The FIELD ARTILLERY Journal

IN THIS ISSUE:

The New Motorized Division

OCTOBER, 1941

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FIELD ARTILLERYMEN should be particularly interested in the mapping and survey exercises conducted at Fort Bragg. For years the Field Artillery has been testing and teaching certain methods and doctrines, but here for the first time was afforded an opportunity to try them out, on a large scale, with troops in the field. Today's fast-moving war has swung attention from the deliberate methods of the War of 1914-18 back to the "Indian-fighting" style. Observed shooting, they say, is all-important. This is true, and never has the Field Artillery lost sight of the prime value of open-warfare methods and observed fire. But in blitzkrieg, also, there are many occasions where observation varies from difficult to impossible, even for forward observers and air observers. Map shooting, at such times, is the only alternative. The Fort Bragg exercises were designed to determine whether we have been kidding ourselves as to our abilities and capabilities in survey and mapping. Hence in the two articles by Majors North and Echols, reporting these maneuvers, little mention is made of observed fire. No inference should be drawn that the School or the Chief's office intend to neglect the latter. Observed fires may be going on even while survey and mapping is in progress. But good survey will facilitate observed fire, and will supplant it only when observation fails. In rapidly moving situations survey may never be completed, yet it is always initiated against the possibility that some degree of stabilization may occur, when it will be necessary to rely on mass shooting and schedule fires.

NEXT MONTH we will begin a serial by Colonel Onacewicz, Polish Army, who commanded a regiment of field artillery serving with the Polish corps in France in the campaign of 1940. This story is packed with psychological as well as professional lessons. It shows that strong-hearted fighters equipped even with antiquated weapons can stop the blitz. This Polish regiment was placed in position behind the Maginot Line, and in the withdrawal therefrom fought to the bitter end, not even surrendering after the Armistice. The men made their way in small groups through a land infested with the enemy, until after an astounding trek of hundreds of miles they escaped from France. Don't miss the beginning of this fascinating and significant article!

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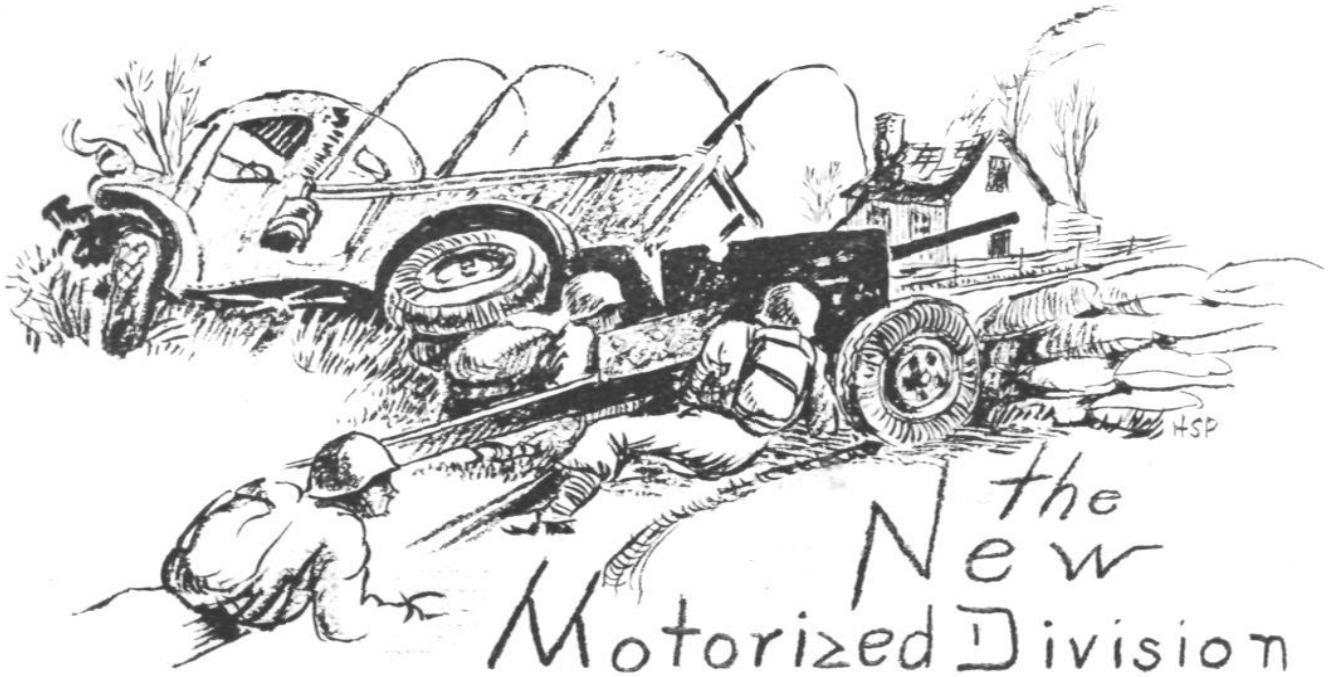
Fort Sill, October



Part 1- How will it be employed? . . . . .

The experimental motorized division which is being built at Fort Benning from the 4th Division bears some resemblance to Germany's *Schnelletruppen* and Italy's *celeri* divisions. It is, however, a native product, well adapted to modern combat over much of the vast spaces which constitute North America. Its organization and armament, on paper at least, look very, very good. The master minds as well as the pick-and-shovel boys have done a fine job.

The motorized division, which contains 14,000 officers and men, is a cross between a triangular division and an armored division. Its component parts are:

1 reconnaissance battalion
  2 reconnaissance companies — 52 light tanks (these take the place of armored cars)
  1 company of scout cars (36 bantam cars)
  1 weapons company (AA and AT guns and machine guns)
3 infantry regiments, motorized, each having
  2 rifle battalions, each having
    2 rifle companies
    1 weapons company (machine guns, light AT guns, 81-mm. mortars)
  1 support battalion, having
    1 company of self-propelled accompanying artillery, 75-mm. howitzers
    1 company of six 37-mm. AT guns
    1 company of .50 caliber AA machine guns
1 divisional artillery, having
  3 battalions of 105-mm. howitzers
  1 battalion of 155-mm. howitzers
1 antitank battalion
  2 companies of light AT guns
  1 company of heavy AT guns
  1 mine company
1 tank battalion
  1 headquarters company
  3 companies of medium tanks (total 54 tanks)
1 antiaircraft battalion—24 37-mm. guns.
1 engineer battalion
1 QM battalion
1 medical battalion
1 ordnance maintenance company

The division will contain a total of about 2,600 motor vehicles.

According to the War Department, the motorized division's employment will be characterized by swift, decisive action and all-around fighting ability. "It could go through a break or contain an enemy force while an armored division looped around a flank to destroy rear installations. When terrain becomes difficult it could relieve armored units. With its mobility, armor and heavy fire power, the new division could be used as a shock force in the van of an infantry division or to follow it up in exploiting success."

The motorized division can be used to advantage in

BY MAJOR RITCHIE WOLFE

Life

Motorized units may have to leave the roads and make detours through swampy ground.

rapid offensive thrusts,[1] to anticipate the enemy in applying strength at important points, to localize and restrict the consequences of a local failure, to protect an exposed flank, or to widen the range of an action. Its value will be enhanced if there are wide spaces of favorable (for motorized units) terrain in which to operate. In delaying action or in pursuit, a motorized division will be at its best. The European War has demonstrated that a defeated force composed of foot troops cannot successfully break contact and escape from motorized pursuers.

On the offensive, the motorized division is organized and equipped especially to attack units similar to itself and also ordinary infantry divisions, either in motion or in a fixed defensive position. It should attempt to avoid making frontal attacks against organized localities, however, and should employ its superior maneuverability in striking from the flank and rear.[2] Its very attribute of great maneuverability implies that the division may, at times, be used (like cavalry) to operate at a relatively great distance from the main armies. Hence its sustained offensive power may be weak.

The value of the motorized division will be conspicuous when it attacks moving infantry (either foot or motorized). While the actual assault will be made dismounted, its effect will be great because of the ability of the division to secure surprise. Guderian's armored and motorized divisions surprised French troops *at drill* in the barracks grounds at Abbeville. French units far behind the supposed front were constantly surprised and defeated by reconnaissance elements of German motorized divisions which had made rapid marches beyond the range of foot troops. All this has significance for artillery. It implies reconnaissance parties well forward, fire direction greatly decentralized initially, positions close to the attacking infantry, much forward observation, simple communication systems.

A motorized division will normally attempt to move on a wide front in multiple columns consisting of a varied array of units and detachments. If this war has proved one thing, it is that the order of march of an armored or motorized division falls into no pattern of "infantry, followed by artillery, then more infantry." Serials are very mixed affairs, but *they are short*. The general depth of advance is based (among other factors) on time-space, and consists of two echelons—the reconnaissance units and the main bodies. The width of the advance depends upon the road net and the hostile situation.

Life

Proper route reconnaissance will help avoid this

[1]In this discussion the motorized division is visualized mostly in its role of operating ahead of the main bodies, as a semi-independent force. Of course, it will be useful in many other ways, especially with an armored corps, where it may be used more as a ground-holding unit.

[2]There may be cases where it will be forced to make a frontal attack. The motorized division will often be operating as part of an armored corps, in which case it might make the holding attack while the armored divisions make the envelopment.

Both width and depth will be considerably greater than for an ordinary infantry division. The terrain is studied constantly to keep the commander continuously informed as to what possibilities it offers for quick massing for a blow in a predetermined direction.

The line of demarcation between reconnaissance groups and groups of the main body may not always be a clear one. Under certain conditions the whole division may advance as a mass of separate reconnaissance detachments gradually increasing in power. The picture is one of initial decentralization so arranged that centralization and coordinated effort occur progressively as hostile resistance stiffens. It is not an advance on successive lines according to the old cautious French school of thought, but it does lend itself to a prompt seizing of the initiative.

Signal Corps photo

Drivers and assistant drivers clean the vehicles during a maneuver in the South

Those who have viewed the European War from the roadside (and that is where it was mostly fought) state that the German schnelletruppen advance in little groups or cells, each composed of a few motorcyclists, a platoon or so of motorized infantry, a few tanks or armored cars, a battery or a platoon of artillery, and some pioneers. Each cell, radio-equipped, is able to call for air-force assistance or to bring up other cells from farther back in the column. These cells fight miniature, self-contained battles; but they are like ants—when one discovers a job too big for him, others quickly cluster around. This is the battle of "blobs" mentioned by Maj. Gaither in his article on Infantry in the July issue of THE FIELD ARTILLERY JOURNAL. The Germans like it because it provides safety to all elements on the march, facilitates (because of the small size of serials) march control, and above all because it lends itself to the sudden, vigorous style of piecemeal attack which they generally employ.

If the forward reconnaissance elements of the division are unable to brush aside resistance, and the main body becomes involved in the engagement, the action becomes similar to that of an ordinary infantry division. Centralization sets in, a coordinated effort is made, and artillery employment is in mass. Nevertheless, maneuverability and the time element retain a high order of importance. Furthermore, the motorized division will frequently fight alone, whereas the infantry division is engaged as a part of a larger unit.[3] Quite often the fractional parts of the motorized division are thrown unexpectedly into action unassisted, and must be able to break off such action abruptly. The reconnaissance detachments often have to fight to perform their missions, as do the flank-protection groups. These detachments, whose success frequently has the greatest bearing on that of the division, need more than their inherent mobility. They need fire power. That is why the Germans give them tanks, self-propelled antitank guns, artillery.

For the sake of argument, suppose that our motorized division adopts the method of advance which we have just described and which the Germans employed in France and in the Balkans. What would the march formation look like? Can we visualize an example?

To limit the discussion, suppose that the division is to advance in three columns with the center column echeloned to the rear. The question of air support will not be inserted into the picture. According to Maj. Gen. Brereton (*Cavalry Journal,* August, 1941), the current doctrine of our Air Force is to furnish close support to ground troops only when "vital" targets are encountered. Which targets are vital will presumably (if we interpret Gen. Brereton correctly) be the decision of the air officer at the headquarters of the task force commander. Hence it may be supposed that many objectives will present themselves at the front of a motorized division which the man on the ground considers vital but which will not produce air support. It does no good to tell an infantryman, an artilleryman, or an officer of the armored force that air support is necessary for the successful operation of his unit. He would be delighted to have this support, but when he is given a mission he must go ahead with or without air support.

With the "air thus cleared," we may picture each flank column of the motorized division advancing in the following formation:[4]

[3]Even when the motorized division fights as part of an armored corps, it may operate at a comparatively great distance from other units.

[4]The time-distance between groups may vary from 5 minutes to an hour.

Reconnaissance groups

Group No. 1:
- 14 scout cars (jeeps). The personnel are armed with automatic weapons of various calibers. Some of the cars are equipped with radio. This group fans out on a broad front.

Group No. 2:
- 2 scout cars
- 5 light tanks
- 1 section of AA and AT guns (from support company of the reconnaissance battalion)
- 1 section of pioneers

Group No. 3:

Same as Group No. 2

Main bodies

Group No. 4:
- 1 company of infantry, reinforced from weapons company
- 1 platoon of assault guns
- 1 battery of artillery[5]
- 1 company of pioneers (less platoon)
- 1 section of AT guns } from support battalion
- 1 section of AA guns }
- 1 section of ordnance maintenance company

Group No. 5:
- 1 battalion of infantry (less detachments)
- 1 platoon of assault guns
- 1 platoon of 37-mm. AT guns
- 1 platoon of .50 caliber AA guns
- 1 battery of 105-mm. howitzers

Group No. 6:
- 1 regiment of infantry (less detachments)
- 1 battalion of 105-mm. howitzers (less detachments)

The center column would contain, not necessarily in the order shown:

1 regiment of infantry
Divisional artillery (less detachments)
AT battalion
Tank battalion
AAA battalion
Engineers (less detachments)
Services (less detachments)

Reconnaissance and security elements of this column would be furnished from the column itself. If the center column were not echeloned to the rear, it might be better to organize it similarly to the others.

The AAA and AT battalions are employed under divisional control. Whether they are held together, and where they march, depends on the situation. The AAA guns usually are leap-frogged forward to protect defiles. Since the subordinate units of the division possess some organic AT protection, the AT battalion is usually held together for division employment.

[5]This artillery is for long-range fire, not for close support of Group 4. It would be desirable if one or more batteries of long-range guns could be attached to the division.

In the march of a motorized division, traffic control is a major and vital problem. The Germans use special traffic-control groups, some of which are stationed at key points while others patrol the columns. Further, each driver is considered to be a part of the traffic-control system. This has a beneficial psychological effect in that the driver feels that he is a cooperating member of a team rather than a herded nonentity. The traffic-control work of the higher German commanders is interesting. Examples have been noted where the division commander or even corps commander (*vide* Guderian at the Meuse) personally directed traffic through a bottleneck. This may seem contrary to the idea that a general is too important a figure to be concerned with such details; but what is more important at such times than the smooth advance of the unit? Many officers in our own army will recall seeing a higher commander standing beside the road watching the column pass. Other than OK-ing the march order drawn up by his staff, he seems to exercise no other control on the march. There is no known case where his standing by the road has contributed materially to the progress of the unit, but doubtless it has furnished good ammunition for critiques. If the division commander knows which units should reach the battlefield first, he might well take charge personally at the defile to establish the order of priority for units to go through.

This rule should extend down to lower commanders, who should take active command when their units are passing difficult points, always with the proviso that if their personalities do not contribute to smooth progress they should remain absent.

In advancing into foreign territory it is advantageous to select personnel of the foremost groups from men and officers who speak the language of the country. This placing of linguists in the advance elements, instead of only in the CPs where prisoners (or enemy civilians) are questioned, permits the acquisition of early intelligence as to routes, conditions of roads and terrain, and sometimes also as to the hostile situation. Intelligence obtained in this manner is, of course, always subject to scrutiny as to its reliability, but the advantage of having linguists in the advance groups seems self-evident.

Mention has been made of the need for a special type of artillery (long-range guns) to be attached to the motorized division. It is possible also to visualize operations in certain theaters where an even more exceptional kind of weapon is required. In the western hemisphere there are many localities where it is possible to move a motorized division rapidly along a splendid highway, but extremely difficult for the vehicles to leave this highway. This is almost always true in mountainous country, and frequently so in the jungle or semi-jungle. Consider, for example, the stretches of highway through some of our southern states where the ground is swampy and heavily forested on both sides of the road. The infantry might be able to dismount and make its way on foot through the morass, but not the wheeled vehicles. Again, consider

the quite possible case where the motorized division must move rapidly for several hundred miles over a fine paved highway, only to arrive in a roadless broken terrain where the actual fighting must be done. The infantry can walk; the tanks and jeeps can be left behind. Must the artillery also cool its heels by the roadside wondering how it can get forward through the brush, hills, swamps, glaciers, or old lava flows to support the infantry?

The answer to this is *pack artillery*, attached to the motorized division in quantity as needed. This pack artillery must be carried portée to give it the necessary strategical mobility. In rare cases animals may be left behind—where there is an assurance that suitable ones can be procured locally—but usually they must be carried portée. This can be done, and has been done in certain small tests; but it should be rehearsed by our new motorized division, too.

In discussing the subject of the motorized division, principal attention has been given to its use offensively. It may be necessary at times to use such a division in defense. Doubtless this defense would usually be conducted along the lines prescribed for cavalry; that is, the division would employ its units aggressively to attack the heads, flanks and rear of the advancing enemy columns. It should never be used deliberately in a static type of defense. Nevertheless the exigencies of the situation may force this type of defense upon it, in which case it fights similarly to an ordinary infantry division. Its mobility, however, in shifting units and reserves, may permit it to hold a wider front. In defensive situations in open warfare the motorized division usually adopts the deep horseshoe or hedgehog formation as recently taught at the Command and General Staff School and as practiced by German panzer units operating alone in hostile territory. Defense is always peripheral.

The foregoing discussion leaves untouched many interesting phases in the operation of the motorized division; and it naturally is too general in character to be very satisfying to subordinate commanders. It may serve, however, to get the "ball rolling." It is hoped that others will send to the JOURNAL their ideas on supply, evacuation, reconnaissance, motor maintenance, and so on. Once again there is need for some original thinking.

Part 2- The Artillery Component . . . . . .

Artillery *technique* has been evolved as the result of years of study, experimentation, and exhaustive test. It is constantly undergoing revision, but major changes are slow of adoption and comparatively rare. Our present methods, remarkably similar to those of the Germans, have been proved in modern combat. We can accept them with confidence. With appropriate and slight modification they apply to artillery support of any type of division or other unit.

Tactical employment, however, may differ widely according to the type of unit. For it no rigid rules can be laid down. Nevertheless, while each specific problem must be solved as it is presented, the exercise of a little imagination and foresight will prepare one for some of the more unusual exigencies which will occur. For example, a battery commander of artillery with an ordinary division rarely considers the problem of local security except in terms of defense against aircraft and tanks, and even then he considers himself as a part of the battalion team. The battery, or even section commander of artillery with a motorized division, however, may have to provide his own advance, flank, and rear guard; he may be in action far from supporting troops. He may have to devise his own bridge or raft to cross a stream. He may have to execute his own survey, supply his ammunition, evacuate his wounded, repair his own materiel. He must be skilled in technique; he must be self reliant; he must never lean too heavily on the battalion fire-direction team.

Artillery support of a motorized division will often be of the same pattern as for an ordinary division, and the sequence of events—reconnaissance, selection, and occupation of position, firing, displacement—will be the same. But the whole tempo will be tremendously speeded up.

After the division commander has announced his decision as to the number of columns in which the division will march, and has specified the elements which will constitute the advance guard (which may or may not include the reconnaissance battalion), it will be up to the artillery commander to recommend an assignment of the divisional artillery to these columns. The consideration of a few general principles will be helpful to the divisional artillery commander in making these allotments:

1. *Difficulty of control on the march.* Although some people may think of a motorized unit as being very flexible, in some phases of its activities the reverse is true. Owing to the speed at which it moves, the lengths of its columns, and the fact that it is confined during a great part of the time to roads, the advance of the motorized division is difficult to control or change once it has been launched. It will not be easy to halt the various elements, change their routes, or effect any rapid regrouping. The success of the operation may be seriously impaired unless great foresight is exercised in the original assignment to the various columns. If it

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The motorized division on the march

is felt that a certain column may have need of artillery, some artillery should be assigned to it initially.

2. *Zones of advance*. It generally is safer to prescribe zones of advance rather than routes, even if the division order has not so specified. This is helpful to the artillery elements in that they will know the zones of observation and fire for which they are most likely to be responsible. Of course, higher authority may require assignment to specific routes, but this does not necessarily prohibit the artillery commander from adding an allotment of zones.

3. *Decentralization*. It is uneconomical to break up the battalions, and weakens their possibility for mass effect. Nevertheless owing to the special characteristics of combat of motorized divisions, which obtain results by utilizing the factors of time and speed (and often resort to piecemeal attacks), the weaker but more immediate fire of a battery may be more important than the more powerful but delayed action of the battalion. Thus the initial allotment to columns may mean the attachment of batteries, or even parts of batteries to the divisional reconnaissance battalion or following units.

4. If the division is confined to a very narrow zone of advance, it may be necessary to have all the artillery except two light battalions follow the infantry of the main body. In spite of the natural desire of the artillery commander to place his battalions well forward, he may have to make sacrifices where the situation demands that the advance elements be short and easily maneuverable. Artillery, especially with its ammunition batteries, adds greatly to the length of the column; it may be that the situation confronting the division is one in which unsupported small groups of motorized infantry and tanks can clear the path most expeditiously.

5. On the contrary, when it is believed that nothing will contribute more to the advance than the possibility of delivering early and powerful artillery fire, the artillery commander should not hesitate to urge that all light artillery be placed in support of the reconnaissance elements or advance guard.

6. It is axiomatic that the main effort will be given the maximum artillery support.

In the order attaching artillery to the reconnaissance battalion, it may be necessary to make provision for special reinforcements for this artillery. This may include additional reconnaissance, liaison and communication personnel, ammunition supply, motor-maintenance vehicles, demolitions or pioneer groups and equipment. In case less than a battery is attached, special administrative and supply arrangements may have to be made. In considering these matters it is well to maintain the principle that all small groups should be, so far as possible, self-sufficient in all respects. The action and movement is fast, units are often widely separated.

Above all, as has been mentioned briefly, special provision must be made for security. In spite of the repeated grievous lessons of history, even veteran units grow careless concerning local security. There is an example where in May 1940 a small German armored unit ran through the bivouac area of a French artillery battalion

which was sixty miles from the main fighting area. The French, feeling perfectly secure, had failed to install any local security system. The artillery cannot rely at all times on the protection of its own infantry. It is a cold, hard fact that extremely mobile units during maneuvers have a common habit of forgetting that their artillery is with them. They will be apt to act in the same way during the excitement of war.

Artillery units must never assume that front, flanks and rear are safe during the march or in bivouac. Today's tactics constantly involve ambush of motor columns. Such ambush is hard to circumvent in close terrain. Artillery units must always inform themselves as to the amount *and efficacy* of protection afforded by other units, and must of their own resources, reinforce this as necessary. Frequently a single "jeep" patrolling a side road may suffice as a flank guard. The main thing is not to overlook the necessity. A study of the terrain may disclose the most dangerous localities; these must be given special attention. Watch for covered localities on the flank where a good field of fire covers a long stretch of road; watch defiles.

The artillery order for the advance must provide for reconnaissance elements of that artillery which is not attached to the reconnaissance battalion. Since *time*, not space, is the important consideration, reconnaissance parties pertaining to artillery with the main body must be pushed well forward, unless it is felt that the artillery with the advance guard can supply all needful information concerning routes, positions, objectives, and topographical data. Decision must be secured as to what size reconnaissance parties will be permitted to accompany the advance elements. The artillery will wish to have them as large as possible, so as to execute early route reconnaissance, marking, and pioneering; survey; installation of communications, or reconnaissance therefor; selection of likely position areas; study of the target area.

Preoccupation with these tasks must not blind the artillery commander to the fact that in today's war, especially with motorized units and a fluid "front," targets may appear most unexpectedly, in most unexpected places. Hence the reconnaissance groups should be securely connected by radio or other appropriate means to firing elements which are prepared to get into action quickly from roadside positions. These reconnaissance groups (and this is an unusual consideration) must be prepared *to conduct fire* as well as to perform their usual reconnoitering, pioneering, and survey tasks. If the march has been planned in detail, and successive check concentrations spotted along the axis of advance, this task may be simplified. If not, other means of target location and identification must be employed, perhaps the use of pyrotechnics as suggested by Capt. Hart in a recent issue of this magazine.

With respect to reconnaissance, the main duty of these detachments will *not* be to locate firing positions, for these will depend on the situation. Their big job will be to locate routes to possible firing areas. The very nature of modern highways, with their deep cuts, steep-sided fills, and roadside drainage ditches, makes it very difficult for motorized artillery to leave the road quickly. Reconnaissance groups must furnish information of such danger spots, and tell the commanders of firing units where routes of egress from the highway exist.

Another important thing is that reconnaissance parties must have the ability to make lightning choices in selecting routes and positions; reconnaissance made from a fast-moving vehicle requires excellent training and a high degree of mental mobility.

Battery commanders will often find it advantageous to march with the advance elements, keeping close to the axis of advance so that they will be centrally located to receive reports from parties sent to the flank. Here, too, they will be in closer touch with the commanders of the supported units.

Where the size of advance parties is limited, the column artillery commander is faced with a dilemma of who should go; the RO's, the Com O's, or S-3? The

Signal Corps

Truck-drawn 155-mm. howitzer

decision will result from a careful study of the technical and tactical requirements. Never should a rigid rule be followed. For the motorized division, route reconnaissance will always rank high in priority. Survey and communications are of lower importance initially because simple, open-warfare methods prevail. However, if observation is restricted, survey may take high precedence. Since radio will be the more common means of communication until a coordinated attack is made, the Com O's work will not require such early reconnaissance for wire routes or other installations. The need for S-3 to be far forward will likewise be of reduced importance until centralization is effected.

When the division advances in multiple columns, the senior artillery officer with each column usually will be a battalion commander. He, like the divisional artillery commander, will probably advance with the first echelon. Initially, he should keep his staff together (not necessarily with him) so that it may make early plans for the coordinated employment of the battalion, and prepare the battalion to advance in pursuit of the enemy or to echelon the batteries properly to cover a withdrawal if the latter should become necessary.

The initial stages of the action of the motorized division, however, will be characterized by decentralization. During this time the artillery battalion commander must hold rein of his natural inclination to interfere with his subordinate units. He can occupy himself (and his staff) best by making all arrangements to assume centralized control against the moment when the need therefor arrives. Included in his functions in the interim will be detailed reconnaissance for routes, OPs, firing-position areas, CPs, communications, antitank and antiaircraft dispositions, and so on. He can arrange for resupply of ammunition and other necessities, and for evacuation and replacement of both personnel and materiel. He can become more familiar with the situation, visit supported and subordinate units, and make plans for fire-direction. He should welcome this opportunity for detailed study of the situation before being called upon to make the numerous decisions usually required. These tasks should keep him busy; and if he has used imagination and foresight, he will have so facilitated the work of his batteries that "taking over command" will be a smooth and rapid transition, accomplished without stoppage of firing.

The conditions under which the motorized division will move, especially in hostile terrain where surprise due to the infiltration of fast mobile elements is always possible, make it necessary for the batteries to be well armed and trained for close defense. In spite of using all means at its disposal for self-protection, the artillery will at times be dangerously exposed to hostile attacks. The enemy will seek to make sudden and deep counter-thrusts, using tanks and motorized infantry. These attacks, usually delivered from flank or rear, are aimed at the area generally occupied by our artillery.

One of the best ways of assuring self-protection during an advance is for the artillery always to stay as close as possible to its infantry. Recent military events in Europe, especially the sad experience of the Russians in their winter campaign against the Finns tend to confirm the truth of this.

On initial entry into action, positions will be located near roads so as to facilitate early delivery of fire and displacement as necessitated by circumstances.

Much of the fighting, so far as the artillery is concerned, will be roadside fighting. The idea of this is distasteful to many; and some of our units on maneuvers have been severely criticised for being road-bound. No doubt much of the criticism is just, but there is room for speculation as to whether roadside fighting might not be a distinctive development of this war. Perhaps it will occur whether we like it or not. Lieut. Dupont and others who have faced the German panzers state that during May and June 1940 the armored and motorized columns clung quite close to the main highways. The noted German commentator, Soldan, verifies this in a recent article. If this is the case—and we ought to be sufficiently realistic to recognize that things do happen which have not been planned that way—some little thought should be given to the slightly special technique involved in emplacing batteries in and firing them from the road or roadside ditches.

Without going into detail, it might be mentioned that ramps, timbers, blocks and tackle, etc., may be needed for getting vehicles off the road; and should be carried with each battery. The Germans appear to use a metal trough-shaped ramp to permit light vehicles to cross ditches or descend roadside banks. In swampy terrain, mats made of fascines are useful, and should be prepared beforehand and carried on the vehicle. In rocky terrain, and especially where the ground is covered with old lava flows, some blasting or other demolition equipment may be mandatory; this fact is easily lost sight of by troops who are accustomed to maneuver only on sandy soil.

Special effort should be made to keep the batteries as mobile as possible during combat. To accomplish this, commanders should avoid the unloading of more ammunition and equipment than will be required for the immediate situation. Vehicles should be held near at hand, communication lines kept simple and short. Continuous and early reconnaissance must be made for alternate positions and for routes of advance or withdrawal.

Battery positions must be far forward, in order to shorten wire lines and to effect close support. Unless this is done, liaison with the supported unit will be almost impossible. Additional protection must be given to the batteries so employed. During the advance into Poland, the German battalions of artillery frequently occupied positions in advance of the line of departure

of their own infantry. Their OP's and firing batteries were given some protection by advanced cavalry detachments but this had to be supplemented by German artillerymen armed with rifles and machine guns.

Since it may be urgently necessary for batteries to enter into the fire fight at a moment's notice, each of them must be prepared to fire independently in its own zone of action. Battery commanders and other personnel must be perfectly trained in all the open warfare methods for which we have been so thoroughly indoctrinated in time of peace and which have proven their worth during the present war. This does not mean that deliberate preparation of fire should be thrown into discard. Even with motorized divisions occasions will arise when only map firing is possible, the accuracy of which must depend upon careful and often extensive topographic work.

The artillery of motorized divisions must always be ready to execute the normal missions of all divisional artillery, including counterbattery. The missions most frequently assigned, however, will be those of accompaniment and direct support.

Principal targets of the artillery will be antitank guns, tanks, and automatic weapons, since these are the obstacles most effective to the enemy in checking the advance of our division. The fact that reinforcing artillery will seldom be present, and ammunition will be limited, requires that the targets engaged be only those which are the most dangerous to the advance of our own troops. Blind firing on suspected areas will scarcely ever be justified. Ammunition expenditure must be watched with exceeding care, and timely arrangements made for its resupply. The type of fire delivered will usually consist of sudden violent concentrations. Rarely will there be opportunity, time, or ammunition for prolonged fires, precision fires, barrages or other fires characteristic of stabilized warfare.

There appears to be some reason to believe (although these reports have not been confirmed) that the need for quick use of artillery emplaced in the road to combat motorized or armored attack has re-introduced the expedient of mounting guns in trucks. Both the Germans and the Russians are said to be using this method at present. The idea is not new in this country. In years past we have mounted (experimentally) 75-mm. guns in various types of cargo vehicles, without modification of gun or truck. Older officers will also recall the so-called "Moseley mount" in which a 75 was mounted on a specially constructed multiwheeled truck. The disadvantage of this expedient was that, owing to limited traverse, fire could be delivered only through a restricted sector toward the front of the truck. Recent improvements in materiel have opened up this field again, and commanders of motorized divisions should bear in mind that in many cases they can greatly augment their quota of tank chasers by means of this device. Organic divisional artillery must not be so employed except where hostile tanks constitute such a threat that antitank fire is the most vital mission which artillery can perform. All divisional light artillery should be prepared, by prior training and test of materiel, to shift quickly *and cheerfully* from its normal role to this more exceptional task.

Notice of Annual Meeting, U. S. Field Artillery Association

In compliance with Article VII, Section 1, of the Constitution, notice is hereby given that the Executive Council has fixed 5:30 PM, Monday, December 15, 1941, as the time of the annual meeting of the Association to be held at the Army and Navy Club, Washington, D. C.

The business to be disposed of will be the election of six members of the Executive Council; voting on proposed amendments to the Constitution (as printed in each issue of the JOURNAL beginning with June, 1941); and the transaction of such other business as may properly come before the meeting.

Proxy cards are being sent out to all active members of the Association within the continental limits of the United States, as required by the Constitution, and it is desired that they be returned promptly. Nominations may be made on the proxy cards or from the floor of the meeting.

A Pan American Airways plane over South America. Photograph by Henry S. Villard.

WIDENING HORIZONS

By Lieutenant Edward A. Raymond, 87th FA Bn.

Editor's note: In line with the quickening interest in areas of possible strategic interest to the United States, this magazine will print from time to time general articles dealing with other countries in the Western Hemisphere. The first of these, in the July and August issues, concerned Mexico. Last month we ran an article on Canada. Herewith is a brief but up-to-date picture of Peru, with emphasis on the things which military men, and especially artillerymen, should know. Of special significance are the author's comments concerning mountain troops.

Subject: Orders.

1. The Secretary of War directs as necessary in the military service that you proceed to Albrook Field, Canal Zone, and accompany the military aircraft flight leaving that station for Lima, Peru. . . .

That meant taking off on a Goodwill Flight to Lima at 5:30 the next morning! A whole flock of ideas crowded to mind immediately. A leisurely flight in the somewhat antiquated bombers which have been on duty in the Zone for years. Stops in those countries between Panama and Peru—by the way, was Venezuela one? Notions, too, of the Andes, with condors; Lima, old and shabby; and the Peruvian Army with officers who specialized on life in garrison cities. Not forgotten were the diplomats, with purple soutaches across their starched shirtfronts, nor the willowy senoritas. What a furbishing of military finery began! All of these were normal reactions, probably, but like so many mental pictures of the shape of things to come, entirely false.

