The FIELD ARTILLERY Journal

IN THIS ISSUE:

Five Features on Antitank Work

JANUARY, 1941

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THE NEW tables of organization have introduced an immediate necessity for training literature dealing with subjects which heretofore have been so foreign to Field Artillery that not only does no training literature exist, but even ideas are incomplete. Perhaps one of the most important of these is the training and employment of antitank units, or artillery acting as such. Complete unanimity of opinion is lacking—and this is natural—among those who are concerned most intimately with these matters. Consequently THE FIELD ARTILLERY JOURNAL can perform a real service by presenting thoughts on the training and employment of antitank units. Such thoughts may be hasty, may even be erroneous. But they are a start, which has to be made by someone. This issue presents several such articles, bearing directly or indirectly on antitank training and employment. Readers are invited to participate in the discussion. Much good can come from a full and free airing of the whole topic.

LESSONS FROM the war, dealing with antitank employment, are, of course, vital. "The Defense of Hondeghem," in this issue, is included because it pictures how artillery fought tanks.

IN THE SWING from siege warfare to blitzkrieg (sorry to use that over-worked term, but it is still expressive), we must not forget that maps are useful. There is a widespread lack of precise knowledge throughout the Arm as to just what maps are available now or would be available in time of war. In some posts, excellent photomaps have been issued for training purposes; this has produced a false conclusion that there is no need to worry over the lack of 1:20,000 maps. At many other places, and during certain large maneuvers, there have been issued mosaics which consisted mostly of unintelligible smears of ink purporting to be a representation of the terrain. This led many to think that we cannot hope for photomaps useful for tactical or fire-control purposes. The truth lies somewhere between these views. Great progress has been made in the production of photomaps. The new wide-angle lens may not supply the final answer, but it seems to offer an improvement. New processes in use at the Engineer Reproduction Plant in Washington assure us that lithographic reproduction of the photos will be clearer than anything received heretofore. This whole subject is brought up to date for us by Major North in his article in this issue.

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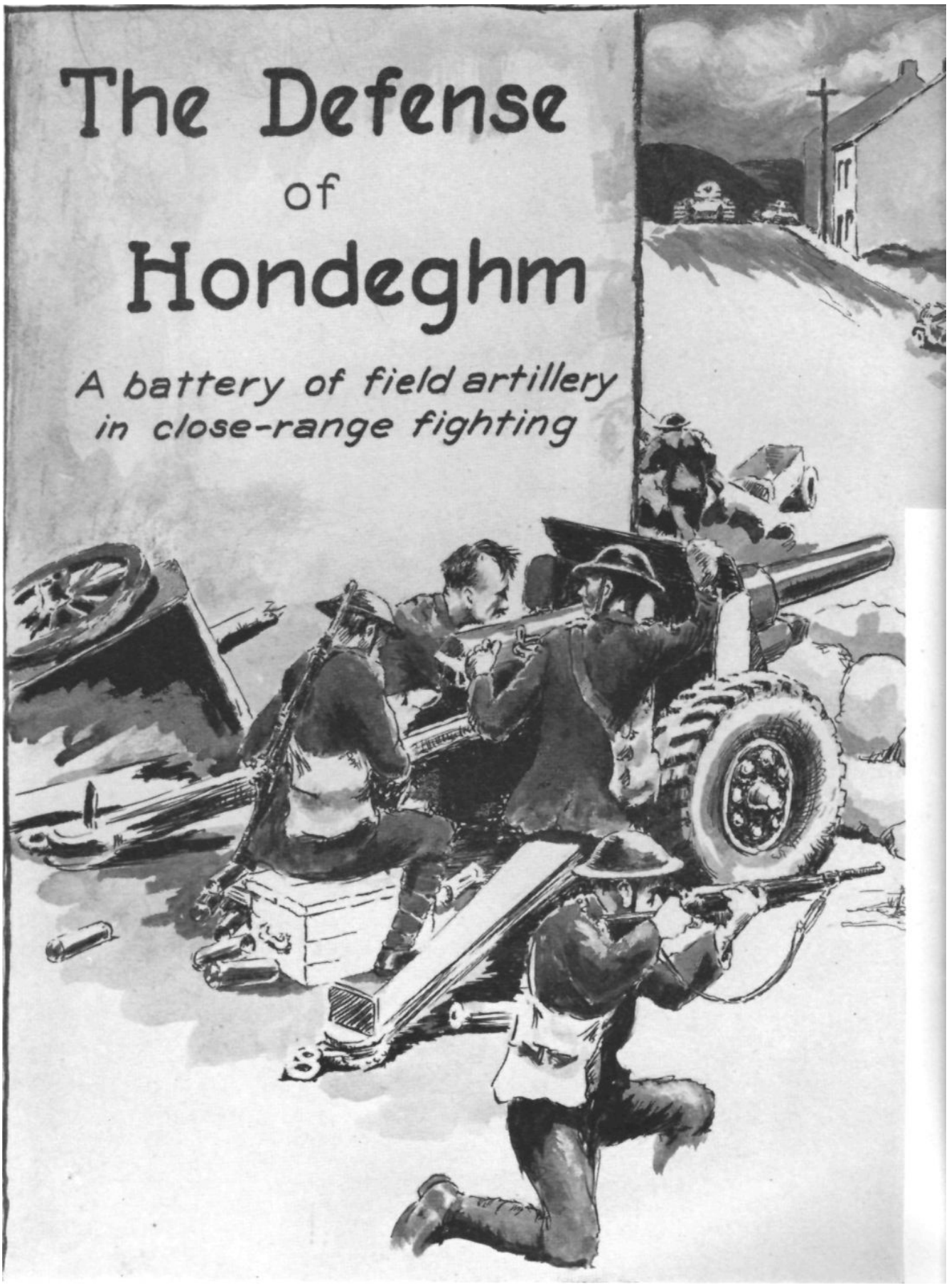
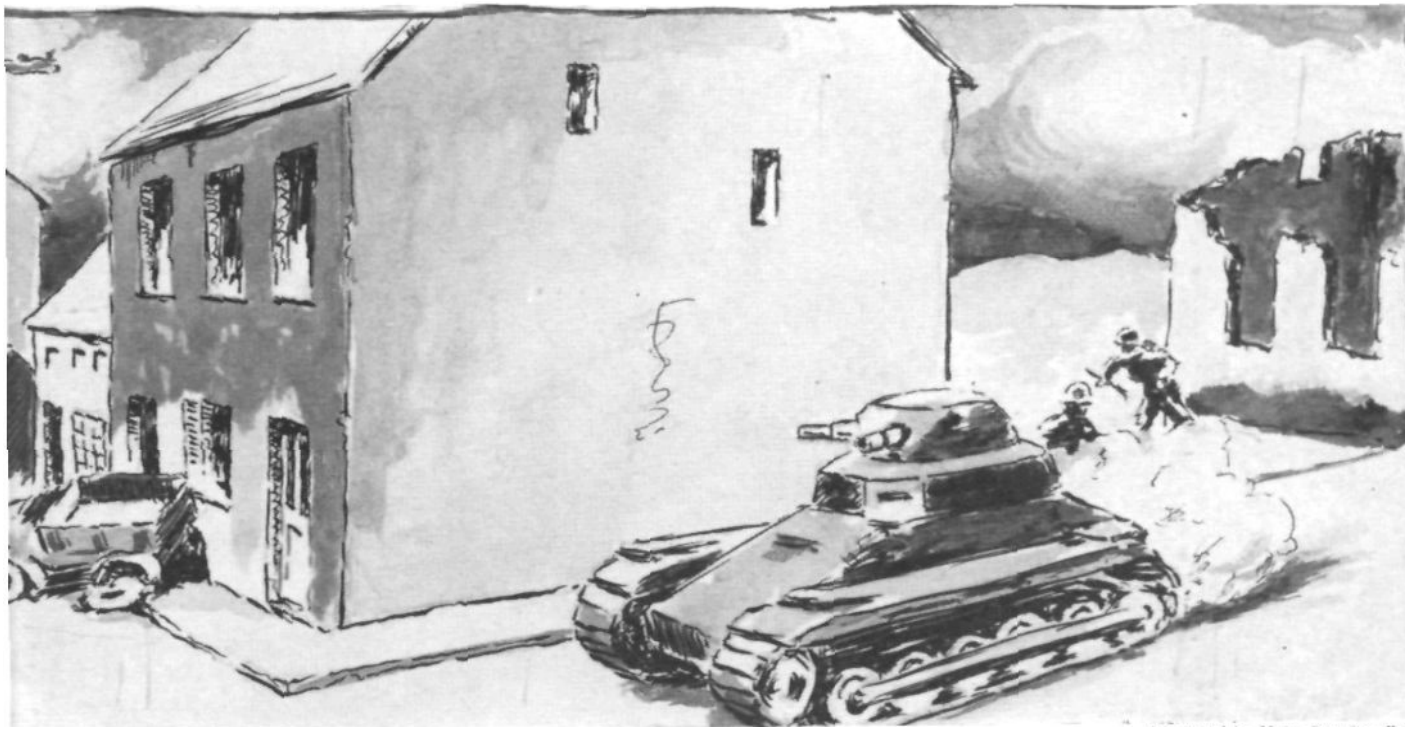
The Defense of Hondeghm

A battery of field artillery in close-range fighting





Illustrated by Major Rex Chandler

ON MAY 26 German forces were in full flood along the main road from St. Omer to Mt. Cassel (see maps, p. 5) in their thrust to the Channel ports. Strategically sited and immediately in the direct line of their advance lay the village of Hondeghem. To delay the enemy it was vital to defend it, and the task was allotted to K Battery, R.H.A.*

The battery commander selected a small headquarters staff and F troop of four guns for the purpose. No infantry were available, and the only additional garrison was a detachment of 80 men and one officer of a searchlight unit.

The village formed a virtual outpost in the widely dispersed British line and its defense was far from easy. The defenders' armament was restricted to four 18-pounder guns, Bren and Lewis machine guns, and rifles. By the evening of May 26 final arrangements had been made. Two guns, I and J sub-sections, were posted on the outskirts of the village to command the roads by which the Germans would probably come, and two others were placed at critical points inside the town. Bren and Lewis guns were located in makeshift strong-points, chiefly in the upper windows of houses. The battery headquarters was placed in the building shown in the sketch, with the radio trucks in the street immediately south of the building. The observation post was in the church tower in the village square. The night passed in an atmosphere of great tension, as scouts reported the Germans in force concealed in woods only four miles away.

About seven in the morning German Panzer units approached from the southwest. I and J sub-sections at once engaged the enemy and destroyed several vehicles including two or three tanks. Within ten minutes, however, these gallant artillerymen had been overwhelmed by an avalanche of tanks; the guns were put out of action and the crews killed or captured. A motorcycle despatch rider brought news of this disaster to battery headquarters at 7:30 AM.

Such a setback so early in the day was a serious matter, and all considerations were now centered on the defense of the village itself. Armored vehicles and supporting parties of German infantry began to penetrate its outer perimeter. The two remaining guns were immediately in action, registering hit after hit at short range on the enemy as they tried to place machine guns in house windows as they advanced.

The enemy managed to get one machine gun into position in the battery's cookhouse, but just as they were about to open fire, L sub-section gun, gallantly handled under intense fire, with the same precision as if the men were deploying during gun-laying practise, put a round straight through the cookhouse wall, effectively silencing the post. The cookhouse was set on fire and all the day's food was destroyed, but the German gun was knocked out, and later the dead crews were discovered in the embers of the building. The remains of the German machine gun are now a prized memento in the battery.

Another enemy gun was located by K sub-section gun behind a farmhouse which had served as a park for the battery vehicles. Although some British soldiers might have been there, it was essential to silence the gun, so the

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*For the material from which this account was taken we are indebted to *The Gunner,* November, 1940. The reader is reminded that a British battery is the same as our battalion, while their troop corresponds to our battery.

18-pounder was trained on the farmhouse and the first round brought the whole place down in a shower of plaster and dust. Another four rounds were pumped in to make sure, and the machine gun was not heard again.

One British driver, who was in the farmhouse, had a miraculous escape and rejoined his unit little worse.

Both K and L guns were now hotly engaged, firing point blank at 100 yards range, using Fuze 1. So close were the Germans that the gun crews were being attacked with hand grenades; but casualties, apart from the total loss of I and J sub-sections, remained small, only one man having been killed and two wounded. Both guns were in very exposed positions, but they maintained a fast rate of accurate fire; every round took effect.

About 1:00 PM large numbers of German light and medium tanks were seen from the top of Hondeghem church approaching Cassel and Hazebrouck. It was the last observation made from that position, for the enemy about this time began to shell the church and demolished it.

In the thick of the fighting, one British gun through error fired a round of smoke shell. It burst in the village street and all ranks expected that the Germans would make use of the smoke as cover for a general advance. So the two detachments worked like galley-slaves pumping round after round into the center of the smoke cloud. It dispersed, however, without the enemy having seized his opportunity.

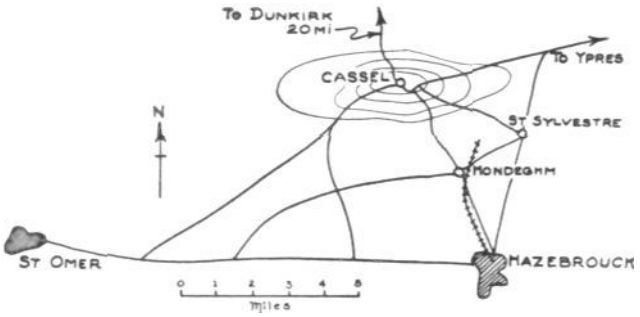
Machine gun fire was now coming from all sides. Both 18-pounders frequently had to change their positions, their crews manhandling them up and down the village streets and firing from all angles. At this critical moment D troop of the battery, on the slope of Mt. Cassel some three miles to the north, and controlled from Hondeghem by radio, opened up a defensive barrage. So accurate was their shooting that although at one time their shells were dropping within fifty yards of the two guns in the village street, not a single round fell among their own people. Unfortunately, this firing brought down devastating German counter-battery which knocked out three of D troop's four guns. The remaining section continued to fire, though only one round each five minutes, as its ammunition was nearly exhausted. The German activity, too, seemed to die down a little.

Battery drivers, armed with rifles, did some excellent work taking pot-shots at the enemy from windows.

At 3:30 PM it became apparent that the small garrison could hold out no longer. Ammunition was almost gone, all food supplies had been destroyed, no reinforcements (except one small detachment of Fife and Forfar Yeomanry) had appeared, and finally they were in great danger of being surrounded. At 4:15 PM the withdrawal was ordered. The two guns and the wounded men were sent off ahead, for a rendezvous at St. Sylvestre. The remainder followed later by a different route.

At St. Sylvestre, however, the main road running through the village was found to be held by German medium tanks. Positions were hastily found around the church, where a group of some twenty R.A.S.C. men armed with rifles and Bren guns joined the action. The enemy were by now aware of the British troops' arrival, and a volley of hand grenades suddenly started from behind the tombstones in the graveyard.

Germans appeared on all sides. The Troop commander decided that they could only be dislodged by a direct charge. Two parties with bayonets fixed advanced round each side of the churchyard wall, each man shouting, as ordered, at the top of his voice. A terrible roar went up. The psychological effect was just what had been calculated. Three or four Germans were shot and



the rest, throwing away their rifles, broke in a panic and were routed.

Both guns were now again brought into action from the graveyard and fired what little ammunition was left, into the neighboring houses. One gun was limbered up to its quad (four-wheel drive) for a change of position, but both gun and quad were blown to pieces by two direct hits from a German gun firing along the road.

Though the situation then began to look desperate the men were in no whit disheartened and were still full of fight. Charges were made by small parties against houses where Germans were hidden, and K's one remaining gun continued firing until its last round had been expended.

Darkness was coming on. Lights were winking here and there in the dusk, and it was thought that the Germans were bringing up reinforcements. The decision was to run for it. The men piled into the remaining lorries and L sub-section gun was put out of action and abandoned.

Away went the British vehicles, under fire from German tanks in the fields. There was a left turn, then a right turn in the road commanded by a German machine gun. This S-turn had to be taken at speed. The first vehicle was ditched at the second curve. The occupants scrambled out and were taken into the third truck. The second vehicle, meanwhile, had negotiated the first turn, but the driver missed the second and went straight through a hedge into the field. As the ground was dry he drove on, crossed the field, and rejoined the road where it skirted the field at a further point.

Escaping at last from the German machine-gun fire, the convoy went on in comparative safety and after a mile or so startled a party of the East Riding Yeomanry by arriving alive by the very road they had just mined. One of the trucks had actually been blown up, but the occupants escaped injury.

In this secondary engagement at St. Sylvestre, which lasted two and one-half hours, all ranks showed once again the greatest bravery and coolness, which was all the more remarkable following, as it did, on the day's continuous fighting.

All through the heat of the battle the men of K battery took orders and carried them out with the same expedition and precision as though they were on the barrack square at home. A heavy toll was paid in casualties, but the gallantry of those who fell will remain for all time an incentive and example to all ranks of the regiment.

Comments

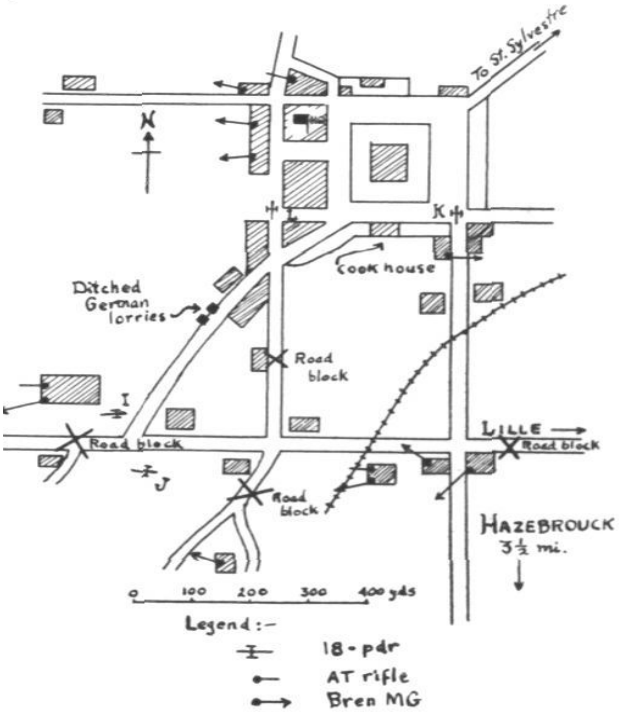
This was enough excitement and fighting for anybody. No doubt there are lessons in the day's work for U. S. artillerymen; some of these cannot be deduced owing to lack of exact knowledge as to what was done or could be done. One wonders, for example, as to what obstacles, in addition to the road blocks, could have been utilized to prevent the quick overwhelming of I and J sub-sections. This incident indicates also that a judicious use of mines by artillerymen may have considerable value.

A lesson of prime importance is that battery personnel must be given real—not nominal—target and combat practice with the rifle and machine-gun.

Antitank units should be taught the principles of street fighting, and given some instruction in scouting and patrolling. All phases of local security must be given close attention by artillery.

Note how, in this rear-guard action, the two troops were placed in echelon, so that the rear troop supported the one in Hondeghem; the observation post and fire-direction center were near the enemy, not back with the rear troop.

The British would have been better off if K Battery had had a third troop emplaced in a defiladed and protected position, to be used for counterbattery or other purely artillery missions. D troop, which rendered such excellent support at a critical time, did not remain in action long because it was posted in an exposed position. A photo printed in a recent issue of the *Artilleristische Rundchau* shows the remains of D troop's materiel at Cassel after the action was over. The guns were in the streets, on the forward slope of the hill, being sited for antitank firing. They were easy prey to German counterbattery. Nearly every artillery lesson from Europe contains this same thought, i.e., counterbattery is as important as ever, and it must be executed by light artillery placed well forward.



ANTITANK BATTERY TRAINING

By Major Ralph Van Wyck

"It does not suffice to study military history; it will not do to adhere to the old things. One must make an honest effort to venture into the unknown, and must endeavor to look into the future — at the risk of arriving at wrong conclusions." — von Eimannsberger, in *Mechanized Warfare*.

So you have been assigned to one of the new antitank batteries! It should be one of the most interesting jobs in the Army today; and one of the most difficult. Training literature is scanty. Much precedent is lacking. Hence for once you can be a pioneer, can try out those original ideas which have been bothering you. If war comes, the importance of the proper training of your unit will be manifest at once. When the full story of the present European struggle is told, one of the things that will stand out will be the desperate, last-ditch fighting of artillery antitank units.

SELECTION OF PERSONNEL

Rarely does a battery commander, or even a higher commander, have "much say" in the matter of selecting personnel. Nevertheless it is well to consider the types of men most suitable for assignment to antitank batteries. Both officers and soldiers must be young and vigorous. There are so many occasions when the pieces will have to be manhandled, and where organization of position will be accompanied by strenuous physical labor, that only those with strength and endurance can be depended upon. Since gunnery methods will not involve the mathematical gyrations common to more deliberate kinds of firing, educational qualifications will be of less importance *per se*. Mental alertness, native common sense and ingenuity, and resourcefulness under trying conditions, will be prime requisites.

Even though the battery commander has but slight influence in the matter of original assignment of men to his unit, he can do much in fitting the pegs into their properly shaped holes. Section chiefs, for example, should not be ancient (though worthy) patriots whose reaction time is excessive or whose eyesight, especially with regard to depth perception, is below par. A gun commander must be adept in estimating ranges, in locating targets, in estimating their speed, and in sensing shots under conditions of excitement and poor visibility.

Men assigned to the antitank warning net must have good eyes, normal hearing, ability to analyze quickly what they see and hear, and must not be of that well-known type which goes to sleep at every opportunity. They really must be very high-type soldiers, not the battery culls. It would be well for the antitank battery commander to devise special aptitude tests for determining which men are best qualified physically for various positions where the wrong man could bring about disaster. For example, an untrained soldier who has good reflexes, manual dexterity, and at least normal vision might be safer as an antitank gunner than an older and slower individual who has, perhaps, made expert gunner in an ordinary battery. NCO's should be given tests which will indicate, if not establish, a high degree of self reliance when "placed on their own." Antitank fighting is by piece or by pair of guns. Decentralization was the rule in Flanders and France.

BASIC TRAINING

It is assumed, for the purpose of discussion, that the recruits assigned to an antitank battery will have passed through some center where they received basic training and physical conditioning. Nevertheless there is still a considerable amount of basic training which must be given them. One of the more intangible, though highly important, phases of this pertains to morale. Antitank fighting is personal fighting. The enemy is visible; he is in strength; he approaches at speed from all sides, including the air above; and he uses every weapon from hand grenades to big-caliber shells and bombs as he comes toward you. Single sections of artillery antitank guns have had to hold bridges or other defiles for hour after hour, often without support of any kind. This requires courage of the highest order. It requires courage, not only that born in the excitement of strenuous action, but that which endures with good spirits for hour after hour, long after the situation apparently has become hopeless.

You, as battery commander, will have no sure way of knowing ahead of time whether your men will have the required moral fiber. But you can provide reasonable assurance of it if you will lay the proper groundwork during training. Much has been written on this subject, and to it we can add little. It is desirable that every one of us avoid the mistake of adopting, for the new antitank units, some ill-advised nickname or slogan. A

German light armored vehicle advancing through Breteuil, France, June, 1940.

German antitank guns preparing to cross Marne Canal.

German antitank unit in woods during advance through Alsace. Note World War monument in foreground.

name like "suicide squad," for example, certainly would do nothing to bolster morale.

As to more positive methods, no one can diagram this for you. Three thousand years of military experience and tradition, which are the heritage of military men everywhere, point unerringly to the fact that discipline and training are the two prime ingredients in the production of a courageous combat unit. The German engineers who crossed the Rhine under heavy fire and crawled up to the gun ports of the Maginot line were brave because they had rehearsed the operation beforehand until they knew exactly what to do and what to expect. There is no need to elaborate on this. Rehearse your men continuously in their duties until they are confident that they, their comrades, and their leaders can function calmly and smoothly under all conditions. Seize every opportunity to educate them in what to expect in the type of combat current today. This can be accomplished by informal talks, illustrated by news reels (it is expected that the Signal Corps will have such movies for loan) and literature which will prepare the men mentally and spiritually so that battle with its noise, confusion, distressing sights, and peril will not overwhelm them with its unexpected fury. The German whistling bombs were effective because they were unexpected. The writer has a relative who was a private in the 38th Infantry during the Second Battle of the Marne. Neither he nor any of his immediate comrades had ever been in battle before. But when the regiment was surrounded on three sides, his own company almost wiped out, he and the survivors were not dismayed. Why? He says, "We would have been scared to death, but we thought this was the usual situation. We had been told so much about tough fighting that we didn't expect anything else."

Physical training for every officer and man in the battery must be a part of the daily routine, and must not be confined to the recruit stage or only to fair-weather days. This will be new to some of your officers who, though not lacking in physique or ordinary health, have received most of their athletic training seated in the cheering sections in the stadiums of their respective colleges. The automobile, too, has had its effect on our people. Walking is currently unpopular, and at first you may have to administer it under forced draught. Don't let your officers stand around "supervising" while NCO's give calisthenics, and let no one—not even the supply sergeant—be excused from this exercise. Frequent hikes over rough terrain must form an important part of your training schedule, and these hikes should not be postponed on account of inclement weather. Teach your men to scorn the idea of being "fair weather soldiers."

Your men should all be qualified in swimming. Crossing streams is still a frequent occurrence in warfare of today, and bridges are not always available. We wish that we could give as much emphasis to this subject of physical conditioning as it deserves. It is one of the *big* lessons which the British learned in Belgium.

EVERY MAN A DRIVER

Another desirable phase of basic training (which may be at variance with "orthodox" ideas) is that every man and officer be taught to drive motor vehicles. When all artillery was horse-drawn, all personnel received instruction in equitation. The same principle should prevail in the antitank battery. There will be occasions in antitank fighting where almost anyone will have to drive temporarily. It is mentioned here that officers should be given some instruction too, because some military vehicles have somewhat different gearshifts, especially where subtransmissions are used, than ordinary commercial automobiles. Furthermore, an officer is much more able to determine the condition of his vehicles if he drives each of them periodically for short tests, rather than have to accept the word of the driver or mechanic as to the condition of each particular truck. Frequently a short test run will disclose faulty brakes, slipping clutch, etc., after the driver had declared that the truck was in good condition.

COMMUNICATIONS

It might be well to give most if not all your men some instruction in how to use the radio set. It is not clear, at the present writing, just what kind of set you will have in your battery, but it seems reasonable to assume that radio telephone will be a part of it. It was not too much to require that all field artillerymen know how to use a telephone, and the same requirement should apply to the radio telephone for the antitank unit. Suppose all your radio operators suddenly become casualties. Are you going to be stymied because no one else in the battery knows which knobs to turn to be able to use the radio sets?

And now, painful as it may seem, we are going to suggest that you instruct your men in visual signalling. It may not be necessary for them to be able to wig-wag or semaphore, but a few readily understood signals should be known to all. These will be useful to the men of the warning net in transmitting the direction and strength of a tank attack, for example. No doubt horns and whistles will be used for warning, but necessity may arise for the transmission quickly of more specific messages—messages whose urgency cannot wait for delivery by runner. In the "good old days" we all knew the arm signals for mounted drill. The infantry, too, had arm and hand signals which applied to combat musketry. Perhaps antitank gunners may make use of some of these old signals.

ORIENTATION

Your men have so much which they must learn that you must omit all non-essentials. Orientation is a phase of training where simplification is indicated. It is not necessary that the antitank gunner be able to construct a map, chase contours, draw an accurate grid, restitute an air photo, or perform an Italian resection. Every man in the battery, however, should be able to follow a route on a map or sketch and to locate himself approximately on an air photo.

As for target designation, rarely will the antitank personnel have time to fool with coordinates and azimuths. Targets will be pointed out, and in considerable haste. However, a sentinel or other man somewhat distant from the gun cannot readily designate a target by such simple means. Therefore it may be necessary to instruct the men in a method such as, say, the old musketry method of designation by clock, both horizontal and vertical. Too little practical experience is available at present to determine our exact needs in this matter, or to suggest definite solutions; but there seems little doubt that a simple, quick, and sure method of target designation will have to be devised. Our service-practice method of saying, "To the direct front at 1,000 yards, lone tree on skyline; go left from there 50 mils and at a point 12 mils lower is a burnt brown spot on the terrain; then go from there . . . what, you don't see it?"—this method seems a little inadequate for pointing out a moving tank. *But,* some targets will have to be pointed out by a man who is 150 yards or more from the gun.

SMALL ARMS

The need for a reasonable amount of practice with the machine gun and rifle is well understood by all who have read accounts of what happened in Europe. Here again the battery commander must concentrate on combat instruction. No need for qualifying your men for the National Matches at Camp Perry, but they ought to be able to hit a silhouette of a kneeling figure occasionally at 200 yards. Give them practice in shooting at moving targets on the ground (the enemy will be in motion, we presume), and also at small free balloons. Why? Parachutists.

NCO's and junior officers should be given instruction in infantry scouting and patrolling.

STANDING GUN DRILL

Some standing gun drill should take place every day. After men have learned their duties well, the drill may be for very brief periods. It then has a two-fold purpose: (1) to keep the men "handy" at it so that guns can go into action with great rapidity under all circumstances, and (2) for the purpose of strengthening discipline and continuing physical conditioning. The instructor will do well to give suddenly the command for placing the guns in action, at times and places when the men do not expect it—on the march, in the gun park, during rest periods or even while at meals. In May, 1940, a German Panzer unit, perhaps composed of motorcyclists and light tanks, rode through the bivouac of a French artillery battalion sixty miles behind the "front." The artillery unit of today must *always* be ready to protect itself against such surprises.

RANGE ESTIMATION

Practice in range estimation must also be a daily affair, or at least it should be conducted at frequent intervals. Basic Field Manual FM 23-70, *The 37-mm. Antitank Gun, M3*, soon to be issued, describes a good method to be used in instructing men in range estimation. Many other portions of this manual will be found valuable in training the 75-mm. antitank battery. The reason for continued practice is that, like so many other things which are more of an art than a science, the individual loses his aptitude if he is permitted to get "rusty." We would like to suggest that you may combine range estimation and estimation of speed of targets with drivers' instruction. Arrange your set-up so that a few of your vehicles are in the distance, communicating with your gun position by radio. Then have your men estimate the ranges to these vehicles, and their speed. If you have laid out a simple course with stakes, and measured the ranges to them, you can determine the accuracy with which your men are making their estimations.

IDENTIFICATION

One of the unsolved problems connected with antitank firing is that of distinguishing friendly from hostile tanks. British antitank guns shot up French tanks and vice versa; also British antitank gunners on several occasions permitted German tanks to approach too close because the tanks were not identified as hostile. At present, it seems that the safest thing is to make sure that all men know the appearance of our own tanks, and not cause them to confuse themselves by trying to memorize the appearance of tanks of different foreign powers. It may be difficult for you to conduct training in this, but you can start out with diagrams, photos, cardboard silhouettes, and movies. As soon as possible, however, you should show your men actual tanks. If they can be sure of identifying friendly tanks, they will know that all others are hostile.

GUNNERY

Gunnery, of course, is the most important phase of antitank training, and it must be continuous, both in garrison and in the field. Major Douglas V. Johnson, in THE FIELD ARTILLERY JOURNAL, July-August, 1940, described an excellent method for imparting preliminary instruction in direct fire at moving targets. His method could be applied in the gun park, and does not involve the use of any special equipment. The target merely consisted of a soldier who walked in front of the gun at a speed calculated to simulate that of a moving target. This man was placed at about fifty yards from the piece, so that extensive clear ground was not needed. After the gun squads have had drill of this kind, they should progress to subcaliber work. While the 37-mm. tube probably will be used as subcaliber for the 75-mm. antitank battery, there is also need for .22 cal. or .30 cal. fire on an indoor range or an outdoor miniature range. [Using a set-up similar to that described in Maj. Ely's article in this JOURNAL, on the subcaliber range, and employing a miniature moving target drawn by a small cable and hand-operated windlass, considerable excellent experience can be imparted to all personnel at the gun position. Furthermore, a metallic screen on which a moving picture

is thrown can be used for practicing fire at moving targets; .22 cal. ammunition of the type described by Maj. Ely is suitable.—Ed.] This practice can be held in an indoor range in inclement weather, or at night. It is an inexpensive method of giving the gunners and other cannoneers lots of practice; and plenty of practice, day in and day out, is what they need. There should be no great difficulty in rigging up a .22 cal. mount for your guns. This has been done by various officers both here and abroad. Col. Francis T. Colby, of Hamilton, Mass., has employed this method in instructing officers for many years, and doubtless readers interested could obtain the details of construction from him. Photos in French and German magazines have shown quite similar devices in use. FM 23-70 describes in detail how to construct a 1,000-inch range for subcaliber firing; we presume that it could be used for the 75-mm. battery as well as for the 37-mm. gun provided a .22 subcaliber mount is obtained in some manner.

The British say that they found it necessary to fire over open sights at tanks approaching under such conditions of poor visibility that the targets could not be seen through the optical instruments. It is believed that the gunners' panoramic sight on the 75-mm. gun has such good optical characteristics that the gunner will be able to see through it as well as, if not better than, with the unaided eye. There is some doubt as to the sight used by No. 1 for setting the range. At any rate, your materiel may not be equipped with the new sight, and even if it is, accidents during combat may require the use of direct fire with open sights. It would be safer to give your men some practice in this type of fire. Furthermore, it is highly advisable to drill the men in operating the gun while they are wearing gas masks; this drill need not be given frequently, but the men should have had a little experience of this kind.

Lessons from Europe show that antitank guns of all sizes have been used with direct fire in firing at gun ports and observation slits of bunkers and steel cupolas. If our people should ever have to do this, they should have had some previous experience in it. It is best to be prepared for all eventualities.

