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THE FIELD ARTILLERY MINIATURE BATTERY

THE FIELD ARTILLERY JOURNAL

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THE FIELD ARTILLERY MINIATURE GUN

THE primary qualification of an artillery officer is his ability to conduct the fire of a battery. That ability comes from experience in actual firing of service ammunition, and this fact is recognized by an annual allowance of ammunition.

However, on the meager allowance authorized there is little chance that a young officer will get over his sensation of the newness of it all before his annual allowance is gone, and with it his confidence that he is a qualified artilleryman. For years Major General Bishop, Chief of Field Artillery has worked with training devices in the service, designed to instruct officers in firing. It has been his experience that, except for the 37mm, the value of sub-caliber practice is doubtful, and the training allowances are quite limited even in that. Terrain boards, smoke bomb and sand tables have some value, but they lack the realism necessary to prepare a young officer to step up to the firing point with confidence, or to keep the older officer's hand in. He had in mind for some time a miniature battery that would really shoot, but could be set up, used and put away again, with a maximum of instructional value, and with none of the elaborate preparations necessary for smoke bomb.

A report from Captain Victor A. Dash, instructor with the Wisconsin National Guard upon a miniature battery in which rubber bands were used as propellants struck a responsive chord. At General Bishop's request the Ordnance Department started extensive investigations "to provide a miniature battery of four projectors which could throw small projectiles along a trajectory approximately 1/100 of that of a standard service gun; the projector to be mounted on a carriage susceptible of setting the projector for deflection, angle of site, and range or elevation." After determining that a one inch ball bearing was about the size of projectile to give a suitable impact, a means of propulsion

was investigated. Rubber bands, steel springs, compressed air and powder were all tried out. The .22 caliber blank was hit upon as the most satisfactory and it was later found that sufficient uniformity could be secured from commercial blanks. After investigation in shapes of projectiles, ordinary ball bearings were decided upon as satisfactory.

About this time General Bishop was taken sick and spent some time in Walter Reed Hospital. Apparently, this was the opportunity he had been waiting for. He pencilled off one design after another until he had a mount sketched that would take this one-inch tube with a .22 caliber rifle breech, and could be laid with a panoramic sight, and a quadrant or a range scale.

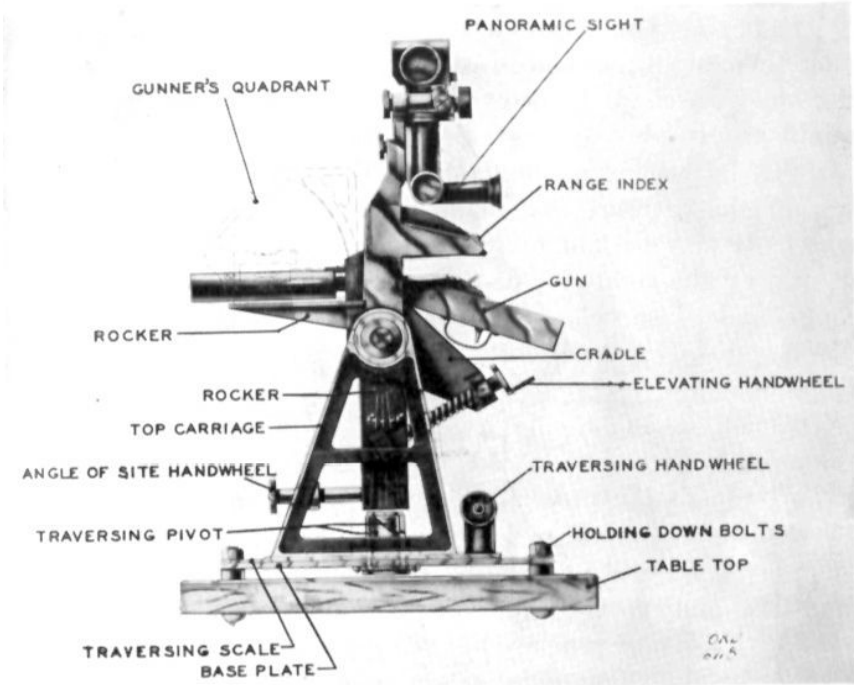
Following out his suggestions two Ordnance Engineers, Mr. T. A. Conlon and Mr. D. A. Gurney drew up the detailed designs, insured the lightness, balance and smooth working of the various parts and presented the drawings for manufacture of a pilot battery.

In the meanwhile, it became quite evident that the Fiscal Year 1934 would see a very severe reduction in ammunition allowances. The Ordnance Department rushed through the manufacture of a battery of four miniature guns in less than ten days in April 1933 and the battery was sent to the Field Artillery Board for test.

In this test the Board concluded that "the miniature gun will have a definite value for preliminary instruction in the technique of conduct of fire," and recommended that with the certain modifications needed, it be adopted as a standard training device.

A second battery was built incorporating the changes recommended, and having been pronounced satisfactory by the Board the projects of manufacture of one for each regular army battery, one for each Field Artillery ROTC unit and a number for National Guard Field Artillery organizations were set up. However, the axe of economy had hit with such force that it was some time before the relatively small amounts could be found for these projects. Money for the purpose having been allocated, the War Department approved the projects and it can be anticipated that a number of these miniature batteries will be manufactured and issued in the near future.

Instructions for the use of this device were drawn up by the Field Artillery Board and tested out by the battalion of the 16th Field Artillery stationed at Fort Myer. These instructions will be issued in the form of tentative training regulations.



NOMENCLATURE OF THE MINIATURE GUN

DESCRIPTION OF THE MATERIEL

As may be seen in the pictures herewith the miniature gun consists of a one-inch barrel to which the breech of a .22 caliber rifle is attached. The seating of the projectile is regulated by a brass sleeve inserted in the barrel. By using spacers of different length any desired density of loading and consequent muzzle velocity can be secured—the longer the spacer, the less the muzzle velocity. A wing nut secures the barrel in position. By loosening this wing nut and screwing the barrel in or out, small variations in muzzle velocity may be made which permit calibration of the guns in a battery. The longest spacer, which seats the projectile just inside the muzzle provides a trajectory

which is 1/100 of that of the 75mm gun M1897, of the outer zone of the 75mm howitzer M1, Zone V of the 240mm How and Zone V of the 155mm howitzer M1918. The other spacers permit the same reduction of 1/100 to be applied to the outer zone of the howitzers and to the 155mm gun.

The barrel is mounted in a carriage which has a seat for the panoramic sight and permits 45° traverse, by use of the traversing hand-wheel. It is also trunnioned to permit elevations from minus ten to plus 45 degrees elevation. The gun may be laid for site, by placing a gunners' quadrant on the seat on the left side of the carriage and manipulating the angle of site hand-wheel. It may be laid for elevation by placing the quadrant on its seat on the right side of the carriage, or for range using the range scale just below the eye-piece of the panoramic sight. An elevating hand-wheel is provided for moving the gun in elevation.

To load, a ball bearing is inserted in the muzzle and seated against the spacer by use of a small rammer. After the cannoneer, who loads the projectile, is clear of the muzzle, a blank is inserted in the breech, and the breech block closed.

Since the propellant is black powder it is necessary to clean the barrel and spacer frequently. Cleaning brushes for one inch and .22 caliber are provided for this purpose.

USE OF THE BATTERY

It is intended that the miniature battery be used at any place where a range of about 100 yards is obtainable. The impact area should be skinned so that the impacts of the ball bearings will be visible, through kicking up dust, simulating a shell burst.

The "normal interval" of 20 yards between guns is 7.2 inches on the reduced scale of 1/100. Angle irons for a platform are provided with holes for bolting the guns in battery. These holes are spaced at intervals of 3.6 inches which permits the guns to be staggered laterally at any multiple of (1/100 of) ten yards.

Since the gun is trunnioned some 10 inches above the base, which would correspond to an elevation of 1000 inches or 83 feet, the battery should be emplaced in a small trench so that the trunnions are just above the ground, with space provided for

the loader to pass in front, insert and ram the projectile, and for the gunners to be able to take a comfortable position for operating the guns.

The officer conducting fire should either be in a depression or in a prone position. Using field glasses he can observe the impacts and conduct fire, from either an axial or lateral observing post.

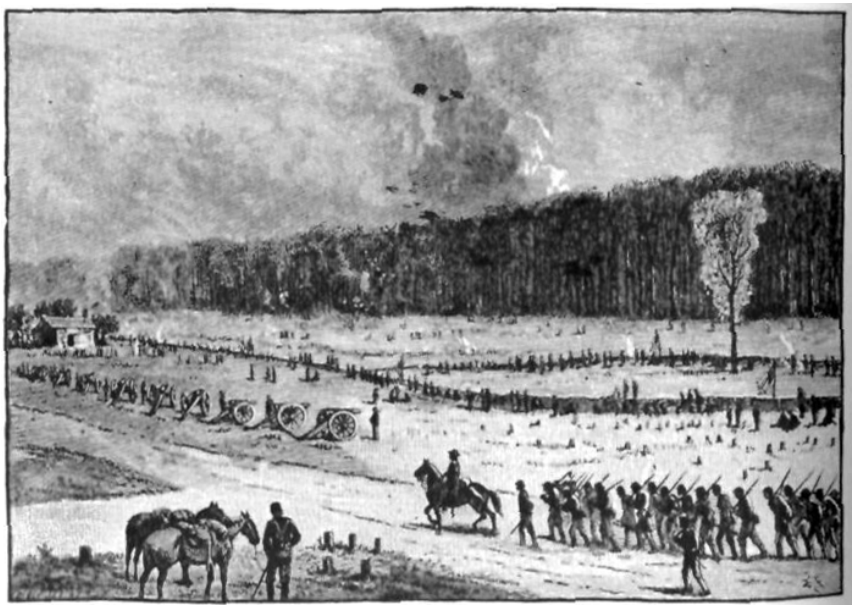
Field Artillery officers who have conducted fire with the miniature batteries have been impressed with its possibilities for the purpose for which intended. There is no question as to the necessity for practice with service ammunition at service ranges in the training of artillery officers.

There is also no question as to the real economy in so doing. There is a stock of ammunition in war reserve. It has a limited life before deterioration sets in. The money appropriated for training allowances is really used for manufacture of new ammunition, or for a certain amount of renovation where this is possible, and an equivalent number of rounds is withdrawn from war reserve for service practice. Assume that the life of a round of ammunition is thirty years. Unless enough money is appropriated for one-thirtieth of the war reserve each year, the ammunition will deteriorate more rapidly than it is fired in service practice, and sooner or later it will have to be destroyed as dangerous. It then serves no purpose in training and is a total loss. General Bishop has emphasized this point and has repeatedly stated that "nothing can take the place of service practice with live ammunition in the training of field artillery." However, that training should be much more valuable if the officers, through use of miniature batteries have mastered the technique of adjustment.

Much has been done in developing methods for fire direction, and methods in fire for effect. Due to the relatively large amounts of ammunition required for these phases of handling artillery fire, the actual trying out on the ground is very limited. It is believed that much good use will be made of miniature batteries for these purposes.

The underlying purpose of General Bishop in pushing the development of the miniature gun and battery was not to make

reduction of training allowances possible but to get the maximum value from the meager allowance through proper preparation. While the use of training devices is not new, he hoped to get one that would require a minimum of difficulties of installation and of operation and enough realism to hold attention and interest. Apparently he has accomplished his purpose in a way that will have an appreciable result in better qualified field artillery officers.



THE UNITED STATES FIELD ARTILLERY ASSOCIATION

In compliance with Article VII, Section I, of the constitution, notice is hereby given that the Executive Council has fixed 4.30 P. M. Thursday, December 14, 1933, as the time of the annual meeting of the Association to be held at the Army and Navy Club, Washington, D. C.

The business to be disposed of will be the election of eight members of the Executive Council. Of these, four are to be elected from the Regular Army, two from the Organized Militia (National Guard) and two from the Field Artillery Section of the Officers' Reserve Corps.

Section I, Article VI, of the constitution reads as follows:

"The Executive Council shall be composed of nine active members, five of whom shall be officers of the Regular Army, two officers of the organized Militia and two officers of the Field Artillery Section of the Officers' Reserve Corps, to be elected biennially for a term of two years by a majority vote in person or by written proxy of the active members."

The members of the Executive Council whose two-year terms expire this December are the following:

Major General Harry G. Bishop, U. S. Army

Brigadier General Allison Owen, Louisiana National Guard

Colonel Charles D. Herron, U. S. Army

Colonel Augustine McIntyre, U. S. Army

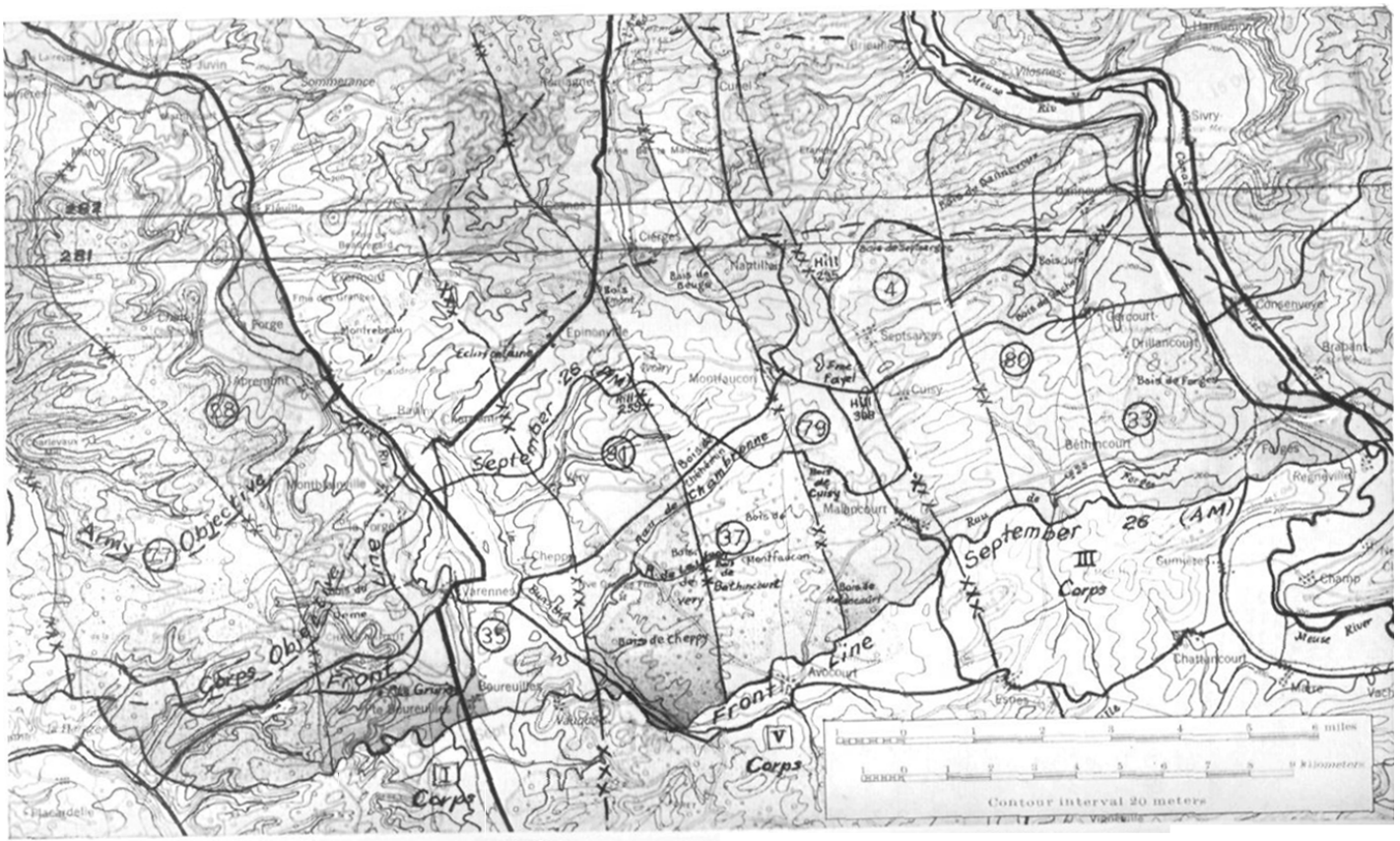
Colonel Stephen Elliott, Pennslyvania National Guard

Colonel Leroy W. Herron, Reserve Corps

Colonel Paul V. McNutt, Reserve Corps

Lieutenant Colonel Robert M. Danford, U. S. Army

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



MAP SHOWING: FRONT LINES, SEPTEMBER 26 (AM) AND SEPTEMBER 26 (PM) (INDICATED THROUGHOUT BY WHITE ARROWS); BOUNDARIES BETWEEN CORPS AND DIVISIONS: CORPS OBJECTIVE: ARMY OBJECTIVE

SUPPORTING AN INFANTRY DIVISION

BY COLONEL CONRAD H. LANZA, FIELD ARTILLERY

THE MISSION

ON the night of September 28-29, 1918, the 35th Division occupied the zone of action bounded on the west, roughly by the Aire River, and on the east by a line 1 kilometer west of Tronsol Fme—Very (excl). The command post was at Baulny; that of its 60th Field Artillery Brigade at la Hobette Fme., south of Charpentry.* The location of the front line was not exactly known at these command posts, but was believed to be beyond the north edge of the Montrebeau woods. Liaison within the artillery was by telephone; within the infantry by messenger, without precise knowledge of the whereabouts of commanding officers.

Since September 26th, the 35th Division had been heavily engaged, having made attacks daily. Some of the battle losses during this period were:

Organizations	*Killed*	*Wounded*	*Total*
137th Infantry	155	654	819
138th "	161	651	812
139th "	175	690	865
140th "	218	808	1026
128th MG Battalion	8	27	35
129th "	23	99	122
130th "	9	76	85
110th Engineers	18	90	108
128th Field Artillery	1	6	7
129th "	2	15	17
130th "	0	0	0

No figures are available as to men absent sick, nor as to straggling, but there were many missing for these reasons.

During the 28th, General Pershing had visited the 35th Division command post. It was explained to him that the position of the front line was not definitely known, that losses had been severe, that units were mixed, that the enemy was making a strong resistance, and that the troops were worn out. When the General left, it was understood that on the next day, the 29th, there would be no formal attack, but only an advance without regard to objectives. There had been a difference of opinion within the Division, as to whether there should be any advance, or attack, on this day. The artillery commander, Brigadier

*At south exit of Charpentry.

General Lucien G. Berry, was opposed to it, expressing the opinion that the infantry was not sufficiently organized to go ahead. The division chief of staff was of the contrary opinion. The division commander, Major General Peter E. Traub, decided that under his orders, there would have to be some advance.

A field order was consequently issued at 10.00 P.M. on the 28th, directing an attack without objectives, by brigades abreast, in columns of regiments. As the brigades were mixed in their positions on the field, the formation and missions ordered were:

Right Brigade, Colonel Kirby Walker, commanding.

138th Infantry, leading	)	Mission: to attack from
129th Machine Gun Battalion	)	Exermont, inclusive, and
140th Infantry	)	east thereof.
1 battalion, 110th Engineers		In division reserve.

Left Brigade, Colonel L. M. Nuttman, commanding.

137th Infantry, leading	)	Mission: to attack from
130th Machine Gun Battalion	)	Exermont, exclusive, and
139th Infantry	)	west thereof.
1 battalion, 110th Engineers		In division reserve.