The trip did not prove to be a pleasure jaunt, but strictly business. It brought home interesting lessons. We flew in modern, fast ships (flying fortresses), and got straight to Lima in eight hours. Peru suddenly seemed extremely near to the Canal, and Peruvian friendship seemed important. As we lost an escort plane on the trip down, the Mission entered official mourning. We concentrated our attention on the Peruvian Army, not on balls and cocktail parties. We found a hard-bitten force adapted and trained for special operations in high mountains and Amazon jungles, operations which the writer believes would be entirely impracticable for any present units of our Army. The Peruvian mountain artillery was particularly impressive, both as to type and quantity. It looked as though we would have a very difficult time driving any external aggressor out of that country without the help of the Peruvian Army. The friendship of Peru seemed still more important. Should not the same considerations apply to Chile, to Brazil, and possibly to other South American countries? That small neighboring armies could help us much and teach us more was a new idea. But to go back to the beginning, and describe our trip chronologically—

FLYING DOWN TO LIMA

The prospect of a non-stop flight as long as a transatlantic hop made waking easy, even at three o'clock of

Operations over such unexplored mountain terrain as this demand specialized mountain troops.

a foggy morning. Breakfast, in a squadron mess, was disposed of in silence, and all officers making the flight assembled in the Operations Room, overlooking the concrete runways of Albrook Field. Our flight commander moved a step away from a little knot of senior pilots.

"Gentlemen, here is your flight plan."

He spoke with the easy, definite tone of a good officer. "Weather eight-tenths overcast to 1,100 feet. Mountains covered. Fly initial course on 52 degrees. That will take us off the coast. Headwinds expected. Radio frequencies will be—. Carburetor settings—. Special instructions: Do not enter clouds at closer intervals than five miles. Do not alter course in clouds. The central coast of Peru has a perpetual overcast 1,500 feet thick from 1,000 feet at this time of year. I shall decide whether to go underneath it or stay on top on the basis of later reports. Order of take-off, one, three, two. Usual instructions, last man off. Any questions?" He paused. "It is now 5:05. That is all."

We blasted off the field and went up on instruments. Some time later we came out on top. Suddenly the world was brilliantly clear and the sunlight was reflected from a boundless tundra of cloud beneath. Our spirits rose. We forgot the steamy mistiness of a tropical dawn upon the ground, and the intense loneliness of climbing through a cloud bank. It was fun to try guessing just where the other ships would emerge to join us in our super-world. The flight formed into echelon and headed for Peru.

Breaks in the clouds revealed the old familiar coast of Panama, so toilfully defended on maneuvers. The end of the isthmian section of the Pan-American highway at Chepo showed up sharply from the air. There is the jumping-off place into virgin jungle. Columbia was largely hidden. More rifts in the clouds did not appear until we were off Ecuador. It was hard to follow our progress from small-scale maps, as the little jig-saw pieces of ground we saw did not make much sense. Even from our altitude, the Ecuadorean rivers looked muddy, and that gave us the clue to the ground conditions underneath that carpet of tree tops. There is nothing like the root mass of a jungle for holding moisture. Evaporation occurs slowly from the heavily shaded ground, and the resulting swamps are not the lightest curse of South American "bosky." What a contrast between that green, fetid hell below and the cloud sea we were surmounting in the planes!

With the feeling of sailors sighting land we glimpsed the Andes, forming a false coastline in our strange double-decked world. Naturally, the sun is very bright in the latitudes of Ecuador, so that every snow cap and ravine of the great black range was etched clearly. Mountains have personalities; those who know them well can recognize them as they recognize people, without stopping to scrutinize the features. The starkness of the Andes is apparent at first glance, and the more they are seen the more strongly that characteristic stands out.

The clouds beneath melted away before we reached Peru. We came in over a sunlit sea to the bulge of coastline which contains Talara. This, the second port of Peru, sits on the edge of rich oilfields. One thinks of copper and silver in connection with Peru; actually half

the mineral production of the country is of petroleum and its derivatives. Derricks run back from Talara as far as the eye can see, and out into the ocean over the broad, yellow beaches. The juxtaposition of tank farms, with plenty of refined gasoline, to a large airport, must be known in Tokyo and Berlin. The airport is at the edge of a 100 per cent desert covering northern Peru. The rains never come. The very rivers run sand, with a seepage of moisture far below the surface causing infinitesimal movement of the whole sand mass. The small black specks of vegetation which exist depend upon rare mists.

Farther down the coast the wasteland is splashed by emerald-green patches of irrigated land, commonly lying in valleys. Peonage persists, and the population of a whole township may work the sugar plantation of one well-bred Spaniard or industrious German. Even more important than the sugar industry is cotton growing, which accounts for a quarter of the country's total exports. To an appreciable extent this industry is in the hands of Japanese.

Cotton fields came into sight as our planes flew farther south. We descended to a lower altitude for the last hour of flight, to get under the winter overcast. Flying at only a few hundred feet, we saw clearly the face of the country. So perfectly preserved were the Inca terraces on all the hills, and such a geography-book appearance did they give the landscape, that it would almost have been easy to believe that we were traveling over time as well as space, and looking at the pre-Spanish empire itself.

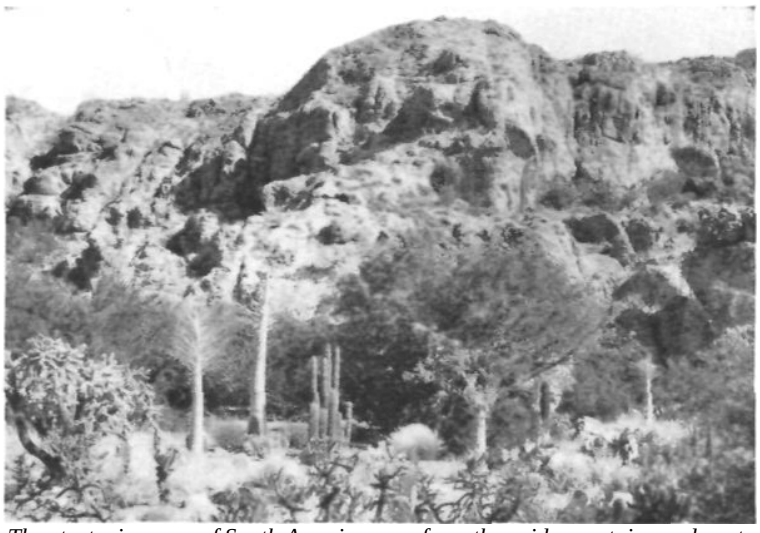
Nothing in northern Peru, nothing seen since leaving Panama, had been any preparation for the sight of Lima. After jungle and mountain and desert and tin-roofed Talara, a grand city of 500,000 people was impressive indeed. Callao, the port of Lima, once eight miles from the city, has now become ingrown; the residential suburbs go up to the foothills of the Andes to the east. Still at a few hundred feet, the flight circled Lima three times and landed on one of the airports at the outskirts of the city. Crowds were there to greet us, and after a brief ceremony, punctuated by magnesium bulbs, the flight was taken to the leading hotel. Even though the past eight hours had been spent in a stable flying fortress, with a corridor to walk up and down, most of the time had been passed at high altitude, much of it on oxygen, and all hands were tired. But it had been a good trip.

THE PERUVIAN ARMY

Peru is bounded on the west by the Pacific ocean and on the other three sides by territory disputed with Ecuador, Columbia, Brazil, Bolivia, and Chile. Lima, capital of South America in Inca days, capital of the richest viceroyalty of Spain, had a two-year reign of terror under Chilean occupation after the War of the Pacific. San Marco, oldest university of the New World, was sacked and the National Library was burned. The rich nitrate provinces of Tacna and Arica were lost. No

The volcano Osorno, photographed at 10,000 feet by Robert M. McClintock

wonder that Peru is a militarized nation! In South America only the A-B-C powers (Argentina, Brazil and Chile) have larger armies. Conscription, while not always enforced, is universal, and carries a two-year term. There are approximately 12,000 trained men under arms, and about the same number in reserve. The Army is divided into a regular component and the Guardia Civil, from which certain ideas might be taken at some future date for our own National Guard. The Guardia is a permanent force, with officers trained in the military schools and staff schools of the army. All guardsmen have completed periods in the other force. They carry the rifle, live in barracks, drill, and engage in military maneuvers. Yet they earn their keep by doing police work.



The strategic areas of South America vary from the arid mountainous deserts such as that of Peru, to the lofty cordilleras whose summits are covered with perpetual ice and snow. On the eastern watershed is a dense jungle.

The regular army has five divisions, each with its divisional headquarters at a strategic point. The largest permanent

Mt. Aconcagua, highest peak of the Andes on the "hump" near the border of Chile, elevation 23,098 feet, is in the midst of a magnificent mountain area. Photo by Capt. Albert W. Stevens, courtesy of Pan American-Grace Airways.

concentration of troops, and the General Headquarters, is at Lima. The American Flight, which landed the day before an anniversary of the death of Pizarro, was able to watch a parade of all units of the division based on the city. The Peruvian soldiery is squat, sturdy, and reflects the general blood pattern of the country—10 per cent white, 30 per cent mestizo and 60 per cent Indian. The uniform is of the same mustard color as used by the French in the current war, and the helmet is of French type. The rifle is a five-shot Mauser. Leather and equipment showed excellent care, and the marching was good.

Besides two regiments of infantry and a regiment of cavalry, each Peruvian division has a field artillery regiment, armed with 75-mm. pack howitzers. Most of these weapons are Model 1916 Schneiders. They have the advantage of being broken down into nine loads instead of our six. Their heaviest load instead of being in excess of 300 pounds, like ours, is approximately 200 pounds, including the pack. Four batteries are equipped with the Model 1928 Schneider. This jewel has a maximum range of 14,000 yards with HE shell. A third type is the Japanese Osaka, which is not as highly regarded by the Peruvians as their French materiel. Purchase was made some six or eight years ago during a crisis on the Colombian border. Credits in France were inadequate. Germany had other uses in mind for her munitions. Peru attempted to buy our present pack howitzer. We were "unwilling to arm one neighbor against another," so Peruvian orders went to build up the Osaka works, and the Peruvians obtained a pack piece more mobile and with greater range than ours.

The American Flight rode a train up into the Andes all one day to see the mountain conditions under which the greater part of the Peruvian Army operates. It is in Peru, incidentally, that the Andes reach their greatest height, with seven peaks vaulting up over 19,000 feet. It might be added that this portion of the range is rising at least a foot every hundred years, which is fast work, geologically speaking. The writer rode much of the time with a lieutenant colonel of Peruvian artillery. This officer was a graduate of the Ecole de Guerre in Paris, and had served in a French artillery regiment before the present conflict. Colonel S—— mentioned that the military influence, as well as the cultural influence, of France had always been strong throughout South America, and remained so. He pointed out that Germans and Japanese in Peru virtually never entered the Army, finding other occupations pleasanter and more lucrative. French training influence among Peruvian artillery officers, he emphasized, was lifelong, and not to be forgotten in a few months. Col. S—— had been stationed on the Ecuadorean frontier, where repeated rifle skirmishes had already taken place. The Peruvians do not have anything like enough artillery pieces to be strong everywhere along a defensive front, so they hold their force massed for a counter-thrust, or, in the Eucadorean view, an aggressive assault. The slight, mountain-bred mules and stocky mountaineer soldiers are able to climb, march and maneuver all day at altitudes above 10,000 feet. The aviators as well as groundlings of the American Flight were so giddy and so badly "blown" after climbing one steep hill at 12,000 feet that they had to rest for twenty minutes. The effect of such altitudes on the fleshy, hulking mules which stagger under our 300 pound loads in Panama would be disastrous.

It was not until part way back to Lima on the train that the Americanos del Norte learned that they were not seeing the "montaña." The Montaña Division in the Peruvian Army is not a mountain, but a jungle, force. The "montaña" of Peru lies to the east of the Andes, and its military and economic headquarters are in Iquitos, the only ocean port in the world two thousand miles from the sea. To be exact, Iquitos is 2,653 miles from the mouth of the Amazon, and lies in an immense area less than 1,000 feet above sea level. Not only this basin, but the foothills, lower slopes and valleys of the eastern Andes are covered with a half-impenetrable jungle, steaming endlessly with bluish mist. One tiny illustration of what American troops would have to face in such jungle is the gnat problem. Small hard-shelled gnats

The flagship of a Goodwill Flight landing at Limatambo Airport, Lima.
This was the first Flying Fortress ever to land on foreign soil.

there can force their way through sandfly bars, and never even know a headnet is being worn. Each bite raises a blood blister the size of a dime. In a matter of minutes an unprotected man is unable to see, or even grip a rifle—he can not close his hand sufficiently. The Peruvians use a protective salve which we do not know how to make. They do not toil the best part of an hour in tropical heat to build jungle beds each night (these are raised platforms covered with large leaves or fronds, on which a shelter-half may be erected, out of the path of snakes, ants and vermin). Instead they carry a small woven hammock weighing less than five pounds. Montaña troops are recruited almost entirely from Indians and mestizos who have grown up in that climate, know its dangers, and can live in comfort on its half-hidden resources.

We have read of the German and Austrian mountain troops in action in Norway, the Balkans, and Crete. Also, we know that the huge Colonial Institute in Berlin flourished all through the post-war years when the Reich had no colonies. We have voluminous evidence on the fascination colonial military problems hold for German students of war. Operations with French colonial and Japanese allies in Africa, Indo Chino and the Straits Settlements might supply veteran jungle troops before we reckon. *We cannot assume that an aggressor would be at as great a disadvantage in South America as we would be ourselves*.

Part of Peru is neither rugged mountain nor Amazon jungle, but coastal plain. Here the GHQ artillery of the Peruvian Army would be a trifle inadequate against a first-class power. It consists of one battery of World War 105-mm. howitzers, horse-drawn, of Krupp manufacture. Incidentally this has been our own strength in weapons of that caliber until very recently.

Peru has an extremely popular Air Force, which attracts the finest blood in the country, is immaculately tailored, and is "advised" with an iron hand by the lieutenant colonel heading a U. S. Marine Corps Air Mission to that country. The Force has approximately two-hundred planes, the best of which are American A17A attack ships and German Junkers transports confiscated from the Lufthansa Airline. An "obolo," of a day's wages, is being imposed on all citizens to buy more planes in the United States.

Peru also has a Navy, under the tutelage of a high-ranking American Naval Mission. This service, also, has a greater social and public standing than the Army.

From the standpoint of hemisphere defense, the Peruvian Army would seem a much better investment for the Peruvians than planes and ships. Her contribution in these can be but trifling. She must depend on our aid, in any conflict except one with another American nation. It would seem the part of common sense to influence Peru, by all means at our disposal, to *supplement* our potential power in South America; rather than try to *supplant* it.

The Goodwill Flight convinced this writer that actual military aid from the armies of Latin America could be of decisive importance in resisting invasion of the other half of this hemisphere. It may sound ridiculous to contend that in defending Peru, for instance, her army of 12,000 active troops could render critical aid to ours, which is more than a hundred times as large. Here is the answer: Peru, like the greater part of South America, has such difficult terrain that only highly specialized mountain and jungle troops can operate there. Let us keep this thought in mind as we watch the progress of United States foreign policy in South America.

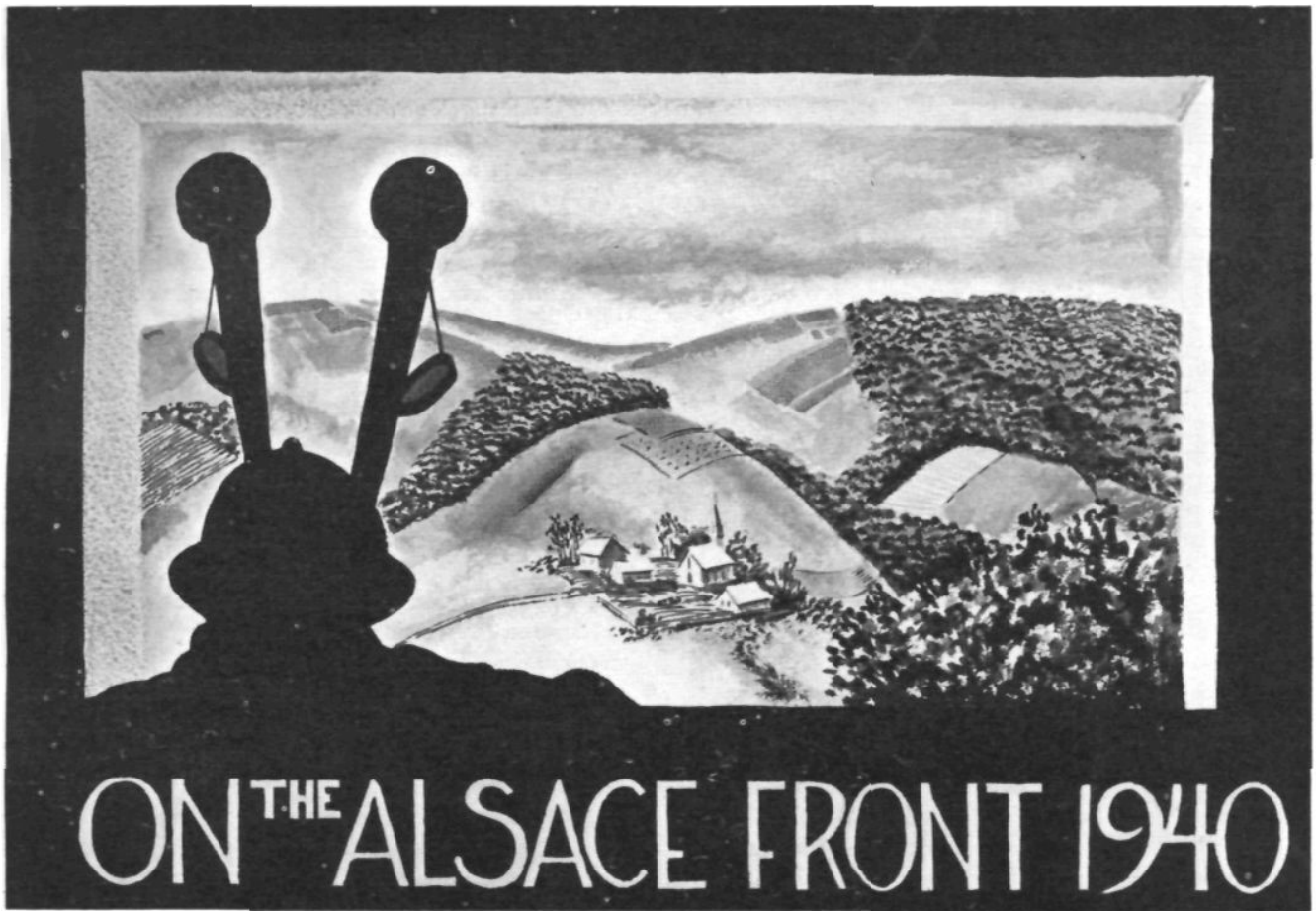
With official blessing, the press and screen are doing a great deal to popularize Latin America in the United States and to spread goodwill abroad. Large loans are being made. Political and military conferences on New World solidarity are held. Army, Navy and Marine Corps missions are sent. The Good Neighbor Policy is being given all possible effect, to the end that our intervention would be sought at once if invasion came. This is well, for the situation of the American republics now is strikingly similar to that of the thirteen colonies, once summed up so well by canny old Ben Franklin. There are others in worse need of hanging than ourselves, and after his flight, this writer is anxious to see the Peruvians, also, on the exempted list.

Errata

a. In the September number of THE FIELD ARTILLERY JOURNAL, on page 694, line 13, right column, the date 19*40* should be 19*34*.

b. The picture displayed on page 635 of THE FIELD ARTILLERY JOURNAL is a Schneider 105-mm. rifle, and not a howitzer.

c. On page 636, the number of cannoneers in the battalion is shown as 60 instead of the correct number, 69.



BY LIEUT. JEAN DUPONT

(Formerly French Army)

February 12th. Our division, which had been at rest for two months in a little Alsatian village, received the order to go up again to the front. The news was received cheerfully by officers and men. We all were fed up with the "rest," which meant hard drilling more than anything else. My observers in particular were tired of climbing hills swept by icy winds, tired of seeking through their binoculars an imaginary objective, and of setting up topographical equipment in unheated barns. The machine gunners were bored with following, through their sight-finders, small wooden airplanes carried in front of them on long sticks; and never firing one shot.

On the 15th of February, the battalion with its twelve guns took to the road. On the frozen paths the horses slipped, and on one sharply banked curve a gun slid into a small ravine, pulling its team of horses with it. In the afternoon we reached a little village on the Maginot Line where we waited for several days for our position to be organized.

It was a pretty village, typically Alsatian, with clean houses made of beams and plaster, a handsome church, and at the main crossroads a lifesize statue of Christ in stone. Unlike the other villages we had left, this was unoccupied, the inhabitants having been forced to abandon it a few hours after the outbreak of the war.

Here we were told that the mission of the division was to cover the Maginot Line in the Seltz sector—in the angle formed by the frontier of Alsace and the Rhine River. In this section the Maginot Line curved away from the angle at a great distance from the frontier, and joined the Rhine through the Forest of Hagenau.

It is well known that the Maginot Line was composed of many forts of different sizes: from simple blockhouses, manned by a few soldiers and one machine gun, to powerful fortresses manned by 1,500 soldiers and artillery. The much publicized Hochwald, set on our left on the first hill of the Vosges Mountains, was one of the greatest of these fortresses. It may be described as an enormous plant, with its repair shops, its storage rooms, its hospitals, and its underground railway—all built at a depth of two or three hundred yards under the surface, and from which emerged artillery turrets and infantry battlements with their machine guns and antitank guns.

It has been said that after the armistice the Germans removed heavy guns from here and put them on the Channel coast, or intended to use them against Gibraltar; but as a matter of fact, the guns of the Maginot Line, though remarkably well protected, were of small caliber.

The Hochwald artillery, for example, included eight long-range semi-automatic 75's and four semi-automatic 135 howitzers.

The other forts which were part of the main line were spaced at an average distance of six or seven hundred yards, and were connected by a continuous barrier made of rails, barbed wire and deep ditches. These forts had infantry armament but no cannon. The artillery and particularly the heavy artillery was on the surface behind the Line.

Everyone who visited the Maginot Line brought back the impression of great strength, which was, I think, justified. True test of this strength was never made. The only blockhouses which were attacked and taken were not in the main Maginot Line, but in advance of it, sometimes not even connected by telephone and not protected, by material barriers, against close approach. One can easily recognize these advance works in the description given in the German magazine *Signal*. Their purpose was merely to give the alert and to slow up the enemy advance.

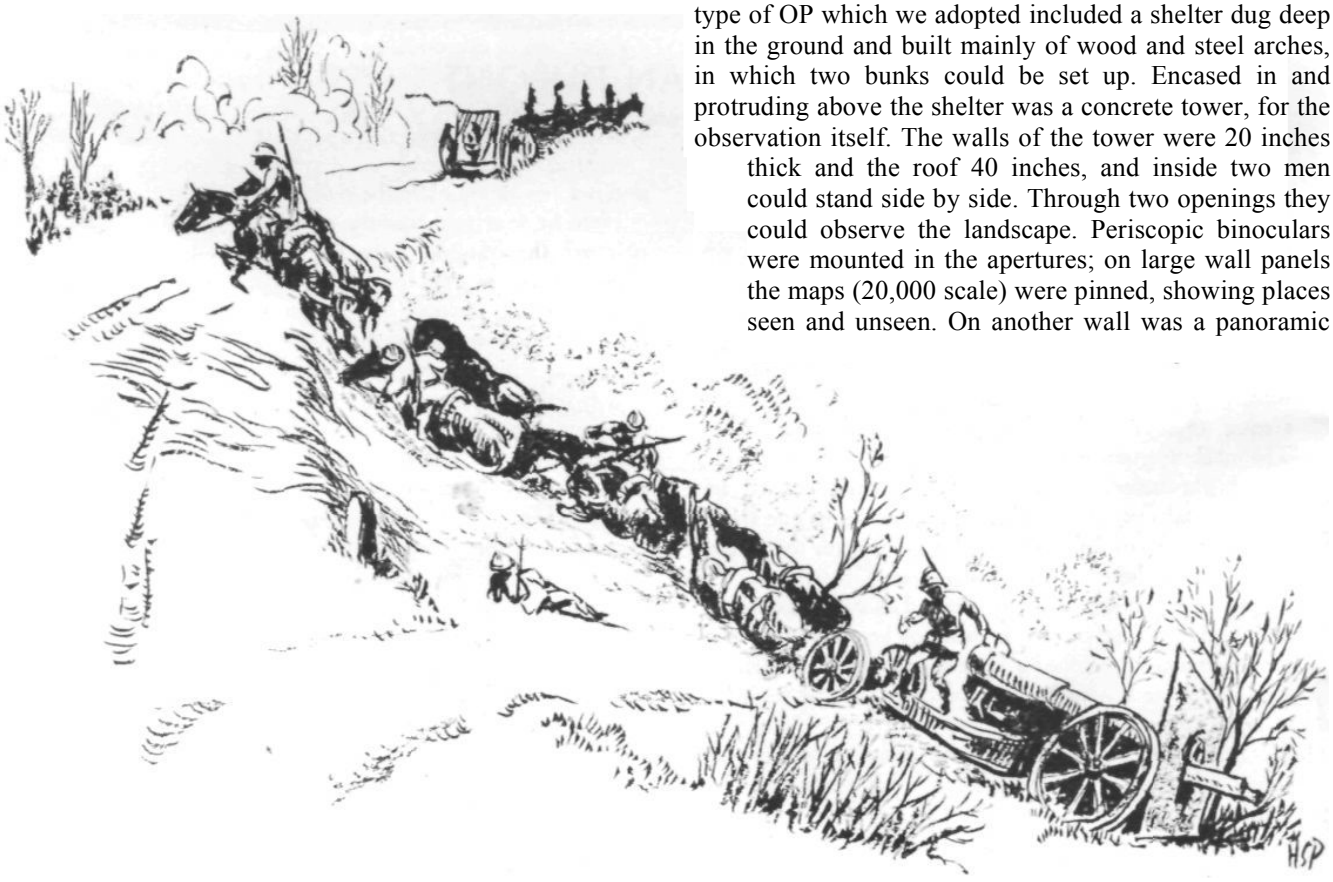
Our division was to occupy a position on two lines—one on the frontier, the other on the north of the Hageneau Forest, five kilometers in advance of the main Maginot Line. This position was new because, originally, our General Staff had decided to give up all the ground in front of the Line, but had changed its mind.

It was decided to set the main observation post for my battalion of 155's on the second line inside an infantry center of resistance, and on a hill with a splendid view. On the north were the rolling hills of Alsace, on the south the black mass of trees which was the Forest of Hageneau, behind which appeared on a clear day the tower of the Strasbourg Cathedral; to the east was the Rhine Valley with the Black Forest as a background.

The view was ideal for an OP, but unhappily the hill on which we were stationed was completely bare of trees and foliage, thus affording no natural cover.

Every observer knows that he cannot see well without sometimes also being seen; but in this case, it was better to have 25 inches of concrete overhead. Hence we decided to take advantage of the fact that the sector was quiet to build a good OP. The type which we adopted had been tested before and found satisfactory. It was made of wood, concrete, and arches of steel. The wood we got from the forest, the steel arches from the engineering company of the division, and the iron frame in the concrete was made of metal harrows and garden gates removed from villages in the neighborhood.

The observers—one non-commissioned officer and five privates—were, in civilian life, a stone-cutter from Paris, a steel worker from the north, two farmers from the center of France, and a clerk from the west—a happy combination which produced amazing results. They were as fond of mixing concrete and digging as they were of observing and, later on, of patrolling and scouting. The type of OP which we adopted included a shelter dug deep in the ground and built mainly of wood and steel arches, in which two bunks could be set up. Encased in and protruding above the shelter was a concrete tower, for the observation itself. The walls of the tower were 20 inches thick and the roof 40 inches, and inside two men could stand side by side. Through two openings they could observe the landscape. Periscopic binoculars were mounted in the apertures; on large wall panels the maps (20,000 scale) were pinned, showing places seen and unseen. On another wall was a panoramic



drawing showing the angles of site and the ranges to reference points.

During the three weeks which this work required, the Germans certainly sighted us, but kept quiet. When the last shovel of concrete was thrown on the roof, the men traced their names with their fingers on the fresh cement; then in the shelter, by candlelight, officers and men drank champagne to the glory of the regiment.

The observation post was in communication by telephone with the main network of the Line. It also had a two-way radio which had been hidden (as was the rule) in a less elaborate dug-out shelter a few hundred yards behind the hill. Most of the time the OP did not function as a separate unit but was incorporated into the observiation network of the whole sector. Its reports were wired to the headquarters of the division and analyzed by the lieutenant in charge of the divisional artillery intelligence section.

Therese Bonney, courtesy "The American Foreign Service Journal"

On the church steps at Givet (Ardennes) women and children wait to be picked up in evacuation.

No observer worthy of the name is satisfied with only one OP. He sets up several others, topographically equipped, summarily constructed but occupied only occasionally. These secondary observatories are chosen with the idea of having a more complete view of the sector or are set up in the second defensive position. We established an OP of this type in a pine tree, 75 feet above the ground; and it was great sport to climb up to it. We were always delighted to give our visitors, after a heavy meal, the opportunity of struggling up the tree, in a high wind.

At the same time the OP was organized the batteries built up their positions in the forest; huge concrete shelters were dug in the ground, platforms for guns were set, and so on.

We discovered then how a camouflage, however crude, can fool the planes. The work undertaken in a clearing in the woods should have been easily discovered by the German observation planes which were always flying above us. To hide from their view, we had stretched a few wire nets on which were hooked tops of pine trees. After May 10th the Germans often tried to reach the batteries, but their shooting was erratic, and sometimes the shells fell at great distances, which proved they had not located us. At the same time, the batteries erected small "barracks" ornamented with foliage. There were about thirty houses, all of different types of architecture—the imagination of the builders had an opportunity to expend itself freely.

Providence was with the battalion, and furnished us with a big house in a village nearby which contributed abundantly windows, doors and tiles. The house had belonged to a spy, shot at the beginning of the war. By using his belongings for our comfort we helped him pay his debt. His bed served our Major, and we intended to use his bathtub, but we were forced to leave before we had put it in place in a lovely corbeille of foliage in the woods. Only the system of running water had been completed, thanks to a fire-engine pump from a neighboring village.

On May 8th, I left my battalion for a much-longed-for ten days' leave. May 11th, I was back again, summoned by telegram. War had actually begun.

During the long winter we had often rehearsed and carefully worked out every part of our plan. During the spring we had worked hard to build a powerful position—and at last we had the opportunity to test it.

What happened afterwards showed that this war was not the kind for which we were prepared—that instead of our 155's we would have had more use for antitank guns; that instead of concentrating on such things as the effect of humidity on an 11-kilometer trajectory, we would have better trained in pistol or rifle shooting.

In a village in the rear of the Line (on my way back to join my battalion) I experienced the first attack by planes. Later on, low-flying planes were constantly above us—we shot at them repeatedly with our few machine guns, but with little hope of ever bagging one. We were amazed one day when we saw one of them suddenly lose control under our fire and turn back to the German lines, where he probably crashed.

On May 13th, the Germans attacked the first line of our division and succeeded in reaching several points on it, but were repulsed by counter-attack. One of the young officers there was shot, lost his sight and was captured. At the same time, the batteries were subjected to a severe pounding. Three officers of the forward 75-mm. batteries were killed.

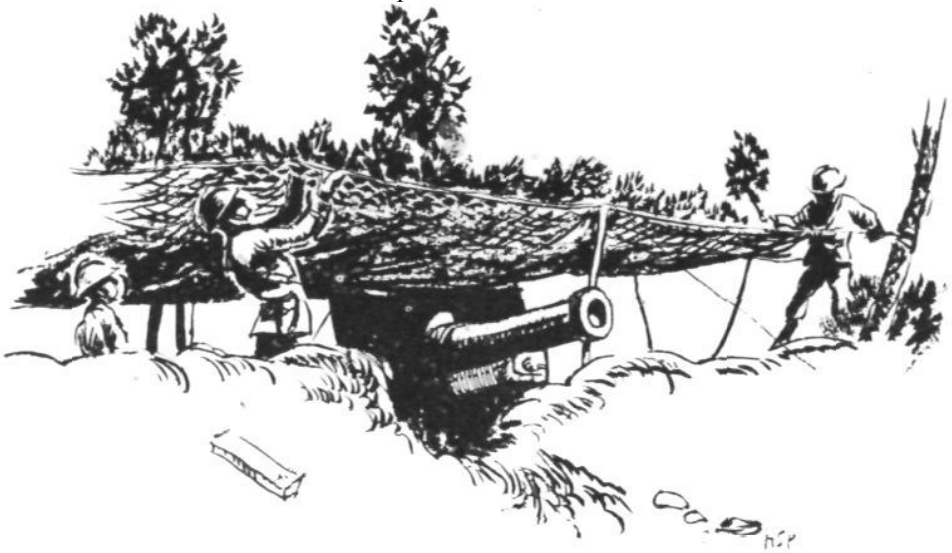
Our division received then the order to fall back to the second line. This was quite a surprise, but later we learned that this was part of a general move to free some troops urgently needed on the northern front.

Anyway, the first line was far ahead of the second and it was better not to wait for a violent attack before retreating. In this way, the second became the first line, and ours became the forward observatory. This new first line was weak, and the infantry center of resistance in which our OP stood consisted only of a few shallow trenches. No shelters had been dug for the infantrymen, and the young lieutenant in charge, fresh from St. Cyr, had only a small dugout propped up with thin boards and covered with tar paper.

The infantrymen could rightly claim that they were not numerous enough to work, that they were tired from night patrolling, and, moreover, lacked implements and means for transporting the materials. For its defense, the center was equipped with a few heavy and light machine guns and had a 25-mm. gun to rout the tanks. The position of this gun, because it was the only one, had been discussed many times and had often been changed, so that no sufficient ground protection had yet been built up. I must not forget to mention that the center was surrounded by barbed wire which would not have kept out even the cows which, abandoned at the outbreak of the war, and now wild, were wandering in the fields.