Some of you may be called upon to fire at small craft crossing streams or landing on the seacoast. Again, there is indicated the need for practice in this type of fire. Of course, it is similar to firing on tanks, but there may be a few "wrinkles" to it which have not occurred to most of us, and which you will discover, perhaps, by trying such type of fire. The Germans crossed the Rhine in 45 seconds in power boats, and attacked the bunkers of the Maginot line before the sleepy defenders knew what was going on. The French had plenty of cannon, well served and properly implaced. As usual, they were surprised because they had not imagined that the German assault boats would travel so fast. The German outboard motors were four-cylinder affairs, very powerful, not the two-cylinder engines to which we are accustomed. Yet these boats could have been hit if the French had had practice in firing at them with direct fire. According to the German accounts, nearly all the French shooting was just in rear of the boats, the gunners weren't taking enough lead; but by the time they realized this, the Germans were across.

Drill your men in "reducing" jams and misfires. A few seconds' delay in antitank fire may be fatal. Also they must function so smoothly that there is no lost motion in serving ammunition. Train the men to care for the ammunition, so that no malfunctioning of the piece will result from dirt on or damage to the ammunition. Work out a method of laying out the shells so that they can quickly be loaded, yet so they will not interfere with the rapid displacement of the piece to an alternate position. If it is necessary to swing the gun quickly through an angle of 180 degrees (as is quite likely), it may be advisable to have a few rounds already in position to the right front so that when the piece has been swung around, these rounds will be in proper position on the left of the trail.

Occasionally, when firing subcaliber, or even when firing service ammunition, have your gun squads given a command which will cause them suddenly to displace to an alternate position some little distance away; then, with the least possible delay, open fire on a new target. Service practice should be as realistic as it is possible to make it—artificialities in this type of firing should be reduced to the minimum.

Since most of the firing is done by enlisted men, you must adopt a somewhat different attitude than that of an instructor criticizing a gunnery problem at service practice. Your men will respond well to a little praise. In direct fire there will be little need to point out mistakes. These will be evident to all.

Twenty years ago George G. Gatley, then in command of the 10th Field Artillery, required all junior officers to take the gunners' examination. He himself, the colonel, gave part of this exam, and he "knew his stuff." Consequently his junior officers were the better able to show the men how to perform their duties, and they knew what standard of performance to expect or to look for. It seemed an excellent idea then, and it does now. Why have we gotten away from this? Why shouldn't we go back to it? Many of our junior officers are far from adept at the things for which they hold their men responsible. This is not true in the German army. It is the belief of this writer that every officer in the antitank battery ought to be able to perform standing gun drill—all duties, and to qualify as an expert gunner.

Although nearly all antitank battery gunnery consists of direct fire, occasions may arise where indirect fire will be ordered. The antitank battery may participate in normal artillery missions, may be used as an attached unit with some special group or combat team; or, in firing at a tank assembly area, may use massed indirect fire. Therefore, do not entirely neglect this phase of gunnery training.

Direct Fire 1941 Edition

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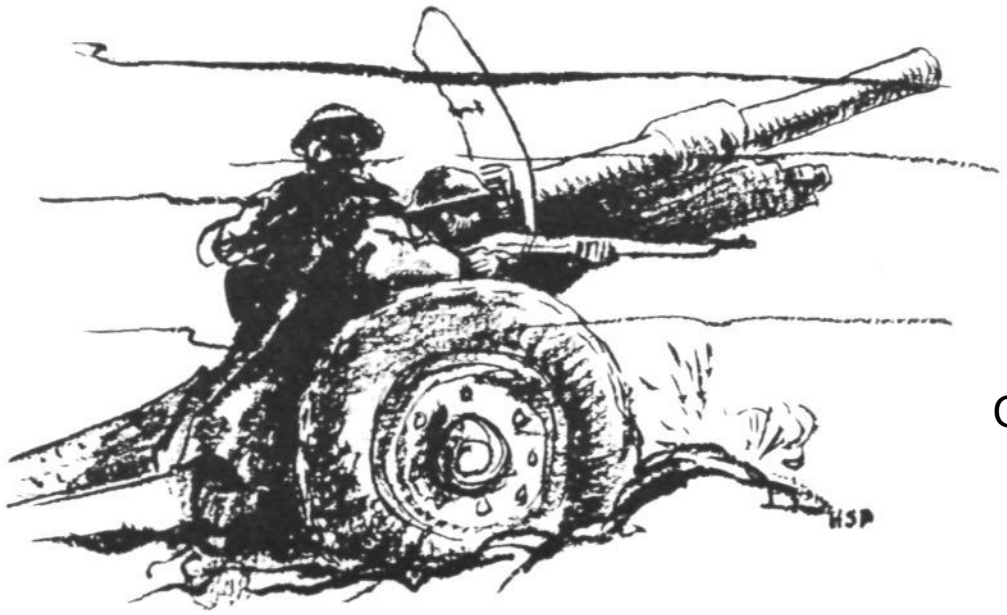
By Lieutenant Allerton Cushman, 441st FA.

In view of world conditions the Reserve Corps training schedule is being stepped up. Rooms which last year were occupied by a mere handful of men are now conducting brigade and division exercises with the Standing-Room-Only sign hung on the door. Instruction is concentrated, and quite rightly so, on fundamentals. They must be mastered before the soldier can graduate to the study of weapons and tactics produced so dramatically during the blitzkrieg. Yet one does not need to be an advanced student of artillery to realize that certain of these so-called fundamentals are predicated upon conditions characteristic of the last war—conditions which failed to materialize during the German assault of last summer.

We know that higher authorities are aware of this and that new weapons are being designed that will permit us to fight successfully on the modern battlefield. We also know that today draftsmen are poring over blueprints that eventually will be translated into countless jigs, dies and gauges that eventually will make the tools that eventually will make the guns. It is an unfortunate but inescapable fact that many months will elapse before even the Regular Army is fully equipped with up-to-date weapons.

THE FIELD ARTILLERY JOURNAL published in its issue of September-October, 1940, the tables of organization for the triangular division. Here the reserve officer first learned that the principal artillery weapon will be the 105-mm. howitzer. The *Congressional Record*, however, reveals that the number of such guns on hand on August 1, 1940, was exactly zero. On order were 240 but the world may be quite a different place before all these weapons, and ammunition for them, finally join the Army.

In many respects we are where the French were in the summer of 1940. The defense of that now sad country was predicated upon the use of material which had been developed and manufactured in limited quantities but which had not been issued to the armies in amounts sufficient to influence the final decision. A particular instance of this kind involved the antitank gun. Defense against mechanized troops called for the employment of a weapon heavier than the 37-mm. but more flexible than the 75-mm., hence a 47-mm. gun was developed. Yet when the enemy broke through along the Somme it was the 75's that were called upon in a futile effort to stem the tide. One can do no more than speculate on what would have happened had the French been correctly armed and trained to meet the onslaught. Yet sufficient details are now available to judge as to whether they



Gunnery methods for the 75mm antitank gun.

made the best use of the artillery they possessed. If they did not, which appears definitely to be the case, are there any lessons which we can draw from their failure and apply with profit in our own situation?

The recent adoption of a field piece of heavier caliber is tacit recognition that the new type of mechanized warfare, introduced and perfected by the German Army, has rendered obsolete our present divisional artillery weapon. Changes in the art of war are also reflected by the incorporation within the triangular division of an antitank battery consisting of four platoons of two 75's each. This armament would appear to be a stop-gap because the 75 is far from the perfect antitank weapon. Its muzzle velocity of less than 2,000 feet per second is too low; the piece is laid on the target by one man and fired by another, thus introducing a variable (reaction time) which will greatly reduce accuracy of fire on fast-moving targets. The 75 is not the answer, yet anyone conversant with industrial production problems realizes the truth of the following: If this country fights within the next two years most of its light artillery fire will come from the barrels of the French 75, Model of 1897, or its sister with her face lifted, the model M2.

But while we are waiting for our new guns is there anything we can do to improve our use of the old? Let us examine some of our standard artillery practices and see if they, like our materiel, have been rendered obsolete since the Battle of France. Let us look first at our methods of fire against the tank.

This instrument of war, vastly improved over its 1918 forerunner, was one of the chief elements contributing to the German success last summer. Yet the field artilleryman's Bible, FA Book 161, devotes only *one* paragraph (273-c) to conduct of fire against this type of target. It is fairly obvious from this brief treatment of the subject that its importance has not been given the weight that recent fighting has shown it to merit. Furthermore, the system of fire against tanks which the book teaches results in many unnecessary delays, delays which would be of small consequence if the tank were lumbering along at ten miles an hour but which would spell ruin in a modern high speed attack.

Let us analyze the procedure now being taught. The tank is sighted. *Target that tank, deflection left 10, 1000* commands the chief of section. The gunner first sets the deflection on the azimuth micrometer (deflection drum in the case of the French collimator sight). He then moves down to the eyepiece, looks through the sight, picks up his target and puts the cross-hair on it. These manifold operations give the "lead" which must be allowed to obtain a hit on a target with a lateral motion. While all this is going on No. 1 has set his range at 1000 and when the gunner yells *Fire* he pulls the lanyard.

Now suppose the tank changes direction. The chief of section has to command *Right 20* and then give another range setting; the gunner goes through the whole performance once more. But why is it at all necessary to mess around with the azimuth micrometer? The panoramic sight has indices on each side of the cross-hair spaced at 5-mil intervals. If deflection is given by the command *Lead 10,* the gunner could follow the target with the second graduation instead of the cross-hair. Any confusion in *right* or *left* deflection would be obviated because the gunner would instinctively apply the lead ahead of his target. Because he would not have to divert his attention from the sight in order to constantly adjust the azimuth micrometer setting he would be able to follow the target with far more speed and accuracy, especially when the tank is pursuing a zig-zag course.

No. 1, according to the book, waits for the chief of section to give him the range. There is no reason why he should not be taught to estimate the range himself and adjust it continuously as the tank approaches. All expert riflemen in our service must be qualified in range estimation. It certainly should be a basic requirement of every field artilleryman.

Under this proposed system the chief of section will give the initial lead and range. Thereafter the gun crew will carry out the fire as a team. If the chief of section observes that the lead is not sufficient he will command *Lead up* (*or down*) *so and so*. If he observes that the estimate of range is not correct he will command *Range up* (*or down*) *so and so*. In other words, his prime function, after giving the initial commands for *lead* and *range,* will be to *improve* the accuracy of the fire. The gun crew will work at far greater speed than is possible when they have to wait for fresh commands after each shot.*

It should be the ultimate objective of direct-fire training to qualify each gun crew to deliver fast and accurate fire *without direction or assistance from a chief of section*. This is not an over-ambitious task like teaching the average enlisted man the manifold complications of indirect fire. It merely calls for extensive training in the estimation of range and speed and the application of a simple rule of thumb. For it so happens that the lead required to hit a target with a lateral motion is "based on one mil for each mile-per-hour of lateral speed of the target" (FA Book 161, paragraph 273-c). If the gunner can estimate the lateral speed of the tank in miles-per-hour he simply "leads" the target by that same number of mils. Instead of the inevitable confusion and delay involved by *right* and *left* deflections he puts his cross-hair the estimated number of mils *ahead* of his target, a natural and instinctive act for anyone who has ever fired a shotgun or passed a football.

Proficiency in estimating range and speed does not require brains—it requires practice. Gunners and cannoneers—all of them—should be trained intensively in

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*The method herein proposed by the author is standard for the 37-mm. antitank gun, and doubtless will be used by the new 75-mm. antitank batteries. Training regulations for that weapon have not been issued, hence the suggestions of the author are timely and worthy of consideration.—Editor.

the art. Every man in the battery should be able to take the position of gunner or No. 1 and fire the piece without help from a non-com or officer. Thus a gun crew could be reduced by casualties to as few as three men and still continue to deliver fire.

Close action against tanks means that the gun crew must smash the tank before it smashes them. The men on the trails will be fighting—not against an unseen enemy thousands of yards to the front—but against death-dealing steel monsters, charging directly *at them*. They must be able to shoot—shoot the way an infantryman shoots with his rifle. Waiting for commands between each shot—even having to depend on someone else—will inevitably slow up action. Because of the intense enemy artillery and aerial fire power which will accompany such an attack the ability to transmit or comprehend commands will be reduced to a minimum. The men should be free to concentrate their every force and effort on the approaching tank.

Advanced training programs for the battery should give recognition to the fact that the success or failure of a close-in defensive action against tanks may be decided by one or two surviving guns, manned by greatly depleted crews. Firing practice should be conducted with targets that actually move toward the gun position and, as they approach, the strength of each gun crew should be reduced, thereby accustoming each cannoneer to taking over quickly every job on the gun including those of gunner and No. 1. Only by such exercises can the firing personnel develop the versatility which is essential in combat and without which no battery should be considered worthy of taking the field.

While the panoramic sight has definite limitations, it can be used to observe fire and to observe "lead" in the manner set forth above. On the other hand, the French collimator sight has no facilities for observing the target or measuring deviation of shots fired.

The French tried using their 75's equipped with this obsolete mechanism against the German tank brigades. Some of the details have been supplied to me by a young French officer just arrived in this country. He was captured, escaped and then fought continually until hostilities were officially terminated by the Armistice on June 25th. In fact, he fought for two whole days after the Armistice. According to him the collimator sight was so inadequate that it was useless to open fire against individual tanks until they were within 500 yards. Then it was simply a matter of load-fire, load-fire until the duel was decided one way or the other.

Instead of attempting to use the panoramic sight, let alone the collimators left over from the last war, it would be better perhaps to design a telescopic sight for the express purpose of direct fire.* Such an instrument would be in essence not much more than an ordinary telescope, inscribed with a horizontally graduated scale, and mounted so that it could be readily inserted in the present sight socket at the command *Tank action*.

Admittedly this latter suggestion is subject to the exactitudes of production schedules within a branch of industry that is already overburdened. On the other hand there are no factory priorities interfering with the development and establishment as standard practice of improved methods of conducting direct fire. The system above advanced was worked out "on paper" and undoubtedly could be modified and greatly improved by practical experimentation.

In addition to conduct of fire there are other aspects of defense against mechanized attack which the American officer, even a reserve officer, should be learning something about. The French artilleryman quoted above stated that the most effective method of protecting gun positions proved to be land mines. The need of some protection in addition to the fire power of the guns themselves is easily understood when one correlates the relationship of tank speed to the artillery's effective range and rate of fire. Yet how many of us have ever seen a land mine?

Tactical use of new but essential weapons was developed by the Allied armies last summer under the cruel exigencies of survival on the field of battle. For instance, the successful British evacuation of Dunkerque is said to have resulted in large degree from the use of mines. Not specially designed land mines of which the English had pitifully few, but naval mines which they rigged up and planted, not in the stormy waters of the North Sea, but in the fields and roads behind the retreating infantry.

The British and French learned the hard way, and for one at least, too late to save the country. These lessons are now available to us. They have been digested and applied to the design of new weapons—weapons which will not be available for many, many months. But is there any reason why such lessons, where they obviously suggest a modification or revision of our fundamental training, should not be the basis of study by every American officer, Regular or Reserve?

The method of direct fire against tanks here presented is offered with no conviction that it represents a final answer to the problem, but with the hope that it will stimulate thought and experimentation on this extremely important subject and lead to the modernization of certain of our now patently obsolete doctrines and regulations.

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The ideas on direct fire set forth above were originated before the Field Artillery Field Manual FM6-55 was available. This book calls for the use of the sight reticule scale for measuring lead. It does not, however, present any detailed instructions on the subject nor does it give this phase of artillery fire the emphasis that recent military developments have shown it to warrant.

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*New sights have been designed for the 75-mm. gun, as well as for other weapons, which will obviate all the difficulties mentioned by the author, and will greatly facilitate direct fire at moving targets. Of course, as the author points out, such sights are not yet available in quantity.—Editor.

MEN IN ARMOR

British tanks in France.

PART I

ACCOUNT BY 2D LIEUT. V. D. C. YORK OF AN ACTION AT THE BRIDGEHEAD OF COURCELLES (from *The Tank*, October, 1940).

On the afternoon of the 8th June, 1940, the Battalion crossed the River Seine between Courcelles and Gaillon.

At about midnight orders were received from Battalion Headquarters to the effect that Capt. Carey-Thomas and three tanks of B Squadron would proceed to the Courcelles bridgehead and would hold it, at all costs, until it was either blown up by the French or until he was relieved. One scout car and the B Squadron liaison agent were attached to this force for the purpose of reconnaissance and to facilitate inter-communication between the French and ourselves.

It was anticipated that the Germans would attack and attempt to force a crossing at dawn on the following day (9th June) and, with this fact in view, Captain Carey-Thomas and his composite Troop, consisting of one Cruiser Mk. I and two Cruisers Mk. III, was ordered to be in position on the bridge by 3 AM.

At 12:50 AM Captain Carey-Thomas ordered his force to advance, but having gone only some 500 yards toward Gaillon the A Squadron Cruiser (commanded by Sgt. Urry) became a casualty due to a mechanical breakdown. The road from Gaillon village to the bridge itself was blocked by every conceivable type of vehicle—refugee carts, cars and lorries, French Army lorries and French troops, who were retreating over the Seine. Our drivers, already tired out, performed the seemingly impossible as they wound in and out of this struggling, mobile mass.

We arrived at the bridgehead at about 2:45 AM and, after getting the tanks under cover from the air, Captain Carey-Thomas and myself went forward to liase with the French officer in charge of the demolition party and bridge defenses. This officer was a lieutenant in the artillery. He had under his command one 75-mm. field gun (later reinforced by another one of the same caliber), one 47-mm. A/T gun, and a battery of dual purpose light A.A.-A/T guns. The 75-mm. was dug in extremely well on the bridge itself, covering the approaches to it from the northern bank, while the A/T gun enfiladed the bridge and its approaches from an excellent position on the right of the bridge. The A.A. battery was split in half—three guns being mounted immediately right of the bridge and three more situated about three-quarter mile back toward Gaillon in a field on the left of the road.

The French officer asked Capt. Carey-Thomas to get into a position from which he could cover the bridgehead and support the detachment there.

We made our way back to the tanks through the mass of refugees that was still pouring over the river, and Captain Carey-Thomas gave his orders. I was to take my tank, a Cruiser Mk. III, forward to a line of trees some 500 yards behind the bridge on the right of the road, and to cover and support the French position. He himself was going to take up a position on the same side of the road about 400 yards behind me, from whence he could support us. Both tanks were in position at 3 AM.

Now began a long period of waiting for a dawn attack which never materialized.

The road from Gaillon to Courcelles was almost dead straight and there was little or no cover on either side, with the exception of the two belts of trees in which we had our positions. Some 400 yards in front of the forward belt of trees a railway line ran parallel to the river, and in front of this a row of houses flanked the road almost up to the river and on either side of the bridge. It was in the last of these houses on the right that the French officer had his H.Q. Between the railway line and the line of the river, flanking the road, were two deserted factory buildings. All around, on our bank, the ground was very flat and featureless and fairly boggy within 50 yards of the Seine. On the opposite

bank a cluster of houses around the bridge marked Courcelles itself, while a densely-wooded ridge above entirely commanded our positions. To the right of the ridge a line of about six or seven houses stretched away, ending in a lone flagpole.

The morning passed slowly and we found time to wash and shave, and also to eat some stew from the container that we had brought with us. This worked wonders, and we eventually managed to get a few moments of sleep by working a system of reliefs on the gun and in the driver's seat. The men, though nearly worn out after three days and nights on the move, were in the best of form and determined to stop "Jerry."

By 1 o'clock our number had increased by four, for some lost and weary British soldiers had been gathered together by Captain Carey-Thomas. About this time Captain Carey-Thomas and I went forward to the bridge to find out from the French what news they had of the enemy advance. While we were talking to the lieutenant, orders arrived by land line for him to close the bridge to all traffic. This made us much happier, for it meant we could sight our guns to defend the obstacle without the fear of having to fire into the mass of refugees should the enemy attack. But, for an hour after this order, the line of people was still moving along the road—faster now, for we had been bombed twice that morning, and the enemy's forward elements were reported to be only seven kilometers away.

At 3.05 PM an enemy armored car pushed its way boldly up to the bridgehead and was promptly put out of action by the "75" on the bridge. A volunteer picquet of six artillerymen armed with rifles, which had been posted on the northern side of the bridge and whose task it was to spot and report any advance by forward elements, sent back a message to say that they had seen some enemy tanks advancing towards them. At 3.15 PM the bridge was blown, and this picquet (their numbers now reduced to four) volunteered to remain on the German side until they could hold out no longer, when they would attempt to swim back to us across the Seine. This gallant little band was not seen again.

As soon as the bridge was blown the French officer in charge signalled us up to him. On reaching his rendezvous he told us that, as far as he knew, the Germans had established some machine gun posts on the left and right of the bridge itself—both in Courcelles and on the wooded ridge above it. He told us also that some infantry had swum across the river and were endeavoring to work round his flanks under cover of the factory buildings. This very gallant officer, armed only with his revolver, directed operations from a most exposed position on the river bank throughout the action.

Captain Carey-Thomas made up his plan rapidly. As the enemy appeared to be established on both sides of the bridge, we were to adopt independent tactics—he would take the right and I the left.

The enemy infantry that had got across to our side of the river were by now round on each flank—they did not apparently expect us, for they were not making a great attempt to conceal themselves. Machine-gun fire from Capt. Carey-Thomas's tank quickly mopped them up. While this was going on his tank had been moving off the road to the right and getting into a position by the French H.Q. As the nose of the tank swung to face the bridge again Capt. Carey-Thomas saw an enemy light tank in a stationary position on the bridge. Its crew were dismounted and apparently making an inspection of the damage done to the culverts, etc., of the bridge. This tank he put out of action with one round of two-pounder; he machine-gunned the crew, and then destroyed the tank with another round of two-pounder. Immediately after dealing with this tank he spotted another one (medium or heavy) approaching the bridge from among the trees which lined the road. Three two-pounder shells hit it like a machine gun and the crew tried to get out, but were dealt with.

In the meantime my tank had advanced up the road towards the edge of the break in the bridge and, having got within 50 feet of it, had been fired on by a heavy machine gun, which appeared to be in position in a house on the left of the road across the break. The gunner silenced this with three bursts from his co-ax gun, and almost immediately afterwards another heavy machine gun opened up on the troop commander from the region of the flagpole on the ridge above. He replied to this with all three machine guns; my tank reserved fire until it could also bring fire to bear on this target, and supported him until the machine gun sheered its recoil pin and jammed. While the loader tried to repair this and improvise a pin I ran into a field on the left of the bridge and endeavored to pick up another target. It was not long before we found one. Moving from left to right across our front and apparently seeking cover in the trees that flanked the shore there appeared what was probably the other half of the enemy section of tanks—a medium (or heavy) and a light. The gunner took the big one first and hit it with five two-pounder shells—no one got out of it. One more two-pounder stopped the light and two more finished the job completely. Again we were fired on by a machine gun from among the trees. As my co-ax was out of action I could only use the Q.F. gun, and the first shell fell slightly left and short. An anxious few minutes followed, for we got three shells in quick succession which would not allow the breech mechanism to close, owing to slight enlargement of the cartridge cases. As the loader was getting rid of these, machine-gun fire from our right rear made me look sharply round, and I saw that our scout car had come up from the rear and was supporting us with his Bren gun. The gunner, who was a trooper in a cavalry regiment, was one of the worn-out men we had gathered around us that morning. Despite his condition he kept the gun going all the time—raking the factory building in front and mopping up the remaining

Germans on our side. A good round was now in the breech of the two-pounder and this time the gunner was dead on. Three shells completely silenced the machine-gun nest and three more demolished one side of the factory wall.

The enemy had now opened up on Capt. Carey-Thomas with HE from a mortar. He put the mortar out of action with a round of two-pounder and then his hull guns settled the matter.

We on the left were suddenly subjected to this fire as well, but, in addition, the Germans had got either a field gun or an infantry gun somewhere on the heights above us and were searching for us with that also. Running to and from the bridge to the far side of the field, we plastered the mortar and put it out of action, but during this shoot the boggy ground caused the near-side track to run half off the sprocket, so it was travelling round a portion of the final drive box. The driver, by very fine driving, kept the tank going throughout the whole rest of the action. The infantry gun was still shelling us, and so, moving very slowly and cautiously, we went back towards the road. I told the gunner to put maximum range on his drum and to rake the top of the ridge with his two-pounder. This he did, and after the seventh shot that gun stopped firing, so we put another five shells into the same place, and as he did not open again we ran straight back onto the road in time to see Capt. Carey-Thomas completely smothering another heavy machine-gun post, which had opened up on him. While he was doing this I demolished the wall of a suspicious-looking house in Courcelles which the French said held an A/T rifle.

After this last salvo quiet reigned everywhere, and the French officer led some of his spare numbers down to the river banks to reconnoiter. He came back to say that the enemy appeared to have withdrawn from the bridgehead completely, and that he was now going to try to reorganize his own defenses and await reinforcements. So, down to the last of our ammunition and with repairs to be carried out, we went back to the nearest of our two original positions.

At about 6 PM we withdrew to try and find the battalion and rejoin it.

During the action both tanks were hit by heavy machine-gun (and it is thought) A/T rifle fire, but no ill effects were observed on the armor.

PART II

DEVELOPMENT OF THE GERMAN PANZER FORCE.*

In the 100,000-man army, the Panzer force, one of our latest weapons, was represented only by antitank units. The edict of Versailles denied us not only heavy artillery and airplanes, but also tanks. It was in the days when for training purposes with our antitank troops, the momentum of an armored attack had to be simulated with the aid of contraptions made of tin and cardboard mounted on the chassis of small Dixie passenger motor cars. At the same time, however, a nucleus of officers and men came into existence amidst the motor units of the national defense, which was being developed for the day of regained military supremacy. Most likely none of the men who at that time did their best at a labor which, in the nature of things, must have seemed to them mere childish play, foresaw that as early as 1935 a feverish construction of the new Panzer arm would commence, and the practicable utility of the weapon would be appreciated.

The difficulties attending its construction were greater than those for other arms. While for these latter any number of experiences existed and sufficient experienced officers were available, these factors were almost entirely absent when it came to creating formations of armored fighting vehicles. Including captured English tanks, at the most 45 armored vehicles were serviceable during the World War. In the meantime, the tank of the World War, ponderous, slow, and capable of traveling but short distances, had developed into a Panzer combat vehicle, adaptable to every sort of terrain and adequate for extended distances. It was really an advantage not to have been encumbered with obsolete vehicles, but to be able to construct modern combat cars from the very beginning. Inasmuch as it was imperative that we have on hand immediately an enormous number of such combat vehicles, it followed that the new force be promptly supplied with a light 2-man tank, equipped with two machine guns.

The First Tanks. At the very beginning both the army and the armament industry had to accumulate experience. Considering the fact that the automobile industry for the production of a new model passenger car, from the moment it appears on the drawing board of a designer until the delivery of the finished car to the customer, requires at least 2 years; considering further that the development of a new weapon takes about 4 years, it is readily appreciated what labors are involved in the construction of armored fighting vehicles. It so happened that the bold venture was favored by fortune, and the first new vehicle was definitely (by test) found to be a useful expedient for war. Mass production got under way promptly and in a short time a considerable number of light Panzers were on hand. The advantageous experiences derived from these were immediately made use of in the construction of heavier tanks armed with field pieces. They made their first appearance in the parade in honor of the Fuehrer's birthday in 1937. Thus and to the amazement of technical circles, the German armament industry had proven its production capabilities.

In the same speedy tempo the development of Panzer troops progressed. Hardly had the first nucleus for instruction in motorization come into existence, and had gone through a short practical summer course, when the new Arm was divided into fundamental units for the

*From *Deutsche Kavallerte-Zeitung*.

organization of two new regiments, which later were filled by quotas from the recruits enrolled that fall. These, in turn, produced new nuclei for additional organizations. In that manner it was possible to bring into being, in step with available materiel, a large contingent of Panzer troops, and in but a few years. Thus our army leadership obtained an extraordinary means of decisive import in battle.

Building Antitank Units. Since France and her allies, then including Czechoslovakia, possessed a large number of tanks, it behooved that, with the recovery of military supremacy, our antitank defense be strengthened as rapidly as possible. In this respect we had an undeniable advantage. Since we had no tanks, our neighbors allowed their antitank defense to lag, while we naturally gave special attention in that direction and had developed not only a superior antitank weapon, but also the personnel to serve it. Consequently, the foundation for new organizations had been laid. Besides, viewed from a manufacturing standpoint, the mass production of antitank cannon is much easier than the construction of tanks. Nor does the training of the serving personnel encounter the difficulties as with Panzer combat wagons. Consequently new antitank organizations were raised in short order. They can cover every threatened point in no time and frustrate the enemy's armored attack. The cannon are comparatively small and light. They can be uncoupled in a few seconds from the trucks carrying the personnel, and put into battery. The position is well camouflaged so that the enemy's tanks, with vision limited because observation slits are closed in action, can recognize their most dangerous opponent only with difficulty and at the last moment.

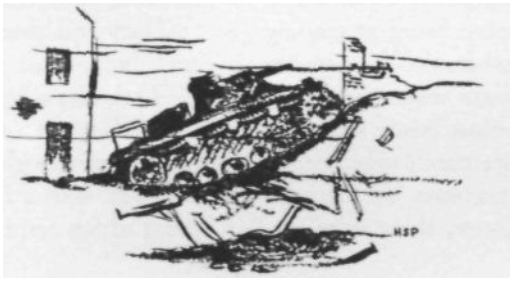
The power of the modern antitank defense compelled consideration as to whether the employment of tanks was still as feasible as during the World War (when, after artillery preparation, they broke through German positions). Promise of success was generally accepted, especially when tanks were used in combination with other arms. According to the French school, having in mind experiences gained in the World War, the paramount duty of tanks is to support advancing infantry. On the other hand, the English school considered the Panzers the means to conserve man power—especially precious to England—and as independent operating motorized units to strike the opponent in the flank, and if possible, in the rear. The propaganda for a completely motorized though small shock army was most likely based (for the British) at the beginning on the wish that in eventual cooperation in a war on the mainland more materiel than manpower was to be called for.

From the very start we considered the Panzer force a weapon, which, with its powerful fire effect, in combination with its normal protection, its high speed and mobility, is superior to all the others, if and when utilized in masses and in critical situations, so as to force a speedy decision.

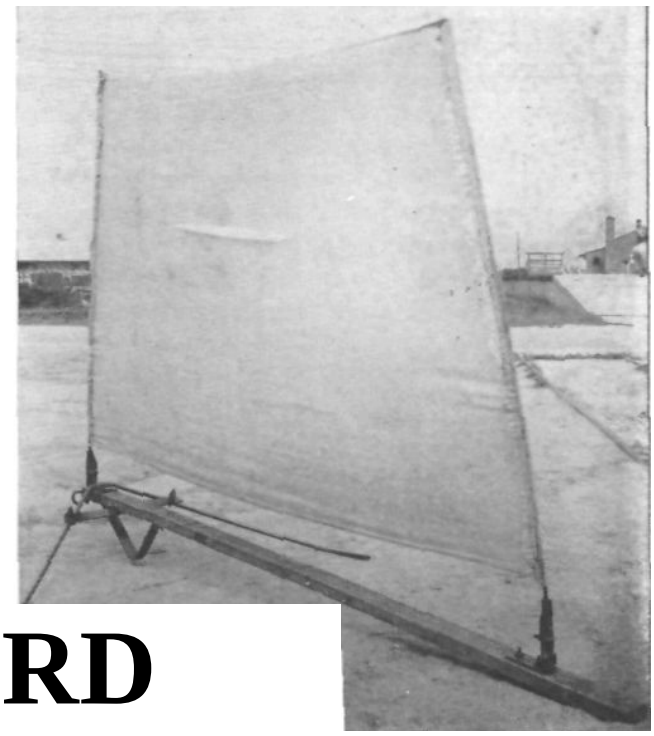
Experiences in Poland. The Polish campaign proved the correctness of this conviction most strikingly. Although Polish tanks and antitank units were never mentioned, which is apt to lead the layman to the erroneous conclusion that the Polish Army was insufficiently equipped, nevertheless, our German Panzer divisions can lay claim to a substantial part of the final results. For that reason they were cited expressly in army reports. The Polish failure (so far as armored units is concerned) rests upon the fact that the Poles never resorted to mass attacks; their efforts in individual actions were ineffective. Furthermore, the Poles did not anticipate any such irresistible thrusts by our Panzer forces, and they relied upon the difficult terrain (poor roads, deep sand, mud, marshes, etc.) to impede our advance. The Panzer divisions, however, struck and gripped the flanks of the Polish Army like the claws of tongs, promptly broke up every resistance by attacking in mass formations, and rushed on like an avalanche thrust deeper and deeper into the very rear of the opponent, so that in some instances they were ahead of their own infantry as much as 100 kilometers. In this manner, not only were the rear forces of the Poles, already disturbed by air attacks, disrupted, but they were also pinned to the ground; blood sacrifices by our infantry were prevented. Without our Panzer forces, the rapid and complete encirclement of the Poles and the destruction of their army in such an unparalleled short time would have been incredible.

Thus the Panzer forces had proven (prior to the attack in the West) that both the leadership as well as the systematic development of the Panzer personnel, in spite of but brief schooling periods, had met every wartime demand; also that they were imbued with an impetuous determination to defeat the enemy and to pursue him to destruction, without allowing themselves even a moment's rest. Furthermore, the materiel itself had stood the grueling test most efficiently.

The Panzer forces, most efficiently equipped and proven in battle, stood beside the older arms of the service, ready for the decisive conclusion which was soon to come.



By Lt. Col. J. H. Woodberry, O. D.



THE LIZZARD

"Leggo my leg!" the Princess shouted, who from behind the closed doors had scarcely been heard to utter a sound.

So goes the opening sentence of the essay of a school boy who wanted his story to command attention; but I am using the expression to open my story in a realistic sense, because I want to lessen the periodic leg pulling that so often comes to Post Ordnance Officers and others who have to deal with towed targets. The Artillery, Cavalry, and Infantry have all participated in this form of exercise, and from things read and heard, it seems chronic. The latest of these figurative manipulations came our way just the other day, here at Fort Bragg, in connection with the Field Artillery Board test of our new M2A2E2—75-mm. field gun, and out of the circumstances attending that test has come what may prove to be less leg pulling probability. So I'm telling the story.