Both columns were to attack at 5.30 A.M., with two battalions and two machine gun companies in the front line, and with one battalion and a machine gun company in support. Each brigade covered a front of approximately 1500 meters. In addition to the duties prescribed above, the 110th Engineers with the 128th Machine Gun Battalion, were to prepare the ridge extending north-east from Baulny for defense.

The duties of the artillery were:

a. a rolling barrage, to start 100 meters south of Exermont, then to advance 100 meters each 4 minutes, to a line 1,000 meters north of Exermont.
b. a standing barrage by 155mm howitzers on a line 1,000 meters north of Exermont, to start at 5.30 A. M., and to lift when the rolling barrage arrived on this line.
c. 155mm concentrations on Chatel, and heights northwest of that town, to start upon completion of b.

The 60th Field Artillery Brigade, reenforced, was disposed as follows:

128th Field Artillery	75mm guns	1 bn just north of Very; 1 bn on Charpentry-Eclisfontaine road.
129th Field Artillery	75mm guns	1 bn near Charpentry; 1 bn between Charpentry and Cheppy.
130th Field Artillery	155mm how	near Varennes.
219th French Artillery	75mm porté	1 bn just east of Charpentry; 2 bns in adjacent positions.
317th French Artillery	155mm how	3 bns southwest of Cheppy.
451st French Artillery	105mm guns	2 bns northeast of Boureuilles (short of ammunition).

This gave a total of:

60	75mm guns
60	155mm howitzers
24	105mm guns
144	pieces in all.

As the Division covered about 3000 meters front, this gave one gun for every 21 meters. If deployed in one line, the artillery would have about covered the front with guns at normal intervals The observation posts were along the ridge extending northeast from Baulny through Chaudron Fme., and along the bluffs overlooking the Aire valley. Communication with the front line was irregularly maintained according to circumstances.

The 35th Division was the right division of three which composed the I Corps. The corps artillery consisted of:

59th Coast Artillery	24	8″ howitzers
1st and 5th Bns, 23rd French Artillery	12	280mm mortars
4th Bn, 292nd French Artillery	8	220mm TR guns
Total	44	heavy pieces

These batteries were south of Varennes. The First Army Artillery had in position, guns covering the front of the 35th Division, as follows:

60th Coast Artillery	24	155mm GPF guns
86th French Artillery	24	155mm GPF guns
4 batteries, 91st French Artillery	16	155mm GPF guns
5th & 18th batteries, French Navy	3	16cm guns
31st Coast Artillery Brigade (railroad)	2	305mm guns, and
	2	340mm guns
Total	71	heavy long range pieces

A few batteries were in front of Varennes, the balance in rear of that town.

At 11.00 P.M., on the 28th, the I Corps, issued a field order, covering the attack for the following morning. It was similar to the division order issued an hour earlier, except that it ordered two accompanying guns to be attached to each leading infantry battalion, and directed the corps artillery to counter-battery, and later to advance.

PREPARATION

The 35th Division did not receive the corps attack order until long after their own order had issued. They had been advised by telephone as to certain features which would be in the corps

order, and these had been inserted in the division field order. Requirements as to accompanying guns had not been included in the advance information, and the Division did not now require it.

The 60th Field Artillery Brigade promptly made the usual preparations for firing the program prescribed. Missions and assignments were:

Missions	*Start of*	*Stop at*	*Assignments*
Rolling barrage	5.30 AM	6.22 AM	128th FA (75mm guns)
Standing barrage	5.30 AM	6.10 AM	130th FA (155mm how)
Concentrations near Chatel	6.20 AM	on order	130th FA (155mm how)
Counter-battery, right front	5.30 AM	on order	451st Fr Art (105mm guns)
General Support	when ordered		129th FA (75mm guns)
"	"		219th Fr Art (75mm portée)
"	"		317th Fr Art (155mm how)

As the rolling barrage was ordered by the Division to start 100 meters south of Exermont, and roll to 1000 meters beyond, and as the depth of Exermont was 200 meters, the total distance to roll was 1300 meters. At 4 minutes per 100 meters, 52 minutes were necessary for this barrage, or until 6.22 A.M., as above. The brigade selected coordinate 80.6, as the line 100 meters south of Exermont, and this line was to be covered from 01.5 to 04.5, or three kilometers. The 1st Battalion, 128th Field Artillery was assigned the east half; the 2nd Battalion the west half. Each battery received a 500 meter front to cover.

The targets assigned to the 451st French Artillery were supposed locations of hostile batteries suspected of having shelled the command post of the 91st Division, which had the zone of action east of the 35th Division. The Corps Artillery provided a moderate program of fire against locations suspected of containing enemy batteries within the Corps zone of action. The Army Artillery had been prohibited by the Army from firing into any Corps zone of action without the consent of the corps. It offered its service during the night of September 28-29 but no request for fire was sent to it.

About 2.00 A.M. on the 29th, the division commander, sent a letter to his artillery commander, stating that Lieut. Colonel Ristine, 139th Infantry, missing since the 27th, had just reported to him, explaining that he had been cut off by the Germans, and after hiding two days, had now escaped from their lines. He

brought the information that German 77mm guns, and machine guns, were posted along the Aire River, and that the Germans were everywhere in retreat. The division commander directed "imperatively" that as many 75mm guns as could be supplied with ammunition be sent forward to meet this situation. At 3.30 A.M., General Berry replied by indorsement, stating that although he did not have much confidence in the report of the officer mentioned, he would carefully study and comply with the orders received. There were standing orders from the Corps prohibiting artillery commanders from firing outside of their own zones of action. But General Berry considered the division commander's instructions warranted him to fire across the Aire valley, into the zone of the 28th Division, and from this time on, did so, as occasion demanded, without asking for further authority.

The infantry preparations for the attack did not proceed smoothly. Due to ignorance as to location of command posts, and the difficulty of finding them at night, it took 2¾ hours, or until 12.45 A.M., to deliver the Division field order to the right brigade. It took two more hours, or until 2.55 A.M., for this brigade, to then issue its field order. It required almost four additional hours, or until 6.45 A.M., to deliver this order directing an attack at 5.30 A.M., to the command post of what was to be the leading regiment. The left brigade did better. Its attack regiment received the Brigade field order at 4.20 A.M.

THE ATTACK

The 137th Infantry was the leading regiment of the left brigade. It was scattered in great depth. The regimental commander had his front on the north edge of the Montrebeau woods. He had made no preparations to attack, prior to the receipt of the order to do so. In the dark, among dense woods, and in unknown country, orders had to be issued to the scattered men individually. They were asleep, many were back of the edge of the woods and could not be found. At 5.30 A.M., zero hour, there were formed for attack, under the regimental executive,

100 men in one line at 10 paces interval, covering about 1,000 meters, center approximately at 01.4-79.7. This line had two automatic rifles.

12 men	6 on each flank, as combat patrols.
25 men	in rear, as battalion reserve.

At 5.30 A.M., the artillery opened fire. The barrage fell at the rate of two rounds per gun per minute. On an average it was about 900 meters in front of the infantry line. From where the infantry were, 8 rounds per minute per 500 meters front, did not look like a "barrage," and it failed of recognition. It was believed to be harassing fire. In accordance with custom, the barrage started a few minutes before schedule time, to permit a line up in rear of it. But due to its distance, and non-recognition, the infantry did not at once advance. The first bound of the barrage, caused it to fall in the Exermont ravine, disappearing over the crest and out of the view of the infantry.

Finding no assistance from the artillery, the commander of the attack, started it forward. It was 5.40 A.M., and still night. Fire was at once received from hostile forces only 300 meters away. For ten minutes there was an exchange of fire, when the enemy withdrew, leaving three prisoners. It was ascertained that the opposition had been from an outpost. About 6.10 A.M., the advance was resumed. After passing over 300 meters, hostile infantry fire was received from the right front. This was the cause of another delay, while the right of the attacking line swung around toward the threatened flank. About 6.30 A.M., the enemy again withdrew. In accordance with the prescribed program, our artillery had now stopped, with the exception of certain missions outside of the division zone of action. It was misty, but it was full daylight, and visibility was good to fair. Enemy artillery began to put down barrages, and hostile machine guns from north of the Exermont ravine came into action. About 6.45 A.M., a new advance was started, and not meeting any enemy directly, the line, by crawling, reached the south edge of the Exermont ravine along about 7.15 A.M. Here it met most severe opposition; it never was able to go further.

During this time, the 137th Infantry had found some 100 more men in the woods. They were led forward to reenforce the firing line at 6.15 A.M., but were stopped at 6.30 A.M., after an advance of 300 meters, by artillery and machine gun

fire from both the front and the left. Under this fire the men lay down. Nothing being done, the men individually decided that it was useless to remain where they were, and quietly, without orders and without panic, slowly retired to the protection of the woods from where they had just come. Efforts of officers to stop this movement were unavailing. The infantry made no reports of these events either to the artillery, or to higher headquarters, nor did they report any enemy targets.

The men who had reached the edge of the Exermont ravine saw the failure of the attempt to assist them. They themselves began to withdraw. By 8.00 A.M., all that were left were back in the Montrebeau woods. A message was now sent in by the regimental executive that he had received destructive machine gun fire from northwest of Exermont. He did not give any coordinates.

The commander of the right brigade, after issuing his field order for the attack, went to the front. He found the 140th Infantry in the front line, but could not find the 138th Infantry. Expecting that this regiment would appear at the proper time, it was waited for. The barrage fell at 5.30 A.M., as it did on the left. It rolled forward as ordered, and expired by reason of expiration of schedule, without anything having been seen of the 138th Infantry. The brigade commander then directed the 140th Infantry, to attack from the north edge of the Montrebeau woods. This regiment had expected to be in support, and had made some preparations for that purpose. Due to the fact that the men were scattered and concealed within the woods, the process of finding them and organizing them had not been completed, when the order to attack without further delay was received.

There being no direct liaison either with Division headquarters or with the artillery, no artillery support was had. At about 7.00 A.M., the 140th started forward. As soon as it left the woods, it received a very severe shelling. The attack broke down, having made no appreciable progress.

An hour later, the brigade commander, personally directing operations at the front, and believing that the 138th Infantry was surely about to arrive, directed that a new attack be launched

with the 140th Infantry; together with the 138th Infantry, less one battalion in brigade reserve. But as the 138th was still absent, the 140th was ordered to advance alone, without waiting for the missing troops. It was 8.15 A.M., and still there was no artillery support. This attack had some success. Notwithstanding hostile artillery fire, and resistance from entrenched enemy, partially protected by uncut wire, and despite heavy losses, the 140th captured the trenches south of Exermont about 9.00 A.M. A half hour later, the remnants of the regiment, reduced to about 100 men, entered Exermont.

Two companies of the 139th Infantry, had been mixed in with the 140th in the Montrebeau woods. They were led forward and about 10.00 A.M., a few of their men arrived in Exermont. The balance of the battalion of the 139th to which these two companies belonged dug in on the right front of the Montrebeau woods. They were assisted forward by a group of Corps tanks, which then went on in to Exermont, and helped to secure that town.

The troops which advanced out of the Montrebeau woods were subjected to severe artillery fire from west of the Aire River. This fire gave the troops the impression that it was an artillery preparation for a counter-attack. As the fire came from the left, it was assumed at Division headquarters, which could observe this fire, that a counter-attack would come from this direction. As early as 8.00 A.M., the division reserve, consisting of one battalion, 110th Engineers, together with the 129th Machine Gun Battalion, were being placed in line near the left of the Montrebeau woods to meet this. At the same time the artillery brigade was ordered to pay particular attention to the enemy on this flank, and above all to counter-battery. The I Corps was advised of the situation, and informed that the division artillery although repeatedly ordered to counter-battery, had obviously failed to fully comply with instructions, as the enemy artillery was firing heavily. The division commander, being then anxious as to the situation, and not having received any information from the front, at 8.15 A.M., left his CP, and proceeded towards the front, to observe and to personally give necessary instructions. After his departure, the I Corps at 8.40 A.M. authorized the

relief of the artillery commander of the 60th Field Artillery Brigade, if in fact it appeared that he was not giving full support. An inspector was also sent at once to visit the 60th Field Artillery Brigade. Although the inspector was personally unfriendly to General Berry, he found that there was nothing to criticize in his actions as a field artillery officer, and no action as to relief was taken.

Let us turn to the 138th Infantry, long missing from where it was expected. On this morning its leading battalion was just east of Division headquarters at Baulny, and the remainder of the regiment was in the vicinity of Charpentry. As already stated, the brigade field order was not received until 6.45 A.M. It took two hours to issue the regimental field order, distribute it, and form the troops for the advance. About 8.45 A.M., the 2nd Battalion, leading, started over the open ground east of Baulny, in its three kilometers approach march to the front line. It immediately received severe artillery fire from gas shells. As the troops could see high ground near Chatel, known to be in possession of the enemy, they assumed that the hostile fire was controlled from there, and a report to that effect was sent to the artillery, demanding assistance.

About 9.30 A.M., the 138th Infantry was approaching the front in attack formation. The 2nd Battalion (250 men present) was on the left; the 3rd Battalion (421 men) on the right; and the 1st Battalion (182 men) was in support in rear of the left. Instead of being on the right of the Division zone, the regiment was on the extreme left, and was about to move around the west end of the Montrebeau woods, in plain view of the high ground across the Aire. The commander of the left brigade, observing the movement, deflected the advance through the Montrebeau woods. The leading battalions here became separated. The left, 2nd Battalion, proceeded nearly due north, and at about 10.30 A.M., reached the edge of the woods. After reforming, they attacked about 11.00 A.M. They received severe shell and machine gun fire, from both the front and left, but the battalion progressed slowly, and at 12.00 Noon, reached the south edge of the Exermont ravine, where it stopped. A group of 8 tanks had been waiting in the Aire valley to support the 138th Infantry.

The change in direction made in its attack resulted in the tanks failing to locate the regiment, while the regiment failed to find the tanks. The latter made no attempt to advance. The right, 3rd, Battalion of the 138th, marched to the extreme northeast edge of the woods, where it arrived about 11.00 A.M. Soon after it started forward, but swung around until it faced nearly east, and at 12.00 Noon, came to a halt under severe fire from the east and north, about 1 kilometer west of the Bois Communal de Baulny.

About 10.00 A.M., the division commander, reached the north edge of the Montrebeau woods. He successively found his two infantry brigade commanders, and was informed that our men held the south edge of the Exermont ravine. He noted conditions, and particularly the severe artillery fire of the enemy. He received reports of the arrival of the 138th Infantry, and that it could muster only 853 men out of over 4,000. At a dressing station he found over 300 wounded. By 11.00 A.M., the entire area of the Montrebeau woods, was under severe fire from heavy artillery, as was also the foreground. He could locate no reserves, or bodies of men capable of taking offensive action. Under these circumstances, and under the advice of both the brigade commanders, the division commander at 11.00 A.M. decided that it was impracticable to maintain the present front. He ordered the line withdrawn at 1.00 P.M. from the Exermont ravine to the north edge of the Montrebeau woods under cover of an artillery barrage, and sent an officer forward to Exermont with necessary instructions to this effect, and sent a message to the artillery as to the barrage. He instructed the brigade commanders to further withdraw the line at dusk to the ridge line, extending northeast and southwest through Chaudron Fme, and sent a message to the 110th Engineers to lay out this line. He verbally explained to the First Army liaison officer who was present, that this would be a defensive position, to enable the main body of the troops to assemble in rear of Charpentry for reorganization, and a subsequent advance. To the I Corps, he sent the following message at 11.15 A. M.:

"Regret to report that this division cannot advance beyond crest south of Exermont. It is thoroughly disorganized, through

loss of officers and many casualties, for which can not give estimate, owing to intermingling of units. Recommend it be withdrawn for reorganization, and be replaced promptly by other troops in order that the advance may be continued."
The intent to withdraw was not reported to the Corps. The division commander then started back to his CP at Baulny.

We will now describe what the supporting artillery knew, and did, about the events related. Near the artillery CP, was that of the Corps Cavalry, which had the 2nd Squadron, 2nd Cavalry patrolling through the zone of the 35th Division. The tank commander also had his CP in the vicinity, as had the 138th Infantry until it moved forward.

Until 6.30 A.M., action was limited to firing the schedule prepared in advance to support the attack. Commencing at this time, the OPs reported a large amount of firing by hostile artillery, mostly from west of the Aire, and high ground, supposed to be hostile observation posts were shelled. Efforts were made, but with no success, to locate hostile batteries. No information of importance was received until 8.00 A. M., after which hour the following was received.

8.00 A. M. The Division CP advised that the enemy was counter-attacking in rear of our left flank, and that a battalion of engineers had gone forward to meet it. Counter-battery was urged against enemy artillery firing heavily, supposedly in connection with this counter-attack.

The artillery brigade opened fire on targets across the Aire. These were only map locations, as the OPs could see no enemy. The OPs thereafter kept on reporting that the enemy artillery fire was increasing, instead of decreasing as hoped. It was consequently apparent, that the locations fired at could not be batteries, and thereafter although a few problems were fired, not much was done on counter-battery, through inability to find the enemy artillery.

8.30 A. M. OPs reported heavy barrage falling at cross roads 2578 (700 meters northeast of Baulny).

8.45 A. M. A message from the commanding officer Troop F, 2nd Cavalry, dated 8.15 A. M., at north edge Montrebeau woods arrived stating: "Our line is at the north edge of

the Montrebeau woods. Condition very serious. 137th Infantry advanced over hill toward Exermont, were driven back, heavy casualties. Lieutenant reports badly disorganized. 139th with one of its battalions is digging in on right flank of woods. Counter-attack is expected. Need more artillery support. All men seem to be on the line fighting."

9.20 A. M. Division CP advised: "Reports from cavalry patrols say 137th Infantry driven back from beyond Montrebeau woods. Enemy counter-attacking on our left flank. Need artillery support beyond, and to left, of Montrebeau woods. Heavy casualties from flanking fire of artillery and machine guns from left across the river. American troops advancing on the left in direction of Apremont."

Renewed attempts were made to subdue the enemy fire coming from the left. These attempts had no better success than those made earlier. The OPs were instructed to locate the counter-attack, but saw nothing. Fire was not directed straight to the front, due to uncertainty as to the position of the front line. As no objectives had been given to the infantry, it was believed that some of the infantry might have made considerable progress. Also all demands for fire related to the left front.

10.00 A. M. OPs reported that the enemy was severely shelling Baulny, and the high ground just to the north, which was occupied by the 128th Machine Gun Battalion, and one battalion of the 139th Infantry. The enemy fire seemed to come from over Chatel Chehery.

10.15 A. M. A message arrived from the commander of the right brigade, hour of sending and location not given, stating that troops on both flanks seemed to be withdrawing, that the troops were badly disorganized and mixed, and that there were many casualties from artillery and machine gun fire.

10.15 A. M. The 128th Machine Gun Battalion reported from north of Baulny that the enemy was threatening the left, now almost unprotected.

10.15 A. M. OPs reported intense shelling by enemy of high ground northeast of Baulny, apparently by batteries west of Apremont. They were unable to locate any targets.