But the worst of it was that, being a forward position, it was two kilometers from the main line of resistance. These inconveniences appeared in their full light when the pounding began.

The Germans had, of course, easily located the center and as soon as they brought forward their batteries, began a bombardment with 105's and 150's. Our OP was not much affected—we had only to remove earth which the concussion had dislodged, and to rebuild the entrance which had received a direct hit. Inside the shelter, we defied the German batteries, but out in the open, on our way to and from the main line, the two kilometers seemed very long. No communicating trenches had been dug, but a small ditch made for telephone wires proved very useful. It was surprising to see sometimes how quickly a rather fat man could slide into such a narrow space.



Therese Bonney, courtesy "The American Foreign Service Journal"

Alsatian refugees in Haute Vienne.

On the morning of May 16th we were advised that from certain sure clues, the Germans were to attack with tanks at 3 AM the next day. Our infantrymen filled the valley at the foot of the hill with land mines. The young St. Cyrien was full of fire and energy, but rather perplexed as to how we were going to stop the tanks. We had full confidence in the Maginot Line but it was 3 miles behind us. Our only 25-mm. gun had been taken away, the 75-mm. batteries were two miles behind us and rather inefficient for indirect fire against tanks. So our main hope rested on the barrage of 155's which I was charged to start 200 yards in front of our line. But we didn't expect much from it, either. The infantry lieutenant on our left, a hard-boiled former officer of the Foreign Legion, had just as much enthusiasm as the St. Cyrien, and was just as puzzled as to the way of fighting the tanks. He was better off than we were, for he had a couple of 25-mm. guns; but we knew them to be inadequate.

We had read in the newspapers during the Finnish war that a good antitank defense

was to jump on the tank, open the trap-door and shoot its occupants. But what if the Germans were mean enough to lock the door? We would just be taken for a ride. So we thought it better to duck into the bottom of the trench and let them pass above. "Wouldn't it be a good opportunity," said the Foreign Legion Lieutenant, "to take advantage of the situation and see how the German tanks are made underneath?" We hoped, however, to emerge afterwards and strike at the German infantry which we believed was to follow the tanks.

All night the forest was illuminated by flashes of our guns, firing toward the places through which the Germans were expected to bring their attacking troops. Three o'clock, not yet dawn, found the observers scrutinizing the foot of the hill; the infantry with their forefingers on their triggers; and my radio man, with his telephone headgear on, ready to buzz the signal for the barrage. . . . But nothing happened.

We wondered what actually had been the "clues" for the expected attack. It seemed that the Germans had never even had it in mind. Proof of this was given when, the day after, two prisoners, without thinking they were releasing any valuable information, told that during the night, three times in succession, they had been ordered to pack, and three times had the order countermanded. For one who knows how carefully the Germans prepare an attack, this seemed as if they had not planned one.

During the following days, action was limited to engagements between patrols. In one of them, an infantry lieutenant was killed. He had, a short time before, narrowly escaped capture, when he had been surprised by a German patrol while sleeping in a little village. Ordered to dress quickly, he had, instead of putting on his helmet, struck the German officer with it, knocked the flashlight out of his hand, grabbed his pistol, and forced him to flee.

As for us artillerymen, we were busy principally with artillery duels. Our system worked well. The target was first located in direction, and when possible, its distance was gauged by means of the angle of site. Generally several OP's worked together, calling each other in order to check their findings. Their information was transmitted to the "bureau director of fire" (computation squad of fire-direction center) of the battalion, which made calculations and sent the elevation and deflection to the batteries. Little by little, and not without great distress, we saw the lovely Alsatian villages being demolished and burned, and once more a part of French soil ravaged by war.

While we were becoming enrooted in a war of position, the Germans had crossed the Meuse in the Sedan-Givet sector and broken through the Allied front. It may be because of the relative ease with which the Germans had crossed a river considered to be impassable, that one day we had orders to face our guns toward the Rhine. As I have said, the right shoulder of the division was holding along the river, but we had always faced the northern frontier, taking for granted more or less, I suppose, that the Rhine

could not be crossed. Along the river our defense hung on several pill-boxes, rather small and far apart. In April already the Germans had tried a coup-de-main on one of them. They had succeeded by crossing the river at night in a motorboat to surround a pill-box, and after having captured several sentinels had been repulsed only with some difficulty.

Around May 18th, we were ordered to destroy three suspicious-looking barges on the right bank, but we had no direct view of them, and fired by the map; the barges escaped unharmed. It appeared then that, if the Germans succeeded in establishing a bridgehead and building a ponton bridge, our artillery could not demolish it due to the insufficient view of the river.

The only OP on the river was in a bell-tower in a village in the valley. But one can not rely on a bell-tower, as was proved later on, when it was demolished by German shelling and two observers killed. It was hastily decided then to erect a metallic observatory, 100 feet high, in the forest. We had laid its foundation by May 23rd when we were ordered to leave for an unknown destination.

We said farewell to our trenches, shelters and newly-completed barracks, and started our night's march to the railway where we were to entrain. We had been advised that German parachutists had descended in the forest, so the column was carefully patrolled. The "parachutists" were found. But they turned out to be our General's messengers, who had put on white overalls.

At two o'clock on a hot day the regiment entrained. German planes kept circling over us. They did not attack us but succeeded in killing seven men of the infantry regiment who departed after we did. Before leaving, we bought Alsatian dolls—souvenirs of a country dear to every one of us.

The Battery Commander*

Life

In Two Parts

Part I

"Military leadership is predicated upon cheerful responsibility, superior ability, and untiring care."

The war that is now in progress will decide between life and death for many nations. This conflict may eventually engulf us; our armed forces will then be called upon to defend our right to exist as free men. The nation is lining up for this task and it is our responsibility, as officers and leaders, to fit ourselves and our men for the sacrifices which will have to be made should we find ourselves a part of the titanic struggle which appears just beyond the horizon.

There can be no greater and more gratifying task for an officer of our army than to be the leader and comrade of the men under his command. There is no other similarly direct way for his personality to make itself felt. Knowing a unit's leader, one can have a fairly accurate idea of what the unit will be like. If the men feel that their battery commander unfailingly has their interests at heart they will not fail to take a friendly interest in him. His problems will then become their problems and the result will be a balanced relation that will be hard to beat when the battery is put to the test.

The officer who gives most, in this way, will receive most in return. Our pride should be to give each to his battery the best that is in him. Many of our soldiers merely await the word. Leadership and command are for them a mere release of forces that urge into action. There are many, however, who will require an urging call and the force of a great example; and the timid and fearful have to be swept along and forced ahead by a leader's determination of will and superior insight.

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*Editor's note: Based on a booklet, *Der Kompaniechef,* by Capt. H. Ellenbeck, one of the finest pieces of "grass roots" military philosophy produced during this war. Ellenbeck wrote his little treatise for the company leaders of the new German Army, but its appeal and application are universal throughout the profession of arms.

For all these men the commander of the battery is the man who must supply the cues. "To be an officer is to be a living example for one's men." An officer should be regarded by every one of his men as the soldier *par excellence*, as an ideal they wish to imitate.

Their leader has to be a living example for them on the way to their greatest adventure and accomplishment, indeed at the supreme moment itself when they have to risk life and limb in battle for their country. Any officer in the army who is thoroughly imbued with the spirit of this task and has grown with it beyond his own stature, will feel awakening deep down within himself the finest of latent forces. Life will take on its true meaning for him if his constant endeavor is "by sheer ability, bearing and spirit to compel his men to follow him anywhere." Such is a man's task for which he can willingly risk his life in order to gain it.

Heavy burdens go with this task, and heavy responsibilities—all the more reason for pausing to contemplate the meaning and content of what goes to make up the official existence of a military commander. Willingness of the heart can be guided by discipline and reflection, and raised to its highest effectiveness.

Practical advice on the relationship between the "Old Man" and his men.

AUTHORITY FOR THE TASK

Provided he is really capable, any soldier in our army has a right to consider that an officer's career is potentially open to him; but the winning of his commission must be based upon the strength of performance and ability. Once this promotion is obtained, his performance must continue at the same high level of excellence.

The officer's subjective, individual authority has to be newly created from day to day by his personal conduct. Regarding this authority one can apply an old dictum about the inheritance from one's forefathers: "You must deserve it, if it is to be your own." The effect produced by an officer's personality upon his men will depend on his command of subjective qualities to support the objective authority of his rank. No one who is commissioned can afford to rely on it that his rank alone will suffice as a source of authority, and to suppose that he has reached his goal and can now safely relax his effort. Genuine authority has nothing to do with insignia; it is based solely on accomplishments and performance of duties.

According to an old European military principle, it is always important to be more than one seems to be; and this principle incidentally points the way for an individual at work on his self-improvement. If we are aware, at all clearly, of the tremendous responsibility we owe the Nation, we officers are bound to make every possible effort to measure up to our task, determined to give the strength that is in us and pass our test with colors flying.

THE MEN IN THE RANKS

The fighting men of the country are placed in our care. Our task is to train and educate them and make good soldiers of them, and afterwards to lead them in battle. Our comradeship with them must be of the sort that holds good in the face of death itself. A higher position of trust is not conceivable for any man in this Nation.

The goal of military training is fitness in combat. This implies that each soldier must be thoroughly familiar with the weapon he is to use, and thoroughly competent to handle it. But soldierly spirit as shown in actual combat—we must remember—is not merely a question of knowledge and skill; it is largely a question of character. Character training and personal influence upon the men in the ranks are of the greatest importance, especially in times of national peril. It must be remembered that the men under the colors are not all young recruits; some are older and have seen much prior service; others have come in from the Reserves or the National Guard. Truly, every enterprise, every environment and every social strata are here represented. Our task is indeed a comprehensive one.

It still happens occasionally that soldiers (particularly senior NCO's) participating in our present defense effort find themselves under the command of an officer considerably younger than they, and perhaps even less experienced. All the more it is important that each officer should devote himself enthusiastically to the problems of leadership. All the duties that arise out of the obligation of giving personal attention to the soldier must be conscientiously performed without fail; and no opportunity should be neglected for establishing bonds of friendly confidence between the officers and their men.

Good leadership presupposes deep insight into the human heart and human relations, and the ability to deal with people. We must remember that the psychological background of men in the military service is in many instances far from being the same as that of their comrades of earlier times.

Now that our citizens are taking arms in the defense of our country it is our duty to see to it that they find its solidarity convincingly reflected above all in the organization of our companies, batteries, and squadrons of the armed services. For the period of the emergency these organizations must largely replace the influences of home and family.

A soldier must be hardened. Providing for him and taking care of him must not be allowed to soften him, but merely to make it possible for him to undergo cheerfully the inevitable hardships of training and discipline.

A soldier can be counted upon to remain in a state of grace, so to speak, so long as he gets proper care and finds that his officers are providing for him like the best of comrades. The men will follow such leaders through hell and high water, and submit willingly to the hardest duty. But an officer, in turn, must be exemplary in his own conduct, in everything he does, in respect of all soldierly virtues. He must never think of himself until he has taken care of his men. Nothing short of the good example will prove convincing. The moral right to make demands upon others is founded exclusively upon living as their example; and only the commander's own achievement can impart to such demands the momentum of compelling necessity. Setting and following the right example welds officers and men together into an army.

In the hour of danger irresistible strength grows out of such union; and an officer can then place absolute reliance on the men under his command, both when the time has come for reckless daring and at times when even greater courage is required for hours and hours of patient waiting.

It should be obvious enough that profound obligations arise in this manner; and yet these obligations are often neglected, simply because of failure to recognize their importance.

AUTHORITY AND DISCIPLINE

Discipline is the foundation upon which an army is built. The goal of military training should be to inculcate the mere external discipline of the military unit until a point is reached where this discipline is embodied in each individual member of that unit as a fixed mode of living. An officer who in his own person embodies also the subjective type of discipline will be able to attain the goal by making of himself a living example of conduct for his men. His authority will be assured even in the most difficult situations if his sincerity is perfectly obvious, and his men then will willingly acknowledge him as their leader. It is not really essential for him to be the most intelligent man in his unit, but he must be the most blameless. Deep down in their hearts soldiers in general are quite sensitive to the ethical quality of their superiors. They will be only too glad to follow a leader they can look up to and for whom they have genuine respect. Conditions in the field make it necessary for an officer to spend day and night under the scrutiny of his men; and that calls for a high degree of self-discipline, both on and off duty. It implies first of all cheerful and conscientious performance of all necessary tasks; but aside from that the situation also requires cheerful willingness to be content with little in the way of food or lodging, a habit of keeping sober at all times, self-control in matters of sex, avoidance of profligate conversation, as well as a certain steady and calm self-assurance of manner.

As regards social contacts with his comrades, an officer in the field has to meet a situation quite different from that which prevails in times of peace: his friendly entertainment must never be allowed to conflict with any of the necessary restrictions and privations imposed upon the enlisted men; because their desire for company and entertainment is just as great as his own, and not at all less justified.

The burdens, self-denials, restrictions, and privations incident to warfare must be borne in common and to an equal share. Every battery commander needs to cultivate to some extent the old Spartan virtues. His men must be aware that he does not mind doing without one thing and another: that he is above the situation, and that little every-day annoyances will not down him.

An officer's position is exalted above that of his subordinates by virtue of the honor of being permitted to shoulder greater responsibilities and a wider range of duties. The commanding officer's uniform obligates him to conduct himself as "the first servant of the unit under his command."

A commander will not be lacking in natural authority of the sort required for his work if he has genuine native ability and a knack for getting things done, and if while being the chief of his men he is readily regarded by them as "the old man." Where such is the case, there is rarely need for sharp rebuke and compulsion.

CULTIVATING A SENSE OF HONOR

"A soldier's honor consists in unquestioning devotion of his whole person to the service of his country and nation, and willingness to give his life in that service if necessary." This exalted conception of military duty must be a goal set for enlisted men as well as officers, even in the midst of commonplace daily routine. To make this requirement is indeed to set up a lofty goal for military training and education. Severest discipline, and unconditional reliability in great things and small, will be found indispensable in achieving it. The importance of the cause at stake is such as to call for prompt and energetic corrective measures, regardless of the identity of the persons involved.

At times it may be necessary for a battery commander to know how to use vigorous language. The less it is used, however, the more effective it will be. But an officer's language on such occasions must always have something wholesome about it at the core. The impression created should be that of righteous manly indignation breaking out in a thunderstorm. And it will be best if the storm does not last too long. The result will be a general cleaning of the air and an easing off of tension.

The use of vulgar expressions is unworthy of an officer, and such expressions insult and dishonor the man to whom they are addressed. Taking advantage of one's

rank to address a man with profanity is cowardly. Using language of either sort can only serve to lessen the men's respect for their officer. The effect will be to embitter the culprit and make him stubborn, instead of restoring good order and reestablishing mutual confidence.

Scolding and nagging can easily become a habit. The results in that case are disastrous, and authority suffers.

If something is wrong, the need is to do something about it promptly, energetically, and in a straightforward manner. No one should be allowed to remain in doubt as to the commander's stand in any matter affecting his relationship to members of his organization, and vice versa. Pettiness and trickery do not befit the character of an officer; and one should not bear grudge and continue to harp on old wrongs.

rarely, but enthusiastically if at all." Approval is called for not only by the conspicuous type of accomplishment; and even a soldier who is assigned to relatively unimportant duties (the battery mechanic, for instance) has a right to feel happy and proud if his captain has occasion now and then to comment favorably on his work.

Every soldier must bear in mind that his reputation is bound up in his duties; and that his worth is contingent upon his faithfulness in performing those duties.

To give military service for his country and nation is one of the loftiest duties any human being can perform. To implant in his men this high conception of military honor is one of the outstanding tasks for each battery commander. He should be mindful of this task at any time, especially in exercising his punitive authority.

Life

The battery mess can make or break the morale of the "outfit."

In administering reproof and correction one should appeal to the offender to compensate somehow for any harm done. Specific suggestions to that end would be quite in order, closing the interview with something of a constructive note.

Rigid self-criticism and a tireless effort to develop one's own powers are of the standard traits of a real soldier. But the wholesome endeavor constantly to improve upon standards of performance must not be carried to the point of undermining self-confidence by excessive criticism. One can easily produce discouragement instead of an impulse to work ahead with renewed energy. Give praise where praise is due. Never let it be said of you: "What's the use trying to suit him, anyway!"

There are times when praise can be very effective. It has been suggested by a famous general that one should "praise

A battery commander's authority to determine punishment presupposes a high sense of responsibility as well as willingness to take the initiative. It is easy enough to impose punishments promptly and frequently. And real skill is required for a commander to make punishments a rarity by creating a situation where there is little chance of committing offenses, or even of having the impulse to commit an offense.

Every subordinate must feel thoroughly convinced that his chief will never resort to punishments unless it becomes necessary to do so. Every punishment given should be such that every member of the unit really consents in his heart to that punishment; and the punished man himself must agree that the punishment he has received was just, and a necessary atonement. The effects should be to inspire him with a determination to

make up for what he has done. When he reports back for duty, he ought to be shown a way to square himself and then be given every opportunity to do so.

In cases where the commander feels the slightest doubt about imposing a punishment, he might do well to put the matter off until the next morning. His decision will in each case have to be determined entirely by the exigencies of the situation. If circumstances unqustionably require him to act at once, it is an irreparable mistake for a commander to be deterred by any considerations whatever.

COMPLAINTS

Complaints can be regarded as an exception. And it is a good thing that such is the case. A soldier, as a rule, will realize perfectly well that he must not attach too much importance to his own person, and that there is no need to call attention to every little thing that happens to go wrong. The situation is not quite the same, however, where a matter of any importance is concerned. It would be a mistake, and possibly a disastrous mistake, to allow any real grievance to develop without chance of redress.

A good soldier, as a rule, does not like to make complaints. He does not like to go to the trouble of appealing through official channels, and would rather avoid the risk of unpleasantness that might arise. Unfortunately it still sometimes happens, when information is issued concerning the right and the procedure of making complaints, to insert quite an unmistakable hint that it is wise not to make use of the privilege. A commander who allows any such impression to get out is seriously derelict in his duties, and is acting quite stupidly besides. It is anything but pleasant, certainly, to have to examine a complaint and get unpleasant glimpses of the real functioning of the battery. But it is a fundamental error and unworthy of an officer of our army to cut off justified complaints—for the sake of preserving illusions. One must remember that the damage done will only be greater if an evil is allowed to continue, or if at last someone appeals anonymously to higher authority, or to civilian authorities.

Therefore, in giving instructions to his men about their right to complain, the battery commander must inform them that it is their duty as upright soldiers to make report if at any time they are wronged. He should add that it would be an obvious sign of cowardice if they allowed themselves to be deterred from making use of their right to complain.

And if one of the men actually does make a complaint in the line of duty and uncovers reprehensible conditions, there is every reason for appreciating the man's courage; and the battery commander should give him his unqualified moral support.

But is there anything else that a battery commander can do to make sure that existence of undesirable conditions will under all circumstances be reported to him? Whenever someone is wronged somewhere in the battery, or if ill-adapted or harmful measures have been or are being taken, only one person, as a rule, is primarily interested in "keeping the thing quiet." This person is quite likely to be an NCO or acting NCO; and most of the enlisted men will probably be afraid of his enmity or revenge if they report him. At times, however, it is merely a mistaken sense of loyalty to his comrades which prompts a man to allow an abuse to go on rather than make the proper report. Quite often failure to make report is due simply to some sort of foolish prudence, such as a desire to "stay out of it" and "keep from getting into trouble."

Thus, failure to seize upon an existing evil and eradicate it can as a rule be traced to some foolish prompting or other, to a lack of determination, or to indifference or cowardice. Many of the great evils in the world could never have spread except for wholly inadequate motives like these. Courage in the performance of official duties is only too often conspicuous by its absence; and there is commonly a lack, above all, of what has been characterized as "civil" courage.

A battery commander should be aware of this fact. If he knows his business he will be extremely punctilious in the matter of looking into things for himself instead of depending altogether on reports from his first sergeant. He must constantly keep forming his own opinions and keep in touch with the situation. Beyond that, however, it is up to him to educate his battery to a point where the men feel that they themselves are to a large measure responsible for maintaining neatness and orderly conditions. Each individual soldier ought to be made to realize very clearly that he owes it to his battery to keep out of difficulties. The ideal of service to the nation must be impressed on each soldier's mind; and aside from that, his sense of right and wrong must be kept alive so effectively that every member of the organization really participates in the general responsibility. A sense of responsibility and solidarity with their unit will enable the men to overcome an unmanly attitude of pity for the individual wrong-doer. Where such is the case, everyone will feel deeply imbued with an ideal that has been expressed as follows: "No rotten conditions will be allowed to exist in *our* battery."

If the men think of their battery in such terms as these, one can safely count upon so many latent forces of resistance to evil that the causes for complaint are likely to be few.

A practical matter of decisive importance is that the head of a battery must keep himself accessible at all times for any of his men who may wish to talk to him. This is not an easy matter, and very likely the First Sergeant will wish to interpose himself; but no matter how justifiable the sergeant's motives, he must not be allowed to become an obstacle to personal exchanges between the battery commander and his men. The captain himself is the responsible person in all cases of importance, because

he alone has ultimate responsibility. In that sense he is the "father" of the battery.

Many soldiers, and among them notably some of the best, always will find it hard to make up their mind to approach the commander with a problem of concern to the battery as a whole. Consequently, it will be up to the captain, on special occasions, to make an effort to get such men to speak their mind freely. He needs a faculty for sensing that a man has something of that sort on his mind.

In dealing with problems of this type a commanding officer has every opportunity to prove himself a masterful leader of men. Mere tell-tales and conniving informers ought never be allowed to show their face. Petty complaints are properly dismissed with a mere wave of the hand. But a sincere and unprejudiced individual who goes to his chief with the idea of helping to promote justice and good order among the armed forces should find in him a sympathetic and helpful adviser.

Life

The battery day room should have a cheerful and informal atmosphere

ADVICE AND CARE FOR THE ENLISTED MEN

The commander of a battery has a wide field open to him in his effort to meet the broad task of giving advice and care to any of his men who are in difficulty. Aside from the Captain's manifestations of sympathetic interest in the family life of his enlisted men, one might mention under this heading also his efforts to assist them in their correspondence with governmental and other administrative agencies. There are probably relatives and friends at home to whom a soldier's family can turn for aid and advice but special cases will arise where it becomes necessary for him to communicate with municipal or county authorities at home. During peace time and under normal conditions there is no difficulty in taking care of an errand of that sort. The man simply calls at the office concerned; and the whole problem is quickly settled by a brief discussion of doubtful points, on the basis of oral information obtained right then and there. But suppose that in time of war the wife finds herself unexpectedly confronted with a difficult situation of one kind or another. She does not know what to do and quickly writes to her husband, telling him as best she can what has happened. But in the army, far away from his home, the husband very likely cannot obtain all of the information required, not to speak of any chance of settling the matter in person. Probably there is not even a place for him to figure the whole thing out for himself in peace and quiet. Suppose the man has received an inquiry from the Treasury or the Office of the Tax Collector, or from his insurance company. In many instances the matter will be a routine one but some cases are bound to require personal attention on the part of the soldier himself. He has been accustomed carefully to look after details of that sort and save his wife all the trouble. He

is now away from his home; and we can easily imagine him, sitting on his bunk or elsewhere in his crowded quarters, studying his wife's letter and worrying what to do.

Whenever a case like that arises in a properly organized battery, the first thought to come to the man's mind will be: "This is something the CO could do for me. He'll be glad to do it!" And if he does take that attitude, there could be no better proof that his chief is well under way towards developing the right sort of relationship with his men.

Nor should the commander wait for someone to come to him with a request of that sort. During instruction hours he should not only tell his men, again and again, *but really mean it:* "And now, if any of you have trouble at home, or if there is any kind of letter-writing you need help on . . . I want you to come right straight to me. That's what I am here for. Between the two of us we ought to be able to manage it somehow."

Many cases of that kind can be disposed of by just a short interview to make things clear. A problem that looked very serious at first may seem very much simpler after the Commander has calmly and quietly analyzed the whole situation. Quite often the circumstances will call for a certain amount of correspondence. In that event it will be best for the chief to sit down and dictate to his battery clerk whatever letters are needed. For him it is a relatively simple matter to do this correspondence, which for the soldier himself would involve a considerable expense of time and effort. And besides, a properly written letter bearing the battery commander's signature is not at all unlikely to expedite the business in question.

An officer who puts himself to this slight inconvenience should easily be able to console himself by considering that there is his chance to pay a small fraction of his indebtedness for the good fortune of having been blessed with more comprehensive training at school.

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Even more important is the commanding officer's sympathetic interest in outstanding events affecting the man's family at home, births and deaths especially.

It is always an event of incisive importance to have a gap in the family as a result of death. Usually there have been weeks of worry and care preceding the sad event; and they have been all the harder to bear because the head of the family was away at the front, unable to give such help and advice as he might have been able to contribute. A short telegram at first will probably be all that reaches the soldier with his battery in the field. And even that telegram has been on the way for some time. Hours, often days, have passed since the death; and especially during these first helpless hours the family would have needed its father. Obviously, therefore, a telegram of that sort means a heavy blow to the soldier receiving it; and a message like that should without fail be handed over by the commanding officer in person. He simply has to find time for looking after a thing of that sort. So far as possible at all, he must handle a difficult case like that without the presence of witnesses. It would be futile to attempt formulating a method of going about it; at all events there is occasion for every cordiality of manner, and—by way of prompt moral support—for an appeal from man to man for the soldier to keep his military bearing under such grave circumstances. If it is possible at all to grant a leave, one should not wait for the man to make the request, but start him out at once on his way and see to it that he gets hold of the quickest transportation available. And one must not fail to find a few words of sympathy for him to take home with him. A man will hear and remember a kind word spoken to him at such an hour; and he will not fail to deliver the message. A soldier who at one of his life's most bitter moments has had the benefit of such moral support will feel personally attached as long as he lives to the officer who has helped him.

And it is a hard road from the open grave back to the battle front. The commanding officer should bear this in mind when the man reports for duty.

Very easy, in comparison, is the task of participating sympathetically in the great joyous events of life. A soldier who has just had a child born to him should be sincerely congratulated.

In all matters of this sort it is up to us officers to show that we really take a personal interest in our men; and we must not try to side-step such duties by saying we haven't the time. *Not to have the time to do things is characteristic of small minds!*

[TO BE CONCLUDED]

Life

HOW TO PRODUCE AN EFFICIENT FIRING BATTERY

By Majors H. F. Handy and V. F. Burger, FA

Part I

EDITOR'S NOTE: The JOURNAL offers this as one of the most valuable professional articles (for the officers of battery grade) we have ever read. It contains a lot of sound advice based on years of practical experience on the part of the authors and others.

1. GENERAL.—The goal of all firing-battery training is *fire discipline*, which amounts to accuracy, speed and dependability, regardless of adverse conditions, in placing fire where called for and when. No matter how expert an artillery unit may be in other departments, if its batteries cannot shoot reliably, it is useless. Fire discipline is not as common an attribute as many seem to think. It is often taken for granted in places where it does not exist. The task of developing it falls to the battery executive, who commands and trains the firing battery.

Select the executive with care, disregarding seniority as the situation may demand. (There are plenty of precedents for the latter.) Leadership, intelligence, and enthusiasm of the contagious variety—properly tempered with common sense—are the essential requirements. Why leadership? More, perhaps, than any other field artillery officer the executive has direct command of men. Intelligence? This is one of those places where a dumb individual can do the most harm. Enthusiasm? The firing battery is no place for boredom.

Change battalion staff officers, aides-de-camp, and even battery commanders if you must, but once a good executive becomes identified with a battery leave him where he can best further the combat efficiency of the command; namely, right where he is.

In war there are losses. It is necessary that all battery officers, all first sergeants and as many chiefs of section as possible be sufficiently grounded in the duties of the executive to take them over in emergency.

It isn't possible to develop executives merely by sending them to school or by requiring them to read the book. Literature on the firing battery is dry and rather meaningless to one who is without experience in firing service ammunition; and during a large-scale expansion of the Army there are bound to be many such. In appropriate cases it is very helpful, as soon as the student executives

have had sufficient firing-battery instruction to enable them to comprehend, to let them witness an informal demonstration. Such a demonstration is actually detrimental unless it is good. The firing battery should be a fairly proficient one. Note, however, that a few errors on the part of the battery may furnish some good instruction material. The demonstrating executive must be thoroughly competent and a good instructor. (Borrow him if necessary.) The demonstration is an ordinary service practice. The executive goes through all the details of reconnoitering his position, supervising the occupation and executing fire missions. He explains each operation in detail as he performs it. He answers all questions as they arise. The number witnessing such a demonstration should be small, not more than six or eight, so that all may follow the executive about and still not get too much in one another's way.

2. TRAINING THE FIRING BATTERY.

a. Literature.—The current field manuals on the service of the piece are excellent, by far the best literature on the subject that has yet been issued. Make full use of the one that pertains to your armament, also of Chapter 2 of Training Publication G-10, the FA School, July 15, 1941—The Firing Battery.

b. Key men to be understudied.—In war there are casualties. In peace there are guard and special duty. A battery will never have, both available for duty and properly trained, its entire complement of men; yet to be an efficient combat unit it must be able to replace its own key-position casualties without being thrown off stride. This calls for a very complete system of understudies. As a practical goal the following will be difficult to exceed:

(1) *Chiefs of section*.—Each to be understudied by his gunner and by one other who can also function as gunner.

(2) *Gunners*.—In each section have three capable substitute gunners, including the man mentioned in (1) above.

(3) *Number one cannoneers*.—Each section to have, in addition to the foregoing, from one to three spare "number ones." The importance and responsibility of this position vary considerably with the type of weapon served.

(4) *Recorders*.—Keep at least three of these on hand, thoroughly trained; of this matter, more later.

(5) *All enlisted men*.—Have every enlisted man, be he clerk, cook, or colonel's orderly, so trained basically that a few minutes of refresher instruction will qualify him to fill passably well any position in the gun squad other than that of gunner (and possibly number one).

c. Training; individual, section, and battery.—First comes the training of the individual cannoneer and of the various "teams" (ammunition handlers, loaders, trail-shifter and gunner, etc.) within the section. Following this and overlapping it considerably comes training by section. Both require the supervision of the executive. To just what extent depends largely on the experience and ability of the chiefs of section. In any event the executive must plan and coordinate the work in advance. Overlapping the section training, in turn, is the drill of the firing battery. Unless the latter is handled intelligently it is sure to become a deadly bore. Drill has to be fast, with something doing every minute. It defeats its purpose if periods are too long. An hour is about the practical maximum. The average battery, vintage of 1941, should be able to spend such an hour profitably about as follows:

15 minutes individual instruction
10 minutes training by section

During these periods the executive and his assistant, if any, move about and observe, taking such part in the instruction as may appear advisable.

5 minutes rest
15 minutes battery drill in service of the piece
5 minutes rest
10 minutes battery drill in service of the piece.

d. Discipline.—When the firing battery is at attention see that all men are keenly aware of the fact; *require every man to keep his eyes on the executive except while performing a duty that prevents*. This latter procedure furthers alertness to a marked degree. Never keep the gun squads at attention without good reason. Give AT EASE or REST whenever possible, even if for only a few seconds. The men will react to this consideration by giving their undivided attention when you call for it.

Conversation among the members of a gun squad that is at attention indicates either an atmosphere of uncertainty or a total lack of discipline. Whenever you notice such conversation in a section, either at drill or when firing, call the piece out of action and do not let it fire until you have had a chance to investigate.

Make it a rule never to allow horseplay or smoking in the immediate vicinity of the pieces. For such purposes require the men to be at least ten yards in rear of the trails. Or make other reasonable restrictions, depending on circumstances; in any event, give the men ample opportunity to smoke and otherwise to enjoy themselves.

e. Place for training.—Under present conditions the average gun park is not likely to be a satisfactory place to train the firing battery. There will be noise, dust, traffic, and all manner of interference. Therefore try and make the necessary arrangements, as early in the game as possible, to march the battery away from park to a place of your own choosing and work there. This will also afford considerable practice in reconnaissance and occupation of position.

f. Prepared fire commands.—These are virtually indispensable if the drill is to be fast moving and interesting. One good idea is to make up in India ink several sets of data on cards according to something like the following scheme: There are two cards to the set. One of these bears only fire commands. The other bears the

same commands and, in addition, the resulting correct settings for all pieces. The card that bears both commands and settings affords the executive an instant check on any setting in the battery, and also on the recorder(s). From the companion card some designated individual reads the fire commands, in the desired tempo, to T3 (the telephone operator at the simulated OP). Have a case for these cards and make it a practice always to have them with you during duty hours. Make up new sets of data from time to time. Otherwise the men will come to know the answers. Figure 1 shows a typical pair of fire-command cards. A card 3″ by 5″ will accommodate about 4 drill problems of 4 or 5

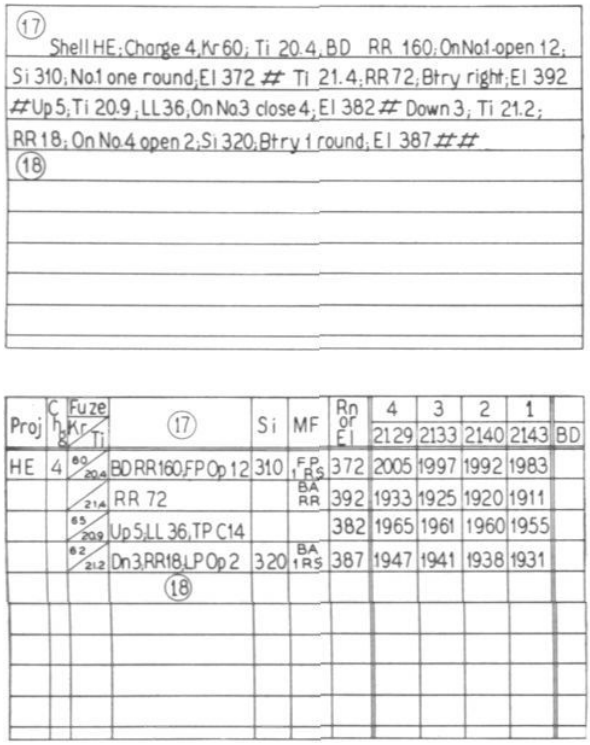


Figure 1

NOTE: Most of the commands shown are written in the fire control code used with air observation. This code appears in TM 6-210. A faster scheme of abbreviation is described later on.

sequences of commands each. The "problem" shown, No. 17, is for the 155-mm. howitzer firing time-fuzed shell. If a percussion fuze were designated, its nature, as Q (quick) or D (delay), would appear in the "fuze" column instead of Kr and Ti.

g. Precision of settings and laying.—Require exactness in settings and in laying. "Very close" won't do. The slightest leeway permitted in drill will multiply itself by two or three in firing. Insist upon uniformity as to the final motion in making settings and in laying, thus insuring that backlash (slack—lost motion—play) is consistently taken up in that direction which will minimize its effect. With breech-heavy materiel the last motion in laying for elevation (range) is breech upward (bubble front to rear). The final centering of a bubble is usually best accomplished by "tapping" the handwheel. The final motion in laying for direction is muzzle left to right. The last motion in setting the panoramic sight is to increase the reading (thumb to the left). After satisfying himself that his panoramic sight is properly cross-levelled, and before calling READY, the gunner should take up the backlash in the sight mount by twisting the sight head lightly to the left. If the vertical hair does not then come to rest exactly on the aiming point he must again traverse on.

