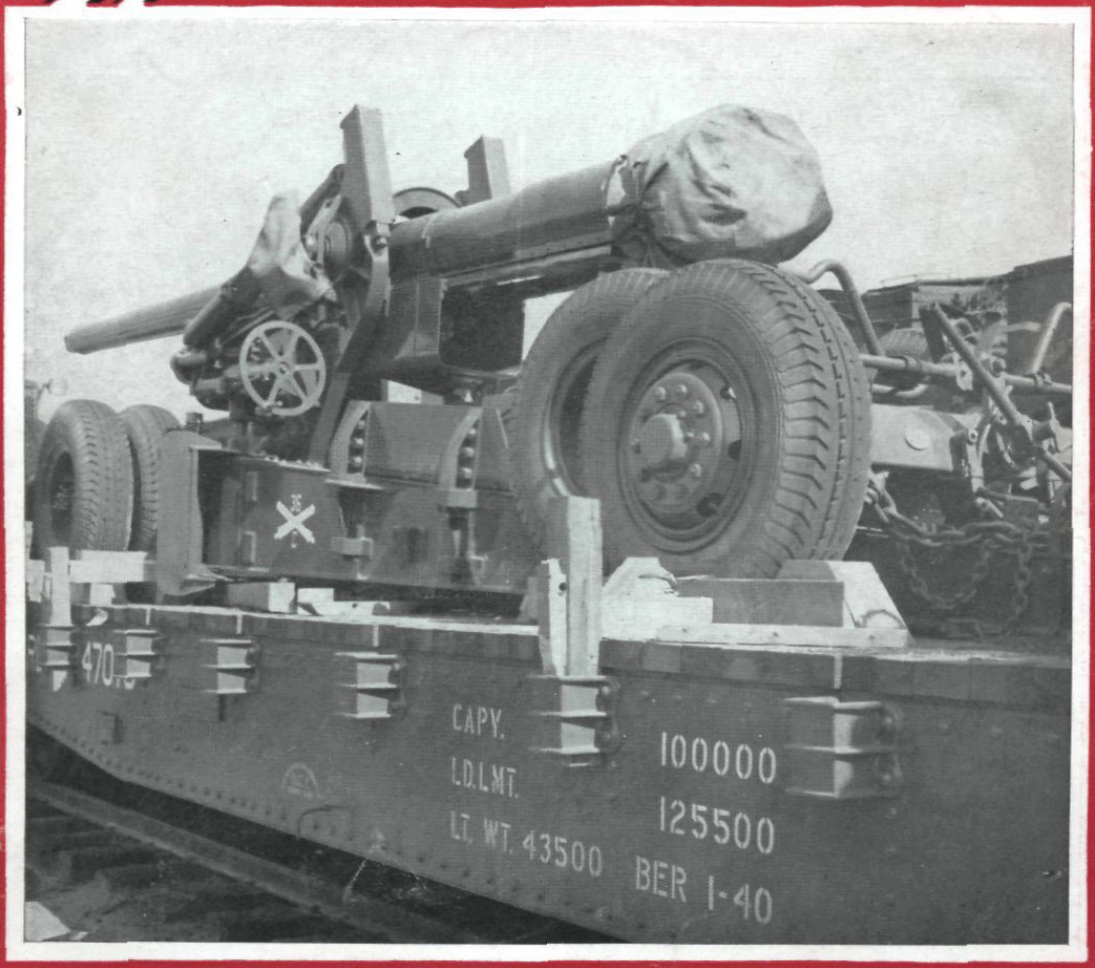
# The FIELD ARTILLERY Journal

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## The Loading of Materiel

JUNE, 1941

**MAJOR W. S. NYE, *Editor***
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THE OTHER DAY we were idly turning the pages of a back number of *Die Wehrmacht*, illustrated service magazine of the German armed forces. We noted the excellence of a series of photos showing the attack on various fortifications of the West Front.

Pioneers were shown creeping from one shell crater to another—men with grenades, wire cutters. Bangalore torpedoes. Finally there was portrayed the action of flame throwers; and men crouched on top of the forts, lowering their demolition bombs in front of the gun ports.

THEN WE HAPPENED to notice the date of the magazine: *August 30, 1939*. The day before the European War began! The photos actually were of training activities in Germany during peacetime. But they showed a preview of the exact methods used in reducing Eben Emael, Boncelles, and parts of the Maginot Line. To make sure that the photos were clearly understood there was considerable textual explanation. This information was available for eight months (or more) prior to the fatal May 10, 1940. Did anyone west of the Rhine believe what he read, take heed of what he plainly saw? Apparently not. The Belgian forts and the Maginot Line were universally (except in Germany) believed to be "well-nigh impregnable . . . would cost a million men to reduce them. . . ." So many fantastic tales have been circulated in the U. S. as to how Eben Emael and the other forts were captured, that the JOURNAL has decided to present three reasoned descriptions (including the one contained in Col. Lanza's serial) of of this type of warfare, giving fact rather than fancy.

ANOTHER BIG SURPRISE recently sprung on the world—according to the press—was the appearance in the Balkan campaign of a German "mountain-climbing tank." Again we all clucked our tongues. Yet pictures of this tank have been available for two or three years. A rather complete diagram of it may be seen in a well-known German military dictionary published before the War.

A FORMER French tank officer, now in the U. S., says that the German panzer divisions rolled past him near Rouen in small mixed groups: a few tanks, a few pioneers, some infantry, an artillery battery or platoon. In other words, the division was divided for the march into small combat teams ready for quick action. This should be considered in connection with the article "Armored Action Near the Coast."



# The Field Artillery Journal

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The Field Artillery Journal's military analyst contributes another outstanding study of current European history

# THE FALL OF BELGIUM

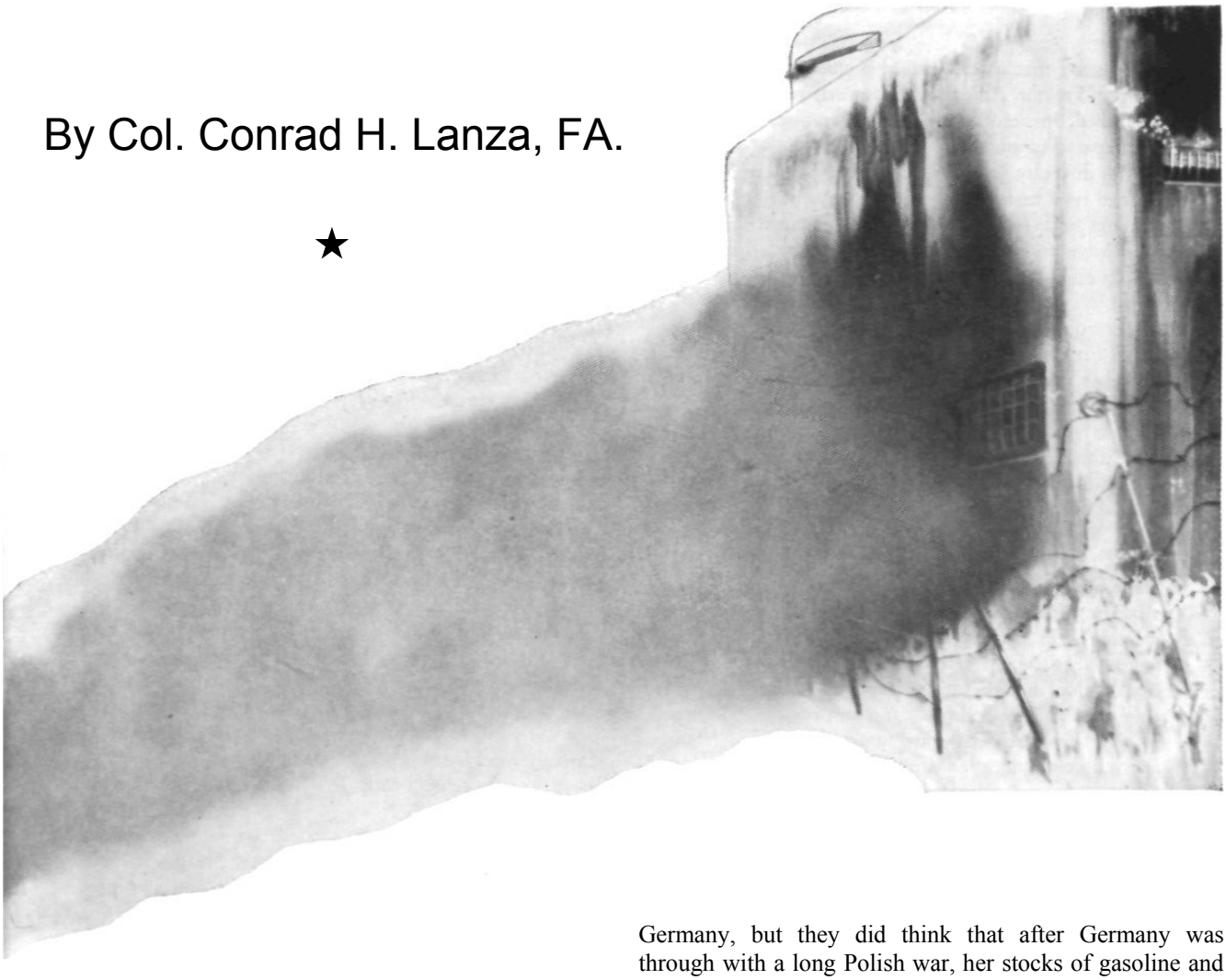
Part I

The Attack

IN
THREE
INSTALLMENTS

By Col. Conrad H. Lanza, FA.

★



### Belgium As a Neutral

Belgium sincerely desired to remain neutral in the current war. Until the last she followed a course believed most likely to secure this result. She repeatedly stated that she had no connections either with Germany or with the Allied British and French. Her military plans provided only for her own defense.

Prior to the commencement of the war on 1 September, 1939, Great Britain and France had not asked Belgium for an alliance.[1] They had offered a guarantee, which Belgium rejected. Consequently the Allies began the war without agreement for Belgian support.

They proceeded also under an assumption that Poland would engage the German army for a considerable time. *On paper*, Poland had almost as many trained soldiers as Germany, and more officers and NCOs. The Polish army was supposed to be well equipped, and its leader was reputed to be one of the best strategists in Europe. The Allies did not really think that Poland could conquer Germany, but they did think that after Germany was through with a long Polish war, her stocks of gasoline and munitions would be pretty well exhausted, and the troops in no condition to fight another serious campaign. Since the Allies had a strong front in France, the blockade, and economic warfare, it seemed that Germany could be gradually but surely reduced to impotence, and finally forced to surrender. Britain and France had no fear of Germany attacking them—this would be a desperate and hopeless move. The only outside help the Allies needed was moral, financial and economic support from the United States, and this they felt assured would be forthcoming.

The defeat of Poland within one month; statements by German authorities that Germany had more gasoline after the Polish war ended than when it began; and the unexpected efficiency of the German army led to making a new estimate of the situation.

### French Overtures to Belgium

It was now considered possible, though still improbable, that Germany might attack the west front. One way of doing it would be by going through Belgium—a time-honored method. General Gamelin, Allied C-in-C, believed that an understanding ought to be had with Belgium as to concurrent action under such circumstances. He so recommended to the French Government.

[1] At least not openly. Secret proposals, if made, have not been made public.—Ed.

He desired that at the critical moment Belgium should "appeal" to the Allies for aid, which would at once be furnished, in accordance with a complete war plan to be prepared in advance.

The difficulty was in approaching Belgium, which remained resolute in her decision to have no compromising dealings with any of the countries engaged in the war. The Allies decided to arrive, if possible, at a confidential understanding with Belgium, but in view of her attitude, to do this "off the record."

According to his own report, M. Jules Romains, the noted French author, was commissioned by M. Edouard Daladier, the French Premier, to go to Brussels and see what could be done to get the Belgians lined up to cooperate against a possible German attack, should this come through their country. Romains arrived at Brussels on 10 October, 1939. In his account he states that he had been given full authority to act as he saw fit.

M. Robert Goffin, a Belgian writer, says he saw Romains in Brussels, on the day of his arrival, and was made aware of what Romains was trying to do. By introducing Romains to key men he got him started on his mission. He made repeated but unsuccessful efforts to have King Leopold receive Romains. Goffin's explanation is that, in order to preserve the neutrality of his country, the King had made it a rule to refuse audiences to secret emissaries of warring countries. He required that all communications from belligerents be submitted through the prescribed official channels.

Romains saw the Belgian Prime Minister, the Foreign Minister, and other principal men. He was unsuccessful in his own special attempts to see the King. Romains acted outside of the French embassy, although they knew of his presence. So nothing would appear in the diplomatic files, and of course nothing in the military files.

Romains completed his visit on 16 October. On this day he received a letter from M. Spaaks, Belgian Foreign Minister, stated to have been given with the knowledge and approval of the King, and which was addressed to the French Prime Minister. Romains has not made public the contents of this letter, but the impression he gives is that it contained a statement that Belgium, if attacked by Germany, would "appeal" for aid, and that in the meantime a plan for delivering this aid might be arranged for "off the record."

Romains left at once for Paris. He was much impressed with the importance of his accomplishment and the need for haste. Late that afternoon he was in Paris. He at once called up M. Daladier, and arranged for an immediate meeting. Romains handed the letter to Daladier, and told him that under the wide latitude granted him, he had arranged that Daladier would without delay write a reply, addressed to the King of the Belgians, and embodying the terms of the proposal. Daladier agreed to do this. Handing him paper and pen, Romains suggested that he write the letter at once. He, Romains, would take this back to Brussels that very night. Then, in accordance with the understanding he had made with the Belgians, King Leopold would accept the proposition tomorrow by another letter. Romains would immediately bring this back to Paris, thus sealing the agreement. Everything would be as General Gamelin desired. The General Staff could go ahead and prepare their plan. There would be nothing on the record.

Daladier objected at being rushed into signing anything. On such an important matter he would have to consult the Cabinet. Naturally no opposition was to be expected. Moreover, he said, a letter sent to the king of an independent state should be signed by President Lebrun of France. It would be necessary to discuss this with M. Lebrun. He promised to have a reply ready within twenty-four hours.

Romains knew Daladier—knew him to be a procrastinator. He tried hard to induce him to write and sign the letter at once. He, Romains, had been authorized a week ago to arrange for Belgian cooperation. He had accomplished his mission; he had made the arrangements. Why hesitate?

Arguments failed to change Daladier's decision. He refused to sign. Neither did he have a reply ready next day. So far as Romains knows he never replied. Maybe he was not wholly pleased with what Romains had done. For he appears to have sent another secret agent to Brussels early in November. This was a distinguished French lawyer, M. Henry Torres. No report of his visit has been found; consequently it is not known what he accomplished.

Romains had, however, started something. On 24 October, Allied GHQ issued instructions for a possible advance of its forces to the line of the Escaut; and, provided the Belgians first prepared the line for defense, for a movement to the line: Antwerp—Wavre—Namur. On 11 November, the Belgian frontier guards facing France were ordered to remove road blocks and clear the way for an eventual advance of Allied troops. Work was pushed on preparing defenses for the Antwerp—Wavre—Namur line. Allied GHQ prepared march tables and made necessary preparations for entering Belgium. A certain number of railroad trains were spotted at convenient points.

## A CURIOUS EPISODE

Nothing further developed until 10 January, 1940. On this day two German majors in uniform landed a plane a short distance inside the Belgian frontier. The two officers inquired as to how to reach Aachen (Aix-la-Chapelle), not very far away, but in Germany. Seeing Belgian police coming, they expressed surprise. They dashed for their plane, seized a package of papers, and went through the motions of trying to burn these. The matches failed to set fire to the package. The two majors and the package were taken to the nearest police station.

Here one of the German officers called up their military

*The French Army digs in, preparing for their planned trench warfare*

attaché in Brussels. After a conversation which no one overheard, the German returned wearing a worried expression. He suddenly snatched the package of papers and threw it into a heating stove. It was rescued by the police. As the wrapper was very thick, the contents had not been materially damaged.

In explanation of their presence the senior German officer stated that he was on duty at the War Department in Berlin. That morning he had been given the packet of papers, contents unknown to him, and told to deliver them in person to the commanding general at Aachen, and with least possible delay. He had intended to go by rail. As he was leaving the building, he accidentally met an old friend of the *Luftwaffe*. It happened that this aviator was just about to fly to Aachen. Naturally he would be glad to have good company, and so the two majors arranged to go together.

When the plane arrived in the general vicinity of Aachen, there was a ground haze. The air officer was unable to identify the landing field. He flew around quite a while looking for it, but without success. He decided to land at the first available place; and came down where the Belgians found the plane, under the opinion that this was in Germany.

The packet of papers was later found to be a copy of a German War Plan for an attack on Holland and Belgium. According to this Plan, the main weight of the contemplated German attack was to be south of Liége, through the Ardennes, with the initial mission of forcing a crossing of the Meuse between Namur and Sedan.

Now nobody believed the tale of the two German majors. Everybody was convinced that the Plan had been planted intentionally in Belgium territory. The two Germans knew their parts, had performed their duty well, but that this was a stratagem was perfectly obvious.

There was a sharp division of opinion among the military experts as to whether the planted Plan was spurious or genuine. Those who thought it was genuine pointed to military intelligence reports that the German troops across the frontier were being trained in river crossings, which might well be with a view to passing the Meuse. Germany probably hoped that the planted Plan would be regarded as a hoax, and no attention paid to it. Others thought the Plan was spurious. They believed that a German attack would have its main weight on the north flank, and that this was a clumsy effort to induce the Allies to weaken their forces in that direction in order to concentrate them elsewhere—incidentally a very unfavorable position should the attack be to the north.

No military expert convinced any other expert. Allied GHQ heard all about the planted Plan. They decided to stick to their own plan, which was based on the *assumption* that the German offensive, if and when made, would have its main weight on the north flank. The Allies concentrated their best divisions and their only mechanized divisions on that flank; placed a smaller number of poorer divisions on their right, which rested at Sedan.[2] These troops lined up just south of the Belgian border, in a long line extending from the sea to Sedan. Through air reconnaissance and reports of agents Germany identified these dispositions; she knew where the Allied resistance would be greatest.

### Belgian Cooperation Apparently Secured

Whatever the real meaning of the planted Plan, its capture indicated (or should have indicated) to the Belgians that Germany would violently disregard their neutrality. They were afraid to enter openly into relations with the Allies, for fear of precipitating German action. They continued to maintain their attitude of neutrality, but from now on they cooperated privately (it is alleged) with the Allies.[3] The original plan of Allied GHQ, to have the Belgians "appeal" for aid at the proper moment, whereupon the Allied armies would advance in as great strength as the road system permitted, was continued. The Allies were still under the impression that a German attack through the Low Countries would be made only when the situation in Germany was so desperate that this forlorn chance would be adopted in preference to surrendering. Belgium was instructed to hold out for two days to enable the Allies to arrive on the front. It was believed that this could easily be accomplished.

On 14 January, the town majors in the Ardennes were advised that French troops might assist in the defense of Belgium. To previous instructions as to billeting of foreign troops were added orders to keep roads from France open. Road blocks facing Germany were to be retained. The Belgiums were advised as to how French troops were uniformed, to avoid possibility of their being mistaken for the enemy. Issue of Belgium equipment and stores to Allied troops, as necessary, was authorized.

### The Belgian Defenses

Allied GHQ completed their plan for an advance into Belgium. Everything was arranged to the minutest detail. Initially a main line of defense was to be prepared by the Belgians. Starting at Antwerp, a permanent fortress, the line passed by Keerbergen (near Malines) — Louvain—Wavre—Gembloux—Namur (another permanent fortresss) —thence following the Meuse to Sedan. The line for short was known as the K-W Line,[4] from two prominent centers of resistance. It was bow shaped, covered the most important places in Belgium, except Liége, and was about 150 kilometers in length. Liége was a fortress, with an independent garrison, and was to hold out whatever happened.

The main enemy attack was expected to come from north of Liége. The main line of resistance to meet this was the Albert Canal, which starting at Liége followed

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[2]This is considering only that portion of the French armies which, pivoting on a point just north of Sedan, were to wheel into Belgium.—Ed.

[3]However, see statement of Ambassador Cudahy, *Life*, November 25, 1940.

[4]Otherwise known as the Dyle Line.

close to the boundary, gradually curving west, and extending to Antwerp. This canal has been reconstructed with high vertical banks, and deep water, especially with a view to being an obstacle to an invader. The part of the Canal which was threatened was the east sector, about 60 kilometers long. Ten divisions were available to defend it. Seven divisions appear to have been in reserve, at the disposition of GHQ.

Utilizing the unfordable Albert Canal, the fortress of Liége, which had been extended to the north by a very modern fort, Eben Emael, and the difficult Ardennes country, south of Liége, the plan called for the Belgians to keep the enemy away from the K-W Line for two days, the estimated time for the Allies to reach it. Whether they would then hold it, or advance beyond would be determined at the proper time according to the situation. The Belgians had 20 divisions for this mission, exclusive of the garrisons of Liége and Namur.

During the first two days, the plan provided for a strong French army to pass along the coast, through Antwerp, into Holland. It would contain mechanized and motorized divisions, and would within two days be ready to attack the right of any hostile force attempting to move north of Liége. The communications of this army were outside those of the Allied troops advancing to the K-W Line. These would confine themselves to the sector from Louvain south. If necessary for the covering Belgians to retreat, they would withdraw to the sector between Louvain and Antwerp. All this, of course, depended on the Germans doing what it was assumed they would do.

The Belgians worked hard on the K-W Line. Reenforced concrete pill boxes were constructed at average distances of 400 meters. Command posts were selected and marked; lines of communication were laid. OPs were established; battery emplacements and firing data were prepared. Maps were provided; everything was camouflaged. Antitank obstacles protected by 47-mm. antitank guns were all along the front. Routes to positions were marked. As far as was humanly possible, preparations seemed to be complete. The K-W Line was Belgium's iron wall for the decisive defense of the country. It was supposed to be all but unassailable.[5]

*The French trenches were carefully prepared*

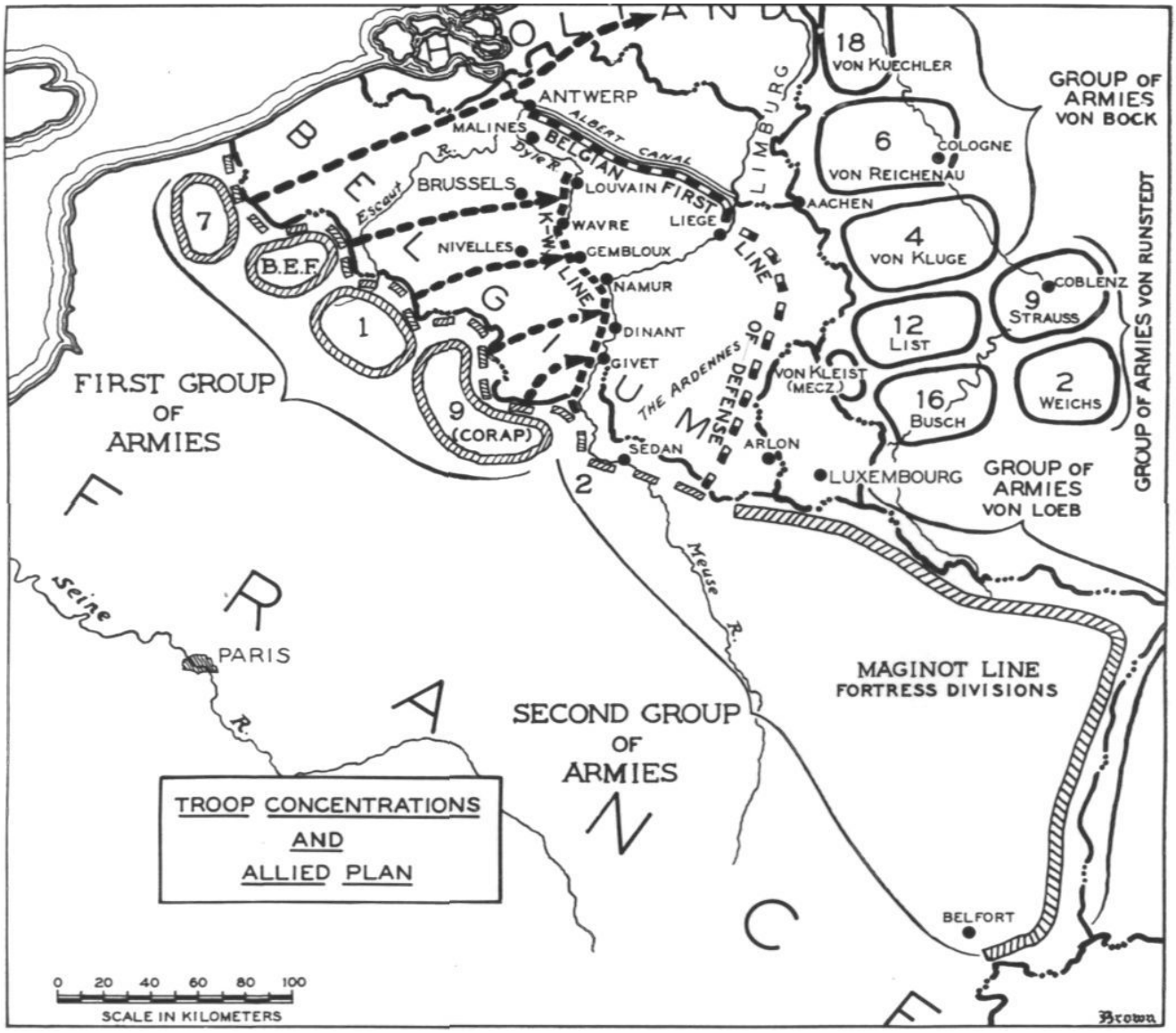
### BELGIUM'S TIME APPROACHES

April arrived. Finland had gone down; Denmark and Norway had been seized by Germany. Belgium had no illusions as to German respect for her neutrality, should it be to the latter's interest to disregard it. But she still hoped that Germany would not find it desirable or necessary to invade her territory.

The French and British peoples, to say nothing of the Americans, had by this time become incensed over the failures to save Finland and Norway. They were solidly opposed to allowing Germany to seize any more small countries. They made this plain to the governments of Great Britain and France. Public pressure was strong on the Allied governments for action. Contrary to this trend, Allied GHQ began to doubt the advisability of trying to save Belgium by advancing into that country.

Captain Maurois, French liaison officer to British GHQ, says he saw General Gamelin, who told him that "in this war, the first one who comes out of his shell will be in great danger." The impression Maurois received was that Gamelin had no intention to advance, but that

[5]The Belgian fortifications were indeed formidable; their very strength possibly contributed to the Belgian downfall, in that too great reliance was placed on a static defense.




an order to do so was forced on him by higher authority.

Colonel T. Bentley Mott, U.S.A., at one time our military attaché at Paris, and an old resident of that city, states that Gamelin's chief of staff, General Georges, wished to mass the Allied forces near the Belgian frontier, not to advance, but to receive the German attack on the line that had been carefully prepared.

M. Baudoin, French Foreign Minister, in a statement made on 5 July, 1940, states that the decision to advance into Belgium was made on England's demand. He does not claim that the French government opposed the idea.

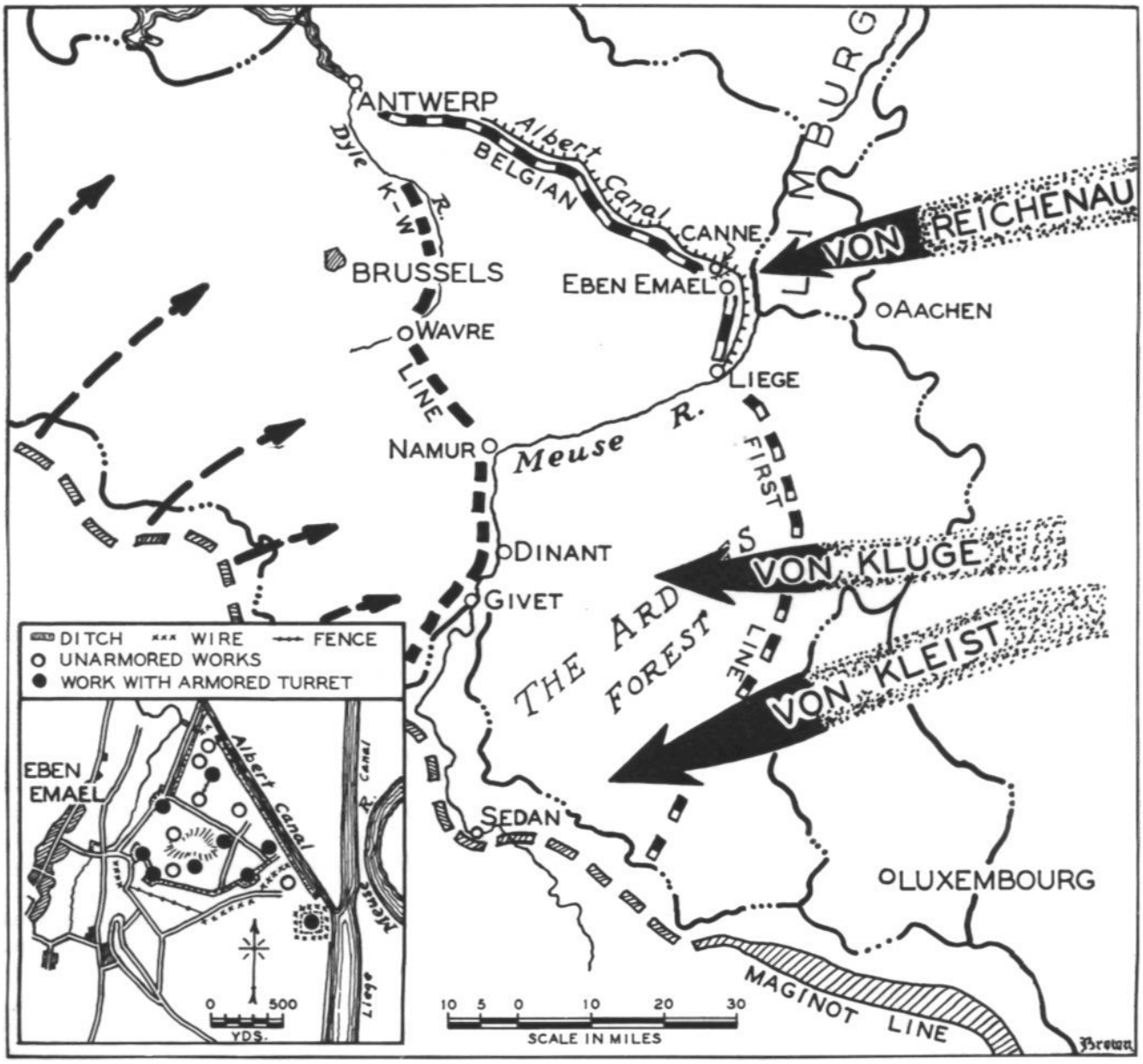
The best available evidence appears to be that the French and British governments, in view of the strong public sentiment against allowing the Belgians and Dutch to fight alone, disregarded the opinion, or change of opinion of Allied GHQ, and decided to go to the help of the little nations.

Early in May, 1940, reports from agents indicated that about 55 German divisions were opposite Holland, and about 25 opposite Belgium. They had been there for some time. Germany explained that these troops had to be put somewhere, and that it was natural to have them opposite her west frontier. They were not threatening anybody. They were engaged in routine instruction. This coincided with the reports from the agents.

Allied G-2 was of the opinion that the location of the mass of the German troops well to the north favored the assumption that if an attack was launched, its main weight would be directed across south Holland, and north of Liége. The number of divisions reported agreed with former estimates of about 80 divisions in line. Probably about 30 more would be in reserve.

### Final Alarms

On 7 May Holland alerted her army. From diplomatic agents in Rome and Berlin she had received word that Germany was about to send an unacceptable ultimatum, and would follow it up with an immediate attack. The Dutch called out the reserves, manned all posts, stopped leaves, seized everyone suspected of being a possible fifth columnist. The dykes were opened, and the country flooded in front of the main line of resistance.




*German plan of attack*

Thus Holland sounded a loud alarm. She notified the Allies as to what she was doing; sent sealed instruction to her ministers at Paris and London, containing an "appeal" for aid, to be opened by the Dutch ministers if, and when, they received a certain code message, whereupon the "appeal" would be instantly delivered.

Next day Belgium and the Allies were also alarmed. They consulted with each other. According to a speech made later by Hitler (19 July, 1940), German agents had cut in and had listened to the phone conversations between the governments at Paris and London. He states that the conversations resulted in a decision to march the Allied armies into Belgium. He received this information so late on the 8th that he could not act that night, but determined that the thing for him to do was to seize the Low Countries first. He consulted his friend Mussolini. His decision was to strike at 5:35 AM, German time, on 10 May (4:35 AM Allied time).

The Allies have denied they made any such arrangements by phone. Whatever the method used, in view of General Gamelin's objection, and the supposed emergency created by the Dutch alert, a decision had to be arrived at as to whether an advance into Belgium would or would not be made. They decided that it would; it is not impossible that the German secret service did find this out.

But the Allied agents did not discover the German decision.

Dawn of Thursday, 9 May, found Belgium and the Allies in an anxious mood. Brussels in particular was greatly concerned. But during that morning good news arrived. It now became known that on 7 May two suspicious Germans had been seen leaving Berlin. At the time, it was understood that they were en route to The Hague bearing an ultimatum. Forty-eight hours had now passed, and the two Germans had not been reported anywhere in Holland. The original report could therefore

now be assumed to have been erroneous. The danger was over. Europe could breathe again.

There was confirmation that the alarm had been a false one. Secret agents advised that everything in Germany was normal. Troops were at their customary drills; no troop preparations nor movements anywhere. The OPs which overlooked the frontier, statements from travelers from Germany, press despatches, the fact that citizens were freely crossing over into Germany and back, confirmed the deduction that if Germany intended to attack, it would not occur at this time. Holland wired that she had arrived at the same conclusion.

Around 5:00 PM King Leopold personally told the American ambassador that the danger had passed, and that there need be no anxiety as to the immediate future.[6] Two hours later the chief of the French Secret Service in Belgium reported that everything on the frontier was calm. He was satisfied that nothing would happen for a long time. It would take several more weeks for the Germans to rest and reorganize from the Norway campaign. He was so sure of this that he was preparing to go to Paris next day on week-end leave.

### THE EVENING OF MAY 9TH

The Belgian Chief of Staff released the GHQ officers that afternoon at the close of business hours. The troops in line on the frontier were advised that the alert was off. Mindful that next day was Friday, commanders were authorized to issue the usual week-end passes, and to grant leaves and furloughs in the regulation number.

The GHQ staff gladly gathered their papers into drawers and baskets, locked their desks, and departed. After two days and nights of work and vigil, they had visions of comfortable homes, good meals, baths, visits to the movies, recreation and rest.

Of course, the GHQ command post was not wholly abandoned. There still was a war, and anything might happen. An officer-of-the-day, with assistants, was left to hold the office down and take care of routine messages. He had the phone numbers of key officers just in case something came up which he could not handle and which couldn't wait until morning.

The officer-of-the-day settled himself to spend a long night. Nothing to prevent his reading, or watching the crowds outside. All of Brussels was happy that evening. The strain had disappeared, streets were filled with people, theaters were crowded. Military and civilian, everyone was in good humor.

During the early evening nothing arose to disturb the general feeling of security. The officer-of-the-day was unable to take part in the rejoicing, but he appreciated it. He was able to take his dinner in peace, was free to talk to his assistants, to wander around the building.

About 8:45 PM he heard a buzz. It was the phone. Long distance stated that Berlin was calling. The operator being assured that the officer-of-the-day was answering, the connection was completed. It was the Belgian military attaché. He had a message, but refused to say what it was, insisting in giving it in code. So the officer-of-the-day got a pad and pencil, and proceeded to take down a code message. He was rather slow at this, and before he had gotten far, the connection was interrupted. The officer-of-the-day called long distance back, stating that he had been cut off before the communication had been completed. He requested that he be reconnected. After several attempts he gave it up; it was impossible to get Berlin.

The officer-of-the-day wondered what the code message could be about, and whether enough of it had come through to make any sense. He sent it to the code-room detail, to see what they could do with it. Once more he had nothing in particular with which to occupy himself.

Not for long. Buzz, buzz, buzz. He picked up his phone. Again it was long distance. But it was not Berlin as he had hoped—he did want to get the rest of that code message. This time it was the CP of the Belgian 1st Division, which was in line south of Liége, covering the Ardennes. General de Krahe, the division commander, was speaking.

The general stated that a civilian living in Liége had called him up just a few minutes ago, and had told him that a friend had just returned from Aachen, Germany. The friend had stated that Aachen was overflowing with troops of all arms, marching west, that these troops had full issues of ammunition, and that a soldier had said that they were en route to attack into Belgium early next morning.

The officer-of-the-day doubted whether this tale was true or warranted any action. While he was thinking this over, he received the translation of the code message. It read:

*SECRET:* The (German) General Staff has issued orders for a lightning attack on Belgium and Holland, tomorrow morning. . . .

The officer-of-the-day realized that this required action. He called the Chief of Staff; told him about the two messages. The Chief of Staff directed that the key officers report at GHQ immediately. He did not at this time authorize an alert. Either on his own initiative or by the direction of the Chief of Staff, the officer-of-the-day had Holland informed of the news, through their military attaché at Brussels. There is no record that France or Great Britain were informed.

It seems to have taken some time to corral the key officers. It was around 11:30 PM when they were assembled. The Chief of Staff was present, also King Leopold, who had designated himself as the C-in-C of the Belgian Army. The question before the conference was what was to be done about the two messages. There had been no confirmation during the interim. On the contrary, there was a report from Holland that everything seemed normal.

"What the civilian said the friend said that the soldier

[6]Mr. Cudahy thought otherwise. His military attaché, Col. Brown, had consistently advised him of the imminence of the German attack. See FIELD ARTILLERY JOURNAL, September-October, 1940.

*Advance into Belgium, German armored scout cars cross the border without meeting resistance.*

said" was very indirect. Countless similar messages from well-meaning persons were constantly being received. They were uniformly unreliable. Yet there was always the possibility that sometime one might be true. The message from Berlin was positive. Nobody could tell how the Belgian military attaché had found out that the German General Staff had issued orders for an attack next morning. The fact that the telephone communication had been interrupted was disquieting. Taking everything into consideration, it was best to play safe. Much as they disliked doing so, it was decided to alert the troops again. The conference came to this decision just about midnight.

The King left at once for his field CP. The alert reached the divisions about 12:20 AM. The troops were at once turned out. How they grumbled and expostulated! They had just had an alert, and upon being dismissed had been told that very afternoon that there was no further danger; that passes and furloughs were again available. Training was necessary, but there was a limit to everything. They were sick and tired of alerts. What the soldiers said about the G-3 Training Section would not look well.

WAR

At 1:30 AM, 10 May, each division received a code message of one word:

RENÉ

It electrified the Army, for it meant:

"This alert is not a drill. It is real!"

It was at once communicated to the troops. No more grumbling and growling. Officers and men were ready to fight for their country, and if this alert was for the protection of their beloved homeland, they were ready to die, if need be, to keep an invader out.

About 1:45 AM, Fort Eben-Emael, a huge work north of Liegé, fired six signal guns. Designated batteries to right and left repeated it. The whole front heard. This was a conventional sign meaning:

"From now on, use live ammunition."

The troops became grim. The cannoneers loaded their pieces with HE shell, and laid the guns on their barrage lines. They stood by the lanyards ready to fire. Communications were checked. The OPs redoubled their vigilance. Machine-gun crews inserted belts of ball cartridges into their guns. The antiaircraft batteries prepared to illuminate and fire on any hostile planes attempting to cross the frontier. The Belgians stood waiting in the early hours of May 10 to meet the mighty and dreaded German hordes.

The first signs came at 4:15—a rumbling of hundreds of planes to the east. The antiaircraft defenders stood tensely by. Now the planes could be seen, flying very high—straight from Germany going west. In a few minutes they were nearly overhead. Right on over the frontier they flew. The antiaircraft guns opened fire. War was on.

The OPs estimated that at least 200 and maybe 300 hostile planes flew north of Liége. More passed to the south; their number was not reported. The fire of the antiaircraft artillery was intense. Every battery within range fired. As far as could be observed, there were no hits. The targets were very high.

More planes followed. Again the antiaircraft batteries fired. Same results as before—no hits. Still more planes came.

### GERMAN ARTILLERY OPENS FIRE

At 4:35 AM a sheet of flame arose on the German side of the frontier. The artillery preparation had started. South of the Dutch frontier it was directed against the defense works. At the same time these were attacked by bombers. They bombed intensively, wave after wave, then machine-gunned the defenders, and returned to Germany for more ammunition. While they were so absent, other waves of planes took their places.[7] The artillery fire never let up, either. The front line was smothered with shells and bombs.

At exactly the same hour every airdrome in Belgium was attacked. Most of the Belgian air force appear to have been caught on the ground. At Schaeffen 42 planes were destroyed. The airdromes at Nivelles and Zoute reported that all their utilities had been blown up, and that all their planes were wrecks. Important railroad junctions were also bombed.

The German attack south of Holland was directed against the defense works of the covering troops. No great progress was made, but the Germans reached to near the outer ring of the Liége forts. Heavy artillery was brought up and emplaced, and fire opened on some of the forts.

North of Liége, Fort Eben Emael was 12, and the Albert Canal 6 to 12, miles from Germany, with the Dutch province of Limburg in between. The Dutch made no defense in this sector. German divisions at 4:35 started across the Dutch territory. The leading elements were reconnaissance detachments, which arrived opposite Fort Eben Emael and to the north thereof around 5:30 AM. Artillery came into action about 6:00 AM. Main bodies arrived later. First German efforts were to secure the few bridges over the Albert Canal.

The Canal contained barges on which civilian crews lived. Nobody had thought about getting these out of the way. When the antiaircraft batteries started to fire, the barge crews wildly called for help. Nearby troops helped them to safety. The soldiers carefully tied up the barges on their side of the canal; they did not stop to think that this might be very useful later to the enemy.

At 4:35 AM German parachutists came down around the Albert Canal bridges. Their mission was to prevent the destruction of these bridges, until the reconnaissance detachments arrived and seized them. The parachutists were immediately seen; everybody went gunning for them. They were not all captured or killed, but as far as the record shows they did not accomplish their mission in a single case.

### EBEN EMAEL

One of these parachutist detachments landed on the Belgian side of the Canal to seize the bridges opposite Fort Eben Emael.

Fort Eben Emael was a huge work of irregular shape, consisting of a series of cupolas and reenforced concrete works surrounding a central area. Roughly it was about 2 kilometers from north to south, and nearly as deep from east to west. The central part was a hill 250 feet higher than the line of works. The armament consisted of two 120-mm. guns, 30 guns of 60-mm. and 75-mm.; 40 machine guns, mounted in 20 pairs; besides numerous automatic rifles. For night defense there were fifteen 16-inch searchlights. The fort had its own power plant, hospital, and usual utilities; and rations, supplies and ammunition estimated to be sufficient for 30 days. The garrison numbered 1,200. They had long prepared to defend the fort, and had complete plans. The general opinion of the garrison was that, in view of its great strength, which must be well known to the enemy, there would be no attack. It was a surprise when the attack did come.

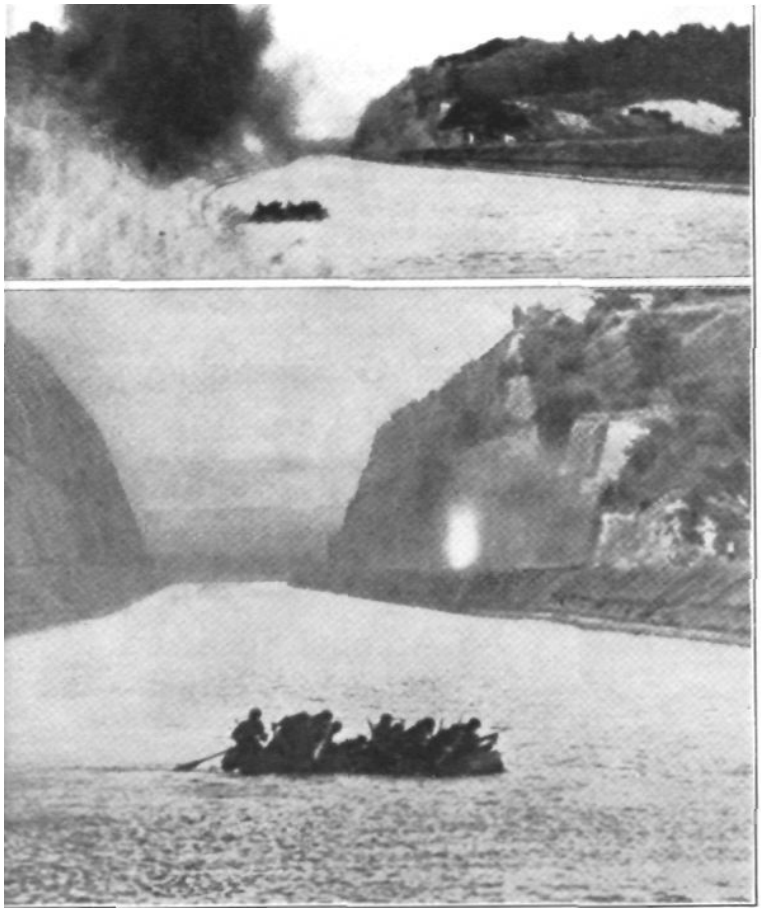
Unlike the troops belonging to divisions north of the fort, Eben Emael had no men available for sorties. While the parachutists elsewhere were vigorously attacked, those in the fort's sector were only fired on. The parachutists found cover and held on. They did not save the bridge, which the garrison blew up by electrical arrangement before the German reconnaissance detachment arrived. The latter therefore found itself separated, by the Canal, from the parachutists, who made their presence known to their comrades by frantic signals for help.

