The men were gay that day in their first flush of enthusiasm. Warmed by the April sun they rested on the rough new cut boards with their pungent odor or played pranks on each other. Bird was just twenty years old, strong and active with a cheerful disposition. He took his turn in manning the big sweeps which were set on either end of the raft helping to keep it in the current and only grinning when his clothes were wet by the swift waves splashing. They dipped their drinking water from the river, ate a cold supper and as night came on huddled together for warmth. The narrow confines of the raft began to irk them and after another day and night they were glad to leave it.

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The way now led over roads that were scarcely more than trails through valleys and mountain passes for three hundred miles which they traveled in thirty days. Their rations were chiefly salt pork and flour cooked by the individual soldier and at the end of the day each received a drink of whiskey. After entering the service on May 6th, brass field pieces were issued and Bird began the technical training of the artillery soldier. He was made a matross, under the direction of the junior subaltern. They wore their harness and the long bricoles hung from the right shoulder over the ammunition pouch belt.

The contractor for the western district was now supplying their rations which were noticeably better than on the march. They received muskets, for the close defense of their cannon, and equipage from the deputy quartermaster general at Pittsburgh. Bird visited Erie and saw the ships there being built of green timbers cut locally, while the ironwork, canvas and cordage were brought from New York and Philadelphia. One of these ships, the Niagara, especially attracted him and he wondered if Captain Perry was really going to come to Erie and add it to his fleet.

Bird knew not only his own duties but those of other members of the gun crew. As gunner of the left he had learned to take the leather finger stall from his gunner's haversack and, wearing it on the middle finger of his left hand, stop up the vent while powder and cannon ball or canister, which included a number of smaller balls, were loaded from the muzzle. With his right hand he turned the elevating screw to give it the proper angle for range while the gunner of the right gave the piece its horizontal direction. It was then fired by number three applying the flame of the port fire to the tube, taking care not to hold it directly over the vent, so he could stand clear before the shock of the discharge.

Perry, after uniting his fleet in the harbor and taking over the new ships, issued a call to the troops asking for volunteers to man his guns. Bird was among those who responded and to his great delight found himself assigned to the Niagara. He served with the fleet at the battle of Lake Erie on September tenth and was wounded by a shot of canister just as Perry came on board to make the Niagara the flag ship of the fleet. With his shoulder

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covered with blood from his wound Bird refused to be evacuated, but fought on until the end of the action.

After the battle he rejoined his command and a few days later the entire company sailed on the Niagara and took part with the Kentucky militia and the Regulars in driving the English back along the Thames River into Canada. The company was mustered out on November sixth and found its way home again.

Except Bird. The war was not yet over, he was entitled to several hundred dollars of the prize money awarded the fleet and the Niagara was calling to further adventure, so he returned to it as a private of marines. He had seen the ship built, had served on it in battle and idolized its commander. But Perry had departed and the war languished in this theatre. There were some new officers on board and Bird found the duty less active and less pleasant. It palled to such an extent that when discipline became too harsh, news of Jackson's successes against the Creek Indians in the south led him towards the new scene of activity.

When brought back he showed no rancor or resentment for being punished. In October his parents received his last letter in which he said, "by the laws of our country, I am doomed and sentenced to death, for deserting." Before the letter reached them he had been shot to death by musketry on the deck of the Niagara, the ship that he had loved so well, and his body buried in the sand beach at Erie. A medal from the State "in testimony of his patriotism and bravery" and the prize money from the Federal Government for his services on the Niagara at the battle of Lake Erie were sent to his father.



A NOVEL METHOD OF STIMULATING PROFESSIONAL INTEREST

AN interesting and successful experiment was recently accomplished in the 2nd Field Artillery Brigade at Fort Sam Houston, Texas. The Brigade Commander, Brigadier General Samuel D. Rockenbach, published on October 20, 1931, a memorandum from which the following are extracts:

MEMORANDUM: To All Officers of This Brigade—

1. The September-October number of the Field Artillery Journal is of more than passing interest.

2. In order to stimulate study and thought the Brigade Commander will give a prize of a year's subscription to the Field Artillery Journal, or the money value thereof, for the best study of the two articles: "Division Artillery" by General Culmann, French Army, and "Organization, Armament and Employment of Field Artillery" by General Summerall. The study to contain: (a) A brief or digest of the two articles; (b) A comparison of the two, as deductions from the teachings of the World War and predictions as to the future; as to types, calibres and number of guns and organization; (c) Best organization, armament and employment to protect the Infantry in defense and attack and relieve them of accompanying guns and howitzers. The above open to all Artillery officers.

3. The same prize for the best study of the articles: "Marching with the Horse Artillery" or "Automatic Rifles for Defense against Aircraft." Open to Artillery Lieutenants only.

4. Conditions: Study to be submitted to Headquarters, 2nd Field Artillery Brigade by 20th November, 1931. To be signed by number only. Name to be written on card and enclosed in sealed small envelope and attached to study. Number only on outside of envelope. Numbers to be drawn at Regimental Headquarters. Award to be made by three Artillery officers outside the Brigade.

BY COMMAND OF BRIGADIER GENERAL ROCKENBACH,

Zim E. Lahon,

Captain, Field Artillery Adjutant.

The judges of the contest were Colonel G. P. Tyner, G. S. C. (F. A.) and Lieutenant Colonel J. H. Bryson, F. A. The winner of the contest was 1st Lieutenant Sheffield Edwards, 15th F. A., whose study is partially reproduced below:

Current Tendencies Toward Improvement of Division Artillery

The following discussion is intended to present current trends of thought towards the improvement of division artillery in organization, armament and employment and to consider the composition of Field Artillery best suited to lend the utmost and most constant support to the Infantry division in all classes of warfare in which it may be engaged.

In the September-October issue of THE FIELD ARTILLERY JOURNAL there appeared two articles, which, although differing

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widely in the treatment of this subject, form an interesting basis for discussion and thought.

The first, "Division Artillery" by General Culmann of the French Army, is a comprehensive exposition of proposed new types and numbers of weapons, ammunition, etc., and of the characteristics that such types must have to be most effective and efficient against the varied targets to be encountered in modern warfare.

The second article, "Organization, Armament and Employment of Field Artillery" by General Charles P. Summerall, demonstrates the great mass of artillery necessary to give constant support and success to the Infantry. In his consideration of the subject, General Summerall includes only the types of weapons which are in present use in our service and which in any near emergency would be our initial armament.

There follows a synopsis or study of these two articles, with analysis of essential principles involved. [The synopses of General Summerall's and General Culmann's articles are omitted here in view of the fact that the articles appeared in full in the September-October issue of THE FIELD ARTILLERY JOURNAL—*Editor.*]

Inasmuch as the treatment of the subject is quite different, a comparison of the two articles must consist of deductions from each which tend to fulfill the common purpose of maximum available fire-power in support of the Infantry. To attain an increase in the fire-power of divisional artillery we can do one or both of two things; increase the fire-power of each weapon or increase the number of weapons. Obviously, the desirability of increased fire efficiency in the individual gun must be attained wherever possible. General Culman has established without a doubt that a divisional gun can be procured which will have at least 50 per cent more fire-power without loss of mobility. General Summerall has attained increased fire-power by doubling the number of present guns. He has further pointed out conclusively the enormous amount of artillery required in highly stabilized situations.

In considering the number of guns to be prescribed for the division we find that General Culmann states that the artillery

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of a French Division of three regiments should have 48 light gun-howitzers including the group of anti-tank batteries and 24 medium howitzers. General Summerall recommends 96 light guns and 48 medium howitzers or just double the French figure. However, can we not safely say that at least in prolonged rates of fire or in barrage fire, the 48 gun-howitzers of the French Division would equal in fire-power 72 (or $\frac{1}{2}$ more) of the 75mm guns? In similar fashion, retaining our present organic division artillery status guns, the use of the light gun-howitzer would increase our fire-power to the same figure. From another angle, the maximum width that a battery of light gun-howitzers can cover should be at least 300 meters. Therefore, if armed with the new gun-howitzers and retaining our present organization, we could cover 3,600 meters of a 4-kilometer front and this without the use of the medium howitzers, or supporting Corps Artillery.

Many officers are of the opinion that except in stabilized situations, where circulation of supplies, ammunition, etc., is facilitated, there is a limit to the amount of organic artillery that can be assigned to a division initially and still allow that division to retain its tactical mobility. Teachings of the World War demonstrate that the Corps conducts the combat and that the Divisions of the Corps must be powerfully supported by artillery in the defense or attack of a stabilized position. Therefore, in organization can we not conclude that this great additional power in artillery must in large measure come from Corps Artillery and through the Corps from Army Artillery?

The need of guns which are capable of attacking the modern tank is urgent. If our new field piece, a light gun-howitzer, cannot undertake such a target, we must design a gun which not only can do it, but can also be available to fire on other terrestrial targets. There should be a battalion of these anti-tank guns in each brigade.

The medium howitzer as a division artillery weapon is accepted as standard and is for the purposes of counter-battery and fire on heavy overhead cover. Improvements can also be made in this weapon in construction, range and mobility.

The problems of traction are often overemphasized, in that they effect fire-power only in the matter of mobility. Motor or horses

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may supplant each other without effecting organization or the type of material to any great extent. The horse at present will continue to be the motive power of the greater part of light artillery. Motors will continue in use for medium and heavier artillery and will be employed with light artillery as they become perfected and as the situation requires.

The problem of close support of the Infantry (i. e., accompanying guns) has not been heretofore mentioned. The solutions in this would be such perfect liaison that close support would be obtained automatically without special provision. It is quite possible that great improvements in radio communication will solve this. Another plan is to use the anti-tank guns as an accompanying gun in the offensive. In the World War the anti-tank gun was merely a defensive weapon. This same weapon might act as the accompanying gun to support the Infantry in the offense. Of course, difficulties in obtaining the great angle of fall necessary for accompanying weapons and other problems of mobility would have to be solved.

In conclusion, the best organization of Field Artillery is such as to place in organic division artillery the maximum number of field guns and medium howitzers which can be properly assimilated in the Division without detracting from the tactical mobility of the unit in all the varied forms of warfare in which it may be engaged. These field guns must be the most efficient obtainable in the amount of fire-power produced. With the use of a new gun-howitzer it is considered that the present organizations of the divisional artillery would fulfill these conditions, with possible exception of the addition of a battalion of a combined accompanying and anti-tank guns. The additional fire-power required for stabilized and other special situations must be supplied by the Corps and Army. The amount of Corps Artillery should be greatly increased and the Corps and Army organization must be such as to be able to readily attach sufficient artillery support where needed.

The best employment of Field Artillery is to furnish through its divisional, corps and army organization the desired support to the combatant Infantry. A flexible system of coordination and organization must be attained so as to provide additional masses of

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artillery when and where needed. The best employment of Field Artillery will depend on the perfection of the closest liaison with the Infantry and the perfection of liaison within the artillery itself.

On December 2, 1931, the Brigade Commander published the following memorandum:

1. The response to Brigade Memorandum of October 20th was very pleasing. Fourteen (28%) of the officers responded with well prepared papers showing careful study and digestion.

2. The range of the articles was great:

- a. "Organization, Armament and Employment of Field Artillery"—authoritative facts as to the requirements of the World War (highly stabilized warfare).
- b. "Division Artillery"—the progress made in division artillery to give the effect (same as a.) required to support the Infantry with a minimum number of gun-howitzers and light howitzers.
- c. "Marching with the Horse Artillery"—a demonstration of what horsemanship coupled with vigilance can do in marching Field Artillery.
- d. "Automatic Rifles for Defense Against Aircraft"—bringing out that a light handy automatic rifle is the weapon for antiaircraft defense.

3. * * * * *

4. It is a pleasure to announce and congratulate the successful contestants:

FIRST: "Current Tendencies Toward Improvement of Division Artillery" 1st Lieut. Sheffield Edwards, 15th Field Artillery.

SECOND: "Automatic Rifles for Defense Against Aircraft" 2nd Lieut. J. A. Barclay, Jr., 15th Field Artillery.

THIRD: "Marching With the Horse Artillery" 2nd Lieut. John N. Raker, 15th Field Artillery.

BY COMMAND OF BRIGADIER GENERAL ROCKENBACH,

Zim E. Lawhon,
Captain, Field Artillery Adjutant.

POST WAR DEVELOPMENT OF CORPS ARTILLERY

BY CAPT. E. C. GOEBERT, ORDNANCE DEPARTMENT

THE subdivision of mobile artillery into the three general classes, namely, Division, Corps and Army establishes characteristics in each of the classes which make the design of weapons for each group distinctive. The types of weapons necessary and suitable in each class are controlled and limited directly by the missions assigned. It is therefore desirable, before proceeding, to state as clearly as possible the prescribed mission.

The mission of the Corps Artillery has been defined as "the protection of Division Artillery against enemy artillery." Considering this mission further, it consists of extensive harassing and interdiction fire along the corps front to a greater depth than it is possible to fire from Division Artillery, and the delivery of destructive fire on strong points, railroad facilities and points of supply.

The "Caliber Board" in its report of May 5, 1919, selected two weapons for the Corps group—a gun and a howitzer. It defined the ideal gun as a weapon 4.7"–5" bore with a maximum range of 18,000 yards mounted on a carriage with a weight between 12,000 and 15,000 lbs; 360° traverse and –5° to +80° elevation. The ideal howitzer was specified as having a 155mm bore with a maximum range of 16,000 yards, 360° traverse and elevation between the limits of –5° and +65°; the weight limit was not specified but it is assumed that it should be commensurate with that of the gun, namely, between 12,000 and 15,000 lbs.

During the World War the corps gun used by the American Forces was the 4.7" gun, model 1906. It had a maximum range of 8,860 yards, 15° elevation, 8° traverse and weighed 9,818 lbs. limbered and in traveling position. The carriages manufactured before the World War were equipped with steel tired wheels (figure 1), while those constructed during the war had solid rubber tired wheels (figure 2.)

The companion piece to the 4.7" gun was the 155mm howitzer (Schneider) model of 1917 and 1918. The model of 1917 (figure 3) had a curved shield and was equipped with steel tired wheels.

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It was manufactured by the French. The model of 1918 (figure 4) was American manufactured; it had a straight shield and was equipped with solid rubber tired wheels. These howitzers had a maximum range of 12,400 yards; 42° elevation, 6° traverse and weighed 9,485 lbs. limbered and in traveling position.

For a clearer comparison there is tabulated below the principal characteristics of the war-time, and the Caliber Board's ideal specifications for the corps gun and howitzer.

GUN

	Bore	Range	Elevation	Traverse	Weight Traveling
Caliber Board	4.7"-5"	18,000	-5° to +80°	360°	12,000-15,000
War type	4.7"	8,860	+15°	8°	9,818

HOWITZER

	Bore	Range	Elevation	Traverse	Weight Traveling
War type	155mm	12,400	+42°	6°	9,485
Caliber Board	155mm	16,000	-5° to +65°	360°	12,000-15,000

A study of these comparative specifications definitely indicated that to approach the ideal for both these weapons the box trail type carriage could not be considered, and that at least the maximum weight limit would be necessary to meet the additional power necessary to reach the range specified and produce a carriage with satisfactory stability. Accordingly the Ordnance Department in 1919 initiated the studies of a carriage of the split trail type to mount interchangeably a 4.7" gun and 155mm howitzer whose ballistics approached as near as possible the ideal specified.

The pilot carriage was constructed and designated as the model of 1920. Figures 5 and 6 illustrate this carriage mounting the 4.7" gun, while figures 7 and 8 show it mounting the 155mm howitzer.

With the gun mounted the carriage weighed 13,600 lbs. in firing position and 15,800 lbs. limbered and in traveling position. It had a maximum range of 20,050 yards, maximum elevation 65° and 60° traverse. Mounting the howitzer the unit weighed approximately the same as with the gun. It had a maximum range of 16,390 yards, elevation of 65° and traverse of 53°.

POST WAR DEVELOPMENT OF CORPS ARTILLERY

The carriage was, as previously mentioned, a split trail type, was spring suspended in traveling position, the springs being bypassed for firing position by inserting a pin which locked the bottom carriage to the axle. The gun and howitzer were brought well forward on the top carriage to provide for the high angle of elevation and as a result the center of gravity of the tipping parts to be elevated was considerable distance in front of the trunnions. To compensate for this unbalanced load condition pneumatic equilibrators were designed for this mount, which as far as is known were the first of this type ever successfully applied to mobile carriages in the United States.

The first tests of the carriage were conducted at Rock Island Arsenal. With the 4.7" gun mounted, it was given a road test and then fired. The 155mm howitzer was then mounted with its top carriage and the weapon fired. These firings developed defects, and after further study it was decided to redesign the unit separating the gun and the howitzer into two distinct problems.

One of the principal reasons for this decision was that the howitzer stresses on the carriage required that the carriage be built with more strength and consequently more weight than would be warranted in a carriage suitable for mounting a 20,000 yard-4.7" gun.

The result of this decision as it effected the 4.7" gun project was the carriage model of 1921, shown on figures 9 and 10. The carriage mounted the gun with maximum range of 20,050 yards, had 45° elevation, 60° traverse and weighed but 12,700 lbs. in traveling position. A comparison of this weight with the 15,800 lbs. required to produce the 1920 model shows clearly the advantage gained by separating the corps gun and corps howitzer problem.

With the 15,800 lbs. found necessary in the model 1920 carriage the gun was carried as a separate load on a transport wagon for sustained road travel. The transport wagon never has been a satisfactory vehicle and is a constant source of annoyance wherever it must be used. Due to reduction of the total weight of this carriage in the model of 1921 to 12,700 lbs., the gun was retracted for sustained travel and the transport wagon eliminated as an accessory to this unit.

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The 4.7" carriage and gun model 1921 were sent to Fort Bragg in February of 1925 for consideration by the Field Artillery Board. In March of 1925 a favorable report was received on this carriage and the mount was recommended for standardization. The final action toward standardization was never taken, however, since it was believed that with the development of other weapons progressing as they had the caliber 4.7" gun might not be necessary, and pending final decision on this point the entire project was indefinitely suspended.

Should the 4.7" gun again become an active project it will no doubt be necessary to completely redesign the carriage for in the interim elapsed since it was built many new developments have been perfected in the art of gun carriage design and the requirement for fast speed road transportation has been added to the other specifications of a satisfactory mobile artillery carriage.

Earlier in this article it was shown that the corps gun and howitzer were first studied as an interchangeable problem, namely, one carriage to mount either the gun or the howitzer. In the attempted solution, the model 1920 carriage in tests with the howitzer mounted gave considerable trouble due to the persistent failure of the top carriage. In December of 1923 the two problems were definitely separated and a project inaugurated to produce a design of carriage to mount the 155mm howitzer. This conclusion came only after three years of careful study.

The 155mm howitzer mounted on the model 1920 carriage, with the top carriage reinforced as best it could be, was sent to the Field Artillery Board so that the problem of maneuverability could be studied and such recommendations made as would enable the Ordnance Department to embody in the new design the most desirable feature known at the time. This new design was designated as the model of 1925.

The design was completed and a full size wooden model built at Rock Island Arsenal. This model was shipped to the Ordnance Department in Washington for study. It is illustrated in figures 11, 12 and 13. The general characteristics of the design are—maximum range 16,390 yards, maximum elevation 65°, total traverse 60°, estimated weight in firing position 12,892 lbs., estimated weight in traveling position 14,332. The unit was to be

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spring suspended mounted on solid rubber tires with a width of 8", the wheels to be 60" in diameter and with a tread width of 70". It had several new features among which were a quick return mechanism to facilitate loading for high angle fire and a new type flatted pin which could be turned by a wrench through 90° to lock the bottom carriage to the axle and thus by-passing the spring suspension for firing.

The model was studied in every detail and as a result abandoned. The model designated as the 155mm howitzer carriage T1 was then designed and built. This carriage is shown in figures 14, 15 and 16.

The general characteristics of the T1 howitzer are—maximum range 16,390 yards, maximum elevation 60°, total traverse 55°, weight in firing position 14,300 lbs., weight in traveling position 16,500 lbs., provided with wheel shoes which bring the total weight in traveling position to 18,400 lbs. It is spring mounted on 60" diameter wheels equipped with solid rubber tires 8" wide and a tread width of 74".