10.30 A. M. A message from a brigade CP at Chaudron Fme, dated 10.04 A. M., arrived, stating that the enemy was heavily shelling the reverse slope of hill 224* and recommending

*Hill 224 is at the north center of the Montrebeau woods.

heaviest fire possible on Exermont and northwest, no fire to be delivered short of woods on hill 224. Suggested that the enemy batteries be located by the Air Service.

Fire was not delivered as indicated in this latest message. Hill 224 was just beyond the Montrebeau woods, which occupied the reverse slope of this hill. It was almost certain that this area was occupied by our men, and being shelled by the enemy for this reason.

10.45 A. M. A message from the 137th Infantry arrived, dated 10.10 A. M., location not given, reporting no reserves left, and only three squads left in one of their battalions; stated the 140th Infantry had very heavy casualties.

11.25 A. M. A cavalry officer arrived reporting that he had just returned from a patrol north of Montrebeau woods. He stated that parts of the line had advanced about 400 yards during the morning, and had since been alternately advancing and retiring. He reported that heavy machine gun fire was being received from the Fme des Granges, and heavy artillery fire from the direction of Cornay. He had noted the 139th Infantry, and considered them badly disorganized, stupefied, terrified and inactive. At 10.15 A. M. he had observed the heavy shelling of a battalion of engineers which was advancing toward the Montrebeau woods.

12.00 Noon. The OP near Chaudron Fme reported it was being heavily shelled, and that buildings there were crowded with wounded.

12.05 P. M. The right brigade, from its CP at Chaudron Fme, requested heaviest support possible by shelling Exermont and hill beyond to the northwest. Also stated that troops were falling back through Chaudron Fme, and that they were going to take up a position on the ridge just south.

12.07 P. M. The right brigade, from its CP at Chaudron Fme, announced: "A battalion of the 139th has gone beyond Exermont. Do not fire beyond Exermont. They are going to be withdrawn."

12.30 P. M. The instructions of the division commander as to the withdrawal of the line from the Exermont ravine at 1.00 P. M., to the north edge of the Montrebeau woods, under cover of a barrage, were received.

This barrage was prepared, and was duly fired at the prescribed hour by both 75mm guns, and 155mm howitzers. It was a standing barrage, covering the north slopes of the Exermont ravine.

THE COUNTER-ATTACK

Around 10.30 A.M., German infantry commenced to encircle Exermont from the north and east. The terrain assisted this movement. They were aided by artillery fire, which shelled the town, causing numerous casualties. Proceeding slowly, advancing carefully under cover, the enemy had succeeded by 12.00 Noon, in securing a foothold in the village, and had surrounded it except on the south. They shot down one tank within the town. The tank commander noting this, and having had two other tanks disappear, then withdrew the 8 remaining ones. Seeing no reenforcements arriving, and no reply having been received to messages sent reporting the situation, the local commander, Lieut Colonel Delaplane, ordered his men to withdraw to the Montrebeau woods.

This movement started in fair order. After it had commenced, the officer who had been sent by the division commander with instructions to direct a withdrawal to start at 1.00 P. M., under cover of an artillery barrage, arrived and delivered his message. It was too late, the withdrawal was already under way, and could not be changed. The troops withdrawing were harassed by enemy machine guns and artillery fire. The men arrived at the Montrebeau woods before 1.00 P.M., with the enemy close behind them. At this hour the artillery barrage came down on the far side of the Exermont ravine.

On the other flank, at about 12.00 Noon, the troops of the 138th Infantry, along the south edge of the Exermont ravine were also attacked by enemy infantry, nearly all armed with machine guns or automatic rifles. The 138th received severe enfilade machine gun and artillery fire from the west. The line gave way without orders, and by 1.00 P.M. was back in the Montrebeau woods, with German infantry following and threatening to envelop their left.

Due to the thinness of the lines, the men were difficult to

control, and the few officers present were unable to make their commands understood, in all the terrific din, and the constant shelling, of battle. Some of the men, through ignorance, or otherwise, failed to stop at the Montrebeau woods, but kept on south. As they went, they communicated their retrograde movement to men within the woods. Gaps resulted in the line on the north edge.

About 2.00 P. M., by crawling, the Germans began to enter the Montrebeau woods. They worked to the right and left, and were followed by others. With no organized opposition, by 3.00 P. M., they had commenced to build an infantry line on the south edge of the woods, while American infantry was still holding parts of the north edge. German planes were flying at this time quite freely, apparently directing artillery fire, and identifying their own front line.

About 3.00 P. M., on hostile machine gun fire being opened from the south edge of the Montrebeau woods, there was a general withdrawal of men from these woods, to the cover of the ridge through Chaudron Fme. It was at once met by a terrific artillery shelling directed on these men retiring through the open fields. The OPs on the ridge, taking the fire as an artillery preparation, and the retiring men in view approaching their position as routed troops, or possibly enemy infantry, commenced to withdraw also. A general retirement of everybody thus started, which was participated in by part of the batteries east of Charpentry.

During the afternoon, the artillery received the following information regarding the events at the front. Nothing of importance arrived until.

1.30 P. M. The I Corps Air Service reported that, at 1.20 P. M., they had observed American troops in the ravine in front of Exermont, with Germans entrenched on the ridge opposite their left.

2.00 P. M. The tank commander reported in, stating that he had withdrawn his tanks to la Hobette Fme. He stated that the infantry was withdrawing to the Baulny ridge, but that he had no liaison with them. He stated that the artillery had no liaison either, and was unable to give much assistance.

3.00 P. M. OPs reported that the infantry was retiring everywhere, with Germans following rapidly from out of the Montrebeau woods, especially opposite the west sector. Terrific enemy artillery fire, directed on positions of OPs and north thereof.

3.01 P. M. OPs reported that the line was giving way, and that the Germans "were rushing them back."

3.02 P. M. An officer telephoned from division CP: "The 70th Brigade is falling back almost to Baulny. General's orders are to get the Divisions on our right and left to help immediately. General now leaving Baulny. Germans are coming right on us."

3.02 P. M. The Division CP requested fire on Germans reported as being between Baulny and Apremont.

The artillery brigade commander reported to higher headquarters over the artillery net the request for assistance from adjacent divisions; he also requested all assistance possible from the Corps and Army Artillery. He then ordered his three regiments of 75mm guns, 21 batteries in all, to immediately place a barrage from L'Esperance* to the southeast corner of the Montrebeau woods, to prevent a possible envelopment of the left flank. The guns were not all laid in direction for this barrage, and considerable shifting of trails was necessary. It was about 3.20 P. M. before this barrage covering a front of less than 1000 meters was fully swept with shells.

3.05 P. M. A report arrived from the 137th Infantry, marked Montrebeau woods, no time given, stating that the Germans were reported advancing on Exermont, our troops reported retiring, and that the 137th Infantry would cover the retirement.

The 130th Field Artillery (155mm howitzers) was ordered to continue the 75mm barrage to the south from L'Esperance to Baulny, to further protect the left flank.

3.06 P. M. The orderly at the Division CP telephoned that the staff had left, pistols in hand, to stop the enemy, who were just outside. (Communication with the Division CP here ceased.)

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*On the Aire River, just across from Apremont.

3.07 P. M. The I Corps Air Service reported American cavalry in woods at 1393 (southeast section of Montrebeau woods).

3.15 P. M. OPs reported enemy attacking the right flank.

The 130th Field Artillery was ordered to fire on the south edge of the Montrebeau woods; while the 219th French Artillery was ordered to fire barrages through the woods towards the northeast. At this hour first aid stations, machine gun carts, field kitchens, caissons, battery details, and individuals were streaming past the artillery CP to the rear. The cavalry commander turned out Troops F and D, 2nd Cavalry, and forming a line of foragers, began with the help of a few officers to stop the retreat, and lead the men back to the Baulny ridge. He had considerable success, many of the men being responsive, and commencing about 3.30 P. M., some degree of order began to be established in spots. By this hour the Corps Artillery was in action, firing at supposed locations of hostile batteries.

The men falling back were not panic stricken; most of them claimed that they had been ordered to withdraw. The battalion of the 139th Infantry, with the 128th Machine Gun Battalion, on the ridge just north of Baulny held, as did a battalion of the 110th Engineers, near Chaudron Fme. With the assistance of these units and men brought back by the 2nd Cavalry, a thin line commenced to be built up on the Baulny-Chaudron Fme ridge from 4.00 P. M. on. The OPs were reestablished. At 4.00 P. M., sixteen batteries of 155mm GPFs from the Army Artillery had Montrebeau woods under fire. Men continued to come back to this line, during the remainder of the afternoon. Although the visibility was excellent, it was impossible to distinguish whether individuals in front of the line were enemies or friends. Fire was not therefore further delivered, to any extent. The enemy shelling declined gradually, and at 5.00 P. M., it was realized that the battle was over for the day.

Later the I Corps reported that as of 6.00 P. M., they had for their three divisions, 331,428 rounds of 75mm ammunition on hand, and that all three divisions had expended during the previous 24 hours 9,900 rounds of 75 mm ammunition. This small expenditure was attributed to inability to locate targets.

The losses this day were—infantry, 174 killed; 1,020 wounded; artillery (U. S. only), 1 killed, 8 wounded.

THE GERMANS

On the day preceeding this battle, the German Crown Prince made an inspection of the troops opposing the 35th Division. They were commanded by his brother, Prince Fritz, son of the Kaiser. There were two divisions jointly holding the line, the 1st Guard, and the 5th Guard Divisions. The west boundary of these divisions coincided substantially with that of the 35th Division—the Aire River; the east boundary was about 1000 meters further east than that of the 35th Division. The Crown Prince in his report stated:

the "First Guard Division . . . consisted of 500 rifles in the fighting zone; the staff with their messengers were fighting in the front line, rifle in hand. The artillery were extremely fatigued, the guns were worn out, fresh ones were hard to get from the depots, the rations were insufficient and bad.

"The American attacks were in themselves badly planned; they showed ignorance of war; the men advanced in columns and were mowed down by our remaining machine guns. No great danger lay there. But their tanks pierced our thin lines—one man every 20 meters—and fired on us from behind. Not till then did the American infantry advance. Besides the Americans had at their disposal an incredible quantity of heavy, and very heavy, artillery. Their artillery preparations greatly exceeded in intensity and heaviness anything we had known at Verdun, or at the Somme."

As a result of the inspection, the 1st Guard Division was withdrawn from line during the night September 28-29, leaving only the 5th Guard in line. These were to be in turn relieved during the 29th, by the 52nd Division, which at daylight on the 29th had not yet arrived.

The mission of the 5th Guard Division was defensive. It held the north side of the Exermont ravine, by a line of men at 20 meters interval, located about the middle of the slope. Exermont was not held, but outposts had been pushed to the south side of the ravine. The artillery was in rear of Montrefagne, which was an important observation post. The neighboring division on the west held the high ground beyond the Aire,

as far south as opposite Apremont. Here the artillery OPs were inside the woods, in tops of tall trees, which overlooked the terrain north and south of the Montrebeau woods. The troops on both sides of the Aire were under the LVIII Corps, which controlled artillery fire.

At 5.30 A. M., September 29th, the battle started with our light barrage falling over the outposts, and short of the main line of resistance. The standing barrage, by our 155mm howitzers, was around 500 meters over the infantry, was short of the OPs, and no where near the line of batteries. The outposts having delayed the advance until after daylight, our troops were visible when they arrived near the Exermont ravine, and were there stopped.

About 8.00 A. M., the 52nd Division began to arrive. It was decided to relieve the 5th Guard Division, with two regiments of infantry, which were to counter-attack through the Guard's line, their objective being the Montrebeau woods. The advance was to be by infiltration on wide intervals, without maintaining either a line or a fixed schedule. There was to be no rolling barrage; the artillery was to increase the fire gradually, cover the advance, and maintain liaison with it through airplane observation.

By shelling the American line, the latter was forced to remain under cover. About 11.00 A. M. the advance started from the north crest of the Exermont ravine. Due to the configuration of the ground, and vegetation, it was possible to arrive within 100 meters of Exermont without being observed. As this town was in a hollow plunging fire was used. By 12.00 Noon, the infantry had entered Exermont, and were crossing the ravine to the west thereof. There was no line, the attack was conducted by individual Germans, or groups of two men, equipped with machine guns or automatic weapons, which crawled to short ranges from where they suddenly opened fire. Planes watched the advance. By 1.00 P. M., footholds had been firmly secured along the entire south side of the ravine. The Germans continued to crawl forward, in an irregular advance, wherever possible under cover. By 2.00 P. M., the northwest edge of the Montrebeau woods had been reached, and small number of men commenced to enter

the woods. They did not pause to mop up. This was left to parties in rear. Some of the Germans met little opposition within the woods, and by 3.00 P. M. had arrived on the south edge. This being the objective, they stopped and dug in. Other Germans arrived later, but the woods were not mopped up, nor the line made continuous until dark.

During the morning hours, the OPs had observed bodies of infantry south of the Montrebeau woods moving north (110th Engineers and 138th Infantry); and commencing about 3.00 P. M. an extraordinary number of targets appeared, infantry and vehicles, moving south from the same woods. A large number of problems at moving targets were fired, which called for rapid fire, but this was by no means either a barrage or an artillery preparation.

At night, the front was established to include the Montrebeau woods, with outposts 500 meters south.

COMMENTS

We have all heard that the 1st Field Artillery supports the 1st Brigade, the 2nd Field Artillery the 2nd Brigade, while the 3rd Field Artillery remains in general support of the Division. In war, this works when.

a. the infantry maintains a known schedule, or
b. the artillery maintains constant touch with the front.

In war it is difficult to determine what the Infantry is doing, where the enemy is, and just what is happening. On September 29th, none of the infantry of the 35th Division did any thing it was ordered to do, at the time it was ordered, with the exception of the attack of the 137th Infantry at 5.30 A. M. And this was made by such a small detachment, without artillery liaison, that it accomplished only a slight temporary advance. The remaining infantry attacks were at hours other than that originally prescribed, were made in directions other than that expected, and were all without coordinating artillery support. The tanks also were unable to keep track of events, and acted independently of both infantry and artillery.

As the infantry had no objectives, the artillery was in doubt all day as to how far to the front they might have gone. Conflicting

reports and delayed messages assisted in keeping this part of the situation a cause of perplexion. The artillery hesitated to fire directly to the front, for fear of hitting their own men. Early and repeated statements were received that a counter-attack was expected from the left; this diverted attention to the Aire valley. It appears that this expectation was due to an erroneous assumption based on interpreting enemy artillery fire from west of the Aire as an artillery preparation. Our artillery fire was consequently directed outside of the division zone of action, to west of, and in the Aire valley, to prevent the counter-attack supposed to be there forming. The real counter-attack from the north was not observed until four hours after it had started, and at this hour it had already succeeded in reaching its objective after driving in our line about two kilometers. Not until then did higher headquarters and the artillery, become suddenly aware that a critical situation had arisen.

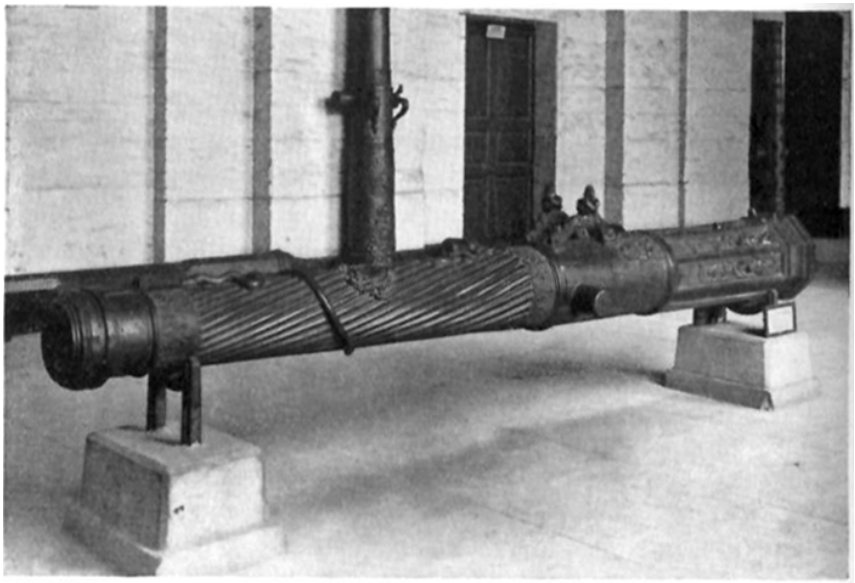
The insignificant losses of our artillery indicate how harmless the enemy counter-battery fire was. German reports indicate that our own counter-battery was equally ineffective.

SIXTEENTH CENTURY ARTILLERY DRILL

BY FLETCHER PRATT

A GLANCE at the earliest manuals of artillery (from the sixteenth century) leads to the saddening reflection that the more important the arm becomes the harder the artillerist has to work and the less consideration he receives. Today he is just another soldier, but then, ah, then——! Listen to the recommendations of the Italian Correra as to the proper etiquette to be observed toward gunners:

"The gentlemen of the artillery, who by reason of the importance of their arm in sieges and the like, are wont to vaunt themselves highly, should be treated with all courtesy and given carriages not inferior to those of the commanders of regiments." And when they are needed, even for a battle, they should be approached by an aide-de-camp who, sweeping the ground with his plumed hat, should remark, "Messieurs of the artillery, the general presents his compliments and asks that you will be good enough to fire a few shots."



16TH CENTURY "CULVERIN" FROM WURTTEMBERG. LOTS OF DECORATION BUT NOT MUCH ACCURACY

But there was to be no haste about firing these few shots. Everything must be done in order and with proper sequence. Another artillery manual, by Diego Ufano, governor of Antwerp, prescribes the steps. "The piece having arrived at the battery and being provided with all needful materials, the gunner and his assistants take their places and the drummer is to beat a roll." Then more bows and salutations, presumably, and—

"The gunner cleans the piece carefully with a dry rammer, and in pulling out the said rammer gives a dab or two to the mouth of the piece to remove any dirt adhering. Then he has his assistant hold the sack, valise or box of powder, and filling the charger level full, gives a slight movement with the other hand to remove the surplus and puts it into the gun as far as it will go. Which being done, he turns the charger so that the powder fills the breech and does not trail out on the ground (for when it takes fire there it is very annoying to the gunner)." One would think so!

"After this he will take the rammer and, putting it into the gun, gives two or three good punches to ram the powder well into the chamber, while his assistant holds a finger in the vent so that the aforementioned powder does not leap forth. This done, he takes the second charge of powder and deposits it like the first; then puts in a wad of straw or rags or something of the sort, which will be well packed in to gather up all the loose powder. This having been well seated with strong blows of the rammer, he sponges out the piece. Then the ball, well cleaned by his assistant (since there is danger to the gunner in balls to which sand or dirt adhere) is placed in the piece without forcing till it touches gently on the wad, the gunner being careful not to hold himself in front of the gun, for it is silly to run danger without reason. Finally he will put in one more wad, and at another roll of drums the piece is ready to fire."

After which, more bows and compliments all around. There was really no reason to hurry, for the gun should not be fired more rapidly than eight times in an hour. "It should also be remarked," continues the sage Ufano, "that after forty shots the gun should be refreshed and given an hour's rest, for after this amount of firing the gun can no longer support the heat."

The materiel, as a matter of fact, does not seem to have possessed

quite the precision and resistance of modern guns. At the same period, a Flemish artillerist complains bitterly about the munition makers.