Most experienced executives require all gunners to use the movable micrometer index (often referred to as the "follower" or the "gunner's aid"), that is, to discard all mental arithmetic* and use the panoramic sight as an adding machine. These movable micrometer indexes require a daily check by the executive. When one of them gets out of adjustment and sticks, as all have a way of doing, it carries the micrometer with it and thus causes deflection errors.

b. Time fuzes.—Uniform results in time fire are hard to get. The battery can do nothing about that dispersion which is inherent in the fuze itself. It *can* do much to prevent those additional errors which are due to faulty fuze setters, careless settings, haphazard cutting, inept loading, or a combination of these. Inspect fuze setters frequently and keep them free from brass filings and other foreign matter. Insist that fuzes be cleaned before insertion in the instrument. Drill cannoneers who cut fuzes to align the fuze lug carefully with the fuze-setter slot before inserting the round. Otherwise several fruitless turns of the round may result before lug and slot engage, thus wasting time and not contributing to accuracy. In removing the round from the fuze setter, train the cannoneer to keep applied to it a slight torque in the direction of cutting-rotation; this counteracts any tendency to "back off" the setting when withdrawing the round.

All must be keenly conscious of the danger involved in allowing anything, especially the breech of the recoiling piece, to strike a fuze that has been cut. Handle such rounds with respect. The foregoing applies with equal force to *any* fuzed round. With fixed ammunition the loader inserts the round gently (thus guarding against accidental change in the time setting as well as acting in the interests of safety) for about 2/3 of its length, then shoves it home. The antiaircrafters tell of the gun commander who, noticing smoke coming from the nose of a time-fuzed round that had been struck by the recoiling breech and knocked from the hands of an ammunition server, picked up the round, loaded it, and fired it. His was *the* solution.

At drill the fuze cutting goes unverified more often

*Some gunners rather fancy themselves as mental calculators. A few really *are* good. In deciding whether to let a clever one do his calculating in his own way consider how well the mental arithmetic is likely to stand up against fatigue, foul weather, hostile counterbattery, and the various other inconveniences of war.

than not. The surest way to check it is for the executive, instead of commanding FIRE when all sections are ready, to form the cannoneers in rear of their pieces and carefully unload each piece himself, note the time of burning and then see if he can recut the fuze to a different reading with the same fuze-setter setting. He also sees whether the torsion applied in cutting the fuze has altered the settings on the fuze setter. If so, it is probable that the operator of the instrument failed to make his last motion in the proper direction. At such a check all fuzes should read the same. In any event all fuze setters must, with the same settings, give identical results on the same individual fuze. If this test fails, have the fuze setters adjusted.

A quicker check, though not so precise or thorough, is to command UNLOAD; READ TIME OF BURNING, then verify the reading on at least one fuze (to offset any tendency toward reading with fictitious uniformity).

It is admittedly difficult to keep the time fuzes on drill projectiles in such condition that they will cut properly and consistently. Even so, effort put forth in this direction will more than pay for itself. The executive and the gun mechanic, with an improvised kit of spare parts, can accomplish much.

i. Ramming.—When serving armament that fires separate-loading ammunition considerable stress must be laid on uniformity in ramming. The only way to get it is to ram uniformly hard, since it manifestly is not possible to ram uniformly "light" or uniformly "medium." Moreover it is essential to guard against the projectile falling back onto the propelling charge when the piece is elevated. (This is likely to result in a blown-up gun and several dead men.) Make all cannoneers understand that a projectile rammed hard may seat as much as a quarter of an inch more deeply than one that is rammed "light." This can cause a very appreciable variation in the volume of the powder chamber. That increased range-dispersion is consequent to haphazard ramming should, then, be apparent to all.

j. Checks of settings and laying.—Make these with suitable frequency during drill. They are useless unless unexpected. It works well, immediately after the first simulated salvo of a new drill-problem, to command: AT EASE; DEFLECTIONS; and to have corrected at that time any deflection errors found, thus getting all gunners off to an even start. At one or more other times during the problem, when the arms of all chiefs of section are raised in token of readiness to fire, command: IN REAR OF YOUR PIECES, FALL IN; REST. Then verify personally the laying and all settings in each section. The chief of the section about to be checked commands: AT EASE. The executive checks not only for accuracy but for take-up of backlash as well.

Examples of the latter: Will twisting the head of the panoramic sight lightly to the left bring the vertical hair to rest off the aiming point? With the light gun: Will shoving the breech to the right throw the vertical hair off the aiming point? Will downward pressure on the breech cause forward displacement of the bubble? Does the torsion applied in cutting a fuze change the settings on the fuze setter? As to each error found, explain the effect it would have had on the projectile had the round actually been fired. *Caution:* Never tax a cannoneer with an error unless it is clearly apparent that he alone could have made the error. Example: In checking the setting of the panoramic sight the executive touches the sight, then calls the gunner's attention to the fact that the micrometer graduation does not match exactly with the index. The gunner is very likely to harbor the mental reservation that the executive altered the setting when he handled the sight. The correct procedure is obvious. In the same connection: With certain heavy-trailed weapons such as the 155-mm. howitzer, if the ground is the least bit soft the trail (unless resting on its float) will gradually sink while the gun squad is waiting to have its work checked. Investigate this possibility before blaming the cannoneer for a forward-creeping bubble.

With a well-trained battery it is possible to save a good deal of time by requiring the chiefs of section to do most of the checking, provided the executive occasionally and without warning checks the checkers and assures himself that slipshod work is not being allowed to pass. In any gathering of firing-battery enthusiasts it is possible to start a discussion as to whether the executive should do all this checking in person. There are valid arguments on both sides. The executive should certainly do the bulk of the checking unless he is well enough acquainted with the battery to know pretty well what to expect from each NCO and man, and unless the battery is a seasoned, proficient organization. If these latter conditions are fulfilled, the question boils down to a choice between keeping the executive more fully aware of what goes on and a faster, snappier drill with chiefs of section feeling relatively more important. A good deal depends also on how the battery happens to be functioning at the moment, for the best of batteries have a way of going temporarily sour.

k. Recorder and telephone operators.—For all practical purposes the recorder and *both* telephone operators are key members of the firing battery and should by all means drill and train with it. In addition to being thoroughly proficient, the operators ought to be accustomed to working with each other and with the executive and recorder, for unless data transmission is smooth and entirely dependable it is a fruitful source of trouble. The recorder furthers the executive's mission of catching errors *before* they are fired. His "check" is highly reassuring, both to the executive and to the cannoneer. In peace or in war a reliable recorder really pays his way. A poor one is an all-around menace. Although it is not at all difficult to train an intelligent man for

this duty, you cannot, as so many seem to think, grab a spare cannoneer in the heat of battle and transform him then and there into a recorder. If you would be sure of having a usable recorder on hand for the next service practice, you will do well, in this day of rapidly changing personnel, to keep three or four men trained for the job. These can get no better practice than at drill with the firing battery.

Have a simulated OP, reasonably close to the place chosen for drill but out of sight and hearing of the gun squads, and there have the fire commands read in the desired tempo to T3.

l. Speed.—This is *always* subordinate to accuracy. One must learn to walk before he tries to run.

The battery that tries to gain speed by hurrying will surely come to grief. Such exhortations as: "This outfit is too slow. Let's see some speed around here" come under the head of nagging and are very harmful to fire discipline. Still worse is to threaten that severe disciplinary action will follow errors or slowness. The executive least likely to succeed, however, is the one who because his battery has failed to do well, conducts extra battery drill of the hazing variety by way of "discipline." Such tactics as these bring about an error-inviting condition of tenseness in some men, while in others they arouse a "what-the-hell" attitude. They are a sure-fire prescription for spoiling a good battery or for making a poor one worse. They fail absolutely to get at the cause of the trouble, which is probably that the executive is not a leader.

True speed is to be gained only by shaking out the lost motion. In no other way can it be had. As battery executive you become an efficiency expert, devising ways of saving half a second here and a quarter of a second there, and seeing to it that you yourself are not guilty of wasting the battery's time. Do not, for example, indulge in such procrastinatory nonsense as to command: NUMBER ONE (dramatic pause) FIRE. Face toward the piece to fire and jerk your arm down the instant the chief-of-section's arm comes up. Do not permit dawdling. In moving from place to place the cannoneer does not walk nor does he double-time. He *runs*.

The professional cannoneer (the amateur, like the second-best army, doesn't belong in a war) is comparable to the experienced touch-typist, as distinguished from the hunt-and-peck artist. He acquires his manual and mental dexterity in the same way, namely by intelligent and persistent practice. He makes no unnecessary motions. Every motion he does make is swift and positive. He knows how many mils to the turn of his handwheel (knob-thumbscrew) and which way to turn it, applying these as naturally and instinctively as he steps off with his left foot. As a simple example of this, consider the matter of traversing the 155-mm. howitzer to the right by about eight mils in order to get on the aiming point: The poorly trained man will first take time out to make sure which way to turn the handwheel. Then, trying to keep his eye at the sight while turning the handwheel, he will fumblingly complete the operation in from 20 to 25 seconds if nothing goes wrong. The professional gunner takes a quick glance through the sight, observes that he must traverse to the right by about 8 mils, and reacts immediately to the fact that this will take 19 or 20 counterclockwise turns of the handwheel. He next concentrates all his powers on making world's record time for about 18 turns of the handwheel, then applies his eye to the sight and, making the last turn or so carefully, finishes the job in a total of 8 or 10 seconds.

The battery should be able to take fire commands as fast as the executive can give them and still be sure that he is both heard and understood. At such a tempo the commands: NUMBER ONE ADJUST, SHELL HE, CHARGE 3, FUZE QUICK, BASE DEFLECTION LEFT 160, ON NUMBER ONE OPEN ONE TWO, NUMBER ONE ONE ROUND, QUADRANT, 420, can be given in about 15 seconds.

In working for speed, the OP (FDC) and the firing battery being considered together, it is important that the firing data come to T2 at just the right tempo. This can be determined only by experience. Too fast a tempo is really more time-consuming than one that is unduly slow, because the executive, unable to keep up with T2 and still make his commands heard and understood, is forced to consult the recorder for the latter elements of the data. In extreme cases the recorder gets behind; then the war stands still while data transmission is repeated. The tempo should be such that immediately T2 repeats any element of data the executive can announce it to the battery in time to complete his command just before T2 repeats the next element.

3. SUGGESTIONS FOR THE EXECUTIVE.

a. Develop the voice of command. If need be, seek seclusion and give yourself a course in voice culture. A screaming voice marks the amateur, as does overloud rendition of commands intended for a single nearby section. With experience most executives acquire a businesslike, confident tone of voice which carries and which conveys assurance to the gun squads. The responsibility that your commands are both heard and understood is largely yours. Do not conduct drill with the pieces hub to hub, giving commands in a conversational tone. Space the guns at full (or greater) intervals and thus get the men used to your commands while you exercise your voice.

Enunciation is important. Pronounce numerals in the manner prescribed for telephone operators. Lest SITE be confused with RIGHT some prefer to say "ESS-EYE." In giving certain commands a short pause in the proper place is helpful, for example: BASE DEFLECTION—short pause—ONE SIX ZERO. The pause gives the gunners and the trail shifters time to

react and thus cuts down the likelihood of false starts and errors.

A system of simple and unmistakable arm signals is often useful for supplementing the voice, particularly when working in a high wind or against noise. For example, thrust the right (left) arm to the right (left) with a straightarming motion to indicate RIGHT (LEFT); make a lifting motion above the head to signify UP; and so on.

School yourself always to announce: "THE COMMAND WAS" before repeating any element of data for which you have been asked. Failure to do this invites the quite common error of doubling the shift or other data-change.

b. Self-enlightenment.—Know your materiel thoroughly, not only the primary guns but the antiaircraft and antitank weapons and all accessories as well. No gun mechanic, gunner, chief of section, or other member of the battery should know the materiel better than you. And you must be largely self-taught. Whenever you take over unfamiliar armament get out the ordnance handbook and go to work. Get some fatigue clothes (and don't be afraid of fatigue clothes or of getting your hands dirty), avail yourself of whatever enlisted help you may want (gun mechanic, gunners, chiefs of section, etc.) and spend a few half-days in the park learning to service the recoil mechanisms, mount the sub-caliber equipment, boresight the guns, make all authorized adjustments and disassemblies, and maintain the armament generally. Also by working with your key subordinates you will learn surprisingly about their abilities and idiosyncracies.

c. Notes.—By all means keep yourself provided with the latest edition of the Battery Officers' Notebook, currently available at the Book Department, Field Artillery School, at about ten cents per copy. In addition to its many excellent notes it contains references which resolve most of the usual doubts about where to look for detailed information. In waterproof ink keep a "permanent" section in your personal notebook. Record in it (in addition to the usual formulas for paint remover and bedbug eradicator) the serial numbers of all guns, all carriages, and all ordnance accessories (especially gunner's quadrants) that pertain to the firing battery. This will help you, for instance, to keep the same gunner's quadrant always in use with a given gun and will serve you in other ways too numerous to set forth here.

(*To be continued*)

EDITOR'S NOTE: After this serial has been completed, reprints in pamphlet form will be available at a nominal price.

THE NEW SAFETY REGULATIONS

By Lieut. Colonel George Keyser, FA

The old regulations which prohibited firing over the heads of unprotected personnel had certain undesirable effects on training and on methods of conducting fire. Compliance with those regulations did not build up the confidence which an artilleryman should have in the performance of his weapons and gun squads. When dugouts were available and used, fire was confined to visible areas where distances from "this point to that" soon were memorized; no one but the newly arrived got a real workout in conducting and adjusting fire. Usually dugouts were not distributed in depth so as to permit the observing party to move from hill to hill as would be the case in combat.

Another effect: Considerations of safety forced an overemphasis on lateral observation, especially large T. Lateral OP's, frequently in false locations well outside the zone of action of the supported unit, compelled the use of our most difficult and time-consuming methods of conduct of fire. Continued use at service practice of unreal OP's, whenever observation in front of the line of pieces was used, had a natural influence on the selection of OP's during nonfiring battery and battalion RSOP's. Not infrequently was the hill affording the best observation dropped from consideration because it was in the line of fire.

W. D. Circular 110, dated June 9, 1941, modified the safety regulations so that service practice can again be made to approach the conditions of combat. When it is desired to fire over unprotected personnel, particular care in service-practice planning, in preparation of safety cards and in actual firing should be taken. Most of this is preliminary work. It need not slow down the firing. If commanders permit slip-shod preparations and careless shooting, a few avoidable but well publicized accidents are likely to result in new restrictions which will put us right back where we were. Firing over unprotected personnel is a training requisite. Who thinks we should delay such firing until the first day of war?

The following are the changes to AR 750-10 which are of interest to the field artillery: As now worded, paragraph 2 *e* simply states: *Firing over the heads of any personnel from tanks or other automotive vehicles is prohibited*.

Paragraph 7 *a* describes new boundaries for the danger

area for all cannon firing except antiaircraft firing at towed targets.

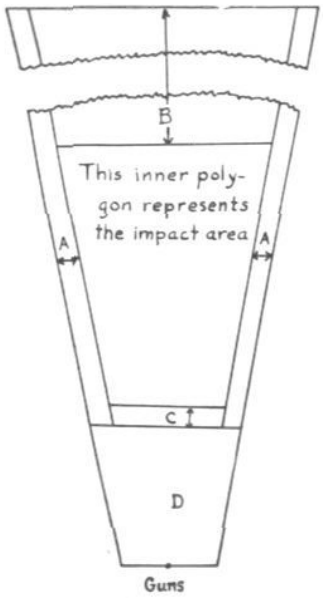


Figure 1

(*1*) *The danger area* (*Fig. 1*) *consists of the impact area and areas A, B, C, and sometimes D. When a fuze other than a time fuze is used, areas A, B, and C and parts of D are danger areas and will not be occupied except as authorized in* (*2*) *below. When a time fuze is used, areas A, B, C, and D are danger areas and will not be occupied except as authorized in* (*4*) *below.*

The sizes of area A, B and C vary for different calibers according to the following tabulation:

Danger areas

Calibers	Width of areas		
	A	B	C
	Yards	Yards	Yards
37-mm. or less	600	2,000	200
37-mm. to 75-mm. incl.	600	2,000	400
90-mm. to 155-mm. incl.	800	2,000	600
7-inch to 240-mm. incl.	1,000	*3,000	1,000

*2,000 yards if firing at more than 12° elevation.

(*2*) *If any part of area D is to be occupied, the trajectory must clear any personnel or materiel objects in this area by 5 yards plus 2 forks. This will require the calculation of a minimum range line which will become the short limit of the impact area.*

(*3*) *All personnel in the area D are subject to the restrictions of paragraph 14 a* (that is, personnel within prescribed distances of pieces firing with non-bore-safe fuzes must take positive protection—concrete walls, sandbags, etc.)

(*4*) *When firing time fuze, area D may be occupied only by personnel that are protected by splinterproof cover as described in paragraph 51 a* (*1*), *FM 5-15. Personnel in a tank with turret closed have sufficient protection for this purpose* (this permits use of an armored OP).

* * * * *

g. (Concerns danger areas when using 60-mm. and 81-mm. mortars)

* * * * *

14. b. Protection of persons authorized to be on the range.

(*1*) *No person will be permitted within the danger area as prescribed in paragraph 7 except as indicated in that paragraph and* (when firing AA guns over the heads of personnel) *as authorized in c below. However, to permit forward movement of troops, the short limit of the impact area may be moved in the direction of range by definite prearrangement*. (A separate safety card should be prepared for each new position of the OP.)

(*2*) *When chemical ammunition, except smoke, is being fired, persons within area D* (Fig. 1) *will be provided with serviceable gas masks.*

* * * * *

Step by step progress toward full use of what is permitted by the new regulations appears advisable. Initially one battery rather than three should do the firing. Because of the difficulty of coordinating safety when many batteries are firing, special care should be taken in using forward observation under such conditions. Displacement of forward observation and use of several batteries should come in the final phases of the training program. With multi-charge weapons, firing should take place with one charge until the organization is thoroughly charge conscious. When more than one charge is to be used, there should be a separate safety card for each charge and the safety officer should be warned of anticipated changes in charge. That batteries should not be taken to the range until their training is of a high standard always was axiomatic. If the batteries are to fire over unprotected personnel, it should be compulsory.

After the battery position and forward OP have been selected on the ground, a survey party should prepare the chart or map from which safety cards are to be made. This chart should show the horizontal and vertical locations of the battery, the OP, and the short-range targets. It also should show the location and height of material objects, such as trees or houses on crests, which may possibly be high enough to intercept the trajectory corresponding to the minimum quadrant elevation. The safety card may now be prepared.

Tentatively locate on the map the arc representing the short line of the impact (target) area. The shortest distance from the OP to this are must not be less than the distance as shown in the right hand column (danger areas) for the caliber being used. Determine the distance, battery-OP, and the site, battery to OP. Select the ammunition, charge and fuze to be used. Take from the firing table the elevation corresponding to the distance, battery-OP. To this add the site. To the sum of these add the mils corresponding to 5 yards plus 2 forks at the battery-OP distance. This is the tentative minimum quadrant elevation. Now take the point of lowest altitude on the arc representing the short limit of the impact area. Compute the quadrant elevation to this point. If this quadrant elevation is not smaller than the tentative minimum quadrant elevation, the latter is accepted subject to one more test. If it is smaller, the

radius of the arc is increased by an appropriate amount so that the quadrant elevation to its point of lowest altitude is equal to or greater than the tentative minimum quadrant elevation. Next check the area D for trees or other material objects whose height is such that they are likely to intercept the trajectory corresponding to the tentative minimum quadrant elevation. If all such material objects are not cleared by 5 yards plus 2 forks, at the battery-object distance increase the quadrant elevation by the appropriate amount. This becomes *the* minimum quadrant elevation. Finally determine the lateral limits, maximum range and other data for entry on the safety card.

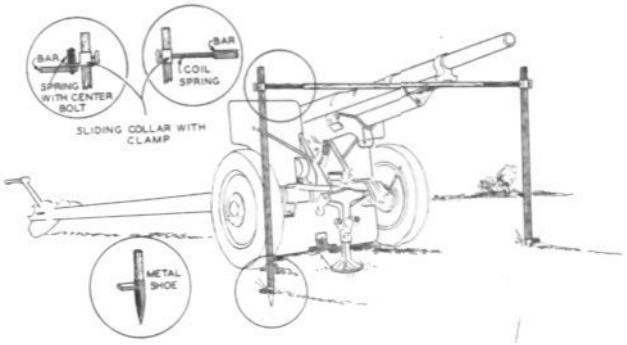
SAFETY CARD NO. ——

For battery at _____ with OP at _____ (indicate map)
coordinates coordinates

.....
(caliber, ammunition, charge, fuze)
Reference point for safety officer ....., Y-Az .....
Left limit .....
Right limit .....
Minimum Quad, elevation .....
Maximum Quad, elevation.....
Special instruction.....
.....
.....
Card prepared by....., ...
(date)
Card checked by..... .

Suggested form for safety card. Use of a different color for each caliber would be a good idea.

For years it has been the practice to provide safety officers with means for a quick visual check to determine whether any piece is pointed outside the lateral safety limits. Stakes with distinctive markings have been used to materialize these limits for each piece. Now there should be provided a quick check on the minimum quadrant elevation. The following, although untested so far as I know, seem feasible. After the piece has fired a round or two, set 2 stakes in front of the piece and suspend between them a bar of adjustable height and length. This bar should be suspended on springs so that if forced downward in shifting trail, it will return to its original position. If the piece is laid with its minimum quadrant elevation and the bar placed horizontally so as to touch the lower part of the cradle or tube, the safety officer and the gun squad will have a visual check on quadrant elevation (fig. 2)



NOTE: The two methods of fastening bar to upright, as shown in circles at upper left, are alternative methods of construction.

Fig. 2

Another method which might be practicable, especially with box trails, is to clamp an L-shaped piece on the trail flask to prevent elevating the breech beyond a certain point. Admittedly, either of the above would be practicable only when the piece is placed on firm level ground and when it is fixed so far as concerns digging in or backward movement.

Marking the quadrant or elevation scale at the setting corresponding to minimum range would not provide the safety officer with a visual check but it would tend to prevent errors in elevation settings.

If the gun squads are well trained, the chief of section might be required to give undivided attention to the use of the proper charge and to the elevation given the piece. When firing with multicharge weapons the safety officer might check on use of the proper charge by having an ammunition server display, after loading, the increments that have been removed from the propellant.

When observation is to displace during the service practice, the officer in charge at the firing point need only call the safety officer and instruct him "put safety card No. 2 in effect until further notice."

THE FLYING OP

The following question was asked of certain commanders of U. S. divisional field artillery and field artillery brigades: "Should short-range airplanes and maintenance crews be an organic part of Field Artillery?" Sixteen officers emphatically answered YES; one made a negative reply.

Major General R. M. Danford, Chief of Field Artillery, recently visited the British Artillery School at Larkhill, England. On this occasion he saw the British artillery operating their newly-acquired "flying OP," a light commercial airplane operated by artillerymen. The flying "gunner" was a young artillery officer who previously had been given a short course of instruction in piloting the plane. The British appear to be pleased with this new method of obtaining that much-sought-after aid, aerial adjustment of artillery fire. The British artillery now has its own light observation planes, flown by artillerymen.

In this connection, JOURNAL readers will be interested in the article on pages 781 and 782 of this issue.

AN IMPORTANT TEST

BY
LIEUT. COL.
THOMAS NORTH,
FA.

Mapping and Surveying Exercises at Fort Bragg, N. C.

At Fort Bragg, N. C., in July of this year the artillery of the I Army Corps, Topographical Engineers, and Air Corps units, staged a cooperative surveying and mapping maneuver of unprecedented extent, to the accompaniment of six inches of rainfall during the eleven days the troops were in the field. Surveyors are traditionally a profane species, and their tribulations were exemplified in these two weeks. To adapt a famous inscription, "Neither rain nor heat nor gloom of night stays these troops from the swift completion of their appointed rounds." An equal tribute can be paid to the cannoneers, whose ruggedness has long been asserted in notorious rhyme.

The exercises were conceived in the recognition that while maneuvers of the combined Arms have many advantages, they have one important, in fact essential, defect from our viewpoint. True enough, they enable the Infantry and the Artillery to get to know each other, but, romping about the landscape in the pursuit of objectives which are usually fleeting, very fleeting, the Artillery has little opportunity to expand its technique and is apt to content itself with technical gestures. Maneuvers, of course, are no place to develop new techniques. Rather, they are the proving-grounds of those already adopted.

These, then, were some of the reasons which inspired the Chief of Field Artillery to join the Chief of Engineers in urging G.H.Q. to authorize an Engineer-Artillery mapping and surveying exercise, freed from the tactical and logistical difficulties of other Arms. The Chief of Air Corps arranged for the essential Air Corps collaboration.

It was a most interesting experience. Artillery could think, talk, and act artillery. The recently published TM 6-200 had not yet received much circulation; it would have been a great help in solving the problems.

For the benefit of our newcomers, the Observation Battalion is a Corps Artillery unit of two sound- and flash-ranging batteries and a headquarters battery. To its peculiar technical functions has been recently added the task of aiding and supervising the survey work of the Artillery with the Corps, acting also as a link between the Engineers who deal with surveying from the mappers' viewpoint, and the artillery who survey as an aid to fire-control. The Army Corps also includes an Engineer Topographical Company which has the missions of surveying and hasty mapping to meet the immediate local needs of the Corps; it also has a mobile reproduction train which can turn out lithographic prints rapidly in sizes up to 17″ × 19″; when the Corps is part of an Army its survey platoon operates in harmony with the Army Topographical Battalion. Other elements of the Army Corps are an Air Corps Observation Squadron, which takes aerial photographs and performs a limited amount of laboratory work, under difficulties, in a trailer; and also a balloon squadron.

Participating in these exercises were typical headquarters batteries, and firing batteries of all of the artillery with the Corps (13th Field Artillery Brigade, 8th, 9th, and 30th Divisions) not omitting the 1st Field Artillery Observation Battalion, whose full strength was needed; in addition the 112th Observation Squadron and 2nd Balloon Squadron took part. The 64th Engineers acted as the Corps Topographical Company, and Company A, 30th Engineers, (Topographical) represented the Army topographical engineers.

The exercises were designed for the purpose of testing procedures which contribute to the preparation and delivering of unobserved fires. The terrain was flat and densely wooded. Observation was poor at best; the Corps Artillery had virtually no ground observation and depended upon air observation to register

* * * * * *

I. In the first exercise the I Army Corps had advanced rapidly into enemy territory outrunning all survey control until its leading elements had been halted by

stiffening enemy resistance. The problem was to arrange for the unobserved fire of the divisions, and, later in the week, to stage a coordinated attack by the Army Corps with full artillery support. One regrettable omission, due to the safety considerations, was the forward observers; this resulted in a false situation since the artillery could not take advantage of their adjustments in building up the firing charts.

For their immediate needs, the divisions adopted independent arbitrary grid systems, aided by some enlarged wide-angle airphotos which had been made before the "War." The Observation Battalion did yeoman service in extending its own survey system, and tying to it the independent division systems, an operation involving the adjusting and skewing of each one.

Rain and overcast was a serious handicap to the Air Corps in obtaining intelligence airphotos of the target area; as a rule the photos were so low, i.e., of such large scale, that they showed insufficient topographical detail to enable the target to be located on the grids and, at times, even on the wide-angle photos. This is a significant lesson; we have been too ready to assume that even by survey operations alone it is possible to establish sufficient points in enemy territory to enable us to make graphic restitution of targets from airphotos. The theory is grand, but when weather—and enemy—effect on the photography is such that the said points don't show, we have to resort to methods of restitution that stem from one's ingenuity, rather than from the book.

The exercise also forcibly indicated that opportunities for high altitude, wide-angle photography may be rare. Actually the exercises went a week before an airplane was able to poke its lens through a hole in the ceiling at 20,000 ft., and produce a few pictures patched with clouds; remember, too, that there was no enemy interference. The obvious deduction is that we should get our pictures ahead of time—i.e., mosaics, or wide-angle photos that have been made for the engineers' mapping purposes. Failing that, the answer is to keep the corps aviation on its toes, ready to seize the fleeting opportunity that a few hours clear sky may offer. And when we say fleeting, let us look at these figures which are based upon official records:

Average number of days per month upon which the sky is clear, or covered 10% or less by clouds.

Boston, Mass.	5.7	Cheyenne, Wy.	5.3
Buffalo, N. Y.	2.7	Indianapolis, Ind.	4.8
Bismarck, N. D.	5.9	Miami, Fla.	2.9
Seattle, Wash.	3.6	New Orleans, La.	5.2
San Francisco, Cal.	8.7	El Paso, Tex.	12.5
Los Angeles, Cal.	10.0	Algiers	6.2
Salonika	5.6	Dakar	5.2
Dunkerque, France	2.0	Puerto Rico	1.2
Amsterdam	2.1	Georgetown, Br. Guiana	0.7
Tripoli	10.4	Para, Brazil	2.3

To get back to the first exercise—when the division artillery had oriented itself it fired to demonstrate the accuracy of its work; the problems were transfers, based on a registration from an air or a ground OP, and metro problems. Each round was observed from four OPs set-up by the Observation Battalion. Throughout the exercises these observers did splendid service standing up to their instruments day after day, through long and tedious hours, which were not improved by sweltering heat and tropical downpour.

Meanwhile the Army Topographical Engineers had been searching for known control points some 35 to 40 miles to the rear, and extending this control system forward. This was the network upon which future maps of the theater of operations would be based. They worked day and night; at one point they jumped the Cape Fear River, measuring its width by a subtense bar.* Simultaneously the 64th Engineers got together with the Observation Battalion to decide upon a common point of origin of their respective survey operations, and then worked backwards to junctions with the Army topographical engineers. In this manner the control was brought to the Observation Battalion which in turn would furnish the divisions with the data to bring the corps grid system to the common army control—a step which actually was omitted but which could have been carried to completion on short order. The corps arbitrary grid system was used for the remainder of this first exercise. Once more the batteries fired and the accuracy of the fire was recorded in the plotting-room in the provisional I Corps headquarters.

II. The second problem was intended to test the practicability of maintaining coordinated support by the artillery with the corps in an attack followed by an enemy withdrawal in successive delaying positions. These positions were several miles apart, sufficient to compel us to displace our artillery forward each time in order to attack them successively. Again the Engineers, cooperating with the Observation Battalion, carried control forward at a speed which indicated that as long as corps artillery support is needed, this control can be kept abreast of the artillery position areas. The divisions and battalions had little difficulty in performing their necessary operations on time. In each case the artillery fired to demonstrate the efficacy of all this work.

III. In the third problem, use was made of a controlled mosaic made by the corps topographical company in lieu of a map. While this was usable, another mosaic, made under peace conditions by the Engineer Reproduction Plant in Washington, was found much more desirable in quality of reproduction and in accuracy.

IV. In the fourth and last problem we came back to the skeleton fire-control data sheet, familiar to many artillerymen about seven years ago when it was being tested by the School and the Board. This time, however, it was produced by the Corps echelon, instead of

*A horizontal bar, 2 meters long, set-up and adjusted by means of a telescopic sight so that it is exactly perpendicular to the line of sighting of the theodolite. The operator of the latter carefully measures the angle subtended by the bar (in seconds and fractions), and from a table reads the horizontal distance.

the Army or Base echelon as of yore. It consisted of a 1/20,000 grid upon which were located, by photogrametrical means, an occasional road junction or other point of detail which could serve the artillery in lieu of a control point. Using this as a means of fire control, quite good results were obtained, but there was room for doubt as to the overall accuracy of the sheets which had been plotted at 1/40,000 scale and enlarged to 1/20,000. It has much appeal as a clear and rapidly-produced means of coordination of fires.

* * * * * *

Considerable interest was aroused by the advent of the wide-angle airphotos. They were taken at a scale of about 1/40,000, enlarged to double the scale, i.e., about 1/20,000, and were overprinted with the target-designation grid discussed in FM 6-200, pages 20-21. Being excellent pictures they served, within the divisions, as bases for firing charts; little or no corrections for relief distortions were necessary in this terrain, nor was tilt troublesome. But to respond to missions ordered by Corps—based on sound-ranging or flash-ranging locations, for example—the grid system was required, and to the latter the airphotos could be oriented when time permitted.