It came about this way: An envoy from the Board, who has a passion for anonymity, rushed to the Ordnance Shop a few days ago and said, "Friends, we've got to shoot this gun (M2A2E2) at a moving target—pronto! The M2 target is not out yet; all our sled targets look like dive bombers have been working on them; and the Chief is coming Tuesday to see the test."

This sounded just like echoes of former days of mellow memory at Fort Bliss, Fort Crook, Fort McKinley and other places where announcements pertaining to moving targets presaged a period of great activity, swearing, welding, improvisation and prayerful uncertainty. On hearing this pronouncement, the Technical Sergeant in charge of the shop oozed out a groan. I just moaned. Shades of repairing again those heavy old drag scows out on the junk pile; and of the sporadic starts, shots, stops, and waiting which were to follow, loomed melancholily; and a creeping on of that familiar sinking sensation which attends every test where moving targets are involved blanketed the air. The sergeant's wilted condition showed plainly that he had glimpsed the apparition. There is nothing that the sergeant hates so much as to have the Chief come to see some firing at moving targets when he knows too well that in the first run or so the mechanics must be called into action, and that great periods of anxious inactivity must ensue while the boys attempt to weld up or otherwise patch together the mangled parts of sleds which the accuracy of the gunner have scattered asunder. Of course, there were several sleds on hand which could be repaired; but repair in itself was a job—a real job, and what would follow was all too well known. The fact that these lumbering portable bridge-like structures had to be hauled out to the range, requiring the services of many men and several trucks, did not bother him. That was a job for the Artillery. He cringed, however, under the knowledge of the guilty feeling of embarrassment which was sure to ensue with each period of fretful waiting resulting from damage to the cumbersome trusses of the heavy sleds. Besides, the Chief was coming, and that was something. As the sergeant shifted to his other foot, it was observed that his face showed signs of mumbling funny words.

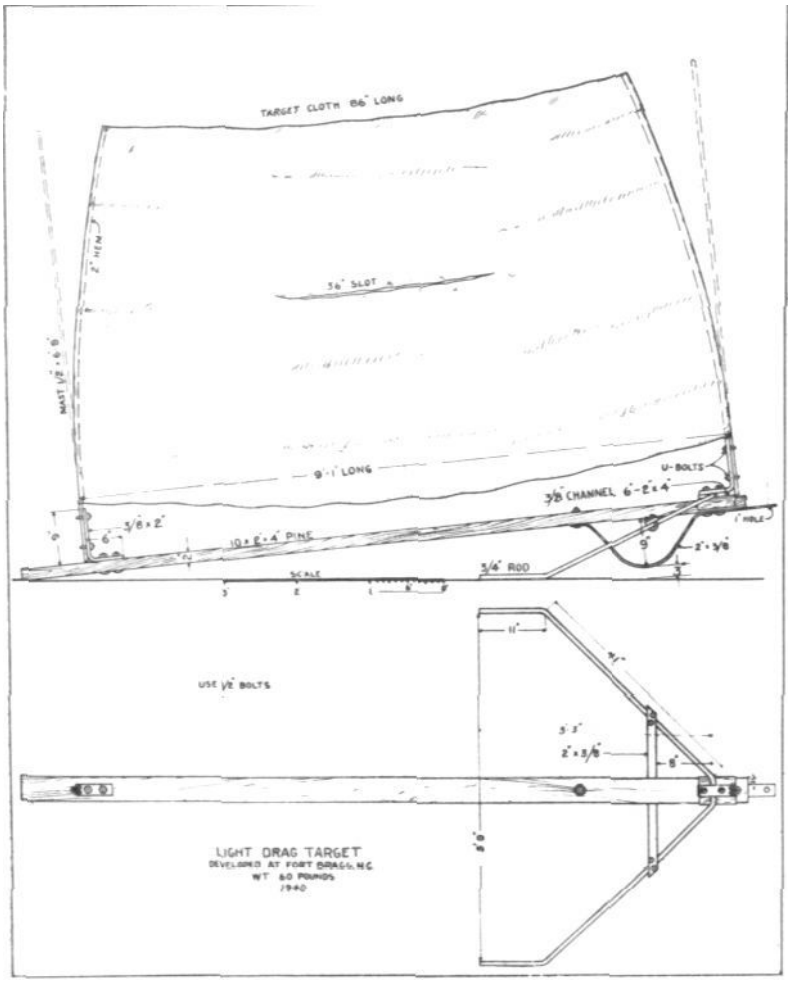
After the passionately anonymous officer had departed, I says to the sergeant, "Sergeant,"—or maybe he says to me, "What's the solution to this recurrent (*sic*) drag-target problem?"

"I don't know," I says to him, or he says to me. "But with this mechanized force now riding the waves, the matter of shooting at moving targets is going to be something for the Artillery, Cavalry, and the Doughs to lose sleep over, and if some simple, light, easily reparable moving target is not devised, and that soon, there will be some mournful tunes."

Then and there the sergeant went into a conference with himself.

"Let's draw up the Military Characteristics," says I.

"Let's make a sled first," says he; "one that a man can drag around with a string; one that can be concocted by anybody with a hammer, a drill and an anvil; one with parts which can be yanked off or hooked on in a couple



of minutes; one that will ride through brush, over stumps, and around trees with ease. In short, let's make a light, simple, screwed together affair and put a target on it."

"Fine," I encouraged, "let's start."

"A 2 × 4 with a couple of masts on it," extended the sergeant, not giving a hoot about Military Characteristics, "is all you need if you can keep the thing right side up; and if you can't get a 2 × 4, then a sapling or a piece of gas pipe will do. Put some iron out-riggers on one end of the scantling like them Hawaiian boats, and let the tail drag where it will. The stumps, stones, brush and rough going will mean nothing, for a rig like that will bounce off or run straddle of 'em. Put her together with bolts, all the same size, and when those Artillerymen take her out, give them a wrench and handful of parts and let 'em go. When the old cannon musses her up, those lads will take pride in seeing how fast they can put her together again, and by the time the gunners are through congratulating themselves on their lucky shot, the lizzard will be up and in tow again. That's it, a lizzard—just like a lizzard! Who ever saw a lizzard get turned over?"

The boys got busy in the shop and in the time that it would have taken to have fixed up one of those drag scows out on the junk pile for the shoot, parts for six new complete drags with extra target cloths were made and ready. On the day of the test, two were assembled and carried with ease in a truck, for they weighed just 60 pounds each, and extra parts in plentiful quantity were taken on the floor of the truck.

When the test came and the Chief was there, those gunners were the luckiest mortals you have ever seen shoot a piece of artillery. They just shot the cloth full of holes and the lizzard, too; but when a mast went down, as several did, or a 2 × 4 splintered, there was so little time lost in repairing the drag it just didn't seem natural. The sergeant's face had a grin on it like a bull with a mouth full of gympsum weed burrs.

Herewith is a photograph of the lizzard like the sergeant made, and some drawings which show the idea.

Now, the Field Artillery Board has written a letter about this target, sending photographs and sketches to Washington, and something may come of it later; but on account of the apparent existing urgent need for moving targets by Artillerymen and machine-gunners, and the ease with which these light targets may be improvised by troops if they get in a hurry to shoot, the above drawings are shown in sufficient detail to enable anyone to construct some of these rigs for local use. That foot under the nose of the drag should be two or three inches off the ground. Its main purpose is to hold the weight of a man should he stand on the drag while threading the target cloth onto the mast. This protects the out-riggers against bending. The out-riggers, by the way, should not be made of stock more than ¾ inches in diameter. Keep them springy and light.

While witnessing the test referred to above, one of the gunners was heard to remark that he would love to see a half dozen of the rigs tied to the cable with lariats, one behind the other. It would be fun, he said, to watch No. 1 Cannoneer level off at No. 3 target while the gunner draws a bead on No. 5 target. Of course, no gunner and his No. 1 would ever be so uncoordinated in action as to lay on different targets, but it is said that in battle, individual tanks may not attack alone. In fact, there may be a field full of them at one time and if so, a little practice, ahead of time, at multiple targets wouldn't hurt. The rope idea, whether used with multiple targets or not, sounds good. If there is inserted between the target and the cable, a length of rope, the chances of damaging the cable will be materially reduced.

Well, that's the story and if any blacksmith who attempts to improvise one of the above targets runs into difficulty, he can get further information, and maybe some help, by writing directly to the Field Artillery Board at Fort Bragg.

MAPS *From an*

By Major Thomas North, FA

★ ★ ★ ★

Any discussion of the subject of maps as they concern the Field Artillery should be prefaced by a few remarks on the allied subject of observation. It is axiomatic that field artillery fire is observed whenever possible. No artilleryman denies it, but it is here set down in black and white to forestall any possible hint, any possible implication, that the possession of a map may of itself dispense with observation *if it can be found*. The great increase in our radio equipment has appreciably augmented the potentialities of forward observation and air-ground liaison. Nevertheless, a large proportion of those who have taken part in the large-scale maneuvers of the past two years will recall the frequent impossibility of obtaining observation, either from an OP or through forward observers, while air observation seems to have been just something mentioned in a book. Yet the artillery was expected to chase across the flat landscape, blind to what lay ahead (this was the forest's prime evil), to find and to occupy positions, and to deliver supporting fires on call.

Every field artilleryman wishes to know the status of the mapping project in the United States: what kinds of maps are available, how much of the country has been mapped and photographed from the air, and what improvements have been made in the technique of photogrammetry and lithography. We have therefore requested of an officer who has been intimately concerned in this matter for many years that he prepare for our readers a resume of the whole question, including a discussion of mapping and aerial photography to meet the needs of the Field Artillery both in our own and possible enemy territory. We are pleased to present it here. The inserts to this issue of the JOURNAL *pertain to this article; they provide the reader with an easy comparison between the types of photomaps produced four years ago and those which it is possible to reproduce today provided good "copy" is furnished the reproducing agency.*

One third of a war is spent in darkness, in morning mists, and fog. The enemy gravitates towards defilade. Denied observation, ground or air, map firing becomes our inescapable alternative — not from choice, indeed, but because of our hobby of accomplishing our mission.

Although a basic tool of the soldier, the map receives surprisingly small consideration; rather, it is taken for granted. To the field artilleryman the term "tool" is inadequate, for the map is, to him, an essential instrument. This, surely, is one outstanding lesson of the maneuvers of recent years. It is rare that on any two occasions maps or photomaps have been issued which resembled each other in nature, appearance or accuracy. Occasions have been equally rare in which any maps or photomaps which were really suitable for the needs of the field artillery have been available. Possibly the fault is ours; possibly we have not been sufficiently emphatic in voicing our needs; possibly our demands may not have been sufficiently definite.

Here is a quotation from an article in the November-December, 1940, issue of a Service journal reporting the impressions of an observer of the First Army maneuvers during August:

> Map supply for both the Blue and Black forces was very effectively handled by the Engineer, —— Army. Maps furnished were of excellent quality, *of suitable type*, and the supply was ample. The principal maps furnished were the following: *a*. a strategic map, scale 1:500,000 published by the Engineer Reproduction Plant; *b*. a special map of the maneuver area in two sheets, scale 1:62,500, of similar appearance to the United States Geological Survey quadrangle sheets, except for the larger size used; *c*. a set of 13 photo maps, scale 1:20,000, covering that part of the maneuver area over which operations could be expected. *In all probability map supply was better than could be expected in war*.

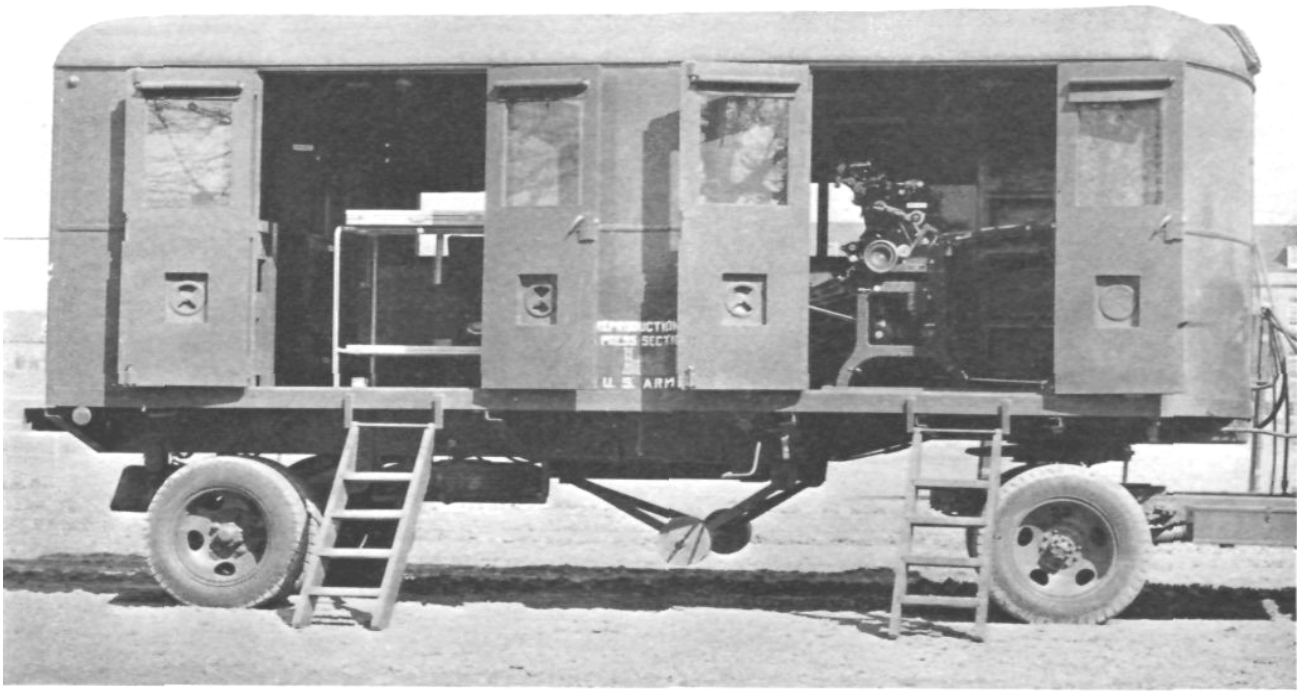
The italics are ours. They mark two statements which any field artilleryman may reasonably challenge. Why? Let's examine these three maps:

a. Was a strategic map, about 8 miles to the inch, compiled from other existing maps, of little more use to the battery and battalion than a gas-station road map.

b. Was a topographic map, about 1 inch to the mile. This is a splendid map for the division commander, if it is not too out-of-date.

c. Was a mosaic, scale 1:20,000, laid with little or no control, reproduced by halftone with a 120-line screen

Artilleryman's Viewpoint



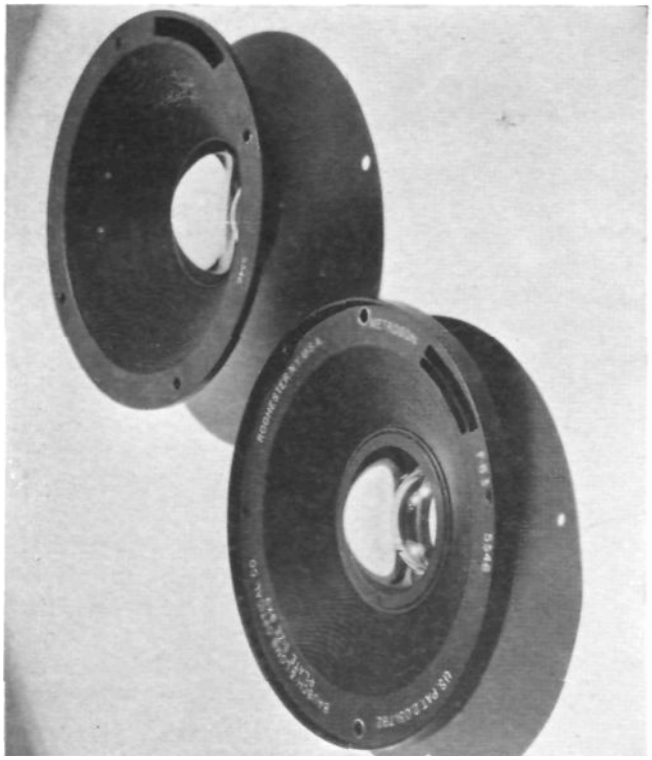
Plates courtesy "The Military Engineer"

Views of the Army's new mobile map reproduction plant. Corps equipment. For hasty reproduction of large-scale air photos, and of maps up to 17 inches by 19 inches.

(i.e., using a reading glass you find that the detail is represented by variations in a mass of dots spaced 120 to the lineal inch; taking 3 dots as the smallest group which can indicate identifiable detail—and this is open to question—the smallest identifiable object on such a mosaic is 42 feet long, provided that the mosaic is otherwise clearly readable). Not a shot was fired in anger, else the field artillery (and possibly the supported infantry!) would have roundly questioned whether or not this mosaic was "of suitable type."

The statement that this map supply in all probability was better than could be expected in war can hardly be serious. But it does indicate that there is still need for a loud and concerted clamor by the Field Artillery for the types of maps which we need, to the end that our requirements may be universally recognized, accepted, and met.

Since the picture with respect to maps and photomaps is constantly changing, it may be helpful to review the subject in its present state of development and to appraise the respective virtues of the various types which it is *technically* possible to produce under the conditions peculiar to our own military situation.



Courtesy of Fairchild Aviation Corporation

The Bausch and Lomb wide-angle lens

Map Accuracy. To most people a map is a compilation, in readable form, of the general information necessary to give them the lay of the land ("to orient ones-self") or to go from hither to yon. But, it is repeated, to artillerymen it is also an instrument, an accessory in the computation of firing data. At times the importance of the map as a fire-control accessory becomes paramount. It is this need, peculiar to the field artillery, which has inspired our persistent demand for suitable maps. To the artilleryman the map has thus two major and distinct uses, viz,

a. As a fire-control instrument.
b. As a means of visualizing terrain for movements, reconnaissance, selection of position, planning operations.

For brevity the two major uses may be referred to as fire control and tactical; the inadequacy of these terms is admitted, but this is not an etymological thesis. Obviously there is less need for a high order of accuracy in the map from the standpoint of its tactical use; but precision is essential in the fire-control map.

Field artillery map-firing was the artillery contribution to the First World War methods of obtaining surprise; until 1917 all major attacks had been betrayed by the registering of the artillery. Upon its arrival in France the American Army learned and practiced the art with the aid of the French Plan Directeur — a 1/20,000 contoured map which is generally credited with a high order of accuracy; horizontal errors of from 20 to 40 yards have been detected, but the relative errors between gun and targets were probably less. Following the World War, field artillery (and infantry) training was continued through the use of the 1/20,000 terrain map; this was the product of expensive and laborious ground methods such as would obviously be impracticable in large maneuver areas or in any theater of operations in the world save where this type of map already exists in Western Europe.

This was realized quite early by most of those who gave thought to the problem, and in 1933 it was recognized by a change in Army Regulations which pointed out that the 1/20,000 contoured terrain map was a luxury which should no longer be contemplated, even in training. But outlawing the map did not relieve the field artillery from its responsibility of furnishing fire support, nor was there any particular prospect of obtaining appreciably greater effective observation of the target area. Naturally enough, the Field Artillery demanded a substitute for its 1/20,000 map.

Role of Aerial Photography. There were ten thousand officers in the Army, and, since all have some ideas about maps, probably ten thousand different suggestions could have been obtained. But it is a safe guess that these suggestions would have been unanimous in pointing to aerial photography as the one means by which the various solutions could be accomplished.

Broadly speaking, aerial photography may be exploited in two forms, viz, as reproductions of aerial photographs in some of their many forms and combinations (single verticals, mosaics, etc.), or as graphic maps derived from airphotos by photogrammetric methods.

Terminology. In any treatment of the subject of aerial photography in its relation to maps it soon becomes evident that there is need for the standardization of its terminology. Without such standardization it is impossible

to convey a coherent thought without a tedious trail of parentheses and qualifying phrases. One term we could well be rid of is "map substitute"; the term "map" can properly embrace all forms of the representation of the earth's surface, irrespective of the manner of production, reproduction or accuracy. Until recent years its appropriateness was undisputed, whether it referred to contoured maps made by the Geological Survey, the maps in your atlas, the gasoline companys' road map, the pseudo-medieval map from the Antique Shoppe, or that effort of yours with the plane table. As a step toward better comprehension, let us systematize the terminology in this manner:

MAPS

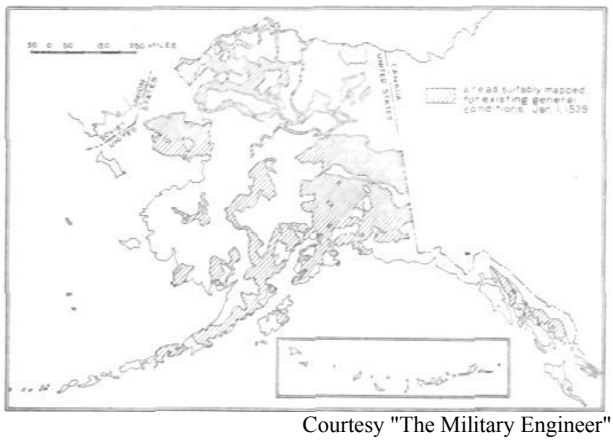
are divided into two broad classifications:

MAPS*	PHOTOMAPS
which, for more specific differentiation, may be called graphic maps. The term includes topographic maps, planimetric maps, battle maps, road maps, etc. All are the product of the draftsman's pen.	which, for greater precision in discussion may be differentiated as airphotos (verticals, composites) and mosaics (uncontrolled, controlled, strip). All are the product of the camera or reproductions thereof.

*Objectors to this generic and specific use of the word "maps" are referred to use of the word "gun" colloquially to mean any firearm, and specifically to mean a long-barrelled piece of ordnance; or to the use of "man" to mean both men and women. Confusion rarely results.

The Old Way. By the old-fashioned method of map making it was first necessary to start from an accurate control, carry this to the area to be mapped, and intensify the control network therein. Upon this network the surveyor built up his map—by measurement in the case of critical features, by sketching in the case of less important detail, by guesswork where time and money pressed; contours were usually sketched by interpolation between critical elevations. There was no uniformity in the accuracy of such a map. Its appearance was no criterion of its worth; an inaccurate map may be just as pretty as, or even prettier than, an accurate one. By experience the artilleryman grew chary of measurements which were not based on points which he had reason to believe were fairly accurately located. In theory, at least, he would select a few of these accurately located points, base resections and traverses upon them, and thus build up his firing chart.

The New Way. The newer methods of map-making are more consistently accurate. Given adequate ground control and good aerial photography, it is possible to produce a map, by photogrammetric methods, that is far more accurate than any produced by the old methods of ground surveying. The time and the cost are less. The pictures that serve to extend the control also serve to furnish the detail; hence the accuracy of the maps is, or should be, uniform. The American Society of Photogrammetry has proposed map-accuracy specifications which include the requirement that 95 per cent of all well-defined cultural and drainage features shall be plotted within 1/50 inch at publication scale, and that 85 per cent of all elevations interpolated from contours shall be correct within one-half the contour interval. However, it must be confessed that the limitations imposed by war conditions are a serious handicap. The difficulties of following regular, systematic flight courses in the presence of the enemy are obvious; weather is an important hazard. Add to these the difficulty of finding accurate control in the enemy's territory, and of identifying it on the photographs if it is found. More than passing thought should be given to this matter of CONTROL, which is really of fundamental importance; the more control is available and identifiable, the more accurate is the map. Nevertheless, surprisingly good results can be obtained with a small amount of control and a large amount of skill and training. The Engineers are equipped to produce maps at 1/20,000 scale in entirely unmapped territory, by photogrammetric processes; an essential preliminary is the recovery of existing control or the establishment of new points as far forward as ground parties can operate. There may be some loss of accuracy as compared with the specifications quoted above, but the errors are not necessarily prohibitive. The horsefly in the



Courtesy "The Military Engineer"

Mapping in Alaska
"Suitably" does not necessarily mean "Suitably from the artilleryman's viewpoint."

ointment is the time factor; by the most optimistic estimate the first hundred square miles of 1/20,000 map could not be issued for some days after the photography had been performed. Note that last joker "after the photography."

Practical military-mapping photography requires pictures of wide coverage. These, in general terms, require high-altitude and very painstaking flying. Even if the enemy cannot prevent our photographic airplanes from operating, weather may cause serious delay. A cloudless day is relatively exceptional. While a day may be cloudless to your eye, a bank of clouds may lie fifty miles away—and this is apt to spoil the prospects for a mapping job. From observations made over a period of 37

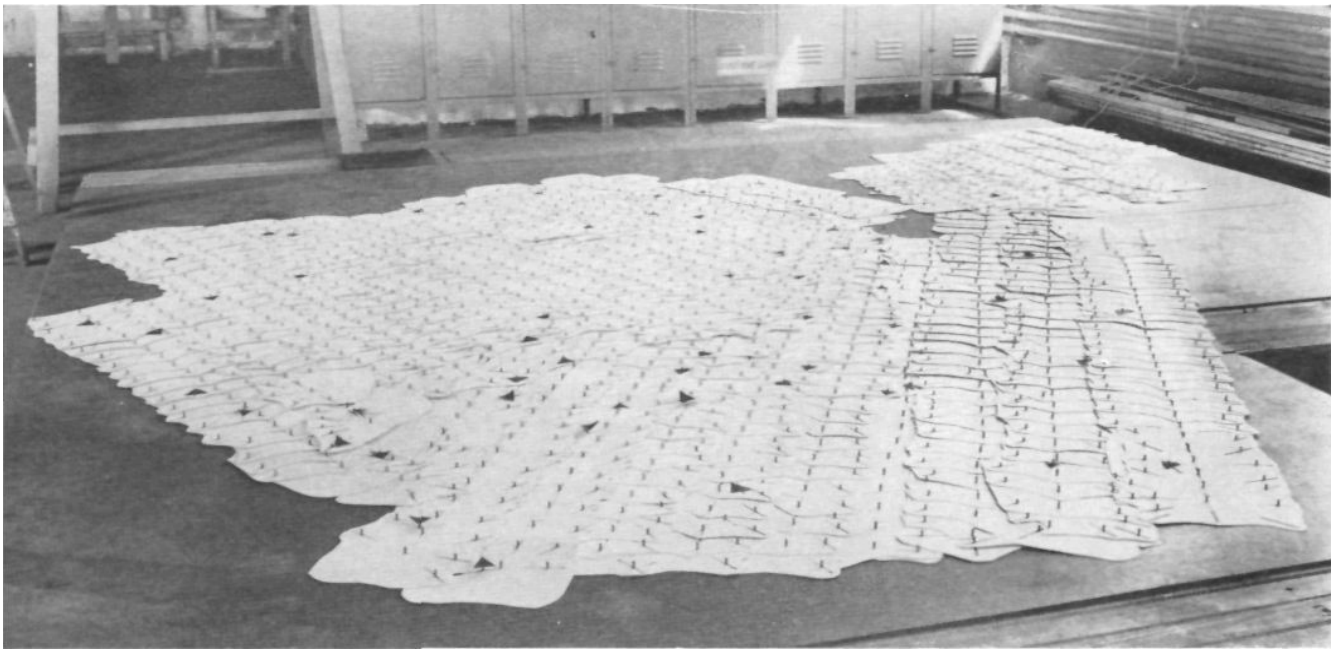


Photo courtesy Fairchild Aviation Corporation

Slot-template method of extending control

years, the U. S. Weather Bureau has found that the average number of cloudless, or almost (0.1 or less) cloudless days per YEAR is as follows (for example):

Albany, N. Y.....	61.4	Galveston, Tex.	78.6
Erie, Pa.	43.6	Santa Fe, N. M.	106.2
Washington, D. C.....	63.8	Los Angeles, Cal.	120.5
Columbia, S. C.....	72.5	Portland, Ore.	54.2

According to commercial experience, two hours per day is the average length of time that an airplane can spend in photography. One more point—the sky may be cloudless, yet smoke or haze can be so dense as to prevent the passage of enough light to the outer regions of the camera field; in the case of the Army multilens mapping cameras, the rays to the edges pass through three times the thickness of atmosphere (with its impurities and haze) as do the rays to the center of the picture. The result, even on a cloudless day, may be poor pictures. In short, days suitable for high-altitude mapping photography are rare.

Weighing these hazards and assuming that the mappers start from scratch, it might well be a matter of weeks before battle maps of a large area could be produced and distributed. At the tempo of war such as has recently visited Europe, or even at the tempo of modern maneuvers, the maps might not catch up with the front until both sides sit down for the winter. If by any chance the photography had been performed well ahead of time, we should have reason to be very grateful.

Precise battle maps of this type are what we want, and what we hope to get ultimately. But in case of delay, how will the Army fare for its maps? The road map, the 1/250,000 compilation of parish maps, the 1/125,000 contoured maps, and even the one-inch-to-one-mile map are not the answer, at least to the field artillery. Some of them may help in reconnaissance; even the better ones are of small account for planning fire support or for the other tactical needs of the minor echelons of the artillery. They are unquestionably inadequate for fire-control. The hastily assembled uncontrolled mosaic is a broken reed; it may happen to be accurate in one area and be badly in error in another. It is no reproach to the field artilleryman that he cannot fire map data corrected with any of these maps. Were it possible to fire live ammunition in the large maneuver areas this would have been demonstrated long since. Where, then, shall we look for relief?

Mapping in Our Own Territory. Fortunately there need be no dearth of practicable expedients. The most accurate and best alternative for the contoured battle map now seems to be the controlled mosaic. Formerly this was held to be an impracticable solution, but technique developed during the past few years has changed the picture considerably. To make the component photographs it is necessary to fly at a constant altitude above the mean ground level (which may vary appreciably though imperceptibly) on parallel courses, making exposures with uniform overlap with respect to each other and with uniform sidelap with respect to adjacent courses. Accurate ground control must be identified. This ground control must then be intensified into a fairly dense network, as in the case of the battle map; it is possible to perform this latter operation largely in the office by graphical (radial-line), mechanical (slotted template), or stereoscopic means—the mechanical is the quickest. Variations in scale due to unavoidable variations in flight altitude are removed by projection printing from the negatives so as to obtain prints at a common

Figure 1. Control network established by Coast and Geodetic Survey.

scale; in rough terrain it is necessary to project parts of the same negative at different scales thereby removing distortions due to relief. Photographs of normal angular coverage lend themselves best to this process. Tilt may also be rectified in the projecting printer. The photographs, thus brought to a uniform scale and common plane, are then fitted to the network of control. The resulting product is as accurate as any map which could be made in campaign and can be turned out far more rapidly and at a fraction of the cost. This particular procedure is one which has been developed and used commercially although military units have not yet had an opportunity to become acquainted with it. These mosaics show far more detail than any map but in one important respect they are inferior to the battle map, viz, in the lack of data as to elevations ("hypsometric data" for short). Recently the Corps of Engineers has done some unusually precise leveling with aneroid barometers. This suggests the possibility of adding some spot elevations to the accessible areas shown on the mosaics; with such mosaics, some overlapping prints (stereo pairs) and a small stereoscope to help in estimating heights between the spot-elevations, the field artillery battalion should be well equipped.

Three essential elements enter into the making of these mosaics—the systematic photography, the availability of the initial ground control, and the time required for their production. Obviously this is no solution for an expeditionary force unless the photographs and basic control are available well in advance (in which case the battle map might be the preferable solution). It is equally obviously a most excellent solution for possible theaters of operation which are accessible to us in peacetime. Although inadequately mapped, our country is covered with a dense network of control established by the U. S. Coast and Geodetic Survey (Fig. 1) and other survey agencies; and about three quarters of its area has been photographed for the Department of Agriculture (Fig. 2). This would seem to offer an excellent means of utilizing work already done as well as the skill and facilities of civilians, thereby freeing the military map makers to train for and deal with the more uncertain conditions of aerial photography and mapping, should the need arise, in theaters to which we at present have no welcome. The Department of Agriculture photographs were not made with lithographic reproduction in mind; usually they are of excellent quality, but even though the reproductions were considerably less than perfect they would be far preferable to the void that at present exists (Fig. 3). If undertaken in plenty of time, the worst portions might be re-photographed; it would be imprudent to await the day of need when weather (as already indicated) or an enemy might emphasize our lost opportunities.

The question may be asked: Why not use this effort and this material to make contoured maps instead of controlled mosaics? The reasons are several—there is not nearly enough of the very expensive stereophotogrammetric equipment needed for contouring (and an accurate mosaic is certainly preferable to a planimetric map); there is a lack of personnel skilled in the operation of these devices; existing photographs were not taken with contoured maps as an objective, hence many have optical characteristics which prevent their use in stereoscopic mapping devices.

On the subject of the mapping of our own country, it is of interest to note that in 1934 a project was prepared by the Board of Surveys and Maps for completing the mapping of the continental United States. This project was to take 10 years and was to cost $117,000,000. Of the area mapped, only about 300,000 square miles was to be published at a scale as large as 1:31,680, which is by no means an ideal scale for fire control. The cost, about $54 per square mile, would far exceed the cost of controlled mosaics; the time required is equally out of proportion.

Mapping in Enemy Territory. The Wide-Angle Photo. What is the most promising solution to the problem of mapping in enemy territory, which is really the general problem which the Army must itself handle? Shortly we can expect deliveries of wide-angle cameras of a new type, which seems to give the right answer. The ordinary 7″ × 9″ airphoto (K3) with which the Army is familiar is taken with a camera lens having an angular coverage of about 51 degrees (12″ focal length) or 71 degrees (8¼″ focal length). The wide-angle camera (T5) has an angular coverage of 92 degrees and a focal length of 6″. Supposing that all three cameras are exposed simultaneously from an altitude of 20,000 feet the respective pictures have these characteristics:

Camera	Scale	Length	Breadth	Area
K3, f = 12″	1:20,000	4,000 yds.	5,000 yds.	7 sq. mi.
K3, f = 8¼″	1:29,000	5,600 yds.	7,250 yds.	13 sq. mi.
T5, f = 6″	1:40,000	10,000 yds.	10,000 yds.	32 sq. mi.