"Some guns," he says, "are of unequal boring, in such a way that the bore inclines more one way than the other; others are of unequal or inappropriate weight, so that when fired, they tumble head over heels off their mounts because the trunions not being of place or weight pertinent to the gun, the piece weighs more toward the mouth than the breech, the which I have seen several times occur in such a manner that the most adroit and skillful cannoneer I could hope to find could by no means hit the mark as proposed. His assistants were greatly astonished and the event made him to be suspect of being of little science or practice in his art. Now the fault was not with the cannoneer, but with the unusual weight of the piece, whose mouth, louting down, did cause the ball to strike another point than that at which it was directed. I have seen such a piece, whose shots were always too short or too long, of which the cannoneer, perceiving the fault, found a remedy in suspending to the breech a basket of bullets, in which shows that the art of the cannoneer is not only in the aiming.

"It happens at other times that pieces come from the foundry containing pits in their interiors, and being of spongy, porous or warty consistency, in such fashion that the ball cannot enter with the art required. And when necessity demands that the piece be reloaded in haste, not having room enough to wash it out thoroughly with clean water or vinegar as the custom is, and not being able to reach the interior holes in which some spark of fire still lingers, the cannoneer risks being sent to paradise with his boots on."

Even if the gunner escapes going to paradise in his boots, he is apt to take a rating from his general for missing the mark when it is not his fault at all. Still another sixteenth century artillery guide by a French officer named Malthus remarks melancholically, "I myself have seen a great quantity of cannonading at a fortified town which touched neither city nor rampart, which were nevertheless in range of the guns, and all this because the guns were of so bad porte that the shots must needs pass above

the city, as I saw with my own eyes at the siege of La Ferté in Luxembourg."

And why were the guns of such "bad porte"? A variety of reasons. The trunions, for instance, ought to be parallel to the horizon: "that is," continues Malthus, "one should not be higher than the other, and this can arise from a variety of causes, of which the first and most ordinary is the platform not being level due to the earth by some accident being more holed on one side than the other and the cannon rolling across these holes, depresses more to one side than the other. One even finds the trunions themselves out of true, and not resembling each other. The same fault can arrive by the wheels on one side being smaller than on the other, and all these faults sometimes come in the same piece, though somewhat rarely. But it would be a marvel worth many days' journey to see a battery of cannon lodged before a city in siege without some of these faults."

There is trouble with the ammunition, too, "for I have never seen a piece of artillery which had the bullet of the same diameter as the bore to the chamber; by which one can clearly see that if you shoot even at a mark very visible you will never touch it."

But all hope is not lost even if the cannon is cockeyed, the wheels on one side lower than on the other, and the ammunition lopsided. The clever artilleryman can overcome all these handicaps. It's just a matter of practice, according to Malthus, who evidently does not believe in the study of mathematics and the plotting of coordinates.

"To correct these faults by the study of mathematics would be possible," he declares judiciously, "but the study would be so long that it would be to cure one evil by another and greater one, for in that case the artilleryman must needs become a savant. I wish to give means both simple and intelligible to be comprehended by anyone whether he be a doctor of universities or not. Shoot very much lower than you wish at the first shot, with the object that by this you can regulate your second shot much nearer and the third very exactly. Note that impatience, with a little vanity and annoyance causes the greatest troubles to fall on some gentlemen gunners who hope to hit the target on the first shot and after several

shots can see no marks of balls arrived by reason that they have all passed above."

And what does one do when one is not besieging a city, but in a battlefield, facing infantry, where the first shot counts? One makes shrapnel, according to the Polish artillerist Siemienowicz, whose work on the subject excited such tremendous admiration that he was all hung with medals like a Marathon runner and had his book translated into French, Latin and German by King Wladislaw IV of Poland's royal order.

"This species of grenade has not much artifice in its construction. One has only to take a cylinder of wood of which the diameter is a little less than that of the gun that will be used. It is dug out in hemispherical form so that it will hold one-half of the ordinary grenade, of which the diameter should be a little less than that of the cannon. Around the outside one pierces a quantity of little holes, all of which end at the fuse of the grenade. All these holes are filled with fine powder to carry the fire into the fuse of the grenade. This done, it would be an excellent idea to bind the cylinder and grenade together with wire or wool cording and then ram it into the cannon so that the cylinder rests on the powder charge."

After which it is fired with a roll of drums, and the messenger from the general arrives again, and (still according to Correra) must not forget so say, "Messieurs of the artillery, you have fired well today, and the success of the battle is due to your courage and skill."

ARNOLD'S EXPEDITION TO QUEBEC, 1775

BY F. M. DEARBORN, JR., R. O. T. C., HARVARD UNIVERSITY

THERE are few more interesting events in American military annals than the expedition of 1775 to Canada. Its history is not generally known, chiefly because it failed in its main purpose: to drive the British out of Canada and add that vast territory to the revolted colonies. The expedition was, however, none the less remarkable both for the extreme difficulties which accompanied it and the very small margin by which it missed success. This paper will of necessity be confined to a discussion of the route of the right division of the invading army under Benedict Arnold although the combined operations against Quebec will, of course, be considered.

The invasion of Canada was one of the very earliest strategic moves of the Revolution. The advantages of a united continent were obvious and the difficulties presented did not seem insurmountable. The mass of Canadians in 1775 were in sympathy with the colonies, but lacked the necessary leadership for open rebellion. All that was needed to bring this feeling to a head was the presence of an expeditionary force strong enough to expel the English troops from Montreal and Quebec. The blow, however, had to be struck at once before the enemy garrisons could be reinforced.

The capture of Ticonderoga and Crown Point opened the way for an expedition by way of Lakes George and Champlain, the St. Lawrence and Montreal under Schuyler and Montgomery. This was authorized in the summer of 1775, but meanwhile it was decided to reinforce the first division by another along a more northerly route. The value of this second expedition lay in its element of surprise, which Washington and other leaders of the Revolutionary Army considered would result in the easy capture of Quebec while the British troops were engaged in defending Montreal.

There were three principal ways by which an entrance to Canada might be sought, besides the Champlain route over which Schuyler was advancing. One was by the Connecticut, Salmon and St. Francis rivers which would carry the invader to Lake St.

Peter about 100 miles above Quebec; the second followed the St. John and Madawaska and passed over the carrying place to Kamouraska on the St. Lawrence 100 miles below Quebec; and the third was that by the Kennebec and Chaudière to Pt. Levis opposite Quebec. The last route, although the most hazardous, was finally chosen because it was believed that there would be less chance of discovery along the route where settlements were fewest.

Of the personnel of the expedition which set out upon this ambitious project from Cambridge on September 13, 1775, little need be said. Both officers and men were the cream of the existing Continental Army and most of the former had seen service in previous wars. Arnold, the commander, was already known for courage, daring and good leadership. The whole force, all volunteers from the army besieging Boston, was composed of three companies of riflemen and two battalions of musketeers and numbered about 1,100 men.

Washington's final instructions are of interest as showing the hopes of coöperation on the part of the Canadians that were held by the Revolutionary leaders.

"Camp at Cambridge, 14th September, 1775

To Colonel Benedict Arnold.

Sir: You are intrusted with a command of the utmost consequence to the interests and liberties of America. Upon your conduct and courage, and that of the officers and soldiers detached on this expedition, not only the success of the present enterprise, and your own honor, but the safety and welfare of the whole continent may depend. I charge you, therefore, and the officers and soldiers under your command, as you value your own safety and honor, and the favor and esteem of your country, that you consider yourselves as marching not through the country of an enemy, but of our friends and brethren, for such the inhabitants of Canada, and the Indian nations, have approved themselves in this unhappy contest between Great Britain and America, and that you check, by every motive of duty and fear of punishment, every attempt to plunder or insult the inhabitants of Canada. Should any American soldier be so base and infamous as to injure any Canadian or Indian in his person or property. I do most earnestly enjoin you to bring him to such severe and exemplary punishment, as the enormity of the crime may require. Should

it extend to death itself, it shall not be disproportioned to its guilt, at such a time and in such a cause.

But, I hope and trust, that the brave men who have voluntarily engaged in this expedition, will be governed by far different views, and that order, discipline and regularity of behavior, will be as conspicuous as their valor. I also give it in charge to you to avoid all disrespect of the religion of the country, and its ceremonies. Prudence, policy, and a true Christian spirit, will lead us to look with compassion upon their errors without insulting them. While we are contending for our own liberty, we should be very cautious not to violate the rights of conscience in others, ever considering that God alone is the judge of the hearts of men, and to him only in this case, they are answerable.

Upon the whole, sir, I beg you to inculcate upon the officers and soldiers the necessity of preserving the strictest order during the march through Canada; to represent to them the shame, disgrace, and ruin to themselves and their country, if they should by their conduct turn the hearts of our brethren in Canada against us, and on the other hand, the honors and rewards, which await them, if by their prudence and good behavior they conciliate the affections of the Canadians and Indians to the great interest of America, and convert those favorable dispositions they have shown into a lasting union and affection. Thus wishing you, and the officers and soldiers under your command, all honor, safety, and success, I remain, Sir,

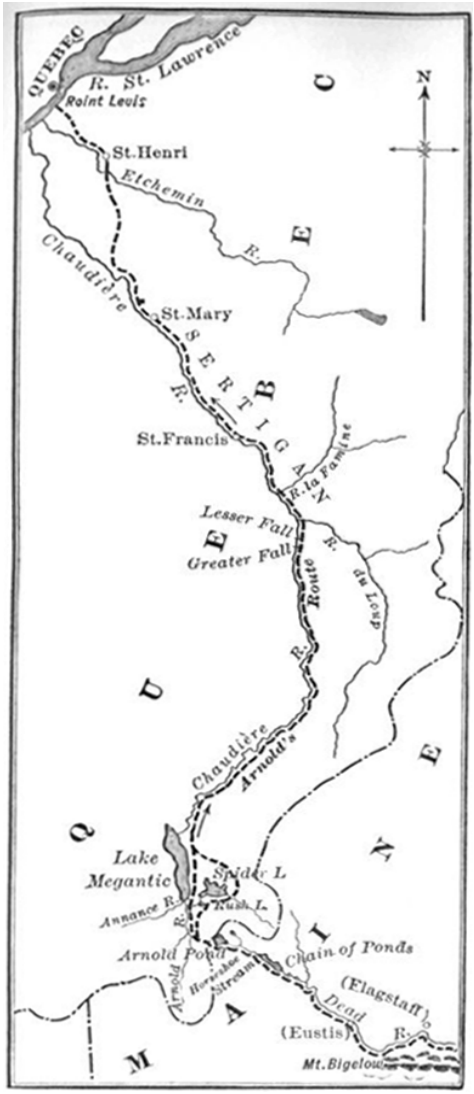
Your most obedient humble servant,

GEORGE WASHINGTON."

By September 16th the expedition was at Newburyport and embarked for the voyage to the Kennebec, the mouth of which was reached without much mishap, except the occasional grounding of one of the vessels. On the 22nd the bateaux, which had been ordered for the ascent up the Kennebec and its branch, the Dead River, were loaded just below Fort Western, the site of the city of Augusta, and arrived at the first portage, opposite Fort Halifax, on the 30th. In view of the later troubles of the expedition it seems that this use of bateaux was one of the greatest of the unavoidable mistakes made in planning the affair. They were hastily constructed of green pine and caused infinitely more trouble than they were worth, especially in view of the fact that subsequent events proved the march could have been made with less effort by land.

The first division under Daniel Morgan was composed of the Pennsylvania and Virginia riflemen; the second under Lt. Colonel Greene, the third under Major Meigs, and the fourth under Lt. Colonel Enos were composed of musketeers and proceeded up the river in their respective order. Of the first part of the trip up the Kennebec, from Ft. Western, a distance of approximately 80 miles, little need be said. The expedition's chief difficulties were leaky boats due to the rapids and rough portages at Skowhegan Falls and Norridgewock, where the bateaux were caulked. It was at this last settlement that as Melvin says "We were now to take our leave of houses and settlements, of which we saw no more, except one Indian wigwam, until we came among the French in Canada."* This last outpost of civilization was left on October 6th. Battling against an increasingly rapid river, the expedition arrived at the great carrying place from the Kennebec to the Dead River on the 12th. Of the 1,100 men who left Cambridge, the detachment now numbered only 950. The loss had been in sickness and desertion, but the remainder was supposedly made up of tried men, as indeed they needed to be, for the worst part of the trip lay ahead between the Kennebec and Chaudière, where the first Canadian settlements

*James Melvin, "A Journal of the Expedition to Quebec in the Year 1775," 7.



were to be reached.

The so-called Twelve Mile carrying place included four distinct portages at each of which the bateaux had to be unloaded and loaded up again. This labor was in turn followed by the heavy going up the eighty miles of the Dead River and the terrible crossing of the border mountains to the headwaters of the Chaudière. During this part of the invasion, which lasted about three weeks, the troops were practically without provisions except for a few pounds of flour, the other foodstuffs having been consumed or destroyed during the trip up the Kennebec. The weather, which had been mild at the beginning, became cold and rain fell a great part of the time. As a result the proportion of sick became tremendous. To add to the general discouragement Enos' fourth division, which was rather better supplied than the others, deliberately turned back, against orders, with the complete consent of its officers, and refused to part with any of its flour for the rest of the army.

The struggle across the high lands of the border was not, however, the end of their troubles, as the army quickly became involved in the overflow of the Chaudière which rendered its headwaters nearly impassable. Most of the bateaux had been

left on the other side of the border, as the men were too weak to carry them over. As a result they had to wade in icy water up to their waists and armpits for a large portion of the way to the first Canadian settlement at Sartigan, a distance of nearly 90 miles. Melvin's journal from October 28th to November 2nd illustrates these hardships so graphically that it is well worth reproducing here.

"Oct. 28. Came down Chadeur river in a birch canoe, and went to fetch back a bateau to carry the men across a river, but could not overtake them. The company were ten miles apart; waded knee-deep among alders, &c., the greatest part of the way, and came to a river which had overflown the land. We stopped some time, not knowing what to do, and at last were obliged to wade through it, the ground giving way under us at every step. We got on a little knoll of land, and went ten miles, where we were obliged to stay, night coming on, and we were all cold and wet; one man fainted in the water with fatigue and cold, but was helped along. We had to wade into the water, and chop down trees, fetch the wood out of the water after dark to make a fire to dry ourselves; however, at last we got a fire, and, after eating a mouthful of pork, laid ourselves down to sleep round the fire, the water surrounding us close to our heads; if it had rained hard it would have overflown the place we were in. Captain Goodrich's company had only three-quarters of a pound of pork, each man, and a barrel of flour among the whole. He ordered the bateau to proceed down the river with the flour, and when they came to the place above mentioned, waded through. They came to the knoll of land before mentioned, and made a fire to dry themselves, being almost perished. After some time they marched, and found the difficulty increasing, being informed they must return the way they came; being night, they camped on the dryest spot they could find.

"Oct. 29. Being Sunday; crossed a river after much fatigue and loss of time, in a birch canoe, and then waded to another river, about forty rods from the first, which we crossed last night. I lay at a bark house, and this morning went in the canoe to ferry the people over the two rivers above mentioned, leaving my provisions behind, as did Captain Dearborn and the three other officers. After we got over these rivers, Captain Dearborn, steering by a bad compass, went wrong about two miles, the company following, and we went back again, then went two or three miles to a little bark house, where I left my provision, and on coming

there found that our provision was stolen by Captain Morgan's company. Goodrich's company came to the lower end of Chadeur pond, expecting to find their bateau with the flour, but were disappointed.

"Oct. 30. I set out in a birch-bark canoe with Captain Dearborn and Captain Ayres. We proceeded to the lower end of the pond, where Captain Dearborn left the canoe, and Captain Ayres and I proceeded down Chadeur river, about three miles, and came to a ripply place, which was very dangerous, the rocks standing up all over the river. Here a bateau was stove, with four men, and one man drowned, named George Innis. I got safe down this place, and from bad or worse, proceeded till night, and encamped with the company. Goodrich's company set out early, though on empty stomachs, and marched about ten miles, in hopes to overtake their bateau with the flour, but, coming to a small creek, they found an advertisement set up, informing them that their bateau was stove, and the flour lost, and the men with difficulty having saved their lives. This was melancholy news to them, having eaten scarcely anything for several days, and having waded through ice and water, and were a great way from any inhabitants, and knew not how far it was. They agreed to part, and the heartiest to push forward as fast as they could.

"Oct. 31. This day I took my pack, and went by land, all the way, to inhabitants. I was not well, having the flux. We went twenty-one miles. Goodrich's company marched three miles, and were overtaken by Captain Smith, who informed them that Captain Goodrich had left two quarters of a dog for them. They stopped and sent for the meat, but the men returned without finding it; however, some of them killed another dog which belonged to us, which probably saved some of their lives. Captain Ward's company killed another dog.

"Nov. 1. Continued unwell; this day I eat the last of provision: I kept with the company, and we went twenty miles.

"Nov. 2. Traveled four miles; I shot a small bird called a Sedee, and a squirrel, which I lived upon this day. About noon we met some Frenchmen, with cattle for our army, and some meal in a canoe. I had a small piece of meat and bread given me; yesterday my messmates gave away victuals to strangers, but refused me, though they knew I had mine stolen from me. This evening, to our great joy, we arrived at the first French house where was provision ready for us. The first victuals I got was some boiled rice, which I bought of the Indians, giving one shilling and four pence for about a pint and a half. Here we were joined by about seventy or eighty Indians, all finely ornamented

in their way with brooches, bracelets, and other trinkets, and their faces painted. I had gone barefoot these two or three days, and wore my feet sore."

It is estimated from existing records that about 90 men died in this terrible part of the expedition. Arnold's energy in going on ahead to order provisions was all that saved many more in the last division under Greene, which was a good deal behind Meig's unit, in which was Melvin.

From Sartigan to Levis the army made very good time, Arnold hurrying as much as possible in the hope of getting into Quebec before reinforcements could arrive from Montreal. There was now no question of surprise, as the American commander's messages to Montgomery and various merchants in Quebec had been intercepted by the British. As a result there was simply a race for the city between the Americans and British, a race in which the former had a slight time advantage but a more difficult route to cover. By November 10th the American Army, which numbered scarce 550 effectives, had reached the shores of the St. Lawrence at Levis and gazed for the first time at the goal of their expedition through the wilderness.

Before turning to an account of the actual siege of Quebec it might be well to consider the causes which delayed the expedition and prevented its surprising and taking the city without a blow as Washington and Arnold had hoped. In the first place the expected supplies had failed to materialize at Fort Western, then Enos had deserted the expedition in the face of orders, which, though not sufficiently explicit, were to the effect that he should advance, and finally the weather had been severe beyond any reasonable expectation. In the face of the constant difficulties that beset the expedition the fact of its arrival at all was most creditable and the delay in time was partly the fault of the maps of the day, which greatly underestimated the distance. The doggedness and perseverance of the leaders and men who came through was worthy of a better fate and Washington's commendation of Arnold was well deserved: "It is not in the power of any man to command success, but you have done more—you have deserved it."