The Germans had detailed *only one battalion of engineers* to seize and hold fort Eben Emael. But it was a specially-trained assault battalion, with the platoon of parachutists attached. The commander was a Lieut. Colonel Mikosch. He decided to attempt to cross the Canal by use of inflated rubber boats, but had to wait until artillery support could be secured. About 12:00 noon an antiaircraft battery was made available to him. Using this for direct fire, and to lay a smoke screen, the passage of the Canal was started at a point about 2,000 meters to the north of the fort, near a small village called Canne which was occupied by Belgian infantry.

The passage of the Canal turned out to be most difficult, owing to the high steep banks, which were almost vertical. Hard to get into, it was harder to climb out of on the far side. It took all afternoon to get one company over. This company attacked Canne, and captured it, taking some prisoners and considerable materiel. They then started south towards Eben Emael.

It was found that the Belgians had opened the locks of a branch canal extending at right angle to the Albert Canal. The terrain was flooded and impassable. The Germans had known about the branch canal, but had not foreseen the possibility of flooding south of Canne. They were thus still separated from the fort by a water obstacle. The parachutists who were beside the fort were

[7] A German aviator, who participated in this, says that all day and night German planes by the score were constantly landing on and leaving the airdrome at Aachen, being directed on split-second schedule by dispatchers using huge loudspeakers which blared out over the field.—Ed.



*Squad of German pioneers under Sgt. Past Steffen crossing Albert Canal under fire from batteries of Fort Eben Emael.*

still isolated. A reenforcement of more parachutists was successfully dropped and joined the first set, but were unable to accomplish anything except to maintain themselves in and between the fort's cupolas and works.

While the engineers were attacking the exterior of Fort Eben Emael, about 50 parachutists were dropped on the high ground *inside* the fort. The Belgians had no plan against an attack from the interior, as this had not even been thought of. Some defenders were withdrawn from the south and west faces, which did not appear to be threatened. It took some time to do this, and when the men were assembled, they had no suitable equipment for fighting in the open. A telephone message was sent to the adjacent 7th Division for assistance. The 7th Division sent a company of infantry which arrived about noon, and immediately attacked the few German parachutists within the fort. By 2:00 PM no Germans remained there. Seventeen prisoners had been taken.

The prisoners were young men. They stated that they had started from Cologne in transport planes, I officer or NCO and 12 men per plane. The officer jumped last. The entire detail had been trained on a full-scale model of Eben Emael, and the men were consequently familiar with the appearance of the fort, and knew exactly what to do after landing. Their duties were to inject explosives into small openings around turrets and ventilators. So far as known, this detail did not accomplish very much.

Colonel Mikosch determined to continue the attack by attacking over the inundated ground north of the fort. The inflated rubber boats had been punctured by enemy fire. They were repaired, and after dark the crossing was started. It was past midnight when everything was ready. A NCO with 50 men crossed first. The fort was using its searchlights to illuminate the foreground, and kept up a severe fire on anything they saw. The 75-mm guns had star shells; these were used to illuminate places not covered by the searchlights. In spite of these aids, the Germans by using great caution got the men over with very little loss.

At 5:30 AM, 11 May, the first of the German engineers contacted the parachutists,[8] who had by this time been isolated for 24 hours. The rubber boats made repeated trips, and brought over more men and materiel, including a battery of antitank guns.

At 10:00 AM, everything needed being over, Colonel Mikosch ordered an attack on Eben Emael by his entire battalion. The attack was made by small groups, covered by the fire of the antitank battery and the antiaircraft battery still on the other side of the Albert Canal and which appears to have had enfilading fire. The batteries were close to the targets, in some cases not over 300 meters away. Nearly all rounds were hits. The attackers crawled over the ground, protected by the artillery fire and by smoke screens. Flame throwers were used to lay down dense smoke. A single German soldier slowly, carefully inched his way under this protection up to a cupola. He reached the cupola; hoisted himself onto the roof. He was in full view from the outside, but the Belgians inside suspected nothing. They kept up their fire. The German soldier lowered a charge of HE in front of the cupola, close to the porthole. The Belgians never noticed it. The German soldier lit the fuze, hurried away, reached cover. A tremendous explosion followed; the cupola was out of commission.

Other cupolas and machine-gun emplacements were attacked by placing strong detonating charges at their base. When they exploded, pieces of guns, steel, and concrete were hurled in all directions. The attack made progress, the defensive works were destroyed in succession. So well was everything going that Colonel Mikosch, who had limited the detonating details until he could see what would happen, increased them at 12:00 noon. More Belgian defenses were blown to bits.

At 12:15 PM, Fort Eben Emael ceased firing. A few minutes later a white flag was hoisted. The garrison surrendered. It had taken a little more than one day of attack since Colonel Mikosch began crossing the Albert Canal to capture what was reputed to be the most modern and unassailable fort in Europe. There were about 100 Belgian casualties; 1,100 were taken prisoners.

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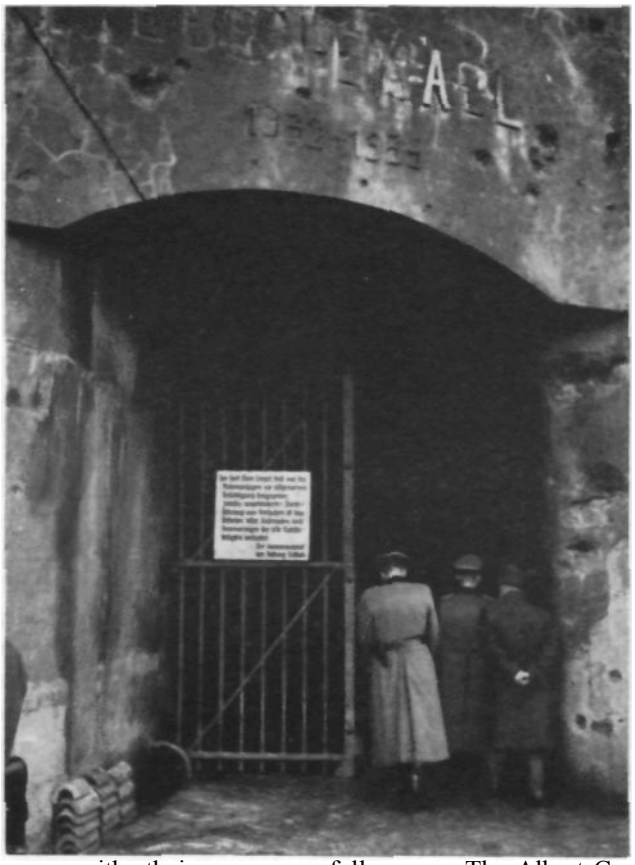
[8]Those who were *outside* the fort, but across the Canal.—Ed.

(*To be continued*)

# HOW EBEN EMAEL WAS TAKEN



*Entrance to Fort Eben Emael*

By
Lieut. G. Sprengling, FA-Res

(*Photos by author*)

## An Account Received from Germany

During the first eight months of this war, Germany's borders in the west and south were ringed by a chain of forts. They seemed an impassable barrier, buried deep down in the ground as they were, with their guns carefully calculated to sweep every inch of the terrain for miles around almost automatically. Then, in a day, they were gone. In the first World War, the Belgian forts had also been battered out of existence by the German heavy howitzers. Then, though, it was artillery against artillery. The better guns won, and the case for the fortress did not seem hopeless. The errors of those forts had been corrected in the new ones that took their places in the meantime. Now the new ones fell more quickly than the old. On the sea, the airplane and the submarine have raised grave doubts in some quarters as to the viability of the heavy battleship in modern naval warfare. Are the same doubts justified with respect to these land battleships? Where was the error of the French, Belgians and Dutch in the building and defense of their fortifications and can these mistakes be avoided?

The outpost of the Belgian line of fortifications was the fortress of Liége. The strongest of the forts that surround the town is the Fort Eben Emael in the north, opposite the tail end of Holland which contains the town of Maastricht. It was designed to join onto the Dutch system of forts, and to prevent an invader from outflanking the forts of Liége by advancing through Holland.

The Albert Canal cuts a twenty to fifty yard deep gash into a gently rolling terrain here, and the guns of

*A machine gun nest on the top of Eben Emael. The machine guns here should have been able to sweep the top of the fort and prevent landing by parachute, but the crew were either absent or asleep on May 10, 1940.*

the fort can control all the country on the other side of it and far into Holland, as it lies on, or rather in, the top of an elevated plateau on the southwest bank. Moats drawn along the sides of the hill and flanked by outworks further protect it, and in case of need, damming a brook will flood all the meadows around. The main part of the fort consists of a maze of 40 to 50 kilometers of rooms and corridors as much as thirty-six meters underground. The only targets showing above ground are the mushroom-like gun turrets of heavy armor steel, and these would require direct hits from a heavy caliber weapon to crack them. At the respectful distance to which the guns of the fort should force vulnerable enemy heavy batteries, a direct hit would be difficult or impossible.

All in all, that would seem to be a very hard nut to crack. Yet in the gray dawn of the tenth of May last year, seventy-two German parachute-jumpers, a mere handful compared to the garrison of twelve hundred men, drifted silently down onto the fort out of the haze, with orders to take it. And with the help of one squad of pioneers, they did that very thing.

On the top of the fort were machine gun nests, put there for this very case of an attack from the air. The guns should have been able to sweep the top of the plateau, but the gunners were either asleep or not posted at all, and the guns remained silent. When the report that enemy soldiers were running around on the top of his citadel of steel and concrete reached the commander, his only reaction was,

*A breach in the fort caused by a charge of explosives placed under the gun. The gun-mount was built into the wall where the hole is. This was an outwork located at the head of the branch canal mentioned on page 357.*

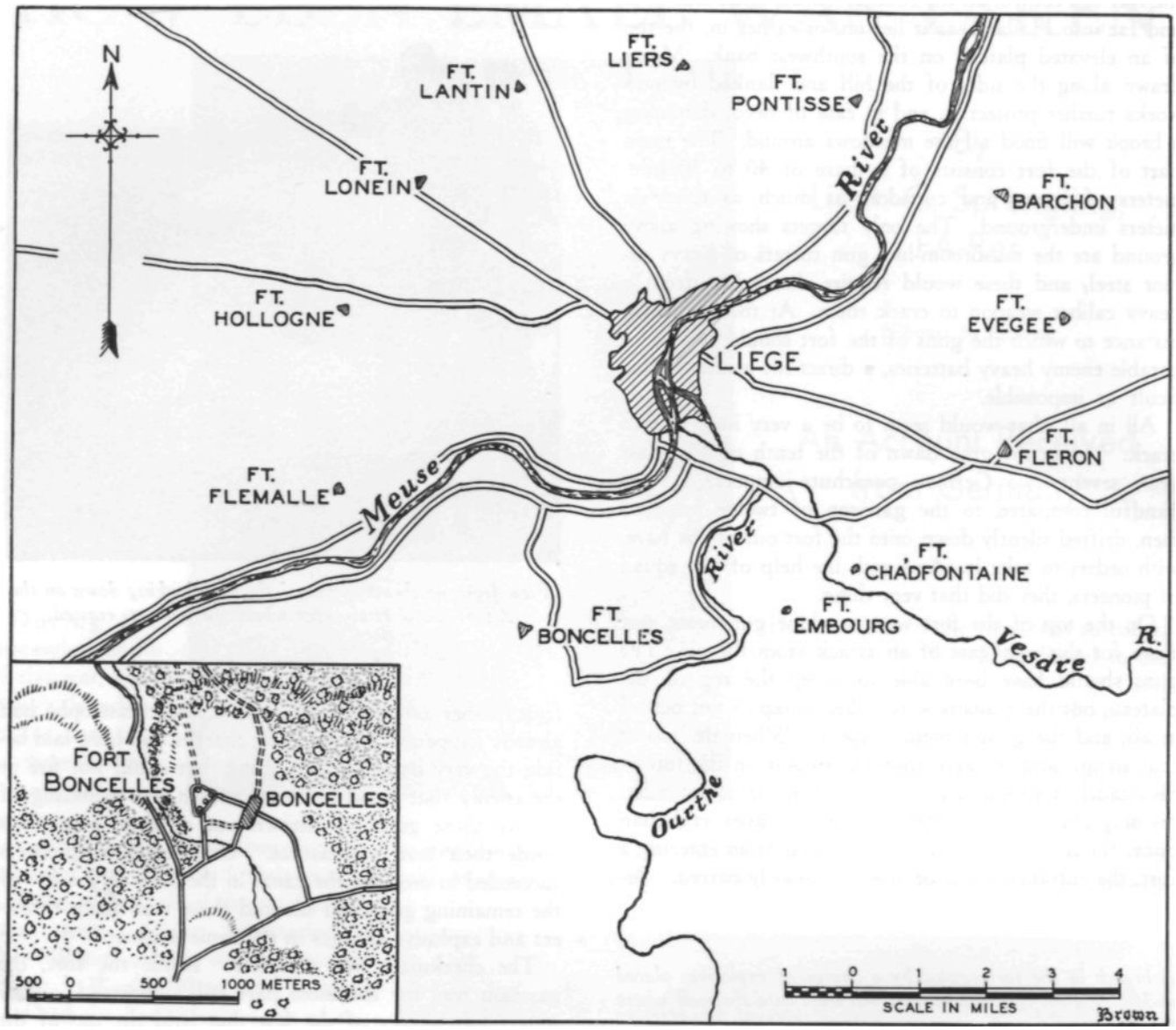
*View from northeast corner of the fort, looking down on the Albert Canal at the spot where the pioneers crossed.*

"Arrest them." Easier said than done, for if enemies are to be prevented from entering a fort, the entrances must be few and heavily barred. Before further action could be taken, the catastrophe had already happened. Detonating charges had been laid beside the very barrels of the guns that could not fire at the enemy that stood so close, and in the twinkling of an eye those guns lay thrown out of their mountings inside their torn embrasures. One squad of pioneers succeeded in crossing the canal in the face of the fire of the remaining guns and silenced these with flame-throwers and explosive charges in the same manner.

The checkmate was complete. Inside the fort, the garrison was for the most part still unharmed. They were at the mercy of the few that held the top of the fort and prevented them from coming out by the few means of egress left intact. Thirty-six hours after the attack began, the fort that took three years (1932-35) to build, surrendered. The garrison walked out of a fort that was as yet 99% undamaged, and yet it failed of its purpose.

If that were an isolated instance, we might call it an accident. However, the greater part of the whole chain of forts fell in the same way. In view of that fact, must permanent fortifications be regarded as rendered obsolete by modern methods of warfare?

The answer is that not the fortress but the spirit that builds it and then relies on it to defend a country automatically is obsolete, and always was. The military measures that should have been taken are obvious. They would have been only the concrete expression of a living will to defend by the strength, intelligence and, if need be, life of the individual citizens—what they dully relied on dead machinery to do. The day of the robot has not arrived, and the country that relies on robots for its defense is doomed to see them fail when pitted against human initiative.




# German Assaults Upon Permanent Fortifications

# By Captain C. T. Schmidt, Infantry

Before the recent campaigns in Europe there was widespread belief that modern permanent fortifications, such as those along the eastern frontiers of Belgium and France, could be reduced only at tremendous cost in men, materiel, and time. But the swift advance of the Germans through Belgium and their penetration of two sectors of the Maginot Line show that this is not necessarily true. Indeed, it is possible that popular opinion now discounts too greatly the value of fixed fortifications. For it can be argued that peculiar circumstances go far to explain the failure of the Maginot defenses. If not backed by a force of maneuver, even the strongest fortified line is likely to be useless. The Germans have at least demonstrated that determined assaults by infantry and pioneer troops, closely supported by artillery and aviation, are capable of overcoming individual fortifications in a surprisingly short time. Recent discussions in their military literature make it possible to outline the tactics and techniques successfully employed in this type of operation.

It is evident that thorough preparations were made for the capture of Belgian and French fortifications. This involved training of selected engineer troops in methods of removing or clearing mines and wire, approaching forts at relatively weak points, blinding enemy observation, and demolishing emplacements. Training may even have included rehearsals on terrain and works similar to those that were to be attacked in earnest. Obviously, such troops must be equipped with weapons, tools, and explosives appropriate to their mission.*

Once the attacking force has approached the enemy position, the forward area is carefully reconnoitered. Specific details of the fort are observed so far as possible, and plans for the assault are prepared. The supporting artillery bombards the fortification, especially with high-angle fire, and seeks to weaken or destroy vital installations and to silence the enemy's weapons. Efforts are made to break up moats and trenches. Pioneer troops may be used to clear wire and remove mines. Light guns, including antiaircraft and antitank weapons, and heavy machine guns are pushed up within close range. Their fire is directed principally against loopholes, ventilators, hinges, and joints, in an effort to blind the enemy and to effect breaks in the fort's armament. Bombardment aviation is likely to be employed on a major scale. In fact, local air superiority is a pre-requisite to success.

As soon as the opportune time has come, special assault

*German assault troops reconnoitering approach to Belgian fortified village.*

*It may be noted that a platoon of pioneers (combat engineers) is an integral part of the German infantry regiment.

Courtesy "The Military Engineer"

*German troops using flame thrower . . .*

detachments work up to the fort and throw or force grenades, bombs, and explosive charges into loopholes, cracks, and other openings in the steel and concrete. These operations in themselves seem to call for relatively small numbers of troops. Obviously, if the enemy is able to counterattack, the assault detachments must be supported by appropriate infantry, tanks, artillery, and aviation.

The following paragraphs describe the reduction of Fort Boncelles, about four miles southwest of Liege, on 14-16 May, 1940. The narrative is based upon a series of first-hand accounts by members of the assaulting force.*

Fort Boncelles was on the interior line of fortifications around Liege. These works had been destroyed during the World War, but afterward were rebuilt and strengthened. The area around the forts was not defended by mobile forces. It was thus possible to infiltrate between the individual forts with comparative ease.

On the evening of 13 May, the 451st German Infantry reached the vicinity immediately east of the village of Boncelles. Fire had already been opened by the forts, and the regimental howitzers were replying. The 5th Company was ordered to reconnoiter in force the area around Fort Boncelles, but it was to avoid unnecessary risks. The company set out along the road toward Boncelles, then turned off into fields south of the village. Here it ran into Belgian artillery fire. The men took cover in the ditch beside the road. By short rushes, the platoons worked their way forward to about 150 meters from the wire entanglements around the fort. However, because there was still uncertainty about the fort's dispositions, further efforts had to be postponed until morning. During the night, the company sent out strong security patrols toward the fort.

Early in the morning the company commander decided to reconnoiter. Two lieutenants, a first sergeant, and two machine-gun detachments joined him. The fort was quiet. Quickly the patrol pushed forward to a house close beside the wire. The fortification was seen to be of triangular shape, with four turrets. The turrets were still down. About 9 AM the patrol cut its way through the wire and crawled toward the turrets. Soon it found that the fort was surrounded by a concrete-lined moat, about 6 meters deep and 10 meters wide. Quick note was made of loopholes, doors, and partitions. Then the patrol wormed its way along the edge of the moat, and around the right corner of the fort. Still there was no sign of the garrison. Back again, and around the left side, the patrol continued to search for the entrance to the fort. Here was the second turret. Three men remained at this point, with instructions to cut a path through the wire. The remainder of the patrol rounded the corner—and there, within the moat, were several Belgian soldiers. The Belgians darted into the fort, and the turret immediately rose and opened fire. But the

Courtesy "The Military Engineer"

*. . . and demolition charges against fortifications*

*In *Militar-Wochenblatt*, 13 December, 20 December, 1940.

*French fortifications reduced by assault in the German campaign against the Maginot Line.*

patrol was able to crawl back through the opening that had been cut in the wire. Unharmed, it found cover in a roadside ditch. One man was sent back to the company with a request for supporting fire. After some time, the Belgian fire stopped. But the fort's guns now covered the way back to the company. So there was no choice but to remain under cover throughout the remainder of the day. Finally, when night had set in—about 11 PM—the patrol got back to the company. It had obtained information that was to enable the assault troops to move forward.

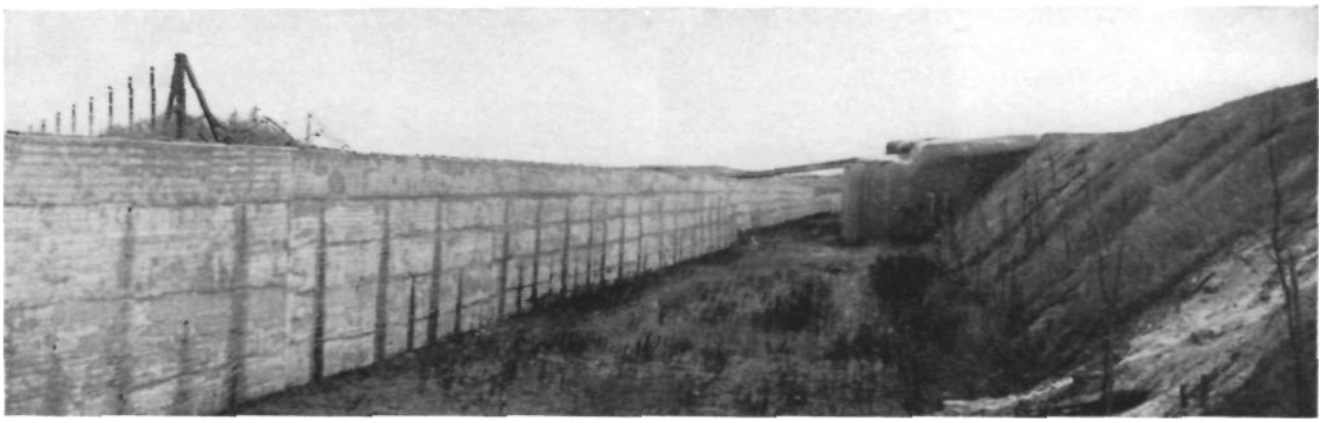
At dawn on this same day the regimental antitank guns had been brought forward to fire upon the turrets and the observation tower. But the 37's, despite well-placed fire, were unable to make much impression. Indeed, only by continual, rapid shifts to new positions was it possible for the antitank gun crews to escape casualties, for the Belgian cannon were accurately laid on every point on the terrain.

By morning of the 15th, heavy artillery had come up. A smoke-screen was laid down by the light artillery. Under cover of the smoke, field howitzers (probably 21-cm. and 30-cm.) moved to close range and opened fire upon the turrets. The medium artillery shells had made little more than scratches on the concrete, and had glanced off the steel turrets. But the heavy howitzers were more effective. Finally, a large turret was shot away and the observation tower was badly damaged. But it was still uncertain whether the moat had been broken in. A patrol found it to be intact. Again the heavy guns blazed away. Then, supported by overhead machine-gun fire, two rifle companies went forward through the cleared wire. They reached the moat just in front of the main entrance of the fort. Fire continued to rain from the enemy guns. The troops took cover, and the machine-guns fired upon the loopholes in order to force the garrison to remain under cover.

Toward evening an assault detachment, reinforced by pioneer troops and an antitank gun, approached the main entrance of the fort. The antitank gun was brought within 5 meters of the door. Apparently the Belgians had not reckoned with such a bold advance, for they might easily have thrown it back if they had been on the alert. In order to clear a field of fire for the gun, a heavy grill door had to be destroyed. No sooner was this done by the pioneers than a hail of machine-gun fire from the fort made the detachment take cover. The antitank gun nevertheless opened fire with armor-piercing shot. Round after round was hurled against the loopholes. The garrison brought heavy machine-gun fire upon the antitank gunners, but the gun-shield was stout protection for them. One bullet, probably from a 20-mm. gun, did pierce the shield, but it was stopped by the gun's axle. In the meanwhile, another antitank gun had been brought up and was firing. At dusk, the 37's ceased firing; the field was cleared for light artillery, which had occupied positions only a few meters to the rear. The antitank guns had been unable to damage the fort's armor. [This contradicts numerous other reports on the effectiveness of the 37-mm. guns.] Nevertheless, they were useful inasmuch as they obliged the garrison to close the loopholes and thus seriously hampered its observation.

The light artillery* fired at point-blank range upon the door. But the door held fast. Pioneers with explosives

*Probably 105-mm. howitzers using AP shell with Charge 5.



Courtesy "The Military Engineer"

*A tank trap in the line of national Belgian fortifications*

tried to cross the moat, but were stopped by the Belgians' stubborn defense. In the meantime, night had set in. The regimental commander ordered the troops to withdraw. The neighboring Forts Flemalle and Embourg sent over a few shots, which were answered by the German guns. Intermittent fire continued through the night.

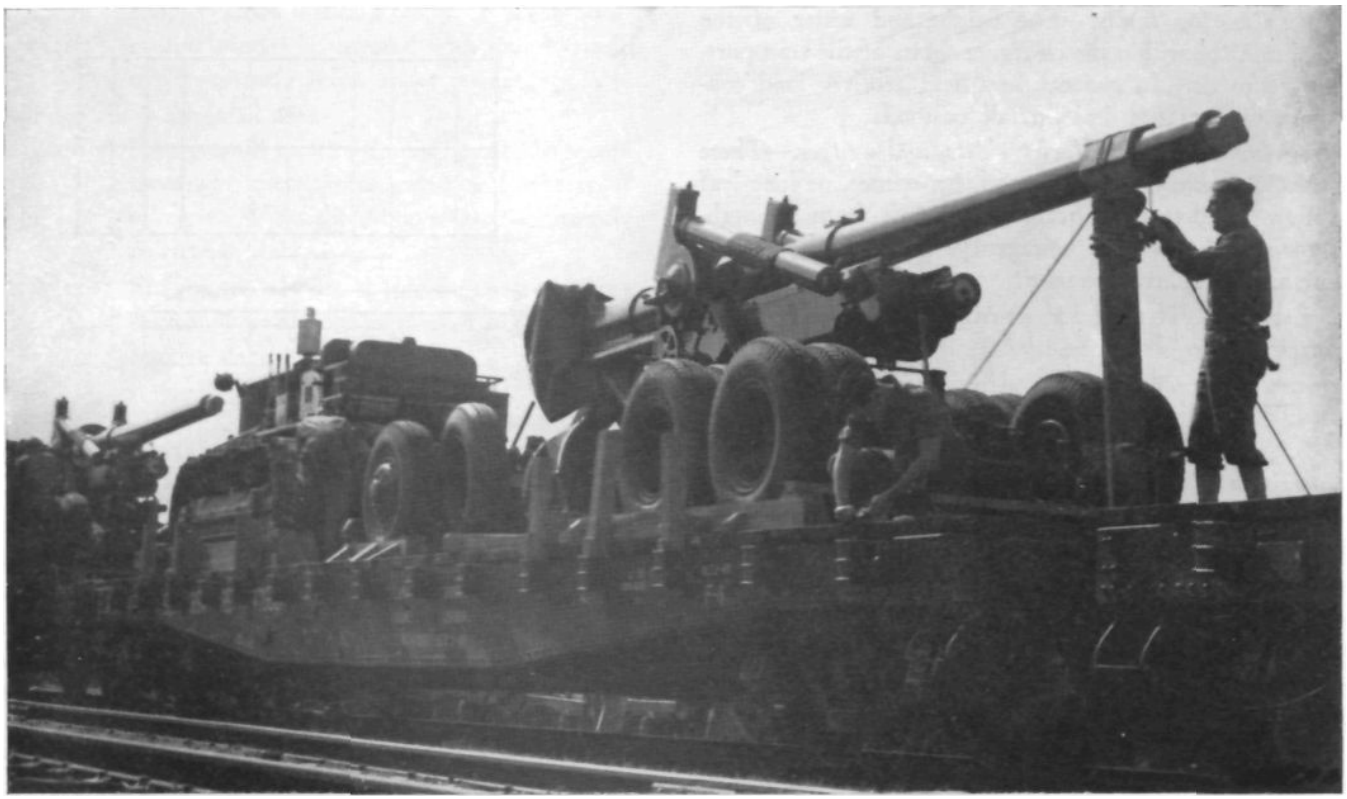
Early next morning German planes reconnoitered, and not long afterward dive-bombers appeared. For five hours they circled the fort, diving again and again with loud screams, and dropping their bombs. One of the planes was brought down, apparently by antiaircraft fire. Under the terrific impact of the bombs, the moat crumbled. At noon the bombardment ceased, but the planes continued to fly about in order to deceive the garrison. There was no sign of life within the fort. Meanwhile, a picked detachment had been made ready. Now the assault troops rushed up to the fort. Some of the men carried ladders to help them cross the moat. But most of them were able to scramble across over the huge pieces of concrete that had fallen into it. Pioneers with explosive charges worked up on top of the fort, searching for undamaged turrets. Actually, two of them were still intact. Heavy explosives were pushed onto them, and several charges sufficed to put them out of commission. Hand grenades were dropped inside the broken turrets, and at the same time the main door was blown open. This ended the attack. The garrison's exhausted survivors, many of them wounded, crept out into the moat and surrendered.

*Carrying Bangalore Torpedo forward*

Courtesy "The Military Engineer"

*Blasting through wire with Bangalore Torpedo*

# Loading Of Field Artillery Materiel For Railway Transport



Signal Corps

*155-mm. gun battery loaded for rail transport*

[From Instruction Memorandum Mat-25, FAS, 1941]

1. REFERENCES.

FM 25-10, pars. 183 to 188, inclusive.
AR 30-935, pars. 1, 4 to 6, inclusive.
AR 30-955, pars. 17 to 26, inclusive.
Rules Governing the Loading of Commodities on Open-Top Cars, Association of American Railroads, pages 9 to 15, 318 to 331, 370 to 371, all inclusive.
WD Circular No. 56 (1940), Section IV.
WD Circular No. 63 (1940), Section II.

2. GENERAL INFORMATION.—The rules and methods outlined herein have been formulated in order to insure uniformity and safety in the loading of field artillery material for rail movement. The methods and materials specified represent *minimum requirements*. The loading of materiel for which no definite illustration has been provided should conform as nearly as possible to the best example that can be derived from the information given. In the loading of railway cars, the hazards connected with high-speed multiple-track operation, tunnels, and electrical conductors, and the necessity of protecting human life and property should be borne in mind; every effort must be made to secure properly and safely all loads before they are offered to the railroads for movement.

3. GENERAL RULES.

*a. Selection and preparation of car*.—Cars must be inspected to see that they are suitable to carry safely the intended load. Cars should have good sound floors; all loose nails or other projections not an integral part of the car should be removed. Nails and bolts used in construction of the car should be tightened.

*b. Brake wheel clearance*.—No part of the cargo must be closer than six inches to any part of the car brake wheel. Consistent with the proper location of the load, this clearance should be increased as much as possible.

*c. Maximum load weights*. — The maximum load weight is equal to the total weight of the car and load less the light weight of the car. For example, a car may be marked (stenciled on the side):

| | |
|---|---|
| Capacity | 100,000 lb. |
| Total weight | 169,000 lb. |
| Light weight | 37,500 lb. |

The maximum load equals 169,000 lb. minus 37,500 lb.

equals 131,500 lb. The cargo should be so placed on the car as to distribute the weight equally, both laterally and between trucks.

*d. Clearing limits*.—The height and width of the load must be within the clearance limits of the transporting railroads. In general, any field artillery load conforms to clearance limits of all railroads.

*e. Stakes, braces, blocks, cleats, and wedges*.—These timbers should be of hardwood, fir, spruce, or long-leaf yellow pine, straight grained and free from strength-impairing knots. In emergency, logs, rough-hewn to size and shape, may be used.

*f. Wire*.—If used for securing loads, 8-gauge black annealed wire should be used.

*g. Nails*.—20d (4 in.) and 40d (5 in.) nails are specified; double-headed nails are desirable.

*h. Fuel in tanks of individual units*.—Paragraph 105, *Interstate Commerce Commission Regulations*, states, "Automobiles, . . . . or other self-propelled vehicles, equipped with acetylene gas cylinders or gasoline or other fuel tanks are exempt from specification packaging and labeling requirements provided such cylinders and tanks are securely closed. When offered for transportation by carriers by rail or highway, drainage of fuel tanks is not required."

*i*. All brake-equipped pieces of equipment must have their brakes applied before movement over railroads.

4. RAMPS.

*a*. Loading may be accomplished most easily by the use of an end ramp; the materiel is moved the length of the train from car to car. When an end ramp is not available, a built-up loading ramp (Figure 1) can be constructed quickly. The ramp should be made of 3″ × 12″ × 14′

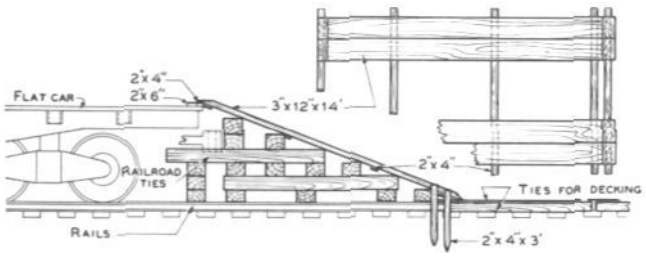



Figure 1-End ramp

timbers tied together with 2″ × 4″ spreaders and nailed with 40d single-head or ordinary nails. The ramp must be firmly anchored at the lower end; 2″ × 4″ × 3′ stakes driven into the ground and nailed to the ramp boards with 40d or larger nails will serve (Figure 3).

*b*. Spanning ramps (Figure 2) may be constructed of 3″ × 12″ × 4′ timbers tied together with 2″ × 6″ × 2′ spreaders. The ramps should be secured in position with 40d nails.

5. STANDARD PATTERNS AND WIRE LASHINGS FOR BLOCKING AND SECURING MATERIEL (Figure 3).—The employment of these lashings and patterns can be determined by reference to Figures 5 to 10, inclusive.

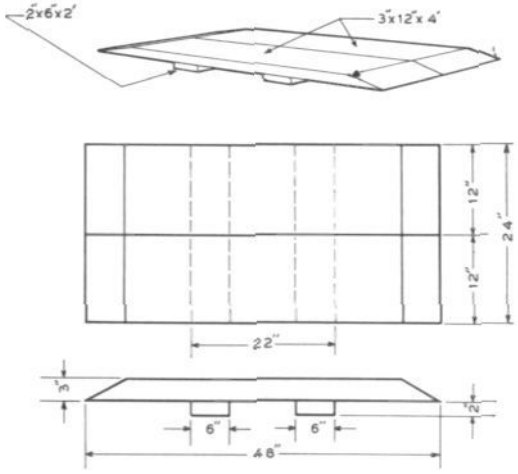



Figure 2 - Spanning ramp

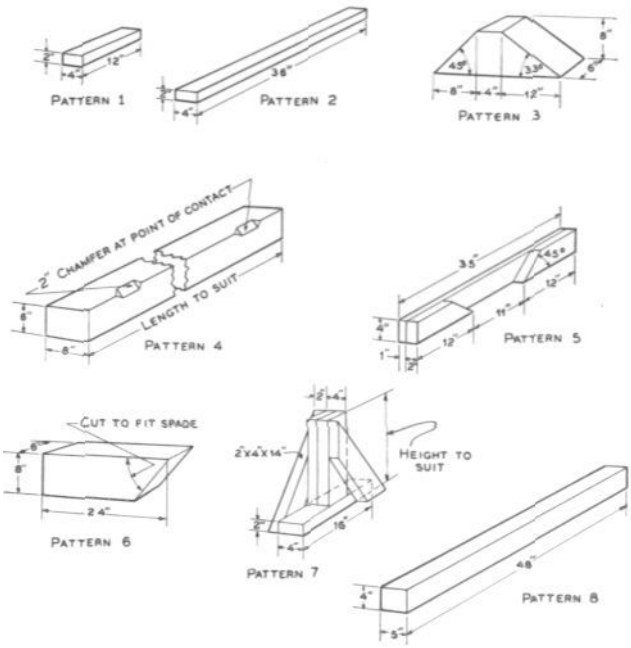



Figure 3 – Patterns

Pattern 1 Cleats, 2″ × 4″ × 12″. Each piece should be secured lengthwise of car with three 40d nails.

Pattern 2 Cleats, 2″ × 4″ × 36″. Each piece should be secured with three 40d nails.

Pattern 3 Blocks, 6″ × 8″ × 24″. Heel of block should be secured to car floor with three 40d nails; portion under tire should be toenailed to car floor with two 40d nails.

Pattern 4 Timbers, 6″ × 8″ × suitable length. Each piece should be toenailed to car floor with 40d nails.

Pattern 5 Cradles. Each piece should be secured to car floor with 20d nails.

Pattern 6 Blocks, 6″ × 8″ × 24″. Each piece should be toenailed to car floor with five 40d nails.

Pattern 7 Support. Each piece should be secured to car floor with six 40d nails.

Pattern 8 Stakes, 4″ × 5″ × 48″ hardwood. Stakes should extend 4 inches below car stake pocket and should be secured with one 40d nail driven directly below stake pocket.

8-gauge black annealed wire

Wire A Four strands of wire should be used to secure passenger cars, motorcycles, and wheels of all types. Wires should be twisted sufficiently to remove slack.

Wire B Six strands of wire should be used to secure trails. Wire should be twisted sufficiently to remove slack.

6. MINIMUM REQUIREMENTS FOR SECURING FIELD ARTILLERY MATERIEL (SINGLE OR DUAL WHEELS).

*a. Guns and howitzers.*

(1) The axles or bottom carriages should be placed on supports (pattern 7). These supports should be ¼ inch taller than the distance from the point of support on the gun carriage to the car floor. This procedure is unnecessary when the piece is placed on the wheel segments or the firing base.

(2) The wheels should be secured with blocks (pattern 3) centered on the tires; cleats (pattern 2) should be fastened along the outside of the tires to a height of four inches (in the case of 155-mm. howitzers, the height should be 6 inches); and Wire A should be used to secure the wheels to the stake pockets of the car.

(3) The trails should be secured with blocks (patterns 1 and 6); wire B should be used to secure the trails to the stake pockets of the car; and stakes (pattern 8) should be fitted into the stake pockets of the car, one on each side of the trail, approximately one third the distance from the end of the trail to the center of the wheels.

(4) The foregoing provisions are sufficient to secure modern materiel. Some 75-mm. guns require modification of the outlined method. Figure 7 shows a method of securing a 75-mm. gun, M1897 (French). Figures 6 to 10, inclusive, illustrate specific applications to various types of field artillery materiel.

*b. Trucks and automobiles.*—The wheels should be secured by blocks (pattern 3) centered on the tires (the outer tire only of dual wheels); cleats (pattern 2) should be fastened along the outside of the tires to a height of four inches. As an alternative to the method using patterns 2 and 3, the wheels may be blocked by timbers (pattern 4) and cleats (pattern 1), with cleats (pattern 2 or longer) placed across the timbers (pattern 4). Wire A should be used to secure the wheels to the stake pockets of the car. The springs of passenger cars should be compressed as much as possible, and the frame or bumper brackets should be wired down as in Figure 4.

7. LIST OF MATERIALS REQUIRED FOR SECURING DIFFERENT TYPES OF MATERIEL (MINIMUM REQUIREMENTS).

| Patterns | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Wire lashing applied to |
|---|---|---|---|---|---|---|---|---|---|
| 4-wheel trucks | 16* | 8 | 8 | 4* | | | | | All wheels |
| Passenger cars | 16* | 12 | 8 | 4* | | | | | All wheels and frame |
| 6-wheel trucks | 16* | 12 | 8 | 4* | | | | | All wheels |
| 37-mm., 75-mm., 105-mm. guns and hows. | 10 | 4 | 4 | | | 4 | 2 | 2 | Wheels aind trails |
| 155-mm. hows. | | | | | | | | | |
| 155-mm. guns | | 10 | 4 | | | | 2 | 2 | Wheels and trail |
| 2-wheel motorcycles | | 24 | 8 | | | | 2 | | All wheels Frame each wheel |

*These patterns are not required when patterns 2 and 3 are used.

8. INSTALLATION OF KITCHEN EQUIPMENT ON TROOP TRAINS.

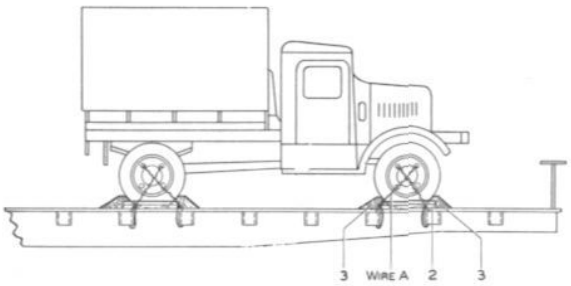
*a. Installation of US Army Field Ranges, M1937.*—Range cabinets, securely latched together as a battery, should be placed against the side wall of a baggage car, and secured by stay chains and wood blocks (Figure 11). The wood blocks should be secured to the car floor with 20d nails. The large hook on the outer end of the chain should be run through a link of the chain to serve as a pull bar against the outer ends of the wood blocks. The range set should be placed two inches from the side of wooden interiors. Ranges which are installed in cars with wood floors should have a piece of twenty-gauge or heavier sheet metal, extending at least four inches beyond the front edge of the cabinets, installed so as to cover the entire floor area beneath the ranges. The installation of the range should be made under the supervision of a commissioned officer.

*b. Fuel supply.*

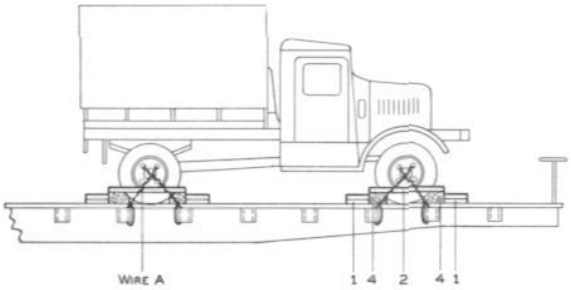
(1) *Only one* 5-gallon gasoline safety filling can, furnished as standard equipment with each range set, should be carried in a car, except where the number of range cabinets installed exceeds three, when *two* cans of gasoline may be carried. Gasoline cans should be placed in individual wood bases (Figure 12) secured to the car floor as far removed from the ranges as is practicable. Arrangements should be made for resuply of gasoline en route.

(2) One 1-quart carbon tetrachloride fire extinguisher and one bucket of sand should be provided in the car for each range set of three cabinets.

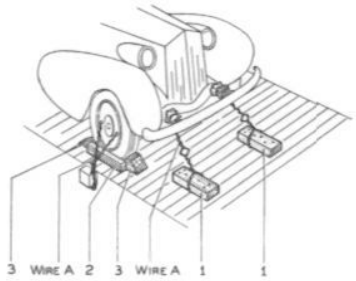
(3) *The units will not be refueled while there is any fire in the car or while the car is in motion.* Fire units should be removed to the other end of the car or outside of the car for refueling. This operation should be supervised by a commissioned officer.




① Method of securing 4-wheel vehicle, using potterns 2 and 3.



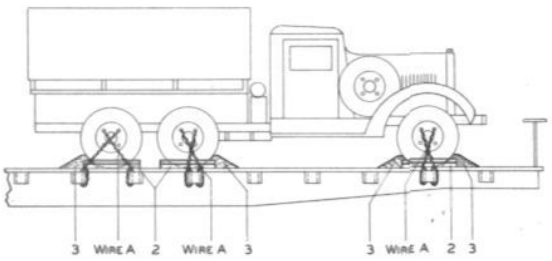

② Method of securing 4-wheel truck, using patterns 1,2, and 4.



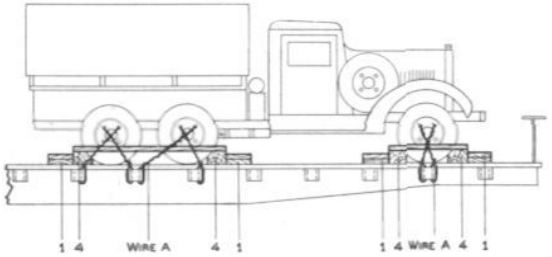

③ Method of securing passenger vehicles

Figure 4 - Securing 4 wheel vehicles.

Figure 4(continued)-Securing 4 wheel vehicles.

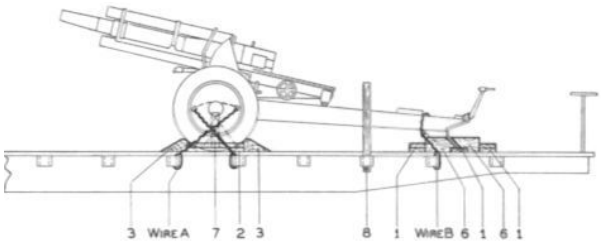



① Method of securing 6-wheel vehicle, using patterns 2 and 3.




② Method of securing 6-wheel vehicle, using patterns 1 and 4.

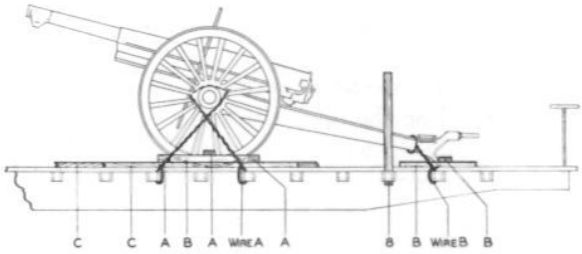
Figure 5 - Securing 6-wheel vehicles.




37-mm. gun, M1, does not require axle supports (pattern 7) if the piece is placed on the wheel segments and the blocks (pattern 3) are placed tightly against the tires.