The new camera plainly offers marked advantages over the former single-lens camera. Its coverage is still much less than that of the multilens (T3) cameras which have a field of about 140 degrees. Because of haze and lack of definition the outer regions of T3 photos cannot be reproduced to advantage although they serve for photogrammetric mapping. The characteristics of the central reproducible portion of the multilens composite, taken at 20,000 feet are, roughly:

Camera	Scale	Length	Breadth	Area
T3, f = 6″	1:50,000	21,000 yds.	21,100 yds.	144 sq. mi.

But this camera is complicated and difficult to operate. Considerable skill is required in insuring uniformity of tone in the segmental prints which are laid to form the composite, and in matching them by predetermined calibrations; in photogrammetric work uniformity of tone is of less consequence.

The wide-angle photograph offers many practical advantages to the field artillery. A few essential pictures can be made, on a special mission if necessary. Conditions

will likely require that the photography be performed from high altitudes, from 20,000 feet upwards, a single print covers sufficient terrain to include the position area and most of the target area of a light regiment. Planning fire-support is thereby simplified. Survey operations are greatly reduced. For example, in registering or making transfers of fire, the aiming point, instrument station, and check point may be identified on the print; the angle measured on the ground can then be compared with that measured on the print. Using the difference, *K*, and an intelligent regard to the displacements resulting from relief, a tolerably accurate correction may be applied to angles read to other points in the vicinity of one of the check points. By analogous methods firing data may be computed with tolerable accuracy. The wide-angle camera has the additional advantage that it lends itself to the preparation of photogrammetric maps. Of course its coverage, wide as it is, is inadequate for "tactical uses" over extended fronts; for this purpose, an additional early expedient becomes necessary—possibly an uncontrolled mosaic laid from the prints without enlargement. All in all, this camera marks a distinct step forward, and it is a fairly safe guess that it will be available in sufficient quantities when needed. It remains to ensure that the pictures reach us.

The field artillery may reasonably demand that in campaign—and maneuvers—it be furnished with at least one of these forms of map. Since the time element is likely to preclude the battle map initially, the selection reduces to the controlled mosaic or the wide-angle photo. If the theater of operations is in our own territory, or territory of which we can obtain photographs and control data in time of peace, the answer is controlled mosaics. Otherwise, wide-angle pictures must suffice. The technical feasibility of these solutions can hardly be questioned. Supply of such photomaps should be as automatic as that of ammunition or food. And we should train in peace with the tools of war; this is self-evident. Should the training program require photography, re-photography and re-re-

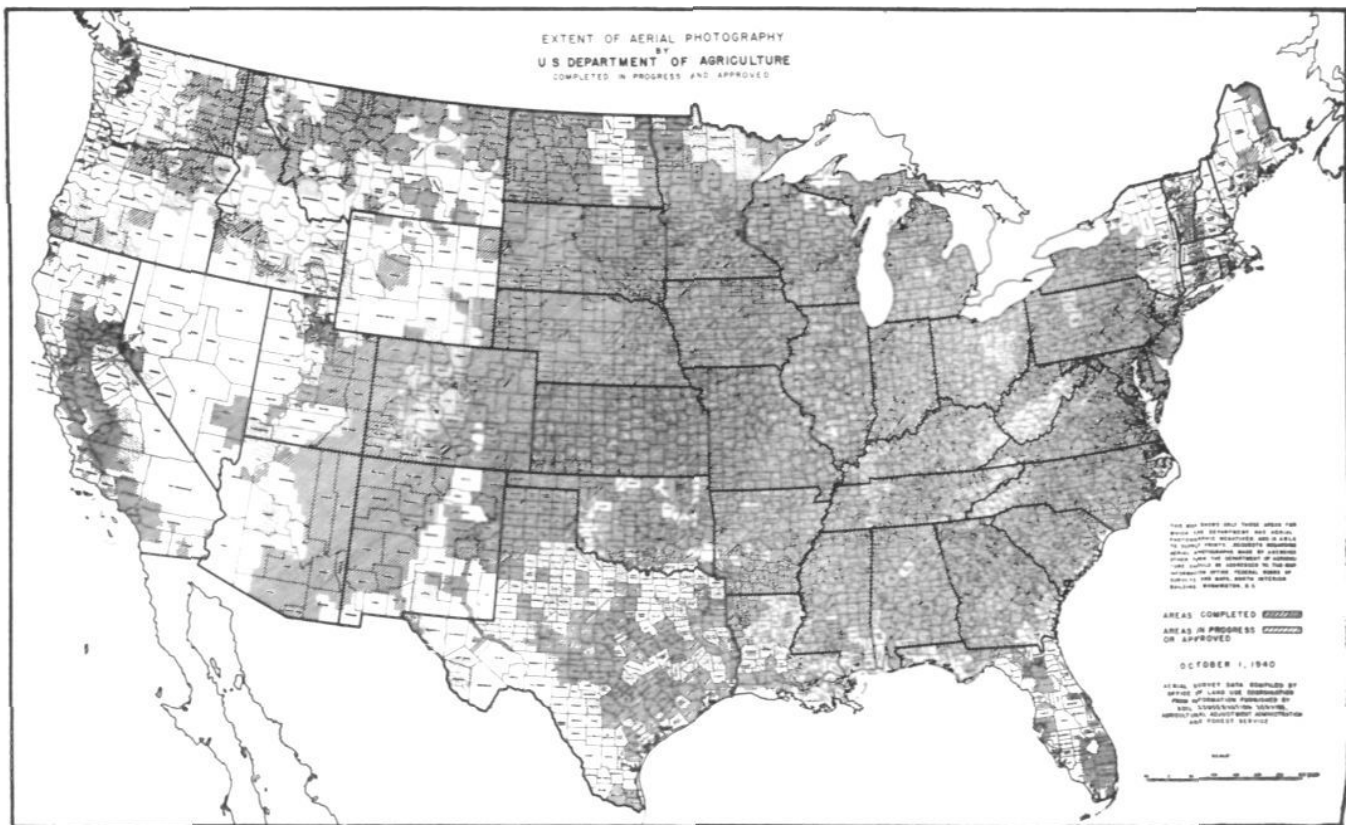
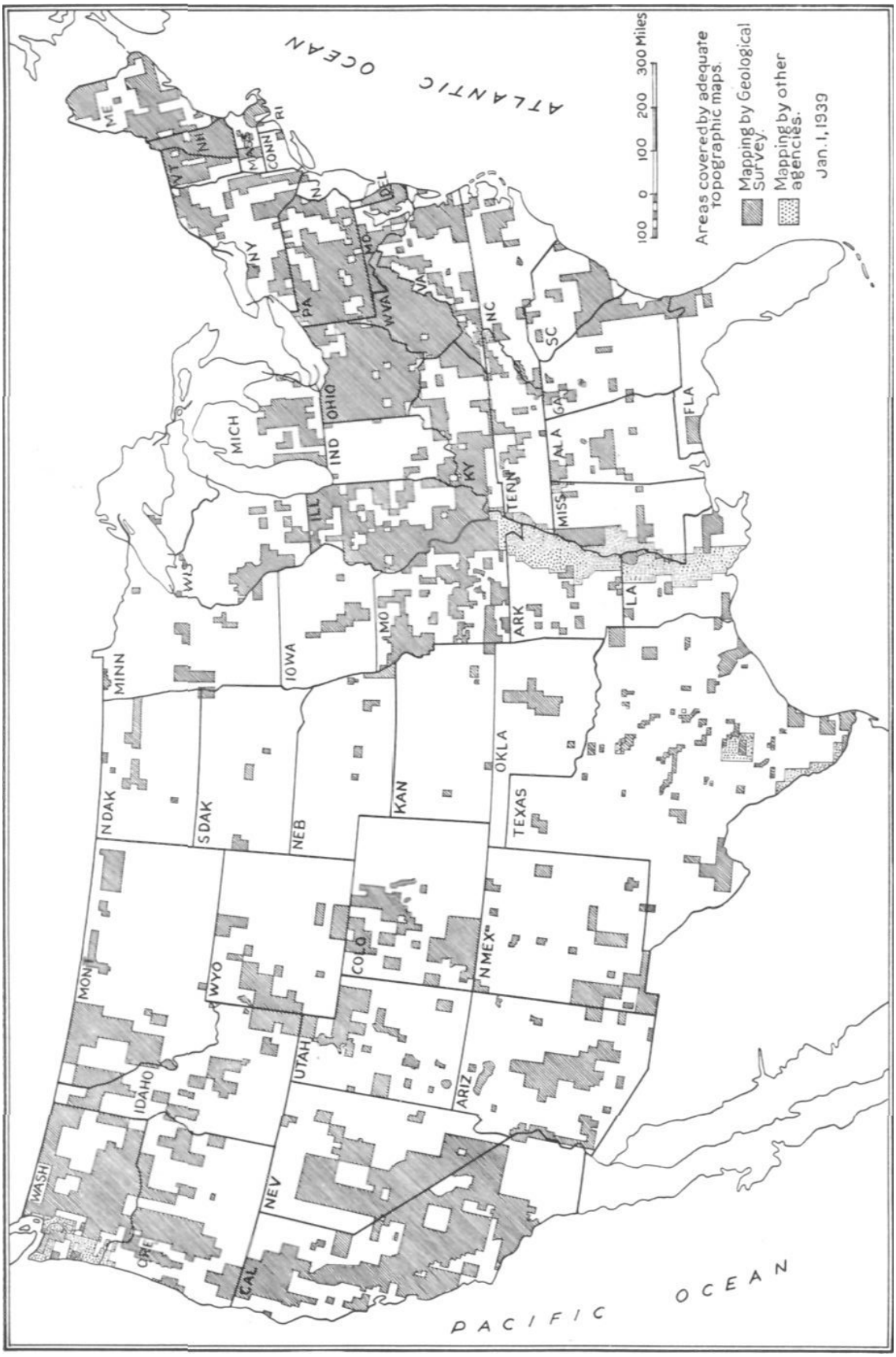


Figure 2. Areas photographed for the Department of Agriculture.

photography, these must be charged to the cost of war—it is good for the training of all concerned, and will save ammunition in the long run. Unanimity of demand on the part of the using Arms will go far towards ensuring uniformity of supply.

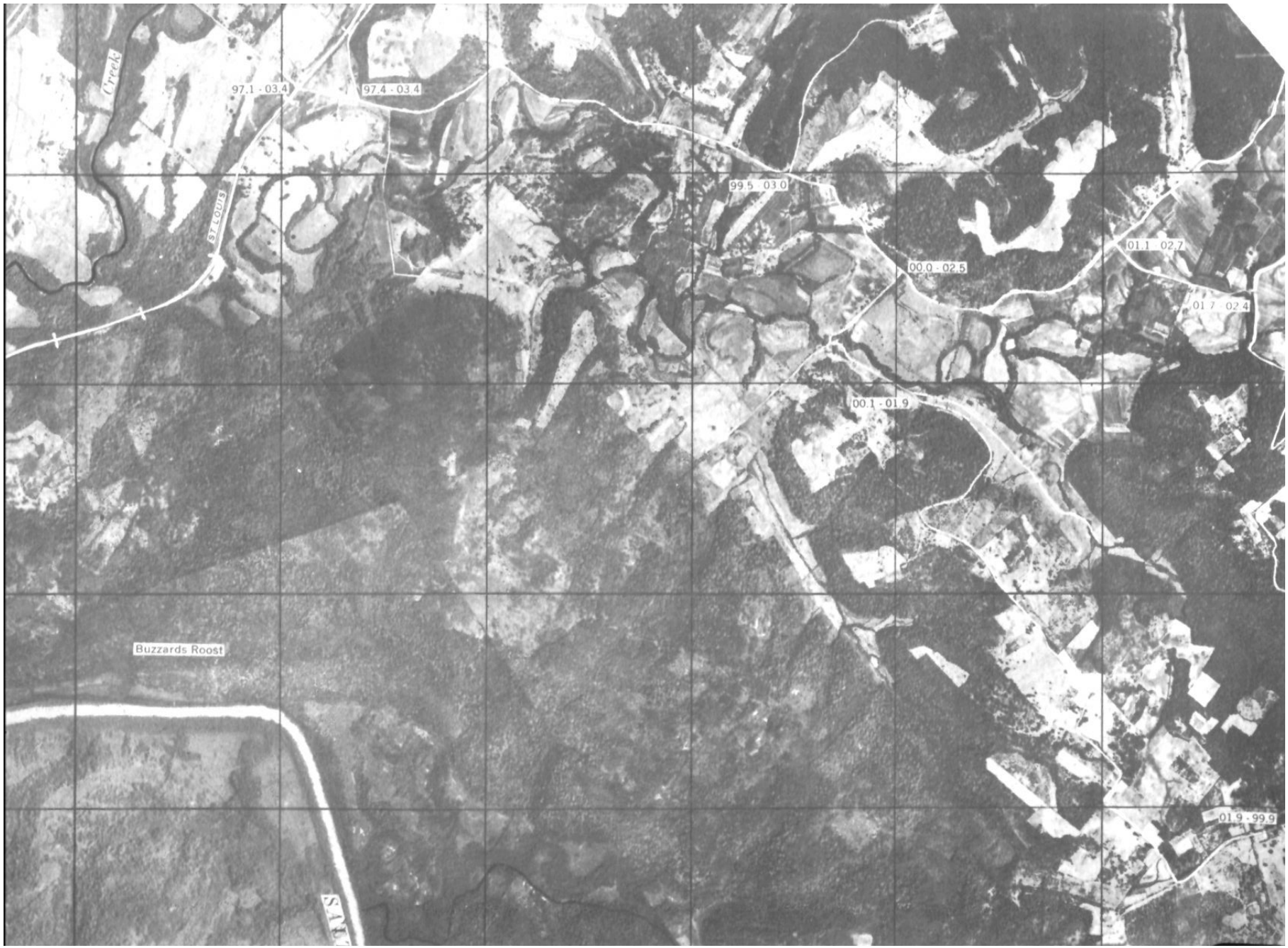
Other Usable Maps. Desirable though these types of map may be, and although we bend every effort to ensure their supply, it would be the height of imprudence to confine our training to them; circumstances which we cannot now foresee may prevent their production. We must therefore be prepared to use other types of maps should the need arise.

The shortcomings of these are fairly well known. It is no longer necessary, for example, to enlarge upon the errors resulting from tilt, from relief, and from lack of



Courtesy "The Military Engineer"

Figure 3. Areas in the United States which have been mapped, mostly by the U. S. Geological Survey. "Adequate" means 1:62,500 scale, except for relatively small areas at larger scales. Some of this mapping was performed 40 years ago.


Creek
97.1 - 03.4
97.4 - 03.4
ST LOUIS
99.5 - 03.0
00.0 - 02.5
01.1 - 02.7
01.7 - 02.4
00.1 - 01.9
Buzzards Roost
01.9 - 99.9

MOSAIC, 1-20:000

120-LINE SCREEN

PHOTOGRAPH NO. 194

QUARTER SECTION

OF WIDE-ANGLE

PHOTO, 1-20,000

control in an ordinary mosaic. The commoner types of maps and photomaps which can be produced with present equipment are listed below in the order of their desirability from the viewpoint of fire control:

Battle map uncontoured.
Strip mosaic, compiled from K3 pictures.
Multilens composites.
Uncontrolled mosaics.
Single verticals (K3).
Obliques.

With the exception of the first (which is but a partially completed battle map), there is no technical reason why copies should not be in the hands of troops in a matter of 24 hours or less—at the most 48 hours—after the photographs are taken. The battle map, uncontoured, may take longer, depending upon the area. It is perhaps worth remarking that, in general, the cruder the map furnished to the field artillery, the more complicated and more arduous are the survey operations which it must perform. It may be repeated that the value of any map is increased if the user happens to have some overlapping airphotos and a stereoscope. In the lower echelons, of course, this refinement must not be carried to the absurd. Many people can read stereoscopically with the naked eyes, or with a cheap pair of magnifying spectacles.

The Armored Force. The usefulness of the photomap extends beyond the province of the artillery and the infantry. The armored force has entered the field. The close liaison of the armored force with the air force must depend upon some rapid, clear, and reliable means of indicating the location of enemy resistance. The photomap seems to provide the answer since it shows every copse, every ditch, every minor terrain feature which would escape the map-draftsman's notice.

Point Designation. There are other related problems which call for solution; one may say, perhaps, that they are well along towards solution. One of them is that of the designation of points on photomaps. Many schemes have been suggested. There is the method of numbering every road-fork and road junction. This takes precious time; moreover, the user has to hunt to find the right number and probably then discovers that he is at an unnumbered trail junction. There are also various types of atlas grids. Whatever be the solution finally adopted it seems evident that it must conform to these requirements:

It must be simple and reasonably foolproof
It must be technically practicable
It must be acceptable to ALL the using Arms
It must lend itself to easy and accurate telephone and radio transmission.

Reproduction. In another phase of the problem much progress has been, and is being made, namely, reproduction. Machines now undergoing test produce hundreds of contact prints per hour. Lithographic reproduction of photomaps has also made great strides. The experience of the maneuvers indicates that fine reproduction of small-scale airphotos is best done at semi-permanent printing plants rather than in the field. There are enough airplanes available nowadays to take care of transporting the prints. Lithography is a laboratory process; the dust, the water impurities, the variable humidity met with in the field militate against acceptable work. The halftone screens which have been used in the past are far too coarse for our needs. In this issue of THE FIELD ARTILLERY JOURNAL there has been inserted a sample of lithographic reproduction of part of a 1:20,000 mosaic of Fort Knox, made in 1936 by the halftone process with 120-line screen, and also a one-quarter section of a wide-angle vertical, enlarged to 1:20,000 and recently reproduced lithographically by a 300-line halftone screen. Both samples were produced in the same plant. The processes are about equally rapid—a matter of a few hours. The contrast between the two prints testifies to the serious effort and continued research of the Engineers and Air Corps towards the improvement of lithographic reproduction. The most important factor in successful reproduction by any means is *good copy*. The samples* given herein were selected more or less at random; other reproductions might be better—field soldiers know that they can be worse. In this day of improved lenses, light meters, light filters, high-speed emulsion and all the other progress proclaimed by camera builders and chemists it seems self-evident that aerial photography should and must become an exact science; the lithographer should be able to specify the degree of contrast, density, etc., of his copy in terms which may be exactly interpreted and exactly responded to by the aerial photographer.

For our own part we artillerymen should refrain from the common error of expecting every photomap to be adequate not only for fire-control uses and tactical uses but also for intelligence purposes. We never examine a graphic map with a glass in the hope of squeezing more detail out of it, yet the photomap is often condemned if it does not stand unlimited magnification. Airphotos for intelligence purposes should be made, reproduced and distributed with their special purpose in mind.

Engineer Capabilities. An appreciation of the capabilities of the map-producing facilities of the Engineers is helpful. The Engineers have a Topographic Company in each Corps, and a Topographic Battalion in the Field Army organization, as well as in GHQ. The Corps Topographic Company is a relatively small and quite mobile unit. One of its chief functions is to cooperate with the Field Artillery (primarily the Observation Battalion) in bringing survey control within reach. It is equipped for hasty mapping, but can NOT produce

*These samples merit a few minutes' close comparison. Essential place-names and a grid could easily be added to the wide-angle photo as they have been to the mosaic. In an attempt to clarify the mosaic, a draftsman has strengthened some of the details. The inadequacy of this expedient is obvious; the time loss and human errors condemn it.

battle maps, not can it be expected to reproduce photomaps, other than small verticals (and obliques) of acceptable clarity. The largest print which can be handled in the Corps Company Press is 17″ × 19″. It can *over*print data on larger sheets by a duplicating process. The Army and GHQ Topographical battalions, however, can make and reproduce maps and photomaps in larger sheets and of much more satisfactory quality.

In our eagerness to improve our own service we profit from the experience of the armies of foreign countries. Yet many of us have persisted in overlooking one essential difference—those armies operate over terrain which has been carefully and accurately mapped and photomapped. We arm with similar weapons—shall be use them blindly? Does the symphony orchestra need a score, or does it play by ear? It is our own responsibility to call for the maps which we know are essential. *Ad bellam pace parati*.

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WHY FRANCE FELL

Tactics of the Artillery in War of Movement

Digested from a recent German article by Kriegsberichter Willy Ehlers

The foremost military power of Europe was forced to capitulate in 45 days; there is nothing about the essentials of German tactics which remains obscure after examining the plans and execution of the successive steps of the victorious advance. However, it is worth while to examine some of the details of which a knowledge will contribute to a better understanding of this unique success.

War of Position and War of Movement

It is quite obvious that the artillerymen of the first World War would be intrigued by the question how his Arm fought in the campaign in the West. He would be indoctrinated by ideas conceived in the war of position, and would seek an official explanation of artillery activities in the war of movement. This subject is the more interesting since it is recognized that the French artillery of the World War, in point of technique and materiel, must not be underestimated.

We start with the principle that a war of movement necessarily demands of every Arm a maximum of flexibility. The German artillery had adjusted itself to this principle during its peacetime training through large-scale motorization and the use of a new light weapon adapted to the special missions of the division artillery; these latter could therefore be accomplished. The task of the artillery in the division team consists essentially in assisting the advance of the infantry. If this mission was accomplished in the present war it was due primarily to a new method designed for the special conditions of war of movement. The infantry was usually accompanied by a forward artillery observer equipped with a portable radio; he could, therefore, in a few seconds exercise a decisive influence on the course of the battle and could give the infantry the reassuring feeling that it could be sure of artillery protection.

Failure of French Tactics

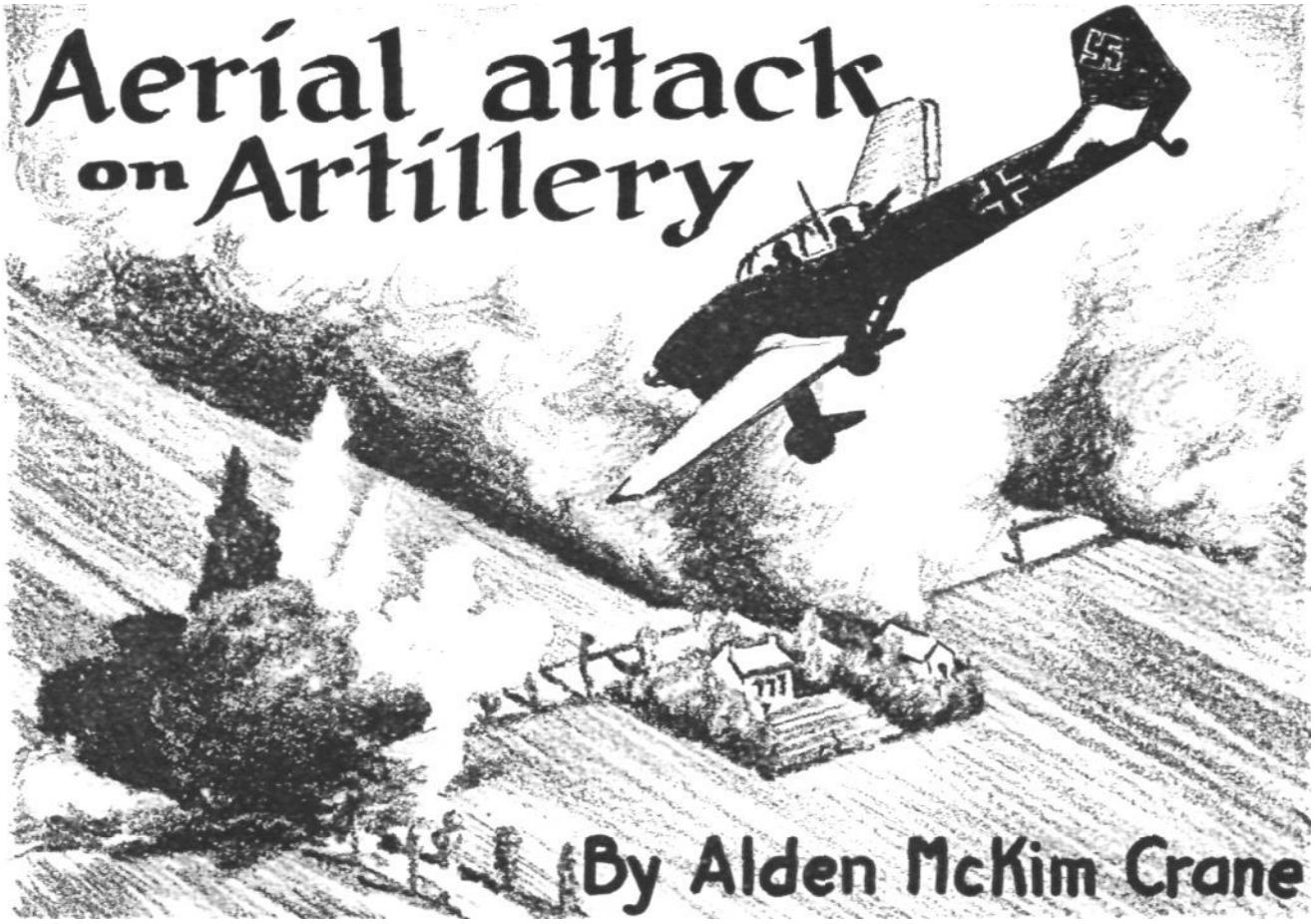
The heavy calibers which were emplaced for the break-through of the Maginot Line and for the capture of the strongest fortifications accomplished their mission. In combination with the Stukas a demoralizing effect was produced which foredoomed all of the enemy's hopes of shaking himself free. The French artillery was checked in its development stage by the impetuous advance of the German troops for the reason that both men and materiel were wedded completely to defensive tactics; these, when the Maginot Line was built, were represented to be the supreme method devised by French military genius.

Through the forward observers a coordination of effort between the infantry and artillery was assured.

Through experience this had been developed into standard procedure; the peculiar methods of the World War are not even comparable. In this connection our artillerymen say that many times they have received machine-gun fire; in fact, because of the rate of advance they have even overrun enemy positions now and then. Also, acting as motorized troops they have facilitated the work of the advancing infantry in addition to performing their own normal functions. A personal aggressive spirit on the part of all Arms is essential. Pride in this immediate and constant contact with the enemy which is expressed in every report of those artillerymen which had the honor of serving with the light guns can easily be understood, for it is always the hope of the soldier to have targets which he can see, and to follow with his own eyes the movements of the battle.

We can also understand the surprise of the German artillerymen at finding among the captured materiel innumerable guns which *had served in the World War*. Bluff, of which Nazi Germany was accused, really should be ascribed to the Paris government; all the fine figures which were once given out as convincing publicity have been unmasked as a mere cover for their own inadequacy. The French are today asking themselves what has become of the billions which were voted each year from the treasury for purposes of equipment, and which permitted the country to whip itself into a frenzy of military megalomania. The French artillery in general was inferior to the German in point of materiel, because the German equipment took advantage of the latest advances in technique. But above all the German superiority showed itself in the tactical employment of the artillery; this forced the French into tactical experimenting since they had given themselves a completely false picture of developments based upon the outpost battles between the West Wall and the Maginot Line.

—T. N.



May 27, 1940

Dear Dad:

Don't know when and if you will ever get this, but here goes.

Well, we have been catching it coming and going. First the German planes shot us up and now the British and the French are doing it. Among others, we had two raids which might be of interest to you, as they were both against Field Artillery and under somewhat the same circumstances, though one raid was against a British outfit, while the other was against a German. I am going to try to give you a rather detailed account of them.

One evening about five o'clock a British motorized artillery outfit pulled into our place and an officer told me that they were going to spend a couple of days with us. Their materiel was scattered about, some under cover and some not, and as the Germans had been flying over our house, obviously trying to find out if there were any troops sheltered in the woods, I suggested to the officer that he put everything out of sight along the rides which I had cut during peace time on which to train my horses. I gave him my reasons for the suggestion and told him that although he might not mind getting shot up, I did.

He answered that German planes had not paid much attention to them and that everything was well enough hidden in any case. Thinking that he knew his business better than I did, I kept still.

After they had straightened things out at the guns, the officers assigned men to billets, and all of them, with the exception of a few, were marched to the billets and told to go to sleep. Sentries were placed before the doors and no soldier was allowed to leave.

I was rather interested in their antiaircraft defense and paid some attention to their arrangements. Near the house they had two Bren guns set on high tripods and the crews consisted, as far as I saw, of two men who lay underneath the guns smoking cigarettes. There were also some heavier antiaircraft guns, but not belonging to that outfit, scattered about the countryside.

I was rather surprised at the laxness of the gun crews, as the Germans were raising Cain about three miles away, shooting up and bombing most of the roads along

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When the German invasion came to Belgium, Mr. Crane remained at his home in that country, where he witnessed at close range many interesting events. In a letter to his father, Brig, Gen. John A. Crane, U.S.A., he describes some of these, which contain information of value to field artillerymen. THE FIELD ARTILLERY JOURNAL *is pleased to be able to present this intimate, eyewitness account of a portion of the cataclysm of this era.*

which troops were moving. It was obvious to anyone that a plane could come in low over the trees, shoot up the place and get away before the men could even get on their feet, let alone get their guns working.

Some time after that outfit arrived, I was standing near a caisson talking about fox hunting with the major in command. We had only been swapping tall stories for a minute or two when suddenly there was a roar and a German plane came helling along about fifty feet above the tops of the trees, dropped a couple of bombs and turned loose its machine guns. The bombs fell in some marshy ground near the lake and went off without doing any damage. But several men got hit by machine-gun fire. Not having any particular job and valuing my own skin, I dove under the caisson, where by peeping out through the wheels, I got a pretty good view of the show.

The plane, just as I expected, was out of sight before the machine gunners got on their feet, but there was considerable antiaircraft fire from the heavier guns scattered around.

That plane, joined by two others, came over again, but that time the machine gunners were waiting for them, going into action as soon as they came into sight. There were plenty of men hanging around the guns, but they, although they had rifles, did not do anything. I don't mean that they lacked guts or anything like that, but I thought they might try to do something with their rifles. I did notice one sergeant blazing away with his pistol.

In all, those planes came over four times and seemed to have things their own way. There were about fifteen casualties and would have been more had the majority of the men not been under guard in the billets. When things quieted down, I crawled out from under the caisson and then began to wonder what would have happened to me if it had been hit, because the ruddy thing was chock full of H.E.

I noticed that the major was raising hell with everyone in sight, so discreetly faded out of the picture.

That night rather a funny thing happened. Going into the kitchen, which we had turned over to the troops, I saw a man wearing an overcoat and with a red cap on his head eating ham and eggs at the kitchen table. The only people I had seen with red caps were M.P.s, so naturally supposed this chap was one getting a handout from the cooks of the officers' mess. Wishing to be pleasant, I asked him, "What are you, a sergeant in the Military Police?" I really thought that he was a private, but raised his rank just to make him feel good. The light came from two candles and you could barely see across the kitchen and I could not see any rank badges on him. He gave me rather a dirty look and answered, "No. Brigadier." Still I didn't catch on and thinking he was a sergeant major or something like that they have in the French Army and call "brigadier," I said, "Oh. You mean sergeant major." Then he snapped, "Not at all. I'm a Brigadier General," and he rolled back his coat so that I could see his rank badges. Was I embarrassed! He took it in good part when I attempted to apologize, but I still think that M.P.s and generals should wear different colored caps. Some private might take a sock at a general in mistake for an M.P.

That gang got a hurry-up call about eleven that night and pulled out for the front. The next morning I noticed that they had lost seven trucks within a half-mile radius of the house. The trucks had run off the roads into drainage ditches in the darkness. Salvage gangs came back for them, but did not even get one on the road. They tried to pull them out with their ordinary small trucks. It seemed to me that their trucks had too little power for their weight and size, as getting out of those ditches would have been child's play for four-wheel-drive trucks. When they saw that it was impossible to salvage a vehicle it was set fire to. I noticed two which had less than a thousand miles on their speedometers.

Well, a couple of days passed, during which I had a time and a half, about which I think it indiscreet to write at present, and then the Germans came through. We had various German outfits billeted with us and all, without exception, were well disciplined and behaved.

Then one morning early a horse-drawn artillery regiment pulled in. The horses were in pretty bum shape, so they were all turned loose to graze in my pastures, where I had not yet cut the hay.

For antiaircraft defense they had two (perhaps they had more which I did not see) machine guns mounted on something like a Scharff mounting attached directly to a small limber. When I say they had two guns, I really mean they had four, as each limber had two guns mounted side by side, but fired with a single trigger. The gun crews consisted each of two men, one with field glasses. And although they were allowed to smoke, there was no lolling about on the grass. They were alert and always ready for action. They were relieved every hour.

At eleven-thirty, the men lined up for chow, the Germans giving their men one hot meal a day from rolling kitchens. However, the machine-gun crews stayed at their posts, as did also the men scattered about among the horses. Just as the cooks started to dish out lunch, a British plane roared overhead with machine guns chattering. Apparently the horses were the target. The chow line scattered like a covey of quail, the men rushing to the guns and grabbing their carbines. I noticed later that although the carbines were kept at the guns, they were not strapped in their racks and were always loaded with full magazines.

The machine guns got into action as soon as the plane appeared, while the men scattered about the pasture tried to drive the horses into the shelter of the woods which surrounded all of my fields.

That plane, joined by another, came over again and they certainly received a hot welcome. Officers with

pistols, non-coms with sub-machine guns and the men with their carbines, to say nothing of the antiaircraft guns, all blazing away. The planes tried to come around again but apparently they figured out that they hadn't lost anything there, when the hot reception was repeated, and beat it.

There were about five casualties among the men and fifteen among the horses, which under the circumstances and taking into consideration the size of the target, was surprisingly small.

I was rather impressed with the way that outfit handled the situation. Every man seemed to know exactly what his job was under such circumstances and did it. There was no aimless rushing about. The sub-machine guns I saw, and later got a chance to shoot one, seemed ideal for the work, though the cartridge, the ordinary 9-mm. pistol cartridge, the standard one for the German forces, was rather on the light side. Those guns were very well made, balanced like a fine shotgun, were loaded with box magazines, holding, I think, 20 rounds. They put out a wicked burst of fire.