Since the Corps Topographical Engineer Company has means for reproducing wide-angle airphotos lithographically, it is obviously desirable that means of enlarging them (which were not strictly kosher as used in the exercises) should be made available in the Corps; the requirements are already being studied. The quality of the lithographic reproduction was generally good, but there is much room for improvement. The Engineer company is to have a new type of offset press, with which it is planned to use some of the finer screens which have been used so successfully in the Reproduction Plant in Washington—although an added requirement, viz. air-conditioning, has also to be met. There was general preference by the artillery for 18″ × 18″ contact prints made at Fort Belvoir by multi-contact printing. To produce them the copy was carried there by airplane and dropped; the prints were returned from Bolling Field by air also—apparently a quite practicable procedure.

Obviously this is no place for a critique, but the following points may properly be mentioned:

a. It is essential that when air photos are delivered to the troops they be accompanied by a simple key and index.

b. All of the careful contributory work of photographing, reproduction, surveying, can be vitiated by an arithmetical error in the computation of firing data. All computations should therefore be checked.

c. FM 6-200 merits careful study and application.

d. Wide-angle airphotos will soon be available to most field artillery units. Their use as firing charts should be exploited.

e. Restitution from one photo to another, i.e., intelligence photo to wide-angle, can usually be done more accurately by inspection, aided by a few check measurements. Reserve graphic methods for restitution to a grid.

THE GUNNERY PHASE

of the recent Fort Bragg Mapping and Survey Exercises

By Lieut. Col. M. P. Echols, FA.

I—FIRING CHARTS

While the gunnery phase of the exercises at Fort Bragg could be covered by a critique, this would be of interest and value only to those who took part in the problems. The purpose of this article, therefore, is to discuss, from a general standpoint, firing charts and the massing of fires on such charts, in order that organizations attending maneuvers, both non-shooting and shooting, will have a knowledge of what can and what cannot be done, and how to proceed. This article is intended to be fundamental, and easily understandable to all officers especially those of limited experience. When reference is made to the maneuvers such reference is merely to bring out a point or serve as a background for discussion.

The gunnery phase was an added starter; the primary purpose of the exercise, as stated by Major North, was that of surveying and mapping in which the Field Artillery, Air Corps, and Engineers, participated jointly. Wide-angle photos were introduced in order that such photos might be given a test under field conditions. This was the first time these photos were given a service test, although they have been in use at Fort Sill for more than a year.

From a gunnery standpoint, the sole purpose of survey is to construct a *firing chart* from which data may be determined to fire on such targets *as can be located thereon*. A map, a wide-angle photo, a mosaic or a grid sheet becomes a firing chart when the guns and targets have been plotted thereon as a result of survey. Such survey may vary from the location of base pieces by direct identification of the point on a photomap to a complete triangulation with taped traverses.

The amount of survey necessary to make a firing chart

will depend upon the amount of topographical information available. Such information may be: (1) Previously located points whose coordinates and altitudes are known (bench marks or place marks located by higher echelons); (2) a photomap; (3) a map.

Let us consider the construction and use of a firing chart when the topographic data is in each of the forms stated above.

a. A grid-sheet firing chart.

(1) *Construction*.—For this case assume that two points have been located by the brigade; the coordinates of both points and the altitude of one point has been furnished to a battalion. The battalion plots these points on a grid sheet and performs a survey, using these two points to establish control. The following survey is accomplished: Location of an orienting line, place marks, base pieces, a base point, OP's (if high-burst or center-of-impact adjustments are to be made) and as many points in the target area as time and conditions permit. Altitudes of all points are determined. The points in the target area can be used as check points, reference points, and targets on which the infantry may wish fire to be placed. In some cases these points may be suitable for restituting targets (or areas to be fired upon) from air photos. In general, points on inaccessible terrain such as the target area *cannot* be identified on vertical air photos unless such points are most distinct. When all points located by survey have been plotted, the grid sheet becomes a firing chart.

(2) *Use*.—This type of firing chart can be used to register one gun of the battalion and determine deflection and elevation corrections for the other guns; to fire unobserved fires by transfers or with metro data on other surveyed points; as an observed fire chart for determining initial data (the air or forward ground observer using any located point as a reference point); and to fire unobserved fires on any target whose coordinates are sent to the battalion. Such targets may be determined by the observation battalion by flash or sound ranging when the observation battalion's survey is based on the same system of coordinates. (Special deflection and elevation corrections based on a sound ranging adjustment are needed to fire unobserved fires—fire for effect only—on targets located by sound ranging. A discussion of this subject is beyond the scope of this article).

(3) *Summary*.—No target which is invisible from a terrestrial OP can be plotted on the observed-fire chart except from adjusted data following an aerial adjustment. A grid sheet is suitable for restituting points from vertical photos. Its construction affords the maximum amount of survey training and it is more accurate as an observed-fire chart for determination of initial data than a chart constructed from registration results only. Its greatest asset is that it ties together all battalions using the same system of coordinates.

b. Controlled-mosaic firing chart.

(1) *Construction*.—This type of photomap is accurate and is treated as a fire-control map. To be satisfactory as a firing chart, the scale should not be materially less than 1/25,000. Points in the position area such as base pieces and OP's are located by inspection or short traverse (See TM 6-200). Points in the target area are accepted as they appear on the photomap. Direction on the ground is taken from two identifiable points on the chart and transmitted to the base pieces by a directional traverse (See TM 6-200 for discussion of directional traverses and orienting lines when using wide-angle photos and mosaics). Base, check, and reference points are identified on the ground and on the mosaic. The proper identification of points in the target area is most difficult; check should be made by ground survey as compared to map measurements to verify identifications; angles and range-finder distances also help. Failure to identify the same base point on the ground and on the chart when a registration is made will cause serious errors in the deflection and elevation correction determined from such a registration. This will result in all K-transfers or metro-transfers missing the targets. When no altitudes appear on the mosaic, vertical control is carried by instrument readings as is done with a grid sheet survey. A study of the terrain features appearing on the chart enables one to estimate the altitude of a point with reference to points of known altitude. Controlled mosaics being gridded, all points thereon are automatically under common control.

(2) *Use*.—The same operations may be performed on this type of firing chart as on the grid sheet. In addition, forward and air observers can often identify targets on the photomap and send their coordinates by radio to the fire-direction center; liaison officers have an accurate and rapid method of reporting infantry front lines (a most important feature); infantry commanders, after a study of the terrain and mosaic, can indicate areas on the photomap upon which supporting fires are to be placed or might be desired (on call); targets found on intelligence photos are easily restituted to the firing chart by comparing corresponding details.

(3) *Summary*.—A controlled mosaic is the ideal basis for a firing chart; particularly so if the altitudes of a number of points are printed thereon. Survey is limited to directional traverses in most cases. The great difficulty is that controlled mosaics require considerable time to make after the aerial photography has been done. For the necessary aerial photography, an unlimited ceiling and, in time of war, air superiority is required. *Caution!* Beware of the uncontrolled mosaic; its errors are unpredictable. Check everything by survey wherever possible. Even mosaics that are supposed to be controlled should be checked by survey if any doubt exists as to their accuracy; especially if fire is to be delivered close to friendly troops or unobserved fires are used. The scale and angular measurements are most likely to cause trouble.

c. Wide-angle photo firing charts.

(1) *Construction*.—This type of photomap is accurate for horizontal location except for distortion of points whose altitudes differ materially from the mean altitude of the ground covered in the photo. This distortion usually has little effect on ranges (distances) but may have considerable effect on the accuracy of angles or directions as measured from the photo. Direction should be established and carried to the guns and the scale of the photo determined as prescribed in TM 6-200. Except as noted above, the survey operations and the construction of a firing chart are the same as described above for a controlled mosaic.

(2) *Use*.—This type of firing chart can be used for the same purposes as the controlled mosaic. In order to designate targets or other points by coordinates, wide-angle photos must be gridded; this will be covered in training literature to be published shortly. Although wide-angle photos cover a large area, in most cases units will seldom be fortunate enough to find both the target and position areas on a single photograph; two photos will have to be "spliced" together into a strip. (It was found necessary to "splice" two photos at the Fort Bragg exercises; this caused so much trouble that an accurate workable procedure is appended to this article.)

(3) *Summary*.—The wide-angle photo is the most likely chart that will be available in unmapped territory. It is independent of ground control but is dependent upon a high ceiling, in order that Air Corps may take the pictures. Its scale will not be exact but will be close to 1/40,000; without ground control, the amount of enlargement of the photo to approximate a 1/20,000 scale must be based on the airplane's altimeter reading at the time the pictures were taken. Wide-angle photos may be reproduced as photographic prints or by lithography in a few hours. They should be gridded, when reproduced, with grid lines 1.8 inches apart so that 1/20,000 plotting equipment can be used in plotting points and reading coordinates (1.8 inches is the distance between 1,000 yard grid lines at a 1/20,000 scale). *Caution!* Always determine the scale of a wide-angle photo; the grid lines are NOT 1,000 yards apart unless the scale is exactly 1/20,000.

d. Odd-scale maps.—Odd-scale maps are usually produced for tactical and strategical purposes. Such maps are the 1/62,500 Coast and Geodetic Map; 1/125,000 tactical maps; "approximately one inch equals two miles" maps, and various forms of blown up "post office" and "railroad time table" maps. Such maps are often encountered but they are not suitable as firing charts. They may be used for one purpose only; to obtain a point of origin and a direction as a basis for survey. Locate a point by inspection, take the altitude (if altitudes are shown) and the coordinates as nearly as can be determined, as an origin for the survey to construct the firing chart (it will be one of the forms mentioned above—probably a grid sheet), and take a direction (Y-azimuth) of another point to establish direction. This ties you as closely as possible to the tactical map. The map can be used for no further topographic data, except to take altitudes from such bench marks as may be available and to check the survey against large mistakes. Do not try to plot targets and guns on such a map and expect to determine firing data. It simply will not be accurate. Organizations that are doing this on non-shooting maneuvers are developing a very bad habit. If you have not the time to calculate data correctly, you should tell your commanders; don't make up silly firing charts, because you are not going to fire, just to "speed up" a maneuver.

One other item that may be worth mentioning: a "200-yard concentration" drawn with a 1/20,000 template is not 200 yards on a 1/62,500 map. Many reports have come in about this being done. Measuring deflection to the right edge of such a circle is definitely wrong when an odd-scale map is used. Furthermore, the use of such templates and standard corrections has been discontinued as a procedure in the Field Artillery. Data are computed for a point target, and the map shift modified to center the sheaf of desired width on the target. This is covered in training literature now being distributed to the service.

II—LESSONS LEARNED

a. Use of the wide-angle photo.—The wide-angle photo was introduced to the troops participating in the exercises for the first time after the survey had been going on for about 24 hours and grid-sheet firing charts had been built up. This procedure was followed as it was desired that all units make a complete survey. Much survey would not have been necessary had wide-angle photos been used as firing charts initially. None of the personnel had seen the wide-angle photo except those officers who had recently attended the Field Artillery School. The use made of the wide-angle photo varied greatly. Some people attempted to restitute to the grid sheet; others used it as a firing chart as taught at Fort Sill. Troops had not been told what use was to be made of the wide-angle photo and therefore had to use their own ingenuity as to how to fire on such targets as were designated by photo coordinates. This "fog of war" was introduced purposely to obtain new ideas and methods of use. The methods selected by the battalions were for the most part sound, although in some instances quite involved.

There follow comments on what to do in this situation, that is, when a grid sheet survey has been completed before wide-angle photos are available. When a wide-angle photo and a grid sheet are both available, it is usually advisable to have two firing charts and to determine data from the one on which the target is designated. Corrections may be determined by comparing the adjusted data from registration on the base point with the map data determined from each chart. In this case each firing chart is treated the same as if

different check points had been registered upon. Corrections are applicable to the chart from which measurements are made. Therefore, if there are two charts, we have two sets of corrections. This is normally the case with a corps unit having its own firing chart and also using the grid system of the Observation Battalion for sound-ranging adjustments.

It is dangerous to measure the range from a wide-angle photograph and start firing without determining the scale of the photo. This is particularly true when a scale is smaller than 1 to 20,000, since the shots will fall short. One battery at Fort Bragg started an adjustment 800 yards short of the base point. This might easily have caused shots to fall within the front lines.

The selection of a base point and the determination of its location on the wide-angle photo proved to be most difficult. Fully one-half of such adjustments as went wrong were caused by selecting a point on the photo at a base point then attempting to determine this point on the ground but failing to identify the correct point on the ground. This erroneous identification of points in the target area also was noted when air adjustments were used in which the observer was told to adjust on a particular point. The most satisfactory air adjustments were made by letting the observer spot a center-of-impact which was fired on an area which showed detail on the photograph. In this case it is very easy for the air observer to pin-prick the point where he sees the projectiles burst. This method will appear in the rewrite of FM 6-40.

Some organizations attempted to restitute points from the wide-angle photo to the grid sheet by surveying control points in the target area. Since points in the target area are difficult to identify on the photo many errors were made. It is believed that points surely identified on the photo and the ground should be used to control restitution no matter where they fall on the photograph. Erroneous identification of points to control restitutes has the same effect as adjusting on a wrongly identified base point, as far as accuracy of fire is concerned. In general, whenever a wide-angle photograph is available and the position and the target areas are shown thereon, it should be used as the firing chart whether or not a grid sheet has been made.

b. Transfer to new coordinates.—When a division is on an arbitrary system of coordinates and a common control is brought forward by the corps, several questions come up. The method of transferring to the new grid system will vary considerably in different units. There is not one standard method in use in the Field Artillery. Furthermore, if your liaison officers and forward observers are reporting targets by your arbitrary grid, you must consider for example: How long will it take to notify the liaison officers and forward observers that you had changed the numbers on the grid and rotated them through an angle? When the new grid system comes forward should the battalions be required to change the firing charts which have been shot in?

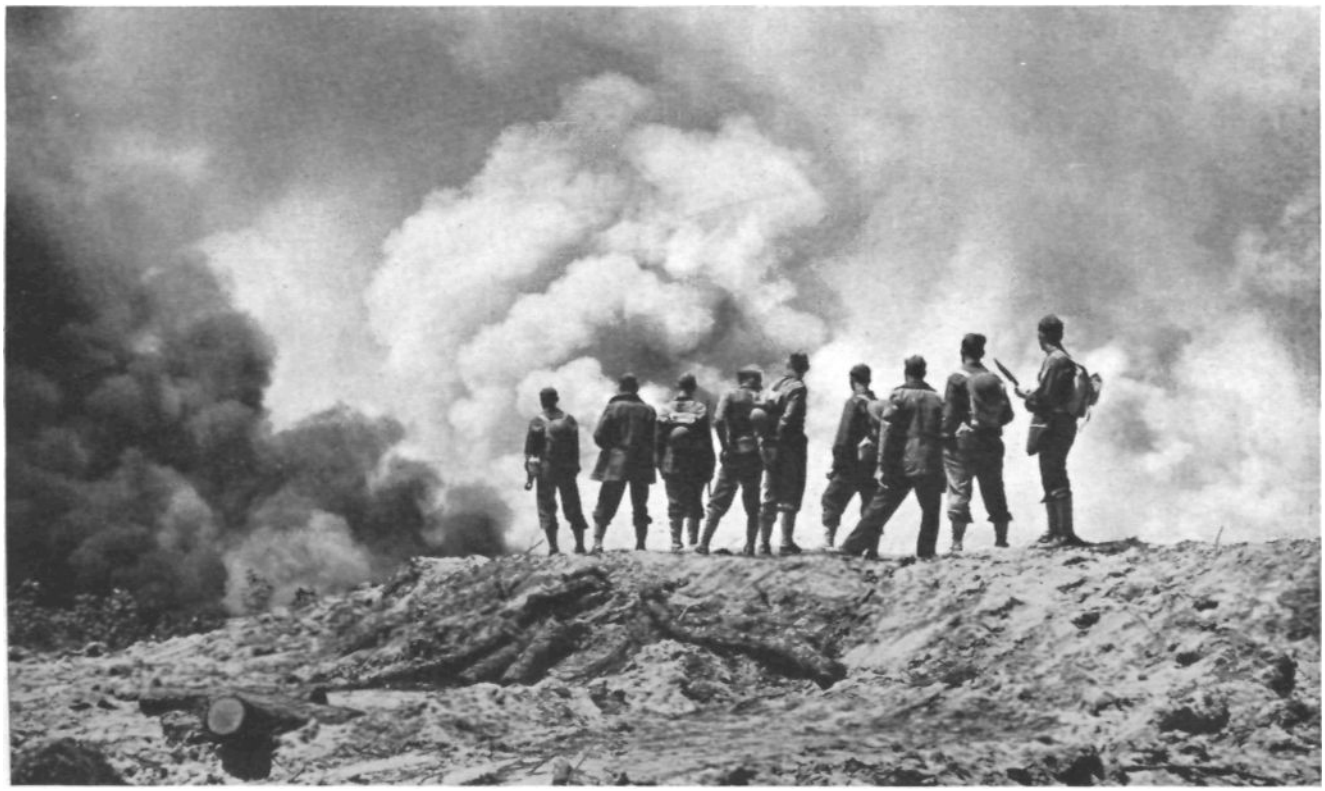
When a grid sheet with an arbitrary grid is the basis for a firing chart and it is known that the arbitrary system must be converted to a common control, the firing chart may be plotted on tracing paper or something like Dupont Film Base, frosted on one side. When common control comes forward (two points or a point and direction to another point), this control is plotted on a separate grid sheet; the transparent grid in use by the lower unit is placed over the grid of the new system and points are pricked through. To be accurate when using this system, both grids must be exactly to the scale 1 to 20,000, i. e., the grid lines must be exactly 1.8 inches apart.

When the wide-angle photo or chart not to the scale of 1 to 20,000 is being used and a common grid sheet control is brought forward, it is believed that the firing chart which has been shot in should not be discarded, but that a separate firing chart should be made. The same base angle on which the guns are laid should be plotted on the new chart. When targets are designated with reference to the new grid system they may be plotted directly, and the data determined from the new chart. Targets designated by the old system, that is the photo, should be plotted on that chart. New *K's* and deflection corrections should be determined for the new chart by comparing the adjusted data with the map data determined from the new chart.

c. Key to wide-angle photographs.—It was found necessary to have a key to wide-angle photographs so as to distribute such photos to the units which needed them. No system has been designed so far for the control of these pictures so that they can be expeditiously issued to units as they need them. One was improvised during the Bragg maneuvers. The centers of the photos were restituted roughly to the small-scale tactical map. These centers were marked by a small circle; an arrow through the circle was parallel to two sides of the photo. In the corner of the map as a marginal note, a square was drawn to indicate the area covered by a single wide-angle photo. It is believed that this method of indexing such photos is most practical. Wide-angle photos are of little use unless you know the particular area covered by each.

d. Fire-direction centers.—It was noted that the fire-direction centers in the various units were organized in quite different manners. This is unquestionably due to the fact that procedure has undergone a considerable change recently and training literature is not available

to the service in final form at this time. Such literature has now been completed and is being distributed throughout the service. It is believe highly important that all organizations train by the approved methods so that when officers are transferred from one outfit to another they will not feel as though they are in a strange army. This applies equally as well to cadres being furnished to newly created units. From talking to different officers it is believed, however, that the biggest fault lies in the fact that battalions are not given sufficient opportunity to train in Field Artillery technique, that very few battalions in the service have been given an opportunity to go out on tactical exercises in which technique was stressed and in which the battalions fired as a unit. It was further apparent in talking to various officers that battalion staffs are changed too frequently and that coordinated team work was impossible.



Life

There are times when observed fire is impossible. The surveyor then becomes an important member of the team.

In studying the accuracy-of-fires digest compiled at the completion of the exercises it was noted that individual errors in batteries would not have been particularly serious had the fires of the battalion been massed on a point target, using a 100-yard sheaf. Where one battery would fire to the right and short of the target another battery would fire slightly over and to the left, and the third battery would probably have a deflection correct and a range error of not exceeding 50 yards. In other words, if each battery fired at the same point using a single range with the sheaf centered on the target the result would be a 200-yard concentration whether you like it or not. Errors of the various batteries will compensate. This is the great advantage of firing three batteries rather than one. Besides, there results a heavy burst of fire in a shorter space of time. Fifty projectiles fired by the battalion produces as much neutralizing effect as one hundred fired by a single battery. The surprise should cause more casualties and create greater confusion. Results at Fort Sill have indicated that when firing at a point target you get a 200-yard concentration when firing one battalion, a 300-yard concentration when firing two battalions, and approximately a 400-yard concentration when firing three battalions.

e. Gunnery errors.—In general the following are the most common errors made in gunnery. They may be used as a check in training:

(1) Not identifying the same base point on the terrain and on the photo, thereby causing an erroneous *K* and deflection correction.

(2) Going right by the amount of drift and recording base deflection; then applying both drift and weather corrections when firing with metro data. This, in effect, corrected for weather twice. Methods of handling corrections prescribed in revised training literature will eliminate the possibility of such errors.

(3) Neglecting drift.

(4) Applying corrections in the wrong direction.

(5) Determining data from the grid-sheet firing

chart and applying corrections determined from registration in which data was determined from a photo firing chart.

(6) Firing near the maximum range for a given charge.

(7) Failing to determine the scale and getting a photo *K* when firing with metro data.

This exercise conclusively shows the need of more technical training.

Recommendations:

(1) That more training be given in joining two photographs together into a strip since it was noted in the exercises that the target area and the position area seldom appear on the same wide-angle photo.

(2) That training be based on the use of two or more photographs in which firing from one to the other is required. Wide-angle photos should be available to the service in the near future.

(3) That exercises be given in training wherein two charts, the grid sheet and the wide-angle photo, are used as firing charts. This is the case when corps artillery, or division artillery performing counterbattery, is firing on the targets found by the observation battalion as well as those designated by liaison officers and the infantry.

(4) That more training be given and more problems be based on all forms of odd-scale maps such as the *Fayetteville and Vicinity* map used in this exercise. Officers must know the limitations of each type and each scale map as far as the accuracy is concerned for determination of data. It is believed that too much stress should not be placed on the wide-angle photo. While this photograph is the most likely form of chart that will be available in unmapped country, it is not always possible, because of weather conditions, to get to the higher altitudes and take photographs. Even Fort Sill has less than one day in four when pictures can be taken from 20,000 feet.

(5) That training be given in problems which illustrate the extreme difficulty in locating and placing targets on charts. In most exercises the targets are accurately located and given to the organization by coordinates. This produces a false set-up. Problems should be held in which positions are occupied, observed fires are performed with overhead fire while survey is going on and the firing chart is being built up until unobserved fires become possible. The proper relation between unobserved fires and observed fires should be stressed more fully and the possibilities and limitations of each brought out.

(6) That it should be made a matter of regulation what unit will order aerial photography for fire-control purposes, how the pictures will be controlled and distributed, and who shall be responsible for such pictures. It is believed that this is a corps function and that the corps artillery officer is the logical person to handle this under the corps commander rather than G-2. G-2 is interested in intelligence photos which are not suitable for fire control.

It is believed that all wide-angle photos should be reproduced by one agency. Present regulations state that the Air Corps will make up to 24 copies of each picture and that any additional reproductions will be done by the engineers. It is believed that either one or the other of these agencies could reproduce all prints needed in the corps. In the distribution of wide-angle photos, it is necessary that they be distributed from a higher unit to a lower unit and that as the picture is distributed the person distributing it should point out on the photo and on the ground the same point in order that the officer of the lower unit will be oriented. This recommendation is made because it was noted that in these maneuvers one organization required the lower unit to report back to higher headquarters to receive its wide-angle photo. Although it was known that their position appeared on the photo, in that flat scrub-oak country it took the officers in the battalion nearly an hour to determine their location on the photo.

III—ASSEMBLING THE WIDE-ANGLE PHOTO INTO A STRIP

The reconnaissance method for assembling a strip mosaic is given in paragraph 93, TM 6-200. This method applies to photos taken on the same flight line with an overlap of less than 50 per cent. The method given below for assembling two wide-angle photos is similar but more general in application because the photos may be on a different flight line or of a different scale.

FIG 1

Method of Assembling. (Fig. 1) *a*. Place photo X over photo Y so that terrain details match as nearly as possible. Draw a line joining the two centers, C-1 and C-2; extend this line across the overlapped portion of each photo. This line is the approximate common radial line of the photos. The direction of a radial line is not affected by distortion (Par. 87 *c*. TM 6-200). The purpose of determining such a radial line is to permit the selection of two points on or near it, the points being identifiable on both photos.

b. In Figure 2, the points selected are A and B. These points should be as near as possible to the common radial line; they should be as far apart as possible; that is, A should be near the edge of photo X. For good results when joining 18 × 18-inch wide-angle photos, A and B should be three or more inches apart.

c. On each photo draw a line through A and B. Place B of photo X over B of photo Y and rotate photo X until

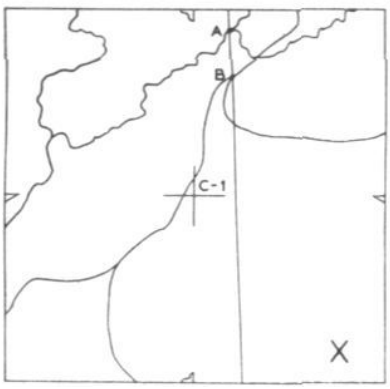


FIG 2

the AB lines of the two photos coincide. The photos are now oriented for direction. To assist in the alinement of the AB lines, these lines should be extended across each photo (Fig. 2); in addition, the coincident points B should be placed over a line drawn on a sheet of paper of such length to extend beyond both ends of the strip (Fig. 3). The lines drawn across each photo can be quickly brought into coincidence with the long line drawn on the paper.

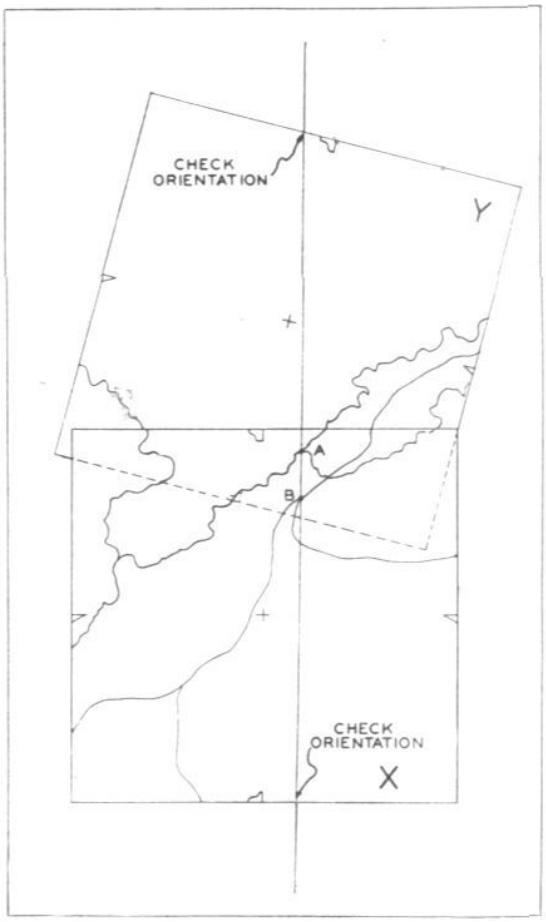
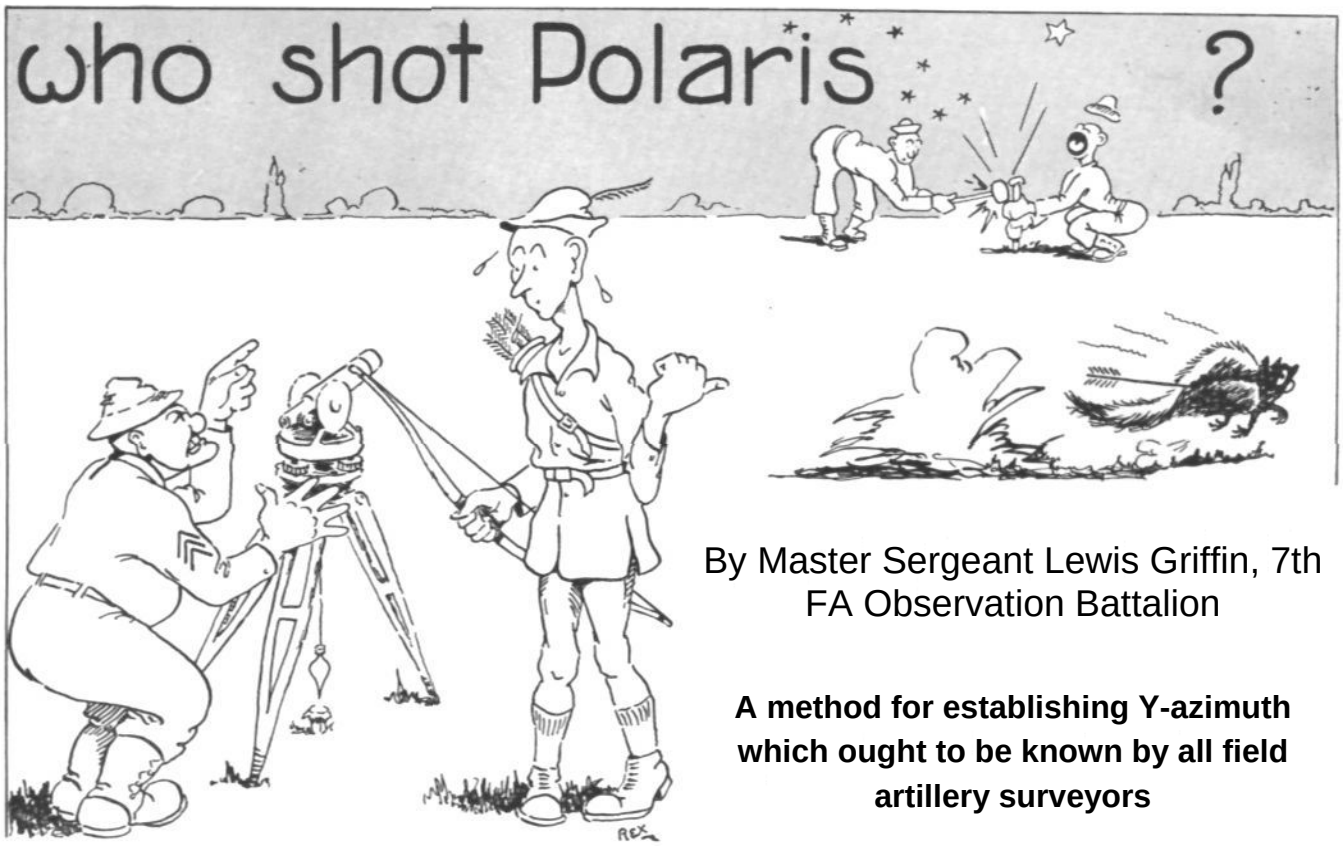


FIG 3

d. If the length of AB is the same on both photos, the foregoing method "locates" as well as orients the photos. If the length of AB is not the same on both photos, the photos are oriented but are not located. To place them in their proper relative positions, the center point of AB on one photo is made to coincide with the center point of AB on the other photo, the orientation of the photos remaining unchanged. The overlap may now be cut off along a line passing through this center point. The edges of the strip may be fastened down with cellulose ("scotch") tape.

e. When there is little difference between the altitudes of A and B, and the scale of one photo is known, the scale of the other can be determined by comparing the length of AB on one photo with its length on the other. If the scales of the photos differ materially, this difference must be taken into consideration when measuring the distance from a point on one photo to a point on the other. The portion of the distance measured on each photo should be corrected for the scale of that photo.

f. A point designated in one of the photos will sometimes fall on that portion that has been trimmed off in the assembly. In this case the grid of the photo is extended and the point plotted in the other photo.



By Master Sergeant Lewis Griffin, 7th FA Observation Battalion

A method for establishing Y-azimuth which ought to be known by all field artillery surveyors

The problem of accurate orientation is always facing the field artillery surveyor. Many times he will be able to set up his instrument over an accurately located topographical point, but has no suitable point on which to orient. Under these circumstances the surveyor usually has one of several options: He may run a lengthy traverse from some other located point and thus carry the azimuth forward to the new station which he wishes to occupy; he may orient by compass; or he may resort to astronomical orientation. The first method is too lengthy, not always feasible, and frequently of doubtful accuracy. The second method is only a makeshift and usually is entirely too inaccurate for the desired purpose (we are assuming that an accurate—to within one mil or less—orientation is required). The idea of orienting on the sun or stars appears formidable to the ordinary field artillery surveyor, and out of question for many of them. Yet it need not be.

It is possible to determine geographic north to within one minute of azimuth by an observation on Polaris (the North Star), without involved or lengthy computations. Of course, the surveyor may use any of the standard methods as described in standard texts,[1] but the writer has discovered a simpler, graphical solution.

It is easily possible to construct a chart as shown in the accompanying sketch, by means of which one can determine graphically the position of Polaris at any time. The resulting accuracy will be to within one minute of arc, which is sufficient for most field artillery purposes.

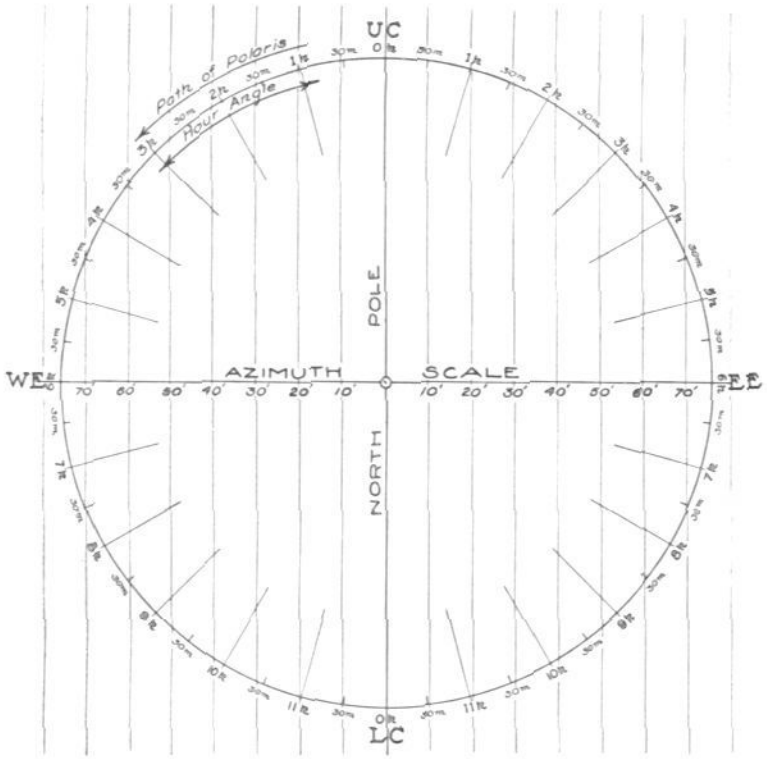
It should be explained, first, that Polaris appears to move in a circle around the true pole in a counterclockwise direction. At Upper Culmination it is directly over the Pole, at East or West Elongation it is about 75 minutes of arc from it. Naturally, if an observation is made at culmination either upper or lower, one will obtain the meridian at once without any computation. However, it is not always convenient to wait for this moment; furthermore the star is changing rapidly in azimuth at that time, so that a slight error of watch time or of measurement will cause an appreciable error in the result. The star is moving most slowly in azimuth at elongation.