The center line of the bore at 0° elevation is 54" above the ground, and with the relation of the rear face of the breech and trunnions and a 48" constant recoil a small pit has to be dug for high angles of fire.

It is equipped with pneumatic equilibrators with an adjustable element to compensate for the effect of changes of temperature on the force exerted by the mechanism.

The carriage is suspended on a leaf spring for resilience in travel. The spring is by-passed when going into firing position by rotating a flatted pin by means of a self-locking worm and worm wheel mechanism operated by a ratchet wrench.

The bottom and top carriage of this mount were made of steel castings since at the time of their construction the art of welding had not sufficiently progressed to permit its use in these elements. The trails for a like reason are riveted box sections.

A second one of these units, designated as the 155mm howitzer carriage T1E1, embodying certain improvements, but constructed along the same general lines, has been built.

These units at the present time are undergoing tests by the Field Artillery Board and the Ordnance Department. It is

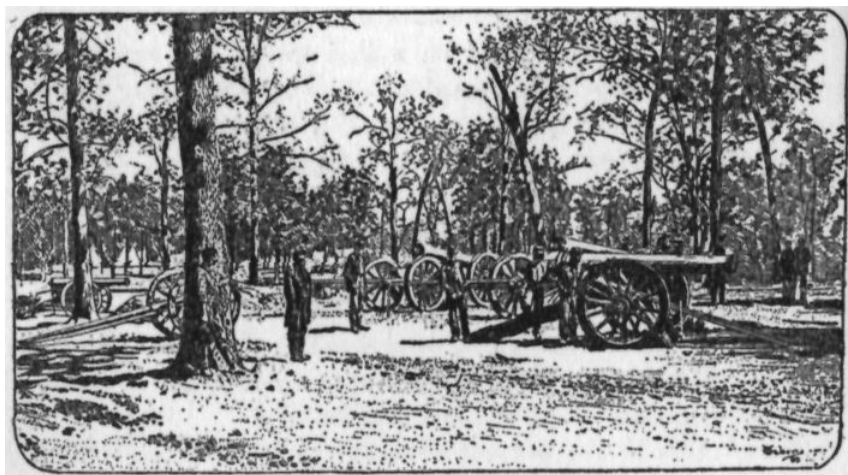
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doubtful, however, whether these units will be the ones finally standardized for use by the Army. They were built for draft by tractors and are not suitable for towing by truck prime movers.

The highly efficient six wheel, four-wheel-drive commercial truck has demonstrated that for road mobility it will be a suitable prime mover and it is, therefore, highly desirable that the modern gun carriages be wheeled and bearinged to make them a suitable towed load for a truck.

To change the 155mm howitzer carriages T1 and T1E1 to make them satisfactory to be towed at speeds of from 20 to 30 miles an hour would require major modifications; it therefore seems advisable at the same time to redesign the entire carriage taking advantage of welding and eliminating as much weight as practicable together with the necessity of a pit for high angle fire.

Preliminary studies made by the writer indicate that by increasing the recoil from 48" to 54" at zero degrees elevation, and gradually shortening to 27" at maximum elevation, a carriage could be built with the center of the bore 44" from the ground which would permit satisfactory stability within the limits of 15,000 lbs. in traveling position. In this design there could be incorporated every feature to give it satisfactory road mobility behind trucks and the use of the modern methods of welding to simplify manufacture of the carriage.



THE 4.7-INCH GUN—MODEL OF 1906



FIGURE 1.—TYPE MANUFACTURED BEFORE THE WORLD WAR

FIGURE 2.—TYPE MANUFACTURED DURING THE WORLD WAR

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THE 155MM HOWITZER, MODELS 1917 AND 1918

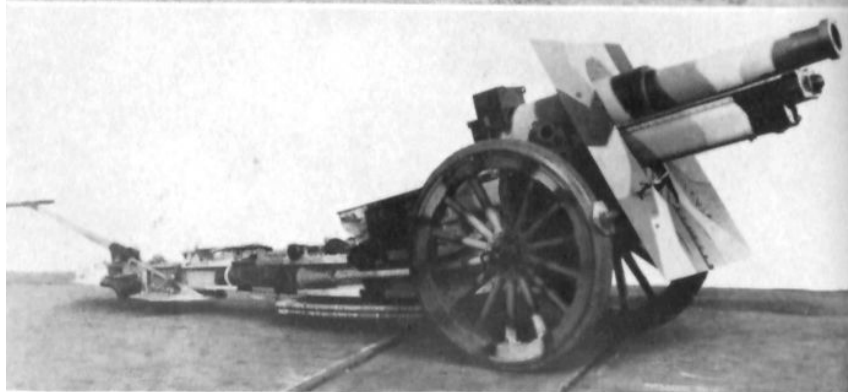
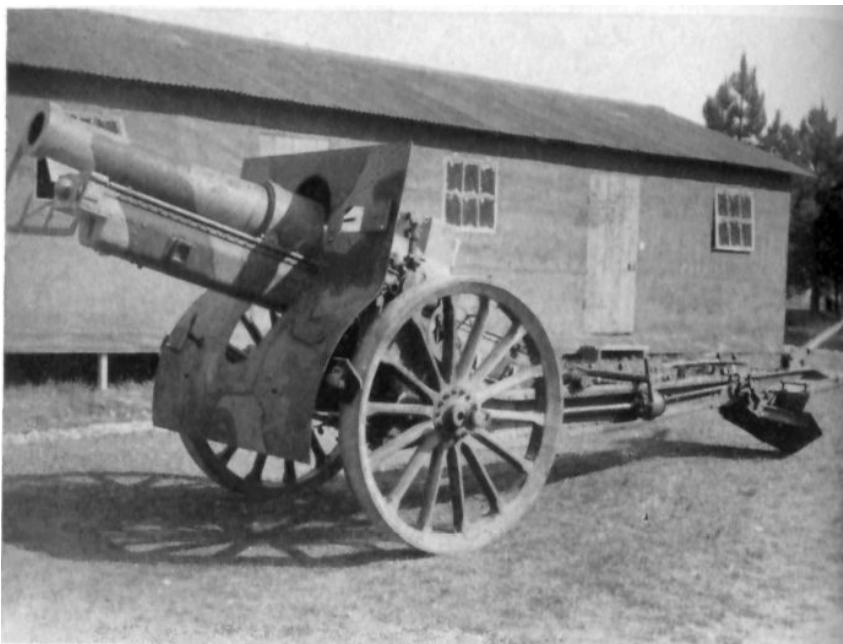


FIGURE 3.—MODEL 1917, MANUFACTURED BY THE FRENCH
FIGURE 4.—MODEL 1918, MANUFACTURED IN THE U. S. A.

THE 4.7-INCH GUN—155MM HOWITZER, CARRIAGE MODEL 1920

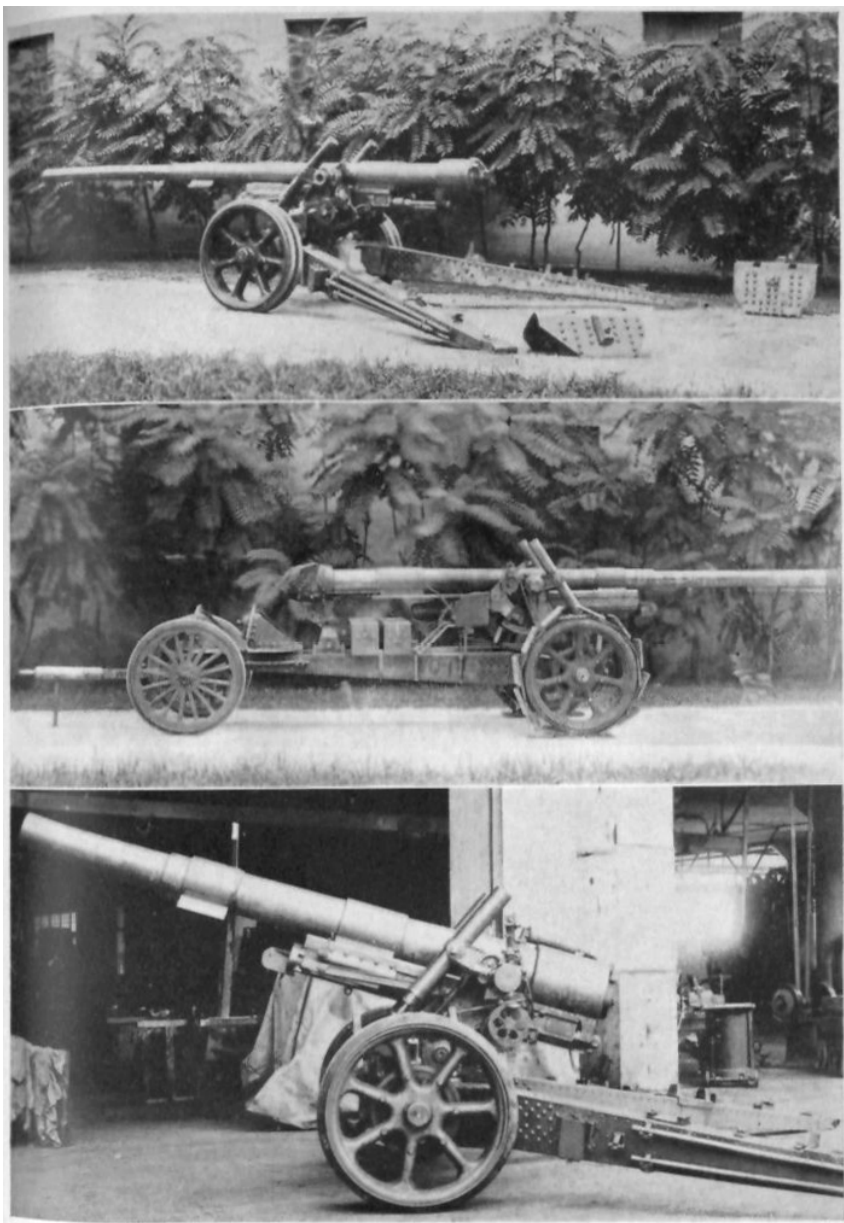


FIGURE 5.—WITH 4.7-INCH GUN—FIRING POSITION
FIGURE 6.—WITH 4.7-INCH GUN—TRAVELING POSITION
FIGURE 7.—WITH 155MM HOWITZER

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THE 4.7-INCH GUN—155MM HOWITZER, CARRIAGE MODEL 1920

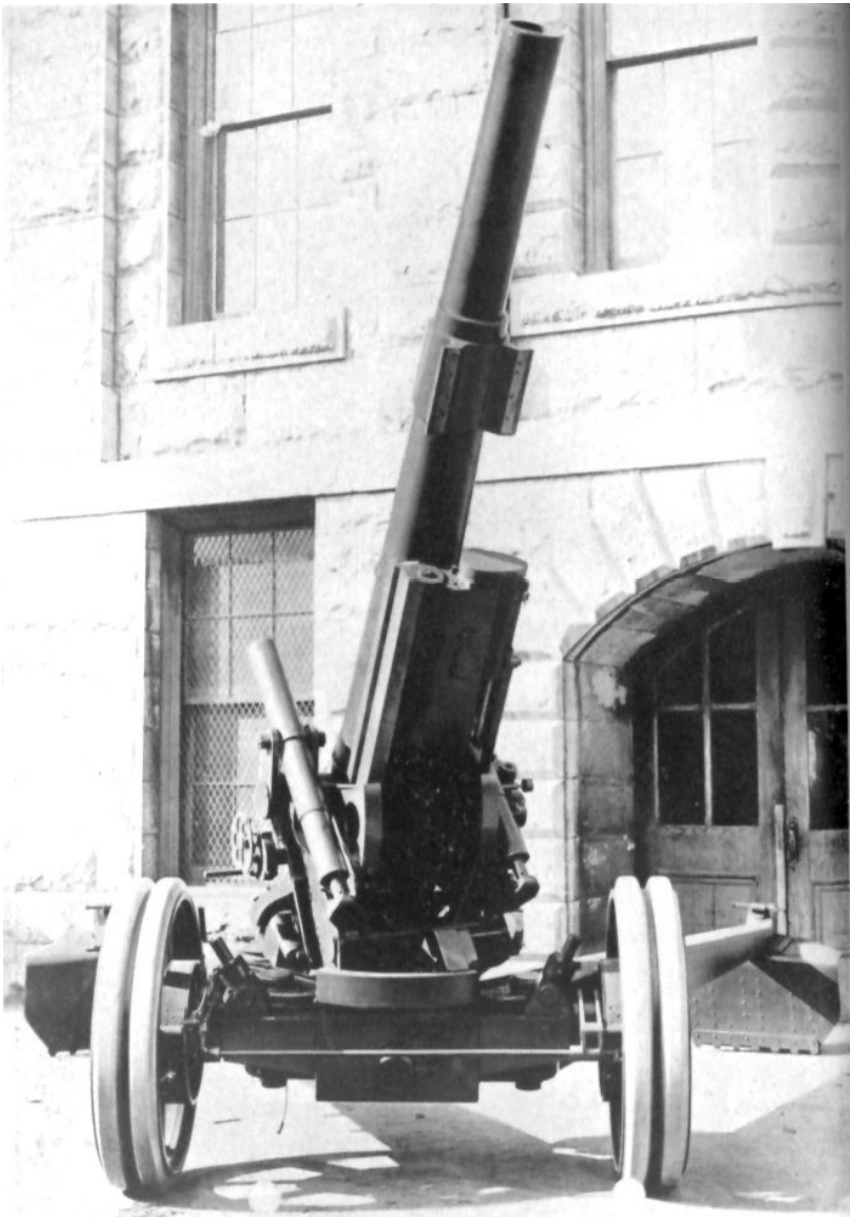


FIGURE 8.—FRONT VIEW OF CARRIAGE WITH THE 155MM HOWITZER MOUNTED

THE 4.7-INCH GUN, MODEL 1921E

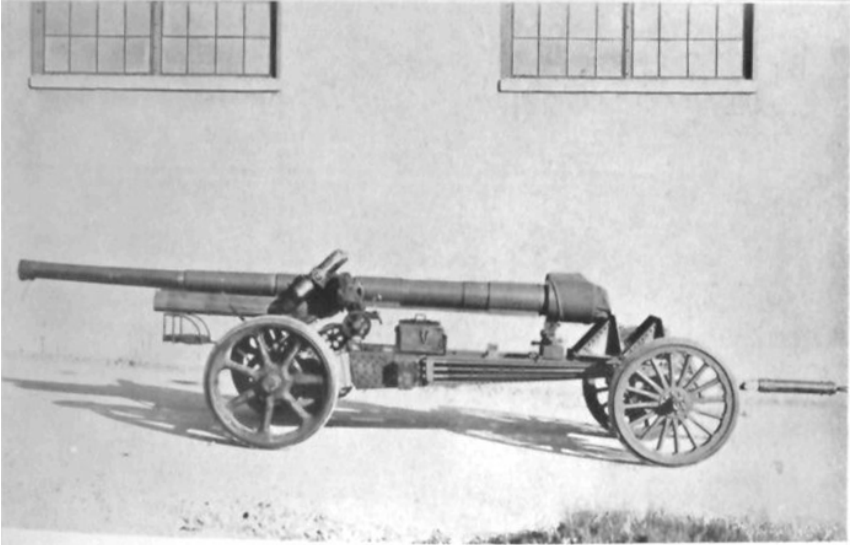


FIGURE 9.—REAR VIEW, FIRING POSITION
FIGURE 10.—SIDE VIEW, TRAVELING POSITION

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155MM HOWITZER CARRIAGE, MODEL 1925E

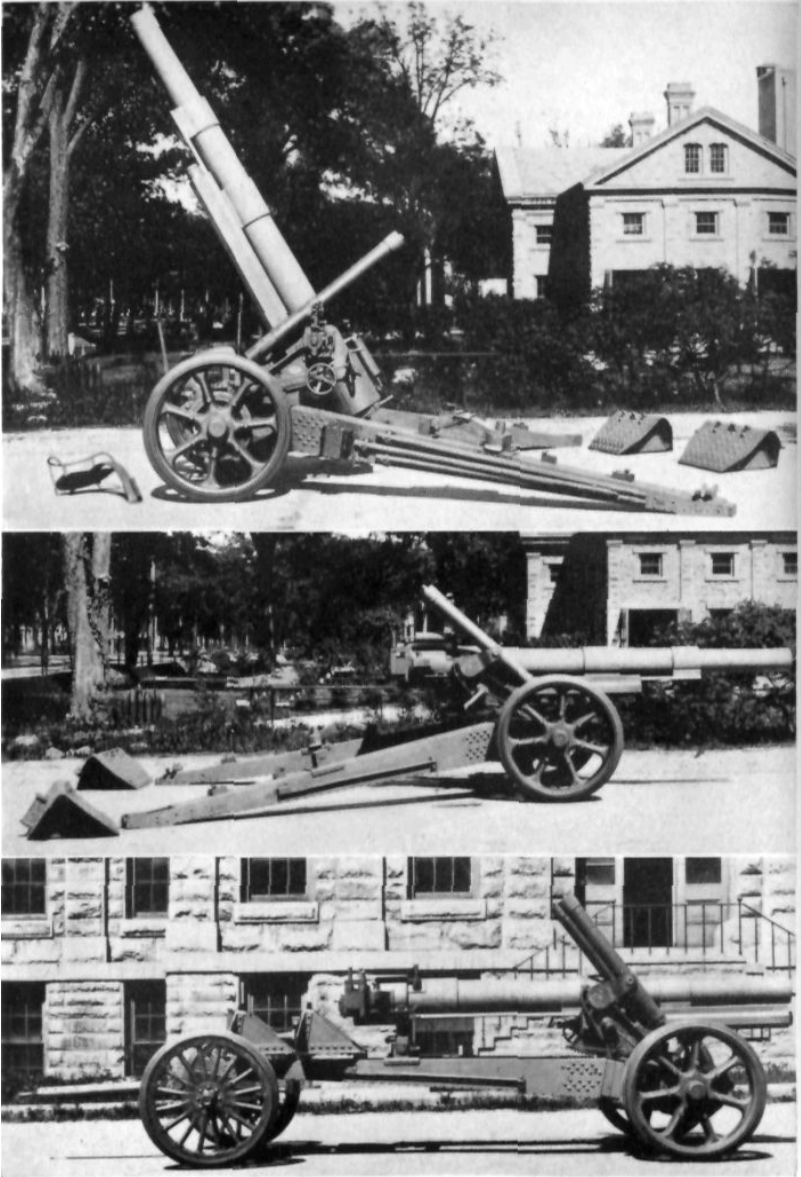
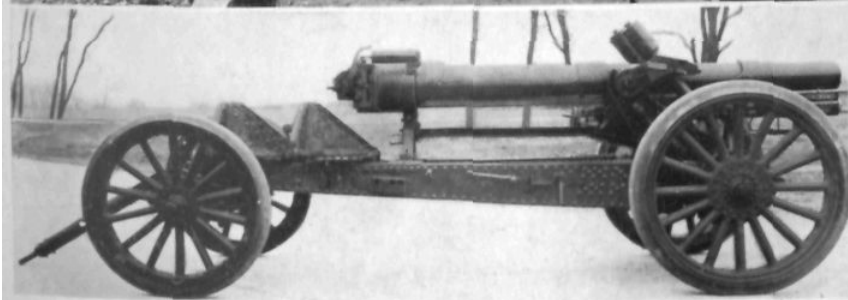
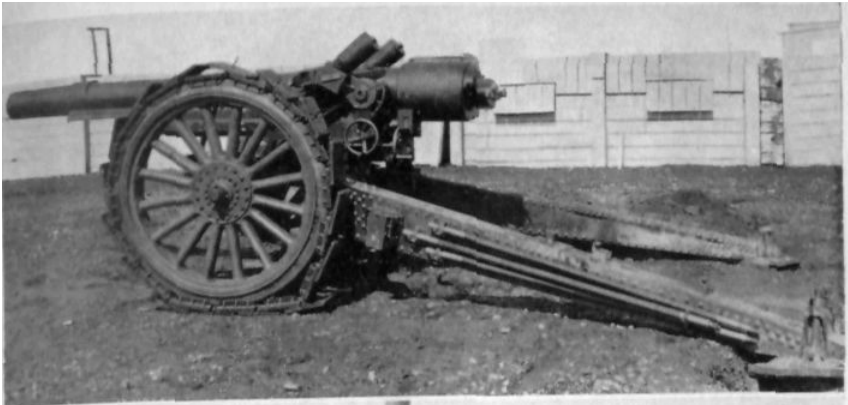