I don't say that the Germans were better men than the British, but they certainly handled that situation better than the British did a similar one. However, the British were raw troops, having just come from Palestine, and had never been in action. Perhaps they just needed shooting over. The German outfit had gone through the whole Polish campaign and had been in action before Liége, so they said.

Don't know when you will see me again, but you can bet I am having a fine time, though I get scared to death on an average of once an hour.

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Minutes of the Annual Meeting of the United States Field Artillery Association, December 16, 1940

In accordance with the call of the Executive Council, the thirty-first annual meeting of the United States Field Artillery Association was held at the Army and Navy Club in Washington, D. C., at 4:45 PM, December 16, 1940. The President, Major General Robert M. Danford, presided.

A quorum was present in person or by written proxy for the transaction of business.

The Secretary-Treasurer presented and read his annual report and financial statement, which are appended hereto and made a part of the minutes.

The President had previously appointed Major John Uncles and Major Rex Chandler to audit the financial statement. At the direction of the chair, the secretary read the report of the auditors, which stated that the auditing had been performed and the financial statement had been found to be correct. A motion was made, seconded, and carried, to approve the annual report and financial statement.

The President stated that there were three vacancies in the Executive Council, caused by the expiration of terms of office of General Danford and Lieut. Col. W. C. Crane, and by the retirement of Col. Herron. A nominating committee consisting of Lt. Col. J. B. Anderson, Lt. Col. J. W. McKelvie, and Lt. Col. Guy Kurtz had been appointed. The chairman of this committee read his report, in which the committee submitted the names of Major General R. M. Danford, Major Thomas North, and Captain George L. Hart as candidates to fill the vacancies. After opportunity had been given for further nominations, a vote was taken which resulted in the unanimous election of the choices of the nominating committee. The secretary was directed to cast this unanimous ballot.

The secretary pointed out that it was becoming increasingly difficult to secure sufficient written proxies to constitute a quorum, and suggested that the Constitution be so amended as to facilitate securing a quorum. The President appointed a committee consisting of Col. W. C. Potter and Lt. Col. D. S. Rumbough to study the matter and submit recommendations.

The secretary announced that as a result of votes made by members of the Association on their proxy cards, the serial "Origins of a Modern War" by Col. C. H. Lanza had been adjudged the best original article written by a U. S. Field Artillery officer which appeared in the JOURNAL during the past year. Col. Lanza therefore wins the fifty dollar bonus previously announced in the JOURNAL. The secretary stated that nearly every article which had appeared in the JOURNAL received votes, which indicated the wide appeal of the magazine content.

Two members of the Association from distant stations were present at the meeting: Col. R. S. Parrott from Fort Bragg, and Lieut. Col. A. E. King on change of station from Akron to Fort Sill.

The President paid high tribute to Colonel LeRoy Herron on the occasion of his retirement from the Executive Council. General Danford said, "It is with deep regret that we lose Col. Herron as a member of the Council, where he has served loyally and faithfully since 1922. I cannot recall a meeting of the Council at which I was present that Col. Herron was not there too. He has always been ready with advice and assistance in solving

the problems connected with the management of the Association, and we shall miss him greatly. His military service extends back to 1897, when he first entered the National Guard. He served through the Spanish American War, was present at the surrender of the Spanish Army at Santiago. During the World War he served as a major of the 110th Field Artillery, and was in France with the 29th Division until the return home of that unit. He rose to the rank of colonel and at the time of his recent retirement was in command of the 313th Field Artillery. He was on the eligible list for promotion to the grade of general officer. Col. Herron, may I say that you will be present with us at future meetings of the Council, in spirit if not in body, and we are deeply sorry to lose from the Council such a stalwart supporter and active friend of the Association."

It was moved, seconded and carried that the Association extend a vote of thanks and appreciation to Col. Herron for his long and valued service.

The meeting adjourned.

ANNUAL REPORT OF THE SECRETARY-TREASURER FOR YEAR ENDING NOVEMBER 30, 1940

Assets November 30, 1939			
Securities:			
Gov't. bonds—value 11/30/39	$ 9,240.00		
Securities, cash value	[1]10,107.55	$19,347.55	
Balance in checking account		594.73	
Savings account		2,553.84	
Interest on savings account		8.40	
		$22,504.52	$22,504.52
Assets November 30, 1940			
Securities:			
Gov't. bonds—value 11/30/40	$9,510.00		
Securities, cash value	10,018.92	$19,528.92	
Balance in checking account (savings account transferred to checking account Dec., 1939)		3,166.26	
		$22,695.18	22,695.18
Net gain for year ending Nov. 30, 1940			$ 190.66
Cash value of securities 11/30/39	$19,347.55		
Cash value of securities 11/30/40	19,528.92		
Net gain in value of securities	$ 181.37	$ 181.37	
Excess of receipts over expenditures (see next column)		9.29	190.66

[1]In the Annual Report for 1939, these securities were carried at their face value, $18,880.00, although their cash value on November 30, 1939, was only $10,107.55. By direction of the Executive Council they are shown this year, and will be shown hereafter, at their *cash* value.

The following is a detailed statement of receipts and expenditudes for fiscal year 1940, as compared with fiscal year 1939:

RECEIPTS

	1939	*1940*
Membership dues and subscriptions	$10,078.15	$13,083.85
Interest on securities	550.14	554.63
Interest on savings account	53.84	
Books and magazines	1,452.09	1,619.25
Miscellaneous	100.68	49.19
Visiting cards		86.78
Total receipts	$12,234.90	$15,393.70
Balance in checking account Nov. 30, 1939		594.73
		$15,988.43
Transferred from savings to checking account 12/15/39		2,562.24
		$18,550.67

EXPENDITURES

Printing and mailing of FA JOURNAL	$ 4,088.35	$ 6,157.85
[2]Job printing		1,169.14
Office supplies	565.64	124.86
Office equipment		261.60
Postage, express, telegrams	328.37	710.34
Rent and telephone	506.48	510.43
Services	2,811.11	2,352.48
Authors, engravers, photographers, artists	2,182.54	2,333.25
Books and magazines	1,134.97	927.27
Insurance and tax	72.85	71.02
Trophies	92.90	
Donations	7.00	27.00
Miscellaneous: copyrights, refunds, etc.	1,049.89	647.78
Prize essay thesis	100.00	
Government bonds	4,500.00	
Visiting cards		91.39
Total expenditures	$17,440.10	$15,384.41
Balance in checking account Nov. 30, 1940		3,166.26
		$18,550.67

[2]Last year job printing was carried under "Miscellaneous."

Receipts for year ending Nov. 30, 1940	$15,393.70
Expenditures for year ending Nov. 30, 1940	15,384.41
Excess of receipts over expenditures fiscal Yr. 1940	$9.29

The foregoing financial statement has been made as brief and simple as is consistent with completeness of data. It is hoped that all items are clear and self-explanatory. The affairs of the Association are believed to be in a very satisfactory condition, and the total assets shown, $22,695.18, represent the actual worth. The difference between receipts and expenditures for the year shows that practically all profits were utilized for the improvement of the JOURNAL, a policy which is strictly in accordance with the expressed desires of the Executive Council and other members of the Association.

One item of expense, that for job printing, was higher than usual, the excess over similar costs for previous years being represented by the cost of printing the Readers' Guide. This should be a nonrecurring item.

Financial prospects for the coming year are satisfactory. Overhead will be higher, owing to the necessity for securing additional clerical assistance. Publishing costs will be immensely higher because of the change from a bimonthly to a monthly JOURNAL. It is hoped, however, that income will show a proportionate increase.

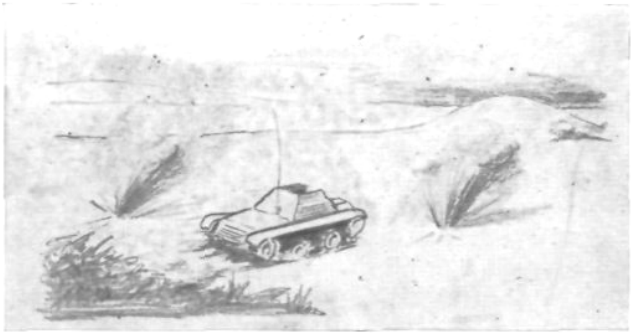
At the most recent count, there were 4,446 paid subscribers, a net increase of 905 for the year. As in former years, great credit for this is due the various members of the Regular Army, National Guard, and Reserve, who have provided concrete assistance by sending in new enrollments from officers of their units, from those with whom they have been associated in business or military affairs, and from friends. We would like to mention every one of these fine supporters by name, but lack of space prevents, and many have asked that their names be not mentioned. As in former years, our loyal and energetic members of the Executive Council, Generals Sands and Haffner, have been busy writing letters, interviewing unit commanders and others, and in sending out promotional material—all of which has accounted for a substantial part of the increased membership.

The Secretary-Treasurer deeply appreciates the friendly assistance given him by numerous fellow Field Artillerymen in the attempt to further the progress of the Association and its JOURNAL.

W. S. NYE,
Major, Field Artillery.
Secretary-Treasurer.

Mobile Armored OP

By MacKenzie Hill

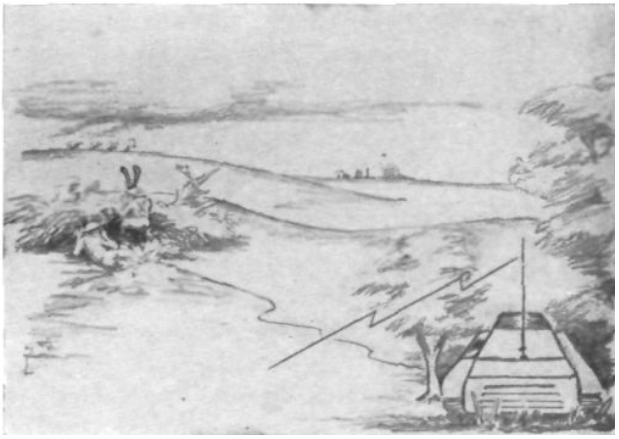


Armored OP crossing fire-swept area

British reports in connection with the action in the Low Countries indicates that improvised armored mobile observation posts were used very effectively in the withdrawal from Dunkirk. These observation posts, in the nature of tanks, were able to remain in observation for considerable periods of time and withdraw to other points of vantage and again take up their role in spite of isolation, and of hostile machine-gun and rifle fire.

German publications show photographs of mobile observation posts (see FA JOURNAL, Nov.-Dec., 1940) which no doubt have been developed through a demand which has arisen on the field of battle.

To arbitrarily imitate or copy a foreign power would not necessarily be to the interests of our Army. On the other hand, we have a system of fire direction in the Field Artillery which facilitates the concentration of fire of a battalion; and, by proper use of check points and communication between the front and the guns, the delivery of fire on targets rather than on coordinates can be greatly expedited provided we have a sure means of communication and observation. We should therefore look into the matter not necessarily of an armored OP but an armored cross-country observation personnel and equipment carrier. Such a vehicle could cross fire-swept zones in short order from one covered position to another. It could carry, as an integral part of the vehicle, a power-driven radio of sufficient range to insure communication with the rear, and could carry sufficient wire to enable advantage being taken of prominent features of the terrain. In short, it could serve as a mobile tender or "mother ship" for an observation post which could be counted on in either advance or retreat and which could not be easily eliminated



OP outside the vehicle

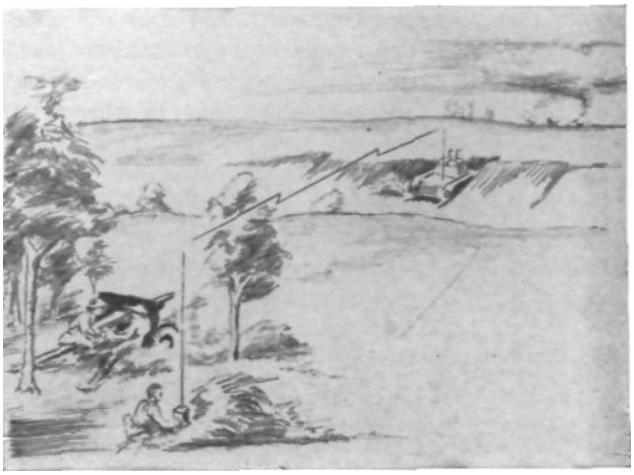
by, say, one machine gun, an automatic rifle, or even a soldier with a grenade.

The development of such a vehicle for the Armored Force is of secondary importance, as any one of the hundreds of tanks or combat cars in this Force could be modified or used "as is" to serve this purpose. The armored vehicle should not be used as an observation post by placing it on top of a hill, but, as suggested above, for transporting observation personnel and equipment. Power-driven radios could well be installed in the tanks destined for this purpose. The development of such a vehicle for the infantry and cavalry divisions in the ratio of one for each artillery battalion is indicated at the present time.

To summarize, such a vehicle properly developed, would do much towards insuring the delivery of fire against actual targets rather than against theoretical points on the map. Mobility in an OP, together with its communication, will facilitate tying the business end of our trajectories to the targets—our raison d'etre.

The millions of dollars now being spent on arms and armor and the funds now set up for development, and our needs are such that advantage should be taken of this opportunity to develop such a vehicle, not for the Armored Corps necessarily, but primarily for the line divisions.

OP in vehicle, ahead of gun



Leader or Adviser?

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

When we have done a good piece of work, it is always a satisfaction to have it recognized as such by some outside and wholly disconnected agency, and particularly when that agency exists for the sole purpose of giving an independent and impartial appraisal. Such an agency is the Inspector General's Department of the Army. The following extract, therefore, from the Annual Report of the Inspector General of the Army covering the Field Artillery in 1918 is interesting:

"In that period covering the appointment of a Chief of Field Artillery, and also following the graduation on a larger scale of officers from the School of Fire, instruction of officers became more uniform and the efficiency of instruction, in general, more marked. Officers' Schools, in most cases, were very satisfactorily conducted, and a more or less definite policy in training followed, generally. In that period since the organization of new divisions in August, 1918, methods of instruction were by far the most efficient. In the case of this instruction, field officers were selected for their efficiency, a very definite policy as to what was to be accomplished, and how, was followed. Where sufficient materiel and men were available, organizations advanced rapidly in training. At the time of the signing of the Armistice, field artillery instruction was intensive and non-essentials eliminated.

"The facts most important in making for efficiency in training were:

1. Appointment of a Chief of Field Artillery.
2. Organization of The Central Officers' Training School.
3. Operation of the School of Fire.
4. Establishment of Firing Centers where materiel and equipment were concentrated, and where expert instructors in the various specialties were sent.
5. The establishment of Replacement Depots where replacements for overseas were instructed, and which also furnished a nucleus of good, partially trained men for newly organized regiments, also contributed to the general efficiency of instruction."

All of the above five "facts most important in making for efficiency in training" are really summed up in the first one—"the appointment of a Chief of Field Artillery"—for all the others were originated by him, except the School of Fire and, by chance, it also was his creation a short time prior to his appointment as Chief of Field Artillery.* Even the School of Fire failed to make progress until after the appointment of a Chief of Field Artillery, in that the first enlarged class as planned by me, when Commandant, did not enter the School until I became Chief and could push this vital matter.

In the interval between my leaving Fort Sill in October, 1917, and my appointment as Chief of Field Artillery in February, 1918, my successor as Commandant of the School wrote me a personal letter saying that the War Department had apparently forgotten the enlarged School project and that it was on the verge of collapse. It is not at all improbable, therefore, that but for the creation of the office of Chief of Field Artillery the School would have died, for, when appointed Chief, I found that there were but few students and only a small and wholly inadequate amount of equipment at the School and but very little interest in the matter in the War Department.

In my stressing the importance of having a Chief of Field Artillery, there is, of course, the implication that such Chief has the necessary power to act. Manifestly the mere existence of a Chief without accompanying power would accomplish nothing. Prior to my appointment as Chief, the War Department General Staff had run the field artillery. They had made a miserable failure of the job and had not only wasted ten months of valuable time (and in war, time is of the essence) but, even worse, the General Staff had allowed an absolutely chaotic condition to arise in the arm ("Chaotic" is a strong word and it is used here because it is accurately descriptive). Had I, after my appointment as Chief, been a mere agency or mouthpiece of the General Staff to carry out their decisions, no improvement whatever would have resulted from my appointment; I would have been merely another cog in the machine. Fortunately General March recognized this fact and not once did he tell me during the war (or after) that I was exceeding my authority. He was a man who wanted results and wanted them quickly. And he knew that only by delegating power to his assistants could he get results; and the same situation must exist in the next war.

I am laying stress on this matter for, in the eight or nine years following the War, and while I was still Chief of Field Artillery, there was a gradual encroachment by the War Department General Staff upon the powers of the Chief of Field Artillery—a strong tendency to reduce him to a mere agency of the General Staff. If such a tendency were to continue in existence, it would mean delay, confusion, and even chaos again in the next war until it were rediscovered that the Chief MUST again be clothed with real power.

It stands to reason that a Chief rather than an impersonal staff is the official most interested in, and concerned with, the organization, equipment, training, morale, and efficiency of his arm.

I am not by any means hostile to a General Staff. I thoroughly recognize and understand its importance and value, but because of my service as Chief for a period covering nearly ten years, and involving both war and

*For his insistence on maintaining the School of Fire during the war, General (then Colonel) Snow was reprimanded in August, 1917, by the then Chief of Staff, as appears in his Memoirs.—Editor.

peace, I had the opportunity to form definite and positive views as to the relationship that should exist between a Chief of Arm and the General Staff in order that the team as a whole might function with the highest possible degree of efficiency. I am presuming therefore to indicate and emphasize this relationship in the paragraphs that follow.

The office of the Chief of Field Artillery was created during the World War to bring order out of chaos; it proved so effective and valuable that, in the reorganization of the Army following the War, similar Chiefs were created for the other Combat Arms, and all Chiefs made statutory.

In the hearings before Congress preceding the enactment of this law, General Pershing stated that the object was to make the Chief a LEADER of his arm; he used the very word "Leader." A Chief is *not* a leader of his arm if the General Staff makes decisions concerning that arm without consulting the Chief, and then directs him to carry out such decisions; or if the General Staff asks his advice on a purely technical question of that arm and then does not accept his advice. In such cases, the Chief, instead of a Leader, is a figurehead. Yet this happened during my service as Chief subsequent to the War. The result is, of course, that if decisions of the General Staff are harmful enough to his arm, the Chief of Arm concerned has to appeal to the Chief of Staff for a reversal of the General Staff decision, which incidentally was likely made by a subordinate far junior to the Chief, that is, the appointed expert, on the matter. Much time is thus wasted, feeling is engendered, and, if the Chief of Arm appears often enough before the Chief of Staff in the capacity of complainant, the Chief of Staff naturally gets into the mental attitude of regarding the Chief of Arm merely as an objector, and more or less of a nuisance, and a "Nuisance" is 180 degrees from being a Leader. Basically, this relationship between the Chiefs of Arms and the General Staff is entirely in the hands of the Chief of Staff. The relationship established by General March could well be taken as a model. It was he who realized and understood the value of a Chief of Arm as a technical adviser, and he decentralized to me as Chief of Field Artillery the responsibility and the authority that I should properly carry as the Leader of my arm.

A Chief of Staff who follows the line of least resistance will likely regard the Chiefs of Arms as advisers to the five War Department "G's" and not to him. There is a vast difference between adviser to the Chief of Staff and to the General Staff; in the latter case it is adviser to an adviser; and also the General Staff may (and it has happened in my experience more than once following the War) substitute its own views for those of the Chief without the Chief of Staff knowing anything about this substitution.

If the reader will refer* to the memorandum fixing the status of the Chief of Field Artillery when he was originally appointed, he will see that it includes the following paragraph:

"All questions pertaining to field artillery, arising in the War Department, will be referred to the Chief of Field Artillery, and his decision, given in accordance with the policy of the Chief of Staff, and subject to review by the Chief of Staff, will be final."

In looking back now after twenty years, I think that in drawing up that memorandum fixing the status of the newly appointed Chief of Field Artillery, I did a far better job than I realized at the time; and not the least important part of it was the paragraph quoted above. The proof is the fact that it stood the supreme test of war. In a short time no one on the War Department General Staff even considered writing anything about the field artillery without previously consulting the Chief of that arm. The result was a smoothly working organization of highest efficiency, and a confidence on the part of the Chief of Staff that when he received a paper from any War Department source, the part relating to field artillery was authoritative and represented my action as Chief.

There is one other phase of this question that I desire to touch upon briefly, and then I have finished. I refer to the failure, so likely to prevail in time of peace, of making a distinction between Chiefs of the Combat Arms, and those of the Services. Both the Chief of Staff and the General Staff are inclined to regard all Chiefs as exactly the same. This is wrong. It overlooks the fact that the combat arms are really the Army—they do the fighting. The services exist solely for the purpose of assisting the combat arms to reach the battlefield properly supplied and equipped. It is the combat arms that win or lose battles, and in this statement I am not ignoring the importance of command and staff work, or the importance of the supply departments. I am merely calling attention to the fact that these supply agencies exist solely to help the combat arms win these battles. Such being the case, a Chief of Staff should recognize this fact and give to his Chiefs of Combat Arms the authoritative status necessary in time of war.

I state unequivocally, and because my convictions are strong, and are based on that best of all teachers, experience, over a period both of peace and war, that unless this coordination between Chief of Staff, Chiefs of Combat Arms, and General Staff, is effected, and harmoniously functioning in time of peace, confusion and delay will again result in the event of war, and will continue until it is reestablished.

I would therefore earnestly recommend to those who at any time chance to be in authority, that they read the memorandum of 1918 fixing my status; and having done so, I would recommend with equal earnestness that the memorandum, modified to include all Chiefs of Combat Arms, but not modified as to principles, be adopted and promulgated as a doctrine continuously to be followed by the War Department in developing and maintaining the highest possible degree of combat efficiency in our army.

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*F. A. JOURNAL, January-February, 1940, p. 10.

London is paying for Britain's schooling in the art of modern warfare.

Wide World Photo. Plate courtesy "The Reserve Officer"

LESSONS From The WAR

About a century ago an Austrian army of three corps in line confronted a French army. The Austrians, expecting to be attacked, thought that three possibilities were open to the enemy. He might either

I Turn the right;
II Make a frontal attack;
III Turn the left.

For each one of these assumed cases, corresponding plans were prepared and published in a General Order covering about ninety pages. As there were in those days neither typewriters nor carbon paper, it took considerable time to write this order and make the necessary copies.

Luckily, the enemy remained quiet. The order was completed and distributed before anything unusual happened. There was even time to read it.

One morning, bright and early, the French unexpectedly were found to be directly in rear of the Austrian center, in readiness to attack. How they had reached this position was unknown, but there they were. Something had to be done at once.

The commander of the Austrian right corps decided that the enemy couldn't have arrived where he was unless he had gone around the right. Consequently Case I applied, and he proceeded to put this into effect.

The commander of the center believed that it was immaterial how the enemy had reached his present position.

By Colonel Conrad H. Lanza, FA.

Never Make Assumptions as to the Enemy

It was clear that Case II was the plan to use, with fronts reversed.

The commander of the left could find nothing in his order that fitted into the situation confronting him. He determined to assume a position in readiness, pending instructions from higher authority. No instructions came, and his forces remained idle all day.

Thus the Austrians, with two corps following different plans and a third corps doing nothing, lost the battle.

In general, three or four lines of action are usually assumed to be open to an enemy. Based on these assumptions, plans are developed for each contingency. Yet the enemy nearly always does something which has not been foreseen and for which no plan has been provided.

Assumptions are habitual in peace for map problems and exercises where the enemy is imaginary or is only represented. The custom engenders the bad habit of continuing to make assumptions in time of war, where the circumstances are completely different, as a real enemy is now present. No habit is more dangerous, none more to be avoided. When made by individuals in high places, the greatest of disasters may result.

Analyses of assumptions as to the enemy, made by the Allies in the present war in Europe show how extraordinarily dangerous and unmilitary the practice is. The consequences of erroneous assumptions entirely changed the situation as envisaged at the time the assumptions were made. They were sometimes disguised as opinions, or by using expressions such as *it is believed*, etc. A common form was to refer to the advice of "The military experts." All this in no way changes their character. In the war in Europe some assumptions were based on no evidence, being purely opinion; more were based on partial evidence. Reasonably complete evidence was occasionally available, and was assumed to be unimportant and therefore was disregarded. Sometimes a doubtful interpretation was placed on the evidence, but was assumed to be the correct one.

The writer, in a previous study presented in this magazine, has pointed out a number of illustrative instances where the Allies, prior to the outbreak of the war, made erroneous assumptions concerning the Axis powers. Among those having the most far-reaching and unfavorable results may be mentioned the miscalculation as to the Russo-German relations, and as to the Axis' resources, both military and economic. Further examples indicate that the Allies continued this unscientific habit after war was upon them. In those which follow herewith, the reader will readily recognize the error without the necessity for lengthy discussion.

* * * *

After Germany invaded Poland the Allies delayed two days in declaring war. The reason is not yet fully known. It appears to have been partially, possibly entirely, due to the hope that General von Fritsch would start his expected revolt against Hitler. When nothing happened in this line, war against Germany was declared. For some time the Allies continued in the assumption that revolt in Germany was probable, and only needed encouragement from the Allies. Considerable propaganda was distributed by plane to urge it forward. When von Fritsch was killed near Warsaw later in the month, the idea as to revolt in Germany was abandoned, and active propaganda efforts to secure it were dropped.

* * * *

By 16 September, 1939, Poland was in a bad way, but still was expected to last for some time. It was now known that a previous assumption as to Rumania assisting Poland was wrong; nothing was to be hoped for from this direction. Another assumption had been that Russia would remain neutral, but it was realized this was no longer certain. Ultimate defeat for Poland seemed to be inevitable. The plan for the war again had to be reconsidered. The decision was to reject peace offers, and fight on until the overthrow of Hitler was accomplished. The blockade, the known lack of gold in Germany, and the battles to be won on the French front were considered to be sure elements leading to victory.

The next day Russian forces crossed the frontier and advanced into Poland.

On 3 October Mr. Chamberlain in a speech to the House of Commons stated that he doubted that Germany had secured any advantage from its connections with Russia. He intended to refuse peace offers, would continue the war until British objectives were gained.

On 9 October the United States State Department reports announced a concentration of Russian troops, estimated as 700,000 strong, opposite Finland; of these 250,000 were within 25 miles of the frontier. On 10 October Finland was mobilizing. Further reports to the State Department stated that an agreement had been reached between Germany and Russia for the eventual return of Bessarabia by its cessation by Rumania.

Offsetting the foregoing, the Allies announced on 13 October that they had signed an agreement with Turkey, providing among other things that if Italy entered the war on the side of Germany, Turkey would enter on the side of the Allies. A "loan" of about $100,000,-000 was granted to Turkey, on 25 October, in return for this valuable understanding.

On 26 October Mr. Chamberlain announced that in British opinion Russian occupation of Polish territory was considered as against Germany and as a protection to Russia.

On 27 October, Mr. Saracoglu, Turkish Minister of Foreign Affairs, had returned to Ankara after a prolonged visit to Moscow. He had had conversations with Russian officials, and had formed a pretty good idea of Russian intentions. The gist was that Russia would seize Bessarabia, Bulgaria, south Dobrudja, and Hungary

Transylvania, all at the same time at the expense of Rumania.

* * * *

On 23 December, a leading French journalist summed up the opinion of the French leaders as: "Chancellor Hitler counted less on a military offensive—which if it were checked, as is probable, would be catastrophic for his prestige in the eyes of his own people—than on our lack of initiative, and of interior decomposition. This war has therefore, above all, become a psychological war."

* * * *

As early as 10 January, 1940, G-2 of Allied GHQ heard that Germany would have 240 divisions by spring, presumably for use somewhere. G-2 was unable to see how this could be possible. In his opinion there were insufficient trained officers and NCO's for such a force. He assumed these were propaganda tales, not to be taken seriously.

* * * *

On 17 January, Mr. Ronald N. Cross, British Minister of Economic Warfare, stated in the House of Commons that Allied control of the world's gold, plus the blockade, were slowly but surely bringing German to her knees. "We look forward to the day when we shall have so strangled Germany's economic life that she can no longer sustain her war effort. By that means we believe we can bring nearer the day of reckoning and save the lives of our people."

On 20 January, 1940, Mr. Winston Churchill, also in the House of Commons, stated: "When we look behind the brazen front of Nazidom, as we have various means of doing, we see many remarkable signs of psychological and physical disintegration. We see the shortage of raw materials, which already begin to hamper both the quality and the volume of their war industry. We feel the hesitancy of [German] divided council, and the pursuing doubts which assail and undermine those who count on force, and force alone."

* * * *

On 28 January, the British press, possibly inspired as a feeler, reported that the opinion of British leaders was that the Allies must find a method to shorten the war by forcing Germany to come out from behind her West Wall and fight when and where the Allies wished. It was proposed to do this by more strongly interfering with Germany's securing resources in neutral countries. The Allies would proceed, regardless of cost, to undersell Germany in any markets she still had; and to overbid wherever she purchased. If Germany wished to oppose violently such economic action, she would have to emerge from her shell and fight. By selecting the areas where the economic pressure was to be placed, the Allies had it in their power to choose the theater of operations best suited to them. It was debatable whether it would be best to interfere with German access to ore fields in Scandinavia, and thereby compel Germany to fight in those regions; or whether it might not be better to interfere with oil and food products from Rumania, and thereby induce Germany to invade the Balkans. In either case it was assumed that the German forces could be stopped by superior forces, while being required to expend rapidly their diminishing stock of resources.

NOTE: Aside from the assumptions made in this pian, its publication in the newspapers was notice to the enemy of what was proposed to be done. Germany thus informed, lost no time. She arranged to seize the two areas mentioned, in the order named, and before the Allies could get there. This publication was on a par with the publication by the Allies, before the war started, of the intent to adopt the strategic defensive, and count on economic warfare.

* * * *

On 31 January, 1940, Swedish reports stated Germany was assembling shipping in the Baltic Sea, and had been for a month past. An assumption was made by the Allies that these were transports for possible use in case they sent troops into Scandinavia to interfere with German ore shipments, or to assist Finland, who was then at war with Russia. The reports as to the shipping and as to embarkation and debarkation drills were repeatedly confirmed thereafter. This was believed to indicate that Germany foresaw Allied supremacy in Scandinavia, and was becoming desperate. The Allies were not alarmed. Germany had no chance of winning the war, and was approaching impotence because of the economic warfare against her. No one thought Germany might enter the indicated areas first.

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On 12 February, 1940, M. Edouard Daladier, at a GHQ conference, expressed his belief that perhaps Germany would have 240 divisions ready by spring, while the Allies certainly would not have any comparable number for a long time. He thought that this large hostile force indicated an intent to assume the offensive. Where would it be? Present available records fail to show what Allied GHQ replied to M. Daladier. He appears to have been reassured that there was no danger.

On 24 February, Prime Minister Chamberlain expressed complete confidence in victory. The Allied plan was working out as intended. On the same day, the French press stated the general opinion in France was that it would be suicidal for Germany to attack France. Consequently there would be no German offensive in the spring. This may have been Allied GHQ's reply to M. Daladier's doubts. No attention was paid to a speech by Hitler, also on this day, in which Hitler stated he was sure of victory. That was just propaganda.

On 28 February, M. Daladier, apparently now completely reassured, informed a committee of the Chamber of Deputies, that based on secret information, Germany was laboring under grave difficulties, and that he was sure of victory.

On 29 February, 1940, Great Britain stopped the importation of German coal to Italy. This normally moved by sea in neutral ships from the mouths of the Rhine (in a neutral country) to Italy, neutral at this time. The British seized and condemned the coal ships.

Italy vigorously protested this action as a violation of international law. The British did not argue the point. This was economic warfare, which required stoppage of all enemy trade regardless of whether it moved through neutral channels or otherwise. Germany received money or credits for the coal, which in volume amounted to around a million tons a month—a very sizable traffic. This enabled Germany to finance the war. Great Britain was determined to stop this, whether neutrals liked it or not. She realized that Italy produced little coal, had to import large quantities if her industries were to function. However, there was plenty of Welsh coal available, which was better than German coal. Great Britain would supply this at a very reasonable price at any time, and in any quantity.

On 1 March. Mr. Raymond Daniell, London correspondent of the *New York Times*, reported that the British government expected that the stoppage of coal to Italy would cause Mussolini to bluster a while, but that faced with the necessity of having coal, he would shortly accept the situation and accept the terms of the Allies. This would bring Italy to the Allied camp.

NOTE: What really followed was that Germany forwarded the coal by rail. The reports of the U. S. Consular Service show that slightly over a million tons a month were thus delivered to Italy in March, and thereafter to include August, 1940, last month reported on.

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On 10 March the British military "expert" Liddell Hart wrote: "A dawning realization of the improbability of any decisive issue on land, owing to the strength of modern defense, has led increasingly to a cry for trying the effects of an air offensive." He then explained the impracticability of accomplishing anything decisive in this way. In Paris, it was common gossip, and not denied, that General Gamelin had stated in substance that with their fortified lines both France and Germany were invulnerable, and that whichever of the two countries came out of its shell was doomed to defeat. The American press and to a lesser extent the British and French press expressed dissatisfaction at the slow progress of the war. In the United States it was alleged to be "phoney;" in France it was claimed that the government lacked initiative and energy; in England, many believed that a change of government might hasten the end of the war, through adoption of a more vigorous policy.

On 28 March, 1940, the Allied Supreme War Council met. It had the foregoing views before it. It was decided to immediately tighten the blockade, irrespective of interests of neutrals, on the ground that angry neutrals were better than losing a million men in casualties, as seemed probable if a land offensive were undertaken against the West Wall. The reenforced blockade would either force Germany to surrender without a fight, or else come out and fight in any field the Allies might select.

This decision modified the policy of the strategic defensive in favor of a new policy of the limited offensive. It remained to carry it into effect.