75-mm. howitzer, M3A1 (Field) and M1 (Pack), does not require axle supports (pattern 7) if the piece is placed on the firing base and the blocks (pattern 3) are placed tightly against the tires.

Figure 6-Securing 37-mm, 75mm, 105-mm guns and howitzers.




A-2″×4″×7′-O″
B-2″×4″×24″ (placed on both sides of wheel)
C 2″×4″× Length required (placed on both sides of wheel)

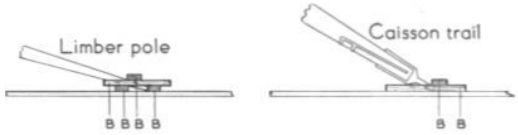



Figure 7-Securing 75mm gun, M1897 (French)

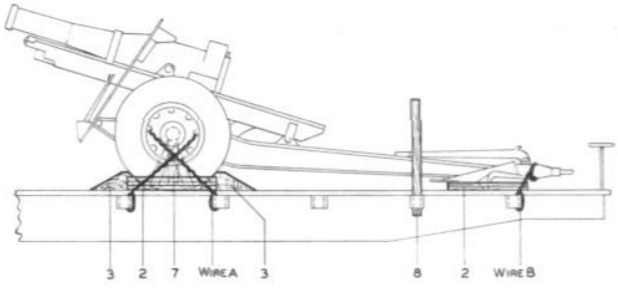
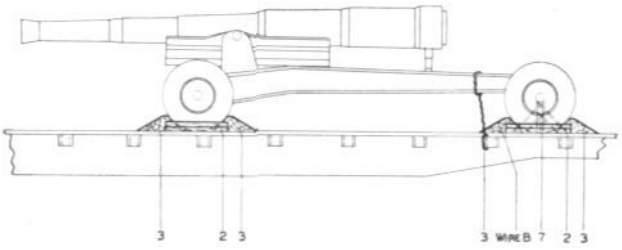
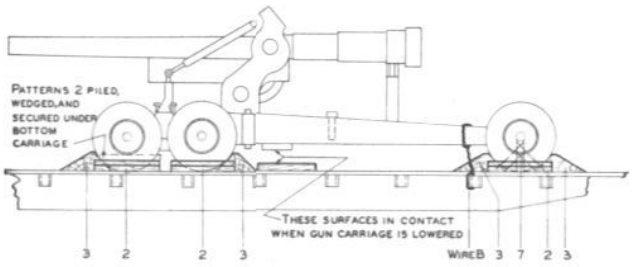



Figure 8 - Securing 155-mm howitzers




① 155-mm gun M1918,M1918A1,M1917,M1917A1,M2 and M3




② 155-mm gun, M1

Figure 9 - Securing 155-mm guns and 8 howitzers.

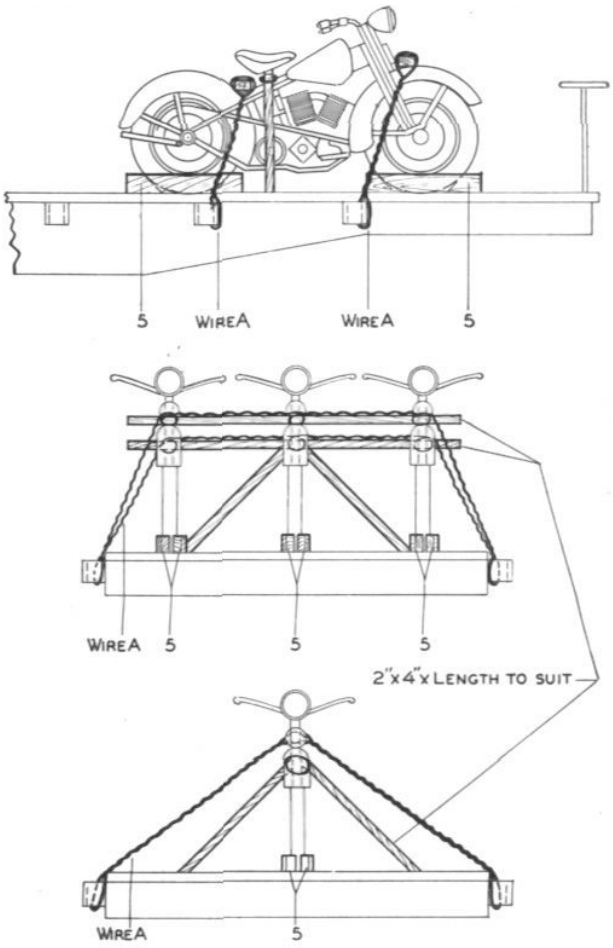



Figure 10- Securing 2-wheel motorcycles.

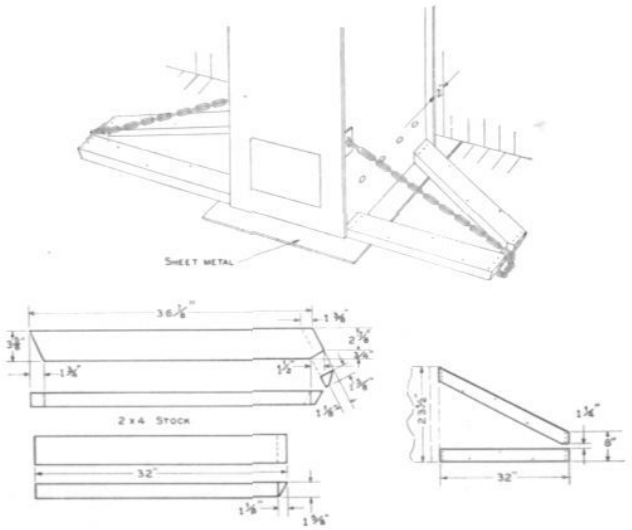



Figure 11 - Installation of field range M1937

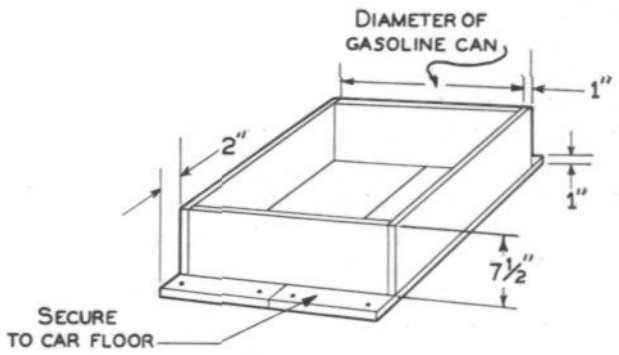



Figure 12-Wood base for gasoline can

The trajectory of the 75 is sufficiently curved that angle of site must be considered in antitank fire

# Antitank Fire With Minus Site

By Lieut. William P. Francisco, 12th FA Bn.

From the operations of Battery D, 12th Field Artillery Battalion, the Second Division 75-mm. antitank battery, since its formation in October, 1940, certain problems have been found in the use of the 75-mm. gun, M2A2, as an antitank gun. We have learned that the gun was not designed to cope with direct fire into valleys. This article does not attempt to correct the procedure in FM 6-55, but rather to add to the information therein in offering a solution to the difficulties found in using this weapon when firing from hills. Our experience is that the method outlined in FM 6-55 is satisfactory for direct fire at moving targets which are at approximately the same elevation as the gun. The mission of this battery is to protect the division, or a part of it, against mechanized attack, and to accomplish this mission we must first consider the capabilities and limitations of the tank and the tactics employed by commanders of tank units. Such information as is available shows that tanks tend to follow the line of least resistance around natural obstacles. Like roads and streams, they follow valleys and flat country, and avoid hills and ridges wherever possible. Therefore, in the majority of cases the guns of this battery must be placed so as to cover such natural avenues of approach. After the first RSOPs it becomes increasingly apparent that the best positions are concealed ones on the slopes of the hills commanding the valleys to be covered.

However, the best gun position is valueless if we cannot bring effective fire upon the target. And the first time we fired from such a position on a moving-target range it was apparent that the methods used when firing from the same elevation as the target were far from satisfactory when firing down into a valley. We got only 3 hits in 100 rounds!

It was found that the errors were all in range; the method outlined in the field manual for deflection seemed to work out very well, with one exception: After the initial lead had been announced by the chief of section, we found that changes in the lead are best made by the gunner. Investigation of this inaccuracy in range pointed immediately to the angle of the site. Neither tank nor target is obliging enough to stop and allow the angle of site to be measured, nor will it remain at the same elevation or range. Therefore, it is impossible to announce an exact angle of site or make accurate changes therein. Furthermore, when firing at a moving target at ranges near, or less than a thousand yards, there isn't sufficient time to change the angle of site and relevel the bubble and at the same time fire enough rounds to make a second adjustment. The obvious solution is to use a constant angle of site for each single run of the target. Two such angles immediately suggest themselves, the approximate site of the target when it appears and the mean site for the area to be covered. The same fault lies in both—the target moves.

For the first case, think where the tank will first appear, and it is apparent that as it approaches the gun position the line of site drops; and finally the range setting should be less than zero, making a decrease in site necessary. In the second case, imagine the plane of fire formed by traversing the piece, with range zero, over the area to be covered. This plane will intersect the surface of the ground in a line; the entire area between the gun and the line is dead space unless the angle of site is changed (see Figure 1). In this same situation, calculations show that a change of a thousand units on the range drum gives less than fifty yards' change in the point of burst on the ground when the target is near the line of range zero. Using this second method gave very poor results.

A third method which I shall outline in detail has given excellent results, using a site of the same value as the minimum elevation measured at the guns. The first and primary advantage of this method is that the target can never move to a position that will require a decrease in the angle of site. Therefore, the changes must be made by changes in the setting on the range drum, a procedure with which the cannoneers are familiar. The man who must understand this method thoroughly is the chief of section.

But before anyone can use this method he must first realize one thing, THE RANGE DRUM DOES NOT MEASURE YARDS and never has. The range drum

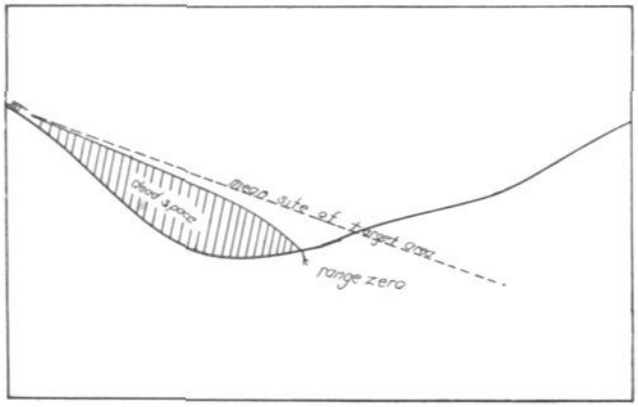



*Figure 1*

is so constructed that a turn of certain magnitude when the pointers are matched gives the tube a certain elevation. Now for convenience in the indirect fire and direct fire with a small angle of site this drum has been graduated so that its reading will be the same as the horizontal distance gun-target, in yards, providing a certain shell of set ballistic characteristics is propelled by a powder that will give an exact muzzle velocity and that weather corrections along with the complementary angle of site have been applied. Otherwise, the figures on the range drum might as well be called "marbles." Actually in instruction it is helpful to give this reading some such value.

Now that we have decided to use an angle of site which is the same as the minimum elevation, and it is thoroughly understood that the graduations on the range drum are arbitrary, refer to Figure 2 and follow the procedure in figuring the setting to apply to put a round on point A. The angle of site for the minimum elevation, measured by the gunner, is 100. This is set as angle of site and the bubble is leveled. The chief of section, sighting along the bottom of the bore, elevates the piece until the axis of the bore passes through point A. Then by matching the pointers by rotating the range drum, a reading is obtained on the range drum and the elevation graduations at the other end of the range drum. The value of the elevation is 150‰. To this value add the elevation for the range to point A (for 1300 yards use 24‰). The resultant value is 174‰. By setting this elevation on the drum or by adding mechanically on the drum, the reading on the range drum will be 4800 (marbles). Now a round fired with site 100 and a setting of 4800 on the range drum will hit point A. That is the actual procedure followed by the chief of section and can best be understood by going through these operations on the gun.

Now let us see just what we have done. Instead of using a horizontal plane for the determination of site, we have used a datum plane (site 100) which forms an angle of 200‰ with true horizontal (site 300). Then with respect to this plane we have measured an angle of site of 150‰. To the 150‰ we have added the elevation for the measured range of 24‰. This resultant quadrant elevation corresponds to a setting of 4800 on the range drum.

At this point it may seem that it would be easier to use the elevation graduations on the range drum throughout. But when it is considered that the gun crews use the range drum for other types of firing and there is a possibility of making an error of 100‰ with the elevation scale, the consensus of opinion is that it is more practicable to use the range drum in this case. The method outlined uses the sighting equipment on the gun as the only instrument for calculation. The circumstances of war and the T/BA are such that the gun is the only tool the chief of section can be sure of having. Moreover, it is the least complicated for the chief of section; and for speed, it is advisable to provide each chief of section with a card giving the elevations for ranges from zero to 2000 yards in 100's of yards for the ammunition to be used.

And what now? A different way to get a round to its destination must have a practical application. Here we take a page from the infantryman's book. The leader of a machine-gun section makes out a sketch of the area to be covered by his guns and then figures out the ranges to the key points in it. We can do well to copy him. Referring to Figure 3, we find a sketch of the field of fire similar to that described in the first part of this article, a valley covered by a gun on the slope of a hill. On this sketch are seen certain key points, the near and far boundaries of an open field, the farthest point on a road, a bridge, the edge of a patch of woods out of which might come tanks, and other points valuable for adjusting on a moving target. The chief of section should make a similar rough sketch, refined only to the point that he can recognize the points on the sketch when he refers to it. Following the procedure set down above, he should then figure the settings to bring fire on each of the key positions. Anytime thereafter that he occupies this position he can bring fire on these points without delay.

Should a target appear near one of the key points, the calculated shot will be a good initial round from which to adjust. Should a target appear between two such

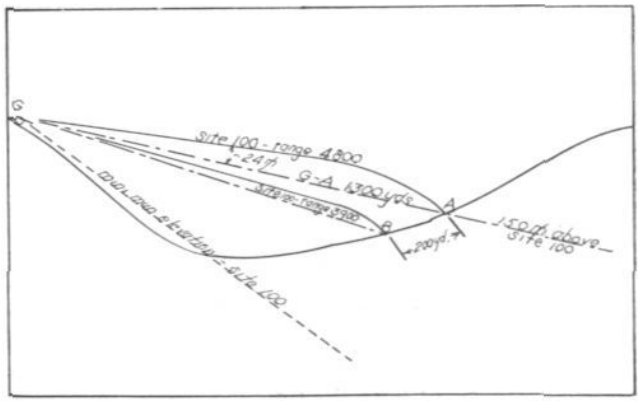



*Figure 2*

points, a setting between the two calculated for the two key points will be excellent for the initial round. The problem then becomes one of adjustment, and here a chief of section who fails to understand that the range drum does not measure yards will waste all his preparatory work. Referring again to Figure 2, it is seen that the ground difference between points A and B is roughly 200 yards, while the difference in settings is 900 (marbles). So a round 100 yards over should be corrected by a change in setting of 500 (marbles). Further study of this figure shows that as the target approaches the gun position the change in setting grows proportionately larger for the same change in distance between bursts.

Now let us follow a chief of section through his problem. Having occupied his position, made his sketch, and calculated his data, he is now ready for any tank. One appears between points A and B. Referring to his sketch and taking a value between those calculated for the two points, he gives his data and the initial round is on the way. Getting an over, he goes after the artilleryman's goal, a bracket. Making a BOLD CHANGE IN RANGE SETTING (a creeper will never get a moving target), he gets a short on the second round, or makes another bold change. When the bracket is obtained the problem is merely one of splitting successive brackets. Should a second target appear on the heels of the first, his sketch will give him the data for repeating the procedure without wasting precious time computing a full set of new data.

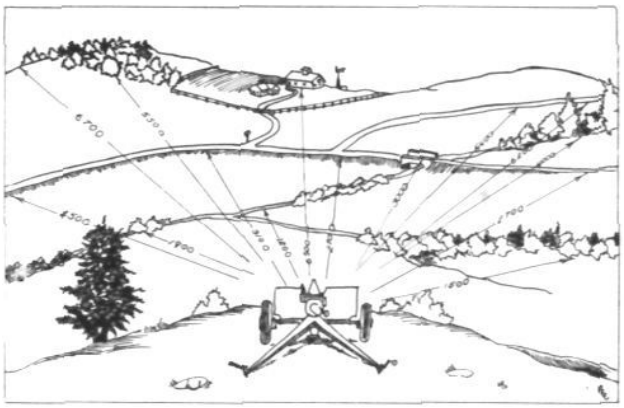


*Figure 3*

That the method is effective is shown by the fact that the same day that we got 3 hits out of 100 rounds using flat-terrain methods, one section got 4 hits out of 5 rounds fired at one of the targets, using this method.

Again let me emphasize that this method is not a substitute for the method outlined in FM 6-55, which is very effective on targets at approximately the same elevation as the gun, but is a solution to the very definite problem encountered when firing from an elevated point into a valley. And considering the frequency with which our mission brings us face to face with this problem, this method is at least worthy of a "try."

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**New Medium Tank**

*The first M-3 medium tank to be produced by a private industrial organization emerged April 19 from the Schenectady Works of the American Locomotive Co. nearly seven months ahead of production schedule. The 28-ton juggernaut is the largest American tank now in production. The M-3 is armed with a 75-mm. gun as its principal means of fire power. It is powered by a Wright airplane engine mounted at the rear. High-ranking American and Canadian army and industrial leaders attended christening exercises. Under-Secretary of War Robert P. Patterson said these tanks will soon come off the assembly line at the American Locomotive Company. Similar tanks are under production at Chrysler Corp. and Baldwin Locomotive Co.*

# TWO REPLACEMENT CENTERS

## I—CAMP ROBERTS

By Lt. Col. O. F. Marston, FA

## II—FORT SILL

By Lieut. Col. W. J. Egan, FA

To the Officers and Enlisted Men of the Training Cadres of the Field Artillery Replacement Centers:

You are on the point of beginning a work and a service, the importance of which is not surpassed by any other activity in our arm. If you enter upon it in the right spirit and attitude, you will find it absorbing, fascinating, and inspiring beyond your hopes and expectations.

First impressions are our most lasting ones. The first impressions of the United States Army for thousands of young, high type Americans will be what you give them. May those impressions be effective in producing for us the best Field Artillery in our history.

The finest morale that you can build for these young men will spring from your ability to keep them efficiently busy on interesting work. Keeping them wholesomely entertained during their leisure moments, though essential, cannot compare in importance.

For the Selectee, you will be his first military instructor and leader. Be a good instructor by thoroughly knowing your subject, and a good leader by knowing your men and gaining their respect and confidence.

Praise in public, reprove in private.

Never humiliate and discourage the slow learner. Give him quiet and sympathetic help after hours. He is likely to develop into a most substantial kind of soldier.

Be exacting, but with it, be fair, kindly, and just.

Indoctrinate our Army standards of truth, honor, integrity.

Remember that if you do your work well, the Field Artillery units to which you send your graduates are likely to profit tremendously. Freed from the constant and never ending basic training of recruits, they can advance efficiently to the task of perfecting their team work and tactical training. When these units, through promotion or expiration of term of service, lose a motor mechanic, or a cook, or a telephone man or a radio man, etc., it is you who have a trained substitute to take his place immediately, and the team work of the unit should proceed as uninterruptedly as that of a baseball team when a pitcher is taken out and another substituted.

Perhaps more than in any other training the results of your work will be quickly and clearly apparent to encourage you, and to inspire you to greater effort and achievement.

My cordial good wishes for your individual and collective success, all for the best interest of a more efficient Field Artillery better to serve the United States Army, and our Nation.

Sincerely yours,

ROBERT M. DANFORD,

Major General, U. S. Army, Chief of Field Artillery.

## I. Camp Roberts

In a brief article in the March issue of THE FIELD ARTILLERY JOURNAL the Field Artillery Replacement Center at Camp Roberts, San Miguel, California, was described. The general purpose and theory of Replacement Centers was outlined. That was before any Replacement Centers had opened. Now that over 14,000 trainees (both Infantry and Field Artillery) have arrived at Camp Roberts and have been undergoing training for five weeks, a description of the practical application of the new system for receiving the selectees and training them may be of interest to the combat organizations which will receive them upon completion of their courses.

To receive large bodies of men into a camp which has been completely made ready and under favorable weather conditions is relatively simple, but the old army axiom of "being prepared for the most unfavorable conditions" proved its merit at Camp Roberts. For along with other precedents which are being established, the well-advertised California sunshine was literally thrown overboard when the heaviest rainfall in fifty-six years was recorded. This, combined with the incompleteness of the camp, made the old Nacimiento Ranch a muddy morass. But even a simple military plan, once put into execution, is difficult to change; and one which involves the concentration of large numbers of troops by rail from many states is practically impossible to stop effectively after the "go" signal has been given. And so, when the Field Artillery Replacement Center at Camp Roberts opened on March 8, one week ahead of the opening date scheduled by the War Department, the precision with which the selectees were received, convoyed to their barracks, fed, and housed was a demonstration of how a well-organized regular army enlisted cadre can function under most adverse conditions.

A representative of the personnel section of the Field Artillery Replacement Center met the train, receipted for the service records and classification cards, and returned to Center Headquarters. Here a group of the personnel section made the first classification of the

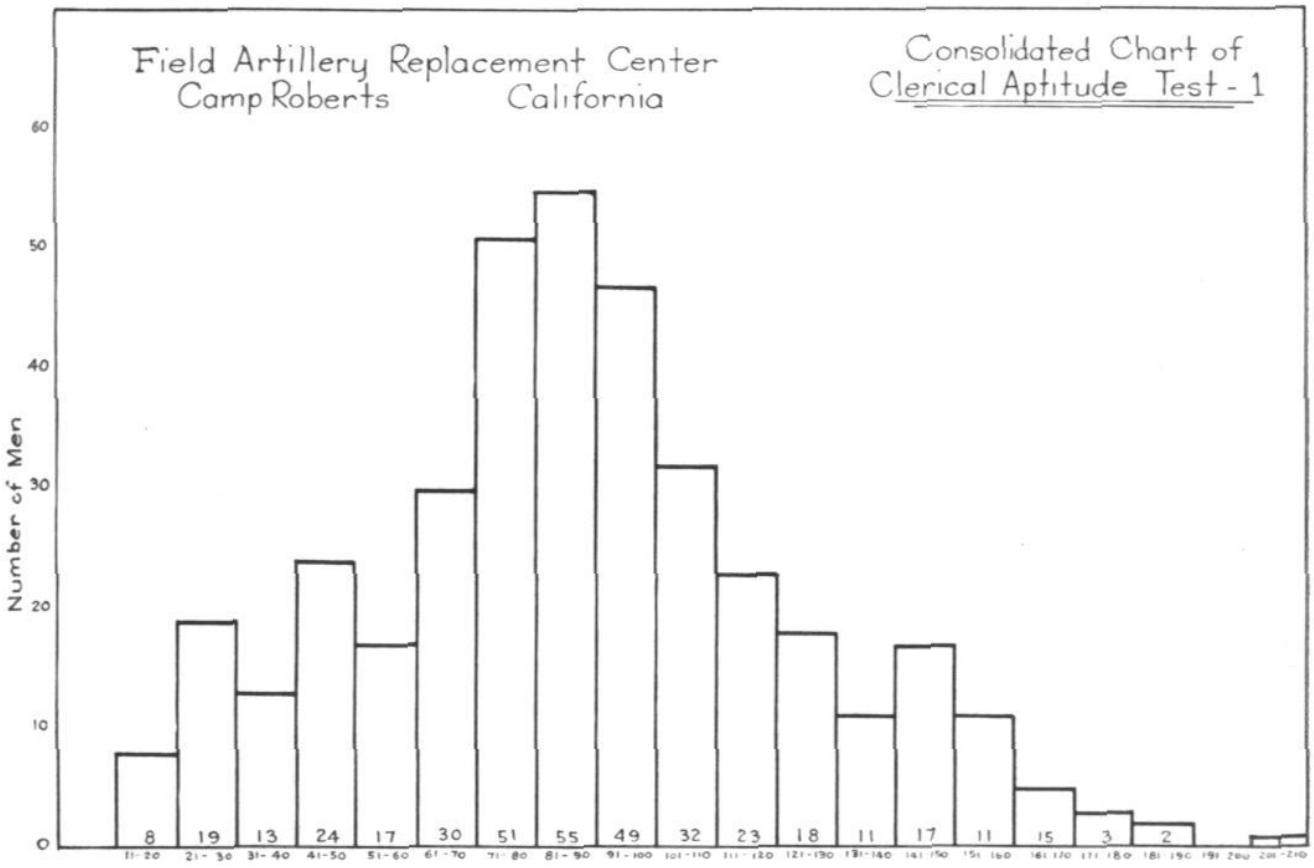



*Exhibit 1*

trainees based on the Form 20 classification cards received from the Reception Centers. The new classification system introduced by the Adjutant General's Office was given its first practical test. The object of this classification system is for the army to take advantage of the previous knowledge, work, and experience of a trainee by placing him in an organization which will train him for that military specialty for which his previous profession or occupation has most nearly fitted him—to place the round peg in the round hole immediately upon his arrival. The system classifies the trainees first, upon their receipt at Reception Centers; second, upon their receipt at Replacement Centers; third, at the completion of their first two weeks' basic training at Replacement Centers; and periodically, but to a much lesser extent, during the remaining ten weeks of their training at the Replacement Centers. Every effort was made at this Replacement Center to give the new classification system a fair trial. The personnel section of Center Headquarters, composed of enlisted cadres and the two regiments, were schooled in the operation of the classification system as laid down in A.R. 615-26 and, at the completion of the brief course, were required to classify 100 members of the cadres who were used as guinea pigs.

During the time the trainees were being convoyed to mess halls where they were served doughnuts and coffee, the personnel section classified them. The service records were arranged according to the completed classification and were then sorted according to those organizations to which the completed classification attached the trainees, so that when the trainees were lined up and the rolls called, they were thus attached and turned over to their respective organizations. After a good night's rest, all trainees arriving at the same time were marched to

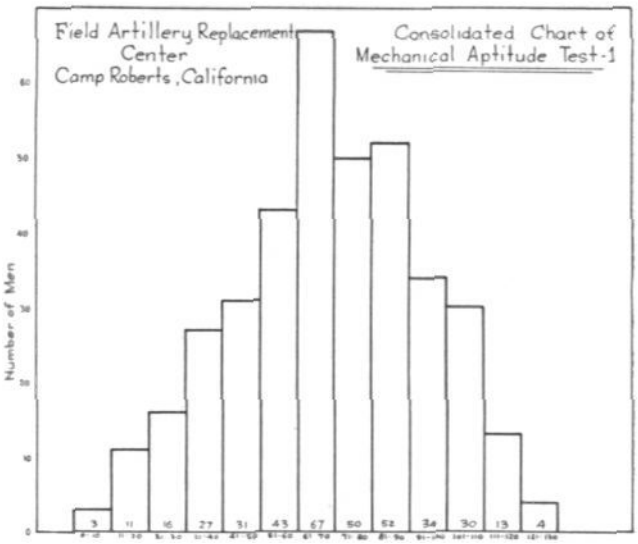



*Exhibit 2*

*One, Two, Three, Four (note trainees counting)*

an examining room where they were given the clerical (CA-1) and mechanical (MA-1) aptitude tests by the combined personnel sections. The results of the first several of these tests are as shown on Exhibits 1 and 2.

A mimeographed form was furnished each battery as a means of determining the progress of the trainee during his two weeks' basic training by personal observation of the one most qualified to render such a report. The trainees were then assigned to those specialist or basic batteries which the results of all classifications indicated for the remaining ten weeks of their training.

The photographs, taken on March 10 and 17, show the Field Artillery trainees in action at Camp Roberts.

## II. Fort Sill

A workman who stopped in the area occupied by The Field Artillery Replacement Center of Fort Sill, Oklahoma, was seeking information as to the whereabouts of a building. As he was feeling his way through a maze of road-building machinery, thousands of drilling soldiers, and hundreds of tents, he questioned two recently selected service men who formerly resided in Harlem.

No doubt surprised at their lack of knowledge of local geography, he asked:

"Are you regular soldiers?"

*155-mm. howitzer cannoneers' drill, basic battery, Camp Roberts*

Two hours and a half are allowed for the taking of the tests, and they should only be given after a full night's rest. The results to date have been very accurate. The remainder of the morning was devoted to instruction in military sanitation and hygiene in their respective barracks. The afternoon was devoted to the completion of the immunization innoculations, the first of which were received at the Reception Centers; after which, in accordance with regulations, the men were free for the remainder of the day. The following day their basic training began.

In order to avoid excessive paper work, the trainees who had already been assigned to the Replacement Center were attached to batteries for rations, quarters, and training during the two weeks' basic training period. This eliminated the necessity for the additional reports of change and also the additional entry on the payroll.

"No suh!" one of them answered; "we'se not volunteers; we'se invited!"

The Fort Sill Replacement Center is located in the

*Specialist battery training at Camp Roberts*

southern part of the reservation, just west of Post Field. It consists of a tent camp with the exception of recreation buildings, post exchange, mess halls, bath houses, and headquarters buildings, which are of a wooden construction.

The initial activities began with the arrival on November 28, 1940, of Colonel Phillip W. Booker, who had been designated as the executive officer. Until the early part of March, the area destined to be occupied by the Replacement Center was assigned to the 45th Division, which then departed for Camp Barkeley, Abilene, Texas. The activities of the Replacement Center were shifted from one temporary location to another, prior to March 4, 1941. Cadres of Regular Army personnel assigned to the Center were temporarily housed with artillery units located on the post, and the officers were temporarily quartered in barracks in the area of the Field Artillery School.

Approximately one hundred and twenty assigned officers arrived on February 14th. The first ten days thereafter were employed in giving these officers lectures and demonstrations, consisting of a refresher course in general subjects. Upon the completion of this course, the officers and men moved into their new homes. Thereafter training cadres arrived with dispatch, and camp housekeeping began, including preparation for reception of selectees.

On March 11th the first selectees arrived and trainload after trainload of men from all parts of the country began rolling toward Fort Sill. The plans for reception of selectees included meeting of trains with trucks and conveying them to their regimental areas. During this period units operated on a twenty-four hour basis, similar to a large hotel. Each selectee found a hot meal, a heated tent and a made-up bed awaiting him upon arrival at his battery.

Classification and assigning a man to a battery where he will be trained along the lines of his civil vocation was the outstanding endeavor of all concerned. Men without special aptitudes were placed in basic gun batteries. Others according to their former occupation and training were assigned to specialist batteries. These latter men include mess sergeants and cooks, clerks, motor mechanics, gun and general mechanics, radio and wire communication operators, and instrument and survey operators. Thus:

Lawyers, undertakers, movie actors, politicians, traveling salesmen and farmers, whose civil training does not equip them for any specialist jobs in the field artillery, join the gun batteries. File clerks, receiving and shipping clerks, bookkeepers, stenographers and public accountants are trained as battery clerks and supply sergeants. Cooks, butchers and restaurant men are trained to be army cooks and mess sergeants. Telephone operators, linesmen and motion picture operators go into the signal and radio batteries. Machinists and electricians become motor mechanics and gun mechanics; carpenters and painters are trained as general mechanics. Surveyors and mathematics teachers, draftsmen and meteorologists are taught how to compute firing data and survey angles to lay the guns.

Along with their specialized training, all are first taught to be soldiers.

Previous to March 23, 1941, training and instruction consisted primarily of: Conditioning, Discipline, Dismounted Drill and Formations; Care of Equipment and Area, Articles of War, Hygiene, Guard Duty, Service of Red Cross, Post Regulations and Military Customs and Courtesies.

Special instruction was given to each trainee, the day he joined his organization, on the Articles of War; the danger of tampering with duds and live ammunition, forbidding same to be moved or brought into the camp area; walking on the left of the road facing traffic; restrictions on hitch-hiking and thumbing rides in uniform; and restrictions on entering unauthorized areas, buildings, etc.

A short road march, dismounted, was included in the daily training schedule during which the trainees were acquainted with the topography, history and points of interest at Fort Sill.

Radio, newsreel, and picture service representatives visited the Center area at 8:45 AM, March 22nd. This was our first training inspection. Demonstrations of massed calisthenics, dismounted drill, service of the piece and training activities of specialist batteries were witnessed.

Trainees were instructed to act as guides. Those selected for this duty were able to explain the demonstration or exhibition, and to discourse intelligently upon their assignment and nature of the work and training at this Center.

Also on this date, March 22, at the request of the Center Executive Officer, Mr. Joseph Reed, Postmaster of Lawton, Oklahoma, established a branch post office in our area.

Colonel Booker greeted each trainee with this message:

To Each Selective Service Trainee of the Field Artillery Replacement Center, Fort Sill, Oklahoma:

Since an individual greeting is impossible, I hope each of you will accept this letter as a personal message.

You are about to become a soldier—a service which means hard work and at times personal discomfort; a service whose only reward is the satisfaction of duty well performed and the knowledge of your contribution to the security of our country and its institutions.

Already you have made a sacrifice in leaving your home and work, whether humble or luxurious, whether from the field or the bench, the laboratory or the desk. You are experiencing a complete and abrupt change of life and environment. Not only have you new tasks to perform, but you must adjust yourselves to a new way of life. Your adjustment to army life will require a real effort on your part. You will find that your comfort and health and the comfort and health of your comrades will require sacrifice on your part and compliance with many orders and regulations that at first may seem unnecessary. You will soon discover why they are necessary.

*Replacement center and reception center areas, Fort Sill, Oklahoma*

* * * * *

You have been sent here to get your first military training. You will be here for twelve weeks. Then you will go to some Field Artillery battalion or regiment. Many will go to National Guard regiments, others to newly organized units.

We will try to place you in positions that best fit your experience and ability as far as possible. If any man feels that he has experience and ability to better serve in some other position, he may apply to his battery commander for reclassification. As far as there are positions available, it is advantageous to have you perform duties for which you are best fitted.

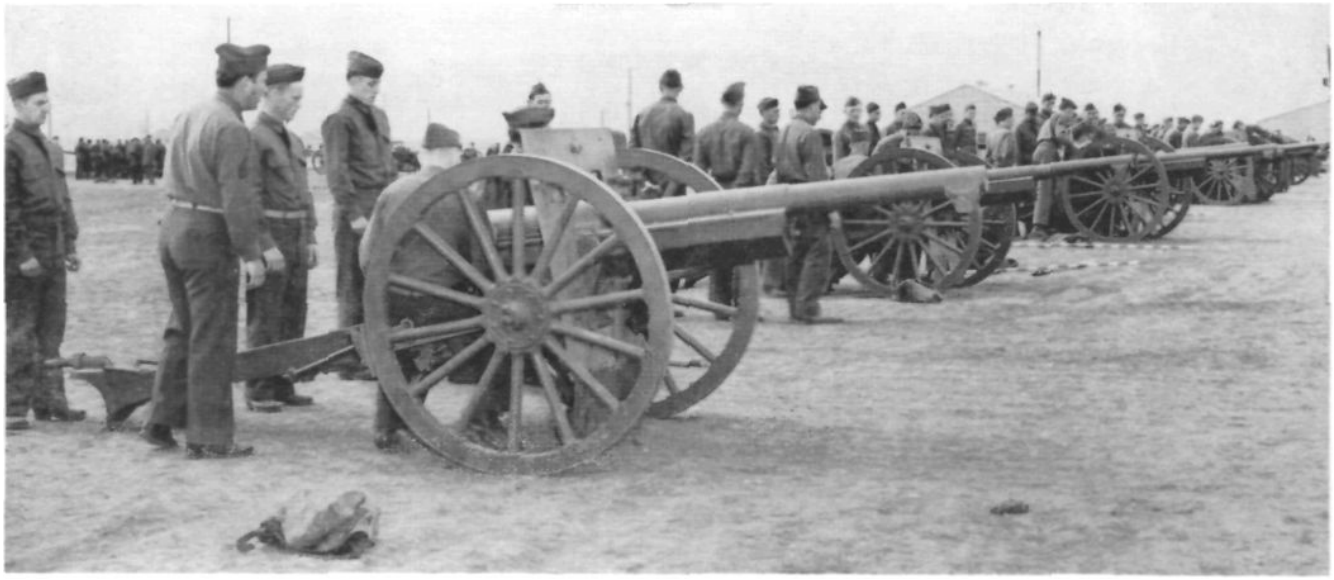
You are now in the Field Artillery, and as a Field Artilleryman with over thirty years' service, I want to congratulate you. It is a branch with a proud heritage. I hope that each one of you will prove to be worthy of wearing the uniform of the Field Artillery in the Army of the United States.

A twenty-eight piece band composed of selectees who have played in orchestras of national fame has been formed under the direction of Technical Sergeant Arthur B. Covert, and regimental parades are held each evening.

On March 30th, Warren Peterson, Seventh Corps Area selectee, who had been dropped by his troop train commander at Wichita, Kansas, to undergo an operation for appendicitis, completed the arrival of our first wave.

As this is written we have completed our regular second week's training schedule; 4,120 trainees have completed

*Battery B, 33d Battalion, 8th Training Regiment, at the Army Day Exhibition at Post Field, Fort Sill.*



*The guns of Battery B, 30th Battalion, at Fort Sill*

their course of instruction in defense against chemicals, and 4,110 have fired two scores on our new 50-target pistol range.

To illustrate the details of work after the basic training, those being trained as cooks are rotated daily with theoretical instruction and practical cooking in organization messes, one day on shift, one of rest and repeat.

When a gun battery has service practice it will be furnished the necessary BC detail by the 32nd Battalion, Eighth Training Regiment. Gun mechanics and motor mechanics from the proper specialist batteries of the 33rd Battalion will join the gun or howitzer battery for the day and so on.

Clerks of all kinds are rotated between work in the classroom and practical instruction in Supply Offices, Orderly Rooms, Personnel Offices and the different staff sections.

The future soldiers are representative high-class American citizens. They are alert and anxious to be about their job, and are assimilating the training provided.

On May 1, 1941, the Replacement Center. is composed of 193 officers, 1,065 Regular Army enlisted instructors, and 6,000 selectees from California, North Dakota, South Dakota, Minnesota, Washington, Iowa, Nebraska, Michigan, Illinois, Wisconsin, New York, Missouri, Oklahoma, and Texas. The June graduation class will ultimately join Regular Army units at Fort Sill and other stations, and National Guard organizations of Michigan, Idaho and North Dakota. In May, Brig. Gen. C. P. George assumed command of the Center.

We feel that we have made a beginning and that the Fort Sill Artillery Replacement Center is "on the way."

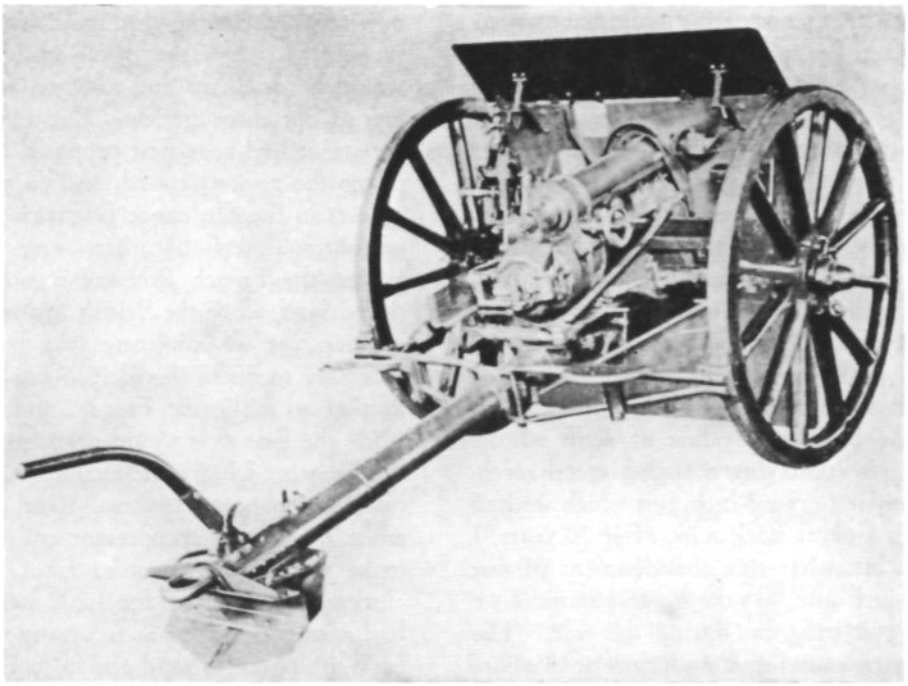
*Battery A, 28 Battalion, pitches shelter tents at Fort Sill. Battery D is working with 75-mm. guns in the background.*

# Wartime Production

## the British 75 millimeter gun

By Major General William J. Snow, USA-Ret.

I have devoted considerable space to the two light guns, the Model 1916 and the French 75-mm., because they were the guns with which we were to fight the war. At the outbreak of the war the former was to be our standard, and when later it became apparent that we could not produce this weapon we took up the latter. But the switch was made too late to help us in 1918; had the war continued into 1919, a different story might possibly have been told. However, the French 75-mm. was, as stated, the gun with which our troops in France actually fought.



*The 75-mm. British field gun, Model 1917, throws a shell weighing 12.3 pounds a distance of 8,300 meters and 16 pounds of shrapnel a distance of 8,900 meters. The weight of the gun and carriage is 2,887 pounds. Its muzzle velocity for shell is 1,750 feet a second and for shrapnel 1,680 feet.*

But there was a third light gun in our production program here in the United States, and this was the British 75-mm., sometimes called the "Model 1917." One day while talking with General Headlam, the head of the British Artillery Mission here, he laughingly made the remark that we might at least leave the word "British" in the name as we did in talking of the "French 75," and not simply say the "Model 1917."

The British light gun in use in their army during the war was the 3.3-inch gun, sometimes called the 18-pounder from the weight of its projectile.

When we entered the war the Bethlehem Steel Company was making these guns and carriages in large quantities for the British government. Accordingly, in May, 1917, our Ordnance Department gave them a contract to make 268 for us, complete, diminishing the caliber to 3 inches. But we had scarcely entered the war when the French Mission arrived here and suggested changing our 3-inch caliber to 75 millimeters. The decision to do this was arrived at on June 5, 1917, and this caused some slight delay in production of the British guns for us. Even so, in January, 1918, we got 11; in February, 26; in March, 28; in April, 47. The number generally increased from month to month.

We were making the British 75's for use in training in this country. Sending them to General Pershing was not even considered at that time (the spring of 1918). In October, however, the subject was considered, as will be seen later. But in the spring Field Artillery brigades in this country were waiting for guns with which to train. The only guns that were being produced were these British 75's. It seemed to me, therefore, the part of wisdom to increase this output at once.

As events subsequently showed, if we had at that time canceled the Model 1916 contracts and utilized the space and labor so freed to make the British 75's, we would have been better off, for up to the Armistice Bethlehem produced only two Model 1916 guns and 14 carriages of that model. Please remember also that during the summer of 1918 we were having so much trouble with the French recuperator that it was impossible to predict

when, if ever, this model of gun and carriage would come through. Under these conditions, it looked to me as though we might ultimately have to pin our salvation on the British Model 1917. So, as the war progressed and no other types of our light gun came through, I became a stronger and stronger advocate of this gun, for it had long since ceased to be a question in my mind of which was the best gun, but it had become a question of what gun we could get in sufficient quantity to equip our army. By midsummer it became apparent that we could not so supply the army both here and abroad, during 1918, even by utilizing all three types of light guns we were making. In fact, considering only that part of our army which was in France, *there was not an American-made light gun on a battlefield in France during the war*.

By the end of June, 1918, we had gotten over 300 of these British 75 guns and carriages, and by the time of the Armistice nearly 800.[1] In October alone, we got 176. In addition to actually getting this gun, it fitted in well with our 3-inch gun in training in this country, as both were equipped with the same panoramic sight and fur-French 75-mm. So during the summer contracts for an additional 1,100 or 1,200 were given to Bethlehem.

I think there was some prejudice against this gun in thermore it had the independent line of sight of the the early days, due to its having a spring recoil mechanism somewhat similar to our 3-inch gun which we had just abandoned. In looking back now, after 20 years, I am not at all sure but what this abandonment of our proven and tried 3-inch gun was the biggest mistake we made in our light-gun program during the war. The British gun was a wire-wound gun, and guns of this construction had never been in favor in our service. I confess that I personally shared this feeling against wire-wound guns, though I did not object to the spring-return feature of the carriage; in fact, I had grown up with the latter and liked it, and I had this feeling in spite of talk about the spring return being obsolete, and in spite of the considerable amount of loose talk about the British battlefields being covered with broken springs.[2]

Although, as I have stated, our main production of light guns were the British 75-mm., yet its manufacture twice became endangered during the war. During the month of April, 1918, not a carriage either of the Model 1916 or the French 75-mm. was produced; during the same month, we got 47 British Model 1917. This was therefore the only light gun that was coming through. Yet about the end of that month an order was given to the Ingersoll-Rand Company to make 1,200 hydro-pneumatic recuperators for this carriage. The British had recently adopted this recuperator and were making it in place of the old hydro-spring one. I therefore had no doubt but what it would be an improvement. But with me it was not a question of getting an improved carriage; it was a question of getting *any* carriage that would work; and the Model 1917 with hydro-spring worked. Any changes in it would, I thought, mean delay in production. And even to get a vastly improved carriage we could not stand any delay. This carriage, as it stood, without this improvement, was satisfactory for training purposes in the United States, and that was the only use we contemplated for it at that time. If the Model 1917 now stopped coming through, because of changes in the recuperator, then the whole source of our light guns would be dried up and not one would be produced in any of our three models. The adoption of this new recuperator had been first proposed in March. I opposed it for the reasons stated, and so also did a number of officers in the Ordnance Department. We who were in opposition knew that there were months ahead of us before the French Puteaux recuperator could be produced; and, while the British hydro-pneumatic was much simpler, yet we all knew that the factory equipment necessary to make this British one was largely the same as that to make the French, and that therefore if we made the British it would probably be at the expense of the French. Under these circumstances I was afraid to take any chances. Ingersoll-Rand were quite anxious to make the British recuperator and not at all anxious to make the French, an order for 1,000 of which was included in their order for 1,200 British. Ingersoll-Rand had even gone so far as to arrange with the British here in Washington to send a man to England to visit Vickers, watch the actual manufacture of this British hydropneumatic recuperator, and bring back drawings of jigs, tools, and fixtures. However, about May 10th their order to manufacture the British recuperator was canceled.