The graphical chart enables the observer to determine the azimuth of the star at any time by inspection. Simply note the watch (standard) time of the observation, and project it to the East-West axis of the chart, from which the true azimuth is read by inspection.

This chart should be made on cross-section paper, enabling the observer to determine azimuth to within one minute. Procedure of making the chart is as follows: Select a sheet of cross-section paper having 1-inch squares, with ten fine lines to the square. Look in the texts previously mentioned to determine the azimuth of Polaris at elongation, for the latitude[2] in which you are located. Let each square represent 10 minutes and each

[1] See TM 6-200 and TM 5-236. Solar Ephemeris and Polaris tables can be secured free of charge from most instrument manufacturers. The writer employs one furnished by C. L. Berger and Sons, Boston.

[2] Lacking other information, you may determine your latitude with sufficient accuracy from almost any map; or it may be computed from the altitude of Polaris.



fine line represents, then, 1 minute. By interpolation you may read to 30 seconds.

Choose one point near the center of the paper for the intersection of the X and Y axis. The azimuth of Polaris at elongation may be found in TM 6-200, page 62. Using this azimuth as a radius and the intersection of the axis lines for a center, construct a circle, which represents the path of Polaris. From Table A (which gives the azimuth of the star at all hour angles) determine the azimuths of Polaris for each ten minutes of time. On the horizontal axis of the chart lay off these azimuths on both sides of the meridian line. Project the resulting points to the circle (both above and below the east-west axis) to get the corresponding hour angles. Number the hours counterclockwise on this scale, starting with zero at the top. The azimuth of the star is west of true north for hour angles 0 to 12 hours, and east of true north for angles 12 to 24 hours. If the hour angle is over 12 hours, subtract from 24. Example: Hour 4 is 24 minus 15 or 9 hours.

Observations on the star are made as follows: set up the transit and level it carefully. Sight the vertical hair on Polaris and note the watch time. Bring (rotate) the telescope to the ground and drive in a peg to mark this line, at least 200 yards from the station occupied. From your chart determine the true azimuth of this stake. At least two sets of readings should be made, and the average taken. One reading is made direct, and the other with the telescope reversed, to reduce error. Note that an error of watch time of about 3 minutes will cause an error of 1 minute in azimuth if the star is near culmination, but if the observation is made near elongation, the watch time may be in error by almost a half hour without appreciably affecting the results.

One more step is necessary, to convert true azimuth to Y-azimuth. This is accomplished by using the following formula: (Difference in longitude, in seconds, between longitude of observer and longitude of central meridian of observer's zone) times sine of latitude of observer = difference between true azimuth and *Y*-azimuth. See TM 5-235, p. 245.

Example: Suppose that the location of the observer is:

Latitude	35°	08′	20.85″
Longitude	75°	01′	59.25″

For Zone B, 81° is the central meridian. Computations:

80°	59′	60″	central meridian
79	01	59	long. of station
01°	58′	01″	diff. betw. C.M. and sta.

01° = 3600″ 58′ = 3480″

3600 — 3480 = 7081

Log 7081 = 3,8500333

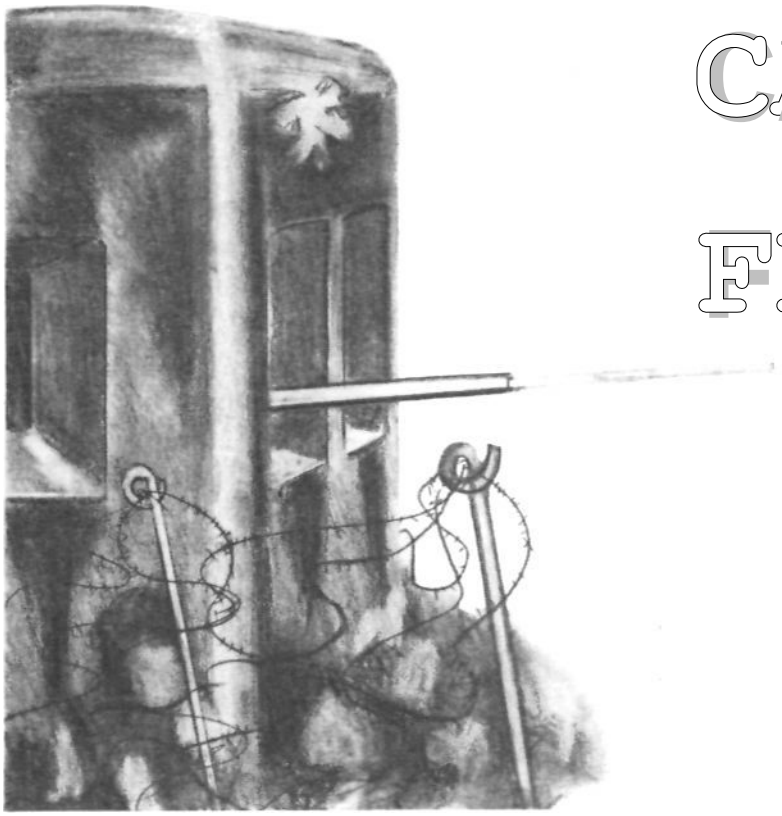
log sin 35° 08′ 20″ = 9,7600909

3,6101242, which corresponds to 4075″.

4075/3600 = 01° 08′ 00″, which is subtracted from the true azimuth to get the Y-azimuth The foregoing may be computed by the use of natural functions instead of logs.

The method outlined in the foregoing has been given a thorough test, and has been found accurate to one minute or less. In addition to the uses already mentioned, it may be seen that a "shot at Polaris" might "win the war" in that not uncommon case where the artillery battalion moves to a "new" country where the aiming circles have to be redeclinated, and no survey points exist for this purpose. An observation on Polaris will provide an accurately oriented declinating station.

New identification tags for the Army are to be made by the Addressograph Co. All we can say is, we use an Addressograph machine for mailing out the JOURNAL, and judging by the number of copies that go astray, several hundred thousand soldiers are going to be permanently lost. Local postmaster, please note.



CAMPAIGN *of* FLANDERS 1940

By Captain Leo Framery,
French Army

Part II--Delaying Action of May 12-14

Editor's note: In the preceding installment Captain Framery gave the organization and armament of the 2d Light Mechanized Division, and told how on May 11 the French units moved rapidly through Belgium to take their place on the Tirlemont-Huy Line, where they first began to resist the German advance. He describes the first experiences with Stukas. As we begin the second installment, the battalion of 75-mm. guns, of which he is executive, is in position near Vissoul. At nightfall on May 12 they receive their first orders to fire in support of French tanks which have been resisting the increasing German pressure from the east.

●

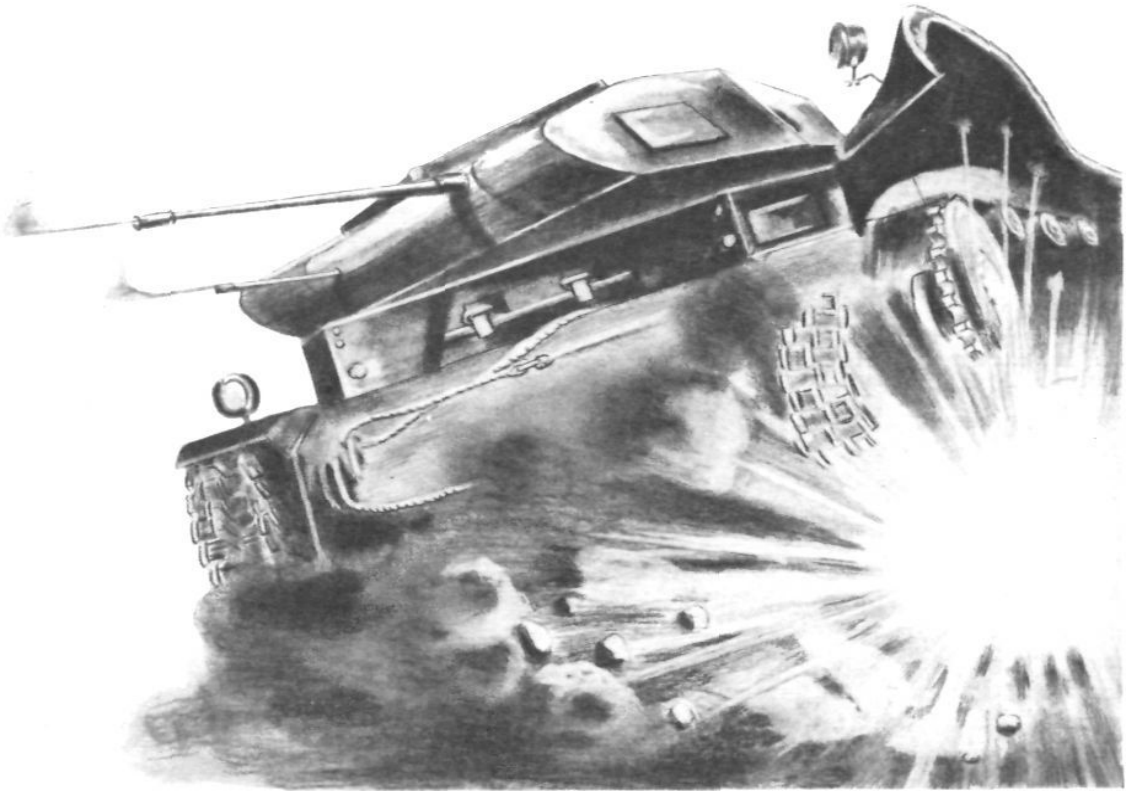
As dusk came on we received a report that enemy tanks, filtering through the defenses to the north, were roaming over the countryside. Our cannoneers were on the lookout, full of expectation.

Before total darkness prevented further large-scale operations, the enemy, stopped short north of Grehen, made another attempt to ram the front at Thisnes, two miles east of Hannut. A squadron of our S 35's (Somua tanks, model 35), the flashes of their 47-mm. guns plainly discernible in the twilight, counterattacked. They not only halted the Germans but also managed to penetrate the hostile position and destroy many German cars.

Our dragoons reported heavy losses in men and materiel, but the division had fulfilled its mission; the enemy had been unable to dent the line: Tirlemont—Hannut—Huy, and his casualties certainly were as numerous as ours.

The night brought but a short lull in the fighting; but soon after midnight our dragoons asked for our help. We were called upon to fire (by map) on German units massing in farms and orchards—we could tell that May 13 would be a well-filled day. Before 3 AM, barrages were requested rather close to our advanced elements. I was uneasy lest the short limits of our firing might endanger the dragoons, for we had had no opportunity to adjust, nor even to check the firing data. The dragoons were cautioned to lie low for the first salvos.

Shortly before sunrise—around 4 AM—a forward dragoon post reported that German parachutists were dropping from low-flying planes and massing in the backyard of a farm. We laid down a stiff concentration on this target, which sent the parachutists scurrying. Furthermore, the dragoons reported that one of our first shots had shattered the gate of the farmyard. This allayed my qualms concerning the accuracy of our firing data.



Continuing an important source-document of contemporary history, with timely, vital lessons for all artillerymen.

As the morning wore on the sector became very active. We fired continuously, with only short respites. The 4th Battery apparently was spotted from the air, for a squadron of Heinkels flew over the position and gave several performances of their "infernal circus." This lasted from 11 AM to 12:15, with short intermissions during which the Germans resupplied themselves with bombs which, according to fragments found, consisted of 100- and 200-pound projectiles. Our machine gunners kept up a steady fire in order to prevent too much low flying and to impair the accuracy of the bombing. In spite of all the blasting we got, no damage was suffered except a lacerated gun tire and the annoyance of having huge craters scattered through the position. One elated French machine gunner from the 5th Battery reported the destruction of a Heinkel; the plane at which he was firing was seen losing altitude. It disappeared behind a ridge east of us, and a few seconds later a huge flame went up.

By this time the whole line in front of us, from Tirlemont to Huy, was alive. The enemy had brought up 76-ton tanks[1] which mounted 77-mm. guns. These huge machines, veritable blockhouses on treads (as a dragoon described them) led all attacks. With this powerful aid, the German pressure of the previous evening against Thisnes was renewed. Some of our fine S 35's, in spite of their 38-mm. armor, were badly mauled.[2] A platoon of the 76-ton monsters, flanked by lighter machines, advanced as far as Merdorp; others reached Jandrain. East of us the valley of the Mehaigne and the sloping terrain on which we had excellent observation was such a disadvantage for the attacking tanks that the enemy made no progress. We fired actively, chiefly barrages observed from our OP.

Early in the afternoon our men counterattacked along the whole front to stop the German thrusts. Once more the low-slung French tanks drove forward across the green fields, plagued by squadrons of shrieking Stukas. Orders for fire poured ceaselessly into our artillery battalion CP. The cannonade spread to the whole battlefield; we could hear violent gun reports all around us Huy, to the southeast, became the goal of fresh German attacks. They succeeded after a while in surrounding the town, which was defended by a battalion of our 1st Dragoons and two battalions of motorized machine guns. The French resistance, stiff and determined, was directed by General Lacroix, our brigade commander. Finally a counterattack broke the German ring around the town.

But the pressure of the hostile armored forces on our

[1]American observers have been unable to accept without question the reports that the Germans employed 70-ton tanks. The Germans built their army for speed; hence it is felt that they used only tanks which could cross their 22-ton ponton bridges. It is possible, of course, that they used a few monster tanks for crashing the initial barriers, but it is more likely that the French overestimated the weight of the larger German tanks, just as the Germans did for the French tanks. See the article *Tank Battle*, herein: the author exaggerated the size of the French Somuas. No doubt all hostile tanks looked big, in the dust and smoke.—Ed.

[2]This first tank-against-tank fighting, near Merdorp, is described from the German viewpoint in the following article, *Tank Battle*, by Capt. Schneider-Kostalski and by Capt. von Jungenfeld in the article on page 772.—Ed.

front seemed to increase as the afternoon lengthened. New tanks were reported entering into the action. Toward 4:30 PM we received orders to withdraw the battalion by echelon. Two batteries were to stay in position; the third was to occupy a position five or six kilometers to the west, enabling it to take over the present missions of the battalion and also to fire on nearer objectives if the necessity therefor should arise.

The new position was selected southeast of Hanneche, after a close study of the map. Reconnaissance of the terrain was completed rapidly. The battery chosen for the displacement, the 6th, moved out of the woods and took the road in full view of the numerous enemy planes crowding the sky overhead. The tractors (multiwheeled trucks), guns, and cars—camouflaged with branches and green leaves—negotiated the ten miles of road in less than twenty minutes! The battery missed by only a few moments a vicious bombing of a crossroads in Burdinne. At 5:30 PM the guns were in their new emplacements and ready to fire. This whole operation took just about one hour from the moment the 6th Battery received orders to cease firing until the pieces were laid on base deflection in their new positions, ready for business. I must add that in spite of the fact that the surveying officer was machine-gunned by a low-flying plane at the new position, just before the guns arrived, the battery did not suffer any damage. The numerous bombers operating in the vicinity missed it completely during the two hours of daylight remaining.

Dusk of the 13th brought a lull on the battle front. At this time the division received an order from the corps commander, General Prioux, to "décrocher"—break up—and establish a new front back of the Belgian artificial tank obstacle of Perwez-Marchovelette. This order had been anticipated; and it conformed with the plan for the delaying action. During the preceding twenty-four hours the enemy had exerted a terrific pressure on our front; thrusts by armored forces, supported by unopposed Stukas, had followed incessant attacks by heavy tanks. In spite of all, our front had held. But many units had suffered; neither reinforcements nor replacements could be expected. New attacks by fresh enemy troops, determined haphazard by the incidents of the action, might cause irreparable damage. Hence the order to disengage from the action and fall back on a new position behind the antitank obstacle of Perwez-Marchovelette.

The latter was a line of huge *chevaux de frise* extending between the two cities, over ten miles in length. It was an advanced defense built six or seven miles in front of the south section of the K-W Line, the Belgian main position running from Antwerp to Namur, through Lierre, Malines, Louvain and Wavre. This antitank fence crossed terrain which offered a favorable avenue of approach to invaders coming from the east; the folds of the ground here—the valleys and hills as well as the roads—run mostly NE-SW. Hence an artificial barrier was necessary to hinder, at least, and delay, any thrust towards the position of resistance.

When we arrived from France on May 11th we went through Perwez, which gave me an opportunity to examine the obstacle. Its main parts were X's or St. Andrew's crosses with branches made from ordinary structural steel I-beams about 12 feet long and 8 inches wide; the two branches of each X were welded together. The X's were anchored in the ground, the pointed end of the front branch facing the oncomer. Set a few feet apart, they were braced to each other with girders. Wide barbed-wire entanglements protected the glacis and approaches in front, so the elements of the line may have had a depth of 150 to 200 feet, where I saw it. As already stated, it had a length of about ten miles, and gave the impression of being a strong and reliable work.

As I looked over this apparently impassable barrier, on May 11th, the thought which went through my mind was a phrase from the French regulations concerning field fortifications: "Obstacles in front of a position aim at impeding the movements of the attacking party, to compel it to linger under the fire from the defense forces, thus to enable the latter to inflict losses to enemy personnel and damage to his materiel." It seemed rather irrelevant then, but subsequent events were to prove its value.

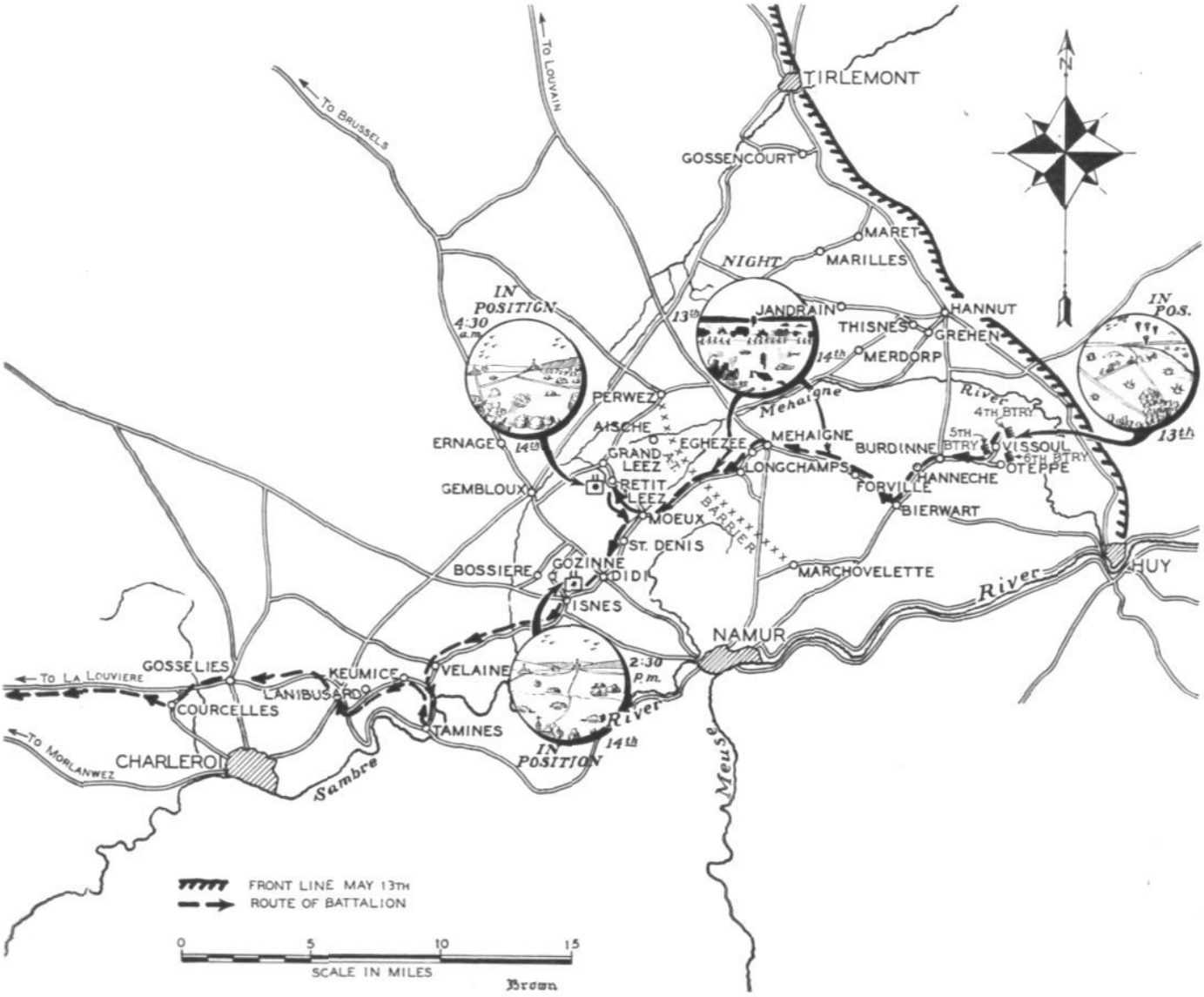
But to return to our narrative: Our battalion was directed to proceed to Petit Leez (four miles east of Gembloux and three-quarters of a mile south of Grand Leez), where further orders concerning new missions were to be given. Itinerary: Burdinne, Bierwart, Forville, Eghezee, Lonchamp, Moeux, Petit Leez. Departure, 7 PM.

For awhile in the CP one could hear only the staff clerk pounding on his typewriter—an anticlimax after the roar of cannon which had filled the whole place during the past thirty-six hours. Outside, the four motorcycle dispatch riders were lined up—one for each battery, one for the combat train—ready to take the orders to their BC's as soon as the clerk had finished typing them. Each car leader was to receive the description of the itinerary on a small strip of paper, to minimize the chances of going astray.

Before leaving the cottage which had been our CP, and observing the instructions given me by the unfortunate housewife before she left on the 12th, I dutifully locked the place and hid the key under the door mat!

We crossed Burdinne, by that time a mass of ruins and deserted except for the tanks which were taking position to cover the retreat. All bridges and culverts had been mined, so our drivers gingerly picked their way between cases of explosives which the pioneers were disposing on the road.

It was easy going to Bierwart, but afterwards the march became a nightmare. Columns of cars and guns appeared at every crossroads, endeavoring to merge into our procession. Night had fallen; we moved along in deep darkness.



At 10 PM the Major and I decided that I should go ahead so as to reach Petit Leez as early as possible. Once there, I was to locate brigade headquarters and obtain from the commander the new operation order. This seemed simple enough. But imagine the apparently endless column of vehicles which I had to pass; the narrow road; the supply trucks running in the opposite direction to our stream, and discernible only when head on, bumper to bumper; and the whole scene in pitch-black night. After a half hour of strenuous efforts and breathtaking near-wrecks, I left my car in a field on the side of the road and jumped on the pillion seat of the motorcyclist dispatch rider who followed me everywhere. It took me an hour to get to Petit Leez and complete my errand. Returning to the battalion fortunately was easier, but finding my car in this army of shadows was quite an achievement in itself. Finally I resumed my station at the head of the battalion. At 2:30 AM, May 14th, we had everybody accounted for and safely dispersed in the village. Even the 6th Battery, which had left its position south of Hanneche at 8 PM, was also with us complete.

A temporary CP was selected in the back room of an abandoned farmhouse. Orders were prepared, typed and issued to the battery commanders. As already stated, we were to occupy a defensive position behind the antitank barrier, and be ready to fire at sunrise, 4:30 AM. Reconnaissances were to be completed by 3:45 AM. This left us half an hour to receive from the battery commanders their reports on the events of the preceding several hours. It appeared that the battalion was very fortunate; only two wounded cannoneers from the 5th Battery were reported. The 3d Battalion of the regiment had had a more serious mishap, we heard—five officers killed by a single bomb, including two captains, battery commanders. They had been grouped for conference around a map spread out over the top of a caisson. A single unlucky bomb struck the vehicle, leaving only slight traces of men and materiel. This was a serious

handicap to our 3d Battalion right at the beginning of the campaign.

The reconnaissances, made in the gray light of the pre-dawn, were more difficult than had been anticipated. The ground was soggy in many places, and we were compelled to place the batteries farther apart than the tactical situation would demand.[3]

The valley of a tiny brook surrounds Petit Leez on three sides; the bottom land, which on the map has the appearance of a likely position for a whole battalion, actually is marshy and covered with bullrushes. However, we found enough dry ground for one battery; the 4th occupied it at once. The emplacement for the 5th was selected almost due west of the 4th, on the counterslope. The base deflection for this battery was 1,000, which meant that in many instances it would have to fire directly over the 4th Battery. Fortunately, there was a difference of altitude of 25 feet. As for the 6th Battery, we had to place it 1,000 yards north of the 5th, in an orchard back of a farm. The battalion survey officer was the immediate sufferer in such cases where the position was over-extended; he experienced some hard times that morning in operating his transit through the bullrushes.

At 4:30 AM we experienced the expected visit of the inquisitive Henschel, which flew over us suspiciously. It was followed by bombers which for some reason restricted their activity to Grand Leez.

I established the command post in a house which was located about equidistant from the three batteries and had enough orchards around it to shelter the numerous cars and tractors of the headquarters unit. The village was still occupied by its inhabitants, but the first bombs falling in the vicinity had their usual effect; soon all the civilians left on foot—a pathetic sight.

In the early morning the sector was rather quiet save for the usual activity of the Luftwaffe. The beautiful weather made one incline to forget the Heinkels in the sky and enjoy the peaceful scene offered by this perfect spring day, in a purely rural environment.

However, towards six o'clock in the morning we heard loud explosions coming at regular intervals from the northeast. We were told that it was a German artillery preparation on the Perwez antitank barrier, executed with heavy guns.

Around 9 AM . . . surprise! From the northwest appeared a squadron of planes from the R.A.F.: three Spitfires, each with one wing painted white and the other dark. They were the first friendly aircraft we had seen since May 10. It created quite a stir among us. We wondered if the Allies really had an air force; possibly these three Spitfires were just the vanguard of other squadrons. If so, we had hopes of acquiring that prime requisite for successful land operations, supremacy in the air in our sector. Then, we thought, we might be able to see the end of defensive fighting and enter into an era of offensive warfare, so much better suited to the tradition and upbringing of the Cavalry.

The German planes quickly sighted the newcomers and passed from cruising to faster speed, engines accelerating to a roar. The Spitfires rushed at them and to our delight, after short dog-fights, two German craft fell in flames. Our spirits rose, notwithstanding the fact that the Britishers had disappeared, and the Luftwaffe had resumed its routine bombing and strafing.

The sector by now was thoroughly alive; our observers on Hill 174 (northeast of Grand Leez) reported severe German shelling on various points in the vicinity of the antitank barrier. However, our first order for firing was not received until 10 AM, a concentration to be put down under control of our observers.

At 11 AM came an alert! A motorcyclist from brigade headquarters brought the unpleasant news that enemy tanks had pierced the defensive line and that a few of them were loose between Aische and Grand Leez. At once we prepared for close defense of our artillery position. New dispositions were taken rapidly.

In the meanwhile an order came to fire a concentration on Perwez, where the enemy was preparing an attack and was massing numerous tanks. In less than five minutes the battalion was ready. We showered high explosive on Perwez at the rate of 16 rounds per gun per minute for the first two minutes, then slowed down to 4 RGM for several more minutes, with a final rapid burst at the end—altogether we fired 800 rounds in a very short time. We learned afterwards from our dragoons that the effect of this fire was considerable. Many enemy vehicles were wrecked and their progress stopped momentarily. French radio broadcasts next day made special mention of our feat.

The 2d Battalion, 1st Dragoons, which had been surrounded, gained its freedom of action. Nevertheless a resumption of the retreat was ordered. The tractors were brought up and we quit the position in good time. The hostile tanks were close at hand. We were compelled to abandon the few telephone lines which we had installed. At the OP our men had to withdraw under direct machine-gun fire. They managed to carry off all their materiel, but it was a close escape.

One piece of equipment which we were forced to leave behind in this emergency was our observation tank. This very special vehicle was a Renault tank rigged with a 2-meter range finder, a carefully shielded and adjusted compass, and a radio set. Thus we did not have an opportunity for using this armored OP under fire, before we were compelled to abandon it, the reason being that it had hardly left the position when the right tread was thrown from the sprocket. The 2-man crew (a sergeant and a driver) hastened at once to repair the damage. But imagine trying to straighten up a bicycle chain

[3]The reader is reminded that the French employed their battalion practically as a 12-gun battery, thus the batteries were usually emplaced fairly close together.--Ed.

weighing several hundred pounds! Nevertheless they became so absorbed in this task that it required the objurgations of the officer commanding the last S 35 to pass—just ahead of the Germans—before our men would abandon the vehicle. Before doing so they wrecked the inside of it. The NCO climbed into the sidecar of a motorcycle which accompanied the S 35. As for the driver of the OP tank, he returned to our lines riding on the back of the S 35, grasping the turret, while its 47-mm. gun was firing close to his ears and his hair was being singed by the flames shooting from an exhaust pipe pierced by many German machine-gun bullets.

Our orders were to retreat in a southwesterly direction until we crossed the K-W Line, then halt in a place suitable for antitank defense and organize a position.

Our itinerary, selected on the spur of the moment, went through Moeux, St. Denis, then Isnes, which was chosen as the place where we were to make a stand. Isnes was a village built on a small elevation which afforded excellent view of the surrounding terrain. Any tank attempting to approach could be detected at a distance of ¾ of a mile to a mile; and point-blank fire could be executed on it most of the way.

The three batteries were deployed on an are giving a zone of fire from *Y*-azimuth 6000 to 24000, each piece being assigned its portion of the sector. We were ready to open fire at 2:30 PM. Already the village was occupied by the 106th Infantry, a part of the 12th Motorized Infantry Division. These men were digging industriously and doing their best to transform Isnes into an up-to-date center of resistance with trenches, barbed wire, tank traps, emplacements for machine guns and 37-mm. cannon, trench mortars, and so on. The divisional artillery of this motorized division—the 25th FA—was in position northwest of us on the slopes rising above the villages of Gozinne and Bossiere, one mile away. We could see several of their batteries firing at a great rate. This meant that the enemy had succeeded in reaching the K-W Line and had contact with the units manning it—troops of the 1st African Infantry Division. According to all appearances there was a hard-fought battle going on—cannonade, explosions, rattle of machine guns—the affair sounded like a grand style attack. We learned afterwards that it actually was a violent thrust made by heavy tanks against the K-W Line between Gembloux and Ernage. The enemy renewed the attempt several times during the afternoon but was always checked by the 1st North African Infantry Division and elements of the 3d Light Mechanized Division.

While these tumultuous events were occurring a few miles north of us our sector remained perfectly quiet.

A company of our 1st Dragoons, which had been fighting a delaying action since south of Perwez, arrived on motorcycles (solo and side car) and took position nearby. The commanding officer was Captain L——, before the war a well-known horseman from the famous "cadre noir" of the Saumur Cavalry School. The dragoons reported that early in the morning German artillery, 210-mm. or heavier, had started a methodical bombardment of a narrow section of the antitank obstacle south of Perwez. This explained the loud explosions we had heard. This shelling crushed the work on a 200-foot front, exploding, at the same time, the minefield protecting it. The heavy German tanks were brought forward and went through the breach without apparent difficulty. The opening was subsequently widened by other tanks which after a right- or a left-hand turn worked sideways on the steel crosses and toppled them over.

It is obvious that the French guns available on the spot—mostly 37's—were totally unable to cope with the heavily armored German monsters. This unfortunate event illustrates that a field fortification unprotected by an adequate base of fire is worthless. It shows also what a crushing handicap was imposed on us by the complete absence of air support. We had to fight, blindfolded, an enemy whose many eyes kept him ever informed as to our movements.

On this fateful morning of May 14 a reconnaissance plane on our side would have given us an insight as to our foe's intentions, and would have enabled us to parry his attacks. Our two L.M. divisions, depleted by the heavy casualties resulting from the relentless battle which we had waged for more than 72 hours against four panzer divisions, no longer had the fire power to defend a continuous front. Our centers of resistance were, perforce, far apart so as to cover more territory. Over this wide deployment of our units no scout planes were present to warn us of impending thrusts. The German panzers acted under conditions which were ideal for them.

While I exchanged thoughts and plans with the dragoons, a platoon of our S 35's roared by. They had been fighting a delaying action since morning. Their arrival was a portent of the enemy's approach; his tanks should soon loom in view. We were prepared for him; each battery had 72 rounds of armor-piercing ammunition, enough to disable many units. Instead there came an anticlimax. An order was received to leave the position and resume the march to the southwest. The Cavalry Corps was relieved by infantry divisions, among them the 12th Motorized and the 1st North African, both of whom were already in line. Until further notice we were to be in reserve.

At 4 PM we swung into column formation and took the road. No itinerary had been prescribed; we merely followed the direction given by men of the Divisional Road Circulation Detachment who were stationed at each crossroad. One mile south of Isnes we took a wide paved highway leading toward Charleroi. Already it was thickly congested with fleeing civilian refugees surprised by the swiftness of the German invasion.