FIGURE 11.—FIRING POSITION, 65° ELEVATION

FIGURE 12.—FIRING POSITION, 0° ELEVATION

FIGURE 13.—TRAVELING POSITION

THE 155MM HOWITZER CARRIAGE, MODEL T1



**FIGURE 14.—SIDE VIEW, CENTER TRAVERSE, 0° ELEVATION
FIGURE 15.—REAR VIEW, EXTREME TRAVERSE, 65° ELEVATION
FIGURE 16.—TRAVELING POSITION**

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TANK TARGETS USED AT FORT SILL

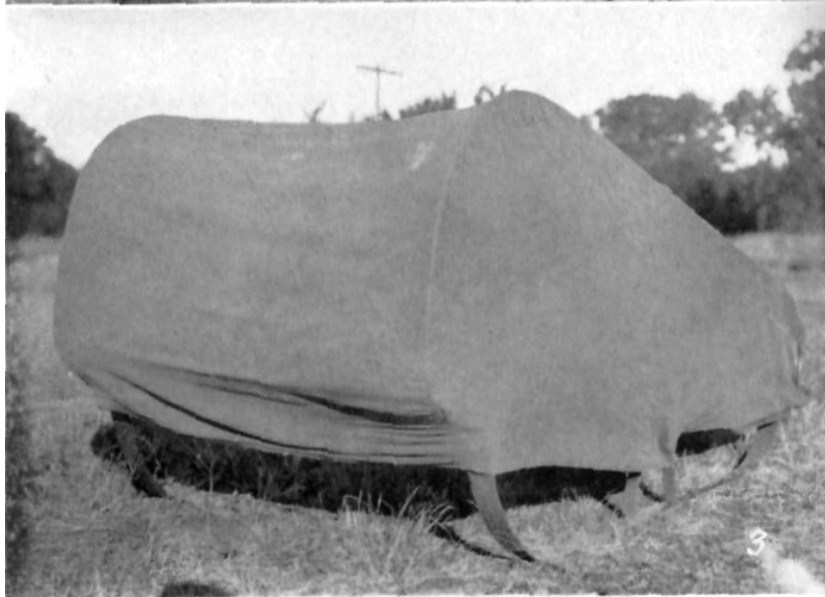
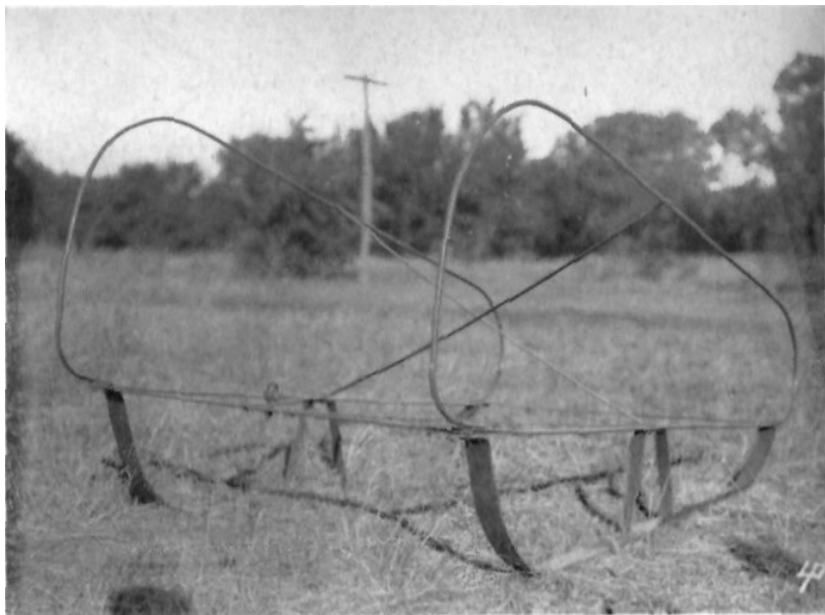


FIGURE 1.—TARGET FRAME
FIGURE 2.—TARGET READY TO BE FIRED UPON

ANTITANK FIRING AT FORT SILL

BY LIEUT. CHARLES C. BLANCHARD, F. A.,
Instructor, Department of Gunnery, The Field Artillery School

DURING the past school year, considerable attention was given to the problem of firing at fast tanks. The objects of this firing were to develop suitable methods of fire, to investigate the effectiveness of fire with weapons of the present type, and, of course, to provide instruction.

The type of target normally consisted of a light metal frame covered with canvas and resembling a light tank in size and appearance. It was towed by means of a light steel cable guided by a series of blocks. A new FWD truck moved the target, usually at a speed of about 15 miles an hour. By a block arrangement, a target speed of 25 miles an hour could be obtained. The target appeared from behind a crest and followed a zig-zag course towards the gun, changing direction two or three times during the run. The problems were stopped when the target came within 700 or 800 yards to conserve targets and ammunition.

For the problems in which 37-mm ammunition was fired, the targets were mounted on trucks which ran on a winding, narrow-gauge railroad and were towed by a FWD truck. After a run towards the gun, the target was drawn back to its original position and was then ready for the next problem. On a few occasions, a problem was fired on the return run as well. After two or three problems, the tilting head on the panoramic sight was moved so the next student could not simply repeat the ranges previously used. This act sometimes caused no little surprise. This type target could be used until the target, track, or cable was destroyed. Hits were counted at the end of the day's firing and not after each individual problem.

The sleeve type target developed at Fort Bragg* was not available until the latter part of the year, so was used only to a limited extent. A speed of 35 miles an hour was obtained with it.

Three methods of conducting fire were used. The procedure was changed slightly at various times during the year; however, the essential points of each method have not been changed. The instructions now in force are as follows:

*See page 428 et seq., Field Artillery Journal, July-August, 1931.

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Always only one gun is used, experience having indicated that a single gun will give more hits than an entire battery. For example: During a previous year a salvaged light tank was started towards a battery from a distance of 2500 yards, four guns firing, the BC giving the range and platoon commanders handling the deflection. Despite the fact that the target was moving at a rate of only four miles per hour, 124 rounds were fired without a hit, largely due to the fact that it was impossible to locate the bursts of individual pieces and correct deflections. The same problem was fired using a single gun and with 40 rounds, three hits were obtained.

PREPARATIONS PRIOR TO APPEARANCE OF TANK

The success of antitank firing will depend greatly on its preparation since, from the moment a tank comes within effective range until it reaches or passes the gun position, only 1½ or 2 minutes will elapse.

From a study of the terrain, note places where targets will probably appear, areas that are defiladed from your gun position, and areas that are impassable to tanks. Determine ranges to a number of points by the best means you have—photo, map, range finder. Markers, such as piles of brush, might be placed at ranges of 500 and 1,000 yards.

Preliminary commands should be given, as:

"Deflection O,
Shell Mark I, Fuze Short,
One round,
Do not load,
1000."

The gun, at the center of traverse, should be laid in the direction in which the target is expected. The initial deflection is zero, as, when the target appears, it will be much simpler to say "Right 10" than "Deflection 3190."

Everything that will expedite trail shifting must be done. The wheels must be placed on hard level ground, or on a platform, and a trail trench dug. A high degree of cooperation between the gunner and trail shifter is essential. With the French 75mm gun, immediately after firing, the trail shifter must point the gun well ahead of the target so the gunner does not have to overtake the target by traversing which is sometimes impossible,

ANTITANK FIRING AT FORT SILL

but rather so that he may meet the target by a short traverse in the opposite direction.

It must be understood that the command "Fire" will be given only by the gunner; otherwise, we will have a gun-shy gunner.

In the discussion of conduct of fire below, the term BC is used for officer in charge of the gun.

FIRST METHOD—GUNNER HANDLING DIRECTION

When the target appears, the BC points it out to the gunner and announces the range. The gunner estimates a shift for the lateral speed of the target. *When using the French sight*, the gunner sets off this shift, lays, and commands "Fire." The gunner keeps the cross-hair on the target until this round bursts. Then, without disturbing the laying of the piece he turns his sight until the cross-hair is on the burst. He then traverses the piece until the cross-hair is again on the target. If there has been no change in lateral speed, the next round should give a line burst. At short ranges or when the gun is not stable, it is impossible to traverse the gun to the target after firing and before the burst occurs. In that case the gunner should leave his deflection set at zero and simply lead the target as a bird hunter leads his quarry. By observing over the shield and noting where the burst appears, he determines if an increase or decrease in lead is necessary.

When using a panoramic sight, the deflection is always left at zero. The gunner estimates the lead for the first shot, and leads by that amount on the reticule scale. He continues to track the target after firing until he spots the burst with respect to a graduation on the horizontal hair, and for the next shot uses that particular graduation. When he is unable to relay before the burst occurs, the gunner watches over the shield to check his lead.

The BC handles only the range, giving the command "Continuous Fire" as soon as he can determine a range which is effective or just short of the target. As soon as the target has passed through this range, the BC gives an appropriate change. A target that is advancing at the rate of 10 miles per hour will cover 100 yards in 20 seconds. A gun squad firing at the rate of 12 rounds per minute, will fire four rounds while the target is advancing

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this distance. Hence, to keep such a target under continuous fire, the range must be decreased 100 yards every four rounds. The ideal would be one short and three overs at each range since only a shot with a point of impact beyond the target can give a direct hit on a tank, neglecting ricochets which do not continue in the plane of the trajectory. If the target is advancing 20 miles per hour, the range must be decreased 100 yards every two shots, or 200 yards every four shots. Knowing the speed which we may expect from hostile tanks, and the rate of fire possible from our gun squad, the officer handling the range has a figure on which to base his range changes that will help him keep the target under effective fire. At a range setting of 500 yards, using Shell Mark I, the maximum ordinate is 4 feet. As the gunner lays on the base of the target and as tanks are more than 4 feet high, do not decrease a range setting of 400 yards.

SECOND METHOD—BC HANDLING BOTH RANGE AND DEFLECTION

The BC gives an estimated shift for the first round. Measuring the lateral movement of the target while counting four in quick-time cadence (2 seconds) will give the proper lead for a range of 1100 yards. Or the lead may be based on the following: Allow a mil for each mile per hour lateral speed of the target.

When using the panoramic sight, some qualified cannoneer, other than the gunner, sets off the deflection shift, No. 1 sets the range, the cannoneer at the trail points the gun just ahead of the target, leaving the gunner only the duty of putting the cross-hair on the target and commanding "Fire." *When using the French sight*, the gunner, probably, sets the deflection shifts.

The range is handled by the BC as in the previous method. Having continuous observation of the target with field glasses, the BC can allow for changes in direction and speed, as well as correcting the deflection error of the previous round.

THIRD METHOD—USE OF RANGE FINDER

The deflection is handled as described under the 2d method.

To determine ranges, an operator, using the present issue range finder, tracks the target continuously. Another operator reads the ranges to the No. 1 cannoneer. Continuous fire is used from the beginning. If the center of impact is too far over or short,

ANTITANK FIRING AT FORT SILL

the BC commands "Subtract 100" or "Add 100." The operator who is reading applies this correction to all future ranges. Any further corrections are accumulative in effect. Proper checking of gun and range-finder should obviate range corrections.

RESULTS OF FIRING

In tables 1 and 2 below, the results of firing during the past year are grouped according to the method used. Most of the firing was done by 3-inch guns. A majority of the problems were fired by members of the Regular Army Battery Officers' Class. "Hit" means that the target was struck by a projectile, not by a shrapnel bullet or fragment. No hypothetical, theoretical, or close shots were counted.

TABLE 1—37MM AMMUNITION

Average	1st Method Gunner—Def BC—range	2d Method BC—Def. BC—range	3d Method BC—Def Range Finder
No. of problems.....	26	28	None
Range at start.....	1029	881	
Range at finish.....	796	522	
Distance traveled.....	692	693	
Total lateral movement—mils.....	138	140	
Total time.....	1:25	1:21	
Average speed—miles per hour.....	10	10	
No. of rounds.....	13.4	14.9	
Hits per problem.....	.85	.64	

Comments: The results are not good as the targets were smaller than a tank and the firing took place early in the year, one object being to train the gun crews. The first method gave better results but one reason for this is the fact that there is no recoil with the 37mm ammunition so the gunner can easily see the burst and determine his correction.

TABLE 2—SERVICE AMMUNITION

Average	1st Method Gunner—Def BC—range	2d Method BC—Def. BC—range	3d Method BC—Def Range Finder
No. of problems.....	46	67	34
Range at start.....	1334	1280	1285
Range at finish.....	719	812	827
Distance traveled.....	750	696	750
Total lateral movement—mils.....	195	196	172
Total time.....	2:01	1:28	1:39
Average speed—miles per hour.....	14.3	14.9	14.9
No. of rounds.....	13.8	11.5	8.2
Successful problem, at least 1 hit.....	65%	58%	62%
Hits per problem.....	1.13	.94	.85

Comments: The methods in order of successful problems are

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1-3-2. However, the time of problem is in the reverse order so that the values of the different methods appear about equal. Also note, that the problems were stopped when the targets were 800 yards distant in the 2d and 3d Methods and only 700 yards distant in the 1st Method.

MATERIEL

The guns which were used are arranged below in the order of effectiveness:

- 75mm M I—Panoramic sight
- 3 inch—Panoramic sight
- 75mm M 1897—Panoramic sight
- 75mm M 1897—Collimator sight

The American M-1 gun with its wide and rapid traverse was considerably superior to the other types as long as the target stayed within the limits of traverse of this gun. There was little difference between the 3-inch and the French 75mm equipped with a panoramic sight. The French gun with a collimator sight was much inferior to the other types. It is believed the effectiveness of the

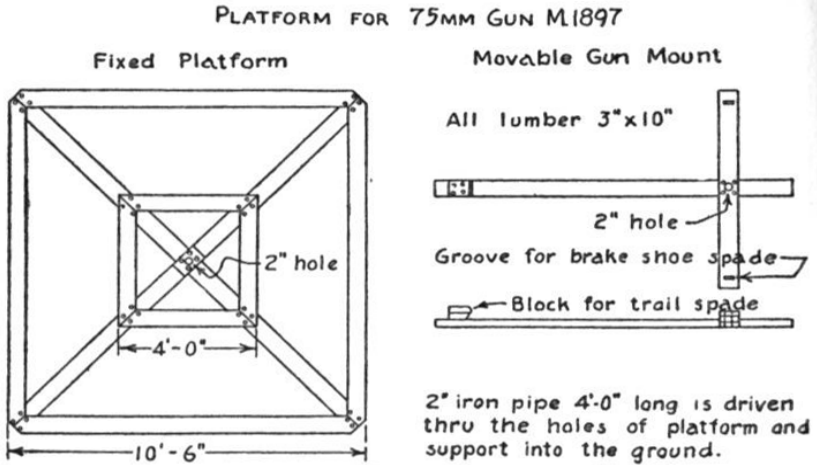


FIGURE 3

French 75mm can be increased considerably by means of a platform such as the one shown in Figure 3, which was constructed according to suggestions of Captain O. N. Schjerven. Another solution is to bolt to the spade a block (see Figure 4) to increase the bearing surface and then dig a trench to receive the enlarged spade.

ANTITANK FIRING AT FORT SILL

While on the subject of materiel, we will mention a test of the 75mm gun on a self-propelled mount M VII, admittedly an inadequate weapon. This weapon and a 3-inch horse-drawn gun went into action and opened fire on a moving target. The self-propelled gun had the honor of the first shot; the field piece did practically all the shooting thereafter. Disregarding the inconvenience of starting an engine to "shift trail," the mount was so unstable that the gunner had difficulty in finding the target after the piece was fired.

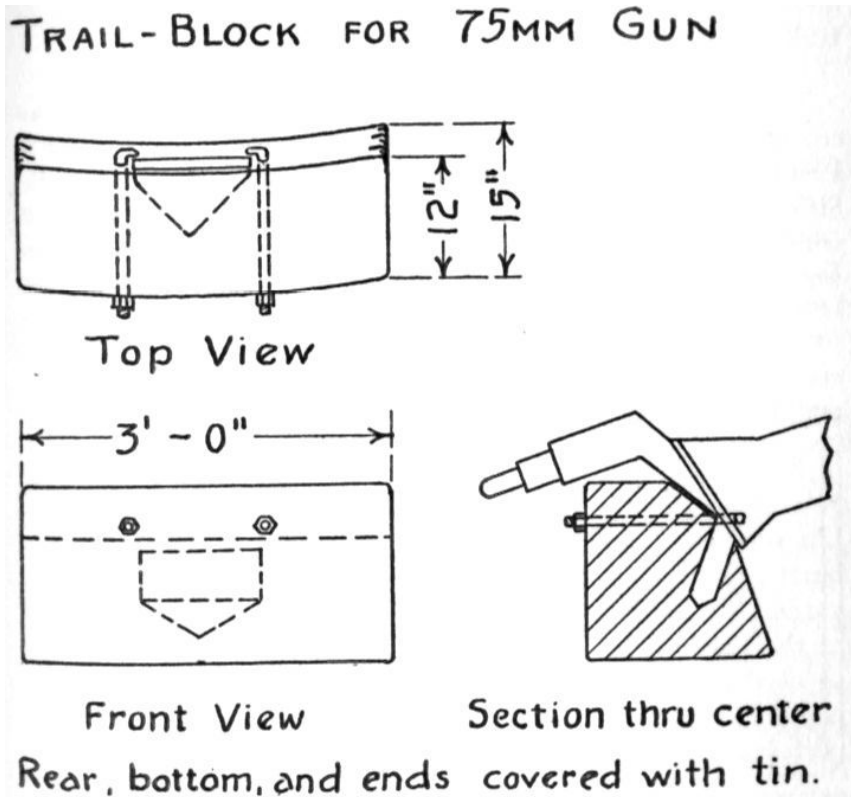


FIGURE 4

EFFECT OF LATERAL MOVEMENT

The effect of lateral movement on our results was so important that it is believed worthwhile to group the problems to illustrate that idea. The conditions were approximately the same for all three cases.

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TABLE 3—SERVICE AMMUNITION

Average	Lateral Movement		
	Large	Medium	Small
No. of problems.....	13	32	103
Total lateral movement—mils.....	504	395	122
Successful problems, at least 1 hit.....	15%	50%	62%
Hits per problem.....	.31	.81	.96

Comments: The relative difficulty of hitting a target moving to the flank is apparent; also, the relative ease of hitting a target that moves generally towards the gun. Two factors cause the fire at targets with large lateral movement to be less accurate, namely, the fewer rounds fired due to the necessity of shifting trail, and the difficulty of adjusting deflection.

EFFECT OF SPEED

The speed of target during nearly all problems fired during the past school year, was approximately 15 miles per hour. It was increased in only a few problems at the end of the course, using the range-finder method to conduct fire. The impression gained was that increase in speed made little difference as long as the target moved towards the gun except to permit fewer rounds being fired; but when the target was moving laterally, the increase in speed materially increased the difficulty of adjusting the deflection and, consequently, of securing a hit.

RANGE

Generally, it was impossible to determine the range at which hits occurred since the projectile passed through the target and burst beyond. The average range in 37 cases reported was 881 yards. The average range at the start was about 1,300 yards and at the finish, 800 yards. From this it appears that the great preponderance of hits was secured near the short limit and comparatively few at the longer ranges. Only seven hits were reported at a range greater than 1,000 yards.

INDIRECT LAYING

Several problems were fired by instructors using indirect laying, a BC scope and range finder tracking the target while two operators sent data to the battery. No hits were secured.

MULTIPLE TARGETS

On one occasion, three targets were started simultaneously

ANTITANK FIRING AT FORT SILL

from 1,200 yards at a speed of 12 miles per hour. An instructor conducted fire by the range finder method, using a single 75mm M-1 gun. The results were as follows:

Time: 0:00 Start of the targets.
0:49 1st target hit once at 900 yards, 9 rounds.
1:46 2d target hit twice at 800 yards, 8 rounds.
2:06 3d target hit once at 500 yards, 3 rounds.