The more British 75's we got, and the more we therefore used and tested them, the higher they rose in my estimation. Troops using them in training in this country spoke highly of them. But best of all was the fact that, in addition to its being a good gun, we were getting more and more of them every month, so it can be readily seen why I wanted no tinkering with it. Events ran along in this way until the fall of 1918. By October General Pershing was getting quite anxious about his supply of light guns for the spring campaign of 1919. General March had told us in the War Department that absolutely no excuse would be accepted for any unreadiness for that campaign, and what March said he meant. So the question of source of supply was examined very thoroughly over here to see how we could supplement the guns Pershing was getting from the French. A close study of the problem resulted in a decision by the chief of staff that a contract for 1,500 British guns should be placed with Bethlehem.

This decision of the Chief of Staff, coupled with

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[1] At the same date (Armistice) we had produced here only one French 75-mm. and 233 Model 1916.

[2] From all I could learn, a large part of the broken springs came from firing the guns with insufficient oil in the cylinders. The addition of a gravity tank corrected the leakage in oil and hence corrected the large spring breakage.

This gravity tank was a British device, developed in 1918. Of our 800 carriages only the last 193 were equipped with this tank.

Bethlehem's estimate of increased production, brought the British 75 distinctly to the front and gave us our source of supply to help Pershing out. This decision to send him the British 75 if he needed them was, indeed, a radical departure from all our previous plans for this gun. We had therefore regarded it as merely a training gun in this country; now, in addition, we contemplated sending it abroad if General Pershing called for American-made guns. This was not a perfect solution by any means; but, in my judgment, it was the only possible way in which we could help him out. The mutations of our light-gun program during the war were certainly interesting but not effective in winning a war!

In trying to present a clear picture to the reader I have discussed each of the three types of 75-mm. guns separately. In reality, all during 1918 they were almost inextricably bound together. This was not due to their physical characteristics, which were really quite dissimilar, but was due to manufacturing facilities. All the plants that could make guns and carriages had contracts for making them up to their full capacity, and, therefore, whenever we considered increasing the output of any one type it brought up the question of reducing production of one of the other types.

I am simply trying to set forth in this book what the Field Artillery accomplished in the United States during the war and how it was accomplished. In such an account it would not be sufficient merely to state that we were badly handicapped by a shortage of guns. If such a statement were made and not elaborated, any interested reader would immediately ask himself "why were we, the greatest industrial nation on earth, short of guns?" It is entirely in an attempt to answer this question that I have gone so fully into the matter of light guns. Nor would it be just for me to drop the subject here without reference to a severe handicap under which the Ordnance Department labored, and which as yet I have touched on but lightly. I refer to the lack of understanding on the part of the A.E.F. of conditions here in the United States. Reluctant as I am to inject this remark, nevertheless it is a fact that constantly suggested changes cabled and written from the A.E.F. caused at times a slowing down of production here and at other times, so I was told, a complete cessation of work in some plants until the matter could be straightened out. As far as the Ordnance Department is concerned, this situation finally culminated in sending the cablegram to General Pershing already quoted. I am not making these statements in censure or criticism, but merely as facts. I do not know where the blame lay; perhaps it was inherent in the distance separating consumers in the A.E.F. from producers in the United States. When sensible men can get together in person and discuss matters, differences of opinion can generally be removed; but when three thousand miles separate them and all communication must be written and sent by the slow process of mail or in the condensed form of cables, it is entirely a different matter. And, of course, all difficulties are greatly complicated by a state of war.

I am tempted to pursue this discussion just a little further and state that the lesson to be learned from our light gun fiasco (for it was a fiasco, reluctant as we may be to admit it) is that a nation cannot radically change its light gun at the outbreak of war and hope for a successful production of its newly adopted type. This also applies to heavy and medium field guns, as will be seen. It takes years of research and development work and tests to produce a new weapon which can thereafter be turned out in quantity with confidence. A high-ranking German officer, with whom I discussed this subject after the war and who had been in charge of design and procurement for a certain class of field artillery during the war, told me that in 1898 he made the first drawings of a certain gun and carriage and in 1911, thirteen years later, he tested the thirteenth model and it was still unsatisfactory. Beginning in 1915, the Germans tried out ten types of light field gun, usually a battery of each, and two types of field howitzer, but none was adopted. A special experimental regiment was maintained in line by the Germans on the Western Front during the last three years of the war for the purpose of testing new weapons.

## MEDIUM GUNS AND HOWITZERS

### *The 4.7-Inch Gun*

While the general plan of organization for the war was to include in each field artillery brigade two light regiments and one heavy regiment, the heavy regiment in one brigade was not necessarily to be of the same caliber or type of weapon as the heavy regiment of another brigade. Thus, an inquiry by me brought forth the information (marked "Correct on April 18, 1918") that the heavy regiment was to be a motorized 4.7-inch gun in the 35th, 40th, 77th and 91st Divisions, which were still in this country. Two of the field artillery brigades of these divisions were actually equipped with these guns when I became Chief.

The 4.7-inch gun, Model of 1906, was the only American gun of a pre-war model which we expected to take overseas. It was a fairly good gun that had been developed during some years of test by both the Ordnance and the Field Artillery. The objection to it was its short range. This was partially corrected by reducing the weight of the projectile from 60 to 45 pounds, thereby increasing the range by about a mile, and bringing it to 9,700 yards. By streamlining the projectile, the range was further increased to about 11,000 yards. There were 60 of these guns on hand when we entered the war.

Someone (I do not know who) had an idea that the 4.7-inch guns, with their greater power, promised to be particularly useful in destroying the enemy's 77-mm. guns. But we took only 48 of them to Europe to destroy the thousands of German 77-mm. guns. The reason

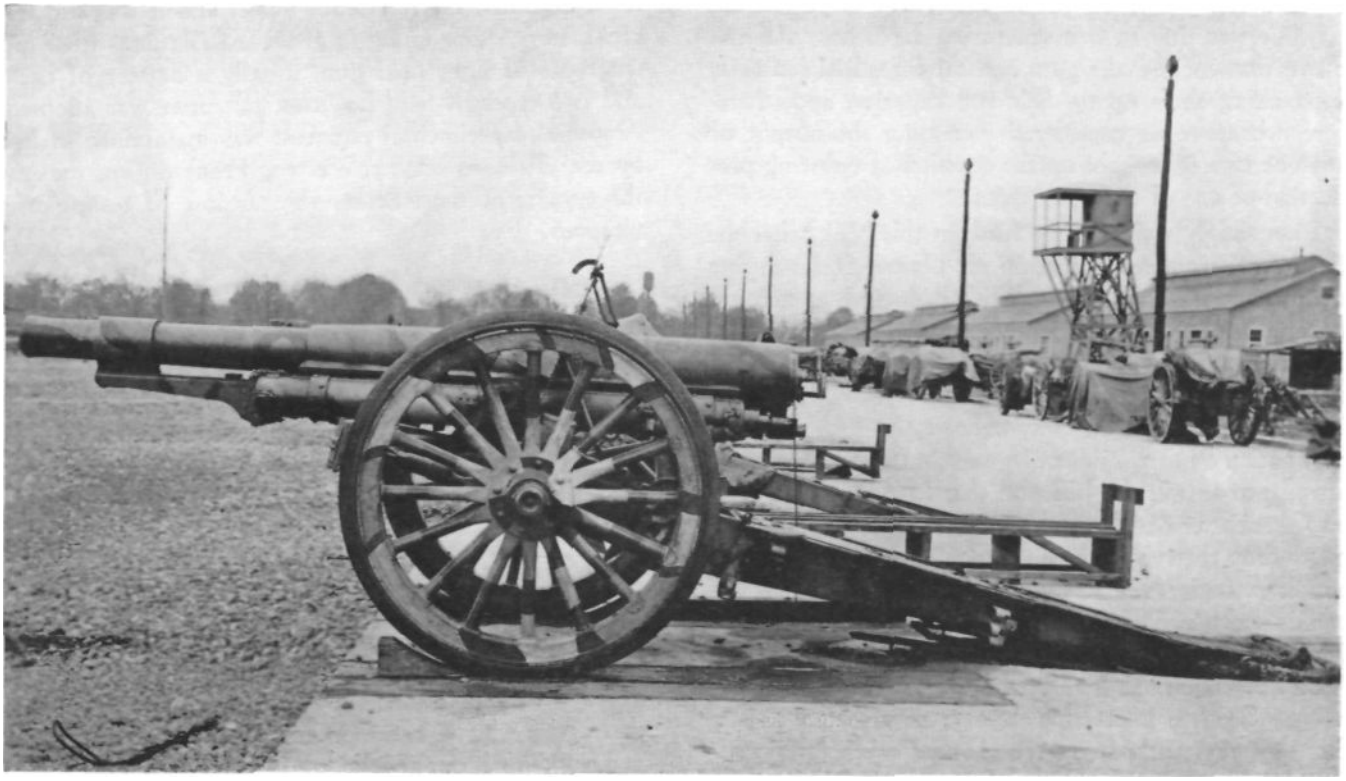
we sent only this small number was because we had no more to send!

Perhaps some light on our failure to produce large numbers of this gun during the war, when ten years' previous experience in its manufacture had familiarized us with it, may be gained if I quote and discuss a cablegram sent to General Pershing on February 17, 1918. It was:

"Subparagraph E. With reference to your 553 paragraph 4 C. Expected delivery at seaboard guns and complete battery material amounts as follows: 4.7-inch guns March 16, April 36, May 50, June 66, July 84, August 29 . . ."

While this cablegram is not entirely clear as to whether the numbers refer to individual guns or batteries (since each battery contains 4 guns), let us assume that it relates to individual guns and not to batteries. This assumption makes easier the promises in the cable. Under this assumption, General Pershing is promised 16 guns in March and a total of 281 by the end of August.

A couple of weeks after the cable had been sent, the head of the Artillery Section of the Ordnance Department, Colonel Hughes, who happened to see the cable, wrote a memorandum to his Chief inviting attention to it and stating that he considered it to be "entirely inaccurate." In substantiation of this, he called attention to the fact that the gun section thought there might be 12 guns completed by the end of May, not 16 by the end of March, and the carriage section thought it could hurry through 16 carriages by the end of March. But Colonel Hughes thought the carriage section had based its report on a statement from Rock Island Arsenal that it could have this number of carriages ready at that time *except* for wheels, sights, fuze-setters, and range quadrants, of course without which the carriage could not even be set up. As to the sights, fuze-setters, and range quadrants, delivery was uncertain (the guns were useless without these instruments) in view of the fact that the Ordnance Department had not then decided what range scale graduations to put on them. Colonel Hughes thought the best that could be hoped for was that three batteries (12 guns) could be gotten to the seaboard by the end of July. He proved not far wrong, for actually the first shipment of 4.7-inch guns, sixteen in number, was made in September. This, it will be noted, was quite different from the promises of the cablegram, both in dates of shipment and number of guns. The cable promised 281 by the end of August, while in reality not a single one had been shipped up to that time. Nor was the delay in shipment due to retaining guns here. None was so retained. There were none to retain or to ship. General Pershing got the first that were produced, notwithstanding the crying need for them here. For we believed that he had the first call on everything.



*The 4.7 gun*

I have mentioned that 48 4.7-inch guns were taken to France; that left 12 in this country. The small number in France were of negligible value to General Pershing, and the small number here were of very little value in

training; so, both the A.E.F. and the service in the United States suffered greatly from the shortage.

Two contracts were made in July, 1917, for a total of 333 carriages, and in December, 1917, another contract was made for 500 carriages. The first deliveries under these contracts were in June, 1918, when we got 5; the next month we got 9; then in August they began to come through faster, so that by the time of the Armistice 175 had been produced. But these were carriages only, and not guns and carriages. This is the only case that I can recall where the production of guns took longer than the production of carriages. However, unlike most of our delays in production, this trouble was not due to difficulty in manufacturing something we had never made before, such, for instance, as recuperators. We had been making this gun for ten years, but there had always been trouble with the jacket. It was a difficult forging to make, and there was trouble during the war in getting forgings that were easy to make, not to mention the ones that were difficult. All forging facilities were overtaxed. At one time we appealed to the Navy and asked that the Midvale Steel Company[3] be allowed to make these jacket forgings. After a first refusal, the Navy consented, provided this did not interfere with their own production. At other times, the question was taken up with other companies. But there were other causes of delay in addition to the forging difficulties. The principal one of these was the caliber itself. It was an odd caliber, not in use by our allies, and therefore all ammunition for it would have to be made in the United States and shipped abroad; and the shortage of ship tonnage was holding up the shipment of all sorts of more necessary supplies. In an effort to get rid of this odd caliber and still preserve the gun, it was redesigned to have a caliber of 120 millimeters, which was a caliber in use in the French Army, and differed from the 4.7-inch by less than twenty-five one-thousandths of an inch. This redesign was completed about July, 1918, but as no guns were made of this proposed caliber, it had merely served the purpose of delaying the production of the 4.7-inch gun. Besides this, the gun as of its original caliber of 4.7 inches was redesigned. This work was completed some time in August, 1918. Due to the causes I have given, and to others, production was greatly delayed. The result was that of the two concerns engaged in its manufacture, Watervliet Arsenal produced its first one in July, 1918, eleven months after receiving the order, and the Northwestern Ordnance Company produced its first one in August, 1918, one year and one month after it received the order. When the Armistice came, only three of this new production of guns and carriages had been assembled, proof fired, and delivered to the Field Artillery, so that while the needs of the Field Artillery in this country for training purposes at that time were 252 of these guns, we had on hand only 15. This shortage had, therefore, continued all during the war, and had constituted another of our severe handicaps to training.

[3]Early in the war, the facilities of the Midvale Steel Company had been allotted to the Navy and those of the Bethlehem Steel Company to the Army.

### *The 155-Millimeter Howitzer*

The mobile howitzers in use in our Army when we entered the war were the 3.8-inch, 4.7-inch, and 6-inch. We had scarcely entered the war, however, when the French Mission arrived here and raised the question, among others, of abandoning this multiplicity of calibers and adopting one single caliber instead, it to be the French 155-millimeter. As we had on hand only a few of each of these various calibers and a negligible amount of ammunition for them, we made no sacrifice in agreeing to abandon our multiplicity of howitzers by adopting the 155-millimeter howitzer. Both ammunition and spare parts for the howitzer would thereby become interchangeable with the French. Accordingly, the decision to substitute the 155-millimeter howitzer for our other calibers was reached June 5, 1917. Yet, when the Armistice was signed, November 11, 1918, and our training needs in this country were 492 of these howitzers, we had on hand 4! Not 400, but 4! Need I devote any more time to showing how badly our training was handicapped? Notwithstanding this negligible production in the United States during the war, there is a fascinating story back of this howitzer.

Up to the time we entered the war, this 155-millimeter howitzer (complete with carriage and recuperator) had never been produced successfully except in one factory, that of Schneider et Cie, in France. The French St. Chamond Works had tried unsuccessfuly to make it. The principal difficulty was, of course, the recuperator. The United States bought the complete plans from Schneider et Cie. Then these plans had to be converted from metric to American units. This work was finished October 8, 1917. To expedite manufacture, contracts were let separately for the howitzer, the carriage, and the recuperator. A month later, contracts were placed for 2,469 carriages (without recuperators) with the Osgood-Bradley Car Company of Massachusetts, and the Mosler Safe Company of Ohio. These contractors had great trouble in securing tools, equipment, suitable steel, and even skilled labor; yet they did produce the first carriage in nine months, or about July, 1918, and up to the signing of the Armistice they had produced 154 and the next month about 230. The production of the howitzer (tube) gave no trouble. A contract for 3,000 tubes was placed with the American Brake Shoe and Foundry Company of Pennsylvania, in August, 1917. Their first one came through 7 months later, about March, 1918, and they continued to come through, so that by October they were producing 12 howitzer tubes per day. Of course limbers and caissons gave no trouble. On a contract for 2,575 limbers, the Maxwell Motor Car Company had produced the first one in September

and had produced 273 by November 11th.

On a contract for 8,937 caissons, the Ford Motor Company had produced 4,373 by November 11th. So, aside from the recuperator, about which I have as yet said nothing, everything was going nicely.

But the recuperator is the whole story here. This device starts with a forging weighing 3,875 pounds. It is made of special steel, and is worked over and shaped, bored out, polished and lapped, until only 870 pounds are left. The steel having given trouble in machining, it was analyzed and its metallurgical formula had to be changed before success was attained. The Mesta Machine Company of Pittsburgh finally produced it. As I remember, there were several hundred drawings to the recuperator, which was a highly complicated and delicate device of inconceivably accurate measurements in its parts. Contractors shied away from it. In the meantime, we had brought from France officers and mechanics who had made these recuperators at home. They flatly stated that it could not be made by our quantity production methods. Finally, Dodge Brothers said they could make it. As the Ordance Department either had to agree or quit, it backed Dodge. Dodge Brothers, during the bitter winter of 1917-18, put up a $10,000,000 factory and equipped it for this purpose. It was stated that during the war, Dodge walked into the Office of the Chief of Ordnance one day and said: "Look here! I have put $7,000,000 in this thing; am I not due a payment on account?" I think he got it. Anyhow, he promised the first recuperator on July 1st. In the 72 hours prior to that date, the mechanics working on the recuperator never left the factory. Dodge sent telegrams every few hours during this time reporting progress. Finally, on July 1, he telegraphed he had one completed. It is true it did not work perfectly and changes had to be made; but he had accomplished what the French said could not be accomplished, and had set a new high mark for American industry. In a few weeks he corrected the errors in the first one, and by the time of the Armistice was producing 16 a day. Of the 3,120 recuperators contracted for, over 800 had been produced by November 11th.

But howitzer, recuperator, and carriage had not been assembled, and so far as training was concerned they were non-existent during the war.

While the story of this howitzer is an interesting tale of accomplishment by the Ordnance Department and a proud record of achievement by American industry, I still must repeat my earlier statement that training in the Field Artillery was badly handicapped all during the war by the absence of this howitzer, and that, even as late as the Armistice, we had only 4 on hand instead of the 492 required.

### THE 155-MILLIMETER GUN

A certain number of regiments of field artillery were to be equipped with the 155-mm. gun. There was not a single gun in any of these regiments in this country during the entire war. There were four at the School of Fire at Fort Sill, and these, as I recall, came from France.

The 155-mm. gun, like the howitzer of the same caliber, was a French design adopted in toto by us, and, like all French designs we adopted, it consisted of the gun tube, the carriage, and the recuperator.

The gun tube gave us no trouble in production, and by the Armistice we had produced over 70.[4] The carriage (without recuperator) was also produced in quantity, so that by the Armistice, we had made 370. But when we came to the recuperator it again is an entirely different story! It was a case of the 155-mm. howitzer recuperator all over again except "more so." It was even harder to make.

As in the case of the 155-mm. howitzer recuperator, Dodge Brothers came to the rescue in making the gun recuperator also. They produced the first one shortly before the Armistice, and then completed 11 more during the calendar year 1918. After the Armistice was signed the company's order was reduced to 880, all of which they completed before May 1, 1919. So here, again, Dodge Brothers brought new prestige to American industry by accomplishing what, according to the French, "could not be done."

By considering the relatively large numbers of guns and carriages produced before the Armistice in comparison with the absence of recuperators, it may seem that the program was ill balanced. But this was not actually the case, for it was planned to send both guns and carriages to France to be fitted there with recuperators. In order to provide these recuperators, we had furnished the French with the forgings and they were to machine and finish them. This would, of course, have taken care of us until Dodge Brothers could come into production.

[4]The following table shows the production in detail:

| Units | Contractors | Number ordered | Number completed Nov. 11, 1918 | Number completed April 17, 1919 |
|---|---|---|---|---|
| 155-mm. gun, tube | Bullard Engine Works | 1,400 | 53 | 250 |
| 155-mm. gun, tube | Watervliet Arsenal | 700 | 18 | 68 |
| 155-mm. gun carriage, Model 1918, Filloux | Minneapolis Steel & Machine Company | 1,446 | 370 | 800 |
| 155-mm. gun caissons | Bullard Engine Works | 1,400 | 53 | 250 |
| 155-mm. gun caissons | Watervliet Arsenal | 760 | 18 | 68 |

Not having any of these guns in the regiments that were supposed to be equipped with them in this country, neither the officers nor men could receive any training in the actual handling of the weapon with which they were later to fight in France.

The four guns at the School of Fire served the purpose of giving demonstrations, and to that extent were a help.

The absence of these guns in the regiments in this country was a handicap to training; but as only a limited number of regiments were to be equipped with the 155-mm. gun, the handicap sank into utter insignificance compared to that caused by the shortage of the other guns and howitzers of which I have spoken.

### SUMMARY OF SHORTAGES OF GUNS AND HOWITZERS

The reader will realize that the nearer we could come to completely and thoroughly training field artillery brigades in the United States before sending them to France, the greater the aid we could furnish to General Pershing; or, in other words, the less time he needed to devote to training the brigades after their arrival in France, the sooner he could put them into battle and thereby increase his effective combat strength. Ordnance was necessary in either case. We were short of guns and howitzers for training in this country, and so was General Pershing; and while he was being temporarily equipped by the French and British, yet, ultimately, his supply would have to come from the production of ordnance in the United States.

Of course, this latter was also the source of supply of the troops in training here. It therefore became necessary to apportion this anticipated production of ordnance between the A.E.F. and the field artillery in the United States. As our desire here was to give General Pershing preference in this as in all other matters, a computation was made in my office as to the *minimum* number of guns and howitzers needed for training in this country, and all in excess of this amount was to go to General Pershing. Of course, the United States allotment would also go to him if, as a last resort, he called for it, but unless and until he did so, a definite statement of what we were to be allowed here would serve as a guide to the Ordnance Department in distributing anticipated production. Accordingly, I submitted to the Chief of Staff an allowance of guns and howitzers for the field artillery in the United States. This allowance, which General March approved, was as follows:

SUMMARY OF GUNS AND HOWITZERS AUTHORIZED FOR TRAINING PURPOSES IN THE UNITED STATES ON NOVEMBER 11, 1918

| | 75-mm. Gun | 4.7″ Gun | 155-mm. Howitzer |
|---|---|---|---|
| School of Fire | 170 | 24 | 24 |
| Replacement Depot, Camp Jackson | 120 | 12 | 12 |
| Replacement Depot, Camp Zachary Taylor | 100 | 12 | 12 |
| 18 Divisional Field Artillery Brigades | 864 | | 432 |
| 4 Corps Artillery Brigades | | 192 | |
| FA Central Officers' Training School | 100 | 12 | 12 |
| Totals | 1,354 | 252 | 492 |

It is interesting to compare this approved allowance with the numbers we actually had in the United States at the date of the Armistice, as this date is the high-water mark of what we had at any time during the war. In the numbers we actually had of any particular gun, I am going to include all the substitutes we had. This will show the amount of training materiel in its most favorable light; but, even after doing all this, there was still a shortage. And I want to impress upon the reader that a substitute is not as good as the desired article itself, for a substitute is, from its very nature, more or less of a makeshift.

75-MM. FRENCH GUNS

| | |
|---|---|
| Allowance | 1,354 |
| On hand 59 French guns, 75 British guns, 88 American guns, and 603 3-inch guns. Total on hand | 1,202 |

4.7-INCH GUNS

| | |
|---|---|
| Allowance | 252 |
| On hand | 15 |

155-MM. HOWITZERS

| | |
|---|---|
| Allowance | 492 |
| On hand 4 155-mm. howitzers, 107 4.7″ howitzers, 39 6″ howitzers. Total on hand | 150 |

I may add that many of the substitutes mentioned, and especially the howitzers, were worn out by long use or broken down by misuse in the early days of the war. Thus, one Training Center had hardly been established when, in June, a telegram was sent to me saying that of the twelve 4.7″ howitzers sent there, only five could be fired, and even they were almost unserviceable. But I had no others to send. Similar telegrams were received from other Centers. I do not want to leave the impression that these howitzers were permanently out of commission. They were not. The Ordnance Department, notwithstanding the heavy strain it was under with its tremendous manufacturing problems, still maintained excellent repair shops at all Firing Centers and Field Artillery Schools. It is a pleasure to record the wonderfully efficient work done by that Department at those places in an effort to keep this old materiel in serviceable condition. But when all is said and done, it still remains a fact that the howitzers would go out of action at critical times, and that a number of them were at all times in the shops being patched up and thus further reducing the small and inadequate number of available substitutes.

I have made no mention of the thirty-six 3.8-inch howitzers we had on hand when we entered the war. This is because we had practically no ammunition for them, and, moreover, they had long since ceased to be much more than junk. However, we were still doing what training we could with them at the date of the Armistice.

Nor have I mentioned the 155-mm. guns, of which we had only four. There were no trench mortars at all. In this discussion, where I have gone into figures at all, I have confined myself to our main training weapons. It may be seen that of the weapons with which our field artillery fought in France, and with which the regiments

should have trained in this country, we had only a negligible number. Thus, we had 59 French 75-mm. guns instead of 1,354, and we had 4 155-mm. howitzers instead of 492. We did our training with substitutes, and even of these there was an inadequate number. We had an assortment of 1,202 light guns instead of 1,354, and we had an assortment of 150 howitzers instead of 492. Yet, notwithstanding this shortage even of substitutes, and in spite of their heterogeneous character, the amount and the soundness of the training we actually accomplished with them was astounding. However, these results were accomplished only after the office of Chief of Field Artillery was established and the Chief could coordinate the training and actually direct it. If such progress was made in spite of the shortage of guns and howitzers, what could have been accomplished with a full training equipment! However, it is useless to indulge in idle speculation; I am trying only to state facts. What I wish especially to do is to impress upon the reader the tremendous handicap which this shortage placed upon our training. It is difficult to overstate the extent of this handicap.

Perhaps at this point the reader may say to himself, "I guess that is so; but I would like to have a few details as to how, exactly, the shortage interfered with training; I would like some sort of a rough picture of training under this handicap." To make the picture clear, I am going back to the field artillery brigade I commanded at Camp Jackson, S. C., before I became Chief of Field Artillery. Here we had one battery of four 3-inch guns and we also had one howitzer. There were twenty-four organizations utilizing this battery of four guns for training. We divided the time from daylight to darkness equitably among these organizations. If there were twelve hours of daylight, each organization could thus be allowed an average of half an hour a day at the guns. Of course, half an hour is too short a drill period in which to make much progress, particularly with a newly organized and wholly untrained unit. So a schedule was prepared giving each unit an hour every alternate day. While this was not much, it was better than half an hour a day. In order to get more working hours at the guns, I even considered erecting lamp posts with electric lights in the vicinity of the guns, as some other brigade commanders had done, for by such means, two or three more hours of training could be obtained per day. I decided not to do it, however, as I was afraid the shadows cast by the artificial lights would prevent accurate setting of instruments, and such accuracy is the very core of field artillery efficiency. I was afraid it would inculcate sloppy habits to be later corrected with difficulty. I thought it better to insist on absolute accuracy right from the start. I do not know whether I was right or wrong as to this.

It is perfectly apparent, however, that only limited progress could be obtained by drilling such a small number of hours per week as was possible. Bear in mind that none of the enlisted men had ever seen a field gun before they joined the army. Their knowledge of guns was zero. The officers conducting the training were but little better off. In these few hours per week the personnel had to learn the mechanical part of loading, aiming, and firing, including the setting of a number of angle-measuring instruments and gun scales. They had also to learn how to adjust and manipulate the sheaf of fire. To their credit, I want to state that in much less time than I had anticipated the men acquired the rudiments. But rudimentary knowledge is a long way from skill. Skill comes from practice and constant repetition, hours and hours per day, until, for instance, a gunner can read his sight as quickly and as accurately as he can tell the time of day by merely glancing at his watch. The field artillery is not efficient until this skill is acquired. With the lack of guns (there should have been 72 in place of 4) to achieve speed and accuracy in laying and loading was an almost hopeless problem.

In training a battery, there is also much more than this mechanical part I have just mentioned. A gun carriage is a delicately constructed machine, requiring constant attention to keep it in serviceable condition. This care of the carriage is taught by actually taking it more or less apart, cleaning, oiling, and reassembling it. Of course, with only one battery of four guns available, this class of work was out of the question, for the guns could not be spared from drill long enough. So this important requisite of training could be taught only (and poorly) by lectures and talks without the guns. In other words, only a little theory could be taught. And, of course, there was no relief in sight until we could get more guns.

Thus far, I have written only of the work of the gunners and cannoneers. But drivers must be trained, if the guns are to be taken to the place from which they are to fire. With only the four guns available for all kinds of training, we could not allow the drivers to hitch the horses to the guns and therefore the drivers could not be trained. Furthermore, as the horses could not be hitched to the guns, the horses could not be trained, and it takes several months of training to get the six horses of each artillery team to work together smoothly and efficiently.[5] The little training that drivers and horses got was obtained by harnessing the six-horse teams to logs, wagons, etc.[6] This was a poor substitute, but was the best we could do. It can be readily seen that progress in training under these conditions was almost nil.

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[5]In October, 1918, I was directed to furnish a monthly quota of 10,000 light artillery horses for overseas shipment, all of them to have received three months' training, as is mentioned elsewhere herein.

[6]Speaking of driving, one day at Camp Jackson I saw a four-mule team and wagon stuck in a small mud hole, due to the lack of driving knowledge possessed by the recruit teamster. I got up on the wagon and drove it out of the mud hole, explaining at the same time to the driver where his trouble lay. Subsequently, I saw him point me out to another soldier and overheard him say: "If I could handle four reins the way that little fellow can, I'd get me a better job than he has got." I do not know what he thought my "job" was, but from the way he saluted the next time I saw him I think his friend must have told him that I was a Brigadier General!

Without continuing this discussion to the wearying point, I think it can safely be concluded that due to the shortage of guns and howitzers only from one-half to one-quarter as much progress in training could be secured in the same length of time as could reasonably have been expected had the full equipment of guns and howitzers been available for training.

I have above been trying to show how shortage of guns handicapped us all during the war, but I am not writing this in criticism of the War Department or of the Ordnance Department. It was simply a case of our great, rich, United States not having guns with which to train its Army, much less to equip it to fight against an enemy. We did not have the guns because Congress, representing the American people, had never provided the money with which to make them, and Congress failed to provide the money in the face of full knowledge of our deplorable shortage. Both the Chief of Staff and the Chief of Ordnance had testified year after year before the proper committees of Congress as to our pitiful condition. General Leonard Wood, five or six years before the war, told Congress that at the rate they were appropriating for guns it would take fifty years to get enough for an army of half a million men, and surely an army of that size was a modest one for which to provide guns. General Crozier, Chief of Ordnance, repeatedly told Congress that guns could not be made overnight and that with an unlimited amount of money at his command he could not produce a single gun in much less than a year.

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## 14th FA Insignia


*The 14th Field Artillery Regiment, an element of the striking echelon of the Second Armored Division, Fort Benning, Ga., is receiving its insignia.*

*The regiment, assigned to the division last July, was first formed at Fort Sill, Okla., during the World War. From 1921 until 1934 it was inactive.*

*The colorful insignia, somewhat unusual in design, consists of a round shield surmounted by an Indian bonnet attached to a scroll below. Center of the shield is a Maltese cross of white on a circular background of artillery red. Surrounding the cross are 14 teardrops, representing the regimental numeral. The bonnet is mounted over the arrow of Satanta, Kiowa Indian chief who regarded the medicine arrow as his symbol of authority. Satanta was identified with the early history of Fort Sill and the Southwest.*

*The motto on the scroll is "Ex hoc signo victoria," freely translated to "With this sign, victory," the words that appeared to Constantine at the Milvian bridge on the outskirts of Rome in the early days of Christianity.*

THE FIELD ARTILLERY JOURNAL *will be glad to reproduce drawings of regimental insignia of other units, together with similar brief explanatory matter.*

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## CHARACTERISTICS OF GERMAN ARTILLERY

During the past few months the FIELD ARTILLERY JOURNAL has printed photographs of various German artillery pieces, including the 105-mm, field howitzer, the 21-cm. mortar, and the two types of long-range railway guns which are firing across the English Channel. Below are a few characteristics of these weapons, including the 15-cm. gun, which has been seen briefly in news-reel "shots" but photos of which have not yet been made available. This 15-cm. gun has a very long tube, and apparently is broken down into two or three loads for transport.

| *Type* | *Caliber* | *Max. Range* | *Max. ordinate* | *Time of flight* |
|---|---|---|---|---|
| Howitzer | 105-mm. | 11,000 yards | 3,300 yards | 50 seconds |
| Gun | 15-cm. | 24,000 yards | 7,700 yards | 75 seconds |
| Mortar | 21-cm. | 9,000 yards | 6,600 yards | 70 seconds |
| Gun | 21-cm. | 132,000 yards | 48,400 yards | 180 seconds |
| Gun | 28-cm. | 42,000 yards | 14,300 yards | 105 seconds |

The foregoing data appeared in *Die Wehrmacht*, Jan. 29, 1941.

# MARKING ARTILLERY FIRES: By Major T. E. Lewis, FA

*Maj. Gen. Walter Krueger and Brig. Gen. L. P. Collins inspecting Btry. C. 77th FA*

In past maneuvers, artillery of opposing forces had little influence on the outcome of an action. Fires, if marked at all, were usually so belated in their marking as to make them ineffective. Realism was lacking. We did not have the means to do the job.

The satisfactory marking of artillery fires requires good, rapid signal communications and adequate training of personnel. For the coming summer and fall maneuvers, we should have both.

Two hundred and forty radio sets have been purchased and distributed to the four armies in proportion to their organizational strength. These sets, known as SCR 298, are standard commercial 25-watt, crystal-controlled, frequency-modulated, police voice sets. Each set includes a transmitter, receiver, receiver power-supply unit and standard operating mobile equipment, including a control unit, handset with cord and plug, loud speaker, antenna, and other accessories necessary for operation in a vehicle equipped with a 6-volt battery. Two frequencies have been assigned solely for marking artillery fires. All sets in the same army are on a single frequency. Sets are mounted in the trunk on command cars, and behind the seat on pick-up trucks, with the controls and loud speaker in both cases on the dash.

Training of personnel in the operation of the set and in marking fires has been initiated in all armies and should be well along by the time the larger-scale maneuvers commence.

The Umpire Manual recently issued by General Headquarters, pending the publication of FM 105-5, explains the method to be used, which is briefly as follows:

*a*. Each artillery battalion umpire and each fire umpire is furnished a vehicular voice radio. A single frequency is used. A fire umpire covers the general area of one infantry regiment.

*b*. Whenever fire is delivered the battalion umpire reports the code coordinates of the center of each battery target to the nearest 10 yards and the duration of the fire in minutes. Example: M8-T3-10. If more than one battery is engaged against the same target, the number of batteries is added. Example: M8-T3-10-3.

*c*. This radio report is received simultaneously by all battalion umpires and all fire umpires. Except when the target is hostile artillery, the fire is marked by either the artillery battalion umpire or the fire umpire in whose area the target lies. If the fire is effective against opposing artillery, the battalion umpire suspends the fire of batteries which are neutralized. It is unnecessary to mark the fire in this case.

*d*. If the fire is conducted by means of observation of the target, the report will conclude with the nature of the target. Example: M8-T3-10-3-Machine guns. The fire umpire then goes to the point designated by the coordinates, places a flag (indicating fire) at the nearest machine guns, regardless of coordinates.

A flag is placed at the center of the fire of each battery, and the fire is taken as effective within a hundred yards of the flag in all directions. It may be necessary to supplement the flag by a sound or pyrotechnic signal, in order to attract attention to the flag initially. No attempt is made to mark the fire of a single battery unless such fire is confined to an area 200 × 200 yards or less and lasts five minutes or more. All battalion fires, however, are marked.

It is hoped that by thorough training and the strictest radio discipline a system similar to a city police system will be the answer. In other words, a battalion umpire broadcasts the coordinates of a fire he wants marked; the appropriate fire-marking party hears the message and marks the fire without receipting. However, if confusion results, due to the number of transmitters in the net, a system of control can be established in which a control station tells each battalion umpire when he can call for his fires to be marked.

With the nature of the equipment and the frequencies assigned there should be no interference with or from tactical radio sets.

With the interest and support of all concerned, the system should work and approach results which would actually obtain in battle. Here is the chance for the artilleryman to really get into the "fire fight" to the extent that he may sway the tide of an engagement.

An aid for getting full value from the coming maneuvers

# An Artillery Action in Somaliland

In September, 1939, when Germany declared war and the task of building up a fighting force in East Africa began, one of the problems which faced the General Officer Commanding was the provision as rapidly as possible of artillery. A decision was made to form an African battery. When the 1st East African Light Battery was ultimately formed it had one section of Yaos and the other section mainly drawn from the Kamba and Luo tribes. The European personnel, all volunteers, came for the most part from the Kenya Regiment. They were a very representative group of Kenya residents: farmers, civil servants, business men and the sons of old settlers. With keen enthusiasm they acquainted themselves with unfamiliar tasks and passed their army qualifying, signalling and gun laying tasks in a remarkably short time. Their first training was done with the 22nd Mountain Battery from India and by the time it became clear that Italy intended to join with Germany and extend the war to Africa the East African Light Battery was ready to take the field. They were moved into the Garissa sector in June, but the only war experience they had there was occasional bombing from the air.

At the end of June, and with very short notice, the Battery was ordered to Somaliland. The unit returned to Nairobi from Garissa on June 28, was given two days for refitting and on July 1 entrained for Mombasa. The

*British artillery in Africa*

Battery left Mombasa on July 3. The movement was necessarily carried out in secrecy, but on the Battery's records there is a telegram from His Excellency the Governor of Kenya, Sir Henry Moore, expressing the good wishes of the people of the Colony, very few of whom knew that their men had left. The Governor's telegram was in these terms: "Congratulations on behalf of the people of Kenya on being the first Kenya unit to serve overseas."

The voyage was uneventful. The Battery arrived at Berbera on July 10.

### Accurate Fire in First Action

On August 4 news was received that the Italians had advanced on Hargeisa and on August 6 the Battery occupied the positions that had been prepared. Ammunition, rations and water supplies were dumped and the Battery's vehicles were moved back about thirteen miles out of the defended area. On August 7 three enemy bombers and two fighters came over and bombed Castle Hill and Observation Hill. The bursts were heavy, but there was no damage.

On August 9 a road block at Kodoyera, about eight miles in front of the Battery's position, was blown up and it was evident that the Italians were massing for the attack. Enemy bivouacs were visible all along the front and large numbers of lorries, headlights full on, moved along all night on the far side of the tree-lined Tug Argen and among the hills. The first attack by the Italian forces began on August 11.

The right section of two guns was on Knobbly Hill, under the command of Lieut. S. H. Powles. Lieut. Powles was observing from a post on the front of the hill about 150 yards away from his guns. With Lieut. Powles were Sergeant Fisher and Bombardiers Proctor and Nazer. With the guns was Lieut. Selby who told me the story. Each gun was tucked in behind a crest over which it had to fire and it says much for the skill of the N.C.O.'s, who were laying the guns, that not a single shell hit the top though the angle was steep. The first intimation that the battle had begun came when the right section heard the guns on Mill Hill, about a mile and a half away, fire the first shot. "Then," said Lieut. Selby, "we cracked off about 12.30. I had a message down from the observation post saying that we had hit a fellow on a white horse. An Italian European sergeant, who was captured later, told us that a General had been killed. When we started the attack he was riding along a ridge behind his troops, which appeared to be massing for an attack." A large enemy force had advanced in open order from a Somali village called Darbruuk. The range was 4,300 yards and the effect of the fire of both sections of the Battery was to split the attack. The enemy lost direction and marched right across the British front. As the shells from the guns of the Light Battery burst among them the Italian force was disorganized and suffered heavy casualties. It was later reported that fifty men were killed or injured by one shell and there were many casualties among horses and mules.

### Coolness in Clearing Jam

Back in the gun positions of the right section there was trouble. After firing thirteen shells one of the guns jammed. But Artificer Staff Sergeant Thoms (from Naivasha) was not perturbed. "Although there was plenty of stuff flying about," said Lieut. Selby, "Thoms got down to it, took the gun to pieces, worked unceasingly for hours and had it working again the next day."

Lieut. Powles, up in the observation post, reported that targets were so numerous that it was difficult to pick out the best. The section now had only one gun in action but the observer was very pleased with the work it did. "According to him," said Lieut. Selby, "we could not fire a shot without hitting somebody."

Later in the day the Italians developed a heavy attack on the Mill Hill position and the fight section took a hand in beating it off. When the shells began to burst between the enemy and the British positions on Mill Hill the effect on their morale was very noticeable and after a time they abandoned the attack and scattered back.

### A Busy Afternoon

During the night, roads and other points were regularly shelled at intervals to discourage any enemy movement. Knobbly Hill was held by a company of the Northern Rhodesians (less one platoon) and four machine guns from the Somaliland Camel Corps. In the afternoon of August 12 the Italians were again reported to be massing in the tugs in front. "That afternoon," remarked Lieut. Selby, "was rather busy. They started a determined attack on Mill Hill and round our right. We never fired within 58 degrees of our zero line the whole time. The Italians either came in on the right or the left. We shelled chiefly on our left towards Mill Hill where two or three attacks seemed to be going on and some of our shells actually fell within the Mill Hill wire."

During the later stages of the engagement there was a heavy thunderstorm and observation became difficult. "The next thing we heard," went on the narrator, "was that Mill Hill had been evacuated and that our left section was coming over to us. Most of this time our guns had been firing almost to our rear, which meant that we had to man-handle them round in the pits and break down part of the parapet to get on to our target."

### Another Good Day

"The 13th—the third day—was a good day. The Italians did not seem to be going round the evacuated position of Mill Hill and all we saw was one or two scratching about in our old positions there for bully beef and what not. But at dawn they started an attack between our place, Knobbly Hill, and another small hill

called Black Hill on our right. The first thing we knew was a quite heavy attack about midday. Because of an intervening rock we could only get one gun to bear on the Italians who were about 820 yards away in the bush and trees on the edge of a dry river bed. Two or three Companies of them came up the tug and started machine-gunning us. The next thing we saw was a lot of pack mules. Apparently a pack battery with the infantry and machine guns were trying to get round behind us. When we saw those mules we thought there must be something in that river bed, so we shoved some shells into the middle of the mules and then saw a few Italians rushing about trying to get the mules out. The tug was hidden by a lot of bush, so we put a line of shells down the river bed and then we saw the Italians running back."

### Firing Over Open Sights

The attack by the single gun of the right section was made over open sights and for three-quarters of an hour it blasted the enemy in the river bed with shells at short range, causing very heavy casualties among the pack battery and the infantry, while successfully repelling the threatened rear attack. The fact that they could actually see the enemy caused great excitement among the African gun crews. All spare men, as well as some of the detachments, manned the gun pits and trenches with rifles and blazed away at the enemy force while the gun barked overhead. Meanwhile the Italians were spraying the position with machine gun fire and bullets were plugging into the sandbags. Some of the enemy moved right down the river bed and worked round behind the Knobbly Hill position. Then the second gun, hitherto blinded by a rock, got a chance. It was moved right round till it was facing to the rear, where fire was opened over open sights at less than 900 yards, shooting downhill, "blazing away with his gun and the rifle fire from his spare men as hard as he could go," as Lieut. Selby told me. "The African ranks had reached their peak after two hard days. As soon as they actually saw the enemy their excitement knew no bounds. They thought it was grand. They were absolutely amazing that day."

### An Astonishing Action

Truly an astonishing artillery action, even for a light battery. The Italians began to withdraw in the afternoon and the day was quiet after that. Early in the evening a fatigue party of the Northern Rhodesians went out and shot some injured mules. A Rhodesian Sergeant, in charge of the party, brought in a wounded Italian Askari. He also found two pack guns. The party brought one of the guns in—a 2.65—with between 300 and 400 rounds of ammunition. "We were going to send out for the other gun," said Lieut. Selby, "but another blitz started in the evening and we never got it." The Rhodesian fatigue party brought back some wire, two bottles of liqueur and a pair of shot guns, as well as all the artificers' tools and the artillery instruments, and the Italians made no attempt to interfere. The casualties inflicted were very heavy.

On the 14th, the Officer Commanding the defenses on Black Hill reported that he was threatened by a concentration of troops on his front, and once more the right section of the Light Battery on Knobbly Hill came into action and their shelling nipped the attack in the bud. Then an Italian 4.2 battery came within range, attacking Castle and Observation hills, and effective fire from the East African guns stopped the enemy fire. That day the Italian artillery tried to find the gun positions. They started shelling Mill Hill for some reason, though it was unoccupied, and dropped a few behind the position on Knobbly Hill.