Had the colonists been able to attack immediately after their

arrival at Quebec on the 10th of November there seems little doubt that they would have succeeded. Cramahé, one of the worst of the royal Lieutenant Governors, was in charge and had under him only a few undetermined militia, thirty-seven marines from *H. M. S. Lizard*, and a handful of artillerymen. Lt. Colonel Maclean with his detachment of Royal Highland Emigrants, mostly old British regulars from the earlier wars, was up the river at Sorel and did not arrive at Quebec until November 12th. The energetic Governor General, Guy Carleton, was at Montreal and did not arrive until the 19th. There was then no human reason why the city should not have been taken had Arnold been able to attack on the 10th or 11th. For three solid days, however, from the 10th to the 13th a gale blew up the St. Lawrence preventing passage with the frail boats that had been gathered up the Chaudière. When the crossing was finally effected on the night of the 13th, Quebec had been reinforced and the great opportunity was gone.

On the 13th the crossing was made in the dark hours of the night to Wolfe's cove and the 14th saw the army drawn up on the Heights of Abraham. Maclean, now in command of the loyal forces in Quebec, had no intention of repeating Montcalm's error and very wisely stayed where he was. There is an unproved story that on the night of the crossing one of the principal gates of the town lay open and unguarded but for one sentry. If this be true, the failure of Morgan's reconnoitering party to discover it must be called another link in the chain of unlucky chances which decreed that Canada should remain in the British Empire.

On the nineteenth, Arnold decided to retire twenty-five miles up the river to Point aux Trembles to await reinforcements from Montgomery's force at Montreal.* Some hundred of the American muskets were useless and there were less than five rounds of ammunition per man left in the army. On the 28th a detail arrived from Montreal with cannon and ammunition and on the 1st of December Montgomery came to Pointe aux Trembles, bringing more guns and some captured British uniforms for Arnold's men, whose clothing was by now in a most wretched condition.

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*On the way up river the Americans saw the sloop bearing Carleton to Quebec pass down the river.

PLAN
OF THE
CITY AND ENVIRONS
OF QUEBEC
WITH ITS SIEGE AND BLOCKADE
BY
THE AMERICANS
RIVER ST LAWRENCE
LOWER TOWN
UPPER TOWN
CAP DIAMANT
HEIGHTS OF ABRAHAM
RIVER ST CHARLES OR THE LITTLE RIVER

In Quebec Carleton's arrival had an equally great bolstering effect. The town, under martial law, was inspired by the presence of real leadership and some unity was felt among the defenders for the first time. The walls of the city, which had been more or less neglected since 1659, were hastily repaired, the sailors from the ships at the Lower Town wharves were formed into companies and battalions, and any signs of rebellion among the inhabitants were quickly suppressed.

The united American force, still less than a thousand strong, started back to Quebec on the 2nd of December and took up their former quarters on the Heights of Abraham and in front of the suburbs of St. John and St. Rocque. Various attempts were made to force a surrender through show of strength or appeals to the populace, but these were of no avail. There remained therefore but two choices: either storm the town or besiege it. The latter alternative could not be considered because the American force was too small to surround the town completely; the winter promised to be a long hard one, and especially hard for the comparatively unsheltered besiegers; a wait would only serve to enable Carleton to strengthen the defenses and win over more of the populace to the royal cause; reinforcements were to be expected for the garrison as soon as the river opened; and finally Montgomery like Washington was constantly hampered by the short enlistments of his troops—indeed most of the New Englanders expected to return to their homes on January 1st. The Americans' attempts to use their few light guns were ineffectual and almost laughable.

In view of the above facts it is possible to see why it was soon decided that an attack must be made and made shortly. The situation confronting Montgomery and Arnold was about as follows: A long plateau on the northern side of the St. Lawrence thrusts itself like a tongue into the corner where the shallow St. Charles empties, and the very tip of the tongue, cut squarely off by a bastioned wall, is the Upper Town of Quebec. At the northern end of this wall the bluff stands about fifty feet high. Toward the St. Lawrence it rises gradually, reaches ninety feet at the very point, and then climbs to three hundred and forty-eight at Cape Diamond, where the southern end of the wall reposes; and as if such a precipice were not defense enough, the edge of the bluff bristled

at this time with a palisade, loopholed for musketry. Not very far from Cape Diamond, St. Louis Gate and St. John Gate let out a couple of roads through the wall, while a little way around its northern turn, Palace Gate opened a way to the suburb of St. Roch.

Between the bluff and the rivers lay a fringe of shore. At Wolfe's Cove this had some width, but eastwardly it grew very narrow, until, a little way beyond Cape Diamond, it filched enough space from the St. Lawrence to make a site for the Lower Town. Beyond this it shrank into a fringe again until it reached Palace Gate, and then broadened out into St. Roch and the meadows of the winding St. Charles. The Lower Town was the commercial city, and most of the merchants resided there, while the governor's castle glowered upon them from the edge of the bluff, with a good backing of churches and religious houses. The Upper and the Lower Towns were connected by a steep, winding road and by a footway of steps cut in the rock. The citadel of today did not exist.

As the last days of December came on, the plan of attack was decided upon. A feint was to be made upon the Lower Town and the real attack upon the bastion along Cape Diamond. On the 28th of December, however, one of the men deserted and gave away the whole plan. As a result Arnold's idea of an attack upon the wealthy Lower Town was adopted. It was believed that if this were seized the people would force Carleton to surrender to save their property. The final plan called for feints at Cape Diamond and the St. John's gate and simultaneous attacks by Arnold and Montgomery from either end of the Lower Town. The hope of the Americans lay in their being able to prevent the enemy's knowing which of the separate attacks was the main one and thus preventing any concentration of Carleton's forces, which were too meager to defend the whole city at once. Once the final plan was decided upon the American Army settled down to await a dark night for the attack. This was not long in forthcoming and at 2.00 a.m. on Sunday, December 31, 1775, the attacking parties were formed.

Arnold with the larger of the two main bodies, about five hundred men, started from the suburb of St. Roch along the fringe

of shore below the bluff to reach their point of attack, the Sault au Matelot barricade. First went the commander with the advance party under Captain Oswald, then Morgan's riflemen and a six pounder on a sled, followed by the main body under Major Bigelow. Dearborn's company, which had been assigned to a position in rear of Morgan, was unable to cross the St. Charles river in time to take its position, so the division went on without it. The head of the column came almost to the first barrier without discovery, although the garrison had been aroused by the American signal fires off Cape Diamond. In the rush for this first barricade Arnold was wounded and forced to retire, leaving Morgan in command. The first barrier was quickly carried and its guard captured. Had Morgan pushed on at this moment, as he wished, his troops would have found the second barrier unblocked and the way clear through the whole Lower Town. Instead he followed his orders, which were to wait for Montgomery at Sault au Matelot, and another chance for victory, unknown to the attackers, was gone. As a matter of fact there was reason in the final decision to stay put as the rest of the division had yet to come up and Morgan's company was outnumbered by its captives alone. By daybreak enough reinforcements had come up to provide for another attack, but by now the second barricade was garrisoned and the attack was repulsed with great loss.

Meanwhile Montgomery's column of nearly 300 men had been having its own difficulties. The General's route lay along the foot of the cliff from the direction of the Heights of Abraham to the Près de Ville barricade, which defended that side of the Lower Town. The column was delayed time after time by icy obstructions and the severity of the storm, which was now at its height. Two palisades were cut down before the party rounded Cape Diamond and came in view of the enemy barricade. Montgomery sent back word to bring up the column and with some 50 or 100 of the men nearest him advanced upon the work. In the first discharge of the British cannon the three leaders of the American column were killed and the officer who succeeded in command ordered a retreat. An energetic advance would undoubtedly have gained the barrier, which was defended only by a handful of militiamen and seamen, but the New York detachment was on

the whole made up of very raw militia lacking even a backwoods training and was poorly officered.

Back at the Sault au Matelot the whole force of the garrison was now turned upon Morgan. Carleton had realized the true nature of the half-hearted feints made by the Canadian rebels under Brown and Livingston on the Upper Town and after the good news from Près de Ville, concentrated on the scanty remainder of the riflemen and musketeers of Arnold's column. After the repulse of the attack upon the second barrier British reinforcements came up so rapidly that a frontal attack was impossible. The houses along both sides of the streets were occupied and the fight came to pretty much of a standstill. Morgan, who now realized the impossibility of forcing the barrier, agreed with Majors Meigs and Bigelow upon a retreat, which was duly ordered. Many of Morgan's party refused to take the chance of retreating down the unsheltered streets and were captured along with their leader, who had come up at the last minute.

Of the adventures of Dearborn's company, which was unavoidably late in coming up and was lost on the way and surrounded by a much superior force, Melvin's record is sufficient report:

"Dec. 31. *Sunday*—About four in the morning, were mustered, in order to storm the town; it snowed and stormed, and was very dark. Our company had not timely notice of the attack, which occasioned us to be too late, for when the firing began we had a mile and a half to march. We made all possible haste and met Colonel Arnold going back wounded. I was on guard in St. Roque that night, and went forward with the main body, and was not with the company. The company went beyond Palace Gate, the enemy firing briskly at them from the walls, and killed two or three. The enemy sallied out, and they surrendered, as did all the detachment, except some few who made their escape. We were put into a monastery, among the friars: at night we had some biscuit distributed among us."

Thus almost by inches failed the first American attempt to attach Canada to the colonies. From the military point of view the subsequent operations of the remnant of the army are of little interest. Carleton stayed within his walls and let winter and small pox fight his battle. The Americans were reinforced in the spring of 1776 but the arrival of the advance of the expected British fleet brought the final retirement on May 5th. The expedition

failed either to capture Quebec or start a rebellion in Canada, but the achievement of that winter march from Cambridge and the closeness of the final decision render it most interesting to the student of history. Montgomery's plan of action has been criticized but it seems that he had no other alternative, lacking siege cannon and a sufficient force to storm the Upper Town. His greatest error was in allowing Arnold and himself to lead their respective columns, but it must be remembered that the personnel of the army, especially the general's section, was such that personal leadership was necessary. There is no doubt, however, that more guides should have been provided to take the place of those killed at the heads of the columns of attack. Another tactical error of Montgomery's was undoubtedly in trusting to the ability of his subordinates to arrive at the various points of attack simultaneously on such a poor night, but there again it had to be done—the attack could not be postponed. The Près de Ville attack should possibly have been merely a feint and the attack along the Upper Town wall and at Sault au Matelot stronger, but that was a matter of chance as much as choice. A few of the more seasoned New Englanders would probably have succeeded where Montgomery's New Yorkers failed.

The expedition as a whole proved the possibilities of the American militia in winter campaigning while emphasizing the need for longer enlistments and better training and discipline. The action against Quebec proved the error of Montcalm's tactics and the necessity for artillery against a fortress. There are three men whose names stand out in the story of the campaign. The greatest is that of Carleton. It was almost entirely due to his energy and ability that Canada was saved for the British Empire. Arnold and Montgomery proved their own personal courage and fortitude beyond doubt, but Arnold's disgrace and Montgomery's death prevented either from fulfilling his early promise.

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NOTE: The American loss in the assault on Quebec was about 150 killed or wounded and 350 captured. The English casualties numbered between 20 and 30.

EFFICIENCY RATINGS

BY COLONEL C. D. HERRON, FIELD ARTILLERY

IN these days when "the old order changeth" and all institutions, even including the Army, seem to have become unstable, many officers are deeply and rightly interested in their ratings. If they have lately served under some officer known to be ungenerous and illiberal in appraising his subordinates, or if, in the dim past, some indiscretion has marred an otherwise flawless record, they are uneasy and unhappy.

Officers might have more confidence in the eternal fitness of things if it were generally appreciated that ratings are much more than the opinion of one's latest commanding officer—that they are the considered opinions, based upon the records of years, of the officer's own Chief of Branch. And that the Chief of Branch is much more than the Inspector of his Arm—that it is obligatory upon him to be the official "first friend" and advocate in Washington of every officer of his Arm!

Recent reports necessarily have the greatest weight in fixing ratings, except that really important duty performed is never lost sight of, no matter how long past. Ratings are pushed up quickly, but are lowered reluctantly and slowly by the Branch Chief, who above all things desires that *his* officers stand well in the sight of all. It is safe to say that no rating goes down on any single report; also that a rating is rarely adversely affected by even several reports of a commanding officer known by his Chief to be ungenerous or narrow-minded.

As each report comes into the War Department, it is coordinated with previous reports. Allowances are made for rating officers who are habitually too generous or too parsimonious. They are also made for the customary old soldier "superiority complex" of those of a few years' service in regard to recruits, plebes at West Point, and second lieutenants, which results in reporting as "Excellent" or "Superior" 85% of the Colonels and but 30% of the Second Lieutenants. It is well recognized in the War Department that the Lieutenant with an "Excellent" rating is probably quite the equal of the Colonel with his "Superior" rating. The efficiency rating system has its weaknesses, but

fortunately they are usually fairly evident and of such a nature that raw deals like the above are easily recognized and allowed for in the War Department. As in any other human activity, even in our courts, errors do occur, but the War Department leaves no stone unturned to rectify them before it is too late.

No officer can handle any large number of efficiency reports without coming to the conclusion that the system definitely favors the individual and discriminates against the Government. A single report may do an injustice to an officer but 90% of such reports paint the lily. There are several reasons for this state of affairs. One is a natural horror of injustice, enhanced by Army training, and resulting in the benefit of the doubt practically always being given to the officer reported upon. Another reason is the close personal relationships of the Service, systematically fostered to promote battle efficiency. A third reason is the fact that laudatory or neutral reports never need be proven before a court of inquiry, while unfavorable reports may need to be at any time. No matter how true an unfavorable opinion may be, it must under existing regulations be suppressed unless the officer making the report is willing and able to establish it under strict rule of evidence. There is the further and natural reason that most reporting officers have a high regard for the Scriptural injunction: "If it be possible, live at peace with thy neighbor." Probably no officer in the Service is rated below his absolute worth, though some are undoubtedly fortunate enough to be rated above it.

A striking and somewhat unexpected feature of ratings is their comparative stability over considerable periods of time and diversity of duties. While officers and leopards do sometimes change their spots, quality of performance seems in general to be about constant and to travel about with the individual. If the reports show him to be "Superior" while with troops, the odds are great that when he goes to General Staff, or college, or Reserve, or recruiting, or what-not duty, his reports will also be "Superior." And it is just as true that if his proper rating be "Satisfactory," changes in duty and in reporting officers are apt to produce little change in that rating.

No Arm has ever had a greater Chief than was the Field

Artillery's first, Major General William A. Snow. Within his Branch, he was "all things to all men." Without, he was a fearless and vigorous critic of the General Staff, yet by its members, as well as by all others in authority, by all odds the most respected and best liked of any Chief in Washington. The high standard he set has been well maintained by his successors and no officer of the Field Artillery need fear that his cause will not be well and vigorously presented whenever the occasion arises.

COLONEL JOHN ROBERT THOMAS, JR.

COLONEL JOHN ROBERT THOMAS, JR., Fifth Field Artillery, was born at Metropolis, Illinois, November 18, 1876. In May, 1898, he was commissioned as first lieutenant in the First United States Volunteer Cavalry, better known as the Rough Riders. In the fight at Las Guasimas, while leading his troop in action after the death of his captain. Allyn K. Capron, Lieutenant Thomas was severely wounded and incapacitated for further active service during the war. For this gallantry in action, he was cited in orders and awarded a Silver Star citation. Of him his colonel, Theodore Roosevelt, on his discharge papers stated: "Was wounded while gallantly leading his men in action against the Spaniards," and General Leonard Wood wrote: "I appreciated most fully your gallantry and efficiency in the Guasimas fight."

The following year he accepted a commission in the Regular Army as second lieutenant of the Seventeenth Infantry. He again distinguished himself for gallantry in action during the Macabulos campaign in the Philippine Islands, and later participated in the Moro campaigns. He became a captain on March 16, 1908, and was assigned to the First Infantry, with which regiment he served almost continuously until the United States entered the World War. In 1908, he married Miss Florence White of Chicago. Mrs. Thomas and a daughter, Hughberta, survive him.

During the World War he served with great credit as Chief of the Aviation Division of the Intelligence Section at G. H. Q. and was awarded the Distinguished Service Medal.

Following the war, he rendered distinguished service as Military Attaché at Brussels, Paris and London. In June, 1923, he transferred to the Field Artillery. Colonel Thomas' name was carried on the initial General Staff Corps Eligible List. He was graduated from the Army School on the Line in 1916, from the Army War College in 1925, and from the Field Artillery Advanced Course in 1926. In addition to the decorations recorded above, he was awarded the Purple Heart and foreign decorations by Belgium. France, Italy, Montenegro and Panama.

Colonel Thomas was a gallant soldier, distinguished for his courage, his devotion to duty, his courtesy and his capacity for friendship.

THE ADAPTABILITY OF ULTRA-SHORT WAVE RADIO TO FIELD ARTILLERY COMMUNICATION

BY REX E. CHANDLER, 1ST LIEUT., F. A.

FROM year to year and month to month we see tremendous strides taken in the progress and development of radio communication. Experimenters, scientists, and commercial firms are turning their energies to the production of efficient and dependable radio apparatus with remarkable results. Old theories of design, oscillating currents, and radio wave propagation are being torn apart or substantiated with dizzy rapidity. Today the mind of the radio engineer is filled with the possibilities of the utility of ultra-high frequencies.

This is not unusual as the trend of radio progress has always been toward the development of higher frequencies. Ten years ago frequencies above 1,500 kilocycles were considered of no practical value. Yet today the frequencies from 1,500 to 30,000 kilocycles provide our most useful channels of radio communication, both commercial and military. The investigation of the utilitarian value of ultra-short wave frequencies has been out of the laboratory for only a year, and in that time their usefulness for communication purposes has been definitely established.

While the terms ultra-short wave and ultra-high frequency are, at this time, but comparative, we are limited in our discussion to the frequencies between 45 and 75 megacycles. It is within this range that a major part of the present ultra-short wave development has taken place. Therein most of the experimental and practical development has given us useful data as to their adaptability to military communication.

Many ideas of the usefulness and range of transmission have been, of necessity, modified by what was found in experiments with ultra-high frequencies. Based upon the theory and knowledge of the action of the lower frequencies, the more the wave length was decreased, the greater was the distance expected from sets using the same power. Twenty meters was found to be more consistent for distance communication per watt of output power than forty meters. So it was assumed that five meters

would produce in proportion the same results. This erroneous assumption led to disappointment when the five-meter field was investigated. A distance of about six miles was about all that could be obtained from sets using these frequencies no matter what the output power. Using elevated antennas or line-of-sight transmission communication could be accomplished with very small power for distance up to twenty-five miles with little or no increase in distance as the power was increased. However what was, at first glance, thought to be a disadvantage has proven a decided asset. As we shall see from a thorough diagnosis of the characteristics of this band of frequencies it presents a field of unquestioned value for short haul, point-to-point communication.