On 30 March, the French press suggested that a start be made on this plan by controlling Norwegian waters, as an effective method to stop ore exports from Narvik to Germany. The press next suggested seizing the Dardanelles as an initial move to intervention in Rumania with a view of stopping oil traffic to Germany. It was no longer possible or desirable to defer to feelings of neutral nations. Anyway the latter, under Article 16 of the Covenant of the League of Nations, should be willing and glad to assist the Allies. Liddell Hart published a new article suggesting that the war was a stalemate, and that neither side could force a victory.

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On 4 April, Mr. Chamberlain at a party gathering told his audience that the blockade was working; leaks in it were about to be closed. He now was ten times more confident than when war broke that he was leading the winning side. Hitler's best time to attack had passed; in his opinion "Hitler had missed the bus."

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According to British sources, on 7 April a report came in that a large hostile naval force was moving toward and along the west coast of Norway. French sources reported a German naval force as 20 miles north of Heligoland. The British main battle fleet, plus the 2nd Cruiser Squadron, was immediately ordered to sail and engage the enemy. Steam being up, the fleet sailed from Scapa Flow the same afternoon.

On 8 April the British fleet was unable to find the reported hostile naval force. It was explained that it had been foggy. It was assumed that the enemy was on a cruise; there was no way to ascertain which way he had gone.

In furtherance of the plan adopted by the Allied Supreme War Council, the French and British ministers to Norway officially informed that government on 8 April that in view of brutal sinking of ships by Germany, plus attacks by air forces, that no matter what, under German threats, Norway's policy might be, the Allies would no longer tolerate Germany receiving resources through Norwegian waters. They had therefore decided to deny to Germany the use of such passages. Formal notice was given that mines were being laid that day off three sections of the Norway coast.

The Allied navies laid the mines as announced. Ships so engaged then withdrew, less one destroyer, which remained to blockade Narvik. Confirmation was received in the morning hours that large German naval

forces were moving out of the Baltic towards the North Sea. The 1st British Cruiser Squadron was ordered to join the fleet already at sea seeking the Germans. During the afternoon numerous German ships were from time to time momentarily seen in the haze south of Norway. They were not identified; no one appears to have suspected that anything unusual was about to occur.

On 9 April, German troops simultaneously landed at various places in Norway. They proceeded to occupy that country. Although the Allies had foreseen several plans open to the enemy, they had not foreseen this one, and were not prepared for it. Nevertheless, they decided to go at once to Norway's assistance. They promised immediate and full military and naval support. They expressed pleasure that Germany had come out in the open. Both French and British press, and speeches in the House of Commons, indicated that it was believed that Germany with her slender stock of supplies, had made a serious strategic error in extending her lines to include Norway. It was a worse error than Napoleon's invasion of Spain.

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On 11 April, the British Admiral commanding, Sir Roger Keyes, recommended a naval attack against Trondheim. This harbor has a narrow entrance, defended by several batteries. An attack might result in some loss of ships; he was willing to risk this. He considered this action indispensable; in his opinion no passive blockade of Germans already in Norway would satisfactorily solve the problem of getting them out. The ships available were the battle fleet, and the two cruiser squadrons, sent out into the North Sea to find and defeat that elusive hostile naval force first reported on 7 April. At that date the German invasion had not been foreseen. Had it been, the Admiralty would have provided some second-class ships to attack coast fortifications. The Admiralty did not consider it advisable to risk loss of the first-class ships which were the only class near Norway. The recommendation to attack Trondheim by a sea force was recognized as a correct solution. It was assumed, however, that it was not indispensable, and under the circumstances it was disapproved.

On 11 April, Great Britain made it known that she was thoroughly prepared to take over the colonial possessions of any Power joining Germany. She was particularly well prepared to seize Italian territories in Africa. These were obviously vulnerable, would fall easily into the hands of the British should Italy join Germany.

On 15 and 16 April, French and British troops landed in Norway. These leading elements had been assembled in Scotland some time past with a view to being sent to Finland. They had been equipped for this mission. When Finland capitulated, that mission had disappeared. No new one being in sight, the expeditionary force was in process of disbandment. Nothing was ready for the present task; no ships; no maps; next to no information as to the situation in Norway. Ships that happened to be nearby were utilized. Traveler's guide books were issued in lieu of maps. Landing places were selected by having air reconnaissances locate places where there were no Germans.

The landings were normal. There was no opposition, at least not at first. The troops advanced some distance. The British and French press were rather jubilant. They published well written and interesting articles as to the troubles the Germans were in for. owing to their ill advised invasion of Norway. Allied control of the sea insured a constant influx of reenforcements to their forces; it was simply a question of time until the Germans were overcome.

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On 21 April, M. Reynaud, the French Premier, said that Italy had given no encouragement to proposals for an amicable settlement of the Mediterranean question. The Allies had taken the opportunity to make it very clear that they favored a *status quo* in the Balkans. Under no circumstances would they tolerate any Italian initiative in this direction.

After what had happened in Norway, it was again necessary to re-examine the war plans. Germany might start an offensive elsewhere. The Allies considered that Germany was approaching a shortage of certain essential resources, especially oil. Should she succeed in securing Norway, iron—another essential resource—would definitely be available to her. But there was no oil in Norway. Sooner or later Germany would be in a desperate condition.

Of course Germany must eventually realize that essential resources were about to be exhausted. It was possible that she might surrender when this stage arrived. It was also possible that she might prefer to go down fighting. A man like Hitler probably would do this very thing.

On 23 April the Allied Supreme War Council held a meeting in Paris. At its conclusion they issued a communiqué stating they had discussed and had fully provided for "political and military problems which may at this time call for vigilance so as to assure in good time against any enemy initiative."

The enemy initiatives considered possible were not specified. The action taken indicates that the lines of action open to the enemy's initiative, and the corresponding plans to meet these contingencies, were as follows. The enemy might either:

I. Turn the left of the Allies by attacking through the Low Countries.
II. Make a frontal attack against the Maginot Line.
III. Turn the right of the Allies by attacking through Switzerland.
IV. Attack through the Balkans to seize resources.

Case I the Allies had foreseen for some time. They had begun seriously to prepare for it as early as March, 1940. In that month the British deployed along the south Belgian frontier, and using mechanical excavators brought over from England, dug extensive lines of deep antitank trenches. After the meeting of the Supreme War Council of 28 March, at which time public discontent at the slow progress of the war was evident, the idea of maintaining a tactical defensive on the French-Belgian border appears to have been abandoned in favor of advancing to the assistance of Belgian and Dutch forces. It would be an excellent idea to fight the Germans in the open. The Germans were nearing the end of their resources and would not be able to fight for very long.

Allied GHQ believed that the Germans would not have over 120 divisions in the spring. Twenty would be needed to guard the West Wall, and twenty more to keep subject Czechs, Poles, and other races from revolt under German rule. This left 80 divisions for an offensive. About 60 had been identified opposite the Low Countries; probably 20 were in reserve. This looked like a very reasonable estimate. Not counting the troops in the Maginot Line, there were 70 British and French divisions and about 24 Belgian and Dutch divisions. The combined force would be superior in strength to the enemy. They would have a better chance of success if they operated together than if they operated independently, one after the other.

Besides, Holland had arranged to inundate large sections of her territory; this would hamper any invader, by requiring him to advance on a narrow front, where he could be readily contained. Belgium had very strong forts at Namur and Liege to protect the north sector of the country. In the south were the Ardennes mountains, very rough and covered with dense forests, most difficult to traverse, and defended by specially trained mountain units.

No probability of German success was seen. Nobody except a desperate Germany would think of attempting such an enterprise. But when Germany found herself nearly out of supplies, desperate acts were to be expected and therefore had to be provided for.

For Case II, a frontal attack, there was not the slightest fear. The Maginot Line was not impregnable, but it could be pierced only by mass attacks, which would surely be most bloody and would involve a casualty list of between one and two million men. It would require expending all the trained army and all the munitions, gasoline, and supplies that Germany could muster. If successful, there would be few men left, with probably no supplies, to continue the war. The Allies would have those 70 British and French divisions, possibly more, which formed no part of the Maginot Line garrison. This Case was thought to be very improbable.

For Case III, an advance through Switzerland, the argument was similar to Case I. The terrain would be unfavorable to an invader, as it was full of lakes and mountains. An almost ideal territory for defense. Swiss are hard fighters. They were mobilized, standing by to defend their beloved homeland. This Case, however, was considered as having some degree of probability. As a precaution the French fortified their frontier with Switzerland.

Of all lines of action open to the enemy, Case IV seemed to be the most promising from his point of view. From the beginning the Allies had thought that this was what, sooner or later, he would do. The prize was the grain and oil fields of Rumania. Allied calculations indicated that if Germany secured all of Rumania's oil, it still would not be enough for her war needs. It would give temporary relief and thus prolong the war.

Counter action had commenced as early as April, 1939. A guarantee was given to Rumania, with the hope that she would join the Allies and oppose the Germans; if necessary she could destroy the oil fields. To provide against an attack by Bulgaria, against Rumania's south boundary, a guarantee was given at the same time to Greece, and negotiations opened and later concluded with Turkey. These two states would be able to stop Bulgaria. Until the war started it was further expected that Russia was with the Allies. She was in good position to help Rumania with troops and supplies.

The Allies did not stop here. To further strengthen the Balkan front, a French army was organized in Syria; a British army in Palestine. Their numbers were stated as being 150,000 or more. They were in readiness to be sent to the Balkans, as and when needed, either via Constantinople or by way of Salonica. With these armies, plus Rumanians, Greeks, and Turks, enough troops appeared to be in sight to protect the Balkans. Even without Russian help, this seemed almost a certainty. If nothing more than an active front was maintained in the Balkans, rapid exhaustion of German resources was bound to follow.

After considering and providing for what they thought were all the lines of action open to the enemy, the situation to the Allies seemed to be well in hand. There were sufficient forces everywhere to contain the Germans, if they tried to break out of their blockaded country. There were differences of opinion as to how long Germany could last, no difference that she could not last more than a restricted time. All that was necessary was to maintain the economic warfare, which was slowly but surely throttling Germany; hold the lines indicated by the four Cases; and wait for a desperate sortie when the Germans saw the inevitable end in sight.

Early in May, 1940, there were rumors that Germany would attack shortly on the west front. The Allied plan was ready for this. Precautions were taken; CPs were manned day and night. On 9 May tension relaxed. The information was conclusive that there had been no change either in the numbers or positions of the 60 German divisions opposite Holland and Belgium. Neither

was there any unusual activity among them. Reports agreed that their normal routine was being followed. Everything was so quiet that the Dutch C-in-C for the first time in some days left his CP that evening and retired to his quarters. He was there when the German assault burst over his head at daylight the next morning.

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The German attack on Holland and Belgium caused immediate reaction among the Allies. Although they had not expected the attack on this particular date, they had foreseen and prepared for it. The Allied plan assumed that the main German effort would be on the north. History pointed to the von Schlieffen plan as that which the enemy would prefer. This called for a strong marching right. The terrain was suitable for field movements on this flank. On the other flank were the Ardennes mountains, not at all suitable for an advance, which besides would be against the historical precedents. Consequently the best Allied troops in the greatest numbers had been posted on their left. They moved gaily forward to join their new Allies, Dutch and Belgians, fully expecting that with them they were going to give the death blow to any hopes the Germans might have of escaping their fate.

The Allied right was weak. The Ardennes mountains, 60 miles deep, were protected by those special Belgian forces. There were only a few roads through this country; not many troops were needed to defend it. The French Ninth Army under General Corap was back of the Ardennes, and disposed in considerable depth to defend the Meuse River, which ran about perpendicular to the direction the enemy would have to come. This river was no mean obstacle. It was unfordable, ran in a narrow valley several hundred feet deep, with precipitous banks. A railroad and trail ran through the valley, the main automobile road was on the high ground on the Allied side. There were few bridges. It was so easy to defend that only a portion of the Ninth Army was on the river, the balance being in reserve in rear. The cavalry was across the Meuse to maintain contact with those special Belgian troops. No signs of any important enemy movement here.

On 13 May, German mechanized forces attacked the Ardennes front in great force. They drove in those special Belgian troops so fast that they had no time to blow up bridges and culverts, arm the road mines, or demolish the structures which ought to have been destroyed. Moving at tourist speed, they ignored the French cavalry, and arrived at the Meuse before the defending troops knew any enemy was near. They were even able to cross the Meuse at several points before the French realized that strong enemy forces were around.

On 14 May, pushing across the gaps they had made, the Germans occupied Sedan, again secured the bridges, and went 10 kilometers beyond. The French were unable to understand what had happened. Some thought this was an enemy raid by minor forces which had accidentally found a weak point in the line. The fact that on 15 May the Germans made no important advance in this sector gave color to this assumption.

That day the Supreme War Council held a meeting in Paris. It lasted from 6.00 to 8.30 PM. The situation was serious. The Dutch had surrendered; the Germans were at Sedan. Were the latter in strength or not? A wrong decision at this time was liable to be fatal. According to M. André Maurois, French liaison officer to British GHQ, the British opposed a retreat from Belgium; they preferred to counterattack and fight it out. "The first reaction of Winston Churchill [a member of the Council] after the engagement at Sedan was to minimize the seriousness of the defeat. Arriving in Paris on the 15th of May, he astonished and revitalized the Supreme Council by the vigor of his determination. Those that saw him that day were filled with admiration at his rage, which was like that of an old lion, and at the power of his eloquence. He was opposed to the idea of a retreat from Belgium and the abandonment of Louvain and Brussels. He wanted to fight the offensive by a counter-offensive."

In spite of this heroic attitude, the Supreme Council decided to withdraw the Allied left in Belgium. Counterattacks were to reduce the "pocket" about Sedan. Local reserves were made available for this mission; the Allied left was not weakened.

This decision was fatal. The Allied forces on the right were completely unable to stem what was in fact the main German effort, led by their best and most heavily armed divisions. It had not been realized that these were massed on the German left. It had been assumed they would be on the opposite flank.

In the ensuing battles the British were driven from the continent of Europe. France, Belgium, and Holland were conquered.

COMMENTS ON ALLIED WAR PLAN

Everybody now knows that the initial war plan of the Allies was defective. What was the fault?

The plan assumed that Germany could be overcome without serious fighting, solely by interfering with her receiving certain supposedly essential supplies. The intention was the laudable one of saving lives. This was to be an economic war, rather than a military or naval one. It was the modern and civilized way, made possible to the democracies, and to them only, by reason of their extraordinary wealth, resources, coupled with sea power. It was an extension of the idea of sanctions embodied in the Treaty of Versailles. It was a bloodless method to force international law breakers to maintain the peace. This had been the dream, the ideal, of the democracies for twenty years—to preserve peace by controlling war resources. Germany having broken the peace and having defied the democracies, was now to be throttled until she was compelled to surrender. It would not be necessary to engage in major land warfare.

Among the resources to be denied Germany, oil was probably the most important. Without it motor transportation would not run, planes could not fly, ships could not navigate. Could oil be denied to the Germans? The Allies figured that it could and would be.

Including German-occupied territory, the production and importation of oil for 1938, latest year for which statistics were available, was around 8,500,000 tons. It was assumed that all was used, and represented normal peace requirements. Of this amount, Germany proper (excluding Austria) had used 3,212,000 tons of gasoline and 2,201,000 tons of heavy oil; say 5½ million tons in all.

How much oil Germany would need in war was unknown. All estimates assumed that it would be considerably more. Some estimated 30,000,000 tons; others as low as 11,000,000 tons. The latter figure was just double German peace requirements.

Home wells plus synthetic production had produced 2¼ to 3 million tons per year. It was assumed that possibly this might be increased to 4 million tons. Oversea imports, normal source, could be completely cut off by the blockade. Rumanian oil production had amounted to around 5,500,000 tons annually, of which amount Germany took 1,000,000 tons; this was believed to be the maximum amount which could be transported overland. In the unlikely case that Rumania used no oil herself, and that Germany could receive and transport all of it, it still would be below war requirements.

Russia, if willing, could supply oil. It was believed that the Russian railroads were in such bad condition that rail transport would be out of the question. In theory, oil could be sent in tankers across the Black Sea, thence up the Danube River. But the Danube was believed to be used to capacity to transport the 1,000,000 tons from Rumania. To make sure, the Allies, at high prices, chartered those barges on the Danube which were not under the German flag, and then tied them up. They arranged with Turkey to admit Allied warships to the Black Sea to stop tankers if this route were used.

The Allied argument is a paper argument. It contains too many assumptions. It is not necessarily true that war requirements will exceed peace requirements. This is a question of fact; to determine it the exact figures are needed. Germany and Italy on outbreak of war stopped the use of gasoline for private consumption and for some government services. For six months after the conquest of Poland, the German land, sea, and air forces engaged in no important operations. For interior transportation animal-drawn and steam-railroad transportation was available. There may have been a large saving of oil during this period.

It is not necessarily true that all of the 8,500,000 tons imported and produced in 1938 was consumed. A considerable part may have been put in war reserve, the consumption may have been correspondingly less.

No one outside of Germany knows how much oil was on hand when the war started.

On 6 April, 1940, a Belgian engineer, a neutral at that time, made an estimate on German oil requirements. According to an exhaustive study, he reported the following figures:

German production for 1940	4,800,000 tons
On hand, 1 January, 1940	3,000,000 tons
Imports from Russia and Rumania	3,500,000 tons
Total probable supply for 1940	11,300,000 tons

Since that date there have been changes in the situation. Latest statistics report that the Rumanian production for 1939 was nearly 6½ million tons, or a million tons more than the Allies allowed for. A count of barges passing Budapest shows that the oil moving by this route to Germany would be just about a million tons per annum at the rate it was moving in June. It may have been speeded up since then.

Oil is also moving by rail from Rumania to Germany. In June this amounted to around 25,000 tons a month, may have since been increased.

Alsace-Lorraine has oil. It is now in German possession. Apparently the oil fields were undamaged by the combat operations. This source may produce easily 500,000 tons per annum.

Poland has extensive oil fields, which used to produce 1,000,000 tons yearly. Production was allowed to fall to around 400,000 tons, as it was cheaper to import American oil. There is no report as to how much oil Germany is obtaining from this source.

For obvious reasons Germany is publishing no figures. There is no reliable information as to how much oil she uses, and how much she is receiving. One thing is certain, notwithstanding any assumptions previously made, Germany and Italy have found oil with which to stage very considerable military operations. Assumptions that the Axis has insufficient oil to continue the war, or is approaching this condition, are hazardous guesses. It may be so, but this has not been proved.

Germany conquered Poland in record time. Her consumption of resources was less than the Allies had counted on. According to German reports, during September, 1939, the expenditure of gasoline and oil was less than the receipts. There is no means of verifying this claim, but it should not be dismissed as impossible. Allowing for oil captured, it may have been so.

Large quantities of gasoline and oil were captured in the conquest of France. How much did Germany expend from her oil reserve? Nobody knows.

During the interval of six months between the close of the Polish campaign and the opening attack on Norway, German land, sea, and air forces were at a low state of activity. What quantity of resources were accumulated in this period is unknown. In his speeches Hitler stated that leaks existed in the blockade. The

inference is that he was continuing to receive at least some needed supplies.

It would take too much space to discuss the assumptions that were made as to the possibility of stopping essential supplies, other than oil, from being available to the Axis states. The German GHQ, whatever defects it may have, is not lacking in intelligence. They have announced that they figured on the war lasting five years, and were prepared for this. To assume that this is a false statement; that they were in fact prepared only for a short war; that no provision, or insufficient provision, had been made for a long war; and that consequently the war would end with exhaustion of essential supplies in Germany, represents wishful and muzzy thinking.

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In war no *assumptions* should ever be made as to the enemy. This applies equally to his reserves and his resources. If it were known *what* these are, and *where* they are, plans can be drawn to meet the situation. Sometimes an enemy's intentions become known in advance. German GHQ has reported that it knew the Polish war plan before the war started; consequently, having superior forces available, they could so dispose of them as to insure a quick victory.

Possible lines of action open to the enemy should be considered and suitably provided against. But no *assumption* should be made that the enemy will adopt one of the courses discussed. He may have sufficient ability to think of a plan which was neither foreseen nor provided for. Consider the examples of the present war where Germany has consistently used plans which were not foreseen by the Allies.

The Allies failed to foresee the attack on Norway. The attack on the west front was foreseen, but the fatal assumption that the main weight of the German advance would be on the marching right flank turned out to be the cause of one of the greatest military disasters ever recorded.

Owing to ample discussions by the Allies in the press of their proposed plans, Germany knew what their assumptions were. Discussions by "Military experts" in magazines and newspapers, by public men before parties or public bodies, generally correctly reflected the government opinion and intent. It was only necessary to apply the principle of surprise, by operating in a different area, or in a different manner, from what had been assumed.

Seldom is complete information available on enemy reserves and resources. What there is no information on, should never be *assumed*. Guessing leads to one error after another. The enemy should be considered as reasonably intelligent. He may have reserves and resources known only to himself.

What, then, should be done? Reserves, properly posted, are the correct protection against a surprise attack. Had the Allies in May, 1940, possessed such reserves, the German penetration near Sedan might have been arrested. A faulty assumption, of which the enemy was aware, was followed by a surprise attack which won the campaign for the Germans.

Preventing the enemy from access to essential resources is proper and necessary. When there is no evidence to the contrary, no *assumptions* should be made that resources cut off will result in the enemy being forced to stop fighting. It is only a possibility. The enemy may have sources other than those generally known; he may have stocks; he may no longer use that particular kind of supplies; by alliances or by secondary campaigns he may secure the supplies, or satisfactory substitutes elsewhere.

Mr. Hore-Belisha, British Secretary of State for War in 1939, is reported to have stated that this would be "a comfortable war." Very nice if it could have been realized. The idea was based on the assumption that economic warfare alone could win the war, and that major fighting could be dispensed with. All will now agree that the assumption was erroneous.

CONCLUSIONS

Nothing is more injurious in war than plans which do not rest on a broad basis of fact.

It is dangerous to permit public discussion of, or publication concerning, the probable intentions of the enemy, or of our own intentions.

IN WAR NEVER MAKE *ASSUMPTIONS* AS TO THE ENEMY.

As of November 30, 1940, Regular Army batteries in the *continental United States* were commanded by reserve officers as shown in the table below:

Number and Type of Batteries in Continental U. S.		*Number of Reserve Officers, by grade, who are commanding batteries*			
		Captain	*1st Lt.*	*2d Lt.*	*Total*
9	Div Arty Hq Btries	0	0	0	0
2	Brig Hq Btries	0	0	0	0
11	Regtl Hq Btries	0	3	0	3
63	Bn Hq Btries	0	14	5	19
38	Serv & Am Btries	1	16	2	19
4	Obsn Btries	0	1	0	1
11	Antitank Btries	0	0	0	0
184	*Firing Btries*	1	37	13	51
322	Totals	2	71	20	93

FROM THE CHIEF'S OFFICE

INFANTRY-ARTILLERY INTERCOMMUNICATION

The question has been asked from several sources as to what is proposed in the way of radio equipment for artillery-infantry inter-communication in the new organization. This is a vital question. If the infantry-artillery combat team is to be a team in fact, the interlocking of the communication systems (wire and radio) of the two arms must be assured.

The installation and maintenance of wire circuits from the supporting artillery to the supported infantry is an artillery responsibility. This provides the necessary interlocking of wire systems. In addition, an artillery battalion in direct support of an infantry regiment (combat team) sends a liaison officer to the assault infantry battalions and provides him with a direct wire circuit for communication with the artillery battalion command post. Thus a direct channel is insured for the flow of information from the assault battalions to the supporting artillery.

It is communication doctrine that "no one means of signal communication can ever be considered infallible; appropriate alternative means must be immediately available, if not in actual operation." To accomplish this, radio is used to supplement wire.

The new T/BA for Field Artillery, 6-1, November 1, 1940, does not provide a separate set in the battalion solely for artillery-infantry radio communication. However, the new SCR-285 set, replacement for the SCR-161, will cover the frequency bands of the infantry SCR-131 and SCR 171 sets. The SCR-285 will permit the artillery to enter any SCR-131 infantry net. Furthermore, in the development of a set to replace the SCR-131, the infantry and the artillery expect to obtain a set which will meet the requirements of intercommunication and intracommunication for both arms. Therefore, radio communication between the infantry regiment and the supporting artillery battalion becomes available.

The SCR-285 is being developed by the Radio Corporation of America. Until development sets are in production, thirteen hundred RCA sets, of a type developed for the Swedish government, are being procured for the field artillery and infantry to replace the present SCR-161 and SCR-131. These sets will be known as the SCR-288.

RADIO FOR THE ANTITANK BATTALION

The antitank battery of the medium battalion has been authorized five SCR-245 radio sets, or substitute vehicular radio sets. The divisional artillery headquarters battery, each battalion headquarters battery, and the antitank-antiaircraft platoons of the battalion headquarters battery have been authorized similar sets. While it is unknown as to just what the final answer as to the tactical employment of these units will be, the radio communication provided will permit almost any combination of nets which may be desirable, or permit all the antiaircraft-antitank elements being netted together if the situation warrants. The infantry has also set up the SCR-245 for their antitank units. Thus the interlocking of the radio nets of all antiaircraft-antitank elements of the division and their coordination by the division will be assured. If a more suitable vehicular set than the SCR-245 is found (for example, the frequency-modulated police radio sets now being tested by the Field Artillery Board and by the Infantry), both arms must be together on its adoption in order to assure intercommunication between all elements of the division.

* * * *

The following reply was written by the Chief of Field Artillery to a letter received by him from a Regimental Commander of the Reserve Corps. Similar letters and similar replies have been so numerous over the past few months that it is deemed wise to publish this part of the correspondence, as being of information to others who would like to make the same kind of inquiry. The desire of experienced Reserve officers and World War officers to be called to active duty and, therefore, to be of use during the present emergency is commendable and inspiring. The reason why use is not yet being made of them is explained in this letter by the Chief.

December 6, 1940.

My dear Colonel:

Your very fine and interesting letter of the 1st instant was greatly appreciated. It reflects a most inspiring attitude of helpfulness and cooperation, and a deep personal interest in the successful training of our armed forces during the present emergency. Its frank statements regarding our failure to use the experience of officers who like yourself learned the never-to-be-for-gotten mobilization, training, and combat lessons of 1917-18, and these statements made with courtesy and directness to your Chief of Arm marks your letter as being from a disciplined and square-shooting soldier. I only hope that my reply will be able to affect you as favorably.

In the Field Artillery of the Regular Army today, 51% of our officers are in the field grades; whereas in a tactical or training organization such as the Division Artillery, the proportions are 12% field grades and 88% battery grades.

Our excess in the field grades is due to the recent action of Congress in alleviating promotion stagnation due

to the so-called World War "hump," which is the term applied to the group of emergency officers who remained in the enlarged Regular Army after the last War. It is the group to which you would now belong had you elected to remain in the Army after the War. The promotion of these officers has been much slower than your own in the Reserve Corps, since only this year were the last of our World War Regulars raised to the grade of Major. Were all of these officers, 383 of whom are still majors, promoted to the grade of Colonel, they would simply be on a par so far as grade is concerned with most of our World War officers of the Reserve Corps. Therefore, they would seem very properly to deserve, in our expanded Army, assignments appropriate to the grades of Colonel or Lieutenant Colonel, ahead of Colonels or Lieutenant Colonels of the Reserve Corps.

At the present time our expanded Field Artillery troop units require only 31% of our available field officers. The remainder are on various D.O.L. assignments and many of these such as those with the R.O.T.C., the National Guard, and the Organized Reserves, are gradually being returned to us for reassignment to existing or projected troop units.

All of the above indicates clearly, I believe, that we are not yet at the point where Reserve officers like yourself are really needed. It would be very desirable to have your knowledge and experience instead of the lesser experience of our junior officers of the Regulars and Reserves, but officers of your age and length of service cannot appropriately be used to perform the functions of junior officers.

To build a combat army, junior officers as well as enlisted men must be trained. Nor can we appropriately use 3 or 4 colonels in one regiment: nor 5 or 6 lieutenant colonels or majors in one battalion; nor do I want any field officer to command a battery, thereby preventing a 1st lieutenant from so functioning and being trained accordingly.

A most remarkable number of our very finest World War officers, not now in any way connected with the service, in the most commendable and unselfish spirit of helpfulness and patriotism, again hear the bugles calling and, like you, feel that their experience should be utilized in the present emergency. The pertinent questions are: "Should we call these men before we call those who, like you, continued their part-time training ever since the last War"; and, "should we call you before we utilize to advantage World War Regulars who continued their full-time training ever since the last War?"

It seems evident to me that the answer to both questions is very properly "No."

The Field Artillery at the present time has a total of over 19,000 officers of all components (Regular Army, National Guard, Organized Reserves). At the termination of the last War we had, for an army of over 4,000,000 men, approximately 24,000 Field Artillery officers. It is quite apparent, therefore, that for the presently projected Army of 1,400,000 men, our corps of officers is over-adequate to the point where many in the Reserves will not be called. That is quite proper, for we have tried to build up a Reserve Corps sufficient to meet any reasonable emergency.

We cannot now foresee the extent to which the Army may ultimately be expanded. Should it continue to grow, however, a point will be reached at which you will be called, and then perhaps another point may be reached at which, with all Reserve Corps officers utilized, it may be necessary or highly desirable to call, for specific training tasks, many who were officers in the last War. By the time we reach this point, however, officer candidate schools will have been organized and will be functioning as they were in the last War.

It should be appreciated also that war is a job for young men. Under the democratic plan of selective service, men who fight our wars will do so because they belong to a certain age group. Experience adequately shows that the commander of a combat regiment should be not over 45 years of age, and preferably he should be 10 years younger than that. In spite of protestations that he can out-hike, out-ride, out-last his more youthful subordinates, the 50 to 60-year old officer just fools himself on his staying ability and his recuperative power. If he does not hold high command or a staff position where his age and experience count, but where comfortable shelter, good food, and a warm bunk are essential to keep his brain functioning, he can be utilized efficiently only in schools, training centers, and administrative installations. The number so needed, however, is not great, and there is always an over-supply.

You may now ask "Well, if such a view as yours is widely held in the Army, why should we in the Reserves sacrifice our time and effort, and deny ourselves pleasure, recreation and leisure, in order to reach the grade of Colonel?" The answer is precisely the same as for an over-age Regular Colonel for whom there is no chance of promotion because there are so few Generals—"because good colonels, superlative ones, are *always* needed to train the on-coming crop of lieutenants and captains." I have frequently declared that I am not particularly interested in our colonels, for the reason that war will put most of them on the shelf, but I am deeply interested in giving to the young officers of a regiment, as their instructor, example, and commander, the very best colonel that the Arm can provide.

Yes, it is well worth while, and of unquestioned value to our national defense to be a Superior Colonel, whether it be in the Regular Army, the National Guard, or the Organized Reserves.

Again assuring you that I have appreciated your letter, and with the hope that my reply may only serve to stimulate your interest in your work as a Colonel of the Reserves, I am, with cordial regards,

Sincerely yours,

R. M. DANFORD,
Major General, U. S. Army,
Chief of Field Artillery.

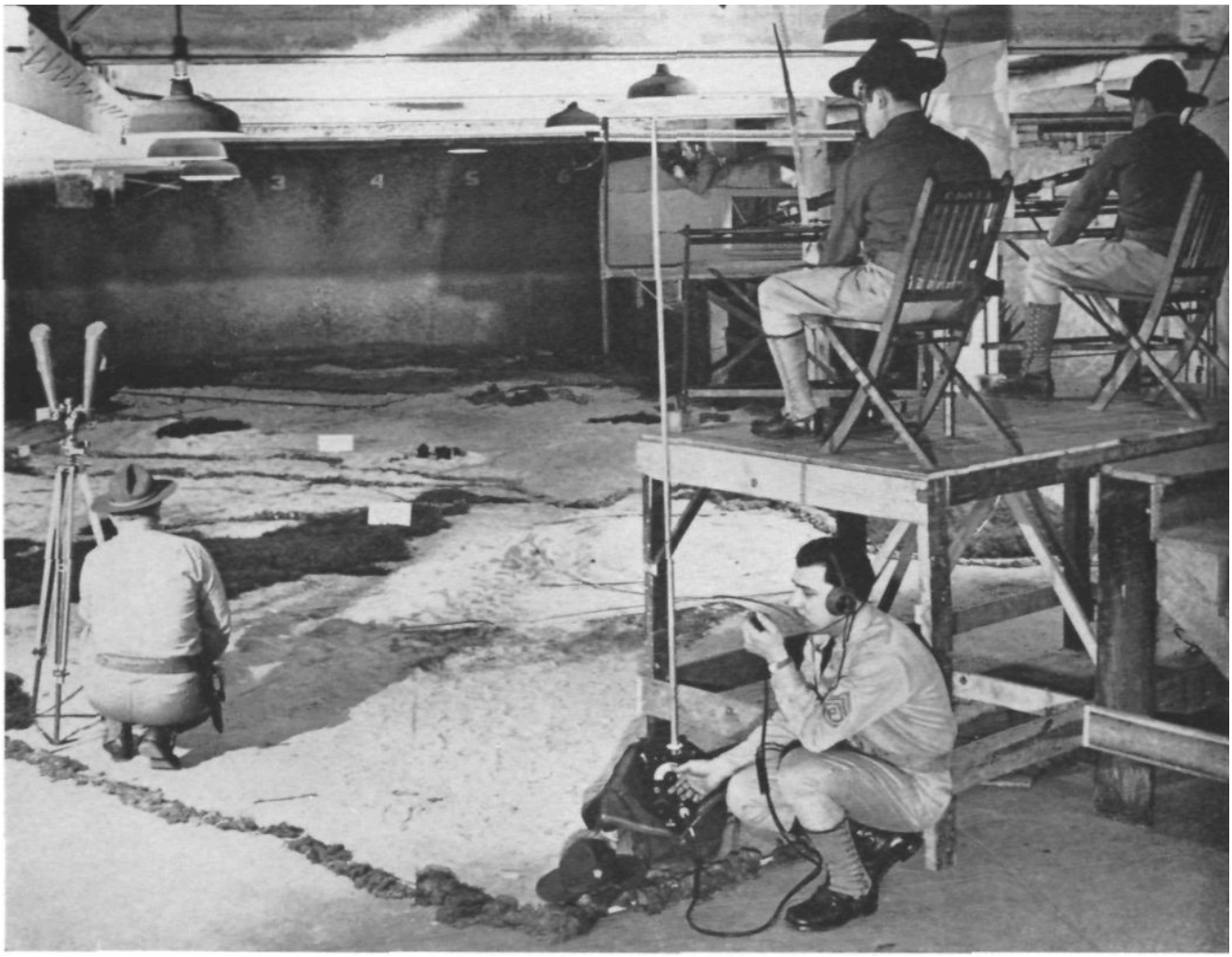
The 108th Field Artillery Trainer

Over a period of about three years there has developed, in the 108th Field Artillery, a machine which greatly advances training in gunnery, fire direction, and communication. Because the principles of construction of the device are so simple, and because it has been the central point around which the applicatory part of the instruction of officers of the regiment is based, it is believed that others may desire to construct similar machines.