Three quarters of a mile beyond Velaine, the R.C.D. directed me due south toward Tamines. The new road, on a steep down grade, traversed a dense wood. I decided

to halt the battalion there and wait for our Major, who had gone ahead in quest of new orders. The wooden shelters of our 1st Armored Division were there, and we saw also ninety "Chars B," the 36-ton French tanks armed with 75-mm. guns. They were massing for a counterattack.

The Major came back, saying that the excursion towards Tamines was an error of the R.C.D. We should have stayed on the Charleroi road; we must turn back. Fortunately a possible loop was discovered in the narrow streets of Tamines which saved us from executing a long and delicate countermarch on the encumbered road. We passed through Keumieé, Lambusard, Gosselies and Courcelles. At the latter we were joined by Colonel B——, commanding the artillery of the division; he gave me further orders: The battalion was to be given a night's rest at Courcelles. A rapid reconnaissance showed me that the place was so over-crowded that it would be impossible to find any shelter or cover for men or materiel. After a quick study of the map I decided to proceed forward to the wooded district of Morlanwez, southeast of La Louviere. We reached the place at 10 PM and in the dark found billets for the personnel in the extensive buildings of a college. The guns and vehicles were hidden in the surrounding park. This operation, executed in total darkness, proved difficult for men exhausted by four days of fighting without rest. They would fall asleep if left alone for a moment.

Finally, at midnight, quiet prevailed for everyone in the battalion, under the watchful eyes of guards.

(*To be continued*)

EDITORIAL COMMENTS

In the first installment Capt. Framery stated that the maps issued were 1:50,000 scale. The accuracy of the subsequent map firing, then, is somewhat of a surprise to U. S. artillerymen, who are accustomed to think that a 1:20,000 map is a requisite for accurate map data. Capt. Framery, however, informs us that the maps of this section of Belgium and France were accurate to about 20 meters; although the original triangulation control was the old Napoleonic survey, these maps had been brought up to date by aerial photography and other topographical operations. Furthermore, it must be remembered that the French had lists of coordinates of the numerous and accurately-located points on the terrain, and that they were thoroughly trained to use trigonometric computations to obtain range and deflection. In other words, they only resorted to graphical methods of survey and measurement of firing data when time did not permit computations to be made. In brief, map firing involved more precise work with them than it generally does with us.

Here again we note that dive bombing does not necessarily demoralize a good unit, nor does it always cause great damage to personnel or materiel. This 71st FA was a regular army unit. The men were well trained and of high morale. The machine gunners stuck to their posts when attacked by Stukas, even though they realized that their weapons probably were inadequate. As a result, the Heinkels were kept high enough so that their accuracy of bombing was impaired. This is an important lesson, and cannot be repeated too often.

Note that for the displacement on the night of the 13th the battalion took the time to prepare and issue *typewritten* orders. To those who are inclined to sneer at such a procedure, we say, "Stop and consider for a moment!" Here was a night march to be made under very trying conditions. The roads were jammed with military traffic and refugees. The German tanks were pushing the rear guard, even long after dark. The terrain was not familiar to these Frenchmen; they were in a foreign country. They had to reach their destination and get in position under cover before the early dawn brought down the Stukas. It paid them to take time to prepare written itineraries for every one, down to include the man in charge of each vehicle. *It actually saved time*. And it certainly avoided confusion in trying to read notes, filled with coordinates, made from some verbal order, and hastily plotted on a map. On this occasion every vehicle of the battalion reached its destination, and the guns were in position and the survey completed on time. Contrast with the next march made on the afternoon of the 14th, in which no such orders were gotten out. The battalion had to rely on the Divisional Road Circulation Detachment, who led them astray. The moral is that a little time spent in reconnaissance, or in issuing clear, unmistakable orders, may mean time saved in the long run. This business of always relving on fragmentary oral orders may be carried beyond the limits of common sense.

There has been some doubt, before this war started, whether artillery fire can be employed profitably in blasting a path through a mine field or in destroying antitank barriers. Whether it is economical, it certainly is effective, *and will be used,* as was proved by the Germans in shooting a hole through the formidable Perwez-Marchovelette barrier. Heavy artillery, if used at the right spot at the right time, may save thousands of lives, and the cost of building such weapons is a small matter even if they are never used again. In this country we might well conduct a series of tests to determine the most efficient calibers, the best methods of fire, and the number of rounds required to detonate a path of given size through a mine field or an antitank barrier.

TANK  BATTLE

Captain Schneider-Kostalski
in Die Panzertruppe, Dec. 1940
Translated by O. L. S.

Editor's note: The two following German narratives describe the same fighting near Merdorp and west thereof which Capt. Framery recounts from the French viewpoint.

The commanding officer sends for me, saying, "Keep off the Bertree-Hannut road; it is under artillery fire." All the roads are crowded with marching troops; I take a solo motorcycle and go to the battalion command post. Wrecked cars, scattered arms and equipment, dead horses, broken-down walls, make the narrow roads almost impassable. Artillery fire is heard in the distance.

At the command post we get our orders for an attack in the afternoon. As in Poland, our objectives are selected far ahead. I hear of patrol skirmishes, and of hostile artillery concentrations.

And so today is the big day, when we must show here in the west what we are good for. Will this new enemy fight better than the Poles? We hear that we are facing the Paris armored division; as we have foreseen, we are to fight armored troops immediately. All our map problems and sand-box discussions have been shaped to prepare the company for this. Every man has learned, from moving pictures, the appearance and the weak spots of the enemy's tanks.

On my way back to the company, I hear that a French tank has been captured, and go to see it. It is an H 35 — the first French tank I have seen. Of course we had read in regulations of the defensive qualities of this tank, but I could not help being impressed by the sight of this heavy armor.

The regiment forms for attack. As usual, my company is the left flank element of the brigade in first line. Another armored division is to attack on our left, but nothing has been seen of it yet. The last few minutes before the attack are devoted to marking maps and memorizing code names. My old company, all veterans of the Polish campaign, seem perfectly at ease. The men work on their tanks, oil their arms, or eat and smoke.

The sun shines; it is clear and warm. At last we get the signal to start, and the armored brigade moves out. The picture, familiar as it is, is most impressive; the attacking mass rolls on, in broad deep formation. Overhead are bombing squadrons, flying toward the enemy; behind us, infantry in trucks are following the tanks. And so it goes for several kilometers, with no contact with the enemy; but shell-bursts show that we are getting close. Then we come to a deep, narrow valley, with a long straggling village in the bottom. It seems probable that we shall meet resistance on the other side.

The battalion halts a few minutes for observation, but nothing suspicious can be seen; so down we go. The slope is so steep that I am afraid some of the tanks will capsize. My old driver, who has driven me through the whole Polish campaign, takes the lead, and goes down the steep slope perfectly. I stand in the turret, submachine gun in hand, and keep watch.

German tank park in Belgium during the action with the French 2d-L.M.D.

A hostile attack here might be serious for us; but we have to go down into the valley. A fence, a stone wall, are broken down, and the company follows me.

We come to a court-yard; and on the farther side is a heavy grating, covered with sheet iron, barring the way to the main street, which runs along the bottom of the valley. This grating is hung to two heavy masonry pillars, and the opening is too narrow for our tank to pass between them. My driver steps on the gas, carries away the gate, pillars and all, and reaches the street.

But unfortunately our gun has pierced straight through the sheet iron cover, and the gate hangs in front of us like a curtain, completely cutting off the view for myself or my driver. Everyone out, and clear the whole thing away! Yes, but how? Our curtain weighs at least 400 kg., and the gun has gone clean through. We take bars and axes to cut away the sheet iron, for it is too thick to cut with wire-cutters.

At this moment, rifle fire is opened upon us; the town is occupied. We can not see the hostile riflemen, but they can see us very well, to judge from the accuracy of their fire; they are firing from the windows of the houses. I return the fire as best I can, with a submachine gun. Drivers and radio men work feverishly to get the gate posts off from the tank and to cut away the sheet iron. It takes us all, working together, about three minutes to get ride of the gate. Thinking to myself, "I'll never try to go through a closed gate again," I take my men back into the protection of our tanks.

And now, apparently, we are to get down to fighting. I throw off the safety locks of gun and machine gun, and get a grip on the laying gear. There is no chance for the company to deploy. We go down the village street in column, my tank leading. Then we come to a bend in the road.

As I turn the corner I see a French antitank gun staring me in the face at a range of 70 meters. Two French soldiers jump behind the shield, and the gun begins to move; apparently they are making the final corrections in laying. Instantly I cut loose with my gun, and see four round black holes in the gun shield; a body falls over to the left. Then I open with my machine gun.

The effect is astonishing. Khaki colored figures appear everywhere, holding their hands in the air. They come out of the gardens, the houses, the ditches. Machine-gun fire is heard in the distance. The crew of the antitank gun lie beside their piece, dead or wounded. The Frenchmen do not seem to know what to do next. I stand in my turret and call to them in my broken French, telling them where to put their arms and where they must assemble to be sent to the rear. Suddenly a bullet goes through my cap, tearing away my telephone head-set. The shot is fired by a Frenchman sitting in the road ditch. After this heroic deed he jumps to his feet, throws away his rifle and surrenders. I am so astonished at this bit of impudence that I give him a sound box on the ear.

French tanks advancing under fire

The company closes up behind me. Part of the men watch the houses on both sides of the street; the rest of them search the houses and gardens for Frenchmen. In a deep dugout, comfortably provided with club furniture, we find two officers and several men. In all, 40 or 50 Frenchmen are collected here, and considerable numbers of weapons and articles of equipment; this unit proves to be, as we had supposed, a part of the Paris mechanized division, which is unusually well equipped.

It proves impossible to go farther forward on the main road, or on the minor road parallel to it; both are blocked by craters two meters deep, filled with water. Similar craters are found in a neighboring village, which indicated that they were neither air-bomb not shell craters, but obstructions constructed by the enemy, making the roads entirely tank-proof. One tank of the company escorts the prisoners to the rear; meanwhile we make a reconnaissance on foot, to find a way through the gardens, around the obstructed road.

Finally we find a route that looks possible, although risky — through gardens, over walls, and diagonally across a railway embankment, to open country again. There is steady firing, all about. The indications are that my company is the only one to cross the valley so far, for I can hear German machine guns—clearly distinguishable from the French by their rate of fire—only from the rear of both flanks.

On our right, in a sunken road, we find French skirmishers entrenched. We open fire upon them, and the survivors are sent to the rear as prisoners. As we cross a bit of rising ground, I see a French antitank gun, limbered, and destroy it the same as the first one. We take the sights with us as a souvenir; the crew are shot down in their turret.

On the next rise, at about 400 meters range, I see sharply outlined against the sky a rectangle closely resembling an antitank gun shield, but it does not occur to me that the French will be likely to put a gun in such a poor position. As I come nearer, I soon learn better. The reports of guns and the sound of shells show that the French have opened fire; no gun flashes are seen, either then or at any time.

My driver halts in a partially concealed position, and I open fire with gun and machine gun. I realize that there is not only an antitank gun on that hill, but a whole little defensive group; by good luck, my first shots put out of action the crews of the gun and of a heavy machine gun. The company has come up into line with me, and when we see the men in the trenches put up their hands we drive up the hill.

The hostile detachment was about 50 men, under a senior lieutenant. I dismount to disarm the prisoners. We leave the rifles on the ground but take the pistols and field glasses with us. Machine guns are lashed on behind. Suddenly a Frenchman rushes forward desperately with a hand grenade in his hand. Instead of throwing it, he shows me that he has already pulled the safety pin, and that the grenade will explode if he lets it go. I order him to step aside and throw the grenade into the open field, which he does; then he joins his friends in captivity. One little Frenchman, apparently a factory workman, looks closely at my men, then shakes his head and says, "Workers, just like us." Apparently he still believes in international solidarity.

The French lieutenant acts more like a soldier. I ask him questions about his position and his troop unit, but he answers that he has nothing whatever to say; that he has surrendered his men, but not himself, and that we may go ahead and shoot him. I press his hand and say, "Brave comrade"; the Frenchmen, sitting all about, clap their hands in applause.

Then I start to locate myself on the map; but suddenly the men begin to shout, "Enemy tanks!" Sure enough, there are French tanks in motion on our right flank; I suppose I must have seen fifty of them in the course of the day. Two Mark III's of the 4th Company open upon them at about 600 meters. My map has shown me that I ought to to be farther to the left. None of the other companies of my regiment are to be seen, so I decide to continue the attack alone, bearing well to the left.

I lead out, taking direction on the village, when suddenly I see on my right a French tank, Type H 35. The muzzle of his 37-mm. gun is swinging toward me. I fire a magazine of 2-cm. shells at 80-m. range. The gun muzzle ceases to swing, and smoke comes out of the tank. I do not know whether my shells have actually pierced his armor or not, but at any rate he does not trouble my company any more.

In a garden on the edge of the village we see a huge park of beautiful tanks and motorcycles. Frenchmen are showing up everywhere, wearing the round steel helmet of the motor troops. As we go by we turn our machine guns upon the park and upon the enemy's men. As we get farther into the village we come upon another deep crater, making the road totally impassable. A sunken road turns off to the right, and this seems to be the only way to get the company out of this witches' kettle. The air is getting thick; at any moment I expect to see the flash of an antitank gun in front of me. But the French seem to be surprised, and to think they are surrounded. This is all that saves us.

There are Frenchmen sitting along both sides of the road, three meters deep, through which we are driving. The turret doors of our tank are open, as usual; I can not shut them, for at any turn of the road I may come face to face with an enemy, and I have to keep my eyes to the sights and my hands on the laying gear. This precaution soon pays for itself; rounding a bend, I meet a French tank, Type H 35, coming straight at me. The sunken road is just barely wide enough to pass, if he keeps close to the right side of the road and if I can not make him halt. Luck is with us. I fire half a magazine of 2-cm. shell at him before he can do anything. The shock of impact of these projectiles is so heavy that the driver's door flies open. I fire into the opening with my machine gun, until there is no further reaction from inside. Then we work our way past the hostile tank.

Forty meters farther on, and the same thing happens again. Again I have the luck to penetrate the armor of the hostile tank and put the crew out of action. The third tank I find at a halt; perhaps he has found out the fate of his comrades, and prefers to receive us at a halt. I open fire at once, but this time I find no weak spot. Whether he fires upon me or not, I can not tell; but at any rate our situation is highly unpleasant. If he fires upon us with his 37-mm. gun, he can put us all out, for he is more heavily armed and armored than we are. Then, suddenly, two hands appear in the rear turret entrance, and a load falls from my mind. I drive close up to the enemy and order the two Frenchmen to dismount. Then a hand grenade puts an end to this tank.

At last the sunken road widens out into open fields. From far behind I hear both French and German gun-and machine-gun fire. My sending set goes out of action, and I can lead the company only by signal and example. We can not stop here, in the midst of the enemy, so we go ahead in the attack direction. On the left I see a French heavy tank, type Somua. A little overconfident from my previous successes, I say to myself, "I can do nothing to this big fellow in front or in flank; perhaps I can do something from the rear." I have more speed than he has, and so I succeed in working up to him from the rear, hiding behind a fold in the ground, and follow him at 20 m. He does not see me. To get better aim, my driver halts, and I fire ten rounds into the enemy; there is a dense cloud of smoke, but he keeps going. Before he can train his 4.7-cm. gun upon us, my driver has taken cover behind a wave of the ground, and we turn back to our other tanks.

Suddenly there is a violent shock; the tank fills with smoke. The driver calls out, "Motor's dead, antitank shell." We abandon our faithful tank in haste — all three of us unwounded, except that in the first skirmish I got some lead splinters in my hand, when an infantry bullet splashed on the armor of the turret. The radio man and I at once put a captured machine gun into position, and spray the edge of the village, where it seems possible that there may be antitank guns. Meanwhile the driver puts out the fire in the motor with a hand fire-extinguisher.

So there we are, all alone in the midst of the enemy's territory, and dig ourselves in beside a manure pile. When the fire in the tank is entirely out we bring from it such things as we need—the submachine gun, ammunition, field glasses, rations, and the black coat which my radio man had with him. His uniform is literally torn to ribbons, and he puts on the coat at once.

The firing to our rear increases, and we see German tanks moving up on a broad front. In the leading tank comes the chief of my company detail, his turret and his gun shot up. Next comes the light platoon of the regiment. We climb up on one of the tanks, and ask the platoon commander to drive up to the edge of the village, so that we can attack the antitank gun on foot; for sure enough, there is one there, just as we expected. The crew take shelter in the turret, and we put them out of action with a few submachine gun shots; then we make the gun unserviceable. When we climb up on the tank again, a French machine gun seriously wounds the platoon commander and my radio man. He is hit through the lungs; and when we cut off his blouse the first thing he says is, "My fine new coat—it's no use any more." We drive on about a hundred meters, and find the company and the regiment assembling.

My senior lieutenant had been looking for me with a dismounted patrol, and on the way he captured eight French tanks with their crews. Not finding any trace of us in the village, the company supposed that we had been killed or captured, so there was great rejoicing on both sides.

German Panzers vs. French Light Mechanized Divisions

By Captain Ernst von Jungenfeld*

EDITORIAL NOTE: *This is another German version of the events described by Capt. Framery in the preceding article. Note how the author pays tribute to the accuracy and effectiveness of the French artillery. Note also his comment that the German panzer attack on the Dyle position could not proceed until artillery support was furnished.*

In the early morning hours of May 13, we received a report that a large-scale attack involving several tank divisions would be launched against the enemy. On May 13, the first large tank-versus-tank battle in military history took place at Merdorp, Belgium.

We left our "rest" area, northwest of Liege, at 10 AM and moved into a position of readiness just in the rear of the artillery. The artillery began to fire at 11 AM against villages and the edges of woods where our reconnaissance planes had detected hostile positions, and even French tanks. This artillery fire, increasingly intense, prepared the way for our advance.

Suddenly, at noon, our dive-bombers appeared. They circled around the enemy like hornets, observing where they could drop their dangerous loads. Their bombs were aimed accurately and seldom missed their targets. At 12.30 PM the aerial attack was completed. All the bombs had been dropped, smoke and flames were issuing from the attacked villages. The artillery continued to fire.

The tanks attacked at exactly 12.45 PM.

We advanced over gently rolling terrain, through meadows and innumerable small fields surrounded by wire fences. There were only a few woods and groups of trees initially. As far as the eye could see, German tanks were attacking the enemy.

The terrain soon changed. Instead of fields and meadows, large and small woods as well as villages, came into view. We passed to the right and left of such areas which were dangerous to us because we could not observe the hostile defensive weapons therein. However, these areas were kept under artillery fire.

*In *Berliner Illustriete Zeitung*.

We advanced quite a distance before a shot was fired either by the enemy or by us. At first many of us thought our advance would be just as easy as on the preceding days. Suddenly we received fire from Merdorp.

We made a short halt for orientation, and through our field glasses we could see that French tanks were awaiting our attack.

A dramatic fire fight began. Our entire regiment formed a semi-circle around Merdorp and fired at the enemy who returned the fire with all his weapons. The enemy changed his position from time to time, and initially it was impossible for us to inflict large losses. Even our tanks armed with heavy cannons did not inflict the losses that had been expected, so we decided to leave Merdorp to our left, and push on farther into the enemy territory.

Our regiment advanced in a perfect formation. But the enemy took advantage of the situation by advancing his tanks out of Merdorp and attacking our infantry which was following our tanks. The battle increased in intensity.

The 1st Battalion grasping the situation immediately attacked the enemy from the flank, destroying eight of his tanks. In spite of our courage and offensive spirit we were forced to conclude that the French tanks were thickly armored and it took many a shot to make them give in.

While the 1st Battalion was attacking the enemy from the flank, the 2nd Battalion attacked frontally, and forced many hostile crews to leave their tanks. Whenever our projectiles failed to penetrate, the desired effect was obtained by a drum fire directed at the tank. Demoralized by the constant hits of our projectiles, the enemy crews abandoned their tanks with arms raised. Moreover, during the first few minutes of this battle we recognized the enemy's weakness. Although his armor was thicker than ours and his armament was good, his tanks were slow and difficult to maneuver. He fought in small, individual groups, without unified command, and therefore was unable to make full use of his power and force.

So it is no wonder that when new hostile tank groups appeared, our tanks would engage them as gallantly as ever.

Presently, we were momentarily surprised to hear the report: "Enemy tanks in the rear!" Some French tanks had succeeded in outflanking us. Soon we received the following order: "Enemy to the rear. To the rear. March. Attack."

In all our previous combat experience, or in our maneuvers, such an order had never been issued or practiced. Nevertheless it was perfectly executed, and the threat to our rear was engaged immediately. In a daring attack, a tank of the 5th Company set a French tank on fire. Encourged by this, we vigorously attacked the rest of this group of enemy tanks and put them out of action.

Our rear free again, we promptly resumed the attack in our original direction. Suddenly, enemy tanks appeared in front of us near the water tower on a ridge south of Jandrain (just north of Merdorp). It now appeared that every disabled French tank was replaced by two new ones.

Adjacent regiments were heavily engaged, and it seemed that they were advancing very slowly against the hostile resistance. We were also aware of the depressing fact that our ammunition was getting low and we had to tell certain tanks to fire fewer rounds and in some cases, none at all.

After a lull in the action, the 2nd Battalion prepared for a difficult attack against the water-tower ridge. First we had to cross a wide plain in the face of hostile defensive fire. Then we had to climb a ridge, from which the enemy could shoot at us from behind thick hedges. My company and First Lieutenant Lekschat, with his 5th Company, led this attack. We crossed the plain at full speed, and in the excitement of battle we did not notice a small cut running across our route of advance. We hit the bottom of this cut with such an impact that my driver was nearly knocked unconscious. The tank that stops in front of the enemy is sure to be disabled within a few minutes. With great energy my driver pulled himself together and we continued to advance toward the water tower. En route, I forced one French crew to abandon its tank, and I set another tank on fire with my weapons.

Meanwhile, the 8th Company arrived with their heavy tanks, and then the 2nd Battalion attacked the northern end of the water-tower ridge. When we reached the ridge we thought we would be masters of the situation, but we received fire from all sides. The heights beyond the tower, as well to the left of Jandrenouille and to the right of Jandrain, were heavily occupied, and the enemy was resisting desperately. Two hostile observers in the water tower fired at us with machine guns at short ranges. Later, we learned that these two men, remaining at their machine guns to the last, were pierced like a sieve by our machine-gun fire.

I got myself into a precarious position on the crest of this ridge. Just as I reached the summit, looking for good enemy targets, I saw a hostile tank excellently camouflaged behind a hedge in rear of me. I withdrew into my tank and immediately turned my turret towards the enemy. I noticed that he followed suit. As I started to fire my first round, my magazine jammed. This prevented me from firing one or two seconds ahead of the enemy. Just then my tank was hit somewhere in the rear, near the engine. We paid no attention to the hit and tried to get our gun back in action.

In a few seconds, another hit seriously wounded my radio operator in the back. He was unable to attend to

his duties, but the driver and myself continued working on the gun. We were nearly finished with this task when the third hit pierced the gasoline tank and started a fire. A big flame shot through the tank and came up to me in the turret.

We immediately dismounted. How we got out of the tank, none of us knew afterwards. We still had enough physical strength to drag our wounded comrade to cover in a small cut.

First Lieutenant Wollschlaeger, who had observed our predicament, immediately came to the rescue with his heavy tank, but it was too late to save my tank. Wollschlaeger's tank received a direct hit and he had to abandon it immediately to avoid being burned alive. In the meantime, many other German tanks had arrived at the scene, and immediately opened fire. Eventually, this French tank was set on fire.

We needed replenishment in ammunition and fuel. The ever-active reconnaissance planes discovered an important tank obstacle at Perwez, which was the initial protection for the Dyle Position beyond the obstacle. The Regimental Light Platoon was sent back to bring up the supplies. Meanwhile, we assembled in a valley, using our heavy tanks for security towards the enemy. The 3d Company, reinforced by the reconnaissance platoons, the pioneer platoon and a few messengers, all commanded by First Lieutenant Pfisters, attacked Jandrain in order to clear the city, and stop the enemy fire from that vicinity.

It was a difficult mission, but this group entered Jandrain, compelled this flank to cease firing, captured 400 men, four antitank guns, and five tanks. An enemy tank tried to escape, but it was driven into a ditch, and there was nothing else for the crew to do but to surrender.

Our ammunition and fuel trucks arrived in a short time. We took on ammunition and fuel and resumed the attack, but the enemy was completely defeated and offered no resistance. We advanced rapidly towards Ramilles with the 1st Battalion leading, followed by the 2nd Battalion. Such an achievement, after going through several battles, proved the excellence of our training and materiel.

En route to Ramilles, which we reached at sunset, we saw many French tanks burning and destroyed by the fire we delivered east of the water tower. We could see for ourselves where and how we hit our targets. We were proud of the direct hits, which proved that our marksmanship instruction was excellent.

The great tank-versus-tank battle on May 13 ended victoriously for us. We not only defeated the enemy, we penetrated deeply into his positions and forced him to retreat, destroying 53 of his tanks within two days.

The night was short, but the next day the tank regiment was ready for another attack. We received orders to penetrate the tank obstacle at Perwez, and attack the Dyle Position.

We advanced rapidly from Ramilles to the tank obstacle without a halt. Not a shot was fired. The tank obstacle was constructed of heavy iron, many kilometers in length, supplemented by barb-wire entanglements and deep ditches. As we approached the obstacle, the regimental pioneers blasted a path through which the tanks passed very slowly in single file.

Strange to say, all trenches and centers of resistance immediately beyond this obstacle were abandoned. The French abandoned their weapons and other materiel in these positions when they retreated.

Enemy bombers recognized this defile and bombarded us. We offered a good target, but even then, their bombs fell on open terrain.

The hostile bombers had hardly disappeared, when we received fire from tanks in a woods to our left. The 1st Battalion had to make an envelopment attack again, and our fast tanks succeeded in winning the upper hand. Before the French tanks recognized the situation and acted accordingly, Captain von Lauchert with his battalion attacked Malprouve and decided the issue in our favor. . . .

First Lieutenant Pikra, following in the second wave with his pioneers, was suddenly confronted by a small detachment of heavy French tanks halted in a defiladed position on our left flank. It was immediately clear to him that these enemy tanks were a tremendous threat to the rear of the heavily engaged tank battalion ahead. He had to decide what to do with his foot troops in the face of these heavy tanks.

He moved up his antitank guns which were captured in Poland, and with only a small amount of ammunition he opened fire on them at close range. He fired all but two rounds and set fire to four of the tanks. But the leader of this tank group still remained unharmed.

Lieutenant Pikra decided to resort to extreme measures. He crept forward and threw a three-pound charge of dynamite under the leader's tank, blowing it into the air.

In the meanwhile, heavy fighting was in progress everywhere, especially in the regiment on our left, but the enemy retreated when we reached Malprouve.

HEAVY FIGHTING AT THE DYLE POSITION

Towards noon, we attacked the heavily fortified Dyle Position. It was clear to the High Command that heavy resistance would be encountered here, because this line protected Namur. Our regiment attacked just north of Gembloux, between Baudeset and Ratentout, with the 2nd Battalion.

The 5th and 8th Companies attacked abreast, with the 5th Company on the right. The 6th Company followed in rear of both companies. Upon arrival at the main highway, the leading tanks encountered heavy fire. The 8th Company, commanded by First Lieutenant Berger, crossed the highway, and reached the railroad cut, which was a tank obstacle so deep that it could be crossed at only a very few places.

Also, the enemy had been entrenched in this cut for

days, hence we received heavy defensive fires which brought our attack to a standstill.

The 6th Company was ordered to move to the right to draw the attention of the enemy and deliver harassing fire to relieve the 8th Company which had suffered losses in its frontal attack. Our attack could not proceed without artillery support, and even the motorized artillery cannot follow the tanks at the rate they had been advancing.

The brigade commander ordered both tank regiments to assemble to the right and left of Baudeset and prepare to attack in the afternoon. The 6th Company, assisted by artillery fire on the enemy positions especially in Ernage, covered this withdrawal.

We hardly arrived at our rallying position in preparation for the afternoon attack when the French artillery fire began with a violence reminding us of World War I. The first shots were well placed.

Two direct hits were made on the place where the brigade and regimental staffs were resting under some trees. Only a miracle prevented a disaster. Then the enemy shifted their fire towards our tanks. Shell after shell fell among them, making several direct hits so that quite a few men were wounded and had to leave the field. But the fire of the enemy stopped as soon as our own artillery got into action.

Our preparations took so long that the attack was postponed until the next day.

The French artillery kept up its fire into the night so that we could not sleep. We dug "fox holes" and used our tanks as a roof. This gave us good protection from all sides and the artillery fire was not dangerous.

HELL AT THE RAILROAD CUT

The next morning we fell in for the attack. First our artillery prepared the way by firing at the enemy positions. Then our dive bombers deposited their "eggs."

Hell broke loose again at the railroad cut. Our artillery and dive bombers attacked the enemy (two Moroccan divisions) who was amply protected by steep slopes and the railroad cut. The fighting 1st Battalion was greeted with a hail of defensive fire. The 4th Company, especially, got into a volcano of fire, and lost some heavy tanks. . . . The regimental commander, Lieutenant Colonel Eberbach, was always at the front and his command tank was disabled by an artillery direct hit. The brigade commander, who was moving in front of his regiments, was wounded, and the entire crew had to abandon his tank.

The fighting continued. We reached the railroad again, but hostile resistance precluded further advance.

Lieutenant Georgi's tank was stopped by an obstacle. He and his crew, armed with pistols and hand grenades, dismounted and quickly destroyed an enemy antitank gun.

Next to him Sergeant Major Kapischke dismounted and took charge of some infantrymen. They broke into the enemy position and captured some prisoners. Just as it seemed that he had cleared a way for us to follow through the line with our tanks, he was shot through the head and the enemy immediately closed the gap.

At this time the 2nd Battalion was east of the highway waiting to be employed. The enemy, knowing what was at stake, delivered such a violent barrage that it was nearly impossible for adjacent assaulting units to aid the 1st Battalion. This fire also forced the 2nd Battalion, which was awaiting orders east of the highway, to change its position constantly.

Eventually, the attack had to be called off. This was a difficult decision, but it was excellently executed. Every tank left the battlefield. Tanks which could not move by their own power were towed off, even in spite of the effort of Moroccan sharpshooters, against crew members exposed while adjusting tow cables.

During the preceding 24 hours the enemy knew our rallying positions precisely, so we expected an exceptionally heavy French artillery bombardment during the coming night. Therefore, we withdrew to a new rallying position in a meadow behind a large forest near "Les Cinq Etoiles."

While we were servicing our tanks and replenishing our ammunition, a report arrived that the enemy was retreating out of the Dyle Position, after the heavy attacks of the last two days.

We immediately received the command: "Prepare to attack!" An advance guard detachment was formed to pursue the enemy. The sister regiment in our brigade was designated to take the lead. It awaited orders at Ratentout until the situation cleared up.

In order to conceal his retreat and impede our advance, the enemy employed his airplanes on a large scale. While awaiting orders to march, we witnessed some gigantic aerial battles and some brilliant victories by our pilots and antiaircraft weapons.

In the meanwhile, a report came in from our advance guard that the attack did not proceed as rapidly as we expected. The enemy resisted from sector to sector. As it was already evening, it was decided to renew the attack the following day.

The next morning our regiment crossed the railroad cut, the scene of heavy fighting on the preceding day. There, I could see for myself how exceedingly well the Moroccans had fortified their position and camouflaged their weapons.

We saw the famous Dyle Position which had been evacuated by the enemy after our two tremendous attacks. It appeared as if deserted by a defeated army which had left everything behind including tanks and weapons of every caliber. Needless to say, we were proud when the German Army reported: "Tank units forced the penetration of the important Dyle Position."

MOTOR VEHICLE IDENTIFICATION

By Colonel John N. Hauser, FA.

EDITORIAL NOTE: *The author herein calls attention to one of the lesser-known but important problems calling for remedial action. The views and suggestions given are those of the author, and do not necessarily reflect official policies*.

PREFACE

The latest instructions on the marking of motor vehicles appear in a change announced in circular No. 74, War Department, April 17, 1941. The new regulations would be welcomed with open arms by the Army, did they serve their purpose of providing vehicles with adequate identification. On the contrary, however, they are no improvement over the old requirements; neither old nor new result in satisfactory identification. That statement could possibly be uttered, more gracefully, as an opinion; but the cry for adequate identification still goes on, the efforts of units to provide identification still can be seen, all to such an extent as to force the positive statement that the means of identification do not identify.

THE PRESENT SYSTEM

To justify the above contention, let us examine the regulations.

How marked: "By means of a stencil, using blue-drab lusterless enamel. Capital letters will be three (3) inches in height. The height of small letters will be one-half that of capital letters."

It will be agreed that vehicles should be so painted and marked as to reduce visibility from the enemy, both on the ground and in the air. Whether this type of marking should go so far as to make identification difficult or invisible to ourselves is certainly a matter that deserves discussion. First of all, the color is bad. Next, the three-inch letter is what one finds on the poorer of the state license plates; the most easily-read license plates have letters three and one-half inches high. And it is obvious that letters one and one-half inches high can be read only if a vehicle is close, and is either standing still or moving very slowly.

Where marked: This part of the regulation provides for the placing of the "W" number. That number is to be painted under the hood, on registration plates, on top of the hood, and on the rear, the specific instructions varying with the type of vehicle. The location of the "W" number is of no consequence; the contention is raised here that it does not identify, except along property lines. It is a property identification, it is not a tactical or a traffic identification. To trace any particular "W" number on a vehicle it would be necessary to search all the property memorandum receipts of a command until that number was located.

Side, front and rear markings; style of marking: This part of the regulation permits identification of units, or purports to do so. The style of marking is by means of abbreviating the name of the unit. Where that abbreviation is short, as in the example "39th Inf. Co. F," identification is not especially difficult; where the abbreviation is long, as in the example "1st Armd. Regt. Co. A," identification is questionable. For all the abbreviations it must be remembered that the color is lusterless blue-drab, the capital letters are three inches high and the small letters one and one-half inches. Identification is possible to persons familiar with unit designations when vehicles are at a halt or moving slowly. Identification is impossible to anyone from the side if vehicles are moving fast, and from the rear only with difficulty.