The propagation of the carrier wave of ultra-high frequencies differs materially from that found at lower frequencies. "It is well known that skip-distance of short waves corresponding to the nearest ground strike distance of elevated rays after reflection or refraction from the ionized layer of upper atmosphere, increases with the frequency" (a theory attributed to Kennelly and Heavyside). As the wave length approaches seven meters (the critical wave length depending upon the height and condition of the ionized layer) even a ray tangent to the earth's surface is above the limiting angle and passes through the layer into space. The result is that, although in exceptional cases ultra-short waves may be reflected earthward by some elevated object such as an airplane, in general their propagation along the earth's surface is restricted to the direct ray or ground wave and there is no air wave in the ordinary sense. This limited range is of some practical value. There is no long-range interference between stations, and it becomes possible to operate many stations on the same wavelengths, if they are separated by a few miles. In military use long-range enemy interception of signals is an impossibility. Fading, in the ordinary sense, as caused by skywave variations, does not exist." (7)

The propagation of the ultra-short electromagnetic wave between two points resembles in its physical characteristics a light wave. It has been found that intervening hills, trees and buildings cast definite radio shadows at these high frequencies. As in

light, the rays may be diffracted or bent around the edges of the object, the amount of bending depending upon the rate of vibration of the electromagnetic impulses. We know that in the diffraction of the light spectrum the angle of bending for the red rays is greater than that for the violet. So in general we can state that the diffraction of ultra-short radio waves decreases as the frequency increases. (6) "The waves easily pass obstacles which are of small dimensions in relation to the wavelength; that is, a five-meter wave would certainly penetrate brush, trees, etc., for appreciable distances, though large buildings, and certainly hills, would cast well defined shadows. However, there is an appreciable diffraction of the waves, similar to the diffraction of light, around hills, etc., and possibly around the bulge of the earth. Television from the Empire State Building. New York City, is clearly received at Camp Dix, New Jersey, which is well beyond the optical range and screened by intervening hills." (2)

"Tests of the SCR-183-T4 radio set (RCA Victor Company, 5 to 6.6 meters) by the Field Artillery Board to determine the suitability of this type radio for Field Artillery use, tend to prove the theory that the sky waves of frequencies above 43 megacycles (7 meters) do not return to earth. Signals on these frequencies appear to be free of distortion due to fading, but the range is limited to the ground wave range. Tests to date indicated that within the limited power of the sets the range is uninfluenced where line-of-sight transmission is possible; in country where hills, wooded crests, buildings, etc., intervene between stations, the inter-operation of the sets is extremely erratic and their range cannot be predicted with certainty." (17) The above was further supplementd by a letter from a member of the Board: "We found five meters very temperamental and subjected to all sorts of odd effects. There is no doubt now, in my mind, that waves below 7 meters are adversely affected by the Kennelly-Heavyside ionized layer and that frequencies above 43 megacycles do not reach the 'mirror' or if they do they penetrate it or are reflected by it at such angles as to cause them to go off into infinity. At any rate only the ground wave is used." (1)

In reply to the questions concerning the action of the high frequencies and their own experience with the SCR-183-T4, the

radio engineers of the RCA Victor Company state, "that although a great deal has been learned with regard to the use of frequencies in the order of 56 megacycles, we do not profess to be able to accurately predict exactly what communication ranges may be expected under untried conditions. It appears to be obvious that intervening natural obstacles, or man-made obstacles, present an impediment to the transmission of these frequencies, but there is considerable evidence to prove that the signal, within limits, tends to fill in behind the shadow cast by such obstructions. In certain cases this appears to be by reflection and it seldom occurs that the condition is so severe that the apparatus does not produce usable results. (5)

"Numerous tests seem to indicate very clearly that elevation of the transmitting antenna will produce better communication ranges than normal increase of power using a lower antenna. The principal effect of an increase in power is to produce a more usable signal at the extreme communication range of any particular installation. The maximum range may be slightly increased, but, as stated above, the principal effect will be to improve communication within the limits of the original range. (5)

"As an example, citing the use of the SCR-183-T4 radio set, it has been found that when the line-of-sight transmission conditions prevail, the signal will become usable at approximately twenty to thirty miles. A more powerful transmitter operating at the same location and with the same antenna elevation will increase this range but slightly; however, it will tend to fill in any existing shadows. In other words, an increase in power usually will produce more reliable communication over the extreme range at which any given frequency is usable." (5)

Most of the foregoing information points out that ultra-short wave propagation is confined to the ground wave, quasi-optical in effect, and of limited use unless the transmitting station can actually see the receiving station. In order to determine the extent of the effect of intervening crests, trees, buildings, etc., in this locality, upon the carrier wave within the radius of position installations of the Field Artillery Battery and Battalion, a series of tests were made using the SCR-183-T4. Over rolling and

wooded terrain, with one station screened by low buildings and the other set up with good sight defilade, consistent communication with a signal strength of S-5 was maintained up to 5,000 yards. The first noticeable drop of signal strength was found at 7,000 yards. With one station south of Medicine Bluff 3 and the other in a ravine north of Hand Hill, an air distance of about 1,500 yards, with every possibility of long radio shadows cast by these two hills, both stations reported a signal strength of S-5. This did not change when the air distance was increased to 4,000 yards. At 5,000 yards the signal strength dropped to S-4, at 7,000 to S-3. Further tests under varying weather conditions have substantiated the foregoing results. The set with less than one watt output was pushing out strong signals through well-screened and defiladed areas up to 5,000 yards. No attempt was made to establish a line-of-sight range as the tests of the Field Artillery Board and RCA Victor Company are conclusive enough upon that phase. The difference between line-of-sight range and that found from the tests above is accounted for in the ground absorption and dissipation of the wave due to intervening obstacles, a natural phenomenon at any wave length. Undoubtedly within the radius of battery and battalion installations we may expect usable signals, without line-of-sight conditions, utilizing extremely low power.

The consulting and designing engineers for the Radio Engineering Laboratories give the following information relative to ultra-short wave propagation and set design. "Our experience along these lines has carried us back through a period of about a year. During this time we have conducted unlimited tests and experiments for various City, State, and Government offices. May we briefly summarize that a small set such as you outline could be readily used for communication services over distances up to about four miles with perfect satisfaction. The set could be made small enough for one man to transport. The batteries employed would necessarily be small in type and would, therefore, be used up quickly, but nevertheless this is not a handicap as a continuous service of 5 or 6 hours is more than enough to warrant replacement of batteries. May we state that in our tests

we have successfully communicated between two automobiles at a distance of 5 or 6 miles, the intervening territory being crowded with steel buildings, hills and trees. This test should substantiate your good ideas of ultra-high frequency communication for Army work." (4)

Amateur experimenters throughout the United States have seized upon the idea of using ultra-short waves for short-haul communication and have been able to carry on consistent contacts up to about 6 miles through every conceivable obstacle (12) (14). Within the last few months, reports of the 56-megacycle work, published in the Q S T magazine, organ for amateur radio enthusiasts, indicate that many of the irregularities and eccentricities of ultra-high frequencies have been ironed out through increased efficiency in the design and construction of sets (15) (16). The amateur has always been the leader in every major step in the utility of radio frequencies. In this new field his interest will undoubtedly produce something of decided value.

No change has been noticed in the accepted theory of the radiating properties of radio antennas at the ultra-high frequencies. Antennas do not radiate an electromagnetic wave in all directions as commonly thought, but have definite radiation properties dependent upon their physical characteristics; i.e., the Marconi, or grounded type is essentially a low-angle radiator while the Hertz is a high-angle radiator. Much of the horizontal radiation and perhaps that for several degrees above the horizontal is affected by the absorption of the earth (9). A small dipole antenna of the Hertz type has been found best suited for ultra-high frequency work (1) (12 (16). It is of small physical dimensions and readily set up. Throughout all tests of the SCR-183-T4 set a 40-inch dipole was used with good results (1).

In the radiation of ultra-short waves it becomes possible to use directive radiator systems of a size that can be conveniently handled. Recent press reports state that Marconi has devised a directive radiator by which the projected energy may be bent or curved at the will of the operator in such a manner that the beam may be focused upon any desired point outside the optical range of the set. These properties when perfected will be of tremendous value to the use of radio by the military.

There is no doubt that the advent of ultra-high frequencies has opened a new field in communication which may definitely alter the present conception of radio in artillery communication. Our present installation, using wire circuits, and placing radio as an auxiliary means may well be reversed, especially in the lower units, the battery and battalion, where extreme mobility and flexibility are essential. Fast-moving situations, the outgrowth of the age of motorization, will be the general rule of any future major conflict. Radio, not wire, will be the only means of communication capable of keeping up with the situation. This is not mere conjecture but a positive, accepted fact which an artilleryman must face if he will but analyze the requirements of mobile artillery. Heretofore radio has been a plaything, none too reliable, subject to the irregularities of untrained technicians. This is the result of the scarcity of officers who have interested themselves in the subject, obsolete radio equipment, and undertrained operators. Ultra-short wave radio has eliminated many of the bugaboos to which officers have pointed as the underlying reasons for discontinuance or non-acceptability of radio as a means of artillery communication. Most of these are evident from the foregoing discussion of the general characteristics of this band of frequencies; however, an analysis from an artillery standpoint may clarify many points.

Atmospheric interference which usually disrupts radio traffic is entirely absent at the ultra-high frequencies. This, while an asset in the use of ordinary commercial installations, is more essential to the military system which must operate under every weather condition. Heretofore every electrical storm, inexplicable condition of static, atmospheric disturbances caused by fog. rain, sand and wind made radio transmission difficult and for the most part impossible. These are entirely eliminated at the ultra-high frequencies. Think of the satisfaction of listening in the headphones of a receiver during a severe electrical storm and hearing nothing but the clear-cut signal of the transmitting station. Too, there is the entire absence of fading due to atmospherics. The operator, once he has tuned his receiver to an audible beat with the transmitting station, is assured of a note of unvarying pitch and signal strength as long as he desires. Artillery operators

trained by listening to the steady signal of a classroom oscillator will have no difficulty copying the note of an ultra-high frequency transmitter.

There is no effect of fading, in the ordinary sense, in operation during day or night. At frequencies between 1,500 and 30,000 kilocycles fading is especially noticeable due to the varying height of the reflecting layers of ionized atmosphere. Since the ultra-short waves penetrate or are not reflected by this layer and only the ground wave is used, no change is noted in passing from day to night transmission. A continuity of radio transmission is therefore assured during the most vital phases of an early morning attack. Stations may be set up at night, orders, dispositions, etc., transmitted and without change of signal strength the transmission of fire missions continued at daybreak and after. This is especially desirable as under the present use of long and short wave stations, signals which get through with excellent strength at night are sometimes lost or become too weak to copy at daybreak.

The assertion that line-of-sight transmission is essential to consistent communication and that steel buildings, trees, hills, etc., cast definite radio shadows would seem at first glance to be enough to cause even the most ardent radio enthusiast to eliminate the ultra-high frequencies as a source of artillery radio communication. This assertion has been expounded by laboratory engineers, and in many cases borne out by practical field demonstrations, yet more often than not we find that good communication has been established without line-of-sight transmission. In a point of controversy such as this appears to be, we need but recall that a few years ago, engineers, mathematicians, and a few experimenters so dubbed the present short-wave field (1,500 to 30,000 kilocycle band). Today the police system of the City of Boston is using a band of frequencies in the vicinity of 56 megacycles for consistent two-way communication between moving police cars. The electro-magnetic impulses are being received through a network of steel buildings, hills and trees with consistent results. A practical application such as this should present to the most skeptical a definite refutation of the impracticability

of ultra-short wave radio where line-of-sight transmission is impossible. We cannot deny that "intervening obstacles, or manmade obstacles present a definite impediment to transmission but there is much evidence to prove that the signals fill in behind the shadows cast by such obstructions . . . . it seldom occurs that the condition is so severe that apparatus does not produce usable results" (5). Usable results are what we are after in Field Artillery communication.

The signals of ultra-short wave radio are restricted to a local definite area and will not be heard outside this area, making it possible to operate many stations within a particular zone without interference with one another. This is useful in situations where the supporting artillery is massed in a narrow zone of action. If we consider the possible number of radio channels available compared with the number required (allowing as a minimum 20 kilocycles per channel) we will find that there will be adequate channels to carry out the most elaborate radio network practicable. Consider a reenforced artillery brigade in support of an infantry division, with every battery, battalion, and regiment, allotted separate channels with some thirty more for intelligence and administration. A total of 60 channels would be necessary. If our sets were built to take advantage of all bands between 45 and 75 megacycles we would have available some 1500 possible channels. There would be no interference from operating two nets on the same frequency provided they were separated by at least 12 miles. We could operate some 1,500 nets within a 12-mile zone, separating their frequencies by 20 kilocycles, and have no interference, an impossible feat with the present sets.

One great objection to the use of radio by the military is the interference it causes to broadcast and commercial radio in the vicinity of an army post. Using ultra-high frequencies this would be entirely eliminated.

Add to the above the limited possibilities of enemy radio intercept of ultra-short wave signals. Long-range intercept would be an impossibility. Any short-range intercept would be practically within range of our guns. Consider from a tactical viewpoint the value of messages picked up by a station within

artillery range and their practical use after relay to the rear and the time necessary for action and dissemination by the enemy intelligence system.

In any discussion of the use of radio with an artillery officer whose knowledge of the subject is limited to his own broadcast receiver or our present radio equipment, the first statement he will make will be to the effect that "the enemy will set up a static or interference machine within the area of your radio and blot out all transmission." Possible but highly improbable at the longer wave lengths but at ultra-short wave lengths it would present technical difficulties which would render it well nigh impossible.

Less power is required at the ultra-high frequencies to cover a given area than at the lower frequencies. As has been pointed out, the principal effect of an increase in power is to produce a more usable signal at the extreme communication range of any particular installation. The maximum range may be slightly increased but the greater effect will be the improved communications within the limits of the original range. As the power for the sets must be obtained from dry cell batteries carried by the operators, this particular characteristic has a decided value in determining the portability of the set. For battery and battalion installations where extreme range is not essential but portability is an item the limited power requirements play an important part. For the regiment and brigade where transportation is better and the maximum ranges increased the set is adapted readily by an increase in power.

Simplicity of construction, economy of space and wiring, play an important part in the proper functioning of any ultra-short wave oscillator. The number and size of parts must of necessity be kept at a minimum. Midget condensers and small coils are used in all oscillatory circuits. Maintenance and repair of sets are thereby simplified.

This simplicity lends itself readily to the building of rugged, portable, apparatus. Field service conditions of artillery demand a type of construction which will stand extreme abuse and still function. Due to the small number and physical characteristics

of the parts required, ultra-short wave sets can be made to stand far more rough usage than any set in present use without change of frequency or damage to parts. Portability in speaking of ultra-short wave apparatus means "capable of being carried by a single operator" without undue fatigue for long periods of time. The SCR-183-T4 set with batteries and accessories weighs about 25 pounds. The entire set could be arranged so that it could be carried by one man. There is no doubt that placing of parts and power supply of any ultra-short wave set could be designed and arranged so that a complete station, including transmitter, receiver, power supply, antenna, and accessories, could be made into a convenient load which could be carried on and operated from the back of a single operator.

Every ultra-short wave set issued to the artillery from battery to brigade could be of identical size and construction and still fulfill every need required. For the higher units an increase in the power supply to insure distance is the only change. Every part could be made interchangeable, simplifying the problem of supply. Plug-in coils could be provided to cover the entire ultra-short wave band from 45 to 75 megacycles. Interchangeability would greatly decrease the cost of manufacture. Taking the cost of parts at their present retail value a suitable set could be built for artillery use for about the cost of one 155mm Howitzer shell and charge. (Cost approximately $48.00.)

There is no doubt that the development of ultra-short wave radio has opened a field for artillery communication of unquestioned value. Its adaptability, from even a brief study, is too apparent to preclude any question of its adoption. No one means of communication has proven, in so short time, all the requisites of field artillery needs. Science has afforded a medium of communication from which a flexible highly efficient system may be developed to meet the needs of the present and future fire power and mobility of the arm.

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OFFICERS' MESSES IN THE BRITISH ARMY

FROM THE OFFICE OF THE MILITARY ATTACHE, LONDON, ENGLAND

THE importance of the Officers' Mess in the British Army is unique. The Officers' Mess may be described as the most important institution in the Army. It fits into the general official-social scheme peculiar to the Army, which may itself be considered as a large club, and according to this scheme, an officer is originally assigned to or later transferred (a transfer is a rare exception) to a regiment or similar unit only upon the approval of the Commanding Officer of the Regiment or unit, after a thorough investigation of the applicant's social and financial status. Officers request assignment to regiments for family reasons such as relatives, past and present, in the regiment, regimental station in their county or near their family seat, financial reasons as some regiments require more outside income than others, friends in the regiment, opportunity for promotion, etc. Once assigned, the officer remains in the regiment all of his service, at least until he attains the rank of Lieutenant Colonel, when he may be given command of some other regiment.

As the regiment is a social as well as an official unit, it is natural that the Regimental Officers' Mess should play a most important part in the life and *esprit* of the regiment and consequently in the general tone of the Army.

The Officers' Mess includes the Mess room proper, the club rooms, bachelor officers' and visiting officers' quarters, and often recreation and sports grounds such as tennis courts, cricket grounds and polo fields. It is the center of all regimental activities, whether official, social or athletic.

By the King's Regulations it is obligatory that every officer become a member of his regimental mess and every officer of the regiment, except a married officer whose family is resident on or near the post, is, by order, a dining member of the Mess. Officers under thirty years of age are practically prohibited from marrying, as officers below that age are not entitled to married quarters, allowances and other perquisites pertaining to marriage in the Army. The result is that all Second Lieutenants and almost all First Lieutenants are required to take their meals at the Mess and

in addition to these two grades there are many other single officers who mess there. This close daily association between officers of the same regiment over a period of many years leads to a knowledge of each other, friendships, common ties and a consequent regimental *esprit*, the importance of which cannot be overestimated.

Although married officers are not dining members, they make a point of going at least once or twice a day to their Regimental Mess to get official information, meet their friends, etc., and once a week, as a rule, a guest night is held when it is expected that all officers of the regiment appear for dinner.

An officer will not absent himself from mess dinner unless he has given due notice.

Mess furniture for use in garrison is furnished by the War Department and remains on the post. Articles required in addition to that furnished are provided by the regiments from their own funds. The dining room of the Mess is usually an imposing and dignified room, well furnished. The regiment has its own silver service, china, ornaments, etc., the latter usually being souvenirs or objects made from souvenirs. The regimental colors stand in the dining room along with other regimental trophies and historical pieces. The other rooms such as reception, reading, billiard, card rooms, etc., contain old regimental pictures, sports trophies, etc. However, in many regiments the more important objects of historical interest are kept in the regimental museums at the depots.

The importance of the Officers' Mess is shown by the fact that four pages of the King's Regulations and many pages of other documents such as Standing Orders of the Royal Regiment of Artillery are devoted to this subject.

The following is a brief resumé of the King's Regulations regarding Officers' Messes.

Every officer will be a member of his regimental mess. The Commanding Officer is responsible for ensuring that all the regulations relating thereto are observed. He will also ensure that the mess is conducted without unnecessary expense or extravagance, and by his personal example and advice will encourage economical habits and careful management. All mess bills are payable by the 7th of the month. If not paid by the 14th, report will be made to higher authority.

The cost of living in the mess will be that which obtains throughout the Service generally. This last sentence is not to be taken too literally, as the differences in costs of messes are great and the cost depends upon the regiment. Some regiments are much more expensive than others. For instance, in some messes such as the Guards regiments, certain Cavalry, Infantry, and other organizations it is customary to spend more on the mess than in the usual regiments. In all regiments the mess dines at night. Some regiments pride themselves on the regimental vintage port or sherry or something else, and these things are expensive to keep up. In the Brigade of the Guards, the necessary outside income of an officer is estimated to be a minimum of £400 per year. Practically all officers of the British Army either have incomes in addition to their pay or families who furnish allowances to augment the pay of an officer member of the family. If an officer has no, or very little, income, it is expected that, if or when he should marry, he marry someone with an income. The British officer lives a rather expensive life. Much attention is paid to style and form. It is considered incumbent upon an officer to live according to the standard set for the Army, which is high.