It was found advisable, in instruction in precision conduct of fire, to cause bursts to be represented on the sand terrain more accurately than can be given by the issue trainer. The problem was solved by mounting a .22 caliber firearm on a bar, and the bar pivoted at its front end for vertical movement, giving range variation. The pivot pin fastened this bar to a lower bar, one end of which was in turn pivoted. The whole could then be swung right or left, giving deflection shifts.

Graduations for elevation, corresponding to the ranges at which the device fired, were placed on an are fastened to the rear end of the bottom bar, as shown in Figure 1.

By Major Louis B. Ely, FA.



INDOOR SUBCALIBER RANGE

One of the many set-ups for two classes at once. Here machines are arranged for air observation and large T. Most woods are represented by green matting made for store window decoration. Bursts in such woods sometimes give losts, sometimes show thinly as bursts in scraggly woods. Photo by A. Eriss.

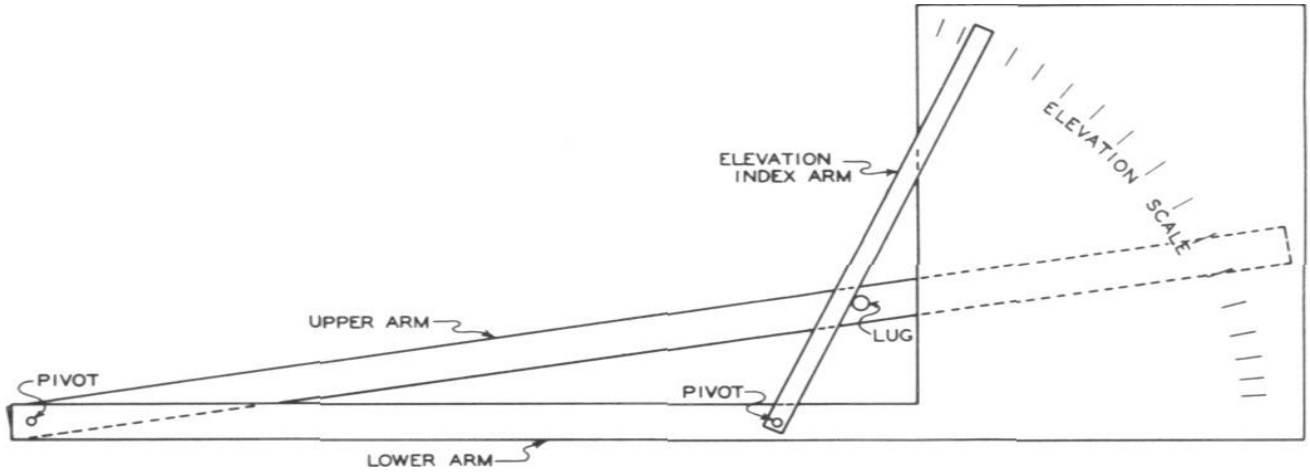
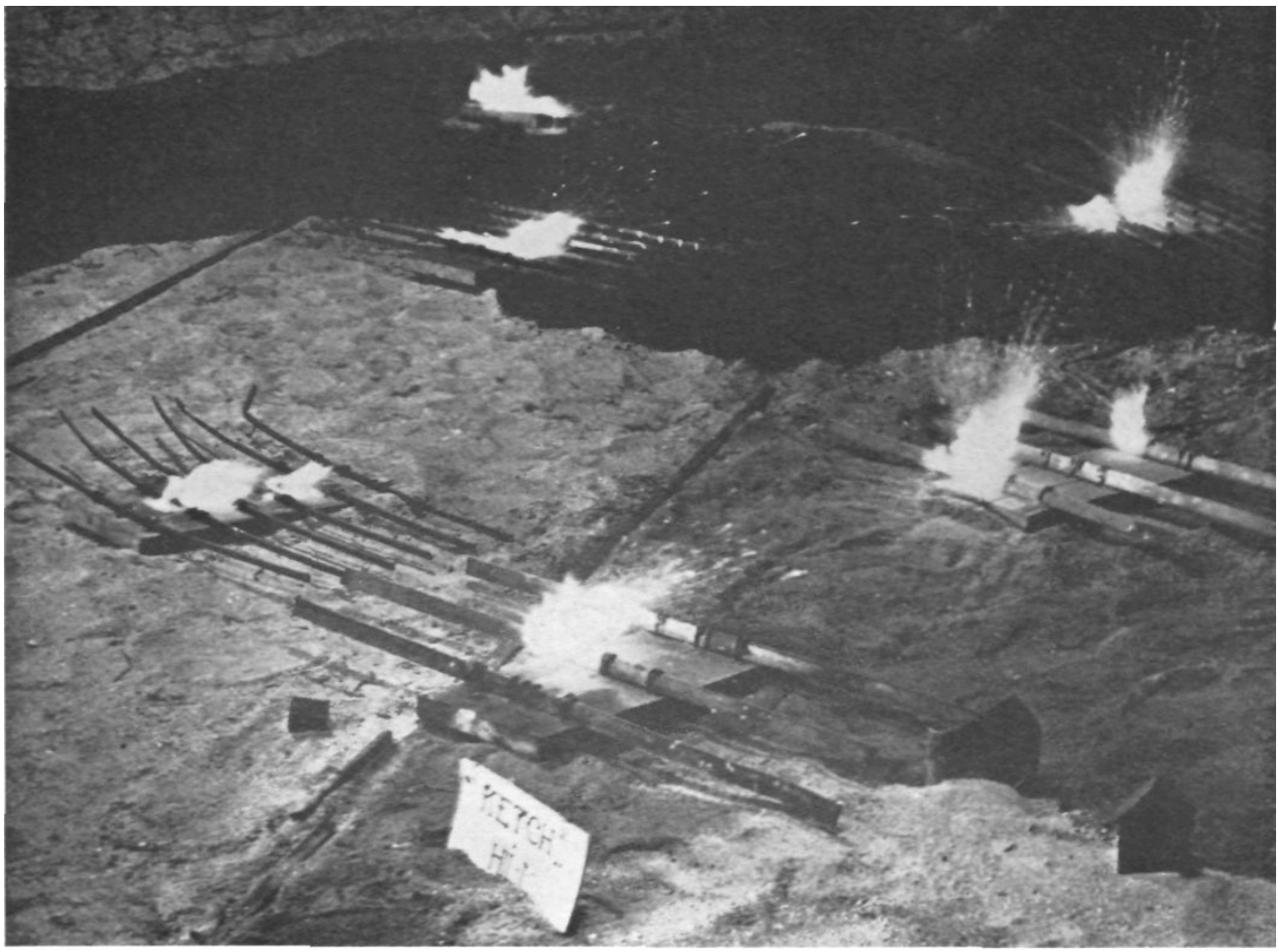


FIGURE 1

The first difficulty found was that the bottom graduations for elevation had to be too close together, not only because at the increased ranges a very little movement of the upper bar was needed to cause a 100-yard range change, but also because a 100-yard range change had to have, of course, a greater number of elevation mil graduations. The matter was remedied by an elevation scale index which permitted wider spacing of the elevation scale graduations at the longer ranges, as shown in the figure.

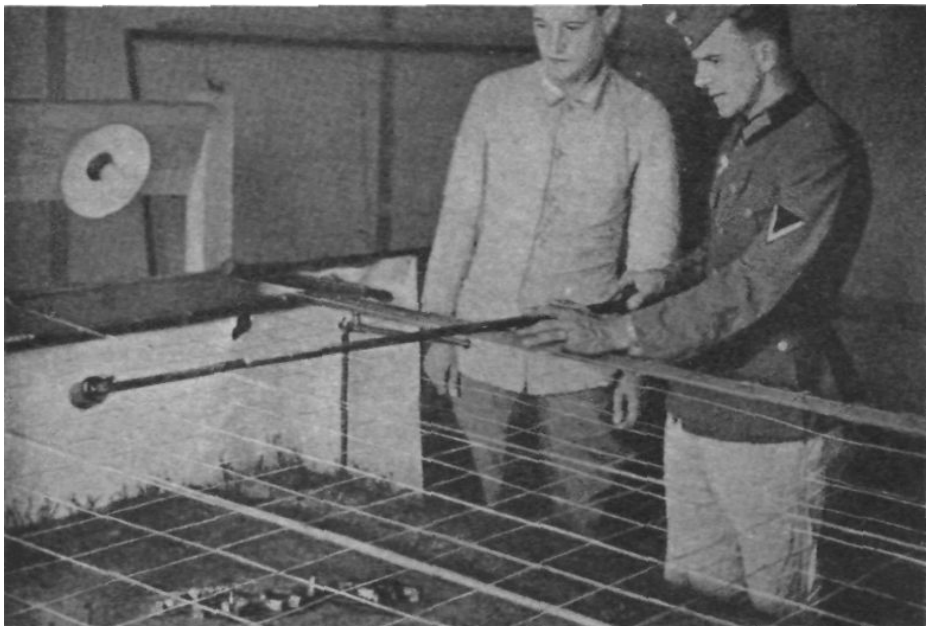


Use of spotlight ammunition gives bursts in dark, but involves necessity of spreading iron grillwork over the terrain. Photo by A. Eriss.

Nine different ways were tried or considered in handling the elevation scale difficulties, particularly in connection with the fact that as many as fourteen different elevations would give the same range with the 155mm. howitzer, considering the various charges and fuzes. The original way of doing it is the way finally adopted.

It may easily be shown that, when the lower bar is pivoted at one end, and deflection graduations are placed along the are described by the swinging end, the space between these graduations can also be increased by use of an index arm. This was done.

Next a deflection shift scale was devised, so that the machine could be operated easily by persons who had no training as gunners. On the bar carrying the deflection scale, a slide was placed, having a zero in the middle, and graduations running to the right and left. Once the deflection (or compass command) is set, shifts are made by sliding the O to the deflection index, then traversing right or left until the index arm indicates that the proper amount of traverse has been accomplished. This is shown in Figure 2.



From "Signal"

German indoor subcaliber range. A drop of sulfuric acid falling from the container on the rod, causes a little smoke cloud on the wet sand, thus representing a shell burst.

After being in use a few weeks, the gadget began to gain the affection of the regiment because it did not require the hunting up of panoramic sights and quadrants (often inconveniently locked up per NGR 75-3), because almost any bozo picked up at random could operate it, and because it answered to the same commands and used the same range table as a 155mm. howitzer. Also it fired rapidly enough to permit problems to be carried through several series in fire for effect, a form of training which, of course, is seldom possible in service practice.

Because of its growing popularity, and because of the training results it seemed to be getting, it was decided to use the machine for bracket adjustments also, firing four rounds in succession to represent the bursts of four guns. To get the proper distribution of the bursts, a deflection difference scale was devised, also shown in Figure 2.

It consists of rows of marks on a piece of paper or cloth, the distance between the marks on a given line being equal to a given number of mils on the deflection scale. To set a deflection difference, place the line giving the amount to be opened from converged fire immediately above the deflection shift scale. The right-hand mark

"Signal"

German subcaliber mount for use on miniature range. Employs .22 caliber rifle. Shown here is a "battery."

will be at the zero of the deflection shift scale. At this setting fire No. 1 gun. Then traverse left to the next mark and fire No. 2, etc., to fire "Battery Right."

It was soon found that some of the students liked the machine for another reason, in that the impact of the bullet made a very large burst. This feature was eliminated after much experiment. Captain (now Major) C. R. Gildart, then senior instructor of the regiment, got calcium chloride to mix with the dirt and sand of the terrain to collect moisture. Colonel William A. March, the regimental commander, bought some heavier sand to mix into the terrain. Tech. Sgt. James Sproul, the sergeant-instructor, discovered that low-powered .22 CB ammunition would further cut down the size of the burst. The three ideas combined cured that part of the student's paradise.

After a considerable time, an angle-of-site mechanism was added by use of a bubble arm and a telescoping device on the hind leg, as in Figure 3.

Before the school had been in operation very long, it was found that large numbers of soldiers, coming early to drill, would gather to watch the officers school on the drill floor, such large numbers that it interfered with the conduct of classes. The school was therefore moved to the basement, where a sand terrain, 25 feet by 75 feet, was installed. Another improvement was effected, by placing OP's in the coal bin, the exaggerated command of terrain thus being overcome. (The terrain scale is 1/300.)

In order to run two classes at once, another machine was built. It was then found that the two used together formed a good basis for training in battalion fire direction, particularly in the operation of the observed-fire chart. Remembering the interest taken by the enlisted men, the instructors of the officers' schools now asked them to come before drill to operate the machines, and later to also operate OP—Gun telephone lines. Next, the fire-direction centers were moved to second floor offices, and permanent wire installed to OP's, guns, and forward-observer positions in the basement. To prepare to practice FDC work, little time is now needed to hook in switchboards and telephones, and get communication. Radio from forward observer in the basement to FDC's on the second floor was added. Soon it was found to be such practical training for communications personnel that some of the work was carried on during drill periods.

Meanwhile, it was found that by using "Spotlight" ammunition and laying iron grillwork on the terrain, we could get bursts in the dark. This permitted practice in night center-of-impact adjustment. When the 28th Division Aviation (stationed in Philadelphia) asked whether the regiment could assist them to train in night observation of artillery fire, an illusion of a dim stream was created on the terrain by use of blue light under glass. A steel bridge was placed over the stream for a target. Whereupon they practiced night observation from a high platform. They stayed and practiced day observation of fire, and liked it so well that they brought an airplane fuselage to put on the platform. By having a 161 set mounted near them (later replaced by a wire-and-key buzzer system) they were able to join in with the fire-direction team, and sometimes took on part of the artillerymen's job to gain an understanding of what happens at the beginning of the trajectory.

Four new, sturdier machines were now built, as the old ones were made of scrap lumber and were getting rickety. One of the new machines was fitted with scales to make it represent a French 75mm. gun, and was then

FIGURE 3

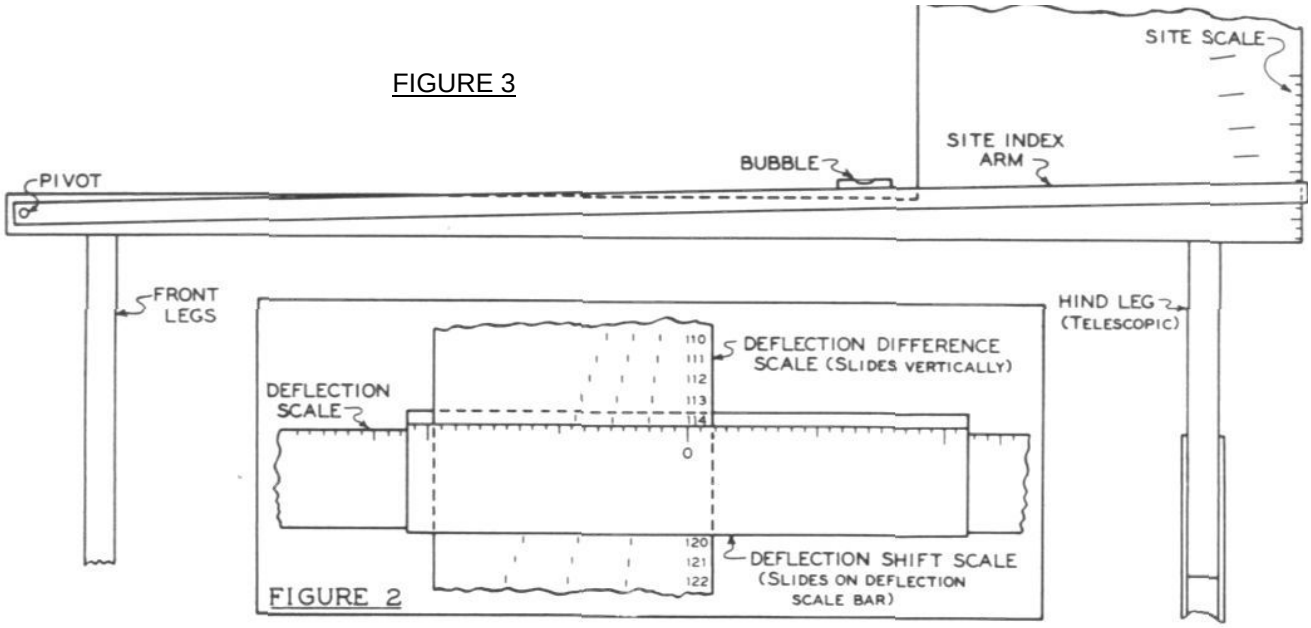


FIGURE 2

loaned to the units of the 166th Field Artillery. From the balcony of the riding hall in their armory, .22 longs fired into tan bark gave good bursts. At the suggestion of the Cavalry instructor, Lt. Col. Kramer Thomas, the gadget was used for a joint cavalry-artillery miniature terrain exercise in the riding hall, the machine supplying the artillery fires on call. A similar problem was arranged for in another cavalry armory in the city.

With the usefulness of the machine in joint work with other arms established, it was decided to seek a small amount of joint infantry-artillery training. The 111th Infantry in Philadelphia, and representatives of a part of the 107th Field Artillery (light), just outside the city, were asked to participate, as were, of course, the observers from the 28th Division Aviation. Captain Gildart rearranged the basement terrain to represent accurately a piece of the Fort Sill reservation of which maps and air photographs were available. In consultation with Lt. Col. Charles B. Lyman, instructor of the 111th Infantry, a problem was drawn up emphasizing infantry-artillery liaison and light artillery—medium artillery liaison. The improved model machines had been built which, together with the older ones, gave six machines for the representation of artillery fire. Barrages, concentrations in the defense, and in the support of counterattack, and other fires resulting from the various liaison actions in the problem were demonstrated. The ability of the force commander to avoid prematurely throwing in his reserve by massing the fires of his artillery was brought out. Targets of opportunity were engaged by ground and air observation. Major James C. Rosborough and his Third Battalion officers represented most of the artillery personnel concerned, and Major Wilson B. Stephenson, S-3 of the 111th Infantry, headed the groups of infantry officers participating.

Following the accurate construction of the terrain, Captain Gildart found it useful in instruction in survey operations, the firing following the survey showing the results of the work. Of course, transfers of fire were also worked out and fired. It was noted that, by various sizes of blocks under the front legs and corresponding adjustment of the telescopic hind leg of the triangular stand, the machine could be given varying K-factors for the student to determine by adjustments on a check point, thus increasing the value of the instruction in transfers of fire. Drift was successfully built into one machine, but the work of constructing it seemed greater than the value gained.

ADDITIONAL MEDAL WINNERS

Cadet Lieutenant Howard K. Read, Culver, Ore., Oregon State College; Scabbard and Blade; Gold Star Award.

Cadet Forrest E. Behm, University of Nebraska; Innocent Society, Student Council, Delta Upsilon; Simon Scholarship Award, Junior Class President, varsity football.

All ROTC cadets are eligible to become associate members of the Field Artillery Association.

FIELD ARTILLERY ABROAD

THE DEVELOPMENT OF ARTILLERY IN RECENT YEARS. Col. Max Blümner, in *Artilleristische Rundschau*. July, 1940. Translated by O. L. S.

The experience of the war of 1914-18, interpreted by exchanges of ideas during the last ten years, and supplemented by experience in the Spanish and Chinese-Japanese wars, has had great influence upon the development of artillery. This paper will deal with land artillery only, naval guns being disregarded.

There has been a steady tendency toward increase in range. The Vickers-Armstrong 75-mm. gun gives ranges up to 13,000 meters; the new Belgian field guns give 14,000. The Bofors 10.5-cm. field guns, length 42 and 46 calibers, adopted in Switzerland and in the Netherlands, give ranges of 17,300 and 18,200 meters respectively. For the Italian Army artillery the old 14.9-cm. gun, 35 calibers long, range 14,200 meters, has been superseded by a new 14.9-cm. gun, length 40 calibers, range 22,000 meters: and the old 21-cm. mortar, length 8 calibers and range 8,400 meters, has been superseded by a 21-cm. howitzer of 22 calibers, range 16,000 meters. In 1938 Skoda brought out 10.5-cm. guns with 18,000 meters range, and 15.5-cm. guns with 23,650. The new French railway guns showed a range of over 50,000 meters.*

This increase in range necessarily involved certain disadvantages, such as greater weight, greater dispersions, and difficulties in observation. These may be minimized by mechanical draft, aerial observation, etc. The increased ranges have been secured by projectiles so shaped as to overcome air resistance—sharper points and conical bases; or by increase in the length of the gun and in the powder charge; or by both methods combined.

No special innovations in gun construction are to be noted; but as was to be expected the autofrettage process has been more generally used. In the United States this process has been used for guns as large as 8-inch; and wire winding has entirely gone out of use, such guns, especially those of large caliber and great length, having insufficient longitudinal rigidity.

In carriage design, it is noticeable that the split trail is coming more and more into use, both for light and heavy guns. In some of the more recent designs, the trails are movable not only horizontally but also vertically, so that the gun stands firm even on irregular ground. In the new M2 carriage for the American 7.5-cm. gun, when the trails are opened a support is dropped from the center of the axle to the ground, the three-point support giving great stability. For the last two years Madsen has used the split trail for light infantry guns, eliminating a platform and so saving time when coming into action.

An innovation is found in the Schneider 15.5-cm., 50-caliber gun, and in three Vickers guns—the 7.5-cm. 30-caliber gun, the 15-cm. 45-caliber gun, and the 10.5-cm. gun. This consists in the use of a rotating platform, giving the gun greater traverse. The 15-cm. platform weighs 2,000 kg., and is transported on a separate vehicle with a crane. The platforms for the other guns are carried on the gun carriages.

The new Russian 15.5-cm. and 21-cm. guns are carried on caterpillar mounts.

In the American motor-drawn field artillery, instead of a cranked axle, an eccentrically mounted rubber tire is used, by means of the "Buquor Adaptor." A novelty introduced by the Ambrosetti works in Switzerland is a wheel stamped out of *avional* plate, with a steel felloe. Avional is an alloy of aluminum, copper, silicon, magnesium and manganese, hardened by a special process. In the French army most of the guns are fitted with Veil-Picard tires, which are built up from several ring-shaped layers of rubber, with numerous round cavities, and which will stand hits from projectiles up to 2-cm.

In recent years there has been an increase in the use of light field howitzers, in place of 75-mm. guns. Not only can the howitzer, with its curved trajectory, more readily find positions and more effectively reach targets behind cover, but the 10.5-cm, projectile has three times the effect of the 75-mm., covers 60% greater area, and is better adapted to firing gas. The howitzer now gives good effect in ricochet fire.

In France, after several years' experimentation, a 10.5-cm. howitzer M-1935-B was introduced in 1938. It fires a boattailed projectile weighing 15.2 kg. at 442 m.s. muzzle velocity, giving a range of 12,000 me. and a rate of fire of 6 rounds per minute. It may be horse-drawn, or may be fitted with rubber tires and towed by

*Press reports indicate that the Germans have emplaced these railway guns along the English Channel.—Editor.

a tractor, with a speed of 20 km. per hour on roads.

Rumania and Hungary, too, are about to introduce a 10.5 or 10-cm. howitzer, in addition to the field gun; and the American Ordnance Department has developed a 10.5-cm. howitzer, which is expected to take the place of the old field gun.

In England, an attempt has been made to combine the characteristics of the field gun and howitzer in a single piece; to this end a gun-howitzer of over 9.4-cm. was introduced in 1937. Japan is reported to have adopted a 7-cm., and Greece an 8.5-cm. gun-howitzer. The American Armament Corporation of New York produced a 7.5-cm. gun-howitzer last year.

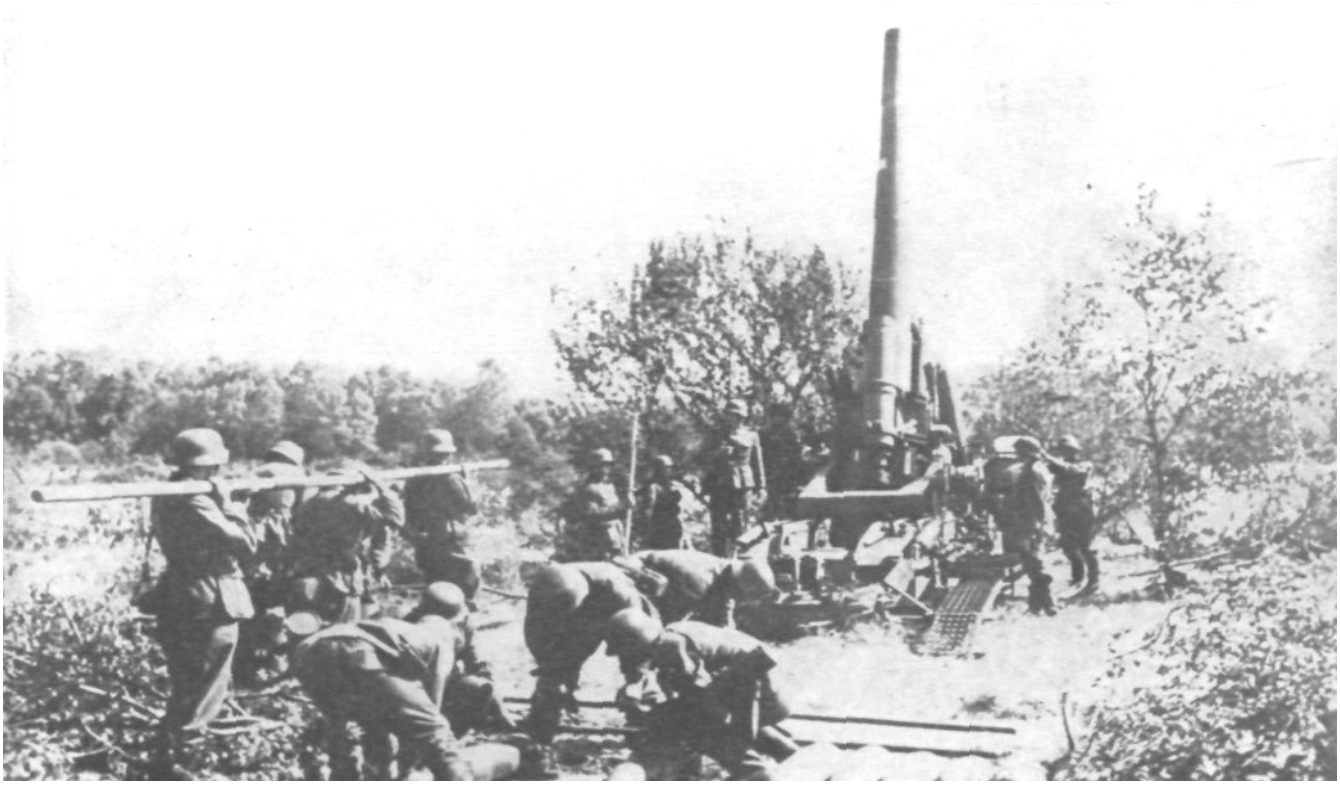
The most noteworthy of the new mountain guns is the Italian 75-mm. mountain howitzer, M-34 and M-35, length 18 calibers. It combines excellent ballistic effect—9,400 meters range with 435 m.s. muzzle velocity—with great mobility. It is designed for pack transport or animal draft, but may also be drawn by a caterpillar tractor at a road speed of 30 km. an hour. For travel on narrow mountain trails the track of the carriage may be reduced; and by folding the parts of the split trail the road length may be shortened. The carriage divides into three loads, and has wooden wheels and cushion tires. For training purposes, guns are taken from time to time up to mountain peaks as high as 3,000 meters, to give practice in occupation of position, firing methods and ammunition supply.

For heavy artillery, the 10- and 15-cm. pieces are gaining in favor as compared with larger calibers.

Worthy of special note is the new American 15.5-cm. gun, M-1, 45 calibers long. This is the French 15.5-cm. gun, G.P.F., on a new carriage adapted either to this piece or to the 8-inch howitzer. In traveling position, the gun is carried on a ten-wheeled rubber-tired trailer, which is connected with the tractor by a saddle limber. In firing position, the carriage rests directly on the ground. Maximum traverse is 60 degrees, and maximum elevation 65 degrees. The dispersion is small, and the effect very good. Projectile weight is 43 kg., muzzle velocity 850-900 m.s., maximum range over 23 km.

The Italian 14.9-cm. gun of 40 calibers' length, and the 21-cm. howitzer of 22 calibers, are conspicuous for their great range, accuracy, and wide traverse. With a view to use in mountainous country, they have been given good mobility and high elevation. The pieces are provided with lining tubes which, when cold, can be changed in about half an hour. In firing, the split-trail carriage is disengaged from the axle and the bedplate lowered to the ground; the piece may then have 360 degrees traverse. For short distances, the piece may be moved complete, by a Pavesi tractor; ordinarily the gun and carriage are transported separately on special trailers.

The Skoda 24-cm. gun, designed for position or fortress warfare, may be transported either on rails or on the road; the change requires 24 hours. On rails,



German 21-cm. howitzer during attack along the Aisne—June, 1940.

the maximum speed is 40 km., on the road 10 km., per hour. It moves in four loads, each of 35 tons; each load has its own electric motor, and current is furnished by a power wagon. The battery consists of one gun, with 200 men and 20 vehicles. Weight in firing position is 80 tons; weight of projectile 215 kg.; range 30 km. with 800 m.s. muzzle velocity. The gun is interchangeable with the 38-cm. howitzer.

On the principle that very heavy guns may be most economically and effectively used on railways, this type of materiel has been energetically studied since 1918, especially in the United States, England and France. Range, time for coming into action, and rate of fire have been greatly improved. The use of Diesel engines has expedited the maneuver of the guns, and the absence of smoke makes better concealment possible. It may be remarked that in recent railway construction the use of railway guns is taken into account.

The French 24-cm. railway gun S.L.P. (Schneider Longue Portée), introduced in 1938, gives the extraordinary muzzle velocity of 1,065 m.s., and has a range of 52.6 km. The carriage revolves on a turn table, and has an unlimited traverse. Eighty rounds of ammunition are carried, on special projectile and powder carriages. All the carriages may be adjusted to any gauge. To expedite fire, small ammunition carts are provided, running on rails about the gun; and hoists are used for projectile and charge in loading.

The new antitank guns are given increased power, to counteract increased thickness of tank armor. The Americans have developed a 3.7-cm. gun, with extraordinary muzzle velocity and penetration. The new Bofors 4.7-cm. gun, 40 calibers long, is said to fire a projectile weighing 1.65 kg. with 750 m.s. muzzle velocity, giving penetration of 50-cm. in hardened armor plate at 1,200 m. range. In Russia the light antitank guns are drawn by small caterpillar tractors, which also carry the gun crews.

No satisfactory solution has yet been reached of the problem of developing a single gun to take the place of the antitank gun and the infantry gun, thus reducing the number of infantry heavy weapons and simplifying training. A gun with two interchangeable tubes does not satisfy the requirements, for it is too heavy, and moreover it may often happen that in an emergency the wrong tube may be in use. Guns with a single tube do exist—a Vickers-Armstrong in England and a Bofors in Sweden—but they do not seem to answer the demand.

The Oerlikon 2-cm. machine gun is designed for use either as an antitank or an antiaircraft gun. With its high muzzle velocity—850 m.s.—its armor-piercing projectile, weighing 139 grams, penetrates 30-mm. armor plate at 500 m. Firing from a tripod, it has all-round traverse and a maximum elevation of 85 degrees. It is provided with bullet-proof *cellastic* tires, and is capable of 60 km. per hour on roads. In exceptionally difficult country the carriage may be divided into 6 pack loads, and the gun into 2.

High-angle-fire of guns for the infantry has been increased during the last few years, because they can keep better connection with the infantry than artillery posted farther off, and release the machine gun companies for their proper duty.

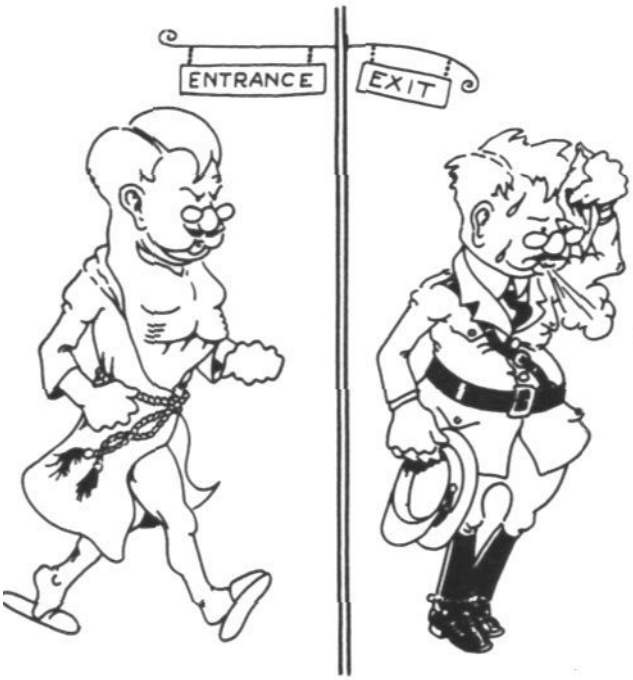
In conclusion, mention should be made of the supply of material for camouflage and for construction of dummy batteries. In Switzerland, each field battery has a net wagon. In addition to this, it is reported, collapsible wooden guns are carried, and even dummies wearing steel helmets, representing cannoneers.