During a General Field Exercise, while three batteries were firing normal missions six targets came over a crest 1,000 yards distant and moved along zig-zag courses in the general direction of the batteries. The umpires on the spot restricted the student officers to the use of one gun in each battery to save ammunition. Four targets were hit before arriving within 100 yards of the guns. One gun, a French 75 with collimator sight, failed to hit either of the targets to its front.

CONCLUSIONS

Method of Fires.—Conclusions regarding the three methods of fire are difficult to make without more data. Perhaps the following are warranted: Given a well-trained gunner, experienced in this type of fire, the 1st Method is to be preferred. With an experienced gun commander and an inexperienced gunner, the 2d Method is preferable. If a range finder is available and sufficient training can be had to secure the necessary teamwork, the 3d Method is superior to either of the others; particularly at longer ranges and against rapidly moving targets.

Effectiveness.—From observation of the problems fired during the year, and a consideration of the factors used in this type of fire, it is believed the difficulty of hitting a moving target varies approximately as the square of the range. Considering the results given in Table 1, it appears reasonable to assume that on the average an antitank gun can secure one hit on a target appearing at a range of 1,500 yards and advancing at 15 miles per hour, by the time it arrives within 900 yards, a second at 500 yards, a third at 300 yards, and at least one more before it arrives at the gun position. Or what amounts to the same thing, a gun should be able to hit four tanks attacking it from a range of 1,500 yards before any of them arrive at the gun position.

TYPE PROBLEMS

These four gunnery problems, fired at the Field Artillery School, are examples of procedure in conduct of fire approved in the new T. R. 430-85.

Time Bracket Axial Problem

(Paragraph 83, T. R. 430-85)

Target: Machine guns in vicinity of a bush. Mission: To neutralize. Matériel: 75mm Model 1897 (French). Visibility: Excellent. Wind direction: Left front to right rear. Initial data obtained: Deflection—compass, Range—estimated.

Commands	Range	Sensings	Remarks
Compass 4820 On No. 1 cl 5, Si O, Kr 35, No. 2, 1 rd.	4000		Open with one gun with estimated range. Sheaf converged.
L 18, U 10	4000		U 10; correct for first problem of the day.
D 5	3600		Low air may be sensed short.
D 2, B R	3800		Height of burst about 3 mils.
On No. 2 cl 2, D 5	3800		
R 5, On No. 2 op 8, U 5, B 1, rd. Zone	4000-3800	Cease Firing by Instructor	Op 33/4=op 8 R 5 to center sheaf.

SUMMARY

Error in initial data: Deflection 18 mils; Range 100 yards. Time from identification of target to announcement of first range: 2.31 minutes. Average sensing and command: 14 seconds. Total time of problem: 5.31 minutes. Ammunition expended: 11 rounds. Classification: Satisfactory. General comments: An excellent problem.

TYPE PROBLEMS

Time Bracket Axial Problem

(Paragraph 83, T. R. 430-85)

Target: Enemy 37mm gun in action, plainly visible. Mission: To neutralize Matériel: 75mm M 1897 (French). Visibility: Excellent. Wind direction: Left front to right rear. Initial data obtained: B. C. Scope and Range Finder.

Commands	Range	Sensings	Remarks
AP Tower to right rear. Pl. 8, Dr. 160. Site plus 5, Kr. 35. Battery Right	3400		Open with 4 guns with range finder range.
Down 5	3400		Should have given R5 On No 3, cl 10.
R 5	3400		
On No. 3 cl 5, D 5	3400		Should cl 10, had 0 height of burst.
	3200		
On No. 1 op 5, U 5 B 1 rd, Zone	3200-3400	Cease Firing by Instructor	Should converge sheaf and seek 100 yard bracket. U 8 should give 3 mil height of burst.

SUMMARY

Error in initial data: Deflection—0 mils, Range—100 yards. Time from identification of target to announcement of 1st range: 3.05 minutes. Average sensing and command: 12 seconds. Total time of problem: 6.45 minutes. Ammunition expended: 20 rounds. Classification: Unsatisfactory. General comments: Much ammunition wasted as sheaf was not converged on adjusting point. This type target should be attacked with narrow sheaf and 100 yard bracket. Open sheaf and deeper bracket could be searched later to get effect on personnel not in immediate vicinity of the 37mm gun.

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Lateral Precision, Small T

(Paragraph 86b (2) (d) page 133, T. R. 430-85)

Target Description: Concrete OP. Mission: To destroy. Matériel: French 75mm gun, Model 1897. Visibility: Excellent. Wind Direction: Left to Right. Initial data obtained: Deflection, B C scope and aiming circle. Range: Range finder. R = 2.6, r = 2.6, T = 250, F = 3, c = 4, s = 10, s/c = 2.5, r/R = 1. B. C. on the left.

Initial Commands:

No. 2 Adjust; Aiming Point Marker on Medicine Bluff 4; Deflection 2630; Shell Mark I; Fuze Short; No. 2; 1 Round; Quadrant.

Commands	Elev.Deviation		Sensings		Remarks
	Elev.	Deviation	Range	Deflection	
	70	40 Left	Over		$40 \times 1 = R 40$ to get on line. $12 \times 2.5 = L 30$ to stay on line.
R 10	58	4 Left	Over		$4 \times 1 = R 4$ to get on line. Bracket between line shots 12 mil change = 26 mils. Command should have been $L 26 + R 4 = L 22$.
L 26	46	8 Right	Short		$4 L + 8 R = 4 R$. $4 R + L 26 = L 22$. $= L 11 = R 11$.
R 11	52	Line	Short		$4 L + 0 = 4 L$ $4 L + L 26 + R 11 = L 19$ $= R 10$.
R 10	55	2 Left	Doubtful		$2 L + 0 = 2 L$
R 2	55	2 Left	Over		$2 L + 10 R + 2 R = 10 R$ $= L 5$.
L 5 3 rds.	54	Line	Short	Short	
		Line	Short	Short	
		Target	Correct	Correct	
	54	3 Left	Over		F = 2
		2 Left	Over		3 short 2 overs
		1 Right	Short		$54 + (1/12 \text{ of } 2) = 54.2$.
6 rds	54.3				B. C. used fork of 3 mils.
Cease Firing, End of Problem.					

SUMMARY

Error in initial data: Deflection 2 mils; range 400 yds. or 17.4%. Time from identification of target to announcement of first range, 1 minute 15 seconds. Average sensing and command, 16.6 seconds. Total time for problem: 8 minutes 46 seconds. Ammunition expended: 12 rounds. Classification: Satisfactory. General comments: The battery commander failed to determine the correct shift to keep his shot on the line after the second sensing of range over. This was not material as he was able to obtain a range sensing on his third shot. He also failed to look up the new fork at elevation of 54 when he determined his adjusted elevation. Otherwise this was an excellent problem.

TYPE PROBLEMS

Lateral Precision, Small T

(Paragraph 86b (2) (d) page 133, T. R. 430-85)

Target Description: Disabled Tank. Mission: To destroy. Matériel: French 75mm gun, Model 1897. Visibility: Excellent. Wind Direction: Left to Right. Initial data obtained: Deflection—Shift-plotted. Range—Range Finder-plotted.

$R = 3.4, r = 3.5, T = 230, c = 4.6, s = 7, s/c = 1.5, r/R = 1, F = 4.$

B C on the right.

Initial Commands:

- No. 1 Adjust
- Base Deflection Right 190
- Shell Mark 1
- Fuze Short
- No. 1
- 1 Round
- Quadrant.

Commands	Sensings		Deflection	Remarks
	Elev.	Deviation Range		
L 8	100	8 Right	Doubtful	$8 \times 1 = 8.$
R 12	100	Line	Over	R 12 to stay on line (8×1.5).
R 10	92	10 Left	Doubtful	$10 \times 1 = 10.$
L 4	92	8 Right	Doubtful	$s/d = \frac{1}{2}.$ $\frac{1}{2}$ of 8 = 4.
L 5	92	5 Right	Doubtful	s/d changes back to 1.
		4 Right	Short	$4 R + 0 = 4 R \times 1 = 4 R.$
				$4 R + 12 R + 10 R + 4 L + 5 L = 17 R.$
				$= 8\frac{1}{2} R = L 8.$
				B C went L 4.
L 4	96	4 Right	Doubtful	$4 \times 1 = 4.$
L 4	96	3 Right	Doubtful	
L 3	96	Line	Over	$0 + 4 R = 4 R \times 1 = 4 R.$
				$4 R + 4 L + 4 L + 3 L = 7 L.$
				$= 3.5 L = R 4.$
R 4 3 rds	94		Short	Short
			Short	F = 4.
			Short	2 overs 4 shorts $95 + (2/12 \text{ of } 4) = 95.7.$
L 2 2 rds	96		Over	
			Short	
3 rds	95.7			

SUMMARY

Error in initial data: Deflection 4 mils; range 100 yards or 3.3%. Time from identification of target to announcement of first range, 2 minutes 56 seconds. Average sensing and command, 21.4 seconds. Total time for problem, 11 minutes, 48 seconds. Ammunition expended, 14 rounds. Classification: Satisfactory. General Comments: The battery commander had difficulty in obtaining a range sensing at 92. He changed his factor to $\frac{1}{2}$ for 1 round and then changed it back to 1 again. The terrain in the vicinity of the target was such that his factors would not work. A shift of "Left 8" would have been a better command before the first round fired at 96.

THE EFFECTS OF ARTILLERY FIRE

[General Faugeron, of the French Army, last year delivered the following lecture to the officers of the Nancy garrison. It cannot fail to interest all Field Artillerymen who will find in it valuable food for thought on the effects and method of employment of their arm. This translation is published with the kind permission of the Revue d'Artillerie and the author.]

ON the eve of the War of 1870, the only projectiles we had in the French artillery were shrapnel of 4 and 12 kilograms, armed exclusively with time fuzes having but two punch holes corresponding to 1,400 and 2,500 meters; and if someone happened to remark that the enemy might chance to be at some other range, the artillerymen of that day replied by asserting that with one or the other of the two available ranges, they were always sure to strike the enemy, using as an argument the depth of the effective zone of their shell.

This situation, however, did not prevent our officers from carefully instructing their gunners, nor their gunners from being excellent, but it shows that, after having done their best to insure the proper execution of all operations involving the departure of the projectile, the artillerymen of that epoch, in the matter of effect to be produced, resorted to results obtained by laboratory methods, that is to say, from proving ground results.

Have we progressed much since then? Undoubtedly so, but nevertheless much less than we should have.

Have I not seen, since the war, in field exercises, the commander of a *groupement* engage successively in two different shoots, the same number of his batteries, the first time on an objective covering a front of 1,500 meters, and the second time on a section of infantry debouching from a village?

Even during the war, how many *groupe* and *groupement* commanders declared themselves satisfied when they had been given the coordinates of an objective, and opened fire at once without bothering to find out on what they were firing?

In war operations, they thus deliberately departed from every conception of combat and absolutely neglected what might be going on at the other end of their trajectories.

Instead of living the battle, they buried themselves in the scientific phases of their roles and applied all the resources of

THE EFFECTS OF ARTILLERY FIRE

their intelligence solely in carrying out the necessary calculations to prepare, in the briefest time possible, a good data sheet for any range and every direction.

Do we not find here, in spite of all the changes resulting from the great progress made in ballistics through a half-century of study, the same mental attitude which we have just been criticising in our elders of 1870?

You will state they failed; we have succeeded.

It is true, and this proves that we have made some progress. Moreover, no one dreams of denying the value of the matériel given to us by de Bange, Deport, Rimmel and Filloux, or the excellence of the regulations issued before the war by our firing boards; but this does not prove that we have been perfect or that we have known how to obtain the very best results from the fine matériel with which we are equipped.

You will grant that some modifications are called for in the conduct of fire and in the selection of ammunition depending upon whether the target is a division passing in review before the Kaiser, a staff occupying a town hall, a battery in action, an ammunition dump, troops engaged in combat or reserves in bivouac.

One should never limit oneself to indicating a target merely by its coordinates. It is always a mistake for an officer ordering a shoot to fail to indicate the nature of the target; it is likewise a mistake for the officer firing not to request this information when it has not been supplied to him.

The error of believing that everything possible has been performed by the artilleryman as soon as the projectile has left his piece with a proper setting is more general than is believed. Too often we tend to regard the artilleryman as a "savant" rather than a soldier, a theorist who handles formulas and trajectories rather than a real combatant. During the war even the right of artillerymen to high command was questioned, regardless of the fact that the Emperor Napoleon and Marshal Foch were artillerymen.

Another result of this turn of mind is the opinion which I heard recently expressed that the artilleryman has no responsibility.

Oh! Gentlemen! What an error! The responsibility of the artilleryman,

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I may venture to say, is greater than that of the infantryman and it is also harder to bear. Doubtless, when an infantry commander is assigned a mission, he shoulders a great responsibility. It is great and manifold. It involves not only the initial dispositions which he has time to consider carefully, but also the rapid decisions which he must make during the course of action. It concerns his plan for the employment of his different means of fire, as well as actual execution; coordination within the various units themselves, as well as mutual support; the conduct of troops, and their vigorous action under the most difficult and unexpected circumstances.

But if he is responsible for the employment of the means assigned him and the efficiency thereof, the infantry commander is never responsible for results obtained; he can never be censured if, when he has done everything humanly possible, the anticipated success did not crown his efforts.

For the artilleryman, responsibility also begins as soon as he receives his mission; it also extends to the first measures which he decides upon deliberately and after careful reflection, as well as to those which he is forced to take under the stress of circumstances, without ever being entirely certain of the existing situation.

At the beginning as well as during the course of action his part is not limited, as one is generally led to believe, purely and simply to carrying out the orders or requests coming to him from the front line commander. In each instance he must instantly foresee and inform his commander, not only of the exact results which he expects to obtain at the indicated objective, but, also and above all, of any possible reaction from his intervention upon neighboring units by which it has not been requested.

The artilleryman has no right to make a mistake. He can make all possible reservations, but he must state what he can do, and when he asserts that such a thing will happen, that thing must happen. When he says he can fire without danger, not a shell of his should stray into his own lines. When he says he will obtain a certain result, for example, that a certain hostile battery will not fire, or that a certain defensive line will be neutralized between certain stated hours, there is nothing which can absolve

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him if the predicted result is not obtained, if at the stated hour the enemy battery is firing, or if on the neutralized defensive line an enemy machine gun in action should suddenly appear.

His responsibility includes the result to be obtained. It extends not only beyond the point of departure, but beyond the point of fall of his projectiles, reaching even so far as to include the impression which is created upon the enemy. It is thus more complete than the responsibility of the infantryman.

On the other hand it is just as hard to bear, although in an entirely different manner.

When an omission, an error or a mistake occurs, no matter who is responsible for it, the infantry suffers as the result.

If the person responsible for an error is the infantry commander himself, he may, as a final resort, strive by his own energy to atone for his mistake and remedy as far as possible the results thereof, offering himself, if necessary, as its first victim.

But the artilleryman is unable to do that. Every error on his part is irreparable, and even when he is not morally responsible, even when he has merely carried out orders from higher headquarters, believe me, Gentlemen, for one who has gone through it, the agony, the despair, the helplessness which he suffers make him envy the lot of those who, when they have made a mistake, can at least undergo the risks to which they have subjected others.

So the artilleryman must not only be interested in what is happening at his end of his trajectory; he must also devote himself to getting certain results at the other end of it and therefore he must be thoroughly familiar with the effect he is capable of producing.

Moreover, he is not the only one who needs this knowledge.

In the first place and above all there are those officers who stage or conduct the action on the battlefield, that is to say those who constitute what we call "the command." If they do not have an exact knowledge of what to expect from the artillery, they are likely to demand too much of it or too little. They may ask the impossible, or may not derive the greatest benefit from the means at their disposal. When they are not annoying the artilleryman with some abuse of authority, they are at his mercy,

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often ending by turning over to him the task of satisfying or refusing their needs, with which he may not be entirely familiar. This is nothing new, for at the end of the 18th century, Count Guibert, the Field-Marshal, wrote as follows:

"It is necessary for an infantry and cavalry officer commanding the combined arms to be familiar with his artillery, although not necessarily with the details of its construction, equipment and drill. He must know at least the results which can be derived from all these details, the ranges of the different weapons when firing under various conditions, and the damage or the support which the troops may expect from them. Lacking this knowledge, he will either be unable to employ the artillery intelligently in making his general disposition, or he will be forced to rely blindly in everything pertaining to the artillery upon some officer of that corps, who perhaps in turn, through failure to visualize beyond the mechanical performance of his weapons, will not dispose of them in such fashion as to carry out the general plan; or finally, through ignorance, the commander may upset the dispositions made by his artillery officer, which in fact may have been entirely satisfactory."

Everyone who may be called upon to utilize artillery fire must likewise be thoroughly familiar with its effects and their value and duration. Otherwise he runs the risk of missing some favorable opportunity for obtaining important results, or of being led to pursue some success beyond the limits to which the artillery is capable of lending effective support. In both cases useless losses may result.

Summing up, we arrive at the conclusion that every officer, no matter what his rank or arm, needs to know what the artillery is capable of doing. That, gentlemen, is the purpose of this lecture.

HOW DOES ARTILLERY ACT?

It is only necessary to open any of our regulations to read that artillery acts "by destroying or neutralizing;" not much thought is needed to realize that if artillery seeks to neutralize, the reason is that it cannot destroy.

Hence the first question which presents itself is: What are the capabilities of artillery for destruction?

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To that question, gentlemen, I shall answer after the fashion of Æsop, who showed his teacher that the tongue was the best and then the worst thing on earth.

So I am going to prove to you in turn that artillery destroys everything and that it destroys nothing, or at least nothing much.

ARTILLERY DESTROYS EVERYTHING

On August 19, 1914, the 3rd Battalion of the 5th Artillery fired on a German battery in the vicinity of Mulhausen. That night a civilian witness gave our officers the following account:

"The German battery had taken position on the high ground commanding Brunstatt, reaching it by a winding path back of the cemetery. The German artillerymen had great trouble getting into position and still greater in holding on. The French artillery, after having demolished the material and killed almost all the cannoneers, directed its fire on the limbers posted in the bottom land and killed a great number of horses. I saw them being buried and counted a hundred and five."

At the end of August of the same year, near Sedan, several German batteries, seen on the march by Captain Bigot, commanding the 5th Battery of the 35th Artillery, were, in a few minutes, immobilized one after the other, on the road.

After the Marne, we found on several occasions, in particular at Sommesous in September, at Aveluy in October, entire platoons of infantry in their trenches, maintaining in death their combat formations and positions.

In April, 1917, at Mont Spin near Fort Brimont, a German battalion marching to counter-attack was seen from our observation posts. It was struck instantly by a heavy artillery concentration of all calibers from 75's to 220's. It vanished so rapidly and completely that prisoners taken shortly thereafter from the battalion which succeeded it stated that they did not know or understand what could have become of the other battalion.

On the 20th of May of the same year, a 400mm shell penetrated the ventilating shaft of the Cornillet tunnel, demolished a room occupied by two battalion commanders and killed sixty German soldiers who were waiting for the signal to counter-attack. The bombardment continued and caused the collapse of the interior

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of the tunnel and the blocking of its exits. Not a single man of the two reserve battalions sheltered in the tunnel could intervene when our attack arrived.

At Liouville in 1914 a German shell put an armored turret out of commission.

At Verdun, during the year-long battle of 1916, we lost from enemy artillery fire almost 600 guns and 900 gun carriages.

Entire forests, like the Bois Fumin, Vaux-Chapitre, Caillette were literally mowed down. Farms and villages like Douaumont, Thiaucourt and Fleury disappeared without leaving a vestige.

On the Cote de Marre, a reinforced concrete observation post was destroyed.

Finally, on the 23rd of October, a 400mm shell opened a gaping hole in the superstructure of Fort Douaumont and the artillery fire was so intense that to save itself from destruction the German garrison evacuated.

Oh yes! Artillery destroys everything!

But wait!

A 400mm shell crashed through the turret of Douaumont, but how many 400's and 420's had previously struck it without effect? How many 420's had fallen on Moulainville, Travannes and Souville without opening a breach?

An armored observation post was destroyed. Note it well, for it was the only one, just as the Liouville turret was the only one actually permanently put out of commission. The Vaux turret blew up, but this was a success which can only be attributed indirectly to the German artillery, since a shell of large caliber detonated sympathetically a charge which had been set for the purpose of destroying the turret in the event that the work should fall into the hands of the enemy.