### The Last Firing

August 15, the last day of the battle, opened quietly until a message came from the Commanding Officer of "A" Company, Northern Rhodesians, who with three or four machine guns of the Somaliland Camel Corps was holding Black Hill. It was an unpleasant spot, covered with lava boulders and boasting only a few trees. But the Rhodesians were very well dug in and had a strong position. The message told of an enemy concentration behind the Northern Rhodesians at a point where, among three little pimples of hills, the enemy had massed a considerable number of troops with two guns. Owing to the position only one of the two guns of the Light Battery could bring fire to bear. Several shells straddled the enemy position and the area was so effectively searched and swept that no attack developed. Black Hill reported that an Italian officer had been killed. The firing was done over open sights by Sgt. H. J. Shorman's gun at a range of about 3,500 yards, and that was the last shooting the right section did.

### Orders to Withdraw

Instructions were received to withdraw and when darkness came the two guns were put out of action and the gun crews formed the rearguard of the withdrawing party. Thus Knobbly Hill, defended so stoutly for five days, was abandoned. The force had instructions that if they encountered any parties of the enemy in their withdrawal to the low country they were to try to go round them. If not, then they had to fix bayonets and go straight through. "But," said Lieut. Selby, "we did not see a soul. We got back to our wagon lines after walking that night for twenty miles across ridges and dry river beds. Eventually we arrived at Brigade H.Q. at 3:30 in the morning.—Reprinted from *The Gunner, London*.

*British medium guns bombarding Derna*

*German armored artillery in Libya. Note the new German tropical uniforms.*

# WAR

## IN THE

# MEDITERRANEAN AREA

**Photos by Acme**

*German horse-drawn "105" moving through Bulgarian mountains on the way to Greece. Evidently the war in the Balkans was not all Panzers and Stukas.*

*British antitank gun near Tobruk. Note type of emplacement, and camouflage net over the shield.*

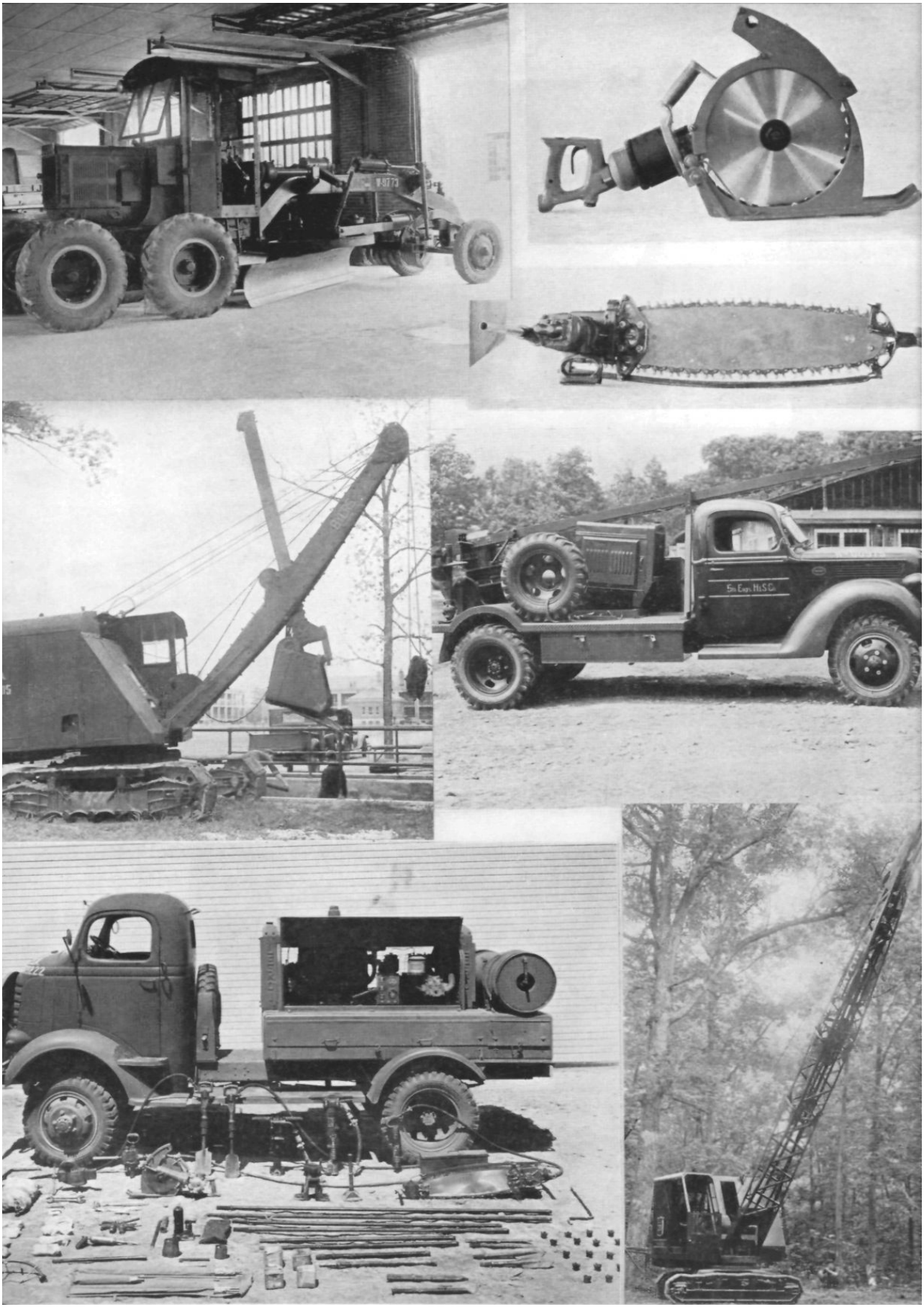
*British medium howitzer in Cirenaica; moving up the escarpment near Giovanni Berta*

*British light gun in action in Libya. The British have modified old caissons for motorized transport of ammunition.*

*Italian light accompanying weapons in Libya*

*British medium howitzers in action in front of Tobruk. Newsreels show that these weapons are very unstable in firing, possibly because of the large tires.*

*Italian tractor-drawn artillery displacing in Libya*



**A New Feature:**

# WITH THE OTHER ARMS AND SERVICES

**Editor's note: Here is the first of a new series, each of which will describe one of the other arms and services. The complete series, together with articles on the War Department, General Headquarters, etc., will constitute a valuable hand book on the Army as a whole; so we suggest that readers preserve each issue of the *Journal* containing this series. On the page opposite are some of the power equipment of the divisional combat engineers. Photos from Engineer Board.**

## I—ENGINEERS

### By Major Thomas North, FA.

It is not news to the old timers, but some of the newcomers in the Field Artillery may be surprised to learn that the Artillery and Engineers were once united in a single Army for a period of eight years. In 1794 Congress authorized the raising of a Corps of Artillerists and Engineers, which lasted until the organization of the Corps of Engineers in 1802. This latter Corps consisted of officers and cadets only; simultaneously, the Military Academy at West Point was instituted, to become a peculiar responsibility of the Corps of Engineers until 1866. The officers of the Corps were held to be staff officers rather than officers of the line, although several were given commands and acquitted themselves with great distinction in the War of 1812. With the organization of the first company of Sappers, Miners and Pontoniers,—Company A, Corps of Engineers came into being in 1846. The nineteen engineer officers who served with the armies in Mexico included Captain Robert E. Lee who, fifteen years later, was to become the military genius of the Confederacy, Lt. George B. McClellan, who for a time was to lead the army of the Potomac against him, and Lt. H. W. Halleck, who was to become General in Chief and Chief of Staff of the United States Army.

While the Civil War was brewing, the Corps of Engineers explored, built fortifications, improved harbors and river channels, performed the surveys for the transcontinental and other railroads. During the Civil War the combat engineers performed valiant and priceless service as sappers, miners, pioneers, and particularly as pontoniers. On June 16, 1864, they put a 2100-foot ponton bridge across the James River in seven hours, enabling the entire Army of the Potomac and its trains to cross in two days. With few exceptions, the officers of the Corps served with the troops in the field. Fame came to many, among them, A. A. Humphreys, Corps Commander and post-war Chief of Engineers, whose name has been given successfully (but by ill-forune, temporarily) to two important military posts, viz, Fort Belvoir and the Army War College.

Following the Civil War the Corps of Engineers resumed its constructive activities. To its credit is recorded the United States Capitol, the Washington and Lincoln Memorials, the Library of Congress, and many other structures in the District of Columbia. While more conspicuous, perhaps, these achievements are relatively small compared with the tremendous river and harbor improvements which have been accomplished under the direction of the Corps. The Panama Canal is well-known as a monument to its skill and efficiency.

In 1777 General Washington was ordered to appoint a geographer and surveyor of the roads to take sketches of the country and the seat of war. In 1813 the employment of eight topographical engineers was authorized. A Corps of Topographic Engineers, distinct from the Corps of Engineers, came into existence. Among its distinguished number was George G. Meade, later to command the Army of the Potomac and to face Lee at Gettysburg. In 1863 the Topographical Engineers lost their identity when they were merged into the brother Corps of Engineers.

After the Civil War the constructional activities of the Engineers once more predominated. Two companies, however, took part in the campaign in Cuba and one in the Philippines. Then, following the Spanish-American War, the number of Engineer troops was increased. Their timely skill proved their worth in the Baltimore and San Francisco fires.

The World War witnessed a huge expansion of the Engineers. Warfare had become highly technical. Not only were pioneers needed, but there were numerous railroad—standard, light, and operating—, forestry and shop units, to name but a few, plus topographical and sound-and flash-ranging units. After the war this last function was taken from the Engineers, rested for a few years in the bosom of the Coast Artillery, and in 1922 passed to our own Arm.

By way of a few statistics, there were more engineer soldiers in the American Expeditionary Force in France than of any other Arm except the Infantry; here are the relative proportions: Infantry, 32.40%; Engineers 12.68%; Field Artillery 11.68%. Not only did the Engineers render their specialized services, but on many occasions they laid down their tools to take up the rifle and bayonet and attack the enemy.

The uniform of the Engineer officer is distinctive in that its buttons bear, not the crest of the United States, but a device modeled after an early fortification work

Courtesy "The Military Engineer"

*The Engineers must be ready at any time to lay down their tools and take up the gun. This practice by an Engineer machine gun unit is a definite part of their training.*

on Governor's Island, with the Corps motto "Essayons." Until after the World War Engineer non-commissioned officers received higher pay than did those of Field Artillery, Infantry or Cavalry. The characteristic colors of the Engineers are red, (the same as our own) and white. Just as Fort Sill is in a sense the "home station" of the Field Artillery, much more definitely the home station of the Engineers was Willet's Point, New York (now Fort Totten), later Washington Barracks, (now the Army War College), and since the World War, Fort Belvoir, Virginia. At this post are located the Engineer School, the Engineer Board, as well as several Engineer units. Two particularly venerable institutions are to be found at Fort Belvoir—the Engineer Mess and the Essayons Dramatic Club.

The Engineers today are organized thus:—The Chief of Engineers, Major General Julian L. Schley, decentralizes his functions to two major branches—Rivers and Harbors, under Brigadier General Thomas M. Robins, and Military under Brigadier General John J. Kingman. A special organization, the Mississippi River Commission (under the presidency of Brigadier General Max C. Tyler) is chiefly concerned with flood control, and comes under the general jurisdiction of the Rivers and Harbors section. The Rivers and Harbors functions are subdivided among eleven regional divisions, each one normally headed by a colonel; each division is subdivided into districts, of which there are fifty, normally under lieutenant colonels or majors. There are a few military assistants in each division and district office, but for the most part the personnel is civilian. The average annual expenditure of funds from 1934 to 1939 was about one hundred fifty millions of dollars for rivers and harbors improvements, and about fifty millions of dollars for flood control work.

The Engineers are both a supply service and a combat arm. Supervision of both the supply function and military activities is exercised by the head of the Military section. In addition to procuring and supplying all characteristic equipment for Engineer troops, the military section procures and distributes searchlights (and actually makes some of the large 60-inch mirrors) as well as all surveying, drafting and topographic equipment for our own Arm.

The Engineer School at Fort Belvoir has a purpose analogous to that of the Field Artillery School. It consists of a school for student officers and one for enlisted specialists. The enlisted specialists' courses include urveying, drafting, map reproduction, water purification, power equipment, and motors. Like our own, the courses now are of 12 weeks' duration.

The Engineer Board at Fort Belvoir is the organization which develops and tests new equipment. Such progress as has been made in the supply of maps and photomaps to the Field Artillery can be largely credited to this Board, which today has many other large-scale developments under way, including ponton and other types of bridge equipment, camouflage, map reproduction equipment, anti-mechanized defenses, power equipment, etc. At Wright Field, Ohio, is an Engineer Detachment which is in intimate contact with the Materiel Division of the Air Corps and which functions in close collaboration with the Engineer Board. Its functions relate to the development and test of aerial photography and photogrammetry insofar as these concern the requirements of the Engineers and the other Arms. It is, and during all of the 20 years of its existence has been, abreast of the latest practices in aerial mapping and related subjects.

An important responsibility of the Chief of Engineers

is that of military mapping. AR 300-15 states that the Corps of Engineers and the Air Corps are jointly charged with the preparation of maps requiring the use of aerial photographs and that in peace time the mapping activities of these two agencies will be devoted to training and preparation for their war-time missions. Formulating the actual policies of mapping is a responsibility of the G-2 Section of the War Department General Staff, but the job of getting the maps made falls upon the Chief of Engineers; to this end his office maintains close contact with the Air Corps.

The *Combat Battalion, Engineer Troops*, is the engineer component of the triangular division. It consists of three lettered companies and a headquarters and service company, of which the commanding officer is also the Division Engineer. The 616 enlisted men in this battalion constitute four percent of the total enlisted strength of the division; the infantry, amounting to sixty-eight percent and field artillery, seventeen percent. It is a far cry from the pick-and-shovel knights of the World War I; these experts are equipped with all manner of labor-saving tools and power equipment, chiefly of standard commercial types; for instance, the battalion has motorized air compressors with pneumatic tools, tractors with bulldozers and trailers, as well as water purification units. It is equipped to take care of the most urgent needs of the division in road repair, bridge work, river crossing operations, field for ifications, obstacles, demolitions—and makes a formidable combat unit in an emergency.

The *Combat Regiment* is the analogous unit of the square division, consisting of a headquarters company and two battalions of three lettered companies each. Its commanding officer is also a colonel and division engineer. Its equipment includes a map reproduction trailer for small or hasty jobs.

The *Engineer Squadron* of the Cavalry Division resembles the Engineer battalion of the triangular division; while the *Armored Battalion* is the Engineer component of the Armored Division. This latter has the particular mission of facilitating the movement of the armored division across obstacles and of creating obstacles against enemy troops endangering its own force. In addition to the three lettered companies, it has a bridge company which maintains and superintends the erection of bridge equipment, fixed and ponton; it also has certain heavy ferry equipment.

Courtesy "The Military Engineer"

*The mission of the ponton battalion is the supervision of construction of the bridges and ferrying points*

Field artillerymen will notice the lack of communications equipment in these engineer units. The Divisional battalion and regiment have but eight miles of wire and five telephones. Radios are found only in the armored battalion, which has eight. It would appear that the canned formula, "Division engineers will be prepared to assemble in Division reserve on three hours' notice" might be more practicable were there a more generous supply of radio equipment.

*The Combat Regiment*, Corps, resembles that of the square division except that it has more work units, some foot bridge equipment, more power equipment and no reproduction trailer. Map work in the Corps is handled by the Corps Topographic Company, which is mentioned later.

*The General Service Regiment* is assigned to Army and higher units; it resembles the Corps Regiment but is less mobile.

*The Aviation Regiment* is assigned to GHQ Air Force and has the prime mission of constructing air bases and advanced airdromes. It has three battalions, each similar to that of the triangular division. Its equipment includes power tools suited to its mission.

*The Separate Battalion* is assigned to Army and higher units. It has a headquarters and service company and four lettered companies. It is commanded by a lieutenant-colonel and, being essentially a work force, is of relatively high strength and little mobility.

In addition to the above units there are also many types of specialized or technical engineer units. Among these are:

*The Camouflage Battalion*, Army, consisting of a headquarters company and four camouflage companies of self-contained platoons which supervise and assist camouflage work of the ground troops. Their function is to advise, but the actual work is the responsibility of the using troops.

*The Camouflage Battalion GHQ* has a headquarters company, a camouflage company with the mission of inspection of camouflage, supply of materials and instruction; and a shop company for fabrication of camouflage equipment.

*The Ponton Company, Light*, has 3 units of 250 feet of 10-ton ponton equipment, two units of 432 feet of footbridge and 80 assault boats.

*The Ponton Battalion, Heavy*, has four units of 250 feet of 25 ton ponton equipage.

It should be noted that the mission of these ponton units (which are Army troops) is the maintenance of the equipage and the supervision of construction of the bridges and ferrying points. The broad backs are furnished by other troops such as general service regiments. It may also be worth noting that the Engineers prefer the pronunciation with the accent on the first syllable and frown upon "pontoon."

*The Corps Topographic Company* has the mission of getting out hasty maps and of carrying to the field artillery the survey control which the latter needs in establishing its firing charts and coordinating its fires. This is a highly important mission from our viewpoint. Unfortunately, there has been limited opportunity for the engineers and field artillery to work together and develop a doctrine and technique. However, the broad objectives are fairly obvious and the present year may witness combined exercises of engineer and artillery survey personnel. The obvious partner of the Corps Topographic Company is the Field Artillery Observation Battalion.

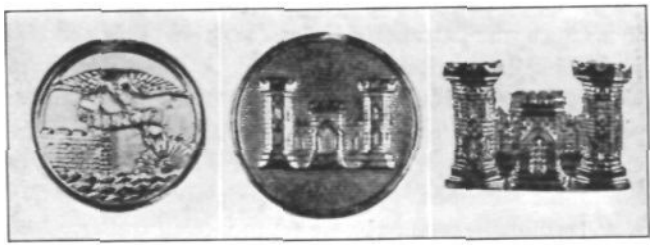
The *Army Topographic Battalion* has the mission of providing maps for the army. However, in the rapidly moving situations of modern warfare it cannot be expected that these battalions can keep pace—the production of 1:20,000 battle maps by photogrammetrical processes is infinitely faster than by the old-fashioned ground methods, but nevertheless is still too slow. In campaign, if adequate maps do not already exist, the topographical battalion must temper its production to the situation, producing photomaps until opportunity occurs for its more systematic, detailed mapping. The battalion has two survey companies whose chief job is to establish, extend, and intensify the basic geodetic control, upon which the maps are to be based and which ultimately furnishes the ground work upon which field artillery survey is founded; a photomapping company, equipped to make maps by stereoscopic devices from air photos (multiplex, etc.); and a reproduction company, equipped with heavy presses.

The *GHQ Topographic Battalion* has a similar mission to that of the army battalion except that its activities concern the theater of war as a whole. It has one survey company and a more permanent reproduction plant.

Both of these units work in close cooperation with the appropriate air corps photo squadron.

The *Water Supply Battalion* has the mission of purifying and transporting water. It has a headquarters and service company and three lettered companies with a total capacity for purifying 630 gallons per minute and transport for 67,500 gallons. Other special types of organizations are the Depot Company (for engineer and supply), Mobile Shop Company, Dump Truck Company (for transporting materials used in engineer operations), Railway Operating Battalion and Railway Shop Battalion.

Sometimes we may feel that in the Field Artillery we have a multiplicity of different types of organization and weapons, but it is quite plain that in this respect we are not alone. The Engineers, too, have a great variety of units and it may be a fair inference that they, like the other arms, are headed for an era of specialization.



Courtesy "The Military Engineer"

*Engineer officers' button* *Soldiers' collar ornament* *Officers' castle*

# The Secret German Weapon

By Captain T. L. Crystal, Jr., FA

Much has been written and surmised on the subject of the German Secret Weapon. Hitler has hinted at it in various speeches, and many theories have been advanced as to its existence or possible characteristics. It is the belief of the writer that the German Secret Weapon is neither secret nor a weapon, but that it is as efficacious as a tremendously powerful force having both these attributes. The secret weapon is a *method of thinking*.

The weapon is a military weapon used by military men in military endeavors. Its sole interest is professional efficiency. The proof of its efficiency is the present map of Europe.

In analyzing the lessons of the European War military men here and abroad are seeking the reasons for the German success. Especially are they interested in details of technique. But beyond that, a searching inquiry must be directed into the guiding principles which actuated the combat units.

Fortuntately we have secured a copy of some remarks made by an accomplished German artillerist to a group of foreign students, in which he discussed the combat doctrines of the German Army. Reproduced in the following paragraphs are excerpts from this address which contain advice and instruction so sound and timeless that they deserve, perhaps, to take their place with such other classics of universal military literature as Du Picq and Jomini, Clausewitz and Saxe.

### THE GERMAN ARMY

Much of the tactics and even the technique of the Artillery depends on the general conception of warfare based upon the national character, upon centuries of tradition and teaching, and upon the largest experience in all kinds of warfare in the latest war. *Artillery tactics, therefore, depend on the resulting organization of the army and the basic tactics of infantry, which is, and always will remain, the decisive arm on the battlefield.*

### ORGANIZATION

Whoever tries to understand the tactical thoughts of an army must first and primarily study the organization of the army concerned. Organization and tactics are closely bound together. For instance, it is self-evident that an army that lays the principle value on mobility must be differently organized than one which hopes to obtain victory through massed fire power. Certain tactical viewpoints are only to be explained if one examines organization. In any case, through the study of an organization of an army, one can gain insight into its tactical thought.

**All staffs are small, because we believe that only small staffs can work quickly. We believe that the more officers a staff has, the more orders will be given, not because the orders are necessary, but because everyone likes to have a say and everyone likes to give orders. A staff of an artillery battalion, for example, consists of a commander; three lieutenants as adjutant, orderly officer and communication officer; and a medical officer and a veterinarian.**

## TACTICS

**The German army has of course its principles, what is to be done in war, but—please mark it well—no stereotyped rules as to how it is to be done. May it well be understood I am talking of tactics, not technique!**

We believe that movement is the element of war and only by mobile warfare can any decisive results be obtained.

Our supreme tactical principle is therefore mobility. (This shows itself in our belief that the division, not the army corps, is the strategic unit. Mobility exists down to the organization of the infantry squad.

Mobility is aided by surprise, by the independence of the subordinate commander within the mission of the higher unit, and what we call the tactics by mission.

**Mobility means quick decisions, quick movements, surprise attacks with concentrated force; to do always what the enemy does not expect, and to change constantly both the means and the methods and to do the most improbable things whenever the situation permits; it means to be free of all sets of rules and preconceived ideas.** We believe that no leader who thinks or acts by stereotyped rules can ever do anything great, because he is bound by such rules. War is not normal. It cannot therefore be won by rules which apply in peacetime. Situations in war change rapidly, and changing situations cannot be solved by rules. We do not want therefore any stereotyped solutions for battle, but an understanding of the nature of war. This is the general basic principle. You will now understand why I cannot give you forms of attack, defense, or pursuit. We have no normal way of carrying out any form of battle. I can only give you a few principles.

We all know that the effect of modern weapons is extraordinarily great in war and that the machine weapons rule the battlefield. The defender counts principally on the power of his weapons, but the attacker can only move forward under their protection. However, the attacker has constantly the advantage of being able to select the time and place and direction of the attack. The selection must be made promptly and come as a surprise if the attacker is to use this advantage. If our attacks are to be quickly launched and come as surprises, we must first develop our fire weapons as early as possible, and second be as strong as possible in weapons at the point of decisive attack, so as to smash down opposition. It therefore follows: If we want quick movements, we must develop early and fully our supporting weapons. That is one element of thought with regard to combat.

On the other hand, the following is to be said: When we meet the enemy, we generally know very little about him. The fog of war surrounds us on all sides. No reports at all; contradicting reports, reports actually wrong, as it turns out later. . . . out of this maze, the leader must select the road to victory. If we wait for better information, we lose time, the most precious element in war, and in doing so we give the enemy the opportunity to get better information about ourselves. We also lose the advantage of being able to win the first point by a strong and prompt attack. *If we attack the enemy, we will in so doing receive the best information about him.* We have, therefore, two points: prompt attack . . . be as strong as possible in supporting fire.

The commander must be clear with his plan of action. You may question perhaps "Does he know enough about the enemy?" . . . I shall answer "You never know enough about the enemy" . . . but . . . that brings up another principle in our army. We say: "The leader has three things: a mission, a map, and from that may he knows the principle terrain features . . . and he has a will, which one hopes is stronger than the will of the enemy." If he studies his map carefully, he can generally estimate what a clever enemy will do and must be mentally prepared for a hostile line of action which is the most disagreeable for his mission . . . but he will not wait to see what the enemy does, but will rather force the enemy to do what he prescribes. Impose your own will on the enemy from the outset. If the enemy is not clever, so much the better. The attack will generally clear up in an hour the situation which the commander would not be clear about for four hours, if he stood still.

And now another vital point turns up: Every commander, from the army down to the infantry squad, must be informed of the mission of his superior unit, in order to act within this mission, whenever a changed situation arises, before he gets a new order from his superior commander. This is what we call "independence of the subordinate commander." Therefor every order must clearly point out the tactical mission of both units, not merely give the means. For example, the order will not be "The regiment will secure such and such a place." Don't tie down a commander to the ground, but rather say: "The regiment will cover the right flank," or "The regiment will prevent the enemy located at A from disturbing the combat of the II Army Corps." How he achieves the mission (attack, defense, delaying action) is left entirely to the responsibility of the subordinate.

In our case now another question turns up, namely, point and method of attack. We have only a few principles in our army. One of these, however, is that every attack must be launched at the enemy's weak point. All leaders down to the last soldier know this and actually carry it out. If you don't know enough about the enemy, well, the map and the terrain will show strong and weak points in the enemy dispositions. We are all here united in the belief that a flank attack is the most quickly successful. Why? Because we believe that the flanks of a body of troops are their most vulnerable point. Why then not attack the weakest point in the front, if we can't reach the flank? In this respect, we go to great lengths. We say: Every front, no matter whether it is an army or a battalion, has its strong and weak points. If I notice, for example, in a battalion front of an enemy, a wide coverless field over which the enemy can observe my approach, then that is his strong point, provided his positions are well concealed. This point I shall not attack at all. No harm is done if a broad gap exists in the front of an attack. I merely cover it with the fire of a few machine guns. This same open space may, however, be the weak place of the enemy, if the enemy's position is not concealed and can be shot to pieces by artillery. So, tomorrow, there can be right what today is wrong. There is nothing stereotyped. The leader must both see and think. There are no rules to be learned according to which he must act.

So much for the question where to attack . . . now the question as to how it is to be done. In our view, only one answer is possible, and that is to make a real main effort, a powerful one against the enemy's weakness.

You may question me: "Very well, but what of the case where the enemy can shift his reserves to meet the attack?" The answer is, "We still have mobility and surprise. Our blow must hit the enemy *before* he can shift the reserves." Once I saw in an American "movie" a series of shifts executed

by the Notre Dame team just a moment before the actual attack. This is just what I mean: Mobility to the last in order to baffle the enemy, and then one powerful main effort, for which everything else is neglected. Here also we have the three important elements in a knockout punch: Main effort, surprise, and the opponent's weakness.

Rifle troops receive combat missions. They receive zones of action pointed out on the terrain. The boundary lines are never laid out over the top of a hill or middle of a village, but always the valleys and the edges of villages. We believe that the fight for a hill can best be conducted by a single responsible leader, and not divided between two. These zones of action are, however, only guides. If I as leader of a rifle company, for example, notice that my right neighbor is advancing better than I am, I immediately leave my zone and fight alongside my neighbor in his zone, for there is the weak point in the enemy line. Generally no complete orders are issued, but fragmentary orders, because the latter are quicker.

Every bit of cover is utilized so as to approach the enemy as closely as possible, without being seen. The scouts in front of the rifle companies move forward in irregular patterns. No definite formation is demanded of them. They may advance in column of one or in groups, but they are always spread out in width and depth. As long as possible they keep moving without firing. The fire power of the platoons is in the light machine guns. These fire, when necessary, through gaps in the line, which have been left for this purpose by the rifle squads. The light machine guns move forward by bounds; at least one gun in every platoon must be firing; it must never come about that all guns are advancing simultaneously. If the fire of the light machine gun weakens or if it ceases, then the rifle squads take up the fire. The attack thereby rolls forward, one element firing, the other element advancing. No special orders need be given. Every individual soldier knows the procedure. He has the eyes and ears. He knows "over there is the enemy—we are attacking him." He moves forward when his comrades fire, and he fires when they move forward. The supporting weapons move forward similarly when they can no longer fire from their initial positions.

As soon as the rifle squads are so close to the enemy that neither the light nor the heavy machine guns can fire (which means that a penetration is imminent), all machine gun units hasten forward so as to be as close as possible to the advance infantry and help them. The final assault is made with bayonets and grenades.

Now begins the really difficult part of the battle, the struggle within the enemy's defensive zone, about whose organization we know nothing. As soon as the machine guns arrive, they go into position and open fire at new targets while the rifle squads continue to move forward. The platoon leader needs only to command: "The enemy is on that hill . . . light machine guns go into position . . . rifle squads attack by the right flank" and all men know they have a common objective, which will be attacked by the machine gun by fire and by the rifle squads by movement. The trench mortar platoons and batteries of artillery all hasten forward so as to continue the penetration in close liaison with the infantry. Every place where the enemy's resistance weakens is penetrated; reserves are used only at such places. Every individual soldier aims to get ahead. It is the supreme moment for the individual, the NCO, the gallant lieutenant. Nobody worries about flanks, only about what is straight ahead. In moving forward in this manner, fire and movement continue. I want, however, to repeat and emphasize the main points. First: No stereotyped or preconceived thinking; second: Mobility; third: A main effort; fourth: Surprise.

I wish to close this portion of my remarks by reminding you of the word of two remarkable military leaders. The first, Napoleon, exhorts his generals, "Activite, activite, vitesse," and Field Marshal Von Moltke says, "Everything connected with war is subject to continuous change. Only change is permissible."

**TRAINING**

**I think two principles will point out our trend of ideas: "The soldier can do in war only what he learns in peace"; and, "Do not teach the soldier anything he must forget the first day he is subject to actual battle conditions."** It is clear that, in view of the type of tactics we have adopted, in which no stereotyped forms exist, training is a real problem. For the soldier himself learns no rules, learns only to think. If he is to be successful, he must be a leader in a small scale.

It is evident that the company commander best leads his company in accordance with the plan of the battalion, and still better if he knows how to lead a regiment. It follows that a private does better if he knows how to lead a squad, a platoon, a company. The more the soldier understands the leadership of the next higher unit, the fewer orders he needs, the more correctly he acts, because he knows what is at stake. The more the soldier is trained as a leader, the better he will fight. **Our principle therefore: to train every man as a leader to the limit of his abilities—one as a squad leader, one as a platoon leader and still another as a company commander.** At a first glance this sounds almost impossible. It is really not so bad as it sounds, for every soldier is a human being, and every human being can think . . . he only needs to be taught how to think. To learn to think only requires experience.

The young recruit enlisting in the army is at first placed in a basic training unit, *where from six to twelve months he receives basic training*. He learns close order drill, rifle and light machine-gun marksmanship, is trained as a gunner and a driver, learns tactics to include squad, platoon and gun section and other matters as well. After that he is transferred to a combat unit. Now his training as a leader really begins. Companies and batteries are divided into several training classes. In these the soldiers are grouped according to capabilities, to be trained as leaders of a squad, a gun section, a platoon. The best of them are trained to command companies and batteries. Little time is devoted to close-order drill, perhaps one or two hours weekly. The rest of the time is devoted to target practice and battle training. *We don't want to spend our time on anything in peace which is not useful in war*. Many will say, perhaps, that close-order drill is necessary to obtain discipline. That is, in part, correct; but we also obtain it in marches and daily routine. We have only to ask ourselves the question, "Which is more important, close-order drill or combat training? With which shall I win wars?" The answer is not doubtful.

Nearly every day we practice on the terrain. Definite tactical situations are given in every exercise. As soon as the soldier reaches the ground on which the problem is held, he is made to feel that he is in the midst of war . . . he is taught how to think. Let us take as an example an infantry platoon. The platoon leader takes his position out on the terrain. He gives a problem and directs that it be solved. As a platoon leader he appoints perhaps a corporal, as squad leaders, privates. After the problem has been completed, there is an immediate critique on the ground, the entire platoon being assembled. Then the platoon marches to another area of the terrain, and another problem is solved with other leaders. In the beginning it very frequently occurs that the second problem is solved in the same manner as the first. Then the platoon commander has the finest opportunity to show that we don't want to learn the rules, but to learn to think and that each

problem requires a different solution. The soldier must be told, however, that there are different solutions to every problem. One can't say definitely in peace that only one solution is corect. We want above all to have thinking soldiers, who are themselves able to make prompt decisions.

In the meantime, the terrain on which the exercise was held is reproduced on the sand table at the barracks, by soldiers who were not present at the exercises. The reproduction is made from the map under the supervision of an NCO or an officer. This seems to be one of the best ways to teach men how to read a map. *It is a matter of course that every soldier must learn how to read a map*. When the platoon comes back to the barracks, it repeats on the sand table the same exercises it has just completed on the terrain. Naturally a sand table is not always required, maps are often used. In any case, this new critique gives excellent opportunity to clear up doubts and to continue the instruction.

This is naturally only one way in which training can be carried out. There are many, and every company commander has a free hand. At intervals there are exercises by companies, battalions and regiments. Every summer the regiment goes, for a period of from four to six weeks, into a terrain completely unknown to them, on which daily field exercises are held in cooperation with the other arms. Every day different situations are given which require a different solution. Every fall large maneuvers are held on terrain which is unknown even to the higher commanders.

If the soldier has now learned something, he must, before he can be promoted to corporal, pass an examination, which consists of troop leadership and tactics in several different situations. He is then returned to the training unit. Here are gathered together all the soldiers of the regiment who have passed the examination. For six months now they are specially trained as corporals, to lead squads and platoons. After this period only, if he has passed his course successfuly, the soldier can become a corporal.

**In the German Army, soldiers are practically never used for fatigue work. Everything not connected with training is done by civilians. We have time, therefore, to train the soldiers for their most important work—battle.**

It is clear that we can only attain our goal if we have specially capable officers, who meet all demands. Therefore we give them a very thorough training. The youngster who wants to become an officer must have university qualifications. He is trained for three and one-half years, serving through all the ranks from private to master sergeant within the combat units. During this period he is also sent twice, for a period of nine months each, to the service school of his arm. Here he learns everything necessary to a young officer; above all, troop leading and tactics, to include the reenforced regiment, and military history as well. Those who show during the course that they are not good enough, leave the army. By this system, we are assured that only the best men become officers.

**I want to emphasize again the following: No rules or forms of combat. Every army runs the danger in peace of becoming enmeshed in rules. That is the greatest danger. We must, therefore, act in peace according to the principle: "Let us kill stereotyped things, otherwise they will kill us."**

**Orders are fragmentary and piecemeal. It is expressly forbidden in the strictest terms to give any special form for orders to the troops. Not long orders, but short, concise directions given at the proper time to proper persons, show character and firmness on the part of the commander.**

The constant anticipation of possible developments and the early reconnaissance are the foundations for early decision and promptitude in the execution of powerful, well supported attacks which roll forward without cessation to an ultimate conclusion. By striking boldly at unknown shadows and cutting the Gordian knot of indecision and anxiety, you win the first card by constant pressure on the enemy, imposing on him your will which is based on your mission, the terrain, and your knowledge of the situation, which, however, will never be complete.

Please note again the speaker's opening statement that artillery tactics depend on the organization and tactics of the supported arm. With this in mind, does it not seem that his advice to artillery students, which consists mostly of a discourse on infantry tactics, is sound, and of great value to each of us? When were these remarks made? Who was the speaker?

The speaker was Captain Anton Frhr. von Bechtolsheim, and his address was delivered *in 1932 at the Field Artillery School at Fort Sill, Oklahoma*, where he was a student. Von Bechtolsheim is now a general, and head of the operations section of the general staff of von Reichenau's Sixth Army — the army which crashed through Belgium.

This talk was drawn out of obscurity by Colonel Carl Baehr, FA, and Major Robert L. Howze, Jr., Cavalry. The foregoing summary contains those points which I believed were most timeworthy.

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## COLONEL LOUIS T. BOISEAU

*Colonel Louis T. Boiseau, the third Secretary-Treasurer of the U. S. Field Artillery Association and Editor of* THE FIELD ARTILLERY JOURNAL *from 1913 to 1914, died April 18 at San Francisco. Col. Boiseau was born in Washington, D. C., June 1, 1867, and was appointed to the army from the District of Columbia. He was a graduate of the Artillery School, 1905, Distinguished Graduate, Army School of the Line, 1910, and a graduate of the Army Staff College, 1911. He held the degrees of LL.B. and LL.M. from Georgetown University. After a service in the Field Artillery from 1898, including participation in the Spanish-American War, Philippine Insurrection, and World War, he retired in 1922. He is survived by his widow, the former Anna Belle McGill, of New York.*

# INCIDENTS FROM
# THE BATTLE OF FRANCE

## Armored Action Near the Coast

### By CAPT. P. W. BRAMWELL, Corps of Engineers

**Editor's note: In the May issue we presented the first two stories of this feature: *Artillery in Action on the Aisne,* and *Adventure at Jussey*. Captain Bramwell now continues the series with an account of the fighting which occurred between German and British armored units during the Allied retreat from the Somme. These *incidents,* generally unrelated, should furnish valuable material to the future historian who will write the whole story; and in the meantime supply us with numerous hints on current tactics and technique. Above all, they give sufficient details to help supply the atmosphere of the war, making it more real. The account which follows shows how the infantry and artillery components of a Panzer division worked in conjunction with the shock element. And it shows strikingly the great destructiveness of a unit of this type which has broken through the organized front and is operating in the "back country."**

INITIAL DISPOSITIONS

During the latter part of May and the first days of June things were lining up for the coming Battle of France. Along the 360-mile front from Montmedy to the sea the Germans had three great groups-of-armies poised behind their bridgeheads. South of the Somme and Aisne, discouraged by their failures to reduce these bridgeheads, were some 25-odd weary French divisions plus the British 51st Division and parts of the British 11th Armored Division. Still hoping, no doubt, that another "miracle of the Marne" would save the day, the Allies thought that the coming fight would be more of a delaying action than the last-ditch defense of a nation—which it was really destined to be.

At the extreme western end of the line, between Amiens and the sea, the Panzer divisions of the Schnelle Korps Roth were opposed to several French divisions (including the 17th and 31st) and to the British forces mentioned above.

The British 11th Armored Division comprised two regiments, the 22d and 23d. The latter, with which this article is chiefly concerned, was landed at Cherbourg on 26 May and marched immediately north to join in attacks then being made against the Abbeville and St. Valerysur-Somme bridgeheads. On June 1, after several engagements, the regiment was withdrawn to the south for rest and refitting; bivouacs were established around Servaville (see map), while many of the tanks were being repaired in ordnance shops at Elbeuf and Louviers. Such was the situation on June 5 when word was received that the Germans had begun their big attack.


Rumors flew about that the regiment would immediately return to the front; but as the day wore on, no such orders were forthcoming. The following day the colonel was summoned hurriedly to division CP, where he learned that there had been a German breakthrough southwest of Amiens. Already things were looking very bad. The colonel was to take command of a provisional regiment consisting of his own two battalions and an attached troop of cavalry. He was to move as soon as possible to a position of readiness west of Gournay. At this time the regiment contained 33 scout cars, 44 light tanks and 73 medium tanks. Owing to shortage of materiel the two battalions had been consolidated into one.

At 2 PM on June 7 the colonel was at Servaville giving his orders. The regiment had been assembled and was ready to march. The orders provided that the unit march at 3:30 PM and take position along the railroad running north from Gournay. The cavalry troop was to be in reserve. Regimental CP was to be in the Foret de Lyon.

After various delays, some arising from activities of the German Air Force, the provisional battalion reached Gournay about 8 PM. A liaison officer arrived from Division with the bad news that two Panzer divisions had broken through between the French 17th and 31st Divisions. At 7 PM the heads of

the German columns were reported to be at Formerie and Grandvilliers. The division commander had directed that the 23d Armored Regiment withdraw at once to positions covering the river and railway crossings at Nolle-Serqueux. The colonel immediately sent orders for his provisional battalion to move to Nollevalle-Serqueux and the cavalry troop to move to Bois Heroult where the regimental CP was to be established.

### GERMAN PANZER MOVEMENTS, JUNE 5-8

The German armored division (with which this account is concerned) forced a crossing of the Somme north of Quesnoy at daybreak on June 5. The fight was a combinedaction of the infantry, pioneer, artillery, and tank elements of the division. After reducing machine gun nests along the bank the pioneers and infantry crossed and established a bridgehead 3,000 yards deep, which by 3 PM had permitted parts of the tank echelon to be crossed to the south bank. Then the tanks moved rapidly south in a deployed formation while the infantry and artillery held the flanks and cleaned up islands of resistance remaining. The French Moroccan troops defending the area resisted tenaciously but by nightfall the Germans had broken through a fortified line at Quesnoy and had seized commanding terrain to the south. During the evening numerous tank-against-tank actions occurred, resulting generally in German victory, while the divisional artillery repelled several strong counterattacks on the flanks.

*German Pazer units advancing in France*

In the morning the French again attacked this new bridgehead, but the Germans continued to press southward in a deep but deployed formation. They did not stick to the roads, but moved rapidly across the flat cultivated fields, surprising and capturing several French units, including some light and heavy artillery. The division reached Formerie about 7 PM on June 7. Early the next morning the advance elements were approaching Forges.

### BRITISH MOVEMENTS, JUNE 8

After having given orders for the movement to positions near Bois Heroult, the colonel of the 23d Armored Regiment proceeded to division headquarters. Travel over any roads in the area was now a slow and painful process. Lanes and highways were choked with retreating French troops and civilians. At division the colonel learned that the situation was as bad as it possibly could be. The line of the Somme had burst like a dam, and the French were in headlong retreat to the Seine. The 23d Regiment was to cover the withdrawal. For this it was to be given every spare tank in the division—these "oddments" amounting to two or three platoons of light tanks and six or seven medium tanks. The oddments were to report to the regiment that night (June 7). Knowing that communications might fail, the division

commander gave the colonel free hand. The only thing was, he was to remember that there were no bridges across the Seine below Rouen, so he was to avoid being maneuvered onto the Havre peninsula. Righto!

The colonel left division CP at 9 PM, and, bucking traffic as usual, arrived at his own headquarters about midnight June 7-8. En route he had visited Nolleval and La Hallotiere. At the former he found an Engineer lieutenant ready to blow the bridge after the last tank had crossed (the provisional battalion was still withdrawing). At La Hallotiere the colonel encountered the commander of two weak battallions of Line-of-Communications infantry which were strung out along the line of the Andelle River. The infantryman, surprised to hear that the Germans were so close, was glad to have the assistance of the armored battalion.

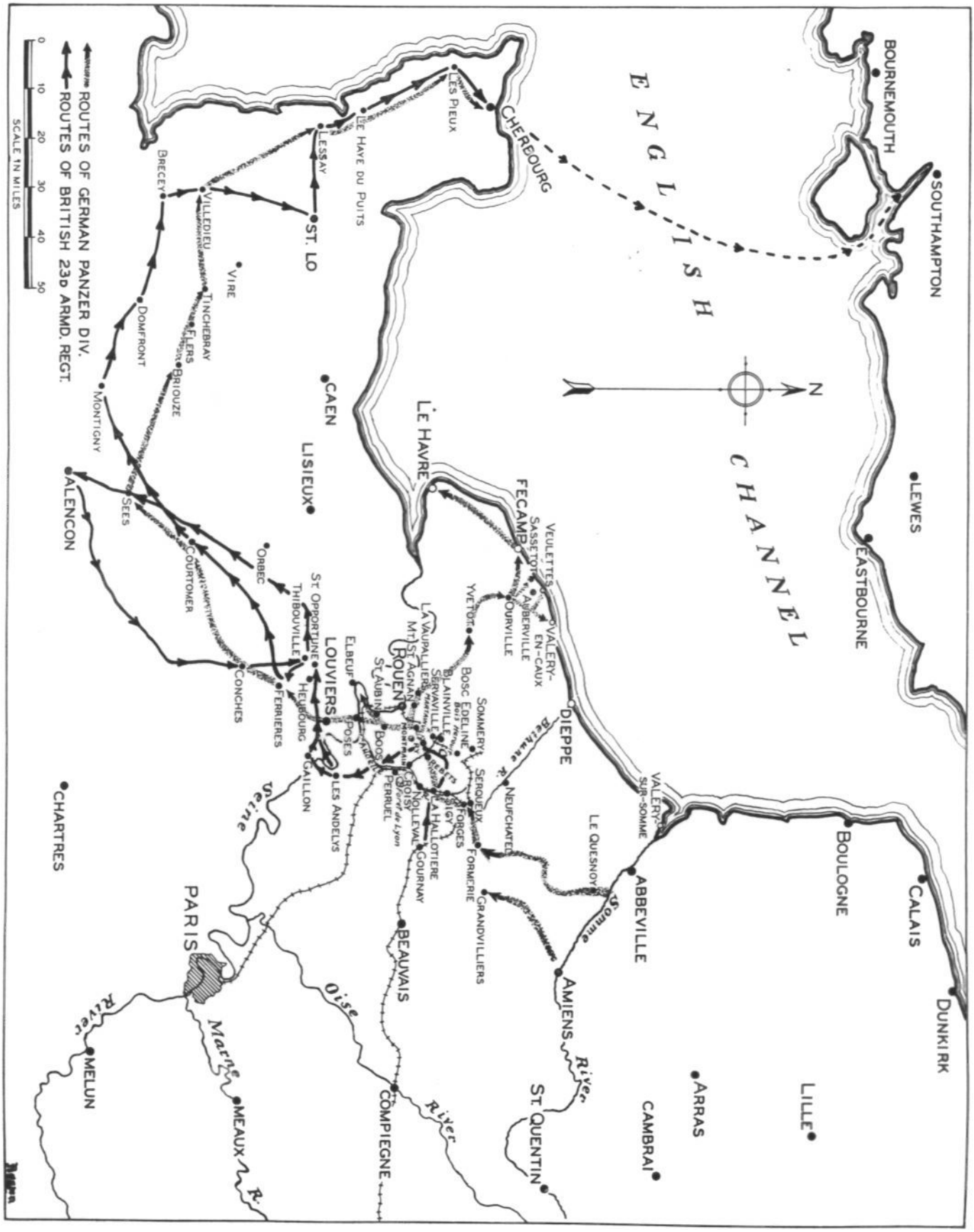
*German armored car reaches the northern coast of France*

The colonel, delivering the orders himself, placed his cavalry troop along the line Nolleval-Sigy; and the tank battalion was directed to extend the line from Sigy, inclusive, north to the vicinity of Forges. Thus it may be seen (from the map) that the British were facing east behind the protection of the stream. Some of the "oddments" which showed up at 6 AM were posted as a guard for the right flank at Croisy, while others were sent to Bois Herouit in reserve.