The senior combatant officer present at mess is responsible for the maintenance of discipline.

The president of the mess committee is the officer deputed for the general management of the mess under the orders of the Commanding Officer.

In certain Corps, Artillery for example, the messes are frequently station messes. That is, the mess and its property are permanent at the station and units as they come and go take over the messes as they find them, funds and property included. Where there are no station messes, as is normally the case with Cavalry and Infantry units, the mess, its funds and property, move from station to station with the unit.

With regard to mess personnel, the permanent staff for a mess corresponding to a regimental mess is one sergeant and five other ranks; this number is supplemented by the employment of officer servants (strikers), of which there is one for each officer.

A sergeant is allowed to act as Mess-man or caterer or superintendent of the mess-establishment, but a non-commissioned officer will not be employed in any menial capacity about the mess.

If a civilian mess-man is employed, the Commanding Officer will take steps to caution tradesmen that the officers of the mess are not responsible for debts incurred by, or on behalf of, the mess-man. When a non-commissioned officer is employed as a caterer, the mess committee is responsible for pecuniary transactions with salesmen.

A mess meeting will be held every quarter.

Before handing over the command of a unit or portion of a unit in which an officers' mess is maintained, the Commanding Officer will send the brigade commander a certificate that all debts are paid. If he cannot sign such a certificate, he will report the facts and the brigade commander will decide whether they will be paid by the Commanding Officer or can be taken over by his successor.

The brigade commander will, at his annual inspection, closely investigate the manner in which the mess is conducted, and will report to the Army Council through the usual channels should he find any infraction of the regulations.

All mess property will be insured against loss by fire or shipwreck, the premium to be paid from the mess funds.

Presents of plate from officers are prohibited.

Officers are permitted to drink the health of the King in water or other non-alcoholic beverages.

The subscriptions which may be charged to members of officers' messes fall under three heads:

(a) Initial contributions
(b) Annual subscriptions to meet ordinary working expenses
(c) Monthly subscriptions to meet incidental expenses

Regarding (a) Initial contributions, on appointment an officer belonging to a Cavalry or Infantry unit or to a Corps not having a headquarters mess, will pay to the mess funds a contribution as may be decided by the Commanding Officer, but not to exceed £4, within six months of his appointment, one-fifth of the amount in the case of Cavalry and Infantry to be credited to the Depot Mess. Where, however, a mess is not furnished at the public expense, an officer will pay a contribution as may be decided by the Commanding Officer, but not exceeding twenty-four days' pay of his rank. In addition to this subscription an officer shall pay to his depot mess a contribution not exceeding £1 if the mess is furnished at public expense.

In the case of Corps with headquarters messes sanctioned by the Army Council, such as the Royal Artillery Mess at Woolwich and the Royal Engineer Mess at Chatham, an officer on appointment may be required to pay an initial contribution not exceeding £5 to the headquarters mess. Where, however, the mess is not furnished at public expense an officer may be required to pay a contribution not exceeding thirty days' pay of his rank.

Regarding (b) Annual subscriptions to meet ordinary working expenses, a compulsory charge is made. The amount to be paid is fixed by the Commanding Officer, but it must not exceed ten days' regimental pay of the officer's rank per annum. Married officers, who are not dining members, may only be charged half this amount. Headquarters messes sanctioned by the Army Council may, if and when necessary, levy an annual subscription up to one day's pay from each officer of the Corps, whether a member of the mess or not. When this is enforced, the subscription for officers in the case of headquarters messes, mentioned previously, will be limited to nine days' pay.

Regarding (c) Monthly subscriptions to meet incidental expenses, this is a monthly charge for all incidental expenses not covered by the annual subscription and the amount is decided by the Commanding Officer, not to exceed fifteen shillings in ordinary, and twenty-five shillings in extraordinary circumstances.

Commanding Officers are held responsible that there is no undue accumulation of funds by officers' messes. In such an event, subscriptions should be reduced accordingly.

Expensive entertainments are to be discouraged and any entertainment is subject to the permission of the Commanding Officer. The sanction of an officer not below the rank of brigadier is required before an expensive entertainment may be held in a mess and for a large entertainment for which a general subscription is necessary, the authority of the division commander must be obtained. Usually these entertainments consist in parties connected with regimental race meetings, cricket weeks, polo tournaments, etc., at which dinners, balls, luncheons, etc., are given by the Regimental Officers' Mess. Officers are required to signify their consent in writing to their being charged a share in any expensive entertainment. It is the duty of the Commanding Officer to give his special countenance and protection to any officer who declines to share in such expense.

The entertainment of units on their arrival or at departure from stations is prohibited, beyond offering them the accommodation of the mess as honorary members.

When the regiment takes the field, the mess furniture is limited by the question of transport. One (1) "Cart, Officers' Mess" is allowed per unit, which carries twelve camp kettles (12 quarts), enamelled cups, forks, knives, spoons, plates, etc., for thirty-five officers. The cart also carries rations for thirty-five officers and three mess staff (less bread and cheese). Any mess requirements beyond these must be supplied by the unit, but no other vehicle is authorized for its transport. When the American Military Attaché dined with a Territorial Infantry unit in the field, the regimental mess was the pivot of all regimental activities. One large tent (like hospital tent) was used as a reception room. The ground was covered with rugs, there were easy chairs, tables, writing desks, etc. Connecting with this reception tent was the mess tent proper, with a large U-shaped table, with the regiment's china, silver service, wine glasses, etc. All officers dressed for dinner as in garrison.

Too much importance cannot be laid upon the Officers' Mess, as it is conducted in the British Army, as a medium for maintaining the *esprit* and general tone of the Army.

COMMENT BY THE MILITARY ATTACHE

From the American point of view, the great merits of the British Army officers' mess appear to be *that a suitable home is provided for bachelor officers*, which the Commanding Officer is charged with supervising with probably as great care as he expends on observing the living conditions of his enlisted men; and that an institution is created for the acquisition and preservation of regimental property and for the custody of the regimental traditions. By making these things a matter of *Regulations*, the whole proceeding is much simplified.

The use of army cooks is authorized and special training is given at the Cooking School for the cooks in officers' messes. The size of mess bills is a matter that varies with regiments and is a matter of the personal tastes of officers. The Military Attaché and his assistant recently attended a regimental dinner, that at a hotel would probably cost $8.00 a plate, and were informed that food bills averaged less than four shillings (less than a dollar at par) a day.

NOTES ON THE K METHOD OF TRANSFER

BY GEORGE V. KEYSER, 1st Lieutenant Field Artillery

RECENT firing at Fort Sill has indicated a possible extension of the K method by using the relation of the K's obtained by the batteries of a battalion. According to our regulations a K transfer is made as follows, considering range only.

An adjustment is made on a target whose map range measures 3,965. The site to the target is taken from the adjusted quadrant elevation and the range corresponding to the resulting elevation is found by reference to the firing tables to be 4,230. The ratio $\frac{\text{check adjusted range}}{\text{check map range}} = \frac{4{,}230}{3{,}965} = 1.067$ is called the K obtained by the check adjustment. To fire on another target at 4,440 yards map range, 4,440 is multiplied by 1.067, giving 4,737. This is converted to elevation, to which the site is then applied. The sum is the quadrant elevation for the new target.

The foregoing method is in reality a classroom solution rarely put into practice in the field. Although no great amount of arithmetic is involved, even that amount is avoided under disagreeable weather conditions or when several missions are received at the battery just a few minutes before the first one is to be fired. Time is gained in the problem cited by adding 35 to both terms of the fraction, making it $\frac{4{,}265}{4{,}000}$. The value of the fraction is little changed. The numerator is larger than the denominator and the K is therefore *plus* $\frac{265}{4}$ or plus 66, which means that we add 66 yards for each thousand of map range and 7 yards for each hundred. The amount to add to 4,440 is therefore 264 for 4,000 and 31 for 440, which gives 4,735 as the initial range. This method of finding and expressing a K seems to be much preferred to the three place decimal method.

Recently a battalion was placed in a position in an area about 800 yards wide. The batteries were located by a survey initiated

by the battalion staff. Targets were then located by intersection. Adjustments on a target at a range of about 3,200 yards were made by the three batteries in the order A, B, and C. From the adjusted ranges the K's were found to be:

Battery A, plus 1
Battery B, plus 6
Battery C, plus 11.

Some hours later adjustments were made by A and C batteries on a target at about 5,600 yards and this time the K's were:

Battery A, plus 21
Battery C, plus 27.

There was a change of plus 20 for Battery A, while that for Battery C was plus 16. Note that these changes are approximately equal. The only weather effect that would cause them to differ would be the effect of range wind due to the different directions of fire of the two batteries.

On another date with the same guns of the same batteries firing from the same positions, the K's obtained on the target at 3,200 yards were:

Battery A, minus 16
Battery B, minus 15
Battery C, minus 22.

Subsequently, adjustments were made on the target at 5,600 yards, giving K's as follows:

Battery A, plus 8
Battery B, plus 9
Battery C, 0.

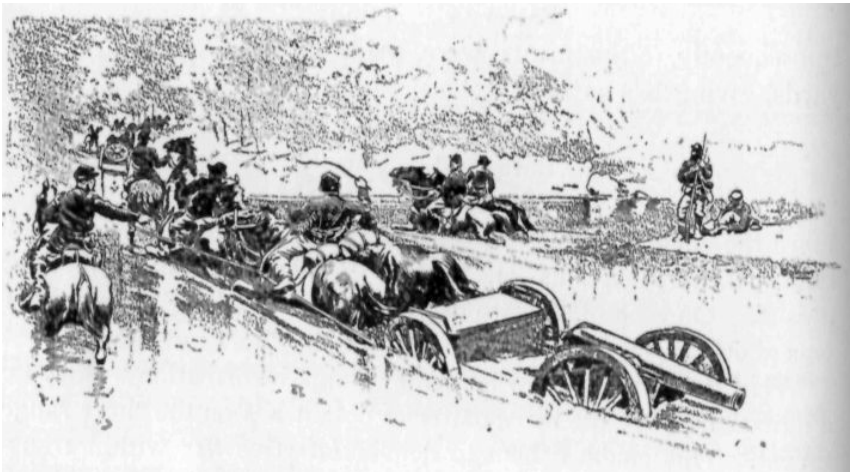
Here the changes in K between the two targets are almost identical. Battery A, plus 24, Battery B, plus 24 and Battery C, plus 22. On each of the two days the K for the long range target was about 20 yards more than that for the short range target.

What practical use can be made of this information? Suppose a situation where the three batteries obtain K's on the short range target. This enables them to deliver effective fire within transfer limits. It is also the starting point for fire direction as now taught at the Field Artillery School. As the attack progresses, fire beyond transfer limits becomes necessary. One battery is called upon to make a new check adjustment and obtain a K for a

longer range. Its K has increased by 20 yards per thousand. This increase is given to the other batteries to be applied to their previous K's. In the problem which was actually fired the new K's thus obtained would have been accurate enough to permit them to deliver very effective fire at the longer range targets.

Of further interest is the fact that on the second day's firing, Battery B fired a high burst adjustment at about 4,900 yards and obtained a K of plus 9, the same as its ground K obtained at 5,600. Had no suitable check points been available, a K obtained in this way would have been as good as the ground K.

No mention has been made of the method of computing the deflection shift. The practicability of the executive checking the direction by firing one round of shrapnel (high burst) is being studied. If such a method proves feasible, the deflection error in the delivery of fire will have been reduced to practically nothing.



THE TRAINING AND SELECTION OF THE MODERN PENTATHLON OLYMPIC TEAM

BY 1ST LIEUTENANT R. W. MAYO, FIELD ARTILLERY

THE Olympic Games consist of a group of competitive sports touching all lines of athletic endeavor. Through the efforts of Baron de Coubertin the modern Olympic Games were revived in 1896 in Athens. The Modern Pentathlon is one of these athletic competitions and was inaugurated in the Olympic Games at Stockholm in 1912. It took the place of the Ancient Pentathlon the champion in which, in the first Olympic Games, would have been proclaimed and recognized at the greatest warrior in all of Greece. The Ancient Pentathlon consisted of running, jumping, throwing the discus, hurling the javelin, and wrestling whereas the Modern Pentathlon includes fencing, pistol shooting, riding, swimming and running. At their different periods these Pentathlon events were supposed to be tests which the soldier might meet and in which he would have to excel. The Modern Pentathlon is considered in the athletic world as one of the greatest tests of endurance, coordination, and all around ability of an athlete that has ever been devised.

The events in the Pentathlon take place one each day for five consecutive days. This allows the competitor a very short time for recuperation. If a person hasn't good staying powers or cannot "come back" within twenty-four hours, he shouldn't contemplate entering this event. To acquaint one with the Pentathlon I shall describe in full the different athletic branches which it comprises.

RIDING

The riding consists of a course across country for a distance of five thousand meters during which the rider encounters about fourteen obstacles which approximate three feet and seven inches in height and up to fourteen feet in width. The horses have not been seen or ridden by the competitors until fifteen minutes before they start on their ride. These horses are gathered together and trained by representatives of the nation holding the Olympic Games. Riders draw their horses and the time of

starting by lot. The course is marked by flags, red on one side and white on the other. Loss of course means elimination. It is a race against time wherein the rider must have, not only riding ability, but also a thorough understanding of how fast the horse can go and still finish the race without deductions for time or faults. This must be determined in the first half mile and must be continually in the rider's mind during the race. Competitors are started at five minute intervals so as to preclude one rider pacing another throughout the ride. A time allowance of 10 minutes 51 4/5 seconds is set for the course and overtime is penalized at 1 point for 2 seconds.

A refusal is penalized	3 points.
2nd refusal on the same jump	6 points.
3rd refusal on the same jump	50 points.
Fall of horse and rider	5 points.
Fall of rider	10 points.

RUNNING

The running consists of a four thousand meter cross-country course over very rough and difficult terrain. Very steep hills, long stretches of sand, newly ploughed ground, knee-high heather, and sometimes obstaces up to three feet and six inches in height are normally included in the run. The course is marked with flags as in the ride and loss of course means elimination. Runners start at minute intervals. This makes it necessary for a runner to have an excellent idea of pace and his own powers of endurance. The course is unknown from start to finish, making it impossible for the runner to plan his race beforehand.

SWIMMING

The swimming consists of a three hundred meter race, partly competitive, as the competitors swim in heats of five or six. It is really a race against time for the individual time of each competitor is taken. This is another case where the contestant must know his pace for competitively he might draw a slow heat and if he did not realize this his resulting time would suffer. Any style swimming may be used. The rules are the same as those of the International Swimming Federation.

Official Photo

OXENSTIERNA (SWEDEN) LINDMAN (SWEDEN)

FENCING

Fencing generally extends over a period of six or seven hours depending upon the number of competitors. The dueling sword is the weapon used and the entire body, the target. Each contestant fights every other contestant in a bout for one touch. A win scores two points, a double touch (both men touched at the same time) scores one point each, while a loss results in a zero. This event is very demanding on one's nervous energy as well as on one's physical endurance.

SHOOTING

The shooting is at a silhouette target at a distance of twenty-five meters. Any type pistol or revolver may be used that does not have an orthopedic stock or glass sights. The butt of the

gun is held against the thigh and as the target is faced towards the firer he raises his pistol and fires. The target is faced on for three seconds and off for ten seconds. Twenty shots are fired in four groups of five each. The entire target is colored blue and the rings separating the different areas are of dark tan. At a distance of twenty-five meters it is difficult to differentiate between the colors. Also, as the target is dark, it is hard to pick up one's sights immediately. This necessitates practice over a long period to enable one to take an aim exactly at the center of the ten ring. I have seen expert pistol shots make very poor scores when they first attempted to shoot at this target because there is no definite point of aim.

* * * *

With a general idea of the Pentathlon, its requirements and limitations, one can readily see that background in each event is necessary in order to produce a winner. By background I mean long periods of training over a number of years. One can't learn to be an expert horseman in a year or two. The same is true of fencing, swimming and the rest. Also, though one has the ability to excel physically in an event, it takes years of competition to acquire the judgment to use that ability properly. A look at the leaders of the 1932 Pentathlon will prove that. The winner, Oxenstierna, was thirty-one and although on the Swedish team for the first time had trained for the Pentathlon for a period of eight years. Bo Lindman, Sweden, was second. He was thirty-three years of age and had trained over a period of twelve years. He was the Champion in 1924 and took second place in 1928. Mayo, U. S. A., third place, was thirty years of age and had a background of eight years of training being a member of the Olympic Team in 1928 and taking nineteenth place. Thofelt, Sweden, fourth place, was thirty-one years old. He had trained for about eight years taking the Championship in 1928. The above shows that it has taken these men years of effort and endeavor to attain the necessary background and skill to be successful.

An example of lack of background took place in Los Angeles in the shooting event. A member of the United States team had been shooting good scores consistently in practice. He had made

Official Photos

WINNERS ON VICTORY STAND

Left to right: Lieut. Lindman (Sweden), No. 2; Ensign Oxenstierna (Sweden), No. 1; Lieut. Mayo (U. S. A.), No. 3

a good score in the try-out. (The competition was among men with whom he had been shooting for a period of eighteen months and the real competitive feeling was missing.) Arrived the day of the shooting event, August 4th. In the two preceding sports this man had maintained a fairly good standing—6th place. If he shot as well as he had been during practice throughout the year he would stand among the first four or five in the final summation. He knew this and was visibly nervous as he took his place on the firing line. Result—he missed the target completely—twice. "Buck fever," they said, but it was really lack of background. He had had lots of practice but not enough competitions to give him confidence in himself. This mistake was not the fault of the competitor. The first five place winners in shooting were old hands at the game, having competed over a period of six to eight years.

1. Mayo—Distinguished Marksman, National Matches, Camp Perry, 1929, had been shooting competitively since 1924.

2. Oxenstierna—A distinguished pistol shot in the Swedish Army.

3. Simonetti—Member of the 1928 Italian Olympic Team and had been shooting competitively since 1925.

4. Remer—Member of the Berlin Police Pistol Team.
5. Miersch—Member of the Berlin Police Pistol Team.

With the knowledge that training over a period of years is necessary to give a candidate the necessary knowledge in each sport, one wonders about the source of material for the Pentathlon. College men surely, for where else does one find equal possibilities of training in riding, fencing, running, shooting and swimming. But even here the fact that these sports are non-allied proves a difficult obstacle. The track men are not allowed to swim because swimming softens the muscles; fencing is bad for shooting because fencing keeps one on a nervous edge while shooting is only for the calm, quiet individual. For natural athletes outside of colleges one finds a financial interference. Those who have the money to shoot, to ride, to fence do not generally indulge in those sports (swimming and running) which require more physical exertion. The reverse of this is also true. Each Olympic year we find three or four excellent civilian prospects who almost make the team. They never continue their work for the next Olympic Team and in this way never acquire the necessary proficiency and background. This is probably due to the fact that until recently there has been little interest in the Pentathlon and no Pentathlon competitions except during Olympic years. The Cavalry Club of the Southwest in San Antonio will hold its first annual Pentathlon competition in April of this year. The competition is open to all. The club members are mostly Reserve and National Guard Officers. Competitions like this would develop material needed for the Olympic Team.