The Germans destroyed some of our pieces. But what of it? We did as much to them and the losses sustained on both sides did not prevent the artillery of either opposing force from increasing continuously from the beginning of the war until 1918.

Even at the time when the destruction is effected it is not always as important as one might be led to believe.

In March, 1916, in Bois Bourrus a battalion of two batteries of 155 de Bange guns under Major Bourboulon was subjected

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to a perfectly directed and extremely heavy destructive fire. It had its eight gun carriages torn completely end from end. Thirty-six hours later the same pieces, after having been repaired and mounted on new wheels reopened fire.

At Verdun at 8:00 P. M. on a November night in 1917, in front of Hill 344 which the 37th Division was to capture a few days later, the 3rd African Battalion had its twelve pieces put out of action by a long and violent concentration of German artillery of all calibers. The following day at 7:00 A. M. the battalion resumed its mission. Its twelve pieces had been replaced during the night.

In 1917 at Cornillet we blew up a deep shelter and wiped out the reserves massed in it. But in September, 1915, on the Champagne Front, in spite of a perfectly adjusted bombardment lasting several days, a large number of shelters, scantily protected by a few logs and shovelfulls of earth came through absolutely unscathed, and our infantrymen, who after passing the first enemy lines, were marching boldly on to Ripont and Somme-Suippe, found themselves taken in rear by fire from these very trenches which they had found empty an instant before and where they had the right to believe that everything had been forever buried.

On February 21, 1916, and later during the night of February 21-22, about 300,000 shells of all calibers fell on the Bois des Caures defended by only 1,200 men. In spite of the terrific bombardment, it was necessary for the 8,000 Germans who tried to capture it to renew their attack twice, each time engaging in several hours of deadly combat to overcome the immortal "chasseurs de Driant."

Finally, four days later, on almost the same terrain the 3rd Battalion of the 146th entered the furnace. The commander, before starting, said to his assembled troops:

"We are about to get the worst shelling we have ever seen, under which no infantry up to now has been able to hold. Well! We shall! And when the enemy infantry advances to occupy the terrain which it believes swept of every defender capable of resistance we shall charge him with the bayonet."

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And the soul of his men replied: "We shall hold! Count on us!"

On that very evening, after eight hours of fierce bombardment entirely from heavy calibers, the three companies of that heroic force rushed an entire German brigade advancing to the assault, stopped it, repulsed it and pursued it for some hundred meters.

No, artillery does not destroy much, since after hours of hellish hammering such exploits are still possible.

What can we conclude from all this?

In a paradoxical form, I have just led you through two extreme theories. One must be on his guard against the one as carefully as the other.

Let us seek the practical lessons that can be derived from this.

In the first place, from the material standpoint, three points are clearly brought out by the facts which I have just narrated.

First. We can, without exaggerating, affirm that every work done by the hand of man can be destroyed by artillery. Examples: Douaumont and the Cornillet Tunnel; and if we gaze seaward, the battle cruisers *Indefatigable*, *Queen Mary*, *Invincible* and the armored cruiser *Defence*, sunk by gun-fire on May 31, 1916, in the Battle of Jutland.

But, leaving aside all questions of calibers and the choice of ammunition which are exclusively the function of the artilleryman, the officer requesting or ordering a destruction must be fully aware of the fact that destruction requires much time and ammunition, great precision in determining the objective and the possibility of directing the fire on it from start to finish.

If the necessary time is available, if there is no concern over ammunition supply, and finally, if all the required means for observation and control are at hand, we may then attempt to carry out the destruction of a given objective.

Second. Regardless of the number of rounds fired and regardless of the accuracy of the fire, no destruction should be considered effective unless this fact has been established by actually seeing it.

I heard told that in 1915, during proving ground firings with the 58mm mortar, one hundred carefully and well adjusted rounds, fired in the presence of a large group of officers of all

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arms gave exactly 50 shorts and 50 overs. The officer directing the fire turned enthusiastically towards the gathering. "Gentlemen," he said, "that is what we can call a marvelously well adjusted shoot." But from the midst of the crowd a voice was heard: "As for me, I would rather see it more poorly adjusted, even with ninety-nine overs, provided the hundredth hit the target."

This, Gentlemen, is in order to have you grasp the fact that the target hit, the destructive hit, is the lucky one, the chance hit.

With a single elevation which gives, during a series of one hundred rounds for effect, half shorts and half overs, the probability of a round hitting the target is evidently greater than with any other elevation, but nevertheless it is only a probability, and when human lives and the security and existence of entire units are involved, one should not regard a probability as a certainty, no matter what its magnitude.

Third. Finally, a destruction is never conclusive.

What man has built, man can rebuild. What the enemy has deemed proper to build in the first place because he considered it useful, he will endeavor to rebuild after its destruction if he considers it advisable.

Therefore, following every destruction we must expect to see what we have destroyed repaired or replaced, after more or less delay. This occurred on both sides all during the entire war.

We have just seen, as examples on the French side, the Bourboulon Battalion and the 3rd African Battalion.

We can also include on this same side the Souville turret, thrice put out of action. Once it was necessary to bring up special artisans from Paris, and the work required three days. The two other times, twenty-four hours sufficed to put everything in order.

On the German side, from May to November, 1916, a certain German battery of two 150's, in position in the Woevre, in the Bois de Montricelle, 1,500 meters west of the village of Haute-court, had 15 pieces destroyed in their implacements. Another battery, the 7th of the 10th Regiment of Foot Artillery, in position Southeast of Aboucourt on the East edge of the Bois du Grand Cognon, during the same period lost 25 pieces.

In 1917, North of Rheims, every morning one could see the

gaps which were cut in the wire entanglements the preceding day had been filled in with Chevaux de frise.

A destruction therefore is only effective for a relatively short time. Consequently, it is an operation which, when it fulfills a well defined purpose, should, in principle, be carried out only at the very moment when it so serves, and, if necessary to effect the destruction in advance, all repairs or replacements of the objective should, as far as possible, be prevented by a fire of sufficient density and duration to accomplish the end.

However, destruction always serves a useful purpose. In the first place, fires for destruction are the tangible proof to the enemy of the power of the artillery confronting him.

Then, every destruction carried out does some damage to the enemy. The proof is his haste to repair it when he is given time and allowed to do so. Moreover there are necessary destructions, indispensable for the success of an operation, for example, in an attack, the cutting of a portion of the wire entanglements.

Finally, if from among the destructive fires carried out, there are a certain number which, either by ill-luck or on account of immediate repairs by the enemy, appear to have served no purpose, there are others whose results are effective and, at a given moment, may have an important influence on the operations. In this category falls particularly the destruction of batteries on the eve of the battle.

Therefore we conclude that:

First. Every time the occasion presents itself and the means are available, there should be no hesitation in carrying out fires for destruction.

At the same time, when we are dealing with an important element of the enemy defense, it is well not to undertake its destruction until the exact moment when this becomes necessary, in order that the enemy may be deprived of any possibility of reconstructing it.

Second. Once the decision to engage in battle has been reached, it would be folly to delay starting it for an hour under the vain pretext of waiting for a destruction to be effected, unless it is absolutely indispensable and certain of being accurately directed.

Third. If indispensable destructions are numerous and can

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only be carried out successively, it is then necessary, either by capturing the destroyed target, or by continuous fire upon it, to prevent the repair of the damage done.

Fourth. Finally, no matter what care has been given to the destruction of a target, it should still be considered as susceptible of fulfilling, partially or entirely, the purpose for which it was designed, unless the impossibility of its so doing has been established by actually viewing it.

As examples of the results of destruction fires on material, I shall give those obtained on German batteries at Verdun during the days preceding the attacks of October 24 and December 15, 1916.

On each occasion these fires began four days before the attack. They were, for the most part, executed with 155mm guns. They were also participated in by a certain number of batteries of 120mm guns, 220's, 270's, and 280's, as well as by some pieces of high power heavy artillery, to wit: in October some 240's and in December, pieces of 19 and 32 centimeters.

On each battery to be destroyed, there were fired, on the average:

- 400 shells of 155mm guns
- or 150 shells of 220mm guns
- or 80 shells of 270mm guns
- or 60 shells of 280mm guns

The results obtained were as follows:

For the first attack, from October 20th to 22nd, 100 batteries were fired on.

Of these 100 batteries, eight did not reappear, but we shall not draw conclusions from the silence of these particular batteries since they had been inactive during the preceding days.

So there remain 92 batteries surely in position.

Of these 92 batteries, 27 or 29% did not fire again at all.

Eleven or 12% were observed in action the day following or two days following the fire for destruction executed against them, but, after being counter-battered on the 24th, they gave no sign of activity on that day.

Finally, 54 or 59% reappeared and showed activity, in spite of fires for neutralization during the day of the 24th.

For the attack of December, 72 batteries were taken under fire. Of these 72 batteries, 9 did not reappear, but we shall not

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draw conclusions from their silence, because 3 of them had shown no activity during the preceding days and the 6 others were situated so close to our lines that it might reasonably be claimed that their complete inactivity was due to the advance of our infantry.

Of the remaining 63 batteries:

Twenty-four, or 38%, did not reappear before or during the attack.

Thirty-nine, or 62%, showed activity during the day of December 15th in spite of neutralization fires.

To draw a definite conclusion from these figures, it would be proper to take into consideration that at least a portion of the batteries which did not reappear were perhaps displaced and, on the day of the attack, appeared in new positions. But it must also be remarked that among the batteries which were active at the time of the attack, many showed a smaller number of pieces than had been determined during the preceding days.

One factor compensates the other. The number of pieces actually destroyed which do not figure in the percentages just given, may be considered as comparable with the number of pieces that were counted as destroyed, but in reality were merely displaced.

So the above figures may be regarded as approximately exact, and it may be admitted that only 40% of the fires for destruction actually gave tangible results.

This confirms, as you see, what I have just stated.

Let us not leave this matter of destruction without deriving from it a final lesson.

I reminded you a moment ago that in spite of the efforts exercised by the two opposing artillery forces to annihilate each other from 1914 to 1918 they never ceased to increase. I shall now add that from July, 1918, on, the German artillery witnessed the number of its pieces decreasing with alarming rapidity. This progressive destruction was not accomplished entirely by the fire of the French artillery, but resulted from the advance of our troops, which as you know was furthered by our fire.

So, again I assert this fact—that the action of a single arm can result in nothing more than partial successes, and that to obtain a complete and definitely successful result, co-operation of all the arms is essential.

Note.—The next installment will deal with the effect of artillery fire on enemy personnel.

THE BATTLE THAT WAS FOUGHT ON THE FORT BRAGG RESERVATION

BY LIEUTENANT W. S. NYE, FIELD ARTILLERY

THE importance assigned by history to battles fought by American soldiers frequently depends more on the amount of subsequent publicity given than on such factors as the magnitude of the engagement, the casualties suffered, or upon the fierceness of the encounter. Many obscure fights took place during the Civil War, interesting and terrible to the participants, but which, due to their lack of bearing on the final outcome of the campaigns of which they were a part, are now practically forgotten. Of this class is the fierce engagement which took place at Battlefield Farm on our Fort Bragg Reservation, usually called the Battle of Monroe's Cross-Roads, North Carolina. The account which follows is the result of considerable diligent research, and has been presented from what is thought to be an entirely impartial viewpoint.

THE GENERAL SITUATION, FEDERAL

Upon the completion of the Union campaign in Tennessee in 1864, Major-General William Tecumseh Sherman, who had succeeded Grant in the West, adopted a strategic plan which contemplated a conquest of Georgia and the Carolinas and finally a junction with Grant in Virginia. After several maneuvers and battles in Georgia, the President of the Confederacy saw fit to relieve General Joseph E. Johnston and place Hood in command of the Confederate army. Sherman, who entertained a very wholesome respect for Johnston, was delighted. He very promptly captured Atlanta, and allowed Hood to go off on a fruitless expedition into Tennessee, where he (Hood) later wrecked his Confederate army at Nashville.

Sherman marched through Georgia to Savannah, opposed only by Wheeler's cavalry and Hardee's corps. Early in 1865 the Federal army left Savannah and turned north through South Carolina. The goal was, first, Goldsborough, then Petersburg. Sherman marched on a wide front, with his army of 70,000 veterans divided into two wings of two corps each. Kilpatrick's

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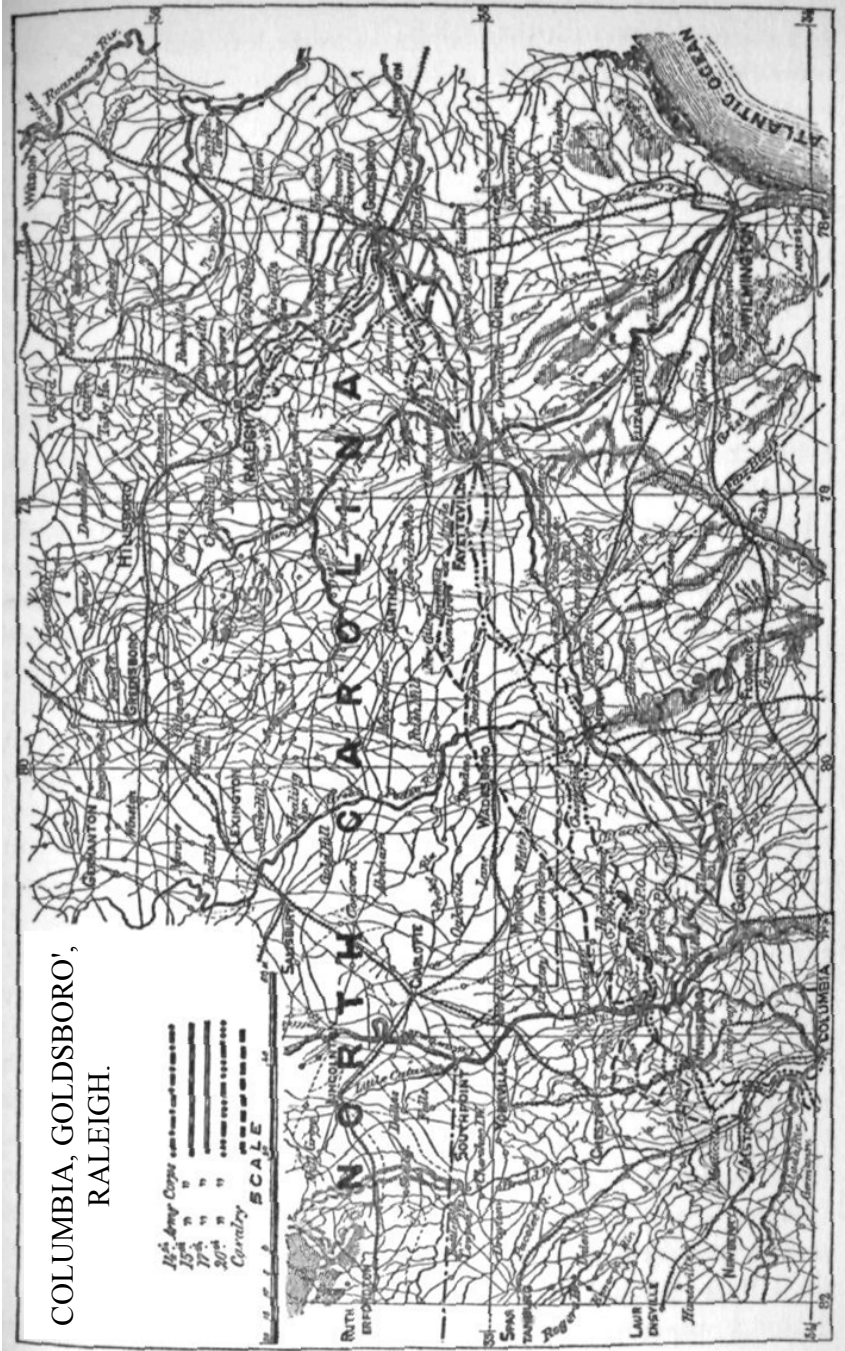
division of 5,000 cavalry, on the extreme left, acted as a screen for the infantry columns, and brushed back Wheeler's cavalry in various skirmishes.

THE GENERAL SITUATION, CONFEDERATE

General P. T. G. Beauregard was in command of all Confederate forces in the Carolinas. He had certain troops available which might have been concentrated to impede Sherman's march through South Carolina, but these troops were widely scattered. Remnants of Hood's army were at Augusta; Hardee's infantry corps of 11,000 men was at Charleston, together with the garrison of Charleston, the latter numbering 19,000, according to Wade Hampton. Wheeler's cavalry corps numbered about 5,000, and was to be reinforced by M. C. Butler's division of 1,200 sabers from the Army of North Virginia. Bragg had 5,000 men at Wilmington, and Hoke's fine division was being sent to him from Lee's army. In addition there were certain "home guards" from South Carolina, and three regiments of the North Carolina Junior Reserves, the latter being with Bragg's forces near Wilmington.

Major-General Wade Hampton, who on the death of Jeb Stuart had succeeded to the command of the cavalry in Virginia, was on leave of absence in South Carolina. He urged Beauregard to concentrate behind one of the natural stream barriers in that state. Nothing was done. Sherman's advance continued steadily north, opposed only by Wheeler's cavalry. Butler arrived just in time to see Columbia burn. Charleston, outflanked by the Union advance, was evacuated, and Hardee was directed to Charlotte, whither Sherman's force apparently was marching. News of the destruction of property, confiscation of foodstuffs, and burning of homes along Sherman's march had reached the men of General Lee's army in Virginia, and was causing widespread desertion. The situation was desperate, yet Beauregard, in ill health in Charlotte, seemed unable to do more than offer suggestions. Upon his recommendation Hampton was made Lieutenant-General, and was placed in command of Wheeler's and Butler's cavalry.

Great pressure was brought to bear upon President Davis to restore Johnston to command. This was finally done; General



COLUMBIA, GOLDSBORO,
RALEIGH.

1/2" Army Corps
 10" 11 12
 17" 18 19
 20" 21 22
 Cavalry
 SCALE

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Lee charged him with the task of forming a Provisional Army, and driving Sherman back.

At this time, late in February, Sherman had been feinting strongly in the direction of Charlotte, and had succeeded in deceiving Beauregard to such an extent that the latter had ordered a Confederate concentration in that vicinity. Hardee's corps, in compliance with these orders, came up from Charleston to Cheraw, and crossed the Peedee River together with Butler's cavalry. Wheeler was further west, skirmishing with Kilpatrick.

HOSTILE MOVEMENTS, MARCH 1-7, 1865

Sherman's advance reached Cheraw just in time to see the bridge go up in smoke in rear of the retreating Confederates. The Federals halted while a pontoon bridge was thrown across. Sherman spent the night in a house occupied the previous night by General Hardee. In this building he found a copy of the New York Times in which an indiscreet reporter had announced that Sherman might early be expected to arrive at Goldsborough inasmuch as a Union supply fleet was at rendezvous off Morehead City, N. C. Sherman felt that this probably had disclosed his intentions, and no doubt the newspaper article did have some such effect. The Confederates had been considerably puzzled, but when the Federal host commenced to swing east toward Cheraw and Fayetteville, Beauregard realized his former error, and sent an order to Hardee to turn east to Fayetteville. This message was not received, but Johnston, who now assumed command, repeated the instructions. Hardee therefore moved back through Carthage and went on into Fayetteville via the Carthage and Yadkin roads.

Thus during the first week of March we have this situation: Sherman's two infantry wings were crossing into North Carolina and were moving through Laurinburg and nearby towns via the Central Plank Road, the Telegraph Road, and parallel highways. Butler's Confederate cavalry, having crossed the Peedee at Cheraw, was near Rockingham. Wheeler's corps had not been able to cross at that point, and, not being equipped with a pontoon train, had marched twelve miles north of Rockingham to Grassy Island Ford, where a halt was made until the waters should subside sufficiently to permit a crossing. General Hampton issued

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orders for Butler to unite with Wheeler on the east bank, near Troy.

MOVEMENTS IMMEDIATELY PRECEDING THE BATTLE

On March 4 Sherman wrote a letter to Kilpatrick, directing the Federal cavalry to march to Fayetteville via New Gilead (about five miles west of present location of Pinehurst; not to be confused with Mount Gilead), thence to Solemn Grove, and by way of roads leading south of Lower Little River, and by roads leading from Manchester to Fayetteville. Kilpatrick was warned that his primary mission was the protection of the left flank of the army; he was not to embroil himself in a battle with the Confederate cavalry. Men and horses were to be saved for a general battle expected to occur in the near future near the Virginia boundary.