About 8 AM word was received that the Germans were entering Neufchatel and Forges. As the German tanks could move along the high ground between the headwaters of the Andelle (which flows south into the Seine) and the Bethune (which flows west), the British left flank was threatened. The colonel ordered his provisional battalion to extend its line of patrols along the railway from Serqueux to Sommery. The British armored unit was now spread very thin, as it was extended over a front of from 15 to 20 miles. The situation was critical.

Fortunately, at 10:30 AM, the cavalry troop reported that all friendly troops had withdrawn behind its part of the front and that all bridges over the Andelle had been blown. The colonel rushed this news to division, who at once authorized him to withdraw to the line: Croisy - Blainville. The colonel, however, was still in doubt as to whether all friendly units had in fact withdrawn. He held up orders for the retirement until he could get verification. In the meantime the Germans had made contact and were beginning to attack, although the colonel did not hear of this until 11:15 AM.

The reports began to pour in. The cavalry reported that the Germans were crossing over the La Hallotiere bridge (apparently it had been only imperfectly demolished by the British engineers. As will be seen later, the Germans attacked here with tanks supported by a battery


ROUTES OF GERMAN PANZER DIV.
ROUTES OF BRITISH 23d ARMD. REGT.
SCALE IN MILES
0 10 20 30 40 50
ENGLISH CHANNEL
N
SOUTHAMPTON
BOURNEMOUTH
LEWES
EASTBOURNE
DUNKIRK
CALAIS
BOULOGNE
LILLE
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LES PIEUX
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BRECEY
VILLEDIEU
TINCHEBRAY
FLERS
BRIOUZE
DOMFRONT
VIRE
MONTIGNY
CAEN
LISIEUX
LE HAVRE
ALENCON
SEES
COURTOMER
ORBEC
VEULETTES
SASSETOT
FECAMP
ANDERVILLE
OURVILLE
VALERY-EN-CAUX
YVETOT
DIEPPE
VALERY-SUR-SOMME
LE QUESNOY
ABBEVILLE
AMIENS
ST. OMMER
ST. OPPORTUNE
THIBOUVILLE
HEUBOURG
FERRIERES
CONCHES
LOUVIERS
ELBEUF
ROUEN
ST. AUBIN
POSES
BOOS
LES ANDELYS
GAILLON
SEINE
BOSC EDELINE
SOMMERY
BLAINVILLE
SERVAVILLE
LA VAUPALLIERE
MT. ST. AGNAN
SERQUEUX
FORGES
SIGY
LA HALLOTIERE
NOLLEVAL
GOURNAY
BOISY
PERRUEL
NEUFCHATEL
FORMERIE
GRANDVILLIERS
BEAUVAIS
COMPIEGNE
ST. QUENTIN
CHARTRES
PARIS
OISE
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RIVER
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MEAUX
R.

of 105-mm. howitzers). The provisional battalion reported that 30 German tanks were moving on Sigy. A few minutes later they added that heavy materials, perhaps ponton trains, were following the tanks. At 11:50 the report came back that the Germans had taken Sigy.

Finally, at 12:05 PM, came word that all friendly units were west of the battle line. As a matter of fact the provisional battalion and the cavalry had already started to withdraw. They were in imminent danger of being cut off.

Now came a new peril. The French 17th Division, in headlong retreat with all its artillery and antitank guns, quicker he too got his troops behind the Seine, the better. Orders for the withdrawal were issued at 4 PM.

In general, the retirement back of the Seine appears to have gone off smoothly enough, except that the movement of the regimental staff was complicated by a last-minute message from division announcing that a certain battalion of the 51st Division was attached to the provisional regiment. The 51st Division was withdrawing along the coast, and the battalion in question was supposed to be 12 miles to the north. The colonel immediately sent out a liaison officer to contact this unit and order it to get across


*Part of a British mechanized division in France: a column of Bren gun carriers*

and making no effort to assist in delaying the Germans, nearly engulfed the headquarters and reserves of the British tank unit which was at Servaville. The colonel issued new orders at 2 PM: The detachment at Croisy was to hold fast. The reserve detachment was to establish a line of patrols from Croisy to Blainville. The provisional battalion at Blainville was to hold against attacks from the north.

Meanwhile the cavalry troop reported that it was withdrawing, closely pressed by the enemy. There was a rumor that the Germans were already in Blainville.

The colonel attempted to contact the French 3rd Light Mechanized Division which was supposed to be holding the line south of Croisy. But at 3 PM he learned that these allies had also withdrawn post-haste, and at that time were crossing the Seine. The conclusion was inevitable that the the Seine at once. By 5 PM the colonel and his staff had reached Montmain, but there still was no word from the liaison officer. Accordingly the colonel ordered a halt until the situation clarified; he attempted to advise his scattered elements of this decision, but without success. This was a bit awkward. Quite.

An order came directing the colonel to report to the division commander at Elbeuf at 6 PM. The colonel arrived there an hour late, but found no general and no representative of division. The trip was not a complete loss, however, because as the colonel recrossed the bridge on his way back to Montmain he saw the missing battalion of the 51st Division marching up to the bridge. He gave this battalion appropriate orders, and rushed back to Montmain. On his arrival there at 9 PM he learned that a passing party of Engineers had left word

that all bridges to the east had been blown and all friendly troops evacuated. The colonel and his staff resumed their march to the Seine.

After several hours the party reached Les Andelys, only to find the bridge completely blocked and prepared for demolition. The march was continued to Gaillon, where the story was much the same. The colonel was no longer in the humor for further detours. He had the steel rails blocking the bridge removed, and went on across. It was now 1:30 AM, June 9. Nowhere was there any evidence that the French had made plans to organize a defense along the Seine. A few British tanks of the 23d Regiment were guarding the approaches to the bridge at Gaillon and a few other tanks were stationed on the south bank. Similar arrangements existed at Les Andelys. These, with demolitions crews, formed the only protection for these vital bridges. It was now 1:30 AM, June 9, and June 8 had been a very full day.

### GERMAN ACTIONS, JUNE 8

The German armored division attacked the river line Nolleval-Sigy beginning at 10:30 AM on the 8th. But, although the division commander himself took command of the advance-guard action, the Germans did not succeed in reaching the bridge at Sigy before it was destroyed by the British. As customary in all their actions of this sort, the Germans at once started searching for a ford nearby. They soon discovered one south of Sigy, and commenced an attack on it with tanks supported by a battery of 105-mm. howitzers. Midway in the action reports were received that the bridge at La Hallotiere had not been completely destroyed by the British; wherewith the advance elements of the division swung to the south, crossed over that bridge, and commenced the "thrust on Rouen."

The attack on Rouen proceeded through the afternoon and on into the hours of darkness, the German axis of advance being Rebets-Ry-Martainville. About ten o'clock that night one column moved off through Boos, hoping to find the Elbeuf bridge intact. Here was an example of the type of bold and rapid movements by which the Panzer units often succeeded in capturing important points. The advance was through country still occupied by French troops, and there was considerable "milling around" in the darkness. The French outposts and the inhabitants mistook the German troops for British, and a sentry of a French antiaircraft battery near the road at St. Aubin even presented arms as the Germans rolled past!

Long after midnight—possibly about 1:30 AM, the time at which the British colonel had crossed the bridge at Gaillon—the Germans reached the Seine. All bridges had been demolished. Meanwhile, near Rouen (which was being occupied by a neighboring division), another part of the armored division had seized the heights of Mt. St. Aignan and La Vaupalliers preparatory for the advance on the next day.

This advance, in accordance with previous plans, provided for a swing northwest toward the coast to surround and capture portions of the French forces which had constituted the left flank of the Allied army. In making this march the German division lost contact with the British 23d Regiment which had been opposing it—but the paths of these two units were to cross again.

### BRITISH MOVEMENTS, JUNE 9-12

During June 9, the 23d Armored Regiment assembled near St. Opportune, south of Elbeuf. It had two missions that day: first, to furnish some motorized groups to patrol the south bank of the Seine; and, second, to get as many tanks as possible in fighting trim again. During the day the Germans continued to arrive at the far bank of the river, and even succeeded in crossing at a few points. Notably, they gained possession of the peninsula formed by the river bend west of Les Andelys. Since another major attack seemed impending, most of the vehicles of the regiment, and all the tanks not fit for action, were sent to the rear. As it bivouacked near St. Opportune the regiment took stock of its strength; 19 light and 16 medium tanks remained for duty. The regiment had suffered tremendous tank casualties (as may be seen by comparison with its former strength) but most of the losses were due to mechanical failure rather than to combat. At least 23 of the casual tanks were also in the rear area waiting for major repairs.

By the morning of the 10th things looked a little brighter. The French had brought up some fresh troops, and it seemed that they might hold up the enemy advance for a few days, at least. Accordingly, it was decided to send the 23d Regiment still farther to the rear, where it could get some rest and repair its materiel. After ten hours of depressing marching over roads crowded with refugees and military traffic, the regiment reached its new area near Alencon.

The regiment remained near Alencon until the morning of the 12th. Reports coming in showed the situation to be growing much worse. Thus there was no surprise when, about 11:45 AM on the 12th, there came an order reading:

> Proceed at once to Conches with any tanks that are able and fit, even if some drop out on the way. There must be no delay. Situation critical.

The only thing was, the order in question was signed not by the division commander, but by General Marslake, the commander of "the rear area of British troops left in France."

Preparations for just such an order had been made. The regiment had been divided into a fighting and a rear echelon. The former consisted of a small headquarters and two "battalions." Each of the latter contained 10 or 12 tanks. The bulk of the regiment had been placed in the rear echelon, which was left behind at Alencon. Early in the afternoon the colonel drove ahead. He was concerned about the short-circuiting of the chain of command,

and wanted to find the division commander.

Finding the division commander turned out to be quite a chore, but he finally was located at Orbec. It developed that, sure enough, the division commander had not been informed of the orders issued by Gen. Marslake. And he was not much in favor of them. After "some discussion," which doubtless was *some* discussion, it was decided that the regiment, now on the march, would bivouac for the night near Conches. The next day it would relieve the 22d Armored Regiment which had been left in support of the French along the Seine when the 23d had gone back to broken through and disorganized; and the German march to the sea continued. The immediate objective was the small port of Veulette.

Northwest of Sassetot the Panzer division encountered the ring of organized positions which had been thrown up around Veulette. To pierce this the Germans advanced the motorized infantry element of the division, detrucked them, and attacked under the support of the divisional artillery. The artillery, being in position near the coast, was also able to indulge in the novel sport of firing at targets at sea. There was to be much more of that sort of things in the

*Rouen during the attack*

Alencon. Accordingly, the two-company regiment bivouacked the night of June 12-13 near Conches.

### GERMAN ACTIONS, JUNE 9-15

After reaching the Seine on June 9, the German Panzer division prepared to swing to the northwest. On the 10th this movement was well under way; the division was striking toward the sea by way of Yvetot and Ourville to prevent the escape of British and French units which had been withdrawing along the coast. One great prize at stake in this operation was the mass of the British 51st Division.

During the march there was some fighting at Yvetot and also at Ourville. Then, near Auberville, the Panzer units struck the French 31st Division which was withdrawing on Fecamp for the purpose of embarkation. This division was

days following.

Following the capture of Veulettes, elements of the Panzer division moved on Fecamp. Soon they cut the communications between that town and Havre. Again the artillery of the division engaged targets at sea, including a cruiser. In addition, coastal batteries were attacked, and as usual the Germans advanced individual pieces to points near the objectives in order to employ direct fire at point-blank range. During the night the troops "dug themselves in hedgehog-wise on the heights west and southwest of Fecamp," which calls to mind operations during our Civil War. Sherman, during his campaign through the Carolinas, was hundreds of miles from his base, and subjected to harassing attacks on his front, flanks, and rear by small units of Confederate

cavalry. Each night his columns closed up and constructed fortified camps of this sort, employing all round defense.

Having taken Veulettes and Fecamp, the Panzer division turned on St. Valery, which, with its fair harbor, was serving as a point for embarkation for French and British (51st Division) troops. Here again the German divisional artillery figured prominently in the reduction of the Allied positions. At the beginning of the action the German artillery sank a number of ships in the harbor; and it brought on the end of the action by laying down a violent bombardment which followed the rejection by the defenders of a German ultimatum. Between times, one of the batteries took on a cruiser lying far off shore; in the ensuing duel the battery lost two of its guns but the cruiser was also hit and set on fire.

After two days' bombardment, St. Valery surrendered. Among the prisoners were a French corps commander, four other generals, and large parts of *two French and one British divisions*, as well as huge quantities of war material. Truly a striking tribute to the power of an armored division! In this action at St. Valery the German account praises the "exceptionally powerful effect of the artillery," wherein the bombardment was effected with "the division's entire light *and heavy* artillery." The italics are ours. Here is evidence that the German Panzer divisional artillery contains 150-mm. weapons as well as the 105's previously reported. It may be seen that this division, acting alone as it was, and confronted with special targets including fortified works, required more than the light (105-mm.) artillery.

After the fall of St. Valery, the Panzer division moved into Le Havre, apparently without resistance. Following mention of Le Havre, the German account simply states that the division "crossed the Seine at Poses and reached the region around Conches-Louviers in order to take up the pursuit of the enemy south of the Seine to Cherbourg." This must have been about June 15. Meanwhile, it will be recalled, the British 23d Armored Regiment had spent the night of June 12-13 near Conches, en route to the front.


*After the fighting in Rouen*

### BRITISH MOVEMENTS, JUNE 13-19

At 7:00 AM on June 13 the 23d Regiment moved up to near Thibouville, where it was to relieve the 22d Regiment. After some orders and counter-orders, involving the whereabouts of French divisions, the regiment was attached to the French 237th Division, which was holding a line of defended localities from St. Leger to Heubourg. On the left of the line were other French units. On the right was a gap about 5 miles wide, beyond which was the 152d Regiment of the British 52d

Division. (The 23d Regiment had learned only the night before of the landing in France of the 52d Division. Actually, only the 152d Regiment of that Division ever saw action. Similarly, parts of the 1st Canadian Division had been landed, but were re-embarked without seeing action.)

The 23d Regiment immediately was given the mission of covering the gap described above. The regiment moved southward to positions behind the gap, and sent patrols forward into it. The regiment was prepared to support either the French division on the left or the British regiment on the right. During the remainder of the 13th, and throughout that night, things were quiet. During the night five renovated tanks overtook and joined the regiment.

The forenoon of June 14 passed without disturbing incident. Then, about midday, reports of enemy activity began to come in. The noise of artillery and machine-gun fire could be heard more and more plainly. On the left, the French reported the enemy to be advancing in force. From the right, there came reports of an attack on Ferriers. As the afternoon dragged on, things looked uncertain and ominous. Finally, about 5:30 PM, the regiment received a message from its own division (the British 11th Armored), confirming the fact of a major German attack, and attaching the regiment to the French 3d Light Mechanized Division. The latter was in army reserve. Soon, the 23d Regiment received orders to withdraw at once to the vicinity of Courtomer.

The withdrawal began about 9:30 PM. Travelling down dusty side roads "allotted (us) by the French," the regiment reached the vicinity of Courtomer about 6:00 AM, June 15. This June 15 passed quietly; but by now it was clear that all serious French resistance was at an end. During the day, orders came through to stand by for a march to Cherbourg, since it had been decided that "all British troops in France were to be evacuated as soon as relieved from their obligations to cooperate with the French."

On the morning of June 16 the Regiment was ordered to Montigny. The move was begun at 11:30 AM and was completed at 1:30 PM. During that afternoon two noteworthy events occurred: First, the arrival of four trucks loaded with 1,200 gallons of gasoline and 1½ days' rations; and, second, the receipt of orders to break contact with the French and "proceed forthwith to Cherbourg, via Domfront—Vire—St. Lo."

At 12:00 midnight (June 16-17), the move to Cherbourg began. At Domfront it was learned that the roads south from Vire were jammed with retreating French troops; hence it was decided to proceed via Domfront—Brecey—St. Lo. After reaching Brecey, the roads being relatively free from traffic, the going was easier. Near St. Lo, where the column had halted for a long lunch-pause, word came that the French had asked for an armistice. The pause was broken off and the march to Cherbourg proceeded gloomily.

At St. Lo another report had told of weak bridges to the north; whereupon another change of route, this time involving a detour over Lessay, had been ordered. Then, at Le Haye du Puits, French road guards told of road blocks to the north, and recommended still another detour, over Les Pieux. This was too much. The British had had enough of detours; and, furthermore, they had their opinions of French roadblocks. Therefore, the decision was to push straight ahead, roadblocks notwithstanding. It was 6:30 PM.

This final stage of the long march was made over crowded roads. Furthermore, by this time there was a shortage of maps, there being not more than half a dozen in the entire regiment. Thus, some of the units had trouble finding the way; and it was nearly midnight before the regiment was assembled, five miles out of Cherbourg.

This is as good a place as any to review the recent accomplishments of the regiment. During the past 20 hours, it had covered about 175 hard miles. It brought into Cherbourg a total of 12 light and 14 medium tanks. During the last five days the regiment had covered about 375 miles, and had lost one light tank in battle, and six light tanks and four medium tanks on the road. This record was considered highly creditable in view of the fact that there were only the tank crews, with very limited facilities, for keeping the tanks in repair.

At Embarkation HQ, to which the colonel reported immediately on arrival in Cherbourg, it was learned that the tanks of the 23d Regiment would be loaded during the night (June 17-18). Only special vehicles, such as radio trucks and ambulances, would be loaded; all others would be destroyed. Accordingly, all tanks were driven at once to the docks; and the most valuable of supplies were loaded into the three or four trucks which were to be saved. The trucks arrived on the docks about dawn.

During the morning of June 18, several motorized patrols were sent out to guard against surprise raids from the south. Meanwhile, the tanks and trucks were hoisted up, and the troops of the regiment marched aboard. Early in the afternoon the patrols returned with news of the near approach of the enemy. The decision was to sail immediately. So the cars used by the patrols were pushed off the docks (they could not be loaded since the crane operators had absconded and the power was shut off), the last guards stepped aboard, and the lines were cast off. The last British transport cleared the harbor at 4:30 PM, just a few hours before the Germans arrived. As the ships steamed away, the troops could see (*a*) parties of marines from a nearby destroyer at work systematically demolishing the giant cranes and docks; and (*b*) the explosions of German artillery shells, directed on Cherbourg from the heights west of the town.

The 23d Armored Regiment arrived in Southampton about midnight, June 18-19.

### FINAL GERMAN ACTIONS

Excerpts from the German account of the actions of the last few days show how the armored units advanced and how the artillery was used to support this forward movement. After leaving Conches-Louviers the division continued the pursuit toward Cherbourg. The account follows:

In Haye du Puits many (French) workmen were about to erect barricades under the direction of officers. They were overcome. Four miles northwest there was a stiff fight about midnight, the enemy employing several field pieces there. They had blocked the road permanently, and leading units of our reconnaissance detachment (motorcyclists and armored cars) suffered appreciable losses.

The division commander was present. He decided that a further night attack was impracticable, and ordered a coordinated attack by the reconnaissance detachment in the morning, supported by part of the divisional artillery. The rest of the artillery was to support the attack of the Rifle Regiment, which was to attack another barricade four miles to the north. Accordingly the divisional artillery went into position before daybreak.

The barricades were taken quickly by storm under concentrated artillery fire. Pioneers then removed the very deep barricades.

The division advanced in a similar manner through other barricades until it reached the outskirts of Cherbourg, which had been fortified.

Suddenly a 75-mm. gun opened fire at very short range on the German column, which had halted in the road (in front of a barricade). The men jumped out of the vehicles as quickly as possible. The divisional commander personally directed the attack and then forced his way through hedges and fences to the rear, in order to dispatch the remainder of the division for the attack on Cherbourg. In a short time it was possible to bring artillery into position and to sweep the heights in the immediate neighborhood of Cherbourg, particularly the harbor, with rapid fire. . . . During the night all the light and heavy artillery of the division was brought into position in such a way as to insure the most effective support for the two regiments of the front line and in such a way that the individual forts of Cherbourg could be smashed one after another by the concentrated fire of the artillery.

Early in the morning the position in front of Cherbourg appeared to be quiet; only a few forts were firing their shells into the area where the division was lying entrenched, some being of heavy caliber. The order was given to attack and advance nearer and nearer to the town as far as the main road which leads from the northwest to Cherbourg. A battalion was held up before Redoute du Couplers, which the enemy was still defending strongly. The Divisional Commander proceeded to the left wing and there personally directed the fire of the heavy artillery on to Fort Central, situated in the harbor, which made itself particularly felt by its fire. We soon succeeded in bringing the concentrated fire of several heavy batteries to bear on the fort, obtaining nearly 80% direct hits. The fort remained silent, but was again subjected to heavy fire. After this, other important objectives were fired on heavily and then a regiment was ordered to advance as far as the naval harbor. Meantime Redoute du Couplers was taken. The garrison, five officers and 150 men, surrendered under the pressure exerted by the regiment.

In the meantime the detachment operating on the coast took many stationary batteries and also a large number of prisoners. Already at daybreak numerous prisoners were sent in to Cherbourg with a demand to surrender, any further resistance being of no avail and the fortress being open to a bombardment with the most modern weapons. The whole town and the forts had had an opportunity in the course of the morning to observe the precision of the German artillery, when Fort Central was attacked. Two men appeared in civilian clothes, a spokesman from Cherbourg and the Prefect of Police. They offered to get into touch with the Military Commandant in Cherbourg about the capitulation of the fortress, which in their opinion was inevitable. The Divisional Commander explained to them he had been waiting for the capitulation since 8 AM, and did not have much more time. It was 12:14 PM. He allowed until 1:15 PM. The negotiators promised to return by that time. A captain accompanied them into the town. The civilian motorcar was shot at so heavily from the harbor that the passengers had to duck.

Shortly before 1:15 PM a message was received that the Commandant of Cherbourg was not prepared to capitulate. All persuasion had been unavailing. Exactly on time there then began the carefully prepared bombardment of the naval harbor of Cherbourg by the entire artillery of the division. At the same time Fort Central received a direct hit from a dive-bomber, and other exterior forts were bombed. About half an hour later two military negotiators appeared, including the Commandant of Fort Querqueville, which had received the concentrated fire of the light artillery.

After brief negotiation the Divisional Commander demanded the unconditional capitulation of the fortress. The negotiators declared that they had authority to comply immediately, upon which the order was given to cease fire. Two battalions were ordered to march into Cherbourg. The Divisional Commander had fixed the hour for handing over the fortress by the Commandant and his fort commanders at 5 PM in the yard of the Prefecture, the commanders having also to be present. The official surrender of the fortress took place quickly at 5 PM.

The fortress Commandant of Cherbourg at the head of his officers, reporting to the Divisional Commander, announced that he was cognizant of the capitulation and was pleased that the innocent civil population had been spared bloodshed: "The fortress would not have surrendered if it had still had supplies of ammunition." Admiral Abrial, commanding the northern naval forces, who arrived shortly afterwards from Tourville, spoke similarly. The surrender was thus complete. The forts, those of them not under water, were occupied by our troops. The Divisional Commander with his personal staff proceeded to Fort Du Roule, dominating the surrounding region, on which the German flag was flying. The Commandant and his lieutenant had fallen in the fighting on the circumvallations.

In Cherbourg 28,000 men had surrendered with their officers. Thousands and thousands of French troops, including very many colored troops, were obliged to surrender on both sides of the Tank Division's line of advance to Cherbourg, and were led away during the following days to clearing camps.

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*The advertising circulars which we get periodically from the Morris Plan Bank addressed to "Mr. F. A. Journal" do not bother us half as much as the completely-blank change-of-address cards on which we must pay two cents "postage due."*

# THE VERSATILE

# JEEP

**Bantam quarter-ton car used as prime mover for antitank gun and as mount for .50 caliber machine gun**

*The Jeep taking off on a long cross-country flight. It has not yet been tested as a "flying OP."*

By Captain George Ruhlen, 3d FA

*The Bantam quarter-ton truck was tested informally at Fort Riley to determine if this vehicle could be used as a liaison car for artillery with cavalry; as a prime mover for the 37-mm. antitank gun; and as a mount for the .50 caliber machine gun. The purpose of the test was not to usurp the functions of the Field Artillery Board or other regular agencies, but to arouse interest so that more exacting tests by competent agencies might be considered.*

### CHARACTERISTICS OF VEHICLE

Vehicle—Weight, 2,700 pounds with load.
Body—By Bantam (new ones by Ford)
Motor—45 horse-power, Continental
Drive—4 wheel (front wheels can be thrown out at any time)
Tires—6.00-16
Speeds—6 forward, 2 reverse (has transfer case, hi-low range can be thrown in or out at any time)
Gas tank capacity—About 12 gallons
Road clearance—9¾ inches

### TEST WITH 4-MAN LOAD AND EQUIPMENT

Vehicle was tested on firm ground, mud, snow, ice, and 10 inches of sand over all types of terrain. Performance highly satisfactory. On one or two occasions the cars accompanied a Sunday hunt, and had no difficulty in keeping up with the field. For liaison purposes with cavalry, a 4-man detail, or 3 men with radio could easily maintain contact with any horse regiment, and also be able to accompany the Regimental Commanding Officer, if the latter chose to move in his command car.

Grades up to 75% were negotiated. The vehicle never failed for lack of power. It was always because of lack of traction.

Greatest obstacle was frozen ground which had thawed to a depth of ½ to 1 inch. The mud, a viscous gumbo, was sufficient to fill the grooves between the

*Note height of spades with this style lunette*

*Overall height of vehicle is low*

*Going over rimrock*

*The Jeep can squeeze between trees*

chevrons on the tire and yet not soft enough to allow the wheel to sink in and make contact with the side walls of the tires. Chains aided, but did not completely prevent the vehicle from slipping on steep slopes.

Speeds of 40 to 50 miles per hour across rolling prairies were easily obtained. On descents, the low-low gear ratio was sufficient to brake the vehicle alone on the steepest (85%) descent.

### TEST AS PRIME MOVER FOR ANTITANK GUN

*With 3 men and towed load of 37-mm. antitank gun* (*weight 945 pounds*)

Same terrain was covered as above. There was little difference noted owing to the towed load, except over shell holes and redoubts, when the sudden pulling and pushing of the gun as it went in and out of shell holes could be felt in the vehicle.

A gooseneck lunette was first used in an effort to raise the trail spades of the piece. This design proved faulty, inasmuch as the lunette straightened after several days of cross-country work and, in addition, when negotiating drop-offs or crossing ditches, the draft reaction on the spades was such as to cause them to dig into the ground like a plow and so hinder the passage.

Another lunette was devised and with this design no difficulty was encountered on any of the test runs made by either the 3rd Field Artillery Battalion or the 6th Reconnaissance Squadron (who also conducted extensive tests using this vehicle as a prime mover for the 37-mm. antitank gun).

### MISCELLANEOUS FINDINGS

Gas consumption on both long and short trips on roads and trails was about 30 to 34 miles per gallon. Cross country and over difficult terrain this dropped to about 27 miles per gallon. When run with other vehicles in a column no column elongation was noted. The vehicle has a quicker pick-up than other trucks.

Three times the vehicle, towing an antitank gun, accompanied the battery on a horse march. Rate of march was 5.7 miles per hour; distance varied from 19 to 28 miles. The vehicle kept right behind the column and moved at the same speed as the animals; it did not march by bounds. In spite of the slow speed, engine temperature did not go above 165 degrees Fahrenheit. On one occasion, because of a small bridge being out, teams and carriages had to leave the road and cut across country to go around the bridge. However, the Bantam crossed the creek readily on two planks moved so as to make a track for the wheels.

Ruts made by other vehicles do not interfere with movement of this vehicle. Many miles of rutted country road were traversed, both with and without towed load, without difficulty, on frozen and on muddy ground.

Because of winter weather, opportunity for extensive tests flotation in soft ground did not exist. However, since transferring this vehicle to the 6th Reconnaissance

Squadron for tests, this organization has reported that they are quite satisfied with the vehicle's performance in mud.

Towing the gun, and carrying 3 men, the vehicle negotiated long distances of deep sand (10 to 12 inches) beside the river in Artillery Park at Fort Riley. In warmer weather, the ground beneath this sand is softer and it is possible that in 15 to 18 inches of soft, dry sand, the vehicle would have difficulty.

After the breaking of the rear universal joint, the rear drive shaft was disconnected, and the vehicle driven for several days using front wheel drive only. The cross country and hill climbing ability was decreased by about 60 per cent as a result. In several instances block and tackle were required to move the vehicle. Three or four men were sufficient to move the vehicle up anything less than a 90% slope. It is believed that, equipped with a light winch, the car could negotiate nearly any terrain, as well as stream crossings of average width.

### MECHANICAL FAILURES

1. One of the factory-sealed lubricated bearings of the rear universal joint on rear drive shaft had not been lubricated before sealing. The bearing froze and the torque of the drive shaft twisted the universal joint off. Factory replaced universal assembly.
2. The rear axle and differential housing became unwelded from the springs. This allowed the differential housing assembly and axle housing to rotate toward the front of the vehicle, thereby cramping the universal joint; and this joint was twisted off. More complete welding remedied this defect.
3. Although not a failure, the welding of the crank case shield to the crank case should be changed so that this shield is bolted to the *frame*.

### SUGGESTIONS

It is suggested that further experiments be made with this vehicle with a view to using it as:

1. Prime mover for antitank gun (believed satisfactory).
2. Liaison detail truck (excellent).
3. A moving OP for batteries (including a hand-operated reel).
4. A vehicle used by Bn CP and Survey parties.
5. A replacement for tricycles and motorcycle with side car.
6. Ammunition carrier for antitank guns.
7. Replacement for the mountain wagon, since the Bantam can carry about the same useful load and is so greatly superior in silhouette, road space, maneuverability, and march ability.
8. Replacement for artillery cart. This vehicle could carry the load of the artillery cart and so would increase draft efficiency of the horse artillery battery. At present, 4 pair are needed to efficiently march and maneuver the artillery reel and cart. The load is out of all proportion to its usefulness and has not

*Goose-neck lunette used. Passage over old redoubts.*

*Second type lunette. Note how it passes beneath spades. Also T connection at top passing through rings on trails. This arrangement permits uncoupling* (*when stuck*) *by opening trails.*

*.50-cal. MG* (*attack from head of column*)

the mobility of the other materiel of horse artillery.

9. A radio truck for vehicular radios.
10. A moving mount for .50 caliber machine guns, for antiaircraft column protection (believed very satisfactory).
11. A prime mover for caissons or ammunition trailers for 75-mm. ammunition.
12. A prime mover for 75-mm. howitzer.

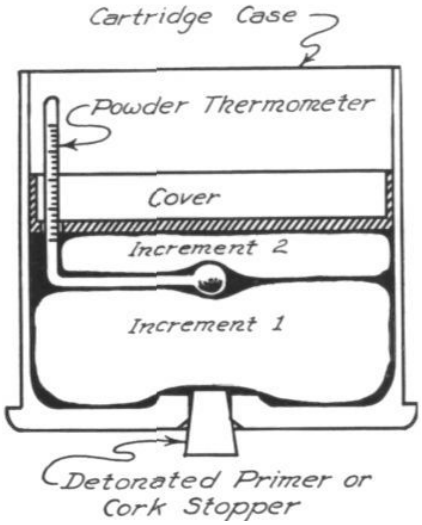
Of the above suggested uses, time was not available to determine their practicability; however, reports from the 6th Reconnaissance Squadron state that when firing the .50 caliber machine gun at a halt from the Bantam the accuracy was the same as when using the ground tripod mount, and superior to the present mount on the scout car. Photos illustrate how gun may be served during aircraft attack. The Cavalry Board plan to mount a SCR 245 radio in a Bantam for further test.

The silhouette, speed, maneuverability, weight of this vehicle admirably suit it for an unarmored prime mover for antitank guns.

Since those officers conducting the tests were more familiar with the tactical functioning of horse artillery than of truck units, all tests, conclusions, and comments were made primarily with a view to ascertaining the capabilities of this vehicle when used with the artillery of a cavalry division.

# Device for Measuring Powder Temperature

*With the advent in our service of the 105-mm. howitzer with semi-fixed ammunition, the question arises as to better ways to determine powder temperature. It has been known for some time that improper measurement of powder temperature very adversely affects accuracy of map-data-corrected fires. One common custom has been for the battery executive, when he draws the ammunition in the morning, to obtain the temperature of the powder at the magazine; or in other cases, a thermometer has been hung (in the shade, we hope) somewhere near where the ammunition is stored in the field during firing. Obviously this procedure scarcely does more than give the air temperature. Herewith is given an extract from the German artillery regulations for the 15-cm. howitzer and 10.5-cm. gun concerning the use of a powder-temperature measuring cartridge; the ideas contained may be useful, even if the translation is not entirely clear as to just how the thermometer is placed and used.*




*Note: Owing to doubtful translation it was not possible to determine the shape of the thermometer nor exactly how it is inserted.*

## MEASUREMENT OF POWDER TEMPERATURE

*Preparation and Use of the (powder-temperature) Measuring Cartridge. Heavy 10-cm. Cannon 18. Description.*

The measuring cartridge can be made from any cartridge used in this gun. It consists of:

A cartridge case;
A detonated primer body, C/12, or a cork-stopper.
Increments 1 and 2, and
The cover of the cartridge case of heavy 10-cm. cannon 18.

### USE

The measuring cartridge is used for ascertaining the powder temperature. It must be marked by encircling the cartridge case with a red (painted) ring or in some other conspicuous manner. In order to prepare it for use, the cartridge-case cover is removed and perforated. The powder thermometer* is placed between increments 1 and 2 in such a way that they will be as near it as possible. If necessary, room must be made for the powder thermometer by moving or removing some of the (tubular) powder grains. When the thermometer has been inserted, the cartridge-case cover is placed with its perforation over the thermometer and pressed firmly down on the increments. In order that the temperature of the powder may be accurately determined, the measuring cartridge must be placed, if possible, among the cartridge cases that are to be fired first. If possible, the measuring cartridge will be stored among the other cartridge cases for about two hours before the powder temperature is read and used. The powder temperature must be read off quickly. In doing so, one must take care to see that the thermometer is not touched by the breath or held too long in the hands. The temperature must be read within a half degree C. The measuring cartridge will then be carefully stored.

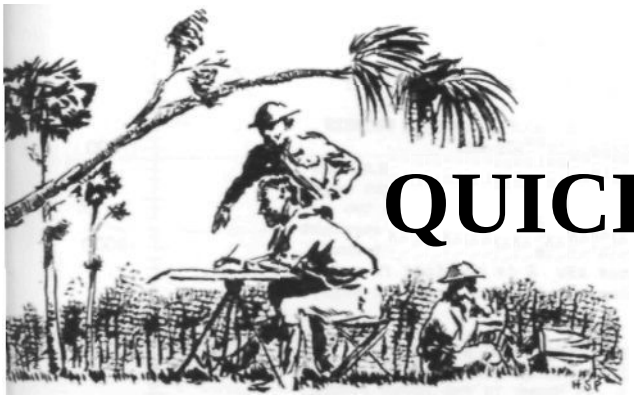
### PACKING

When the measuring cartridge is to be transported, the thermometer is removed from it and placed in its case. The increments are arranged carefully, and the cover is pressed firmly into the cartridge case. The measuring cartridge must be readily accessible, and will be packed in a specially marked cartridge basket if possible.

### DESCRIPTION

Any cartridge case for heavy field howitzer 18 may be used for measuring the powder temperature. If necessary, the primer body is replaced by a cork stopper or by a detonated primer body. A hole through which the powder thermometer can protrude will be bored in the cover of the cartridge case.

*Only on gun No. 1.



# QUICK! WHERE AM I?

## A Rapid Method of Graphical Resection

By Lieut. M. F. Beavers, FA.

While acting as Battalion RO with the 1st Bn. 7th FA during the First Army Maneuvers in New York State held in August, 1940, the writer observed that, in many cases, the situation moved so fast that we hardly had located ourselves before we were headed for a new position.

Owing to the lack of prominent hills or other outstanding landmarks in that vicinity, little use could be made of resection methods in locating our position. However, one could visualize himself *trying* to locate his position by the Italian resection method while "enemy" planes were circling overhead with, very probably, their gun sights trained on the large grid sheet on the plane table. Of course, the plane gunner might have missed the resecting party the first time but the resection required sufficient time for the plane to make a second or third trip around! The writer was thus prompted to look for a quicker and more healthful method of solving the problem of "Where Am I?"

In the March-April, 1940, issue of THE FIELD ARTILLERY JOURNAL, three methods of resection were given which are different from those given in the Field Artillery Book 161. One of these methods[1] is principally a mathematical solution and the other two methods[2] are graphical solutions. These three methods have the very definite advantage of allowing the resector to carry out most of the resection "under cover," and they probably require no longer than the Italian resection method.

The writer observed some similarity in one of these methods (Segments Capable, Reference 2) to one which was worked out by the writer just after the maneuvers and which, it is believed, will permit the resection to be accomplished in less time.

The author's method, employing a combination of mathematics and graphics, is described below in the belief that it is as accurate as any of the more commonly used resection methods, has the "healthful" feature of the three methods referred to above and requires less resecting time than any of these methods. Figure 1 shows all of the graphic work which need appear on the map or grid sheet. Figure 2 is the same situation but shows the steps in detail.

[1]Sic Transit Alidade, by Capt. C. N. Tupper, FA.
[2]Streamlining Resection, by Lt. T. N. Dupuy, 7th FA.

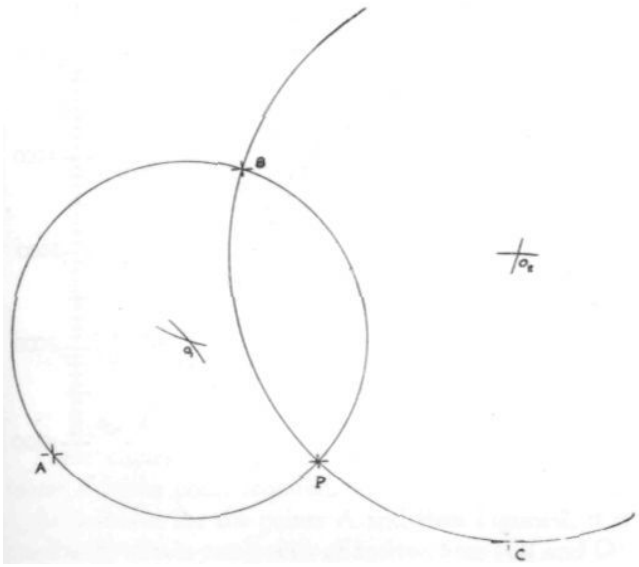



*Figure 1*

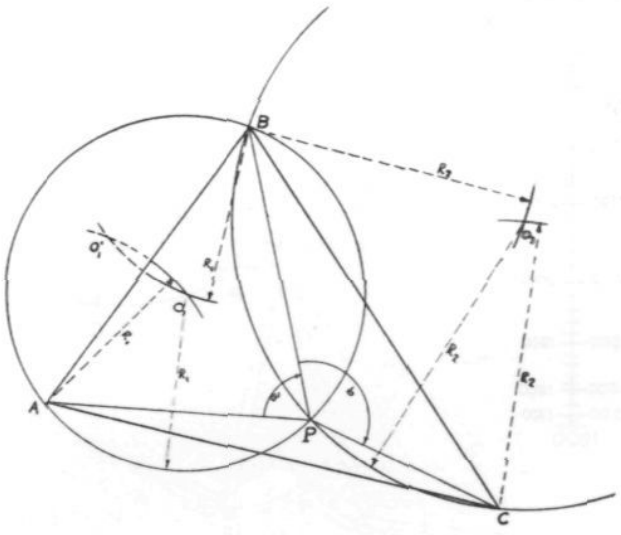



*Figure 2*

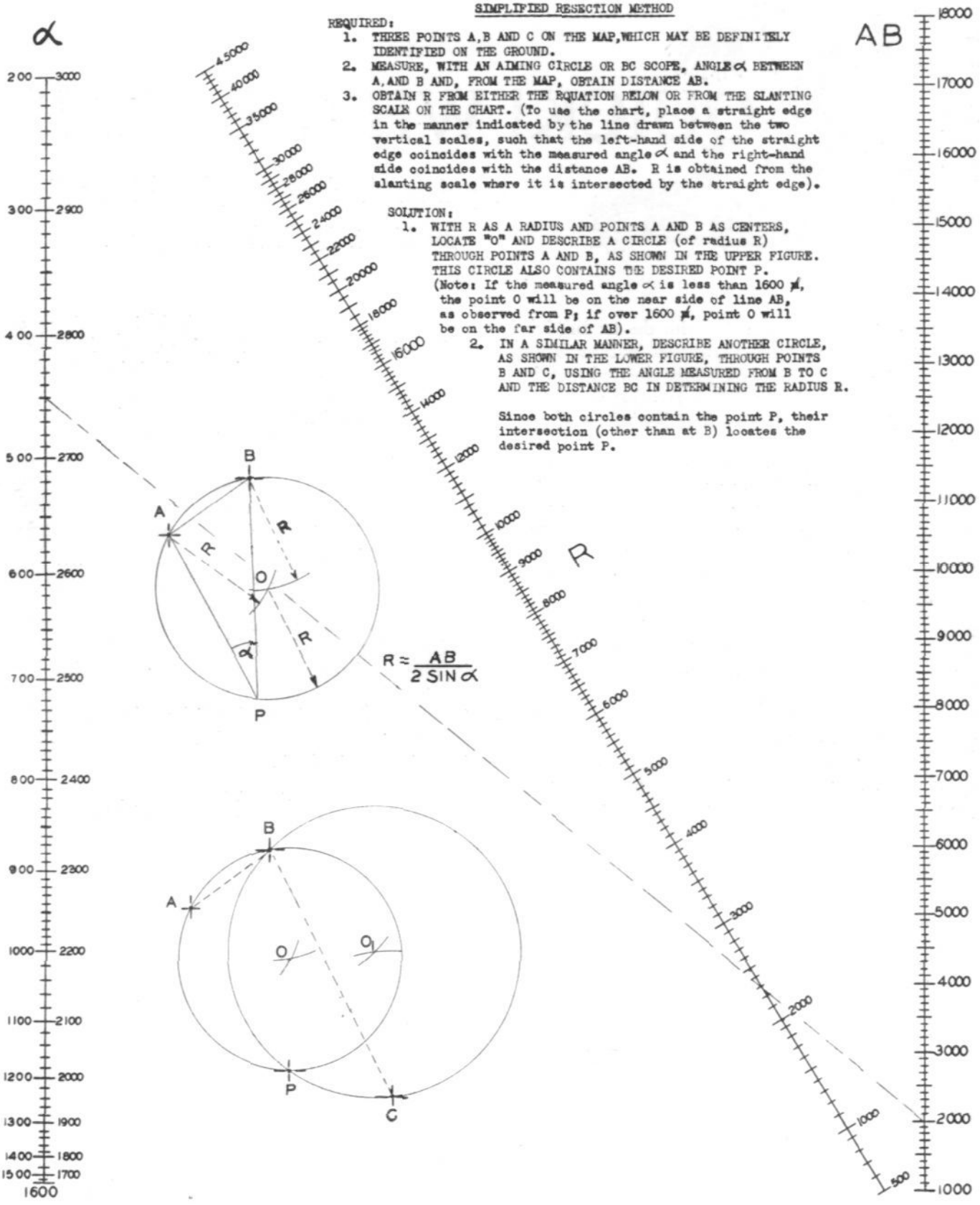

SIMPLIFIED RESECTION METHOD
REQUIRED:
1. THREE POINTS A,B AND C ON THE MAP,WHICH MAY BE DEFINITELY IDENTIFIED ON THE GROUND.
2. MEASURE, WITH AN AIMING CIRCLE OR BC SCOPE, ANGLE ∝ BETWEEN A, AND B AND, FROM THE MAP, OBTAIN DISTANCE AB.
3. OBTAIN R FROM EITHER THE EQUATION BELOW OR FROM THE SLANTING SCALE ON THE CHART. (To use the chart, place a straight edge in the manner indicated by the line drawn between the two vertical scales, such that the left-hand side of the straight edge coincides with the measured angle ∝ and the right-hand side coincides with the distance AB. R is obtained from the slanting scale where it is intersected by the straight edge).
SOLUTION:
1. WITH R AS A RADIUS AND POINTS A AND B AS CENTERS, LOCATE "O" AND DESCRIBE A CIRCLE (of radius R) THROUGH POINTS A AND B, AS SHOWN IN THE UPPER FIGURE. THIS CIRCLE ALSO CONTAINS THE DESIRED POINT P. (Note: If the measured angle ∝ is less than 1600 ₰, the point O will be on the near side of line AB, as observed from P; if over 1600 ₰, point O will be on the far side of AB).
2. IN A SIMILAR MANNER, DESCRIBE ANOTHER CIRCLE, AS SHOWN IN THE LOWER FIGURE, THROUGH POINTS B AND C, USING THE ANGLE MEASURED FROM B TO C AND THE DISTANCE BC IN DETERMINING THE RADIUS R.
Since both circles contain the point P, their intersection (other than at B) locates the desired point P.
∝
AB
R
$R = \frac{AB}{2 \sin \alpha}$
A
B
O
P
C
O1

*Figure 3*

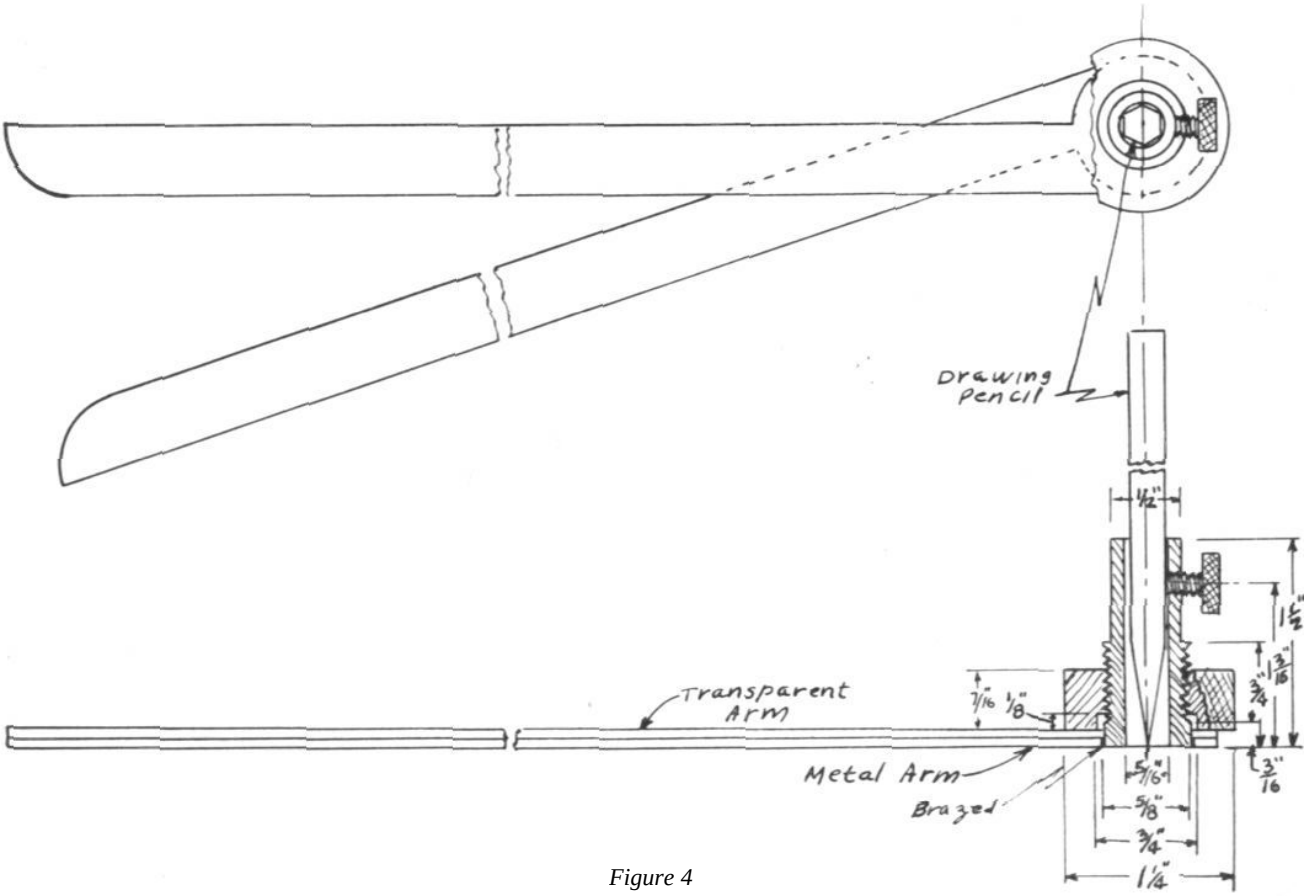



*Figure 4*

The essential data necessary for this resection are:

1. Three points on the map which can be definitely identified on the ground. Label these points A, B and C as in Figures 1 and 2. (Note that point P may be within the triangle ABC.)
2. Measure, with an aiming circle or BC scope, the angle (a) from A to B (see Figure 2) and the angle (b) from B to C.
3. Determine the distances AB and BC from the map, and calculate $R_1 = AB/2 \sin a$, $R_2 = BC/2 \sin B$.