The main source of material up to date has been members of the United States Army who have graduated from West Point. These men have participated in athletics at West Point and have been able to continue their interest in athletics during their spare time while in the service. Most Army posts have pools available for swimming, horses for riding, ammunition for shooting. Running may be practiced anywhere. Fencing is one sport in which practice and competition is difficult after leaving West Point. Therefore fencing, in preparation for the Olympic Games should be given consideration and in some cases preference in the formation of a training schedule.

Due to the fact that the best material comes from the Army, the Olympic Committee has delegated the Chief of Cavalry to control the affairs pertaining to the Modern Pentathlon Team. His delegates are responsible for the training and selection of this team and therefore responsible for the coaches and managers that are provided to assist this team to win its final competition. In making these selections they must understand the ability and character of these men. Perfect army officers are not all perfect managers, and perfect managers are not always perfect managers of athletic teams. A manager of an athletic team must in the first place know the event thoroughly. In the second place he must understand the psychology of handling athletes. In addition he must have those qualities necessary to the normal army officer plus a nice discernment and delicate skill of saying and doing exactly what is suitable in given circumstances. To a large degree the success of the team depends upon the manager. He makes the schedules, organizes competitions within and without the squad, and advises and controls the amounts of training in the various events. He must know conditioning. His idea of the managerial position is more the training and development of competitors than administration.

In 1928 the Pentathlon Team went to Amsterdam having completed approximately twenty hours of equitation in a riding hall. The event calls for 5000 meters cross-country ride across varied terrain over numerous obstacles 3′7″ in height and up to 14′ in width. Pace is an essential factor along with the knowledge of what horse and rider can do under strain. The result was that the U. S. Team placed low in riding. This mistake known, it was determined not to slight riding in 1931-'32. The consequence was that competitions in shooting, as previously stated, were lacking, and that running which placed averagely high in 1928 was not properly handled. The amount of time spent on running was considerable but the type of running insisted upon was the opposite from that required in the Olympic Games.

A year or a year and a half before the Olympic Games sees a group of athletes containing the best prospects for the Pentathlon gathered together at some army post. A manager takes

charge of them and controls their preparation for the Olympic Games. Sometimes this manager is in a position to advise in the selection of this material. He should make every endeavor to advise the selection of the proper kind of material. Quantity does not mean quality and quality is mandatory. Getting in poor material to train lowers the standards of the event in the eyes of the candidates and those who might be interested in future years. It takes coaching time from those who could use it to a better degree and wastes it upon the dead wood. At least after the first three or four months the chaff and the wheat can be separated. Any coach cuts down his squad after the first quarter of an athletic season. He gets rid of the worst material. Why? Because it is a well known fact that a group progresses as fast as the slower members. The coach does not want to be handicapped. The chaff must go. In this discussion we must not lose sight of the fact that men with possibilities who cannot make the grade this time should be retained with the squad for the purposes of giving them additional training and background for a future team. Every athletic coach selects new material which after experience will produce for him in the future. These men are men who have possibilities and should not be confused with the dead wood. During the training seasons preceding June 1928 and June 1932 all of the poor possibilities were kept to the bitter end thoroughly handicapping the team.

West Point and Fort Riley generally have been the places of assembly of these squads of Olympic Prospects. Before instructions are issued ordering them to report for training, a general idea of their strong and weak events is known by the manager of the team and by the delegates of the Chief of Cavalry. It is my contention that good riders should be sent to West Point and good fencers be sent to Fort Riley, etc. They should not be made to duplicate their work or spend too much time on events in which they excel. They should be sent to the place where they can get expert instruction in their worst events. Heretofore this has not been done. The whole group in 1930 was sent to Fort Riley and given a six months' to a year's course in horsemanship. Some did not need this as much as they needed fencing

Official Photo

MAYO (UNITED STATES)

or swimming, facilities for which were better at West Point. Later, this squad was sent to West Point where they rounded out their training with work in all events. Several members would have been more successful had they been stationed the whole time at one place.

Training methods used in riding, swimming, and fencing were, in my mind, as correct as could be expected, recalling the fact that these sports are not allied in any way. However, the methods used in shooting and running could be improved upon.

In athletics one improves through training and competition. Long hours of practice must be participated in in order to acquire the desired form and technique. The proof of one's skill—the proof of the value of these long hours of practice is brought out in competition. Competition brings to the surface certain fundamental errors of training. Competition makes veterans. Competition teaches one how to use his technique and form skilfully and to his best advantage. So in shooting and running we were lacking in competitive experience of the proper sort.

The art of shooting was handled for the most part by a reliable and proved pistol shot on the squad. Later, Lieut. Rehms, who had captained and coached several Cavalry pistol and rifle teams at the National Matches, spent a month with the squad. The instruction given was competent. During the eighteen months of training the squad had but four shoulder to shoulder matches with outside competitors. It is true that we had numerous matches among ourselves but "familiarity breeds contempt"—the

"air" of competition was lacking—there was no nervous tension—consequently no one ever got "buck" fever. It was just another practice to the great majority. If the possibility of outside matches were limited this oversight could be forgiven, but during the progress of the training matches could have been secured with several of the National Guard teams at Camp Smith (at Peekskill, N. Y., a few miles below West Point), the New York State Police, the U. S. M. A. Cadet Team and others. The Old Guard of the State of New York invited us to a match. It was turned down. During a six months' to a year's stay at Fort Riley not a competition with outsiders was sought.

Another inexcusable error was the lack of proper targets for practice. We did not have the proper targets to practice upon until two weeks before the opening of the Olympic Games. Throughout the training season firing was done on a black and white target the rings of which were perfectly discernible. The members of the squad at various times requested as strongly as possible that the correct targets he made available. A shooter has to get used to a target to make an excellent score. His point of aim may have to be changed or his sights readjusted. In the case of a black or dark blue target a gold bead or ivory front sight may be used. If certain changes must be made, it takes time to be so thoroughly acquainted with these changes that the correct procedure is second nature and mistakes improbable.

Certain errors in training were present in the running event. Throughout the history of the Modern Pentathlon running we have yet to find a course which has not been selected because of its rugged nature which would test the vitality and endurance of the runner. Speed, so essential on a track, must be backed by stamina and courage. The Amsterdam course had one quarter of a mile of deep sand, one half mile of ploughed ground, a mile and a quarter of knee high heather,—the rest was easy going. The course at Los Angeles contained a one half mile climb up the side of a very steep hill. So steep was the hill that only three contestants ran throughout the entire course. I have never seen a hill so difficult to negotiate on any of the typical cross-country courses. In our training for the running event we were

told that the Los Angeles course would be over flat terrain. Hill running was discouraged eight months before the games and work on the cinder track was insisted upon. The result shows that all three U. S. competitors placed very low.

Although contestants and observers may think that some one or two events are harder than the others, it is necessary for the candidate to prepare himself equally well in all of the events because all of the events receive an equal weight in the final outcome. Therefore a man should try to bring his poorer sports up to an average with his good sports and not try to excel in any one or two events.

In scoring the Modern Pentathlon the places won by each contestant in the different events are summed up and the individual obtaining the lowest total is declared the winner. The one having the second lowest total is given second place and so forth. It has been noticed in past Olympiads that the champion and runners-up may take first place in one event but that none of their places in the five events are too low. They have struggled to maintain an averagely high place in each event exerting effort to better their poorer events. It is true that one is liable to like the sport in which he excels and if not careful will try to improve this event to the detriment of the others. It is also true after arriving at a certain degree of perfection that it takes twice the time and effort to polish and improve oneself to a higher degree. Lots of runners can do a mile in 4:25 but it takes months and months of practice to improve that time to 4:20—a matter of five seconds. The Modern Pentathlon candidate must first bring all of his events up to a high average before he begins to squander time and effort in the perfection of any one event. He must also remember that these sports are not allied in any way and over indulgence in one event may cause retrogression in another. Also, the bonus for excelling in an individual event is small while that of averaging well is very large. I shall endeavor to explain this more clearly. Records will show that the leaders in the separate events of riding, running and swimming have been well out in front easily defeating the field. Yet these leaders in the individual events (specialists) ranked so low in at least two other events that their

final position was well down in the list of contestants. After reaching a certain degree of efficiency they should have done only enough work in their pet sport to have kept in shape, spending most of their time on their poorer events. Shooting, curiously, shows the reverse of this and fencing a mixed trend.

		Ride	Fence	Shoot	Swim	Run	Total
1.	Oxenstierna, Sweden	4	14	2	5	7	32
2.	Lindman, Sweden	1	2.5	19	9	4	35.5
3.	Mayo, United States	2	4.5	1	14	17	38.5
4.	Thofelt, Sweden	15	1	9	1	13	39
5.	Remer, Germany	12	10	4	13	8	47
6.	Miersch, Germany	10	10	5	17	6	48
7.	Somfai, Hungary	20	4.5	6	12	10	52.5
8.	Legard, Great Britain	6	18	10	18	1	53*
9.	Simonetti, Italy	8	6	3	15	21	53*
10.	Duranthon, France	7	7.5	18	19	3	54.5
11.	Brady, United States	5	12	20	3	16	56
12.	Pagnini, Italy	9	13	21	2	11.5	56.5
13.	Mansfield, United States	13	7.5	16	6	18	60.5
14.	Barlow, Great Britain	3	22	14	7	15	61
15.	McDougall, Great Britain	24	20	12	4	2	62
16.	Van Rijn, Holland	19	16	13	10	5	63**
17.	Naude, Germany	18	10	15	11	9	63**
18.	Benko, Hungary	11	15	11	16	11.5	64.5
19.	Petnehazy, Hungary	16	20	7	8	14	65
20.	Pacini, Italy	14	2.5	23	23	22	84.5
21.	Casanova, Mexico	24	20	8	24	19	95
22.	de Sousa, Portugal	21	23	17	21	20	102
23.	de Heredia, Portugal	22	17	24	20	23	106
24.	Morales, Mexico	17	24	22	22	24	109

*Legard wins over Simonetti by virtue of one first place.

**Van Rijn's tie with Naude decided by running, which takes precedence over other sports.

During the last three Olympic Games there has been on an average of thirty contestants from the various nations competing in the Modern Pentathlon. The winners and leaders had a high average place in each of the events. None were able to place two-thirds the way down the list in more than one event and remain high in the final standing. The above shows then that the man who has trained himself to average high in all events has a better chance of first place than the man who takes first in a couple of events and places near the bottom in one or two of the others.

A large field of competitors will show up the weakness of an individual more definitely than a small field. In an event with a field of five contenders a man might get last place and yet not be considered poor in that event for all five men might be good in that sport. However, if he received last place in a field of thirty contestants he would definitely be considered weak

in that event. Heretofore there have been about twelve candidates for the United States M. P. Team. Some of these men have been specialists in one or two events, sometimes in three, and very poor in the remaining events. The small number of men competing allows these men to place one, two or three in their special events and nearly last in their worst events and yet place high in the final analysis. These same men in a field of thirty candidates would fail to place high in the final scoring because they would lose many more points on their poor events and gain practically none in their good ones. The man who had trained to average pretty well up in all of the events would remain in the same relative position with perhaps a slightly greater total score.

I believe that some use could be made of the charts of the times and records made during the last two Olympiads. These in conjunction with the judgment of a group of athletic coaches well versed in the Modern Pentathlon should be used to make the final selections for the team. As West Point will probably always be the training grounds for Pentathlon candidates, and, as the coaches there are used to prepare the candidates in the different events, these coaches should constitute the jury to make the final selections. In making these selections I believe this group (because of their own experience in athletics) would be inclined to favor the man with the greatest amount of experience and background should there be a close decision to make. To date the three men named for the team have been those three placing highest in one competition. I believe there should be more than one competition to preclude the possibility of a good man having a bad day and therefore failing to place. Should a man with two very weak events happen to make one of the first three places due to the small number of competitors, a study of the times and records of previous Olympiads would reveal this outstanding weakness and he would not be chosen by the judges. In Sweden this past year Bo Lindman placed fifth in their final competition. The jury selected him for a place on the team of three due to his background. He won the Championship in Paris in 1924 and took second place in Amsterdam. The jury's judgment was rewarded when he again took second place in Los Angeles.

I also think that the jury of coaches should not make the selection until three weeks before the Olympic Games. This causes all candidates to be on their toes, to keep in the pink of condition, and to work to further their athletic possibilities. Heretofore the final selections have been made two or three months prior to the Games. A slight slump in a man's work thereafter has been overlooked. Athletes progress from slump to slump gradually getting better. Some athletes have longer periods of slump than others. It is also true that during this two months' period an over-zealous man might become stale. To enter an Olympiad during one of these periods would mean poor work and a low place. Selections three weeks before the Games would insure to a greater degree the choosing of men who were better fitted for the competition.

For a number of contestants the making of the Olympic Team is the big thing and the competing with the other nations in the Olympiad a natural conclusion. The big event should be the competition in the Olympiad with the winning of a place on the team as a stepping stone. I have seen some men (more or less unconsciously) slow up their training and reduce their physical output to a point where they were in poor condition for the Games. Those men slipped because they were selected too soon and felt that they had the position "cinched."

For a period of six years I have been intensely interested in the Modern Pentathlon Olympic Team, the training for a position on that team, and the final selection of those members fortunate enough to make the grade. During these six years I have come to the conclusion that certain principles in the training and selection of this team were wrong. Prior to the 1932 Games I offered these suggestions to one or two members of the selections committee. Such suggestions coming from a candidate for a position on the team had to be offered very tactfully and could not be pushed as vigorously as by a person not so vitally interested. Nine months ago I offered these suggestions to the Secretary of the Modern Pentathlon Selections Committee. This could be done more gracefully now. These suggestions met with some measure of success and I hope to have them accepted in principle for use in the preparation of the 1936 team.

RODNEY

THE R K O Studios will begin shortly the making of a moving picture based on the story "Rodney" by Leonard Nason published in the *Saturday Evening Post* of January 21, 1933. The War Department has authorized the use of the troops at Fort Myer in connection with the filming of the story and the post commander, Col. Kenyon A. Joyce, 3rd Cavalry will represent the War Department in the supervision of the work. It is expected that the 1st Battalion, 16th Field Artillery, commanded by Lt. Col. C. P. George, will furnish the troops and equipment for most of the film, but the 3rd Cavalry and the M. G. Troop, 10th Cavalry will also be used in the review scene that climaxes the story. Capt. H. W. Blakeley, 16th F. A. will be the technical advisor for the military scenes.

The *Saturday Evening Post* story was based on the history of a bay draft horse which spent the last years of a colorful career in Battery D, 3rd F. A. as a very privileged character at Fort Myer.

He had distinguished himself in Cuba during the Spanish-American war by his willingness, strength and endurance. He was reputed to have alone hauled a gun into position when all his teammates were either wounded or exhausted.

At Fort Myer, he was permitted to run loose and for some time was used to haul hay up into the stable lofts. He soon learned however that the arrival of a load of hay at stables meant work for him and his prompt departure at a gallop from the vicinity of stables when a load of hay arrived is traditional at Myer.

General Summerall, in response to a personal letter in regard to his recollections of the horse, wrote as follows:

"Among the horses taken by Grimes' Battery to Cuba in 1898, was a handsome, dark bay named Rodney after a distinguished artillery officer of the Civil War. He was, no doubt, a cross between the thoroughbred and the Percheron as he had the qualities of both. Though not as large as the Percheron, he had the massive shoulders, deep body, powerful legs and neck and the fine intelligent head of that strain. From the thoroughbred, he had inherited his courage, endurance, large nostrils and wind pipe and fine features. He must have stood 16 or 16½ hands high and weighed 1,600 pounds.

During the severe field conditions in Cuba, he attracted the admiration and affection of the men by his powerful strength as a near wheel horse of the piece and by his unfailing courage under exhausting labor in the heat and over the roadless terrain. At that time, the limbers were posted behind and near the line of guns during action. In this position, Rodney was wounded and though not disabled, his popularity was increased.

In his subsequent service, he was an object of peculiar pride and solicitude among the men. When I took command of the battery in August of 1901 at Chickamauga Park, I found him as a near wheeler. While he was outstanding as a superb animal in an unusually well mounted battery, his history increased my interest in him. The battery at once marched over the difficult and historic Waldron's Ridge for target practice and then began the seven hundred mile march to Fort Myer, Va. This service was a severe test for men, horses and materiel. Due to the fine leadership of that superb soldier, Col. Eli D. Hoyle, who preceded me as battery commander, the battery showed itself worthy of its traditions under Duncan in the Mexican War, Tidball in the Civil War and Grimes in the Spanish-American War. Throughout the weeks of constant strain, Rodney never lost a day in his harness and was the reliance of his mates in all hard places.

At Fort Myer, the battery found itself on exhibition and developed the fast parade ground and riding hall drills for which the troops at that post have long been distinguished. At the gallop or what amounted to a run, the action of Rodney was true to his thoroughbred blood.

As age crept on, he grew fat and gradually showed the stiffness that, no doubt, was hastened by the years of hard toil. Inevitably, he found his place on the spare line and instead of going out in the team, he was allowed to graze. His story became a tradition and in that fine recognition that has occasionally marked official procedure, he was retired by the War Department.

Long after I left the battery, I was told that the morning came when he could not rise in his stall. He was mercifully destroyed and buried with honors by the battery."

FIELD ARTILLERY NOTES

Fort Sill History and Museum

An effort is being made by the Field Artillery School to establish a museum of interest to Field Artillery officers and enlisted men. A history of Fort Sill is also being written.

In order that all Field Artillery officers be given an opportunity to aid in these two projects, it is requested that any officer who desires to contribute any pictures or interesting objects to the museum, or who has any document which will be of any interest in connection with the history of Fort Sill, communicate with the Secretary of the Field Artillery School

75mm Gun T2E1 (All Purpose) Battery

The recommendation of the Caliber Board that division 75mm guns have all round traverse and be capable of fire at airplanes has been given concrete form in a battery of four guns being tested at Aberdeen Proving Ground. These guns have the same tube as the 75mm gun M1, are pneumatic-tired, have three outriggers consisting of the split trail and an additional trail attached to the front of the carriage. Besides the guns the battery includes an anti-aircraft director, height-finder, electrical data transmission system, and a motor component of eleven 6-wheel 6-wheel-drive trucks and five station wagons. Upon completion of a month's test at the Proving Ground, participated in by a battery from Fort Bragg, and by Major C. C. Bank of the Field Artillery Board, this battery will receive its test by the Board at Fort Bragg.

Comparative Test of 75mm Gun Carriages

The 1st Battalion, 6th Field Artillery, has recently been equipped with new motor vehicles as a light truck-drawn battalion. Two batteries of gun carriages will be issued to this battalion in the near future, one battery of 75mm gun carriages M1897-M1E7 (M1E10) shown on page 318 of the July-August, 1933, number of THE FIELD ARTILLERY JOURNAL, and the other battery of 75mm gun carriages M1897-M1E12, a more recent design that affords more leg room for the cannoneers and offers certain advantages over the other.

MILITARY BOOKS

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

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

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

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

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