From all this we see that artillery has not wasted its time in recent years. All important powers have taken great pains to bring it to its highest development.

Engraved Visiting Cards

We have made arrangements to supply our readers with engraved copper plates and cards imprinted therefrom at prices substantially lower than commercial rates. Our prices vary from 75 cents per line (for engraving only) to 2.40 per line, depending on the style of engraving. We suggest that you send for a style card, showing the fifty-four styles of engraving available, and price list. Our price for imprinting cards from plates is $1.50 per hundred for plain cards and $1.90 per hundred for parchment. We suggest also that you leave your plates on file with us; when you need more cards, write or wire.

ANNUAL PHYSICALS



by Pat Eleanor Pierce

Around the first of the year, after Christmas has taken all of a man's money and his friends have stored away every available pint; after everybody's egg nog is gone and the world in general takes on a more normal appearance, the army man, breathing a sigh of relief, prepares to settle down for another year. He remembers with pleasure the Christmas turkey, the cranberry sauce and the dressing, not to mention the sweet potatoes and pie, and actually prides himself on the fact that he ate as much as anyone—so far with no ill effects. All this of course, before the arrival of a short, innocent-looking scrap of paper from headquarters.

Uncle Sam, it would seem, requests the pleasure of the Captain's company at annual physicals to be held January 8th at the hospital. Requirements for admission: A blank physical examination sheet and a specimen bottle—filled!

An invitation to an annual physical "party" is like an invitation to dance before the king . . . it is a command performance; one does not send regrets—and to ignore it . . .!! Heaven forbid! It is one of those affairs that everybody dislikes but none can escape; even the poor old Medico who stands by doing all the work and looking so austere has to part with his shirt and breeches and move into the cubicles . . . a mere mortal.

The Captain's first reaction to that slip of paper is one of supreme disgust and annoyance. Bothering him with trivials again! But as the day and hour grow steadily nearer, he begins to have a wholesome respect for the old gentleman's party and has an eerie feeling that all might not be well with his anatomy after all. His stomach hasn't been any too well-behaved of late; his feet have bothered him (they could be getting flat) and he has been having a lot of trouble with his ears. For some reason he simply can't hear that alarm clock in the morning.

And so it is on the afternoon of that fateful day that we find the Captain shining himself and his buckles, preparing for his ordeal at the hospital.

He wondered if he would be the recipient of a letter this year. Of course he was a *little* over-weight, but they knew that last year—didn't they send him a letter then? And hadn't they been writing to him every year since he got out of West Point? But the Colonel had told him last year he would bring him into the hospital and starve it off unless he cut down this year. Darn pleasant prospect, that. He had always wondered how station hospitals managed to get by so well on their annual allowance, that's probably the way they did it—starved their patients. He *had* cut down this year. If it hadn't been for that last four gallons of egg nogs, he'd have been in perfect shape for these physicals. January was the worst month of the year for physicals anyway, just after the holidays and all . . . why couldn't they have them in November? Well, maybe not November, the Army-Navy game was in November, but . . . oh well, some other month then.

He adjusted his tie and looked with interest at his neck. That collar was getting tight. Wonder if he could be developing a goiter? Capt. So & So. had had one last year and he had been operated for it. Hm-m-m-m . . . Wonder just where it would swell? He fingered his

throat and shivered as he thought of someone drawing a knife across it. Damn lot of confidence a man would have to have. He could think of a lot of fellow-officers he'd hate to give the opportunity to. The thought disturbed him and he wondered what it would feel like to take an anesthetic. He'd probably talk and that would be bad; there were several things he carried in his subconscious mind that he'd just as soon not tell in public. He held his hand out in front of him to see if he were nervous. It quivered like a quaking aspen. Could have been the Major's liquor. Burr-rr-rr that was horrible stuff, wonder where he got it.

With his mind free of its original worry, he finished tying his cravat. Wondered why he went to so much trouble when he knew darned well he'd have to take it all off the minute he got to the hospital.

Eventually he was ready and started for the door, only to turn back, happy because he had remembered not to forget it. Now, darn it, where was it? He frowned thoughtfully. Wonder if that striker had thrown it away. Had it here this morning . . . mumble, mumble, mutter. Oh yes, on the window sill in the bathroom, he remembered—or did he? He retrieved a small bottle from the sill and eyed it suspiciously. Could this possibly be that mouth-wash? He'd hate to get them mixed up . . . lot of hooey anyway, specimens; they'd probably give it the sink-test at the hospital anyhow.

At the hospital he found some fellow-sufferers, all of them looking most unhappy. He stepped up to the desk where a sergeant was issuing slips of papers—and directions.

"The E. N. T. Clinic is in the basement, if you'll have your eyes and ears tested there first . . ."

In the basement it looked like bargain day. Women and children hovered in the hall-ways waiting to catch the attending Surgeon; soldiers by the score awaiting sick call or admittance to the hospital cluttered up the passage-ways. A boy standing in the E. N. T. Clinic door told him to go three doors down the hall and he obeyed, opened the door when he came to it and walked in.

A nurse eyed him suspiciously. "May I help you?" she asked.

Silly question, that. He thrust the paper toward her. "I want to be examined." She must have known annual physicals were in progress—any number had been examined before him. Did she have to ask him inane questions.

"Well, Captain . . . ." she hesitated uncertainly, "I believe you have made a mistake. This is the Friday afternoon pre-natal clinic." She *believed* he had made a mistake! Good heavens, he *knew* he had. He blushed furiously and fumbled for the door-knob.

"The room next door is the examining room for officers," she called as he stumbled awkwardly into the hall. Prenatal Clinic in an Army Hospital . . . fine thing!!! What was this army coming to anyway. Soldiers would be wearing kilts the next thing a fellow knew.

He was still fussed as he sat down before the eye-chart and when he was handed the card for close reading he couldn't make out a single word.

"It will read more interestin' if you turn it over, sir," commented the technician. The Captain scowled.

"Pretty big tonsils, Captain, better come in the first of February and have them out." The Doc peered into the abyss before him until the Captain wondered if he were searching for his appendix too.

The Captain's knees were a little unsteady as he left the Clinic but he had forgotten his troubles a few minutes later as he sat before the Chief of the Medical Service.

"Breathe and cough." The doctor listened. "Breathe in and out through your mouth."

"In and out and cough."

"Not like that, like this," the Colonel drew his breath in loudly through his nose and exhaled as noisily. Sounded like wind through the pine trees, thought the Captain, but he said nothing. "Now you do it."

"Too many cigarettes, better cut 'em down." He moved to the next cubicle.

"Blood pressure's too low, better get some rest."

"Hop up and down on each foot fifty times." The Captain did as directed and looked toward the door. Hm-m-m. Well, well! Looks like Carol Lombard has joined the Army Nurse Corps. Not bad! No bad at all!

"That ought to be sufficient," the Colonel said, taking his watch in one hand and reaching for the Captain's wrist. He took another grip. "Good heavens! that pulse. Let's take your blood pressure again." The Colonel listened, his face growing more serious as the mercury ascended higher and higher, a puzzled expression creeping in as he became more befuddled. Then his eve fell on the girl by the door.

"Please, Miss Whoosis . . . will you stay away from this end of the hall. My blood pressure readings are all wrong."

In the next cubicle the Medico eyed him darkly.

"Any insanity in your family?" he wanted to know.

The Captain was uncomfortable. He, too, had wondered.

The Medico hit him with a small rubber hammer below the kneecap and his leg flew up. It always embarrassed him when his leg did that, he could never quite remember whether that was a good sign or a bad sign . . .

"Any abdominal pain?" The Colonel in the next booth bade him lie on the table before him.

"No sir." The Colonel investigated the region four inches above and below his ribs, internally. "That is, not yet," he finished limply.

"No appendectomy?" No scar was visible.

"No sir."

"Better come in and have it out. Boys need practice you know."

The Captain forced a grin. The Colonel's jokes were always *so* funny . . .

Free at last, he pulled his breeches on hurriedly.

"Just let me out of here," he whispered to himself. "Just so I reach the door."

His expression was that of a man doomed to the electric chair attempting a jail-break. Wanta reach the door! Wanta reach the door! It was in double-quick time that he reached the door—only to collide with the old gentleman himself!

"Well, Captain—, been having your physical?"

"Yes, sir."

"Find anything wrong?"

"Er—No, sir . . . er, that is . . . No, sir."

"That's good. Nothing to it." The Colonel moved on.

The Captain grinned "Oh, No sir . . ." he attempted to snap his fingers, "nothing to it . . . I don't mind it in the least."

Back in the privacy of his own quarters he locked the door, looked behind all the doors, pulled the shades and . . . took his temperature. It was normal.

WHAT'S SAUCE FOR THE GOOSE...

By CORWIN ROBBIE

I had just announced "first drill" over the speaker system and flipped the "talk-listen" switch back to "listen" when I heard the Old Man's voice rattling the speaker cone.

"Come in here, sergeant," he barked.

"Yes, sir," I answered in my best voice reserved especially for battery commanders and hastened into his official presence. If there is one thing the Old Man demands it is prompt obedience to his orders.

He was studying the morning report when I entered. When he had doped it out to his satisfaction without any explanation on my part he initialed the remarks and turned to me.

"Have Sergeant Lubber take the battery out for foot drill, then you bring Corporal Slipshod back here," he ordered.

Five minutes later I was back in the BC's office, Corporal Slipshod in tow. Slipshod saluted in his best military manner which even the inspector general once criticized.

"Uhm!" grunted the BC, then deeply absorbed in one of the many training memorandums recently issued by higher headquarters. "At ease!"

At length he tossed the batch of memoranda on the desk and spoke to the corporal.

"How did it happen," he asked, "that you failed to wash all those trucks yesterday?"

Slipshod rattled off his prepared alibi.

"The water pressure was awful weak, and the motor sergeant took two of my men, sir, and we just didn't have time to wash all the trucks before retreat."

"Perfect! Absolutely perfect!" barked the Old Man. "But this time you don't get away with it."

I noticed he was doodling, making a bunch of short vertical marks as if he was in a hurry about something.

"But I am going to be reasonable, too reasonable. A week's restriction to quarters, and you will assume charge of all fatigue details turned out during that week. Remember, though, the next time. . . . ."

Slipshod saluted and departed. The Old Man turned to me. "Listen, sergeant. I'm going to teach these birds to obey orders or I'm going to fill the guardhouse with their worthless hides. . . . ."

"Yes, sir," I agreed.

"Umh! What's all this crazy stuff?"

"That must be some of Captain Dull's training dope," I said.

"Ump! By gosh, if he thinks this battery is going to draw rifles and do doughboy drill in addition to all the cow pasture projects I'm engaged in already, he's got another think coming. . . . By golly, that's ridiculous. . . . . And look! I'm on general court, two boards, and gunners' examination coming up. Sergeant, I'm going to regimental headquarters and take this up with the colonel. Meanwhile, you go ahead and take over first drill."

The BC departed for headquarters. I looked at the clock; twenty minutes was all that remained of the first drill period. Wasn't worth while going out, I reasoned. Instead, I hopped on the charge-of-quarters because there was a cigarette butt on the front lawn. Then I went back into the office, picked up the paper and turned to the comic section.

Sign over camp wash bucket somewhere with the British Army on the Egyptian front: "Please do not use soap when washing, as the water is required for brewing tea."

—"The Tank"

MUZZLE BURSTS

A "critique" conducted by our readers, wherein "Letters to the Editor" and other informal discussions

PEERING THROUGH DUST AT RECENT ARMY MANEUVERS

Since August, in the Field Artillery, Coast Artillery and Infantry Journals, the Reserve Officer and American Legion magazine I have read reports on the Army Maneuvers by officers from major general to captain. Most of these articles have followed a pattern of "praising with faint damns" and have covered the ground almost as completely as the thick rolling clouds of dust that were ever present. That dust is the pretext for these notes and as a veteran of large-scale maneuvers in two corps areas I feel as did Mark Twain anent the weather. "Everybody complains about it but nobody does anything about it." Aside from the annoyance, this ever-present fall of dust lowers the efficiency of the soldier, sometimes causing severe throat infection and hospitalization. Day and night throughout the maneuvers there was a constant rushing to and fro of trucks, jeep wagons and staff cars at high speed, mainly on non-tactical missions. If all non-tactical driving were rigidly held down to a 20 miles-per-hour speed and also all tactical missions in which speed was not essential, the resulting dust would be kept at a minimum. Now that the motor has so largely replaced the horse it is time for the various commanders and staff officers to cease "mounting and galloping off in all directions." Excessive speed on purely non-tactical driving, particularly at night, with its resultant dust clouds, causes deaths and injuries and damage to materiel which is entirely unnecessary.

Along that same line is the reckless driving to and from maneuvers and in the vicinity of the maneuver area. Many trucks and jeep wagons are in the hands of experienced old soldiers of from two to six months' service, commanded by lieutenants who are veterans of one or two summer training camps. The temptation to tear along the road with utter disregard of civilian traffic proves too great for these boys, in many instances. This leaves a very sour feeling among the civilians who are forced off the roads by the embryo "Prussian Guard." All commanders of battalions and higher units would do well to rigidly enforce march discipline both of convoys and individual vehicles whether on tactical missions or just "goin' to town."

Another thought, on the purely tactical side, in regard to air observation. All our preparation is officially, at least, aimed at "defense of the western hemisphere" and more particularly of the United States. In any war to repel an invasion of this country we must concede the enemy a decided air superiority. Without this superiority an invasion would hardly be undertaken. How long would this potential enemy allow our blimps and slow-moving observation planes to remain aloft? Will we not be largely restricted to ground observation, and in flat country like the Sabine River area will not observation for field artillery have to be largely from forward OP's?

This leads to a point in operating procedure, viz., liaison officers and the fire-direction center. Extensive use of the fire-direction center as now operated leaves the battery commander who, at least theoretically, is the man best qualified to fire his battery, as a sort of fifth wheel. If this procedure is to be much used why not push the battery commanders out as liaison officers with the supported infantry battalions where they can conduct what fire can be used with terrestrial observation? With the battery commander at the forward observation post doing the shooting, the communications will undoubtedly be better maintained than under the present liaison system. Scheduled fires and all non-observed fire could be conducted as well by the battery executives as by the battery commanders. Along the same line, why not make it "standard operating procedure" in the combat team for the artillery battalion commander to accompany the infantry battalion commander who is making the main effort? That also would insure a desperate effort on the part of communications personnel to keep the lines open and would get the quickest possible artillery support to the man who needs it most. In the event of urgent need of fire on a target outside the zone of the main effort, the infantry regimental commander could deal directly with the artillery executive, at the artillery command post. This procedure might also operate to reduce the "hump" of captains and majors which is a recurrent "headache" in the service. — JESSE E. JACOBS, Lt. Col., 317th FA.

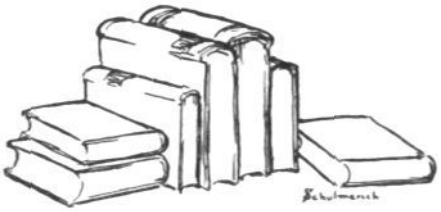
MILITARY PRECEPTS

Every situation always sorts itself out in the end. There is no example in history of a military situation not being settled, in one way or another, sooner or later, by some means or another.

Work and you will be rewarded by the advancement of your seniors.

—The Tank

BOOK REVIEWS



"All now recognize that the officer that has not studied war as an applied science, and who is ignorant of modern military history, is of little use beyond the rank of captain."—FIELD MARSHAL LORD WOLSELEY.

Review of the Month

THE ARMED HORDE, 1793-1939. By Hoffman Nickerson. G. P. Putnam's Sons, New York, 1940. $3.50.

More and more we come to realize that the present war, so unlike the Great War, nevertheless cannot be understood without reference to the events of 1914-1918. We all know that the weapons and tactics of the present war were evolved as a result of dissatisfaction with the costly and unproductive methods of the Great War. Slower to change, the higher theory of war nonetheless was deeply affected by the war of 1914-1918. This book is both the clearest and ablest exposition of the new thought.

Mr. Nickerson dates the rise of the mass army or "armed horde" from the French Revolution. Previous to 1793, armies had been small in size, composed of well-trained, long-service, professional soldiers. The French Revolution, if noble in ideals, in practice degenerated into the worst type of mob, or mass, rule.

Since the government was to be based upon the political wisdom of the masses, it was only natural that its defense should be entrusted to the military skill of a mass army. However, there also were two very practical reasons for the change: the breakup of the old royalist French regular army, and Bonaparte. Bonaparte's victories were spectacular but costly in lives, and inasmuch as they did not bring about a permanent peace they had no practical result except the exhaustion of French manpower. Consequently conscription was introduced and the mass army began.

Let it be said here that Mr. Nickerson is not writing an attack upon the recently adopted Selective Service Act. Even under the Selective Service Act the United States Army will be so small in comparison with military establishments abroad that it would hardly come under the heading of a "mass" army.

Though the idea of universal military service found ready acceptance in Germany, its progress was slow elsewhere. For one thing, the English never forgot that, after all, Wellington's professional army had finally beaten Bonaparte, and the British did not put a mass army into the field until the Great War. But by 1914 the idea of the mass army had gained universal acceptance. No one questioned that God was on the side of the big battalions, and armies were numbered in the millions of men. Unfortunately, by 1914 technical developments had already progressed so far that the mass army was no longer practical.

This point was most emphasized in the Western Front campaigns, because the great number of men concentrated there in so small a space made maneuver extremely difficult. We are all familiar with the story of the campaigns of the first years of the war. Huge, unparalleled mass attacks were launched by both sides, and yet, by comparison with past wars or with the present war, the results were absolutely negligible. The months-long battles of the Great War were enormously expensive, and the casualty lists shocked and astounded the world. If the Great War had a symbol it was the machine gun, and the machine gun was impervious to mass. An increase in the number of men in an attack only meant that the casualty list would be correspondingly lengthened; it did not mean that victory would follow.

The basic objective of every Western Front campaign from 1914-1918 was to break through the trench lines, end the siege, and bring the war out into the open where a decision might be reached. To achieve this end various new weapons and tactical methods were devised and adopted, and most of these are with us today. But to some the problem appeared to have deeper roots. Was there perhaps a law of diminishing returns which applied to the army, so that, after a certain point had been reached, further increases in size actually became liabilities instead of assets? Could it be, indeed, that God no longer favored the big battalions?

Certain things were immediately obvious. In the first place a large army could not maneuver with the facility of a small one. A modern army demands a vast amount of supplies, and as the size of the army increases so does the quantity of supplies that must be carried with it. Again, training is more important than ever before. Close order drill and musketry no longer suffice to produce a soldier. Present day weapons and tactical methods require long practice if the necessary skill is to be achieved. Of course, the more men there are to be trained the less time there will be to devote to the training of each individual man. Expense also was no consideration. In the days when the uniform and the rifle were the major items of military equipment a mass army could be outfitted at a relatively low cost. Nowadays, even the general public is aware that this situation no longer prevails, and that modern complex weapons are not only costly to manufacture but also require a considerable time to reach the stage of quantity production.

Perhaps firepower was the deciding factor. Throughout the Great War the constant cry was for more artillery, more machine guns. This, however, did not mean a proportionate increase in manpower, for one soldier could produce the firepower of a battalion of a half century earlier.

Most of these points were emphasized in the Eastern Front campaigns of the Great War. There the Germans were always outnumbered, sometimes to an overwhelming extent. Yet they were never defeated in a major engagement. Better trained, better armed, the smaller, more mobile German forces easily outmaneuvered the unwieldy Russian masses, and won a series of decisive victories.

Partly as the result of this experience, skepticism as to the value of the mass army arose first in Germany after the Armistice. Another reason, of course, was that since they had been defeated, the Germans were more willing to examine the war critically. Finally, inasmuch as a mass army was forbidden to them by the treaty of Versailles, they were forced to make the best of what they had. In consequence, General von Seeckt, the brilliant post-war chief of the German General Staff, began to experiment with the idea of reviving and revising the old small, professional army. His ideas attracted much attention among a certain group of thinkers, notably the British General J. F. C. Fuller, to whom *The Armed Horde* is most appropriately dedicated. In the United States Mr. Nickerson has been the most persistent advocate of the substitution of the professional for the mass army.

We have seen in the present war that modern weapons and tactical methods are sufficient to prevent a recurrence of the stagnant siege warfare of the Great War. It remains to be seen if the armies in use are the best that can be devised for the revived mobile warfare. Mr. Nickerson is considered by many to be the foremost American writer on the higher theory of war, and this is the best of all his books. For all who are interested in the more profound aspects of military thought, the importance of this book cannot be too strongly emphasized.

—H. S. F.

Shorter Notices

A PRACTICAL MANUAL OF MARTIAL LAW. By Frederick Bernays Wiener. The Military Service Publishing Co., Harrisburg, 1940. $2.00.

In the words of the author, "the purpose of this Manual is to provide a practical guide to the much-discussed and much confused field of martial law—that branch of law which deals, broadly speaking, with the extent to which military forces may properly be used to sustain or restore civil authority, with the measures which may be used by such forces in time of domestic stress, and, necessarily, with the rights and liabilities of military personnel in such situations." The latter question will be of particular interest to the members of the military service, for Captain Wiener points out that obedience to orders is no defense. In other words, if an officer is ordered to perform an illegal act by a superior the fact that he was merely carrying out orders will not save him from subsequent suit for damages. In general, the theme of the book is enunciated in Captain Wiener's concluding quotation: "Respect and obedience to the civil authorities of the land is the duty of all citizens, and more particularly of those who are armed in the public service."

In contrast with most books upon the subject, this manual is extremely readable, largely because it is written "in English and not in law." Though well sprinkled with citations from pertinent cases, Captain Wiener at no time lets his original purpose of writing a practical guide escape him, and in consequence the reviewer unhesitatingly recommends this manual as a useful addition to any officer's library.

—H. S. F.

I SAW IT HAPPEN IN NORWAY. By Carl J. Hambro. D. Appleton-Century Company, New York. 1940, $2.50.

Americans have access to a seemingly endless supply of more or less informed discussion of the present war, but so far very few personal narratives of actual participants have come out. The part of the Norwegian campaign which Mr. Hambro personally "saw" is described in the second chapter, and may be summarized briefly. Mr. Hambro as President of the Norwegian Parliament attended a late meeting of that body at Oslo on the evening of April 8, 1940. At one o'clock on the morning of the 9th he was roused by air raid alarms, and immediately undertook the removal of the King and Parliament to safer quarters at Hamar. A meeting of Parliament was held at Hamar, but German advances forced them to move once more to Elverum. Here a final meeting of Parliament was held, and another move was decided upon, this time to Nybergsund, twenty miles from the Swedish frontier. It had been dark for some time, and after a brief three hours' sleep Mr. Hambro went over the frontier into Sweden early on the morning of the 10th. Since he had left Oslo before the banks opened, his trip had to be financed with a 200 kroner note loaned by the Crown Prince.

The title therefore is somewhat misleading, for Mr. Hambro's opportunities for actual observation of the Norwegian campaign were considerably limited. Nevertheless, with the exception of the first chapter, Mr. Hambro's book gives a good running account of the main diplomatic, political and military incidents of the brief Norwegian campaign, and the index increases its value as a reference.

—H. S. F.

FROM PANAMA TO VERDUN. By Colonel Philippe Bunau-Varilla. Dorrance and Company, Philadelphia, 1940. $2.50.

The name of Bunau-Varilla was familiar to most Americans of the pre-war generation. Born in 1859, and a member of the Class of 1878 at the Ecole Polytechnique, Colonel Bunau-Varilla became one of the most famous of French engineers. In 1884 he obtained leave from the army to join the French company in Panama. The next year he became chief engineer for the whole canal construction project. When the French company failed and the United States took up the idea, Bunau-Varilla came to this country. Opinion here was divided on the merits of Nicaragua or Panama as locations for the canal. Bunau-Varilla insisted that the old French project in Panama should be continued, and conducted a successful campaign to this effect.

Although he had left the military service in 1902, at the outbreak of the Great War Bunau-Varilla reentered the French army. In the fighting around Verdun in September, 1917, he was badly wounded, and his right leg was amputated. In his memoirs General Pershing has testified to the courageous and able service rendered by Bunau-Varilla during the war.

In the course of his long life Colonel Bunau-Varilla made the acquaintaince of a great number of distinguished people, and his book is filled with entertaining anecdotes and reminiscences, not the least interesting of which is the story of the part he played in the final vindication of Dreyfus. He died in the spring of 1940, and this book, his autobiography, was completed just before the outbreak of the present war.

—H. S. F.

THE FLEET TODAY. By Kendall Banning. Funk & Wagnalls Company, New York, 1940. $2.50.

After many years of indifference the public has once more developed a sudden interest in the services, and as a result the publishers are now issuing a variety of books on the Army and Navy. The task of making such a book readable while at the same time including all the necessary facts and statistics is not an easy one. Mr. Banning has had considerable previous experience in this line, and his skill is attested by the popularity of his two earlier books, *West Point Today* and *Annapolis Today*. *The Fleet Today* lives up to the reputation made by Mr. Banning's other books, and those in search of information regarding the Navy presented in well written form will find this one worth investigating.

—H. S. F.

CAPT. LEE HALL OF TEXAS. By Dora Neill Raymond. University of Oklahoma Press, 1940. $2.75.

Captain Lee Hall's story is that of the frontier days of Texas—the heyday of the gunman, the train robber, and the cattle thief. Hall was a Texas Ranger; he helped track down such noted desperadoes as Wes Hardin and Sam Bass. In later years, as an army man, he fought in the Philippines. Dora Neill Raymond has done a fine piece of research and has presented the biography excellently. Army people stationed in Texas or interested in frontier history will enjoy reading this book and will be glad to have it in their library.

—W. S. N.

WHERE THEY HAVE TROD. By R. Ernest Dupuy, Lieut. Col., FA. Frederick A. Stokes Co., 1940. 412 pages. $3.00.

Col. Dupuy's latest book is a notable one, and we recommend it without hesitation. Graduates of West Point are imbued with the traditions of that institution, but many of them have but vague notions as to its early history. They are aware that the information has long been available in the excellent library at U.S.M.A., but have been unable or unwilling to perform the research necessary to inform themselves properly as to the background of this unique school. Col. Dupuy has done this work well; he has brought into one volume, in a readily accessible form, the authentic account of what has gone into the building of West Point, a National bulwark through these many years. West Point graduates owe the author a debt of gratitude; nongraduates (who, in the Army, are more numerous than alumni of West Point) owe it to themselves to be properly informed as to the origin and character of this great military school which has had such a profound influence on their own careers, and on the history of the Nation. The many officers whose sons are now, or expect to be cadets, should by all means secure a copy of *Where They Have Trod*.

—W. S. N.

SPECIAL

BECAUSE of repeated requests from numerous individuals and organizations, we have reproduced in pamphlet form Captain Harold F. Handy's popular and instructive SOME NOTES FOR BATTERY EXECUTIVES. This treatise, published originally in the March-April, 1939, number of The Field Artillery Journal, is invaluable for battery officers, especially the newly commissioned. Price per copy, 20 cents; for lots of 10 or more, 15 cents.

Some Forward Observations

Δ FURTHER INTERESTING accounts of the fighting in Belgium and France are coming through. We expect to print several of these in forthcoming issues of the JOURNAL. It must be remembered that the Retreat to Dunkirk illustrates only one type of open-warfare fighting—that of rear-guard action—and the British do not claim that lessons derived from these accounts can be applied willy-nilly to all modern warfare. Nevertheless they should be examined carefully for lessons, some of which are obvious, others implied. One clear lesson (and we will mention it repeatedly) is that field artillery must be able to *protect itself* against ground forces of kinds, against air units and air-borne units. Eternal vigilance must go hand in hand with proper armament and training. In today's war there is no such thing as rear elements "being protected" by front lines. In open warfare there is no continuity of front, regardless of whether flanks rest on impassable obstacles. In May and June it was common for troops and civilians to meet hostile forces sixty miles in rear of the so-called front.

Δ PROXY CARDS SENT out this year asked for suggestions, and many were received. The results of this sampling of reader opinion have been studied carefully in the hope of determining the trends of interest. We greatly appreciate the trouble taken by members in making these concrete suggestions; they will be followed wherever possible. Plans already made incorporate quite a few of the items requested. In general we must say that we print "what we can get," and we pass the plea right back to our readers to write articles on the topics which they think should appear. Some of the suggestions, we must admit, have us stumped. Here is one: "The price of membership is out of proportion to the value of the magazine." We humbly accept the rebuke, and will try to do better.

Δ THE MAJORITY of the suggestions called for articles on the technique and tactics of field artillery. With that we are in hearty agreement, for such is the mission of the magazine. It is with deep satisfaction, therefore, that we are able to announce that future issues will carry considerable material of an informative professional nature from the Field Artillery School. This data will be along the lines of what was included in the three issues of the now-defunct Field Artillery Digest, and will help bridge the gap between formulation of training doctrines and the appearance thereof in official training literature. The value of this service can scarcely be overemphasized, and in itself should be responsible for a greatly increased support for the JOURNAL. The JOURNAL will print material which definitely will be exclusive and of vital professional importance. Furthermore, we expect to print from time to time *Notes from the Chief's Office,* and messages and announcements from that office which are of interest to all field artillerymen. And of course we shall continue to exert every effort to extract items of interest from the European publications, and will use every endeavor to secure more original articles from those who fought in Europe during the past year.

Δ IN ORDER to provide relaxation for those who feel that there is sufficient shop talk during the day's work without having to read it in the JOURNAL, we will continue to supply a modicum of lighter material and a certain amount of military history. But the meat of the magazine will be professional. Photos and drawings will be used to the extent made possible by available sources and by funds for making engravings. We hope that you have noticed and appreciated that we have printed, during the past year, many *exclusive* photos of foreign materiel.

Δ THIS IS THE first monthly number of the JOURNAL. It contains fewer pages than the bimonthly, but the total content for the year will be vastly greater. The magazine can only continue as a monthly if it receives proper support from the members of the Arm. It should be the responsibility of every member to secure and send in at least one new enrollment from an officer who is not now a member. In so doing, you will be helping yourselves. As has been said many times, this is YOUR magazine, YOUR Association.

Δ PLANS FOR the content of forthcoming issues include two fine articles on antitank employment; a discussion of the development of the 105-mm. howitzer; motor maintenance for field artillery; driver tests and selection; marching and bivouacking; and possibly selections from studies now being made by the advanced class at the FAS. Various foreign journals, including the German, have printed during the past few months a translation of an article which originally was published in the *Revue d' Artillerie* (French). It is, in effect, a sequel to "A Battery of Artillery in the Tempest," which we reprinted a year ago. Gen. McLain has translated this sequel, and it will appear soon. Although it is a historical example of artillery employment during the World War, it describes an open warfare phase of the combat, and is interesting throughout. Another excellent article which is "ready to go" is "Some Suggestions for Equitation Instructors," by Capt. Solem. This will be of real value to officers who are charged with training the personnel of our various newly organized animal-drawn units.

The Field Artillery Journal–As Viewed By Its Readers

"**H**aving just recently become a **F**ield **A**rtileryman. **I** have read my first issue of the **J**ournal with a great deal of pleasure. **T**his issue is very timely as this unit has just been converted and is a corps artillery unit. **N**aturally any information on the subject is very welcome. **W**e have read it from cover to cover."—**C**aptain. **FA** (**N**ational **G**uard).

★ ★ ★ ★

"**I** want all students at this school to read and reread the article by **C**ol. **H**artman in the **U**. **S**. **F**ield **A**rtillery **J**ournal."—**C**ommandant of **B**ritish **A**rtillery **T**raining **S**chool for **O**fficer **C**andidates.

★ ★ ★ ★

"**U**pon the occasion of renewing my membership **I** want to tell you how much the **A**ssociation and its **J**ournal mean to me. **R**eally it has become the magazine of the month for me. **I**f **I** happen to be busy for a long period and have no time for reading other magazines. **I** always find time for the **FA J**ournal. **A**nd this is not from a sense of duty but because of the sheer thrill **I** get out of reading the interesting articles and stories. **T**he magazine is read from cover to cover and then a return reading is made on the more interesting ones."—**C**aptain. **FA**-**R**es.

★ ★ ★ ★

"**A**s usual, the **J**ournal is the best source for advanced information about the **F**ield **A**rtillery."—**M**ajor. **FA**.

★ ★ ★ ★

"**I** have used articles from the **FA J**ournal in instructing my classes at the **S**chool."—**I**nstructor. **FA S**chool.

★ ★ ★ ★

"**S**end me at once all copies of **FA J**ournal containing articles by **C**ol. **L**anza."—**C**ol. **R**obert **M**c**C**ormick (**C**hicago **T**ribune).

"**W**e have mimeographed and distributed to all our students the article on the new organization, in your recent **J**ournal."—**PMST**. **FA ROTC U**nit.

★ ★ ★ ★

"**R**equest permission to reprint in **H**earst **S**unday newspapers pictures of new **G**erman materiel recently printed in **FA J**ournal."—**M**ilitary **C**ommentator. **N**ew **Y**ork **J**ournal **A**merican.

★ ★ ★ ★

"**A**s one who finds himself away from active participation in field artillery for the first time, **I** must confess that **I** look forward to the receipt of the **J**ournal, particularly in order to observe the trends and opinions in connection with the lessons brought out of active operations over here."—**U**. **S**. **M**ilitary **A**ttache.

★ ★ ★ ★

"**T**he **M**emoirs of **G**eneral **S**now are worth more than the price of a subscription."—**N**ew subscriber.

★ ★ ★ ★

"**T**he **J**ournal has not only been interesting but very instructive and enables us to keep up with the latest advances. **I** believe it will be very helpful for our **G**uardsmen before and during their induction into **F**ederal **S**ervice."—**I**nstructor. **FA** (**NG**).

★ ★ ★ ★

"**I** wish to say that **I** would not miss an issue of the **FA J**ournal and believe every reserve officer should be a recipient."—**L**ieut., **R**es.

★ ★ ★ ★

"**H**ave been transferred to another arm, but still enjoy the **J**ournal, a fine magazine that has many timely articles of general interest, in addition to those for field artillerymen."—**F**ormer **G**unner.

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