On March 7 Kilpatrick arrived at Rockingham, where he had a small skirmish with some of Wheeler's cavalry. On the 8th he marched to a camp at the head of Drowning Creek. The roads were very bad, and the streams and swamps were flooded from incessant rains. The invaders now entered the sandhill country. At that time the towns of Pinehurst, Aberdeen, Southern Pines, and Raeford did not exist; there were no peach orchards or golf courses—only dense forests of virgin longleaf pine. Infrequent clearings supported a sparse population of Scotch descent, whose principal means of livelihood was small farming, and gathering resin from the pine trees. Invasion had not touched this section before, but most of the male inhabitants of military age were in the Army of North Virginia.

The Federal march through Robeson and Moore Counties has been graphically described by a Union officer, in Century Company's "Battles and Leaders of the Civil War":

"A mile from the Lumber River, the country, already flooded ankle-deep, was rendered still more inhospitable by the steady downpour of rain. The bridges had been partly destroyed by the enemy and partly carried away by the flood. An attempt to move heavy army wagons and artillery across this dreary lake might have seemed foolhardy, but we went to work without loss of time, and the woods all along the line of each column soon rang with the noise of axes. Trees quickly became logs, and were brought

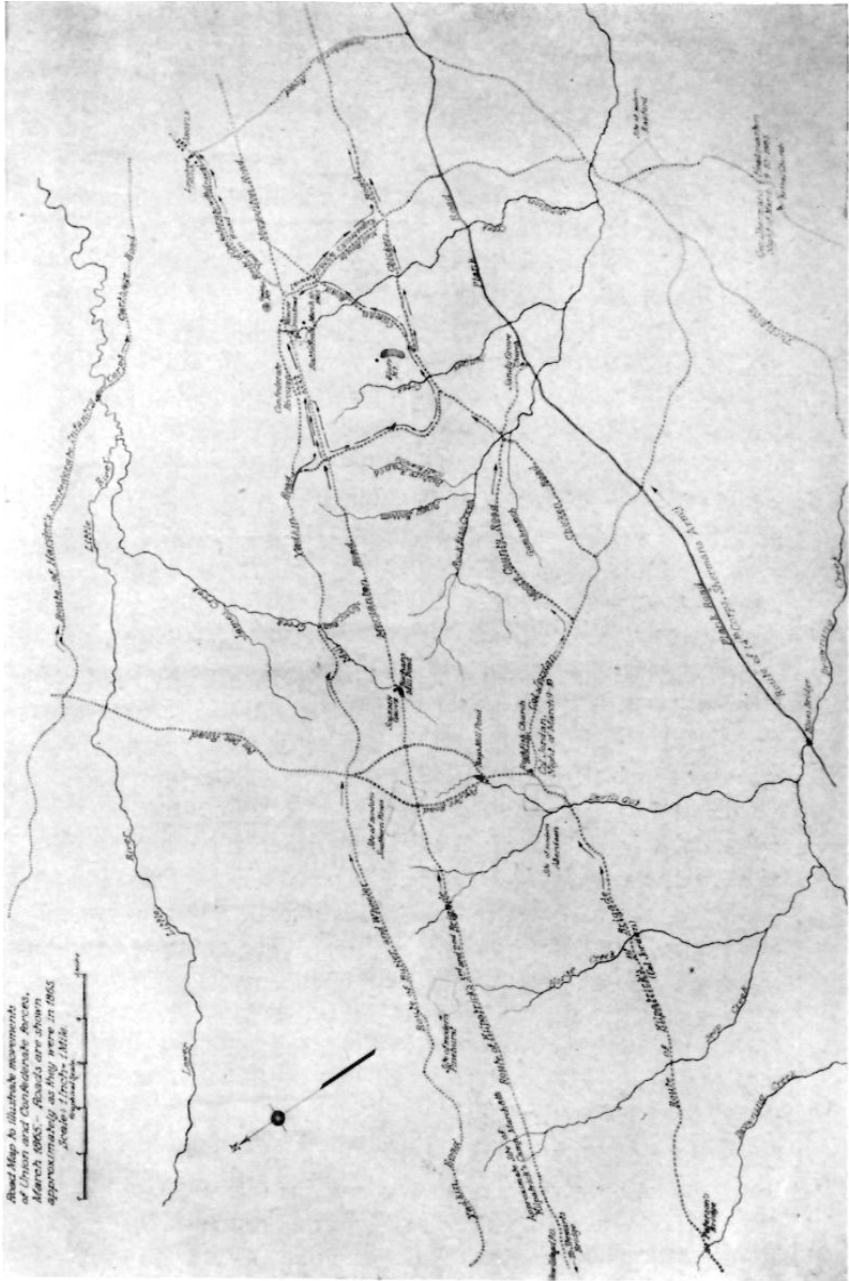
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to the submerged causeway. No matter if the logs disappeared in the mud, thousands more were coming from all sides. So layer upon layer the work went bravely on. Soon the wagons and artillery were jolting over our wooden causeway.

As my regiment was rear guard for the day, we had various offices to perform for the train, and it was midnight before we saw the last wagon over the bridge by the light of our pine torches. It seemed as if that last wagon was never to be got over. It came bouncing and bumping along, its six mules smoking and blowing in the black misty air. The teamster, mounted on one of the wheelers, guided his team with a single rein and addressed each mule by name, reminding him of his faults and accusing the animal of having, among his other peculiarities, a black military heart. Every sentence of his oath-adorned rhetoric was punctuated with a dextrous whiplash. At last, drenched to the skin, and covered with mud, I took my position on the bridge, seated in a chair which one of the men had presented to me, and waited for the command to close up.

As we advanced into the wild pine forests of North Carolina the natives seemed wonderfully impressed with seeing every road filled with marching troops, artillery, and wagons. They looked destitute enough as they stood in blank amazement gazing upon the Yankees marching by. The scene before us was very striking; the resin pits were on fire, and great columns of smoke rose high in the air, spreading and mingling together in gray clouds, suggesting the roof and pillars of a vast temple. All signs of habitation were left behind as we marched into that grand forest with its beautiful forest of pine needles. The straight trunks of the pine tree shot up to a great height, and then spread out into a green roof, which kept us in perpetual shade. As night came on we found that the resinous sap in the cavities cut into the trees to receive it had been lighted by the bummers in our advance. The effect of these peculiar watch fires on every side, several feet above the ground, with flames licking their way up the tall trunks was peculiarly thrilling and beautiful. But it was sad to see this wanton destruction, which, like the firing of the resin pits, was the work of bummers."

On the morning of March 9 the National cavalry marched to



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TOP: A RIVER CROSSING ON A FLOATING BRIDGE
CENTER: GENERAL J. KILPATRICK AT HIS HEADQUARTERS
BOTTOM: SOLEMN GROVE IN 1930



**TOP: LEFT—BRIG. GEN. J. KILPATRICK; RIGHT—MAJ. GEN. M. C. BUTLER, C. S. A.
BOTTOM: LEFT—LIEUT. GEN. WADE HAMPTON, C. S. A.; RIGHT—LIEUT. GEN.
JOSEPH WHEELER, C. S. A.**



—From "Battles and Leaders of the Civil War."
SHERMAN'S FORAGERS IN ACTION

THE BATTLE ON THE FORT BRAGG RESERVATION

Solemn Grove, a country post office formerly known as Buchan's, which is located on the Morganton Road, about half way between Southern Pines and the western edge of the Fort Bragg Military Reservation. Colonel George E. Spencer's Third Brigade, which formed the head of the column, arrived at Solemn Grove at two o'clock in the afternoon; a halt was made to allow the rest of the division to close up.

While at Solemn Grove General Kilpatrick learned from his scouts that Hardee's infantry had just passed, and that Hampton was still to the west, striving to overtake Hardee. Hampton was moving on the Yadkin, and possibly on other parallel roads. Kilpatrick rashly decided to intercept him.

Couriers were sent to the rear; General Atkin's Second Brigade was to picket the Morganton Road; Colonel Jordan, still further to the rear with the First Brigade, was to diverge to the Chicken Road at a point near Bethesda Church. Kilpatrick himself, with the Third Brigade, and the Fourth Provisional Brigade of dismounted troopers, would take care of the Yadkin Road. About five P. M. the Fourth Brigade arrived, and was sent ahead on the Morganton Road, closely followed by the Third Brigade with its "section" of two field pieces. The sky, already overcast, became still more gloomy, and a torrential downpour of rain accompanied the troops on their march east. Kilpatrick instructed Colonel Spencer to halt for the night at Green Springs, where the Morganton and Yadkin Roads intersected.

General Kilpatrick waited for the Second Brigade, saw them well started on their march, and then, after telling General Atkins to join him at Green Springs, trotted ahead into the gloaming to rejoin the Third Brigade. He was accompanied, he says, by his staff, and an escort of fifteen men and one officer.

CONFEDERATE MOVEMENTS

Wade Hampton had united Wheeler and Butler on the 8th. On the afternoon of the 9th the long Confederate column of fours was sloshing through the mud and sand, urging their jaded mounts toward Fayetteville. Hampton had promised Johnston that he would attack and punish any part of the Union Army which he might find separated from the main body. So far no such opportunity had been presented. On this particular evening

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he had directed the leading Confederate units to camp at Blue's, a farm a few hundred yards east of Green Springs (now called Battlefield Farm). The Confederates were aware that there was Union cavalry on the south of their line of march, but did not know that Kilpatrick's leading brigade had arrived at the assigned campsite ahead of them.

General M. C. Butler writes: "We had marched all the day preceeding the morning of the attack on Kilpatrick's camp in a drenching rain. My division was in front. Humphrey's squadron of the Sixth Regiment, South Carolina Cavalry, Butler's Brigade, commanded by General E. M. Law, was the advance guard of the column, Wheeler's division bringing up the rear. About dusk Humphrey halted at the intersection of a road leading toward Fayetteville, and upon my riding up to learn the cause, he pointed out the signs of a heavy mounted column having recently passed ahead of us, evidently Kilpatrick's cavalry, of Sherman's army. While we were discussing the situation we discovered a squad of about thirty cavalrymen coming up the road."

It is necessary to interrupt General Butler's account at this point to remark that the Confederates had moved south from the Yadkin Road on a side road, and had struck the Morganton Road. The squad which they now observed approaching from the west on the Morganton was Kilpatrick's party, riding east to rejoin the Third Brigade. Butler's account continues: "On learning from Humphrey that he had nobody down that road, I moved out to meet the squad, and when within hailing distance, it being too dark to recognize who they were, I asked, 'Who comes there?' The reply was 'Fifth Kentucky.' I knew that to be one of Kilpatrick's regiments. So I said to the man at the head of the column, 'Ride up, sir. I want to speak with you.' Kilpatrick's column having just passed, of which I have no doubt this squad was the rear guard, the man, who turned out to be the officer in command, rode up to me with his orderly, supposing I was a friend. They followed me a few steps into the midst of Humphrey's men, leaving the squad halted in the road. I turned, with my pistol presented, and demanded the surrender of the two. Nothing else was left for them to do. After disarming the prisoners, I whispered to Humphrey, General Law having ridden up,

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to send out, surround the squad of the Fifth Kentucky, and take them in. He very promptly carried out the instructions and brought in twenty-eight or thirty men, with a regimental stand of colors, without firing a shot."

Note: General Butler never learned that this was in fact Kilpatrick's personal guard. The wily Union general escaped in the gloom of the forest with his staff, and rode on to Colonel Spencer's camp.

General Butler continues: "Upon my reporting these facts to General Hampton, he decided to attack Kilpatrick at daylight the next morning. I accordingly followed in his (Kilpatrick's) wake about four miles, and bivouacked on the roadside without unsaddling or making fires, although it was a cold rainy March night. I established my headquarters for the night on the road, and with a pine root for a pillow slept on the ground, covered with my overcoat. I threw out a line of skirmishers in front, with videttes well in front of the skirmishers. Soon after the videttes were posted one of Kilpatrick's Lieutenants rode into our lines, and was brought to my headquarters. Getting all possible information from him, as to the location of Kilpatrick's headquarters, about midnight we reconnoitered, and found he had no pickets out to guard his rear, which enabled us to ride up almost to his camp fires without being discovered. He had moved around the head of a swamp and pitched his camp in front of it, with his right and rear protected by the swamp, but his left entirely exposed.

It was agreed between Generals Hampton, Wheeler, and myself that we would attack at daylight the next morning; that inasmuch as Wheeler's command was stretched back for some miles in column of fours, I should close up my division in column of regiments and be prepared to move when the head of Wheeler's column should appear in my rear; that I should follow up the road taken by Kilpatrick, move around the head of the swamp, as he had done, and fall suddenly on his camp from that (the west) side, while Wheeler was to move through the woods to the right, and attack from the rear."

The bad roads and heavy rains so delayed the march of Wheeler's corps that it was nearly daylight before the advance of

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Humes' and Allen's divisions reached the vicinity. Shannon's scouts, however, were with General Wheeler at or near the head of Butler's command, and they were sent off to the right during the night to capture any pickets which might be out in that quarter. This was to be done, if possible, without any gunfire. This order was successfully carried out; the scouts got the videttes, and then captured the outpost reserve. Captain Shannon was anxious to locate General Kilpatrick's headquarters, and the Confederate prisoners who were held in the Union camp. So he sent two of his scouts, Joe Rogers and B. Peebles, into the camp on foot. When these men returned they brought out two horses apiece. Just as they walked back up the road leading the captured animals General Wheeler rode up, and was greatly astonished to learn that the scouts were able to bring back four horses without being challenged. He closely questioned the two men concerning what they had observed within the camp. Then he rode off to the right and encountered two more of his scouts, Sergeants Hardie and Burke. They pointed out to him the Federal camp just across Nicholson Creek. Had these scouts, and General Wheeler as well, made a more careful inspection of the ground lying between them and the camp, and paid less attention to the location of Kilpatrick's headquarters, the outcome of the morning attack would doubtless have been quite different.

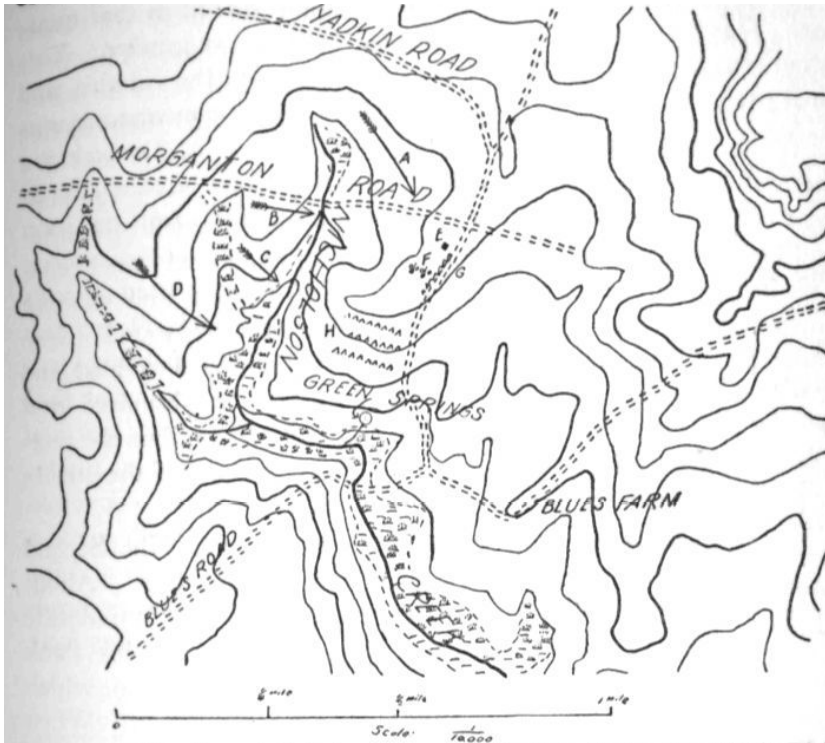
FEDERAL DISPOSITIONS

Let us leave the Confederate bivouack for a few moments to inspect the layout of Kilpatrick's camp, and also learn just what his other two brigades accomplished during the night.

Lieutenant-Colonel Way's brigade of about four hundred dismounted men, having in charge the ordnance wagons and the division headquarters train, arrived at Monroe's Cross-Roads at nine o'clock that stormy night, and camped in line along the road in front of the Monroe farm house. Colonel Spencer's Third Brigade filed on past the house and turned off into a large open field lying on the ridge about a hundred yards north of Green Springs. Shelter tents were thrown over fence rails and saplings. Picket lines were quickly stretched between pine trees; the artillery was parked about fifty yards or less from the house, on a slight rise at the top of the ridge, probably near the point where the two principal

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grave plots are now located. The wagons were also in and near the farm yard. Colonel Spencer states that he picketed the country carefully in the direction of Fayetteville, leaving Colonel Way to



Legend: A=Direction of Butler's attack; B=Wheeler's Scouts; C=Allen's Division; D=Humes' Division; E=Kilpatrick's Headquarters; F=Union Artillery; G=Way's Camp; H=Spencer's Camp.

picket the rear. How carefully this was done has been noted. At any rate Colonel Spencer and his staff soon made themselves comfortable in the little farm house, from which the inhabitants had fled; he was joined here by Kilpatrick and his staff, and the private mounts belonging to these gentlemen were tied to the railing of the front porch, and to the garden fence. There were also in the building two ladies, said to be refugees from Savannah, who were following Kilpatrick's column in a buggy. Sherman's army was followed by a horde of not less than 20,000 refugees of all colors and ages, but it is astonishing to learn that any of these should select for their escort so exposed a column as the cavalry!

At that time (1865) the old Morganton Road ran due east

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across the head of Nicholson Creek, passed along the farm fence just north of the house. The Yadkin road came in here from the northwest, and also Blue's "rosin" road ran just east of the house, down the ridge, and branched off around the head of Green Springs toward Blue's farm just about as it is today. This little ridge south of the Monroe house was the driest place to camp under the circumstances, and here the troops pitched their shelter tents, and built cheery fires of fat lightwood to warm and dry themselves, and to cook the delayed evening meal. Soon the pungent odor of burning pinewood mingled with the smell of leather and horse sweat, and the aroma of sizzling hams and sweet potatoes brought the men from their work of feeding and rubbing down the animals. Not long afterwards all were sound asleep under their little canvas shelters; the provost guard nodded and dozed around the fire where were gathered one hundred and seventy Confederate prisoners. No sound was heard but the restless movements of the animals on the picket lines, and the steady drip of rain from the pine boughs overhead.

In the meantime, eight or ten miles to the west, the Second Brigade under General Adkins was having difficulties. About eleven P. M. the head of his advance encountered the Confederate bivouac near Johnson Mountain. During the march his flank guards had skirmished incessantly with Wheeler's column, which was marching parallel, and not more than a mile distant. When Adkins struck the bivouac of Butler's division, he halted, reconnoitered, and then ordered a countermarch. After moving west for two or three miles he turned off to the south in an effort to find his way around the Confederates. His command was soon enmired in the swamps of Piney Bottom and Juniper Creeks. At daybreak they extricated themselves and marched east on the Chicken Road. On the way they heard heavy firing to the north, and were soon met by wild-eyed refugees from the Third Brigade, who said that Kilpatrick's command had been surprised and badly used up. General Adkins arrived at Green Springs after the battle was over.

Colonel Jordan's First Brigade also had a bad night. He crossed Devil's Gut (just west of Aberdeen) during the afternoon of the 9th by dismounting his men to pull the wagons and

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artillery. At midnight his command was resting at Rockfish Church (Bethesda). At daylight, in compliance with orders which Kilpatrick had sent from Solemn Grove, he took a road leading to Sandy Grove Church (the Moore County Road). At nine o'clock he reached the Chicken Road at Big Rockfish, and hearing firing to the north, hastened to join Kilpatrick. He joined the other two brigades shortly after noon.

THE BATTLE

Toward morning the rain stopped falling, but mists exhaled from the ground produced a heavy blanket of fog, which hung low over the swamp and obscured Kilpatrick's camp on the low ridge beyond. The camp was absolutely quiet.