   Note: Sin a and sin b may be obtained from the Firing Tables. Where extreme accuracy is not required, the chart method shown in Figure 3 may be used. This gives a good summary of the method.
4. With $R_1$ as a radius, swing arcs using points A and B as centers. The intersection of these arcs locates point $O_1$. With $O_1$ as a center and radius $R_1$, describe a circle.

   With $R_2$ as a radius, and points B and C as centers, locate $O_2$, which is the center of a circle of $R_2$ radius.

These circles will intersect at two points, B and P, where P is the point required.

As is shown for the points A and B in Figure 2, it is possible to obtain two points of intersection ($O_1$ and O) of the arcs of radius $R_1$. However, by following the simple rule that if the measured angle (either a or b) is less than 1,600 mils, the circle centers $O_1$ or $O_2$ will be on the near side (from estimated position of P) of the line AB or BC respectively. If the angle is over 1,600 mils, the center of the circle will be on the far side of the line subtended by the angle. Both of these conditions are shown in Figure 2, $O_1$ being on the near side of line AB (angle a is less than 1,600 mils) and $O_2$ on the far side of BC (angle b is greater than 1,600 mils).

The mathematical proof of this method lies in the fact that a circle can be drawn through two points, such as A and B, so that from any other point P on the circle the line AB subtends a given angle (a). This relation is satisfied by a circle of radius, $R_1 = AB/2 \sin a$, passing through A and B. By constructing two such circles which contain the point P, the intersection of these circles will locate the point.

For the benefit of those who are still not convinced

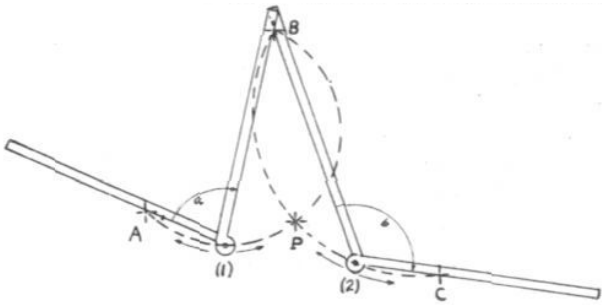



*Figure 5*

that this method of resection is quicker than the more well-known methods, the mechanical device shown in Figure 4, which is hereby dubbed a Resection Compass, is offered for trial.

All the resector has to do is to place pins or thumb tacks (partly down) in points A and B for guides, set off angle (a) on the Resection Compass and place the outside edges of the compass between the pins in a manner shown by position (1) in Figure 5. Swing the Compass in an arc through A and B, keeping the edges in contact with the pins, and the arc APB will be traced by the pencil.

Now set off the angle (b) on the Compass and proceed in a similar manner, shown by position (2), using points B and C instead of A and B, as guides.

The intersection of the two arcs (other than at B) will be the location of point P.

With a little practice, to get the "feel" of the compass, very consistent and accurate results should be obtained—and quickly!

P.S. If the Resection Compass isn't fast enough, you'd better send an S.O.S. before it's too late!

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# U. S. FIELD ARTILLERY ASSOCIATION

## Proposed Amendments to the Constitution

TO THE SECRETARY, UNITED STATES FIELD ARTILLERY ASSOCIATION, WASHINGTON, D. C.

1. *Amendment to the Constitution*. The committee appointed by the President at the annual meeting December 16, 1940, proposes that the Constitution of the United States Field Artillery Association be amended as follows: (suggested changes are italicized).

ARTICLE V. Combine sections 3 and 4 to read: *Active and* associate members shall be entitled to receive the JOURNAL without payment other than the annual dues.

ARTICLE VI, Section 1—The Executive Council shall be composed of nine active members, five of whom shall be officers of the regular army, two officers of the *National Guard* 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; *such majority vote to consist of a majority of active officers present or represented by written proxies at a meeting of the Association*. The Council shall hold its meetings at the headquarters of the Association, which shall be in the city of Washington.

ARTICLE VII, Section 1—The regular meetings of the Association shall be held annually at Washington, D. C., or at such other place as may be designated by the Executive Council, who shall also prescribe the time of meeting and *give* at least thirty days' notice *of same, by publication in* THE FIELD ATTILLERY JOURNAL *or by such other means as the Council may prescribe*.

ARTICLE VII, Section 3—Special meetings may be called by the Executive Council, upon written request therefor signed by twenty members. At least thirty days' notice thereof shall be given in THE FIELD ARTILLERY JOURNAL, or by mail, to active members. The object of the meeting shall be stated in the request and in the notice.

ARTICLE VII, Section 4—*The number of active members present at a meeting or represented thereat by written proxies*, shall constitute a quorum, except as provided in Article IX.

2. *Reasons for the amendments*.

*a*. Sections 3 and 4 of Article V should be combined as indicated to permit the Association to augment its income by publishing books or pamphlets (if so desired) for profit.

*b*. The reasons for the other changes are as follows:

(1) It has now become practically impossible to obtain a quorum, which, according to the Constitution as now written, must consist of fifty per cent (by proxy) of all active members in the United States. This failure to secure a quorum arises because erroneous mailing addresses or frequent changes in address prevent proxy cards from reaching many members; and also because many members fail to return signed proxies.

(2) The proposed changes will obviate the necessity for sending out proxy cards. This will save the Association $100 (or more) annually. No member who desires to vote will be deprived of his vote; he still will receive due and timely notice in the JOURNAL, and will still have the privilege of sending in his proxy if he so desires.

(3) In effect, and in brief, the changes will merely mean that all members and proxies on hand at a meeting will be counted, and a majority of this count will constitute a majority vote.

(4) There is no change in the authority of the Council, which will still continue to administer the affairs of the Association as in the past.

3. In accordance with Article IX of the Constitution, we (members whose signatures are appended below) accept the report of the committee, and propose that the foregoing amendments be made to the Constitution.

| | | | |
|---|---|---|---|
| 1. | R. M. Danford | 16. | H. E. Maguire |
| 2. | W. C. Potter | 17. | Townsend Heard |
| 3. | I. T. Wyche | 18. | B. M. Sawbridge |
| 4. | Thomas North | 19. | C. G. Helmick |
| 5. | J. V. Phelps | 20. | I. Spalding |
| 6. | M. McClure | 21. | B. M. Bryan |
| 7. | Rex Chandler | 22. | A. W. Waldron |
| 8. | J. A. Stewart | 23. | J. W. Mackelvie |
| 9. | J. F. Uncles | 24. | A. F. Kibler |
| 10. | Rex W. Beasley | 25. | I. L. Foster |
| 11. | Stuart L. Cowles | 26. | W. H. Maris |
| 12. | John B. Anderson | 27. | A. C. McAuliffe |
| 13. | David S. Rumbough | 28. | F. A. Henning |
| 14. | J. A. Lester | 29. | John H. Hinds |
| 15. | L. M. Riley | 30. | L. Whitlock |

# Military Progress

Substitution throughout most of the "civilized" world of military force for principles of law and ethics in the application of national policies has had the immediate effect of bringing modernized methods of making war sharply into alignment with other materialistic changes.

Military progress has never been constant. *De Res Militari,* written by Vegetius in the 4th century, was used as a military text book for over a thousand years. It was still in use when Gustavus Adolphus (1594-1632), who followed Alexander, Caesar and Hannibal in the thin column of great captains, lifted the military art from the degeneracy into which it had fallen. And officers still in the American army, whose service dates back to the Spanish-American War, have witnessed greater military changes than had occurred between Leutzen, where Gustavus Adolphus fell, and the victory against the Spaniards at Santiago de Cuba in 1898.

Since the World War of 1914-1918, newly developed and highly efficient weapons and equipment have brought pronounced variations in strategy, tactics and logistics. Nevertheless, the tests of the new appliances in Spain, followed by the European campaigns of 1940, have given undeniable proof that the fundamental principles of war remain unchanged; they also prove that Germany has won the leading position in military progress.

The doctrine of the defensive advocated by several pseudo-military writers of other countries, had much to do with the French debacle. This war in Europe has shown—as have indeed all the decisive wars of history—that successes are attained by offensive action. As the offensive implies possession of the initiative—selection of the time and place of the decisive blow—and high morale, it should now be clear that wars cannot be won by armies that have succumbed to the fatal fascination exercised since time immemorial by the permanent type of fortified system.

To understand what happened to the map of Europe during the past year, it is necessary to go farther back in time. Through years of scientific application the Germans built a war machine, founded on the experience of past military leadership changed only in structure and design to meet the combined and co-ordinated use of the modern weapons. But this machine, and the effort in which it was to be used, needed a man-power different from the soldier of the past, so the nation was rebuilt, beginning with children scarcely out of the cradle, to meet this need. The result was creation of the highest trained, best equipped and most powerful army the world has ever seen, with the entire nation, completely organized for war, in support of it.

**Sarissa Bearer.**

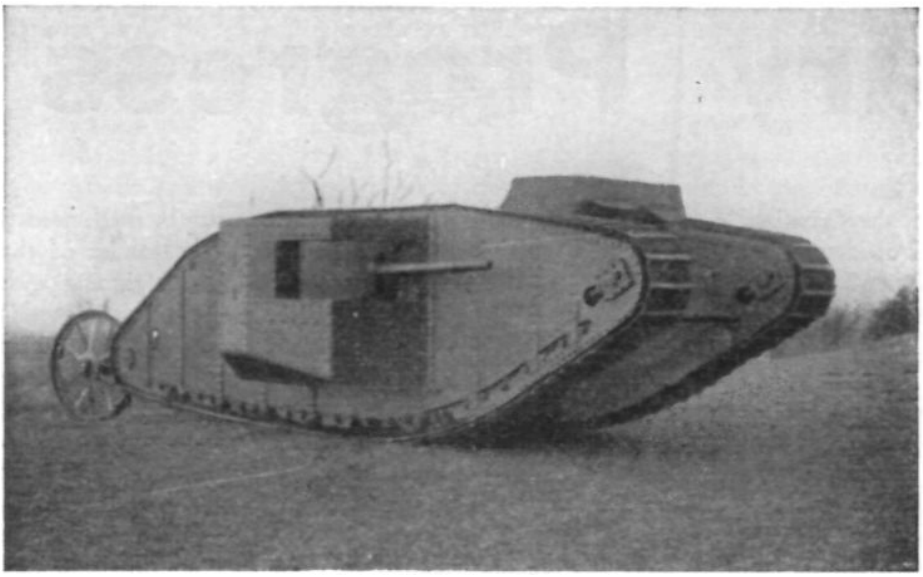
The results gained gave conclusive proof that the German High Command had held steadfastly to the age-old truism that quick and decisive victory come only from the offensive and had never lost sight of the factors on which a successful offensive depends: accurate calculations of time, space and volume; simplicity of plan; fixed objectives; concentration of effort; security in movement; mobility; surprise, and co-ordination of the combined arms.

If relative values could be given to these factors, at the top would stand the co-ordinated employment of aviation, aerial troops, mechanized units, infantry and artillery. The scientific—and artistic—use of this new large-scale combat team, explains the German successes; and to the Germans must go the credit for having devised the team and put it into tactical application.

Air power has become an auxiliary of primary importance; the Germans used it as such with maximum effect. Their first step in combat was to gain air superiority by destroying, or overwhelming, hostile aviation ground installations. Once that had been accomplished, their air arm was used to blast the way through the enemy's defenses for the ground forces that, advancing in perfectly ordered combination, consolidated the gains made and drove on for further exploitation.

The fact that the marching power of the German armies was measured in motors instead of legs implied thorough grounding in basic principles of the military art plus exhaustive preparatory training in the new tactical methods made possible by modern machines. An unbroken series of victories demonstrated the effects of leadership, discipline, initiative, decisiveness and boldness. One of the measures used may be classified as an up-to-the-minute innovation; the parachute troops and the fifth column organization that complemented them.

By Colonel Cary Ingram Crockett



*"Big Willie," the original tank.*

The use of air forces ostensibly against military objectives but actually against centers of population, and also the long range artillery fire that both Germans and British are putting down across the English Channel now take a recognized place among dynamic measures against civilian morale, the purpose being to break the will to resist of the hostile people.

So much for the current war in Europe. In the general field of war the greatest contribution to military progress of modern times has been the development of the internal combustion engine, with its application to devices for use in war.

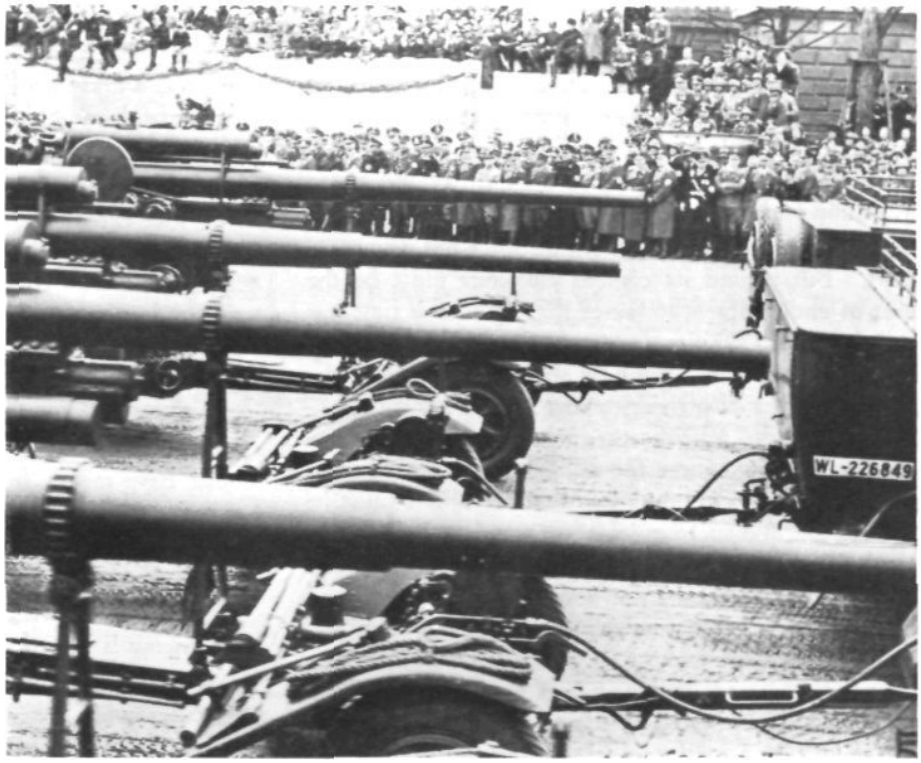
Preparation for war now implies for the nation seeking it (1) an effective industrial organization for rapid production of weapons and munitions in large quantities, and (2) adequate man power, trained, organized and equipped for modern combat. An army requires: strength; organization; weapons and equipment; reserves in men and munitions; training; morale, and leadership. Without these essentials there can be little hope for victory.

Specifically, outstanding military changes since the First World War are: (1) the stupendous progress made in airplane performance, and a vast increase in the use of aviation including strategic employment of an air force as an independent arm operating in three dimensions, and the habitual use of combat aviation in support of ground troops. (2) The development of strong mechanized and motorized forces, and their appearance as integral parts of field armies, with the resultant increase in shock action, fire power, speed and maneuverability. (3) Development of swift and powerful tanks, and their mass employment in echelon on the battlefield in combination with other arms, including bombardment aviation. (4) Greatly increased power and range of artillery. (5) Improvement in liaison equipment, both and and ground, and increased use of modern means of intercommunication to insure coordination in the combined employment of all available weapons against a given objective. (6) The greatly increased power of infantry resulting from its reequipment with automatic weapons, grenades, mortars, and rapid fire anti-tank artillery. (7) Counter-measures to meet the improvements in weapons and methods, including an immense increase in anti-aircraft and anti-tank artillery; creation of anti-tank units as integral parts of combat organizations and their echelonment in depth on the battlefield; creation of barrier troops to protect a flank or other exposed element; increased use of road blocks, anti-tank mines and obstacles to stop armored vehicles; more efficient camouflage and the habitual use of artificial fog to cover movement and blind

*"Little Willie," the experimental—and unsuccessful—model for the first tank.*

hostile artillery observation.

Other special measures recently used, as previously mentioned, and susceptible of further development are: (1) aerial infantry transported in planes, and when necessary landed by parachutes, to capture or disable nodal points on hostile lines of communication or to occupy key ground points. (2) Secret infiltration by small groups and specially selected individuals into hostile territory through fifth column tactics, to seize critical points, or otherwise cause physical or moral injury to the enemy.




*Countermeasures to meet the improvements in weapons and methods is typified by the "largest antiaircraft guns in the world" as they roll down the Wilhelmstrasse, Berlin.*

The purpose and progress of military organization has been, and is, to concentrate combat power in units composed of trained and disciplined soldiers so that this power can be applied with maximum efficiency to break the will-to-resist of the enemy. The infantry regiment of a generation ago consisted merely of three battalions of four rifle companies each. The regiment of today, however, is much larger numerically and with the semi-automatic rifle as its basic weapon and integral units, armed with light and heavy machine guns, grenades, mortars and anti-tank cannon, has more than forty times the fire power of a former regiment. In addition, the modern infantry regiment has a battalion of field artillery as its "indispensable companion," the two organizations now forming what is known as a combat team. Three such combat teams, with auxiliary troops, constitute the recently developed "triangular" division, designed specifically for flexibility of maneuver and celerity of action, combined with heavy striking power.

Two or more divisions, with reinforcing and auxiliary troops, form a corps, and two or more corps, with additional special troops, constitute a field army.

In the past the relatively simple duties required of soldiers ordinarily could be performed by able-bodied illiterates. However, with the progress that has been made in weapons and mechanical means and devices, all soldiers must now possess fundamental education and in addition a large proportion of the men in any unit must be trained as specialists. The infantry corporal of today is in this classification. He must not only be a leader of a small group of men but he must know the powers and limitations of the weapons of his arm, possess a knowledge of minor tactics in order to lead his squad over any type of terrain and above all have a soundness of judgment fortified by courage that will permit him to function under fire of the enemy. Initiative on the part of every soldier down to the private is a prerequisite for modern combat.

The basic principles of strategy still apply: for example, concentration of superior force at the decisive point, today, as before, brings victory. Nevertheless, as progress in war implements and methods implies constant changes in organization and doctrines, mental flexibility for leaders and flexibility of maneuver for all units beginning with the infantry squad and extending upward to corps and armies are increasingly essential.

At present the world powers are building up fighting strength to an extent never before equalled. The efficacy of the new weapons and methods created through mass production can be determined definitely only through the test of a war between first-class industrial states, each possessing strong military forces that are equipped with the latest appliances for fighting and are trained in their use.

Tactical doctrines are therefore still in a state of transition. Invention appears to have forged ahead of military art, and military technology to have outdistanced tactics.

What the modern commander desires above all things is the liberty of action attained only through freedom of maneuver. Flexibility of maneuver is therefore now a primary consideration. Motorization, mechanization and aviation, all characterized by speed, are indispensable in a war of movement—and it is only through initiative and movement that surprise, which leads to victory, can be

obtained. An army that takes the field without plenty of essential implements—plus, of course, ample reserves, able commanders, trained staffs, and good regimental officers—simply invites defeat. Patriotism and the will to fight are of little value in such a case, and the only recourse left is guerrilla fighting, with all the prolonged devastation and suffering that this entails.

A fully equipped modern fighting force has new capabilities. But behind its combat efficiency must be the power of endurance—the factor that up to this time has saved the British Empire. Its powers of attack are greater than before, the reason being its ability to coordinate the powerful factors of physics—mass, velocity, and time.

In view of the general speeding up process that tactics have undergone, time for deliberation at division and corps headquarters is now more limited; orders must be more concise and more quickly prepared and delivered. Calculations of the factors of time and space formerly made in days and hours must now be made in hours and minutes. Troops that formerly moved by marching fifteen miles a day, at the rate of two and a half miles per hour where there are highways, can now move two hundred miles a day, at from twenty to twenty-five miles per hour. And this swiftness of movement implies the ability to concentrate striking power in a selected locality—which naturally favors the offensive, provided surprise can be effected. Secrecy of movement is now more necessary than ever before; it is often gained despite hostile reconnaissance, by night marches, daylight concealment, camouflage and the American Indian slogan, "scatter to march, assemble to fight." Night development for combat is the rule. Night attacks to gain limited objectives have become more frequent. Intervals (measurement laterally) and distances (measurement in depth) are increased. Road blocks have to be considered and troops made available both for building and removing them. Barrier troops to cover a flank or other exposed element have come into being. Troops must be able to defend themselves by both active and passive means against air attacks delivered while they are either in motion or at a halt. Besides, as the total warfare of today includes the mass of civilian populations, protection of the noncombatants, particularly in the cities, becomes a grave problem for the High Command. Traffic control must be given greater attention. Better means of controlling motorized and mechanized troops must be perfected.

Wider extensions, secrecy measures, and the murderous effect of surprise fire from automatic weapons, rapid fire artillery and combat aviation, demand greater initiative and tactical ability on the part of subordinate leaders. And this means, if progress is to be made, more detailed and more thorough training in the education of our officer and non-commissioned officer personnel.

Every organization, from the smallest to the largest, must have means for protective reconnaissance against surprise attack by hostile aircraft and automatic small-arms fire delivered from armored vehicles.

The urgency of combat intelligence measures and objectives must be stressed, because prompt information of the enemy is now doubly essential.

All around security measures must be maintained continually—while troops march, entruck and detruck, and rest in bivouacks, and even at short halts. Knowledge of the use of terrain has also grown in importance.

In short, war-making has become vastly more complicated than before. An army is now one of the most intricate of all human creations. Nevertheless, in one main respect there has been no change since the days when the combined action of the Macedonian phalanx and companion cavalry, under the direction of Alexander, shattered the Persian hordes in one battle after another. Scientific organization and improved elements of war are essential, but tenacity of spirit and the will to fight, on the part of the men who operate the war machines, are the principal concomitants of victory, and these factors are rooted in the character of the people from whom the soldiers come. Back of the armies, and supporting them morally as much as physically, stands the nation, organized for war. As the nation is, so the soldiers will be.

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# The Automotive Driver

**SCHEDULE OF INSTRUCTION—DRIVER TRAINING**

**(Extracted from MT-2, The Field Artillery School; and is a part of proposed revision of FM 25-10)**

1. The following schedule of instruction, which requires approximately 85 hours, is designed primarily as a guide for the training of drivers who are to operate trucks with towed loads, but with obvious modifications it will be satisfactory for the training of drivers for any military motor vehicle. The training includes conferences, demonstrations, and practical periods, and is terminated with a qualification examination. The continuity of instruction may be changed to meet local conditions if related conferences and practical periods are coordinated.

1ST PERIOD (2 hours)

*a.* *Conference*.

(1) Responsibility of drivers.
(2) Personnel and general duties.
  (*a*) Unit commander.
  (*b*) Motor officer.
  (*c*) Motor sergeant.
  (*d*) Mechanics.
  (*e*) Chiefs of section or truck master.
  (*f*) Drivers.
(3) Fire prevention and fire fighting.
  (*a*) Precautions against fire. (AR 850-15 and local orders.)
  (*b*) Proper methods of fighting fires.
    *1*. Gasoline and oil fires—Fire extinguishers, blankets, sand, and chemicals.
    *2*. Other fires.
  (*c*) Location of fire-fighting equipment.
    *1*. In and around motor park.
    *2*. On the motor vehicle.
  (*d*) Method of reporting fire—Location of telephones, how and whom to call.
(4) Accident prevention.
  (*a*) Precautions against accidents.
  (*b*) Carbon monoxide poisoning.
  (*c*) Whom to call to get assistance.
(5) Care, condition, and use of vehicle tools and equipment.

*b.* *Questions on material covered during the period*.

2D PERIOD (light vehicle, 3 hours)

*a.* *Conference and demonstration*.

(1) The command truck or pick-up truck.
  (*a*) Use.
  (*b*) General nomenclature.
  (*c*) Vehicle equipment.
  (*d*) Characteristics.
(2) Inspection prior to starting engine.
(3) Proper method of starting engine, to include cold-weather starting.
(4) Proper warm-up of engine.
(5) Inspection after starting engine.
(6) Driver's position.
(7) Positions of the gearshift lever.
(8) Proper use of the clutch, accelerator, gearshift lever, brakes, and other controls to start, change gears, and stop the vehicle.
(9) Driver's arm signals.
(10) Signals for control of the unit.

*b.* *Practical*. (Vehicles may be blocked with all wheels off the ground. A qualified instructor is assigned to each vehicle.)

(1) Inspection prior to starting engine, by the numbers.
(2) Students mount, assume correct position, and familiarize themselves with controls. (Engine *not* running.)
(3) Start and warm up engines.
(4) Inspection after starting engine, by the numbers.
(5) Drivers shift transmission into each of the several ratios at will.
(6) Drivers shift into designated speeds and change direction on signal of instructor. Students give proper arm signals. Repeat until drivers are reasonably proficient.
(7) Stop engines.

*c.* *Conference and demonstration*.

(1) Inspection during operation.
(2) Inspection at the halt.
(3) Driver's trip ticket.

*d.* *Questions on material covered during the period*.

3D PERIOD (light vehicle, 3 hours)

(Command or pick-up trucks on a large, unobstructed field prior to the conference or driven to the field by the assistant instructors.)

*a.* *Conference and demonstration*.

(1) Inspection prior to leaving park.
(2) Proper procedure to put vehicle in motion.
(3) Proper method of shifting gears and appropriate gear to use.
(4) Proper method for stopping vehicle.
(5) Proper method for backing vehicle.
(6) Duties of assistant driver.
(7) Rules of the road.

(8) Arm signals for various maneuvers limbered.
(*a*) Explain movements.
(*b*) Distance, interval, guides.
(9) Issue trip ticket.

*b. Practical*.
(1) Inspection prior to starting engine, by the numbers.
(2) Inspection after starting engine, by the numbers.
(3) Inspection prior to leaving park, by the numbers.
(4) Preliminary driving. Students, accompanied by qualified instructors, drive at will to familiarize themselves with the manipulation and performance of their vehicle.
(5) Form vehicles in column and maneuver by arm signals.
(6) Form line and halt.
(7) Inspection at the halt, by the numbers.

*c. Conference*.—Organization and formation of the motor park.

*d. Practical*.
(1) Caretaking.
(2) Inspection after caretaking.
(3) Completion of trip ticket.

*e. Question drivers*.

Note.—In all succeeding periods where operation is involved, include the following, if applicable:

Issue of trip ticket,
Inspection prior to starting engine.
Inspection after starting engine.
Inspection prior to leaving park.
Inspection during operation.
Inspection at halt.
Forming park.
Caretaking.
Inspection after caretaking.
Completion of trip ticket.

4TH PERIOD (light vehicle, 3 hours)

(Vehicles in open field or on unused road. Stakes should mark the places for shifting and stopping.)

*a. Conference*.—Review of controls.

*b. Practical*.
(1) Driving and shifting.
(2) Simple, easy turns.
(3) Starting and stopping.

5TH PERIOD (light vehicle, 3 hours)

(Vehicles on a field marked to simulate a street corner.)

*a. Conference and demonstration*.
(1) Arm signals.
(2) Right turn.
(3) Left turn.
(4) Right of way at intersections.
(5) U turns.
(6) Intersection markings and signs.
(7) Turns on multiple-lane highways.
(8) Review safety precautions.

*b. Practical*.
(1) Right turn from stop.
(2) Left turn from stop.
(3) Right turn moving.
(4) Left turn moving.
(5) Right turn with opposing traffic.
(6) Left turn with opposing traffic.

6TH PERIOD (light vehicle, 3 hours)

*a. Conference and demonstration*.
(1) Nomenclature and functioning of vehicle units and assemblies with particular attention to lubrication. (To be carried on through the remainder of the course or until drivers are qualified in this subject.)
(2) Weekly inspection.
(3) Drivers' maintenance.

*b. Practical*.
(1) Inspections.
(2) Proper method of doubling (passing).
(3) Proper method of parking.
(4) Stopping distances.
(5) Drivers' maintenance—Cleaning, lubricating, inspecting, servicing, tightening, and emergency repairing.

7TH PERIOD (truck, 3 hours)

(Trucks in an open field or on unused road. Stakes placed to indicate places for shifting and stopping and a marked intersection.)

*a. Conference*.
(1) Use of controls.
(2) Shifting to higher gears.
(3) Stopping.

*b. Practical*.
(1) Driving and shifting.
(2) Simple, easy turns.
(3) Starting and stopping.
(4) Right turns from stop.
(5) Left turns from stop.
(6) Right turns moving.
(7) Left turns moving.
(8) Right and left turns with opposing traffic.
(9) Tight-circle turns.

8TH PERIOD (truck, 3 hours)

*a. Conference and demonstration*.
(1) Vehicle characteristics.
(2) Double clutching.
(3) Gear range (auxiliary transmission - transfer case).
(*a*) Purpose.
(*b*) Use.
(*c*) Location and operation of shift lever.
(4) Four-speed transmission—Positions of gearshift lever.

*b. Practical*.—Driving.

9TH PERIOD (truck, 3 hours)

*a.* *Conference and demonstration*.
- (1) Cross-country driving.
- (2) Driving through water.
- (3) Changing tires and repairing tubes.
- (4) Application of traction devices.
- (5) Use of winch.
- (6) Accident report.

*b.* *Practical*.—Cross-country driving, fairly difficult.

10TH PERIOD (truck with towed load, 3 hours)

*a.* *Conference and demonstration*.
- (1) Precautions for towed loads.
- (2) Loads, loading, and lashing.
- (3) Coupling.
- (4) March formations, signals, and distances.
- (5) Rules of the road.

*b.* *Practical*.—Maneuvers, followed by a short road march on good roads.

Note.—Drivers' inspections must include towed load.

11TH PERIOD (truck with towed load, 3 hours)

*a.* *Conference and demonstration*.—Special maneuvers for arm or service.

*b.* *Practical*.—Maneuvers as covered by appropriate regulations.

12TH PERIOD (truck with towed load, 3 hours)

*a.* *Conference*.
- (1) Traffic regulations.
- (2) Road marches.
  - (*a*) Distances.
  - (*b*) Speeds.
  - (*c*) Route markers.
  - (*d*) March regulations.
- (3) Passage through cities and congested areas.

*b.* *Practical*.—Road march on good roads.

13TH PERIOD (truck with towed load, 3 hours)

*a.* *Conference and demonstration*.
- (1) Difficult draft.
- (2) Field expedients.

*b.* *Practical*.
- (1) Cross-country driving, difficult.
- (2) Occupation of position.
- (3) Disposition of vehicles during firing.
- (4) Camouflage and dispersion of vehicles.

14TH PERIOD (truck with towed load, 3 hours)

*a.* *Conference*.
- (1) Driving in traffic.
- (2) Review rules of the road.
- (3) Review traffic regulations.
- (4) Map reading.

*b.* *Practical*.—Road march in traffic.

15TH PERIOD (truck and towed load, 3 hours)

*a.* *Conference*.—Roadside repairs.
- (1) Normal.
- (2) Emergency.
- (3) Action upon return to park.

*b.* *Practical*.—Road march in traffic.

16TH PERIOD (truck with towed load, 3 hours)

*a.* *Conference*.—Night marching.
- (1) With lights.
- (2) Without lights.

*b.* *Practical*.—Night march, with lights, fairly good roads.

17TH PERIOD (truck with towed load, 3 hours)

*Practical*.—Night march, without lights, same road as 16th Period.

18TH PERIOD (truck with towed load, 3 hours)

*Practical*.—Night march, cross-country, with lights.

19TH PERIOD (truck with towed load, 3 hours)

*Practical*.—Night march, cross-country, without lights.

20TH PERIOD (truck with towed load, 8 hours)

*Practical*.—March over varied terrain.

21ST PERIOD (truck with towed load, 6 hours)

*Practical*.

*a*. Night march over varied terrain.

*b*. Disposition of vehicles.

22D PERIOD (3 hours)

*a.* *Conference and demonstration*.—Preparation of vehicle for 1,000-mile scheduled maintenance.

*b.* *Practical*.—Preparation of vehicle for 1,000-mile scheduled maintenance.

23D PERIOD (4 hours)

*Demonstration and practical*.—1,000-mile scheduled maintenance.

25TH PERIOD (2 hours)

*Demonstration and practical*.—Complete lubrication of vehicle.

25TH PERIOD (2 hours)

*a.* *Conference and demonstration*.—Formal inspection.

*b.* *Practical*.—Formal inspection.

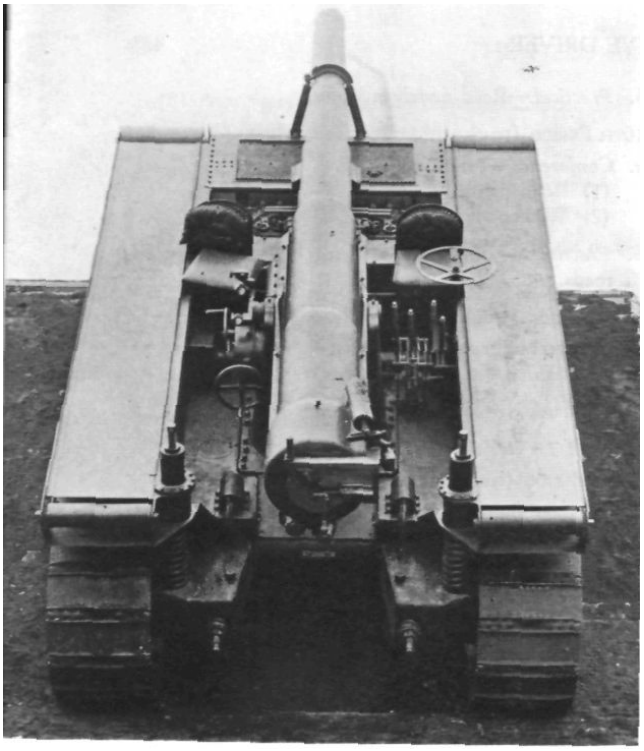
26TH PERIOD (2 hours)

Examination, theoretical, for driver's permit.

27TH PERIOD (2 hours)

Examination, practical, for driver's permit.

2. If personnel are selected carefully, the instruction in the training schedule will turn out drivers who are capable of good performance under all reasonable operating conditions. Additional instruction in maneuvers, inspections, and ceremonies, as covered by appropriate regulations and manuals, may be necessary for the various arms and services. If more or less time is available for instruction, the schedule should be changed generally as follows: With more time available, increase the driving time; with less time available, decrease the conference time.