General Butler moved Young's Brigade to the front, it having occupied the rear of his column during the march of the previous day. Commands were given in a low tone; the thick carpet of pine needles underfoot deadened the sound, and the fog-filled forests screened the movement. Butler sent for Colonel Gideon Wright, of the Cobb Georgia Legion, who commanded Young's Brigade. "I informed him of our plans, and directed him to select a prudent but bold captain to lead the advance squadron in the attack, and that he should follow close on the attacking squadron and throw a regiment into the camp, and that I would be within striking distance, with Law in command of my old Brigade.



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Colonel Wright selected Captain Bostick, and ordered him to report to me for instructions. After describing the location of the house in which Kilpatrick was stopping, I ordered him, on entering the camp at daylight, to rush straight for the house, surround it, and hold his position until we could come to his assistance; that I wished to take Kilpatrick prisoner."

General Wheeler, for his part, was not idle. He arranged his men in five attacking regimental columns. Hume's division was on the extreme right, with Harrison's Texas Brigade leading; in the center, just south of the Morganton Road, was Allen's Division, with Hagan's Alabama Brigade at the head of the column. Wheeler's escort and Shannon's scouts were in front of Hagan. Wheeler also was determined to capture Kilpatrick; he ordered Shannon to make the capture. Dibrell's Brigade, of Hume's Division, was held out as a reserve.

As has been seen previously, Butler formed his division just north of the Morganton Road, holding back Law's Brigade in reserve.

Just before daybreak everything was ready for the charge. General Hampton, feeling some delicacy about appearing in person before Wheeler's troops, having recently been promoted over the latter, turned to Wheeler and said: "I wish you would take command of your own and Butler's troops on the field, and make the fight as we have arranged, while I remain here with Dibrell's reserve; should you need help send to me for it."

Wheeler replied: "Thank you, General," and in a moment, mounted on his white charger, with pistol raised, rode to the head of the column. He gave the command "Forward"; the walk, trot, the gallop, and the charge followed in quick succession. On the left Butler's division charged simultaneously.

General Kilpatrick had awakened early, and, as was his custom, stepped outside the house in his shirt and drawers to see that his horses were properly fed. In the farmyard stood the headquarters buglers and drummers, preparing to sound reveille. At that moment the Confederates charged. The rebel yell screamed through the woods. Around the swamp and down the ridge they came with a thunder of a thousand hoofs and a scattering volley of pistol shots. The Union troopers, thus rudely awakened,

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rubbed their eyes and peered out from under their tents in bewilderment at the cause of the uproar. The Confederates rode over them, slashing with sabers; on down the slope they went, then wheeled and came back through again. Many Federals, nearest the front, surrendered. Others seized carbines and fled to the swamp. In less than a minute both camps were entirely over-run, and a wild hand-to-hand fight ensued.

General Kilpatrick, who in four years had been on the receiving end of many a Confederate assault, said that it was the most formidable charge he had ever witnessed. Eagerly sought, as he was, by the Confederates, he again, for the second time within twenty-four hours made good his escape. Captain Bostick rode up to him as he was making off. "Where is General Kilpatrick?" yelled Bostick. "There he goes on that horse!" replied Kilpatrick in a flash, pointing at a bearded Federal riding away through the woods. Bostick galloped in pursuit, while Kilpatrick ran barefooted in the opposite direction. Years afterward he met General, then Senator Butler, in Washington, and in describing this incident to him said that he exclaimed to himself that "four years' hard work for a major-generalcy had gone up the spout in one minute." Kilpatrick was only a brevet major-general.

The Federals who had fled to the swamp formed behind trees and stumps, and, cheered by Kilpatrick and his officers, directed a hot fire from their repeating Spencer carbines toward the mounted Confederates. In the farm yard, by Wheeler's orders, men were trying to harness mules and horses that they might drag away the captured artillery and wagons. The attack had degenerated into a disorderly meleé. The Texans had run into the swamp; they received a heavy fire from Captain Hind's First Alabama Cavalry (Federal), and were forced to withdraw. Eventually they circled to the north and joined the battle by going around the head of the swamp. But this took time, and by the time they had arrived in rear of Butler the tide had turned the other way. Although the Federals had been surprised in their sleep, and driven in disorder from their camps, they were brave, fierce fighters, all veterans of four years' fighting. General Butler says, "As I turned the head of the swamp and struck the camp I witnessed a scene of confusion and disturbance such as I had

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never seen before. Kilpatrick did not have a vidette or a picket out, or, so far as I could see, not even a camp guard. The result was, we found his men asleep and taken entirely by surprise. I had not advanced far into the camp when I was astonished to meet one hundred and thirty or forty Confederates rushing toward us. At first I thought Wright had been repulsed, but it turned out they were prisoners Kilpatrick had taken and whom Wright's vigorous and unexpected onslaught had released from their guards, and they were making good their escape. I sent them to the rear, and then moved on, past Kilpatrick's headquarters, through his artillery, wagon, and ambulance train. Anticipating that Wright's command would become scattered I had halted Law near the entrance to the camp, to take care of the prisoners, etc. Wright had gone clear through the camp, and, of course, his command had become much scattered. I, therefore, halted in the midst of the camp, and sent back for Law to move in, to complete the capture and possession. To my dismay, I learned that General Hampton, without my knowledge, had ordered Law to some other point, so that my message could not find him. I then hoped for the arrival of Wheeler's command from the other side. He came through himself with a few of his staff and escort. He rode up and inquired about my command. I replied, "Scattered like the devil; where is yours?" He said that he had encountered a bog through which his division could not pass, and that he had ordered it to make a circuit to the left and come around on my track. This, of course, took time, and in the meantime Kilpatrick's 1,500 dismounted men had recovered from the shock of our first attack and gathered themselves behind pine trees, and with their rapid-firing Spencer carbines attacked us savagely and finally drove us out."

During the first part of the battle General Butler rode about calmly through all the hurly-burly, pointing out with a lady's silver-mounted riding crop the things he wished done. In the farm house were Colonel Spencer and the members of his and General Kilpatrick's staffs. They were for a time virtually prisoners, but the battle was so hot that at no time did the Confederates have opportunity to enter the building, and the Federal officers eventually escaped. One of the ladies ran out on the porch

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and implored someone to hitch the horses to her buggy, that she might get away. One of the Confederate captains escorted her to a deep drainage ditch east of the building, and made her crouch there for protection against the bullets which were whistling in all directions. One of the soldiers claims that she remained there for a time, but at length unable to restrain her curiosity rose and peered over the top.

About this time several individual encounters took place in the space between the hostile groups. A Federal officer rode out and engaged in a pistol duel with a Confederate. The latter fell, wounded. Another took his place, and the two fired several shots almost in each other's faces. At the third exchange the Federal fell. General Butler witnessed the encounter, unaware, due to the smoke, that the Confederate was his own brother, Captain James Butler. He said it was the gamest fight he had ever seen.

Twenty or thirty yards from the farm house a group of Confederates were vainly trying to harness the plunging artillery teams. Lieutenant Ebenezer W. Stetson, Tenth Wisconsin Battery, ran swiftly up to where the guns were, and, unnoticed in the confusion, unlimbered one of the pieces. Entirely alone, he loaded and fired it into the mass of Confederates nearby. They recoiled in confusion. Sergeant John Schwartz, the chief of section, and a few other men ran to the officer's assistance. Together they fired the guns as fast as they could be served. One of the Confederate eyewitnesses described what followed:



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"During the hot hand-to-hand fight in Kilpatrick's camp a section of artillery on a slight hill, a little distance from where we were engaged, was playing havoc with our men, discharging double loads of shrapnel into us. Some of Butler's command commenced to concentrate their fire upon the men who were working these guns, and soon killed or knocked out all who were serving the guns except one Lieutenant. He seemed to bear a charmed life, and bravely loaded and fired the one gun left. DeVaux called for some men to charge this battery with him; there was so much noise and confusion incident to such close fighting that he and Captain John Humphries of the Sixth Regiment, and Glenn Davis were the only ones to charge towards this battery. The Yankee Lieutenant serving the gun pulled his lanyard and discharged the load of shrapnel when they were a short distance from the muzzle of the cannon. Lieutenant DeVaux was shot in five places; fortunately no bones were shattered. Captain Humphries was shot in the arm and later died from delayed amputation. Both their horses were killed. When we saw DeVaux and Humphries shot down some of our men charged up to this battery, served so gallantly by this brave and cool Yankee, and while he was in the act of reloading, killed him with a pistol shot. General Butler, when he saw it, said that it was a pity to have to kill so brave a man."

The man who gave the above account is mistaken in one particular. Lieutenant Stetson was not killed; he survived, but Sergeant Schwartz died, and is buried on the Fort Bragg reservation. Lieutenant Stetson's heroic feat served as a rallying signal for the Federals. It was at this point that their line advanced and drove the Confederates from the camp. General Butler says, "I managed to gather up fragments of Wright's brigade and charged the rallying Federals, but they had got to their artillery and, with their carbines, made it so hot for us that we had to retire. It was at the head of this charge that Lieutenant Colonel King, of the Cobb Legion, was killed. In fact, I lost sixty-two men there in about five minutes' times."

One of Wheeler's men describes the fight as follows: "The nature of the fight, and broken, wooded condition of the ground, tended to throw our lines in disorder which was increased in

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crossing a boggy stream on the edge of the camp. Twice had the brave Wheeler reformed his men and charged the foe, who from a neighboring slope poured volleys upon our columns. One of their lines was broken and routed. After this moment General Butler, who had reformed his command, commenced a charge. Wheeler raised his hat to these as they hurled themselves on the fleeing enemy. Thus far all was success, but now a solid line which the enemy had formed in the distance approached slowly with so deadly a fire as to compel us to retire. Generals Humes and Harrison, Colonel Hagan, Colonel Roberts, and Major Farish had been badly wounded. General Allen's and Colonel Ashby's horses had been shot, and the Alabama Brigade having lost its commander and every field officer, was now commanded by a captain. This deficiency of officers made it impossible to rally for another successful charge. The numerous couriers Wheeler had sent to Hampton asking for Dibrell's troops had not been heard from, and slowly but surely we found ourselves yielding the field, but carrying off our prisoners which now numbered four hundred. Wheeler at last met Hampton with Dibrell's command, but in view of the probability that Sherman's infantry had reached the scene, Hampton advised that we continue to withdraw. General Wheeler, therefore, remained with Dibrell's command and checked the enemy, while the other troops moved on toward Fayetteville."

The battle was fought by the Confederates mounted, and by the Federals dismounted. During the latter part of the engagement the Confederate regiments sat on their horses in line, firing pistols and carbines across the short intervening space. Survivors retained but a general impression of that phase of the fight: the rush of columns to fill a breach in the line, officers cheering the men on, pauses, breaks, wild and angry threats, upbraiding calls and taunts thrown back and forth across the narrow field, fresh rush on rush, the zing of missiles through the trees, shrieks of agony, choked groans, and the gasps of dying men close by.

About nine o'clock the firing slackened. The Confederates were withdrawing. A few scattering shots from the rear guard of Dibrell's brigade, a rumble of wagons and the thud of hoofs receding through the woods, and the Federals looked up with wonder

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to see a warm and pleasant morning sun breaking through the mist and smoke.

No pursuit was undertaken. The Federals were exhausted, out of ammunition, and most of them were practically naked. About ten o'clock General John Mitchell, with a brigade of infantry from the Federal Fourteenth Corps arrived, having made a forced march north from the Plank Road to the assistance of the cavalry. Two hours later the other two cavalry brigades arrived. None of these troops came in time to participate in the battle.

Kilpatrick remained on the field until about three P. M., caring for the wounded and burying the dead. The farm house was used as a hospital, or first aid station. The dead were placed in shallow pits and covered over with sand. The re-united cavalry division marched to the point where the Chicken Road crosses Little Rockfish Creek. Here they threw up a circle of log breastworks and camped for the night. Several of the mortally wounded died and were buried here, including Sergeant Schwartz. The Confederates marched on into Fayetteville, where their wounded were cared for in the old flour warehouse, now a filling station on Person Street. Private homes were also filled with the wounded.

No accurate estimate of the number of casualties can be given. It is probably safe to say that there were about one hundred killed on each side, and several times that number of wounded. Neill S. Blue, then a boy of fifteen, who lived on the Blue farm, hid in the swamp during the battle; after it was over he set up a few pieces of sandstone over the graves. A month afterwards, when the war was over, a South Carolinian returning home passed by the spot, and noted that the carcasses of the animals were rotting in the farm yard, and the human dead were partially exhumed by the elements or by wild animals. The house was still deserted.

In 1921 the Fort Bragg authorities identified the graves of thirty-three Federal unknown dead, and placed over them appropriate markers provided by the Quartermaster Corps. The Confederate dead had been exhumed by local citizens a year after the battle; some of them are in a plot in Long Street Church Cemetery, others in Fayetteville; no doubt a few were claimed by relatives in other parts of the country.

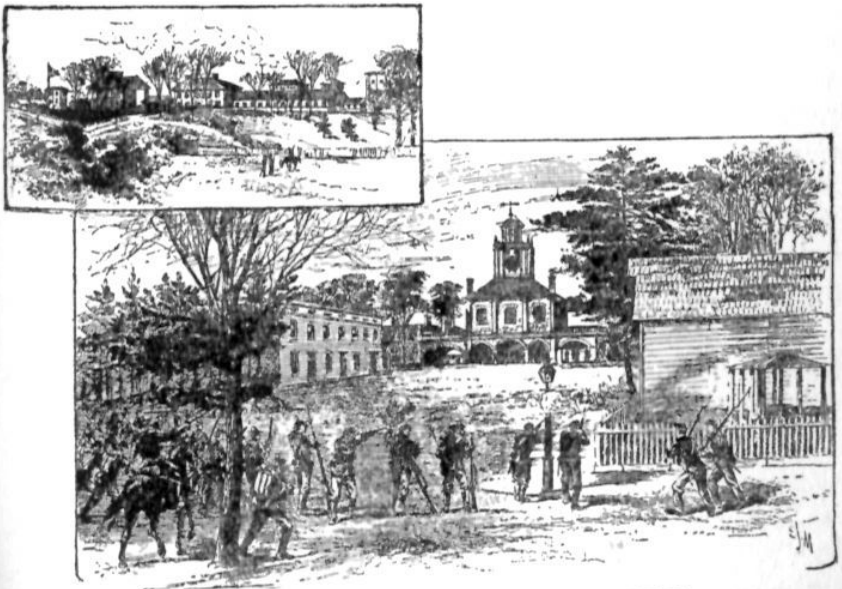
For many years after the war the battleground was a picnic

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ground for local sightseers, who used to come for miles in horse-drawn conveyances to spend Sunday afternoons and collect Minie balls and rusty weapons from the field. Today the site is overgrown with weeds and brush. The house has burned; nothing but deer and fox wander through the fields; there is no monument or marker other than the gravestones hidden in the woods. Few of the local people remember the battle at all, and those who do have only vague or erroneous ideas as to what took place.

All of the Union regimental commanders praise Lieutenant Stetson. Colonel Spencer, commanding the brigade, says, in concluding his report, "It is impossible for me to speak in too high terms of the conduct of the men and officers of my command in this fight, and it would be invidious to mention any, though I cannot let the gallant conduct of Lieutenant Stetson go without mention, who, unaided and alone, crept through the ranks of the enemy and unlimbered and fired one of his guns. To this fact, more than to any other, I ascribe a terrible disaster turned into a brilliant victory."

And now, finally, for a brief description of the principal actors: General Hugh Judson Kilpatrick and General Joseph Wheeler were both very young men. They had graduated in the same



DRIVING THE CONFEDERATES OUT OF FAYETTEVILLE

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class at West Point, at the outbreak of the war. Kilpatrick was twenty-six years old at the time of the battle. He was a small, wiry man, with scraggly side whiskers, a prominent beak of a nose, cool grey eyes, and a thin-lipped mouth. He was personally brave, but rash in judgment, and lacked balance. Wheeler was also a small man, wore a short, but full beard, and had rather prominent eyes. He became a major-general in the U. S. Army during the war of 1898.

Wade Hampton and M. C. Butler were both of old, wealthy South Carolina families. Both were large, well-built, handsome men of middle age. Hampton wore a luxuriant growth of full whiskers, while Butler was clean-shaven except for a large, drooping mustache. Hampton was noted, as was Butler, for great personal courage, resourcefulness, and tactical ability. Both rose to prominence in politics in their state after the war. Neither were military men prior to the Civil War.

According to the strength returns for February, 1865, Kilpatrick had in his division an aggregate of 5,156 officers and men. Col. Spencer states in his report that his command numbered less than 800 during the battle. Together with the dismounted brigade this makes a total of about 1,500 Federals on the field.

The Union artillery consisted of three sections of two guns each. The cannon were six-pounders, rifled. The ammunition was fused shell and cased shot, about fifty per cent of each being carried. At least half of the fused shell failed to explode, but the canister and grape were effective. The gun teams and caissons were not very dissimilar from those in use today. The gun crews were largely made up from cavalrymen detailed for the purpose, but the corporals and "chiefs-of-piece" were generally artillerymen.

Butler's forces totalled 1,526 and Wheeler's 5,172. It is not possible to determine exactly how many of these participated in the battle of Monroe's Cross-Roads, but it is safe to say that there were at least 3,000 Confederates.

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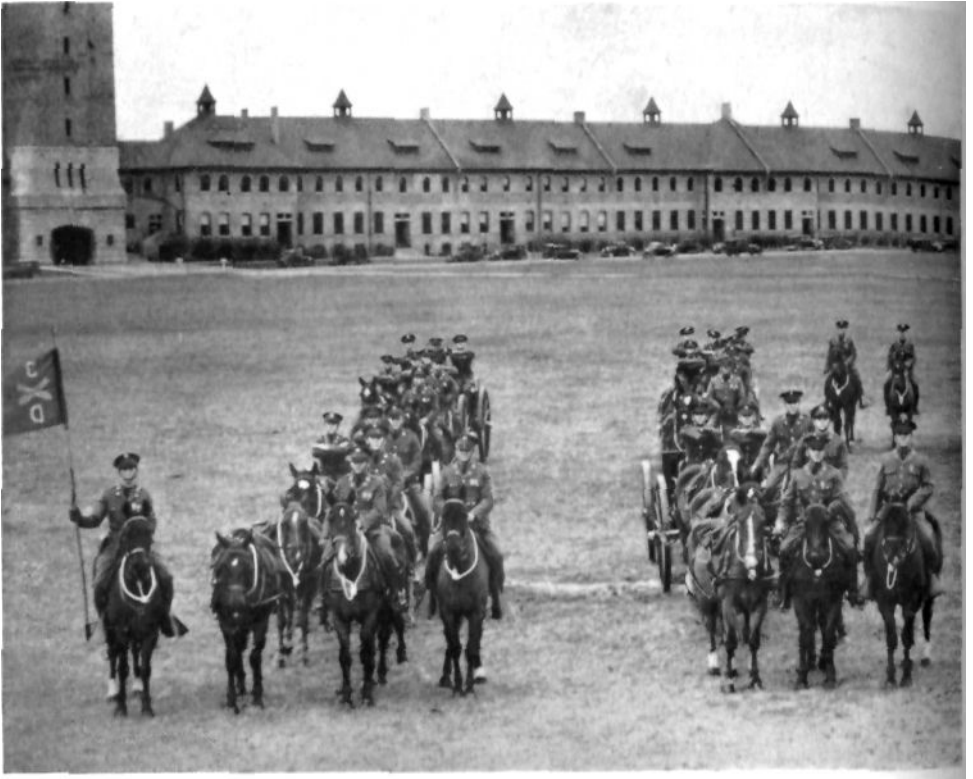


THE RALLY IN THE SWAMP



GENERAL WILLIAM T. SHERMAN

THE 1931 KNOX



THE Chief of Field Artillery has announced that the Knox Trophy for the year 1931 has been won by Battery D, 3rd Field Artillery, stationed at Fort Sheridan, Illinois, Captain Ernest T. Hayes, recently assigned to the 13th Field Artillery in Hawaii, commanding at the time of the test.

The winning battery took the Knox Trophy Test last summer at Camp McCoy at Sparta, Wisconsin, during the summer training season under unusually difficult terrain and firing conditions.