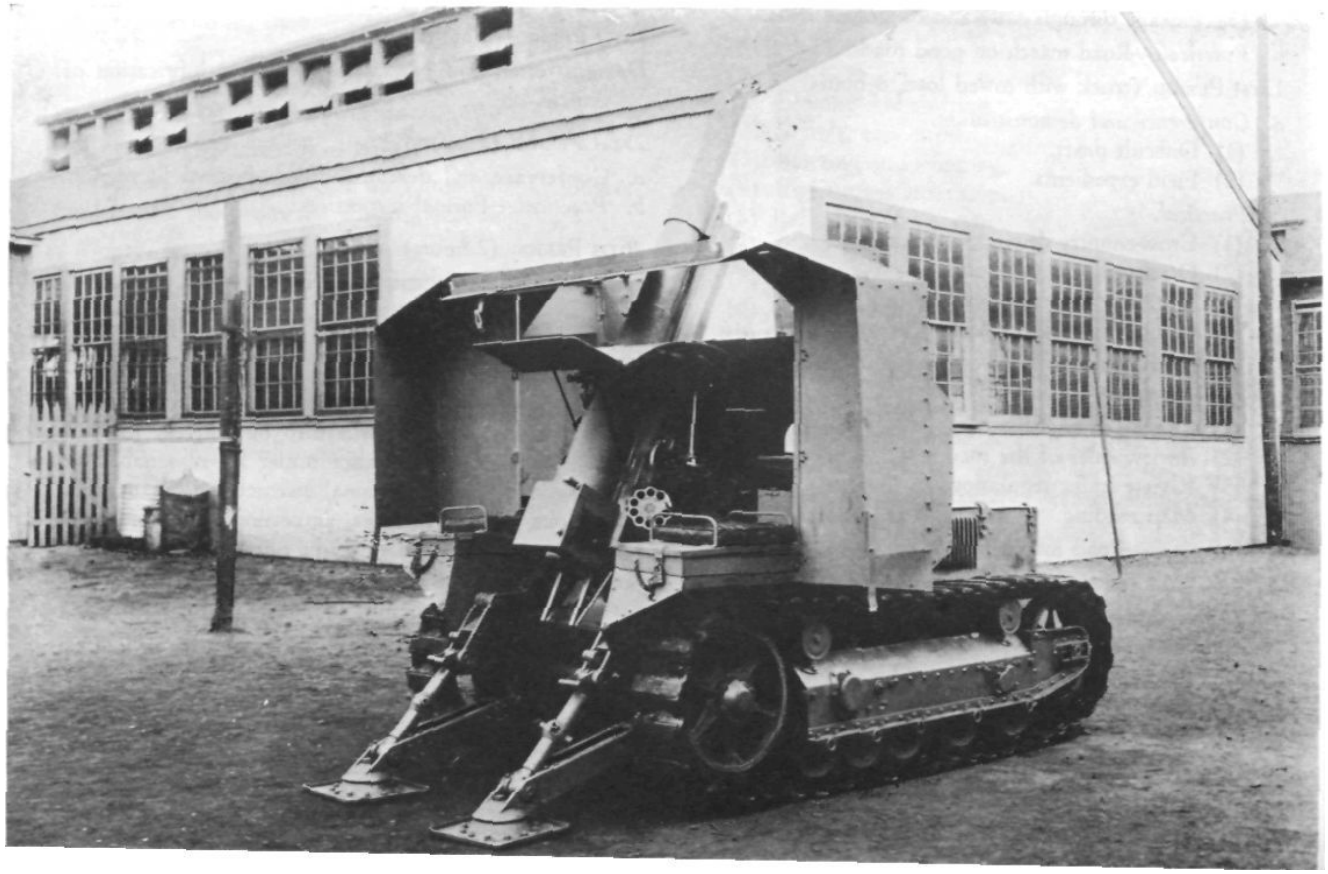


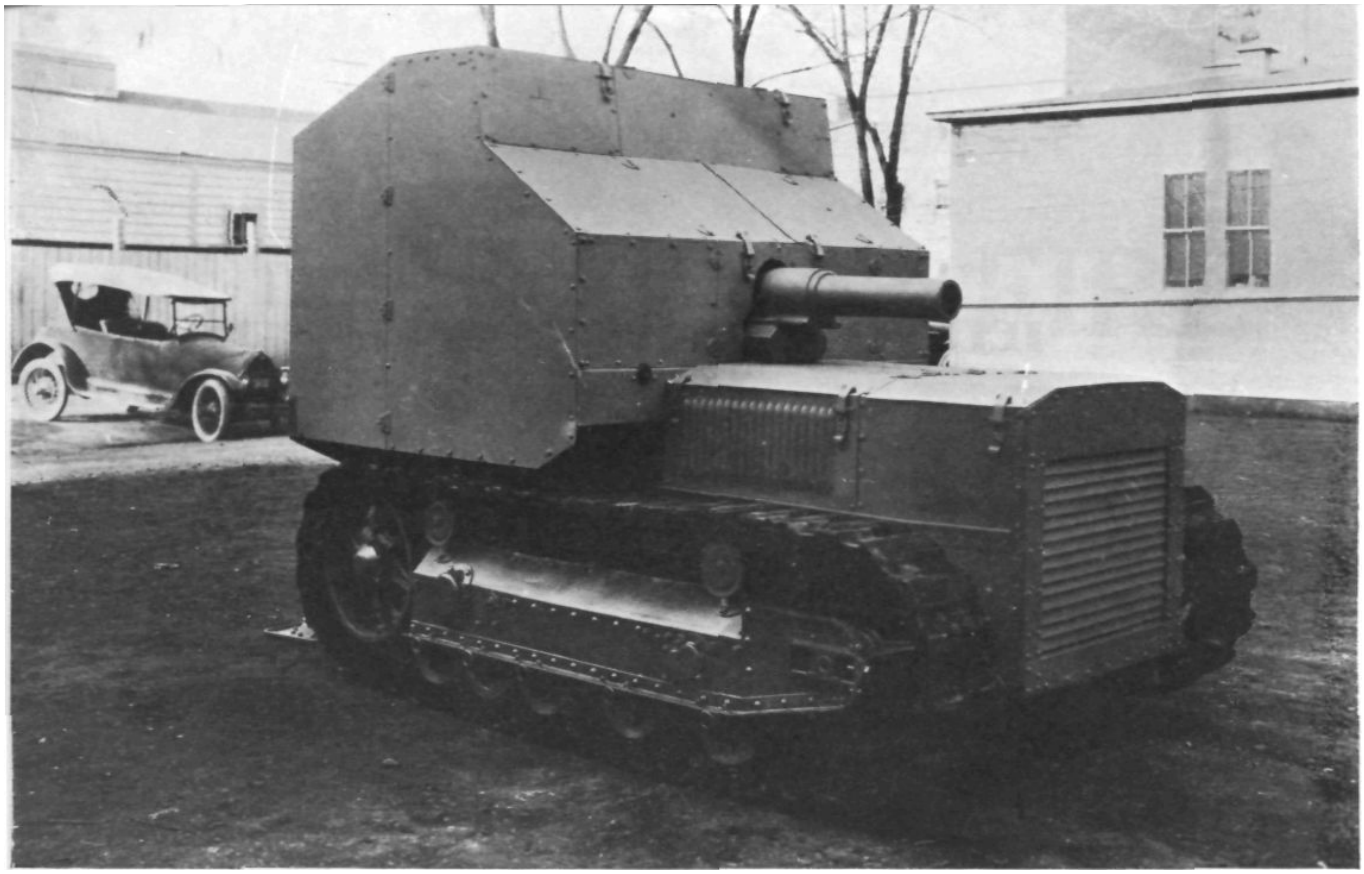
*155-mm. gun (GPF) on Christie mount. Vintage of about 1922 or '23.*

# SELF-PROPELLED ARTILLERY

**Newsmen who have witnessed the recent fighting in the Balkans have sent back reports that the Germans have been using considerable self-propelled artillery. Photos reproduced recently in THE FIELD ARTILLERY JOURNAL have also shown German assault guns, tank chasers, and AA-AT guns on self-propelled mounts. Some have armor, some not. It is evident to one who has his "ear to the ground" that the subject of armored self-propelled cannon of various sorts is a very live one, in Europe at least. Herewith are a few views which indicate that the notion is not entirely new in this country. These pictures are reproduced from issues of THE FIELD ARTILLERY JOURNAL nearly twenty years ago, and show various models which were tested at Aberdeen Proving Ground.**

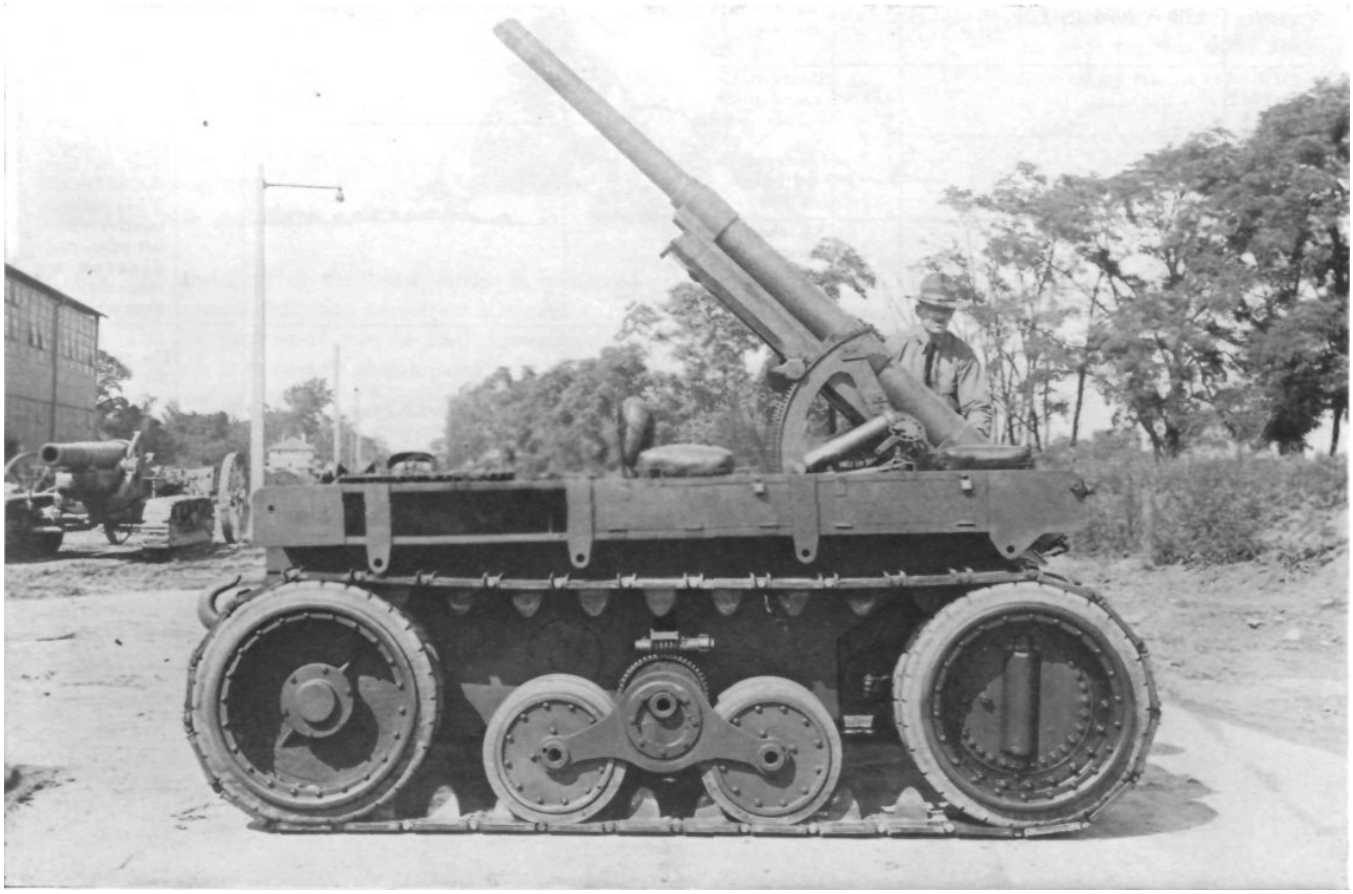
*Armored self-propelled medium howitzer. This mount closely resembles a German 15-cm, howitzer seen in the war film "Sieg im Westen." The German weapon was proceeding leisurely through a French town during street fighting, blasting down the walls of buildings which were sheltering defenders, Crouched infantrymen were following closely behind it, and it seemed to afford them considerable satisfaction to have so stout a friend near at hand.*





*Front view of the armored self-propelled howitzer on a Holt tractor. Note the 1917 Dodge in the background. Ah, my lovely! Many's the unhappy hour we have spent stuck in the sand on the Chicken Road with the good old Dodge.*

*Here's a 75-mm. gun on an old Christie mount. See the queer thing in the left background. It appears to be an 8-inch howitzer on a self-propelled mount, with some farm-implement wheels added for luck.*



# ILLUSTRATIVE EXAMPLES

**Pertaining to Chapter 2 of Conduct of Fire**

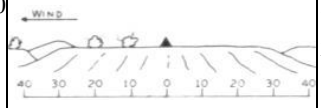
EXAMPLE 3

BRACKET, AXIAL

Target: Infantry weapons in vicinity of terrain feature. Mission: Neutralization. Materiel: 75-mm. gun. Ammunition: HE shell, quick fuze.

$T = 60$; $r/R = 0.7$.

Initial commands: BDL 85, Cv 3500, On No 1 Op 9, Si 305, Sh Mk I, FQ,


| Commands | Results | Sensings | Remarks |
|---|---|---|---|
| BL, 3700 |   | 4. ?<br>3. Lost<br>2. ?<br>1. ? | Ground in vicinity of adjusting point cannot be seen. Burst center is about 27 mils left. 27 × 0.7 = 19 (use 20). |
| R 20, 3700 |  | ?<br>?<br>?<br>? | No positive sensing was obtained after the smoke was blown by the wind. |
| On No 2 Cl 5, 3700 |  | 4. ?<br>3. +<br>2. ?<br>1. ? | Sheaf is narrowed to facilitate sensing. 400 - yard initial bound. |
| 3300 |  | —<br>—<br>—<br>— | All short on forward slope. |
| 3500 |  | 4. ?<br>3. ?<br>2. —<br>1. ? | Bracket is 3500 - 3700; fire for effect is started at the center. |

Next command: On No 3 Op 5, B 1 Rd, 3600.

EXAMPLE 4

BRACKET, AXIAL

Target: Camouflaged artillery battery in vicinity of group of scattered trees; the trees have little apparent depth. Mission: Neutralization. Materiel: 155-mm. howitzer. Ammunition: HE shell, quick fuze.

$T = 50$; $r/R = 0.4$; $c = 10$.

Initial commands: BDR 240, Cv 5500, On No 1 Op 6, Sh Mk I, Ch 4, FQ, BR,


| Commands | Results | Sensings | Remarks |
|---|---|---|---|
| Q, 380 |   | —<br>—<br>—<br>— | Short on forward slope. 2-*c* initial bound. Burst center about 37 mils right. 37 × 0.4 = 15. |
| L 15, 400 |  | 1. —<br>2. +<br>3. —<br>4. — | Mixed salvo. Range is satisfactory for center of bracket |
| On No 2 Op 6, B 1 Rd, 400 |  | — | 200-yard sheaf used for fire for effect. This volley, together with last salvo, indicates a range slightly short. |
| 410 |  | + | The command for this volley is given as soon as the first volley is on the way. |

A good bracket is 395-415.

# CONDUCT OF FIRE

CHAPTER 2

SECTION III—PERCUSSION BRACKET FIRE

24. ADJUSTMENT.

*a. General*. — Adjustment is commenced habitually with a 100-yard sheaf. Battery salvos are used, starting from the leeward side. The range of each round of a salvo is sensed; for example, *short, short, doubtful, doubtful*. When ammunition must be conserved, or to assist in obtaining surprise, the adjustment may be started with one piece, preferably an interior one; the battery is brought in as desired. The use of the range scale, elevation scale, or gunner's quadrant depends upon the materiel. In general, the gunner's quadrant is more accurate for all weapons; when speed is essential, the range scale or elevation scale will often be preferable for light artillery.

*b. Direction and distribution*.

(1) The deviation of the burst center is measured and an appropriate deflection correction is made.

(2) The 100-yard sheaf may be used throughout adjustment unless it is evident that sensing will be facilitated by narrowing the sheaf. Initially, the sheaf should be moved over as a whole and centered on the target; it may then be closed or opened on an interior piece. If the deflection of one piece is observed to be correct, a change is made in distribution only. Any piece materially out of its place in the sheaf is corrected individually.

*c. Range*.—Targets which are attacked with a bracket adjustment are generally transient and distributed in width and depth. A 200-yard range bracket usually is considered sufficient for adjustment. When the target is fixed, of little depth, and clearly visible, a 100-yard bracket should be sought. When the target is moving, has great depth, or is poorly defined, a 400-yard or greater bracket may be necessary.

The following notes on Conduct of Observed Fires were prepared at the Field Artillery School as Instruction Memorandum G-7. Although at present they can only be said to represent methods and trends now being tested at the School it is expected that later they will be incorporated in a revision of FM 6-40. The methods contained herein depart from those of the current edition of FM 6-40 in brief as follows:

a. PRECISION.

(1) In light and medium artillery, except when special accuracy is desired, the c is used instead of the fork.

(2) Deviations are measured (when they are to be acted upon) but are not announced aloud.

(3) In lateral adjustments, small deviations are not computed to the line. Usually when sensings are obtained the deviation need not be considered.

b. BRACKET.

(1) There is no set rule for bringing in the battery. To save ammunition or to assist in obtaining surprise, the adjustment may be conducted with one gun as desired. Unless there is some reason to open with one gun, the adjustment is commenced with a battery salvo.

(2) The 100-yard sheaf is used for adjustment of all calibers. (The same sheaf is used for forward observation and air adjustment.)

(3) In axial, fire for effect is opened at the center of the bracket except when the target is moving.

(4) In general, the sheaf is considered as a group of bursts. The burst center is moved to the desired point.

(5) In small-T, deflection is not sensed until effect is started; On going into effect the effort is to place the burst center on the observing line.

(6) Deviations are measured (when they are to be acted upon) but are not announced aloud.

25. FIRE FOR EFFECT.

*a. Direction*.—The deflection is changed as necessary so that the mean line of fire will pass through the center of the target.

*b. Distribution*.—The entire front of the target should be covered effectively. The maximum front that can be covered without sweeping is that which is covered by an *open sheaf*. The width between flank bursts and the front covered by an open sheaf are given in paragraph 102 *d*, FM 6-40. Targets too wide for this sheaf are covered by successive shifts or by sweeping.

*c. Method of fire*.—The method of fire is volley fire or volley fire sweeping.

*d. Searching the bracket*. — Fire for effect normally is started at the center range of the bracket. The bracket is covered rapidly, using 100-yard bounds, and then the intermediate ranges are included. For example, with a bracket of 3200-3400, the ranges fired would be 3300, 3200, 3400, 3350, 3250, or 3300, 3400, 3200, 3250, 3350. The command for the second volley is given as soon as the first volley is reported *on the way*. Any ranges which are clearly ineffective are discarded in subsequent fire. If one limit of the bracket has been established by sensing of a single burst, this limit should be verified early during fire for effect. If all elements have been correctly adjusted before or during fire for effect, the command for zone fire may be given.

*e. Bracketing or mixed salvo*.—If, during range adjustment, a bracketing or mixed salvo or a target hit is

sensed, this range is considered the center of the desired bracket. When the target is such that a 200-yard zone should be searched, fire for effect is started at this range, and the remainder of the zone covered promptly. When the target is such that a 100-yard zone should be searched, fire for effect is started at this range, with two volleys, to get prompt verification and early effect. Fire is continued at this range until a decided preponderance of the effect is observed either over or short, in which case a range 50 yards in the appropriate direction is included.

*f. Target in motion*.—If the target is moving in the direction of range, fire for effect is started at the limit toward which the movement is taking place.

*g. Sensing*.—During fire for effect, the range of each volley as a whole is sensed.

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# Current Misconceptions Upon the Liaison Method of Conduct of Fire

**By Brig. Gen. F. C. Wallace, USA**

For almost thirty years experienced field artillerymen have held "creeping" to be a cardinal sin. Creeping in range is the result of *believing* that a round short or over is "pretty close." Our whole method of bracket adjustment is based upon the fact that at ordinary observing ranges it is absolutely impossible in almost every case to estimate even within wide limits *how much* over or short a burst actually is.

It took many years and many rounds to convince some of the brotherhood of this well-established fact. We will always have with us a few who believe that any burst which obscures the target is "mighty close." These, for many years, were simply kept in line by strong-arm methods. They never admitted to themselves that they couldn't actually tell when they were getting close, but they were forced to stay with the bracket procedure anyway.

Comparatively recent developments have innocently thrown away thirty years of experience and brought the guesser into good standing again. The inexperienced, who is always inclined to sense anything that blots out the target as "target," is loose on the range again.

This is all due to a misconception of the need, purpose, and appropriateness of the so-called liaison method of conduct of fire. Some "old fogy" must raise his voice in the wilderness, so here goes.

The liaison method of conduct of fire is designed for a single purpose, and is only appropriate to a single condition. That is where an observer is close to his target or, because of altitude of his station, is in a position to make *reasonably* accurate estimates of deviations. It is based on the need for forward observation and a makeshift for delivering fire even when the position of the battery firing is not known. It most emphatically is not based upon any general improvement in the eyes of the new generation. They can't guess any more accurately than the old timers could.

Nevertheless a decided tendency is evident to attempt to apply this method to conditions under which a conventional lateral adjustment is appropriate. These attempts to estimate the distance of bursts from the target at observing ranges of 1,500 to 2,000 yards or more cannot but result in grotesque errors, many wasted rounds and, what is worse than all, the development of the cardinal observing sin, guessing how much.

At such ranges the determination of the distance over or short or right or left has never been possible of accurate estimation and never will be. We must continue to box the target by bracketing, and call for effect only when, and not until when, the fire is known to be on the target. Like every new idea, the liaison method is being badly overplayed. Its use should be rigidly confined to situations where it is appropriate; the impression that it is in any way a substitute for our tried methods at large observing ranges must be suppressed.

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# Hints for Laying a Battery in a Surveyed Position

**By Captain N. R. Duell, 13th FA**

1. Slight variations in compass declination often lead to errors in direction in laying a battery. In a surveyed position, i.e., one in the vicinity of which is a place mark on a line of known azimuth, there is no need for ever using the compass needle to determine the *Y*-azimuth of initial laying.

2. The successive steps are as follows:

*a*. Lay the battery parallel in the general direction of fire either by aiming circle or by aiming point, deflection and deflection difference.

*b*. Set up the aiming circle over the place mark, have one of the gunners refer to the instrument, set off the referred deflection, lay on his sight with the lower motion. The 0-3200 line of the lower head of the instrument is now parallel to the battery.

*c*. Turn to the visible end of the orienting line with the upper motion. The result is the base angle.

*d*. Subtract the base angle from the *Y*-azimuth of the orienting line. The result is the exact compass on which the battery is laid.

3. The above method is fast, accurate, independent of compass declination and insures uniformity throughout the battalion.

4. Having laid the battery by the above method, the executive may then record base deflection (his base deflection) and the *Y*-azimuth and base angle that apply to it. Obviously any *Y*-azimuth or base angle commanded by the B.C. involves merely a shift from the executive's original base deflection.

*Brig. Gen. G. R. Allin, Commandant of the Fort Sill Artillery School, inspecting the Pitcairn autogiro*

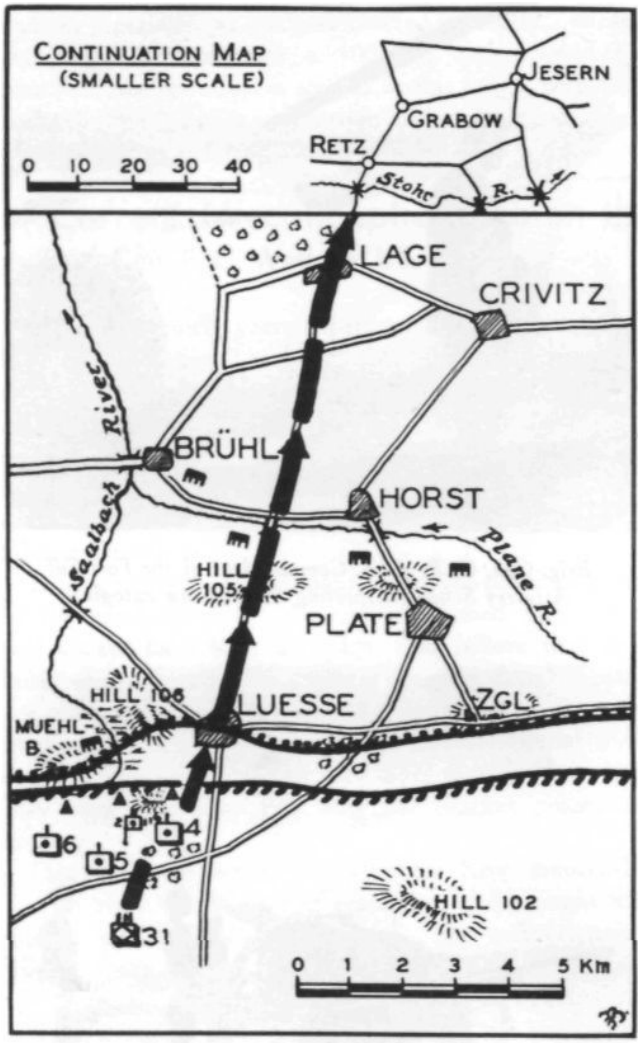
# New Autogiro Tested as Flying "OP"

The Pitcairn autogiro shown in the pictures was used on April 17th to direct fire of a single battery at Fort Sill, Oklahoma. For these fire missions the observer was the company's civilian pilot. No radio communication was used. As prearranged, the pilot took off from the battery position and having reached an altitude of 2,000 feet he signaled the battery by "waggling" that he was ready to observe. The battery immediately fired a converged volley of four bursts as a registration. The pilot pin-pointed the center of these bursts on a photo which had been furnished him, and in addition, he marked on this photo four targets of his own selection. He then landed at the battery, showed to the officer conducting the fire the location of the center of impact and the four targets which he selected. He took off again, and while he was climbing to 2,000 feet, data was quickly computed for the four transfers, using a graphical firing table. The battery was ready to fire before the pilot had signaled that he was ready to observe. Upon receiving his signal the four transfers were fired in rapid succession. The whole performance, including all prearrangement, descending and ascending, and conduct of fire, took less than twenty-five minutes.

*Autogiro hovering near battery*

*Autogiro landing at battery position*

# ARTILLERY IN DIRECT SUPPORT OF TANKS




*Axis of advance is indicated by heavy arrows*

★

*An illustrative problem describing the actions of the artillery liaison officer with a tank battalion*

★

BY MAJOR VON ONDARZA, IN *Artilleristische Rundschau, March*, 1941

★

### THE SITUATION

The 5th Tank Division reached its objective on the evening of May 10th. On the early morning of May 11th, it intends to attack the enemy, in position along the general line: *Zgl* (two kilometers southeast of *Plate*)*—Luesse—Muehl-B*, and advance via *Luesse—Lage—Retz—Grabow—Jesern*, to operate against the hostile flank and rear. The enemy artillery positions are to be the first attack objective. The attack, scheduled to begin at daylight, is to be executed by tanks and infantry. The 116th Artillery Regiment has been ordered to support the tank attack with the mass of its batteries, and to support the infantry attack with at least three batteries.

On May 10th, enemy reconnaissance planes were driven off by our pursuit planes; we gained air superiority.

Troops—two-thirds regulars and one-third reserves, all with war experience.

Ammunition—full supply received during the night.

Fuel—filled up to 80% during the night.

Communications—commercial telephone and telegraph lines are destroyed.

Weather—clear.

Sunrise—4:18 AM.

Sunset—7:47 PM.

The 2nd Battalion, 116th Artillery Regiment, is in direct support of the 31st Tank Regiment. Battalion CP, firing positions, and observation posts are shown on the sketch. Batteries are designated as 4th, 5th, and 6th Batteries.

### NARRATIVE OF EVENTS

Immediately after receipt of the attack order, which gave the organization combat, the commanders of the 31st Tank Regiment and of the 2nd Battalion, 116th Artillery Regiment, confer and discuss in detail the artillery support for the attack, based on reconnaissances of the previous evening.

The leader of the artillery liaison staff of the 2nd Battalion, 116th Artillery Regiment, who was present at the conference, reports to the commander of the 1st Battalion, 31st Tank Regiment, as this battalion was designated as the first unit of this regiment to attack.

The artillery liaison officer informs the tank battalion commander concerning the organization of the observation posts of the battalion and batteries, and the possibilities for effective fire support. After the designation of artillery targets in the zone of attack has been coordinated with those of the tanks, the artillery liaison officer informs the tank battalion commander regarding the concentration of fire on those targets which have already been located by reconnaissance.

The liaison officer in his conference with the tank battalion commander stated: "The 4th Battery accompanies the 1st Tank Company; 5th Battery the 3rd Tank Company; 6th Battery the 2nd Tank Company."

The battery commanders leave their observation posts and accompany the attack in armored observation cars when the tanks commence to advance. The battery commanders have been given orders to direct their fire at hostile defensive weapons during the course of the attack, especially in the tank-proof area between Muehl-B and Hill 106. (When the attack begins, the 2nd Battalion, 116th Artillery Regiment, and if necessary, also the heavy artillery battalion, fire a smoke screen at suspected enemy observation posts.)

The tank battalion commander has the artillery liaison officer briefly repeat the tank objectives and routes thereto as well as the boundaries of the tank zone of attack, in order to prevent any misunderstanding. Then he requests the artillery liaison officer to inform his battalion commander that when the tanks are advancing past the tank-proof area southwest of Hill 106, it is important that concentrated artillery fire be directed against the southwestern edge of Luesse where hostile defensive weapons are suspected to be in position. He again draws attention to the fact that due to the nature of the terrain, the narrow zone of attack must be traversed by the tanks as quickly as possible.

The artillery liaison officer replies that concentrated artillery fire is possible from the present gun positions and that he will immediately inform his battalion commander regarding the wishes of the tank battalion commander.

It might be stated here in parentheses that before the attack commences, the wishes of the tank battalion commander will be transmitted personally by the artillery liaison officer to his battalion commander, if time permits. If time does not permit, this message is transmitted by motorcycle messenger. Transmission of the message by radio is forbidden.

When the infantry and tanks begin the attack on May 11th, the artillery liaison officer rides in his tank in close proximity to the tank battalion commander.

The attack proceeds as scheduled. The enemy observation posts on Muehl-B are neutralized by the well-placed smoke screen. The artillery disables two antitank guns which were located close together between Meuhl-B and Hill 106.

The artillery fire is now being directed against the edge of Luesse, presumably under direction of the battery commanders in their armored observation cars.

At this moment the tank battalion commander observed additional enemy antitank guns in the tank-proof area east of Muehl-B, which had previously remained unobserved because of their good concealment. He recognizes the danger of their fire to the flanks of his tanks advancing toward Luesse.

There is no time to turn around, and furthermore a tank attack in that swamp terrain would be impossible. Artillery alone can render assistance. The tank battalion commander gets in radio communication with the artillery liaison officer, already listening in on the tank battalion net, and requests artillery fire on the hostile weapons on his left flank.

The artillery liaison officer, who rode over the terrain "with open eyes," has also recognized the danger threatening the tank attack. He already has reported the new targets to his battalion by radio.

The artillery battalion CP answers as follows: "At present, very poor communication with the batteries. You get in communication with the battery commanders and transmit the new targets to them!"

This order had just been received when the tanks requested artillery support. The artillery liaison officer recognized the observation car of the commander of the 6th Battery as it drove into a depression. Now he can see that he has stopped his car and is on a knoll not far away. The liaison officer drives up to him in his tank. As the knoll furnishes cover, he jumps out of his tank and informs the battery commander regarding the new targets. Shortly thereafter, he also succeeds in informing the other battery commanders, by radio, of the targets on the left flank. When our tanks have proceeded beyond Luesse and there is no longer any danger threatening from the edge of this village, the fire of the batteries is soon directed at the enemy antitank guns on the left flank.

In a short time the artillery succeeds in silencing the hostile guns on the left flank. Muehl-B and Hill 106 are evacuated by the enemy and the advance towards the hostile artillery positions beyond Luesse is continued by our tanks.

## DISCUSSION

Although the importance of the artillery liaison detail was demonstrated in this instance, the necessity thereof is still more pronounced later in the attack. By remaining in constant communication with the artillery battalion commander, the artillery liaison party is kept informed of all changes in position which the batteries make or plan to make.

A change in position is usually only undertaken after the tanks, supported by their own artillery, have penetrated into the area of the enemy battery position. A premature change of position would leave the tanks without artillery support just as the penetration takes

place. Artillery which is supporting tanks must make the maximum use of its range once it has gone into position behind the front. If a change of position becomes necessary, the artillery liaison officer will be informed as to the area of the new positions as well as the length of time that will be required before the batteries are again ready to fire.

Such a change of position is of great importance to the tank battalion commander. He must insist that the change of position does not take place when his tanks are assembling. Coordination between the two weapons is only possible if the tank battalion commander is advised in advance by the artillery liaison staff of the necessity for moving batteries forward because they lack range. He can then, with the aid of the map and with his knowledge of the terrain and the progress of the battle, make preparations for the assembly of his tanks under the protection of the artillery when it is again ready to fire. On the other hand the artillery liaison officer informs the artillery battalion commander regarding the intention of the tank battalion commander to assemble his tanks, in order that artillery protection will be available at the designated time. The artillery liaison officer may temporarily represent the tank battalion commander in conferences with the artillery battalion commander. Even if the artillery battalion commander is made mobile and follows the attack, it is not his mission to remain constantly in close proximity to the tank battalion commander. It is his mission during the engagement to place his batteries in such position that they will be able to support the tanks by concentrated fire on especially threatening targets.

The artillery battalion commander must himself give the orders designating the new areas for artillery positions which at times, in consideration of the total situation, will not coincide with the opinion of the battery commander, who has only a limited sector before him. Very often it is necessary for the battalion commander to personally designate definite targets.

From the above it is obvious that the artillery battalion commander cannot drive in close proximity to the tank battalion commander. He should not be tied down to one place, but must be free to move about. When batteries are moved forward, he must decide the approximate new positions, allot targets, and seek to aid the tanks by concentration of fire.

The artillery liaison officer will provide for direct exchange of opinion between tank unit and artillery commanders with the view of assuring the necessary artillery support.

The situation will often permit a conversation between the tank battalion commander and the artillery liaison officer through the open tank doors during which the latter will learn of the plans of the tank unit commander and in turn can explain the support that the artillery battalion will be able to render. Such conversations, which should be sought frequently, are possible if the artillery liaison officer remains close to the tank unit commander. The more capable the artillery liaison officer is in artillery matters, the more often the tank unit commander will consult him when making decisions. It is wrong for the artillery liaison officer to reply as follows to every demand: "Yes, my battalion can do that." If it then develops during the engagement that too much was promised, or that the artillery was not technically in a position to meet the demands, mutual confidence is shaken. However, confidence in the advice of the artillery liaison officer constitutes the basis for success. If the tank unit commander knows that promised support will be rendered on time, he will also take the artillery officer's "no" when demands cannot be fulfilled. He realizes that the artilleryman knows his weapon and that in the case in question, artillery support cannot be counted upon. The tank leader will take the artillery situation into consideration when making his decisions and he will then be assured the entire strength of the artillery support.

## EDITORIAL COMMENT

Without repeating the points brought out in the foregoing discussion, although there is a temptation to emphasize some of them, it is possible to extract a few additional ideas. Note the artillery allotments in the divisional order for the attack. It may be presumed that the divisional artillery contains three battalions of 105-mm howitzers and a battalion of 150-mm howitzers. Three batteries, or one battalion, is directed to support the infantry component of the division, while the other three battalions support the tanks. Of course, this allotment may vary with the situation; and it must be remembered that the infantry echelon contains, organically, considerable supporting artillery in the form of assault guns and accompanying howitzers. Breaking the allotment down further, it may be seen that one artillery battalion supports directly one tank battalion, and each tank company in the assault is directly supported by one battery. Note especially that the orders provide for *massed fires* of the artillery. There is not too much decentralization. Snap shooting can be done better by the tanks themselves.

The artillery commander *commands* his unit. He does not act as a liaison officer or go along with the tank commander while the artillery shifts for itself. He has a liaison officer—doubtless a very able and experienced man—to maintain the necessary close contact with the supported arm.

The liaison officer *has a tank* in which he rides. Other artillery commanders have armored vehicles, probably multiwheeled armored cars. There is no room for numerous staffs in these cars. The commanders must be able to make decisions and issue orders without much assistance.

The hostile artillery is the first objective of the tank attack.

# FROM  THE CHIEF'S OFFICE

**MOTOR MAINTENANCE IN REGIMENTAL AND HIGHER HEADQUARTERS BATTERIES**

Inquiries are reaching the office of the Chief of Field Artillery relative to the need of all or a part of Unit Equipment Second Echelon Tool Set No. 2 by regimental and higher headquarters batteries. On April 15, 1941, as a result of study of this matter by the Field Artillery Board, the Chief of Field Artillery commented as follows on this subject:

1. In most situations during garrison training and in field operations, the difficulties arising from the lack of tools in regimental and higher headquarters batteries can be eliminated by administrative coordination by higher headquarters; for example, by attaching these batteries to field artillery battalions for second echelon maintenance.

2. Admittedly this is not an entirely satisfactory solution, but it is, of the solutions possible, the least objectionable. It can be made to work by proper administrative control and cooperation. There is enough equipment now authorized for its accomplishment.

3. The Chief of Field Artillery is, therefore, of the opinion that:

*a*. The number of unit equipment, 2nd echelon sets No. 2, now authorized in the Tables of Basic Allowances, should remain unchanged.

*b*. That a policy should be established for attaching regimental, brigade, and division artillery headquarters batteries to battalions for such of their 2nd echelon maintenance as they are unable to perform with the tools now issued to them.

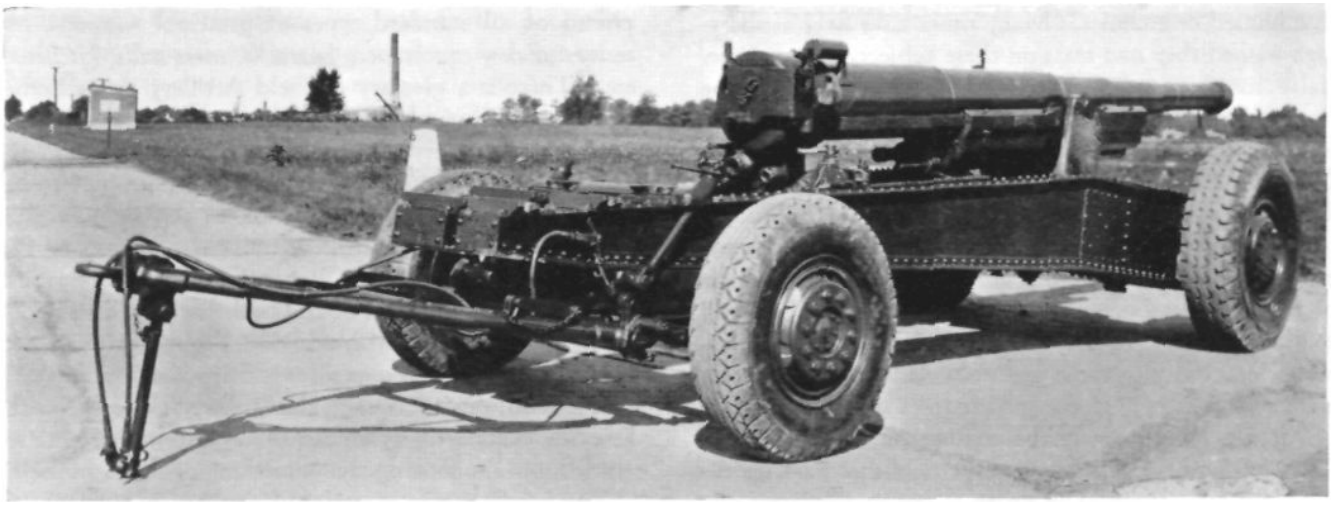
The above recommendations were approved by the Adjutant General on April 25, 1941.

**ASSIGNMENT OF NEW ROTC GRADUATES**

It is planned to order 588 ROTC graduates from Field Artillery units directly to the Field Artillery School to attend the 12-weeks' Battery Officers' Course. These officers will be sent to the School on a temporary duty status and will be assigned to permanent stations by the War Department upon completion of the course. It is expected that preference will be given to those officers with outstanding student records in the unit. Another five hundred ROTC graduates will be sent to duty with the Replacement Training Centers. Others additional to the above quotas will be sent directly to duty with troops. It is anticipated, however, that there will only be a total of about 1,200 graduates this year who will fulfill the eligibility requirements for active duty.

**MOTOR TRANSPORT TECHNICAL SERVICE BULLETIN Z-10— METHOD OF USING WINCHES MOUNTED ON TRUCKS**

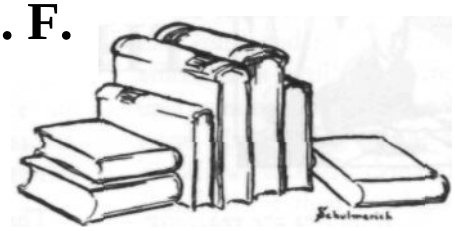
Informal information reaching the Chief of Field Artillery's Office indicates a lack of care and knowledge in the use of truck winches, with consequent damage to them; further, that the Motor Transport Technical Service Bulletin Z-10, giving instructions in the use of winches, has had a very limited distribution. Provision of a copy of this bulletin for each winch truck has been recommended. Additional copies of it should be available for issue by June 1, 1941.



*155-mm, converted GPF. The 1917 high-speed model is the M2. The 1918 high-speed model is the M3.*

# BOOK REVIEWS

**By H. S. F.**



*"Experience enables me to warn all these determined men of how small their chance is of ever reaching any great position in the army unless they devote many of their spare hours every week to a close study of tactics and strategy as dealt with in the best books upon recent wars."* — FIELD MARSHAL VISCOUNT WOLSELEY.

*DRILL AND CEREMONIES FOR FIELD ARTILLERY. Military Service Publishing Co., Harrisburg, 1941. $1.00.*

The chief of the War Plans Section of the Office of the Chief of Field Artillery wrote concerning this book: "Here is an up-to-date compilation of War Department publications in convenient form for every Field artilleryman. Being in one volume and with many illustrations, it is a quick reference and should be very valuable to every Field Artillery Officer."

The foregoing statement just about covers the matter, and succinctly. But this reviewer cannot refrain from adding a few words of praise in behalf of something which we have needed for a long time in our Arm. Knowing something of publication costs, we frankly do not see how the publisher has produced this work to sell at a dollar. It is worth three times that amount. It contains over *three hundred and ten* plates, many of them from new and original drawings. These plates illustrate many phases of field artillery activity and instruction far better than anything we have seen in the texts and far more clearly than thousands of words of explanation. Yet the explanation is there too; and, being from the official texts, is authoritative.

However, the compiler of this work has done more than copy the field manuals. He has modified them, where necessary, to fit field artillery procedure and formations. This is especially valuable in the sections devoted to dismounted drill, to interior guard duty, and to dismounted ceremonies. Many times have field artillerymen wished they had texts on these subjects written especially for them, so that they would not have to argue over ambiguous or only slightly-applicable paragraphs in regulations written primarily by and for doughboys. *Drill and Ceremonies* fills the bill for FIELD ARTILLERY. It resolves your doubts, settles your bets.

In the section devoted to *Service of the Piece* are some excellent reminders for the gunner and other members of the gun squad. This book will be a big help not only to the instructor but to the men of the battery themselves, especially to those ambitious lads who wish to do a little private boning for those stripes or a commission.

We liked particularly the chapter on *Courtesies and Customs,* and understand that the publisher held up the book for several weeks in order to get in the latest official "dope." One can never remember just what to do (with regard to military courtesies) when riding in a car, or a tank, when in civilian clothes, etc. *Drill and Ceremonies* book is a very handy thing to have around. It fits the pocket, has a waterproof limp binding, and you don't have to thumb through a five-foot shelf or fumble through a foot-locker full of books to get what you need. It is a fat volume, though—534 pages with index. We can heartily recommend it to both officer and enlisted man.

—LT. COL. C. D. GRIFFITHS.

*THE SOLDIER'S HANDBOOK. Military Service Publishing Co., 1941. 50 cents.*

*The Soldier's Handbook,* published recently by the War Department as FM 21-100, has been widely hailed as a finely written volume containing advice and information for the new soldier. It is valuable, too, for the older military man, and for the officer. It is a compact source of basic military information required for all enlisted personnel; acquaints the individual soldier with reasons for various military customs and procedures; and explains the nature of the basic duties he will be required to perform.

The Military Service Publishing Co. has made an exact reproduction of the government text (which is permitted by law), and has added thereto a thick appendix containing a history of Field Artillery and field artillery developments, a discussion of materiel, together with photos of all standard types of principal weapons, interiors of new cantonment barracks, mess halls, kitchens, etc. There is a glossary of Field Artillery terms; some basic data on communications which is a handy reference for all field artillerymen; the Caisson Song; charts showing every type of field artillery organization (not to be found in any other published work of this sort); and a station list of all field artillery units as of February 15. Since recent restrictions will prevent further publication of station lists, this part of the book has added value.

Many soldiers will wish additional copies of this book for their own use (and as gifts to friends and relatives). It is a good way to acquaint the "folks back home" as to how the field artillery soldier lives and works, and to tell them in simple language something of the Arm itself.

The binding is in material of artillery red—more attractive and durable than the standard official material.

*THE ARMY OF THE FUTURE. By General Charles De Gaulle. Foreword by Walter Millis. J. B. Lippincott Co., Philadelphia. $2.00.*

This is a translation of the book which had as its title in the original 1934 French edition "Toward the Career Army." As that title indicated, and as Mr. Millis points out in his foreword, the book is more of an argument for the long-service, fully-equipped and expertly trained professional army than for mechanization (as was implied by many press comments when Gen. De Gaulle first came into prominence).

The first part of the book deals with France's problem as seen in 1934, and ends with the sentence, "Without a professional army there can be no French defense." It seems probable, incidentally, that De Gaulle was influenced by Von Seeckt's "Thoughts of a Soldier."

Gen. De Gaulle places great emphasis on esprit de corps. "Real regiments" must exist,—"constant in their composition, in their rites and symbols, renewed imperceptibly by the arrival and departure of new elements in very small numbers, always united—they will lead that intimate life and assume those marked characteristics from which develop collective fellow-feeling." To the harried regiments of our Regular army, torn apart by the furnishing of cadres to new regiments, station complements and training centers, this seems a distant objective, but one that all military history indicates must be attained if we are to have real battlefield morale.

His statement of the role of field artillery might have been taken from one of our manuals: "The artillery must be prepared to concentrate a great volume of fire where it is needed, at any moment, so as to dominate rapidly any part of the battlefield which may be threatened."

H. W. B.

*AMERICA AND TOTAL WAR. By Fletcher Pratt. Smith & Durrell, Inc., New York, 1941. $3.00.*

This book is a survey of America's military situation by a competent writer. Unlike some other competent writers who are merely turning out timely pot-boilers with a few sensational angles played up to boost sales, Mr. Pratt has obviously spent time and thought to produce a book which the military reader will respect even when he may disagree.

Many of Mr. Pratt's sentences are thought-provoking. For example: "Men—morale—machines—the loss of any one of these is fatal." "The successes of the German army rest ultimately upon the training, organization and equipment of its infantry service." "The (German) divisions which fought the great battles of 1940 had about four years of ten hours a day and were stiffened by officers and under-officers from the old twelve-year-enlistment Reichswehr." "In practice 80% of the grey-green tide that flowed across northern France got there on its feet, with the horses behind." In America, the pistol is "the national weapon. It should serve

our men at least as well as the light rifle carried by every German soldier."

It would be interesting to know whether Gen. Drum's recent order issued to the First Army under the title "The Competitive Spirit" was inspired by Mr. Pratt's chapter on "Soldiers of America."

H. W. B.

*THEIR FINEST HOUR. Edited by Allan A. Michie and Walter Graebner. Harcourt Brace and Company, New York, 1941. $2.50.*

The editors of this book are the London correspondents of *Life,* and many of its narratives and pictures have previously appeared in that magazine. The book is a collection of first hand accounts of British experiences in the war. Among the narrators are an infantryman, several R. A. F. pilots, sailors, an antiaircraft gunner, a submarine officer, a doctor, a civilian whose house was bombed, and a fire warden. The editors themselves contribute an account of their own experiences in the air raid. The retreat to Dunkirk, the war in the air, naval operations, and convoying are all described. The book is a vivid and dramatic supplement to the unemotional official communiques which are our chief source of information on the war.

*THE TUNNELERS OF HOLZMINDEN. By H. G. Durnford. Penguin Books, New York, 1940. 25c.*

The author was a British artillery officer in the Great War, who was taken prisoner in the summer of 1917. He had been on his way to report at the infantry CP, and had, to his great consternation, unsuspectingly walked into a dugout which turned out to be full of Germans. Eventually he was transferred to the officers' prison at Holzminden in Brunswick, and the main part of the book is taken up with a description of a spectacular attempt at escape on the part of some of the British officers confined there. For nine long months they worked desperately digging a tunnel under the prison, through which, when it had been completed, twenty-nine officers escaped. However, nineteen of these were retaken, and only ten actually reached England. Finally, the author was sent to another prison at Stralsund on the Baltic, and at last he escaped, arriving in England just three days before the Armistice. An excellent adventure story, which has the added advantage of being true.

*"THESE MEN." By Maurice J. Swetland, assisted by Lilli Swetland. Military Service Publishing Company, Harrisburg, 1940. $2.50.*

The author is a retired publisher who served as a sergeant in the 107th Infantry (the old 7th New York) in the Great War. His book is a readable, popular account of the operations of the A.E.F. in France. The first third of the book deals with the operations of the A.E.F. as a whole; the remaining two-thirds are taken up with the history of the 27th Division. The book is written strictly from the American point of view; indeed, this is carried to such an extent that the realistic historian would doubtless take exception to some of the statements made. A case in point is the author's remark that the 27th and 30th Divisions were "responsible for the breaking of the Hindenburg Line," apparently ignoring the fact that forty British divisions were likewise engaged in the same task. Throughout the book individual acts of heroism and gallantry are emphasized.

*CIVIL AIR DEFENCE. By Lt. Col. A. M. Prentiss. Whittlesey House, New York, 1941. $2.75.*

This is distinctly not a book for the casual reader. Quite the contrary, it is an exhaustive text which treats of the defense of the civilian population against air attack in the fullest detail. The author reasons that the fighter plane, the antiaircraft gun, the balloon barrage and the other elements that make up active aircraft defense can succeed in eliminating only a small portion of the danger from air attack. Therefore, most reliance must be placed upon the passive defense measures taken by the civil population, in the form of shelter construction, etc. Based largely upon European experience in the present war, this book is an authoritative guide to the solution of one of the most pressing problems of today.

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