The Knox Trophy is presented annually by the Society of the Sons of the Revolution in the Commonwealth of Massachusetts to that battery of the Regular Army Field Artillery which has the highest rating in efficiency—this rating to be based on firing efficiency, tactical mobility, proficiency in the use of Field Artillery means of communications, and on interior economy.

TROPHY BATTERY



The batteries selected to represent the commands of which they form a part and to take the competitive test for the Knox Trophy were:

- 1st Corps Area—Fort Ethan Allen, Vermont—Battery B, 7th Field Artillery.
- 2nd Corps Area—Madison Barracks, New York — Battery F, 7th Field Artillery.
- 3rd Corps Area—Fort Hoyle, Maryland—Battery D, 6th Field Artillery.
- 3rd Corps Area—Fort Myer, Virginia—Battery B, 16th Field Artillery.
- 4th Corps Area—Fort Bragg, N. C.—Battery C, 17th Field Artillery.
- 4th Corps Area—Fort Benning, Ga.—Battery C, 83rd Field Artillery.
- 5th Corps Area—Fort Benjamin Harrison, Ind.—Battery B, 3rd Field Artillery.
- 6th Corps Area—Fort Sheridan, Ill.—Battery C, 3rd Field Artillery.
- 7th Corps Area—Fort Robinson, Nebr.—Battery E, 4th Field Artillery.
- The Field Artillery School—Fort Sill, Oklahoma—Battery B, 18th Field Artillery.
- 8th Corps Area—Fort Sam Houston, Texas—Battery D, 15th Field Artillery.
- 8th Corps Area—Fort Bliss, Texas—Battery B, 82nd Field Artillery.
- 8th Corps Area—Fort Francis E. Warran, Wyo.—Battery C, 76th Field Artillery.

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SERGEANT CLIFTON J. PIERCE HQ.
BTRY., 2ND BN., 3RD F. A. WINNER
OF 1931 KNOX MEDAL

CAPTAIN ERNEST T. HAYES WHO
COMMANDED BTRY. D., 3RD F. A., WHEN
IT WON THE 1931 KNOX TROPHY



BTRY. D., 3RD F. A., ON THE MARCH TO SPARTA

THE 1931 KNOX TROPHY BATTERY

9th Corps Area—Presidio of Monterey, Calif.—Battery D, 76th Field Artillery.

9th Corps Area—Fort Lewis, Washington—Battery B, 10th Field Artillery.

Hawaiian Department, Schofield Barracks, Territory of Hawaii—Battery D, 13th Field Artillery.

Panama Canal Department, Fort William D. Davis, Canal Zone—Battery B, 2nd Field Artillery.

The Knox Medal, awarded by the same Society for excellence as an enlisted student at the Field Artillery School, was won this year by Sergeant Clifton J. Pierce, Headquarters Battery, Second Battalion, 3rd Field Artillery, Fort Sheridan, Illinois. Thus Fort Sheridan won both the Knox Trophy and the Knox Medal for 1931.

A FEW WORDS FROM THE WINNING B. C.

When I joined Battery D, in July, 1929, Lieutenant Stancisko, who was then in command of the Battery, was talking Knox Trophy. All the officers felt that we could win the test. Our first step was to emphasize gunner's instruction and pistol marksmanship, and make an effort to insure a rating of 100% in interior economy. During the winter months at Fort Sheridan we had little opportunity for outdoor training, but a great amount of time was spent in indoor training of the battery detail and in non-commissioned officer's schools. The greater part of the outdoor training was conducted at Camp McCoy, Wisconsin, after our arrival there early in May. It consisted mainly of participation in the service practice and battalion field training, where we developed speed and accuracy in the firing battery and the battery detail. Where possible, we used problems which we thought would be similar to those required by the test.

After the camp elimination, D Battery went into the final test feeling that if we did not win, we would at least turn in a score that would reflect credit upon the organization. Too much credit cannot be given to Lieutenant Stancisko, who served continuously with the Battery for three years, and Lieutenant Blakeney for their loyalty and efficiency in training the battery, and to the enlisted personnel who gave full and willing cooperation throughout the preparatory training and the final test. Without this cooperation on the part of the officers and enlisted men of the battery, the test could not have been won.

FIELD ARTILLERY OFFICERS (REGULAR ARMY) ON DUTIES OTHER THAN WITH TROOPS (AS OF DECEMBER 31, 1931)

Note: The list of officers assigned to Regular Army Field Artillery Units (as of September 1, 1931) was published in the September-October, 1931, number of The Field Artillery Journal

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Lieut. Col. T. D. Osborne

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1st Lieut. C. H. Mitchell, Signal Corps School.

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FIELD ARTILLERY NOTES

Training Regulations on Fire Against Fast Moving Targets

The Field Artillery Board has been making a study of the several methods of fire against rapidly moving targets developed to date by the Board, with a view to incorporating the most practical method in the new training regulations regarding the service of the piece.

Methods of fire by direct laying have been developed to the point where it is believed that they may now be prescribed. Studies of methods of fire with indirect laying continue with a view to incorporating the most practical method available at this time in the new regulations or, if this does not prove to be feasible, to preparing a training memorandum for the Field Artillery at large in which all known practical methods developed by the Board will be prescribed for temporary use.

Progress in Liaison

Considerable progress has been made at the F. A. School in the methods of reporting and designating targets on which fire is needed. Special attention is being paid to adjusting or observing fire on such targets by liaison officers, particularly with radio communication and without maps. With radio communication alone, effective fire can be delivered within fifteen minutes on a target reported by the Infantry, the liaison officer observing and reporting the results in the same manner as an air observer. When there is no map available, the designation of targets is facilitated greatly by having one or more batteries of a battalion mark their base line by firing a round of smoke on the base point, or for convenience, a given amount, say 1,000 yards, short of it.

The methods of concentrating a battalion on a target, using air observation or observation by liaison officer, have developed so that the concentration may be effected promptly, using as a basis the adjustment of only one battery.

Gunners' Examinations

TR 430-175 makes sweeping changes in the instructions under which Field Artillery gunners' qualification tests will be conducted.

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The Field Artillery Board has been working a long time on these training regulations under the supervision of the Office of the Chief of Field Artillery. The draft was finally approved by the Chief of Field Artillery and the War Department General Staff and they are now being printed. They will be effective upon publication and will probably be received by Field Artillery units in the early part of 1932.

TR 430-175 will give four lists of subjects upon which the various examinations will be based, as follows:

Subjects for gun and howitzer regiments, ammunition trains and detachments, and headquarters batteries, Field Artillery brigades.

Subjects for Flash and Sound Ranging Units.

Subjects for Reserve Officers' Training Corps Units.

Subjects for Citizen's Military Training Camps.

Each candidate will be examined in a number of subjects from the appropriate list, the total weight of which will aggregate between 100 and 120 points. In selecting the list of subjects in which each candidate is to be examined the battery or detachment commander may prescribe, at his discretion, subjects bearing a total weight of not to exceed 70% of the total taken by the candidate, who will complete the list by the selection of a sufficient number of subjects from the appropriate list to reach the required total weight. The purpose of this dual selection is twofold. Prescribing certain subjects by the battery commander is designed to further the general training of the battery by requiring individuals to gain proficiency in certain necessary duties incident to the functioning of a symmetrically trained battery as a prerequisite to receiving additional compensation. It is intended to insure the attainment of proficiency in the specific duties to which the candidate may be assigned. The election of certain subjects by the candidate is designed to afford him the opportunity to capitalize his proficiency in those varied duties of the Field Artillery soldier in which he may possess special aptitude or interest. In order to qualify as a gunner, an individual should be required to demonstrate a high proficiency in the duties to which he is normally assigned, supplemented by a general knowledge of other basic duties of the Field Artilleryman. It should be possible, therefore, for

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general training and preparation for the gunners' examination to proceed concurrently.

Where the combined weight of the subjects selected by a candidate exceeds 100 points, the percentage attained will be arrived at by proportion, based upon the total of the points attained by the candidate.

The material with which the regiment is equipped will be used in the examination. In the case of detachments, ammunition trains and other units not equipped with guns or howitzers, any such weapons available at the post or station of the unit may be employed for that part of the examination pertaining to the work of the gun squad.

For men on the Detached Enlisted Men's List subjects will be prescribed within the limits specified above by each candidate's immediate commanding officer.

The new examination is designed to serve as an adjunct to training. It is in no sense to be regarded as a means of determining the relative merit of the several batteries or detachments. Within the battery or detachment it will afford a basis for the determination of the relative progress in training of its enlisted personnel, their efficiency in the use of the principal arm as designated in AR 35-2380 and for their classification as gunners.

The Advanced Courses

The increased size of the Advanced Course of the F. A. School, 38%, with a corresponding reduction in the Battery Officers' course, has necessitated changes in the organization of instruction. The program of instruction, however, is being maintained as prescribed. One feature is a material increase in the number of practical problems in reconnaissance and occupation of position by battalion, necessitated by the increased number of students in the Advanced Course, in order that the proper amount of individual instruction may be maintained.

The Advanced Course in Motors has been improved by additional instruction in the following items:

Theory of combustion of liquid fuels and a summary of the different cycles.

Analysis of bearing loads in different parts of the chassis.

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Design of simple parts.

Engine testing and vehicle performance.

Traction dynamometer tests.

More detailed study of carburetion and its effects.

These developments have been made without sacrificing the time devoted to practical instruction. Continual progress is being made in fire direction, primarily by the solution of varied practical problems.

Automatic Rifles for Field Artillery Units

In the fall of 1930 automatic rifles were issued to certain Field Artillery units for experiment and training in use against anti-aircraft while on the march. Instructions from the Adjutant General dated December 15, 1930, directed that the commanders of units to which the automatic rifles were issued make reports on their experience with them along with their recommendations. Most of these reports have been received in the Office of the Chief of Field Artillery and as a result of the study of them the Office of the Chief of Field Artillery has reached the following conclusions and made the following recommendations:

a. That the present Browning automatic rifle is a valuable weapon for protection of Field Artillery units on the march against airplanes. However, it is too heavy and has a tendency to climb. The development of a lighter automatic rifle is indicated.

b. In the march formation, two automatic rifles should be placed at the head of the column, two automatic rifles at the rear of the column and the remainder scattered throughout the column. Ten automatic rifles per battery appear to be sufficient.

c. The automatic rifles should be carried in leather boots attached to carriages, or motor vehicles, except when in an area subject to airplane attacks, in which case they should be in the hands of the operators.

d. The higher numbered cannoneers in the gun sections, and specially selected men in other sections, should be the operators. Immediately upon hearing the airplane warning signals, they should dismount and commence firing as soon as the airplane is within range.

e. The airplane warning signals should be the whistle and verbally "Airplane!" given by the man first observing the plane and repeated by all men having whistles in the battery. All

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chiefs of section and automatic rifle operators should be equipped with whistles.

f. When the warning signal is given, in horse-drawn units, alternate carriages should move off the road to the right and left, if practicable, otherwise, halt and remain on the road. Mounted men should remain mounted, cannoneers should take cover. In motorized units, the column should halt and all personnel use the matériel for cover.

The following recommendations are made:

a. That the training with the present Browning automatic rifles be continued and that those rifles now issued to organizations remain in their present status as tentative equipment.

b. That steps be taken to secure for the Field Artillery a light automatic rifle suitable for defense against airplanes while on the march. In this connection, attention is invited to the present tests of a light automatic rifle for the Infantry and Cavalry.

Apparatus Simulating Service Practice

The Chief of Field Artillery last fall directed the Field Artillery Board to make a study to determine the most practical means of supplementing training for service practice. As a result of this study the Board reported that the following types of apparatus are considered best for preliminary training in conduct of fire:

Blackboard (described in Pars. 107-109 Special Text No. 99—
Army Extension Courses, Field Artillery).

Dispersion scale (Par. 110, Special Text 99).

Axial terrain board (Par. 113, Special Text 99).

Terrain board (Par. 112, Special Text No. 99) or similar type, for example the "Train Board" on sale at the Book Department of the F. A. School.

37mm subcaliber tube (Par. 123, Special Text No. 99).

The .30 subcaliber mount which is being tested by the Board may possibly be added to the above list.

The sand table terrain board, the Jasper-Ward terrain board and similar devices were not recommended for standardization. They are bulky and complicated, expensive to construct, too intricate of operation and require a larger room than will always be available. Above all, their operation is such that the students are apt to become more interested in the mechanical operation of

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the device than they are in the technical solution of problems.

Smoke puff was not recommended for continuation as standard. It requires a large, well trained detail to operate and a fairly long outdoor range. Even with the best detail the practice is apt to be slow, and with a less well trained detail it becomes excessively tedious and boring. The bursts do not resemble shrapnel air bursts in appearance, except as to color of smoke, and are liable to give a false impression thereof. No really satisfactory means has been found to stimulate a graze burst. If the range is such that the operating personnel can be seen, the students are distracted by their movements and can sense for range on the men or the pole. If targets are set behind a ridge so that the operating personnel are defiladed from the OP, sensing is frequently so difficult that the purpose of the instruction is largely defeated. A smoke puff range requires considerable personnel, time and material to install and operate, and its instructional value is rarely commensurate therewith.

The Board recommended the standardization of the various types of apparatus listed above with the understanding that the use of other apparatus would not be prohibited when and where the conditions are such that the instructor concerned believes that a non-standardized apparatus can be used to advantage.

The Chief of Field Artillery concurred in the recommendations of the Field Artillery Board and requested the Chief of Ordnance to discontinue the issue of smoke puff equipment and to take steps to provide for the issue of "Train Boards" or some equally satisfactory items to Field Artillery troops at the rate of one board per Headquarters Battery with the understanding that the boards would not be taken into the Theatre of Operations. Fifty-four "Train Boards" would be required to completely equip the entire Regular Army Field Artillery on this basis.

The materials required for the blackboard, dispersion scale, and axial terrain board referred to above can be improvised from materials available to troops.

Motor Repairs by the Field Artillery

The Field Artillery School has submitted to the Chief of Field Artillery a study on general questions of motor maintenance in

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the Field Artillery, advocating a material extension of the functions of the Field Artillery in repairing its motors.

Lecture on German Tactical Doctrines

Captain Anton Baron von Bechtolsheim, German Army, a student at The Field Artillery School, delivered a lecture to the instructors on November 25th. The subject was the general tactical doctrines of the German Army, and was ably and interestingly covered. This lecture is the first of several which will be given by the same officer on various subjects.

New Training Regulations

The Field Artillery Board has completed the writing or revision of the following training regulations which have been sent to the Office of the Chief of Field Artillery for approval:

- TR 430-15, Service of the Piece, 75mm Gun, M-1897
- TR 430-20, Service of the Piece, 75mm Gun, M-1916
- TR 430-25, Service of the Piece, 75mm Gun, M-1917
- TR 430-30, Service of the Piece, 155mm Gun, M-1917 and 1918
- TR 430-65, Service of the Piece, 155mm Howitzer
- TR 430-130, The Flash and Sound Battery

New President of the Field Artillery Board

Colonel Augustine McIntyre has been ordered to Fort Bragg, N. C., as President of the Field Artillery Board. Colonel McIntyre, prior to this assignment, was in command of the 13th F. A., Schofield Barracks, H. T. After returning to the United States via Suez he was placed on temporary duty in the Office of the Chief of Field Artillery in order that he might gain a personal knowledge of the work of the various sections in the Chief's office, particularly as regards their relations with the Field Artillery Board.

Devices for Improving Anti-Aircraft Machine Gun Fire

The Field Artillery Board has received an anti-aircraft pedestal machine gun mount for test with a view to devising a satisfactory mount for machine guns to defend marching columns against hostile aircraft. This test will run concurrently with one which seeks the solution of the problem of rapid release of teams from

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carriages upon air attack, both for the purpose to escape from concentrated fire and also to immobilize the carriages carrying machine guns which otherwise might be liable to movement through the animals taking fright from both friendly and hostile fire.

The 105mm Howitzer M1

This weapon has been continued in use by Battery F, 1st F. A. There has been firing on two occasions, for the purpose of testing the material and also certain ammunition. The material has functioned generally satisfactorily, with a few mechanical difficulties. The spades have been found inadequate, in the same general manner as reported by the F. A. Board. The modified long fuze T1E2 functioned somewhat unsatisfactorily in firing with zones II and III.

Oil Reclaimer

A Skinner oil reclaimer has been installed permanently at Fort Sill in the garage of the 3rd Ammunition Train, and is in regular operation. It handles all used crank case oil for that station and such additional amounts as may be shipped in from nearby stations. The capacity is five gallons an hour. The cost of the machine, with 260 filter pads, was \$1,417.00 delivered at Sill. About 1,900 gallons have been handled to date, with an average recovery of 80% of usable oil and 12% diluent. The reclaimed oil is being used by motor vehicles and appears satisfactory. A systematic test is being made on a group of GMC omnibusses, in order to determine the relative wear in using different grades of reclaimed oil, as well as new issue oil. The initial results should be available sometime during the coming summer. The results to date indicate that oil may be reclaimed at a cost of about 6 cents per gallon.

Field Artillery Tables of Organization

The Chief of Field Artillery has completed a draft of tables of organization for 75mm tractor-drawn units which will parallel as closely as possible the tables of organization for horse-drawn Field Artillery units. It will be sent to the Field Artillery Board and the Field Artillery School for comment prior to the preparation

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of the final draft which must go to the General Staff for approval.

Tables of organization for every element for the Field Artillery of the Infantry division have now been published and will soon be distributed to units concerned by the Adjutant General through Corps Area and Department Commanders. The Chief of Staff approved these tables on September 2, 1931.

Special tables of organization for the 24th Field Artillery in the Philippines were prepared last Spring in the Office of the Chief of Field Artillery. Under these regulations the 24th F. A. was re-organized as a 75mm tractor-drawn regiment (British 75's). The 1st Battalion was re-armed last Fall and the 2nd Battalion is now being re-armed, both with British 75's. It will be remembered that the 24th Field Artillery was formerly a pack outfit (2.95" Mountain Gun).

New Field Artillery Instructional Films

The camera work necessary for instructional film on the observation and conduct of fire is nearly completed at Fort Sill, a few additional shots of a firing battery still being needed. A number of still pictures of firing were taken at the same time, and will be used in connection with resident instruction by means of a projector. In a number of type firing problems being prepared half-tones of actual firing are being employed for illustrative purposes.

Fire from Staggered Gun Positions

A graphical method has been developed at the Field Artillery School for handling the tedious problem of distribution when shifting fire from guns in staggered positions, materially simplifying this matter.

War Department General Staff, 1932

Under date of December 12, 1931, the War Department announced the selection of twenty-three field officers from the various arms and services for duty on War Department General Staff next year. The officers were chosen from the present classes at the Army War College, the Army Industrial College, the Naval War College and various stations.

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Of those selected the following are Field Artillerymen:

Major Robert G. Kirkwood, now at Fort Benjamin Harrison, Ind.

Major John E. Hatch, now at Army War College.

Major John P. Lucas, now at Army War College.

Major Isaac Spaulding, now at Naval War College.

Field Artillery officers now serving on the War Department General Staff are listed on page 108 of this issue of THE FIELD ARTILLERY JOURNAL.

Panoramic Sight for French 75mm Guns

As previously stated in these notes the Field Artillery Board and the office of the Chief of Field Artillery are strongly in favor of providing a suitable mount for panoramic sights for the 75mm guns. The type E mount has been found to be unsatisfactory by the Field Artillery Board. Although considerable thought has been spent on this matter and exhaustive tests have been conducted, so far there has been no technically sound solution of the problem of putting the panoramic sight on the French 75mm gun. The Chief of Field Artillery recently requested the Ordnance Department to work out a solution which will be technically sound.

T2 and T3 Tests

Field tests of the 75mm gun, model M-1 mount on T2 and T3 carriages, which were described in detail in the May-June and July-August, 1930, numbers of THE FIELD ARTILLERY JOURNAL, have neared completion. Enough has been learned about these two types for the Chief of Field Artillery to come to definite conclusions on the matter of all-purpose light artillery weapons. The Chief of Field Artillery has recommended that an all-purpose gun similar to the T2 and T3 be designed by the Ordnance Department which, although containing most of the features of these weapons, will have more mobility. It was recommended that the new type be reduced in weight in order that it could be run by hand up a 5° slope by a gun crew of seven men and that it could be emplaced on rough ground without special preparation.