THE NEED FOR A BETTER SYSTEM

The first and only requirement of a vehicle marking system is that it should identify the vehicle. This identification is a positive necessity tactically. The need is being met at present by commanders in many different ways. In one regiment observed, regimental unit vehicles were marked with a square yellow plate, vehicles of the first battalion with a red circle, those of the second battalion with a white diamond. In another regiment, tin clips of varying colors were fastened around bumpers. In other units, the regulations were frankly violated by the use of license plates. The tactical need for identification seems to call for no further discussion; those who question it, or are ignorant of the need, could not be convinced by any sort of argument. However, there is another need for identification which seems to have escaped military notice. That is the need for military vehicles to be marked for traffic identification while using the public roads along with civilian traffic. There are military as well as civilian offenders against the rules of the road; there are military as well as civilian hit-and-run drivers. To meet the need for such identification the logical solution is a license plate system, the plates to bear combinations of figures and letters similar to

state license plates. Description of such a system will be given later in this paper.

State authorities identify vehicles in traffic by means of *identification plates*. All people, military and civilian, are familiar with them. Color combinations should make for legibility; black letters and figures on a white background make one combination, and there are others. Symbols should be about three and one-half inches high. While a string of eight numerals is remembered with difficulty, a string of eight letters and numbers can be remembered, especially if broken into groups. Should, for tactical reasons, identification plates be concealed, what is more plentiful in the field than mud?

SUGGESTED REMEDY

The foregoing leads directly to the following identification plate system, which is recommended as a substitute for the faulty system now in effect. As for the "W" number, inasmuch as it is for property identification only, it can be retained provided it is placed in an inconspicuous position where it will not be mistaken for a traffic identification. As for the unit abbreviation on side doors or panels, that can stay on or come off; it serves no useful purpose, but it also does no harm. The matter then boils down to a front and rear identification plate, for traffic identification, both tactical and civilian. By way of repetition, the identification plate should be similar to the familiar license plate; it should be about fifteen inches long by five inches high, black symbols on white.

Next in order for discussion seem to be the symbols to be placed on the identification plates. As stated before, a combination of letters and figures, the total number not to exceed eight, divided into groups, is not difficult to remember. The combination will be, in effect, a code; if the code can be made more or less self-explanatory, the entire problem would seem to be solved. It is contended that the code to be described is practically self-explanatory. The markings for any particular unit can be taught a soldier of that unit in less than five minutes; the markings for other units will be learned, by virtue of sheer curiosity, within a week. The code has been tested against all units of the IV Army Corps and against those units of the Third Army with "trick" designations. It is believed the code will be effective for all units of the Army; should there by an occasional failure, there is still resort to arbitrary symbols.

The marking system calls for three groups on the identification plate, groups being separated by short dashes.

In the first group, there is the number of the unit, whether that be a corps, division, brigade, regiment, separate battalion or separate company. Except for the lower units, the marking is intended for the vehicles of the headquarters company, troop or battery, but the emphasis is placed on the headquarters designation.

Examples:

Unit	*Marking*
IV Army Corps Hq Co	IV
31st Division Hq Co	31
61st Brigade Hq Co	61
56th FA Brigade Hq Btry	56
124th Infantry	124
97th Observation Squadron	97
62d Signal Battalion	62
204th Mil. Police Co	204

In the second group will appear the description of the unit, by one, two, or at the most three letters. The only exception will be for the Army Corps, where the first group serves the same purpose as the first and second groups for other units. The symbols are generally self-explanatory, as inspection of the following will demonstrate.

For units of the IV Army Corps and their subordinate units, enough examples being given to cover all cases:

Unit	*Marking*
Infantry divisions	D
Air corps observation squadrons	AO
Cavalry regiments	C
Engineer combat units	E
Engineer topographic companies	ET
Field Artillery brigades	FB
Infantry brigades	IB
Field Artillery regiments	F
Separate FA battalions	FBN
Infantry regiments	I
Antitank battalions	AT
Military Police companies	MP
Medical regiments or separate battalions	M
Ordnance units	O
Quartermaster units, truck	Q
Signal units	S

Units of the Third Army, attached to the IV Army Corps for training supervision, have difficult designations to encode, and the following are offered to show the absence of duplication of letters and the self-explanatory nature of most of the symbols.

Unit	*Marking*
Chemical regiments	CML
Engineers, general service	EG
Engineers, light ponton	ELP
Evacuation hospitals	MEH
Surgical hospitals	MSH
General hospitals	MGH
Ordnance Co's, heavy maintenance	OHM
Ordnance Co's, ammunition	OA
Ordnance Co's, depot	OD
QM regiments, tank truck	QT
QM companies, car	GC
QM companies, depot	QD
QM battalions, bakery	QB
Signal companies, photo	SP
Radio intercept companies	SRI

The above examples are numerous enough to bear out the contention that the second group can reasonably adequately describe all types of units to be found in the field forces.

The third group is designed to identify a vehicle within its unit. The vast majority of cases will be found in the units having lettered subdivisions. Examples: Vehicle No. 12, Company B—Marking 12B.

For vehicles of regimental and battalion headquarters units, there will have to be resort to a block system. Examples: Vehicle No. 12, Hq Battery 35th FA—Marking: 12; Vehicle No. 12, Hq Btry, 1st Bn, 35th FA—Marking: 112; Vehicle No. 12, Hq Btry, 2d Bn, 35th FA—Marking: 212.

Service batteries may have to be grouped with headquarters batteries, the block 1-49 being reserved for headquarters batteries, and the block 51-99 for service batteries. The drawback here, however, is minor, as members of the units concerned will know the applicable block system; for strangers, the first and second group characters furnish adequate information in the vast majority of cases.

Assembling the three groups, we find our identification plates will look like this (examples):

Vehicle No. 2, Hq Co, IV Army Corps	IV-2
Vehicle No. 2, Hq Co, 31st Div.	31-D-2
Vehicle No. 2, 118th Obsn. Sq.	118-AO-2
Vehicle No. 2, Co A, 20th Engr	20-E-2A
Vehicle No. 25, Co A, 29th Inf	29-I-25A
Vehicle No. 15, Btry A, 20th FA Bn	20-FBN-15A
Vehicle No. 15, 204th MP Co	204-MP-15
Vehicle No. 15, Co A, 62d Sig Bn	62-S-15
Vehicle No. 15, 22d QM Co (car)	22-QC-15

The foregoing applies to the overwhelming majority of tactical units. Certain exceptions to and modifications of the system will have to be made. Vehicles of field army headquarters could be marked as in this example: Vehicle No. 2, Hq Co, Third Army: 3d ARMY-2. GHQ vehicles could be marked thus: GHQ-10. Trailers could take the same plate system as vehicles of their unit, being given serial numbers according to a block system. Motorcycle plates of necessity would have to be smaller. Station complement vehicles could be indicated by plates with the station abbreviation in a first group, and vehicle serial numbers, in a block system, in a second group. Examples: Vehicle No. 245, Camp Blanding: BL-245; No. 245, Fort Bragg: BR-245; No. 245, Camp Livingston: LIV-245.

To put such a system into effect, the following change to par. 6 *d* "Marking," AR 850-5 is recommended to read in substance as follows:

6 *d*. Marking.

(1) U. S. registration symbols and numbers.

* * * * *

(b) *How and where marked*. Marking will be effected, by means of a stencil, under the hood, on the right side, in center of the upper part.

(2) *Side markings*. These markings are required only on vehicles assigned to units.

(a) *Style of marking*. The form of marking will be on the side as shown in the table below, to maintain uniformity.

Description	*Example*
The numerical designation of regimental unit (or other unit) in Arabic numerals followed by the component of the unit.	39th Inf Co F 105th QM Rgt Co A 1st Armd Regt Co A

(b) *How marked*. The side markings will be done by means of a stencil, using blue-drab lusterless enamel. Capital letters will be at least three (3) inches in height, small letters in proportion.

(3) *Front and rear markings*.

(a) This marking will be by means of a plate, similar to state license plates, with black characters on a white background, characters to be three and one-half (3½) inches high, arranged in groups, groups being separated by short dashes.

(b) Army Corps and Army commanders are authorized to prescribe the marking of these plates in any manner consistent with the following general system.

1. First group: The numerical designation of the unit to which the vehicle is assigned. In the case of units having a name, but no numerical designation, such as headquarters units, the numerical designation of their parent unit.

2. Second group: One, two or three letters describing the unit as to arm, service, function within a service, or tactical unit subdivision.

3. Third group: A number, or number and letter combination, indicating the serial number of the vehicle within a subordinate unit. The letter generally to indicate assignment to a lettered company, troop or battery; numbers for vehicles assigned to non-lettered units to be arranged in a block system.

(c) Station commanders are authorized to prescribe markings on plates in a generally similar manner, there being two groups of characters, the first identifying the station, the second being the serial number of the vehicle.

(4) *Markings, recruiting service vehicles*. No change.

The foregoing proposed system is by no means the only solution of the problem. However, it is a solution which, accomplishing identification, has the following characteristics:

a. It conforms to civilian practice as to means of identification.

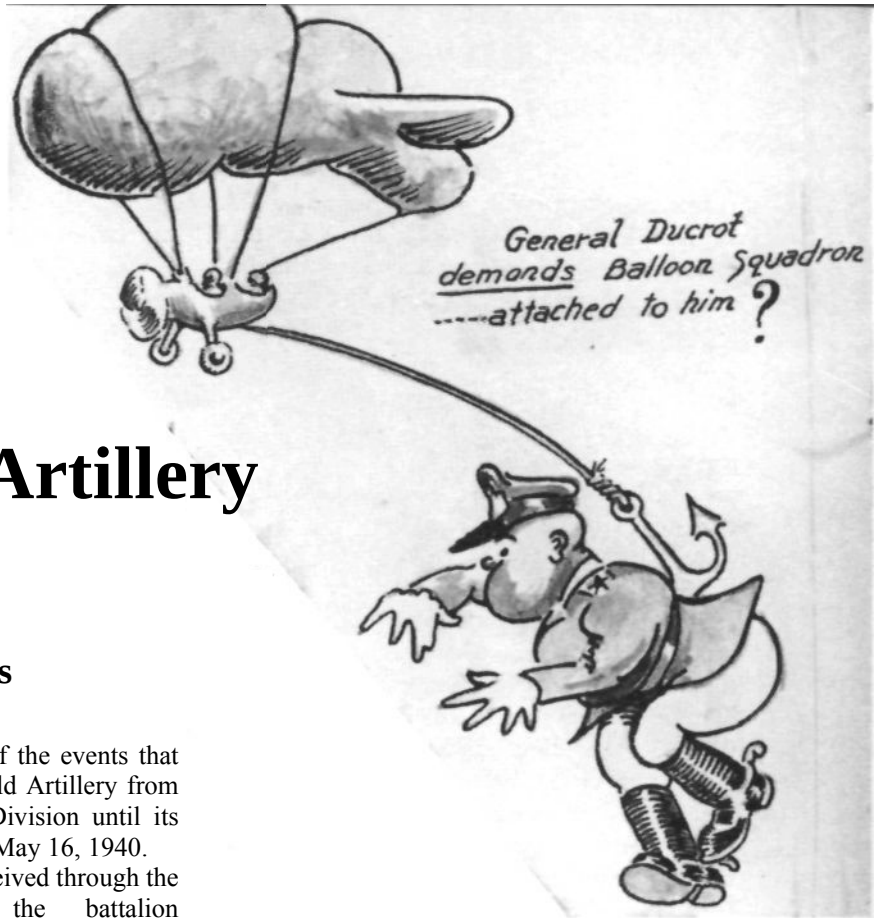
b. It is a practically self-explanatory code.

c. It provides uniformity for all military vehicles, not for the sake of uniformity, but to be of value to all persons, in contrast to the present non-regulation marking systems which are translatable by a limited number of individuals, usually only the members of the command concerned.

d. It can, if adopted, remove uncertainty, confusion and the temptation to violate a regulation which does not accomplish its purpose.

"Any resemblance to living characters is purely coincidental"

Editorial note: This account is a paraphrase of a report on last year's maneuvers. Readers may compare it with results obtained this year, and possibly determine if they are making progress.



The Infantry-Artillery Team

By Marshall Sachs

The following is a running narrative of the events that took place in the Nth Battalion 999th Field Artillery from the time of its attachment to the 25th Division until its return to regimental control on Thursday, May 16, 1940.

In compliance with a warning order received through the commanding officer 999th FA, the battalion reconnaissance officer was sent out from the battalion assembly area with a mission of reconnoitering the routes from Simpson southeast across country to Hinestown. He was ordered to ascertain definitely the territory held by the Blues and to get positive information as to bridges that would safely support the prime movers of our battalion.

He reported back to me at 5:45 PM May 14, after being kept a considerable time at the division CP. He had learned the following at division:

1. Bn CO and Ln O report to 25th Div CP either at Hinestown or Pitkin.
2. Set up a radio at present bivouac and with a predetermined wave length operate with 25th Div.

3. 1st Bn to make a continuous march from present position, and be in position at Pitkin at daylight.
4. General Ducrot *demands* the balloon squadron, and directs that steps be taken to have it attached to him.
5. Route from Hinestown to Pitkin to be via Union Hill and Highway 113.
6. Reconnaissance to be completed before dark, and routes and time of marching to be reported to 25th Division CP.
7. The 1st Bn to be attached to *Combat Team No. 33*.

I directed my executive to march, at 11 PM, via Flatwoods-Boyce-Hinestown-Union Hill to the eastern outskirts of Pitkin, 70 miles distant. I told him that I would meet him there with markers, and guide him to position. The route was marked on his map and on those of all battery commanders.

He transmitted the "request" for the balloon through channels.

At 6 PM I departed with my liaison officer, his detail, and radio. We arrived at the division CP at 7:23, and I reported to the Artillery Section of the Division. The corps plan of attack (a double envelopment) was explained to me. The 25th Division was to make its main effort northwest of Pitkin to Leesville. I was told to go either *here* or *here* or *here*, each *here* being about ten thousand yards apart. I insisted on more definite information, it being already dark and I had to reconnoiter areas and be ready to shoot at 4:05 AM. I then notified division as to the route of march of my battalion, completed all arrangements as to Class I supplies, and

requested that a credit of 1170 rounds of HE be set up at the Ammunition DP. Finally the Artillery Section said that I would be attached to an artillery groupment under command of the CO 63d FA.

With my Ln O I reported to the CP of the 63d FA. They were surprised to hear that my battalion was attached to them. From their reconnaissance officer I received valuable information as to possible positions in the vicinity of Pitkin. Their movement was planned to precede that of our battalion which would reach Hinestown at about 2:20 AM.

At 10:30 PM an order was received from the 25th Division, detaching my battalion from the 63d FA and attaching it to the 98th FA, which would form a subgroupment under the 63d FA groupment. I reported to the 98th FA and gave them the same information I had been spreading around for the last three hours. The 98th FA made immediate preparations to move to the vicinity of Pitkin, and I was directed to go with their regimental commander and his party. Just before we left, a telephone message came in from division directing that my battalion be held in Hinestown until the 141st Infantry had cleared.

I sent my liaison officer to Hinestown to intercept the executive and give him the order.

The division plan called for the 98th FA less 1st Battalion plus my battalion to be in direct support of the 141st Inf. With the CO of the 98th I arrived in Pitkin and reconnoitered for positions. Just as the reconnaissance was completed, I received an order that the plan was changed. I was to go to another area six miles away and reconnoiter for a position there.

The battalion was due in Pitkin very shortly. I made the new reconnaissance in the rain and prepared to lead the battalion to position. Just as the battalion arrived, somewhat late, an order was received to move forward to reconnoiter a new position. But before our parties could move out another order was received to move the battalion up the road to the entrance to the Kisatchie National Forest. At that point a regimental staff officer directed us to turn west and continue marching; the 141st Infantry had advanced to the west and we were out of range of the enemy.

Two miles farther on the battalion was halted in column, 100 yards between vehicles, and battalion and battery commanders were directed to report to the CO 98th FA, two miles ahead. He directed that we feed breakfast and report back to him in one hour.

This was done. He then ordered the battalion into position, stated that the general direction of fire was Leesville, and told us that we were 3500 yards behind the infantry. This was the first definite information we had had as to the location of our infantry. Rear echelons were left under cover, the battalion was put into position with special emphasis on being able to cover routes of approach which might be used by hostile tanks.

The battalion liaison officer and radio went forward to join a battalion of the 141st Infantry. Fire missions were received from him and from the 98th FA.

Water and gasoline trucks were sent to Hinestown. Ration trucks and the Combat Train were dispatched at 1:00 PM. Ration trucks had to go seventy miles to the old bivouac area. The Combat Train commander found that ammunition credit at Hinestown had been cancelled. He went to division headquarters, where he finally received another credit and got the ammunition. Before he returned, the battalion was ordered detached from the 98th FA and directed to report to the CO 33d Combat Team near Craven. The battalion moved out at 3:45 and reported as ordered. The CO 33d Combat Team directed that the battalion be placed in a concealed assembly area one half mile east of his CP and be prepared to move out with the 33d Infantry, 1 battalion 98th FA, and 1 company of the 54th Antitank Battalion for a blitzkrieg dash into Texas. I sent a staff officer back to intercept the supply vehicles and have them follow us over the route designated. No gas was available at the new division DP, and no information. One of my batteries had to be left behind with orders to follow if and when it got gas.

At 6:00 PM I received an order to move out behind the Antitank Battalion. At that moment they were already on the road and going past our bivouac. In five minutes I got the battalion on the road in its proper place in column.

But the route had been changed.

Much of the way was on dusty roads. The speed of the column varied from four to forty miles per hour. We could rarely see the vehicle ahead of us on account of the dust. At 11:30 PM the column was halted short of Merryville by a control officer who ruled that a bridge over the Sabine had been blown up. But he then told me that the problem was over. I was to turn the battalion around and go to a bivouac area near Rose Pine. He said that division would send me definite release orders in the morning.

At this time, tanks, AAA, and other elements had joined the rear of the column. Some did left about by vehicle, some did countermarch. We executed countermarch, but with some difficulty managed to hold our share of the road and keep the battalion together.

In the morning I submitted my ration return and gas requirements to the CO 33d Combat Team. He said that I was not his problem any more.

By sending my executive to my own regimental headquarters I got the necessary orders.

Lessons learned

1. If the battalion gets water, gas, and food, the battalion commander has to make his own arrangements. The attachment to three different units within eighteen hours precludes getting action in any other way, owing to the normal time lag between requisition and consumption.
2. The infantry are more interested in our fire power than our supply.
3. The unusual will be normal.

THE GENERAL AIRCRAFT CORPORATION'S "SKYFARER"

Will open new horizons of flight security and progress. Newest aircraft to be licensed by the Civil Aeronautics Administration. Remarkable new flight principles completely eliminates the rudder. Utter simplicity of control results. The General "Skyfarer" is incapable of spinning, will not slip or skid, and steers on the ground like an automobile. A tri-cycle landing gear makes ground looping improbable. The airplane will land or take off cross wind. Specially designed flaps give positive glide path control.

Fly It Away

An Artilleryman Sprouts Pin-feathers

The Battalion Commander reached a crossroad about eleventeen miles from Nowhere, Louisiana. Visibility was, as ever, between 200 and 250 yards in two directions, less in any others. A dirt road enticed him onward, but he wanted a "look see" to the front. He thought it was about 4 miles further, but locations in Louisiana are deceiving.

He told his Executive to unlimber the Skeet. Six soldiers, two on each wheel, lifted it across the ditch and put the tricycle in the field. (It weighs 850 pounds empty—including the wing). Out of the same 1½-ton truck that towed it, the right and left wing were brought and quickly attached to the fuselage. The Reconnaissance Officer warmed up the motor, the Battalion Commander sat in the seat alongside him, and a Radioman put an SCR 194 in back of them.

Taxiing to one end of the "L" shaped field, the plane picked up momentum; by the time it reached the corner of the "L" the RO had it throttled down to approximately 30 miles an hour. Here it turned 70 degrees down the other leg and took off—at 45 miles an hour.*

All the above—from the decision to the take-off—consumed ten minutes.

This account is not for future narrators. It is entirely possible today. At least it was last week.

At the invitation of an Army aviator who was still incredulous after having flown it, the writer went out to the Hoover airport in Washington, got in the "Skyfarer," was taken on a 10-minute explananatory circle of the field, shifted over to the pilot's seat, and one hour later had taken off and landed ten times. The last eight take-offs and five out of the last seven landings, plus all flying in-between for the last eight circlings, were entirely "unassisted." You too can sit down at the piano—and amaze your friends and increase the efficiency of the Army.

Seriously, any youngster who drives a car can fly the "Skyfarer." It actually has less controls than an automobile and the artilleryman writing this thinks that it would take a determined fool to get into trouble in it.

*It actually gets off the ground in much less than any normal field allows, but to make the problem difficult, and to show the maneuverability the steering wheel on the tricycle gives it, it was assumed that the "L" field was hedged in with trees. Thus using one leg for initial speed and the other for take-off and gaining altitude is entirely practicable in this ship. Don't try it in a normal plane with only 10 hours flying to your credit.

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

The Civil Aeronautics Authority has pronounced it as being "characteristically incapable of spinning."

I tried to stall and spin it. Instead it "mushes" in, i.e., glides down on a straight path, nose high. I made innumerable turns and banks. I understand that one of the most difficult things to teach a student pilot is to execute turns without slipping, or to bank properly with any desired angle of turn. The "Skyfarer" inherently banks itself properly for any turn. The pilot merely turns his steering wheel at whatever angle he desires to turn, and it does the rest.

It actually has no movable rudder, and the only foot pedal is a brake that works, I might add, only when the wheels are on the ground.

The ship is a new development, and is the result of a design by Otto C. Koppen, Professor of Aeronautical Engineering at Massachusetts Institute of Technology, and four years of experimental work by him and Charles W. Sutherland, the President of General Aircraft Corporation, the maker of the plane. Mr. Sutherland offers to make any normal person solo a "Skyfarer" after two hours of instruction. Had Civil Aeronautics Authority regulations not required 8 hours of dual before anyone can solo a licensed plane, he would have let me do so after a little over one hour. He further offers to produce perfectly competent pilots for normal artillery uses in one week of training. I feel he can make good on this without difficulty.

Aviators will—and do—scoff and murmur about "Fools rush in, etc.," but they have never flown a plane without a movable rudder. I have.

The controls make an automobile seem complicated. There is a steering wheel in front of you. It steers, both in the air and on the ground, just like any car. The front wheel of the tricycle turns exactly like your automobile front wheel. In the air, turning it banks the ship, and because of its design, the plane turns without slipping or skidding in the degree indicated by your angle of bank.

The only novel feature about your "Skyfarer" steering wheel is that to go up you pull it toward you and to go down you push it away from you. And that, sir, is flying.

Your dashboard has a "speedometer" that tells your air speed, an altimeter that gives your height, an oil pressure gauge, and a hand-operated throttle. If you want to get into the professional stage, you can add a compass, an oil temperature gauge and a tachometer (to tell you how fast your engine is turning over).

I have the same impression about the ship that I'm sure the Wright brothers had when they first got off the ground. This is a major improvement in flying technique, of the same nature, but of a tremendously greater degree, than the automatic spark, automatic choke, thermostatic control of cooling, etc., were to our present automobile engine.

I never forget that when Army automobiles were still in short pants, only officers were deemed competent to drive them. I trust no one judges any officer or soldier by the IQ of the average driver today. The same thing is, I believe, true of the plane. It took a national emergency to make the Air Corps—pardon me, the Air Force—take down its hair and let anyone beside an officer pilot one of their steeds. Now, I feel, this development opens the door to equipping all units of all branches with planes for primary tactical and service uses.

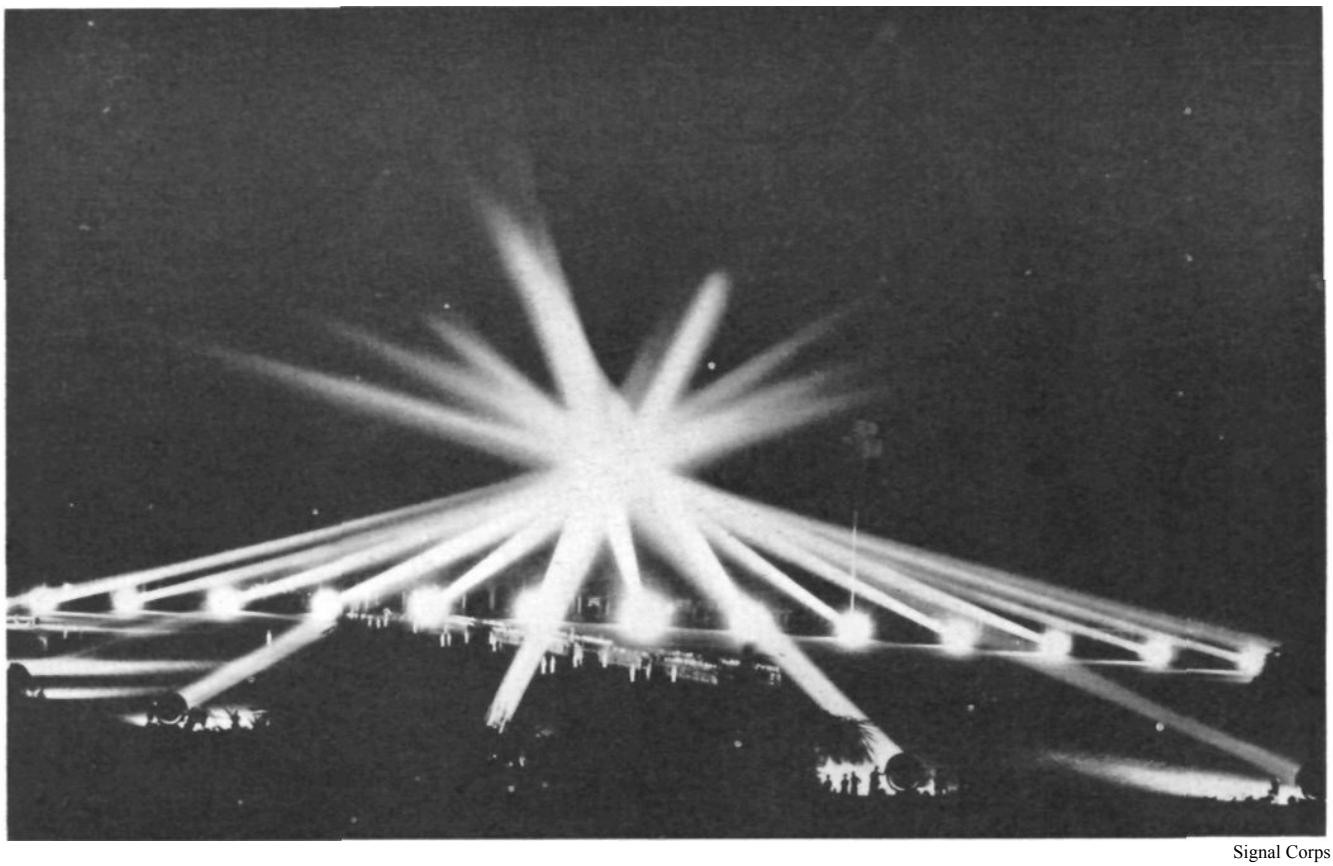
Messenger transport, command liaison, emergency express service for small automotive repair parts, medical necessities, etc., all could use such a plane. And, exactly like trucks and cars now issued to the services, the Quartermaster (or Air Force, if we need their specialized procurement, which I doubt) would procure them and the branches would fly, service and maintain them. The Lycoming 75-HP motor with which it is now equipped is not as complicated as a heavy truck, tractor, or tank engine. The fuselage and wings are simple to repair and to maintain. I know my battery mechanic could do it.

Great rantings will be heard by the fogies who will claim it will be just like shooting clay pigeons to knock enterprising artillerymen down out of their roosts. It may be so. But that's where we hope our Air Force will shine. If only some of the planes topside have red white and blue on their wings, I'll take my chances on pulling in my ears quickly and hiding behind or under the nearest bush when an enemy ship heaves into view. It, belonging to another Air Force, will probably have a 2,000-HP engine in it and be "characteristically incapable" of getting into the briar patches I can duck into. And when I say "duck," I mean duck. The Skyfarer flys itself into a hole at any speed from 45 to 90 mph., and with its tricycle and brakes, can wiggle and turn like an eel, doesn't ground loop in anything less than a hole that would overturn a car, and stops, under optimum landing conditions, in 200 feet.

I do not feel that I have overstated the case. As a battery commander, I would give an arm for about 2 minutes of observation from a height of three or four hundred feet. Properly camouflaged light planes could do this and hide in a hurry. Their use will, it is true, disclose activity and give away some information to the enemy. If we pick the same field our battery is in to use as a landing field, we *should* get shelled.

Maintenance looks simple. The Skyfarer holds 20 gallons of gasoline and gets 20 miles to the gallon. It flies at any speed from 45 miles per hour (with flaps down) to 100 miles per hour. It is 22 feet long, has a 31½-foot wing spread, and is 8½ feet high. It will climb 550 feet per minute.

I would like one in my Table of Basic Allowances. Let's combine "Fly it away" to "On the way" and give the artillery something we've been praving for these many years—aerial observation when and where it's needed.



Signal Corps

WITH THE OTHER ARMS AND SERVICES

Editor's note: **Here is the fifth of a new series, each of which will describe one of the other arms and services. The complete series, together with articles on the War Department, General Headquarters, etc., will constitute a valuable hand book on the Army as a whole; so we suggest that readers preserve each issue of the *Journal* containing this series.**

V—Coast Artillery

By Captain Arthur Symons. CAC

Some of the younger members of both branches may find it hard to believe, but within the time of service of officers still on the active list both the Field Artillery and the Coast Artillery Corps were almost indistinguishable components of the same branch—the United States Artillery. The separate artillery branches were not constituted until July 1, 1908; 104 years earlier the Engineers were members of the same family.

General Orders No. 24, dated February 2, 1907, promulgated the Act of Congress creating the two branches, but it could not nullify the common heritage of the artillery. Knox, Hunt, Tidball, Rodman and the rest of the American disciples of Saint Barbara belong to both the Field Artillery and the Coast Artillery. Here are two branches of the Army which should feel very close to each other.

At the time of the separation the Coast Artillery kept Fort Monroe; along with Fort Monroe came the Artillery School; and along with the Artillery School came the *Journal of the United States Artillery*. Fort Monroe is still Fort Monroe, a very pleasant place for a tour of duty; the Artillery School is now the Coast Artillery School, a thriving, effective institution of military learning; and the *Journal of the United States Artillery* has blossomed forth into today's *Coast Artillery Journal*.

In order to understand the Coast Artillery Corps of 1941, perhaps the first thing necessary is to learn not to take the word *Coast* too seriously. Antiaircraft guns, fixed coast defense guns, railway guns, tractor- and

Twelve-inch mortar battery in action

truck-drawn guns of many calibers; submarine mines, barrage balloons, and searchlights make up the armament of the CAC. With the exception of the fixed guns and the submarine mines, all Coast Artillery armament can, and often does, prove very useful far from the tang of salt air. During the 1917-1918 fracas the CAC performed quite a chore in France with heavy field guns, railway artillery and antiaircraft materiel, to say nothing of the vicious little trench mortars.

In fact, versatility is the outstanding characteristic of the Coast Artillery Corps. The Corps is prepared to engage the enemy in the air, on the ground, and on the sea. Even submarines, under the surface of the sea, find the CAC prepared to dispute control of harbor waters. This same versatility and diversity of materiel keeps the Coast Artilleryman on his toes, realizing he has a lot to learn—and learning it. The new emphasis on using antiaircraft materiel for antitank defense, as well as barrage balloon functions, have many Coast Artillerymen studying nights at the present time.

In seacoast guns, the CAC is provided with calibers of 3-inch, 6-inch, 155-mm. 8-inch, 10-inch, 12-inch, 14-inch and 16-inch. Multiply this by types of mount (barbette, disappearing, mobile, railway, turret, etc.), and then by type of ordnance, as gun, mortar or howitzer, and we have quite a start toward a multiplicity of weapons. Add mines and searchlights, and .30 caliber rifles, and pistols, and ground-defense machine guns, and we have some impressive figures.

In antiaircraft work, there are 105-mm. and 3-inch fixed mounts, 3-inch and 90-mm. mobile mounts among the heavier calibers; in the lighter categories there are 37-mm. and 40-mm. automatic cannon, .30 and .50 caliber machine guns, and rifles and pistols. Searchlights are important here, too. The barrage balloon battalions have only their balloons, machine guns, rifles and pistols

as armament, but the remainder of their materiel will take a lot of knowing.

It takes a versatile man to keep up with this type of variety in materiel, as well as its tactical uses.

The present Chief of Coast Artillery is Major General Joseph A. Green. The Office of the Chief of Coast Artillery is divided into the following sections: Executive, Intelligence, Personnel, Planning, Organization and Training, Fiscal, and Materiel. In addition to these sections, all in Washington, there are functioning under the Chief of Coast Artillery: The Coast Artillery School, the Coast Artillery Board, and the Submarine Mine Depot, all at Fort Monroe; and the Barrage Balloon Training Center, temporarily at Camp Davis.

The organization of a Harbor Defense is one Coast Artillery peculiarity that confuses many soldiers of other branches. Like most army organizational set-ups, it is logical and easy to understand—once you understand it.

Let us take a typical Harbor Defense organization—the mythical Harbor Defenses of Oldport. (See Figure 1.) At Fort Fixed, there are emplaced three permanent batteries: 10-inch, 12-inch, and 16-inch. On the beach to the south of Fort Fixed are emplaced two 155-mm. tractor-drawn gun batteries. For purposes of tactical control, the batteries at Fort Fixed have been combined into a group, and the mobile batteries on the beach have also been organized into a group. These groups correspond roughly to a battalion—the groupment, consisting of Groups 1 and 2, corresponds roughly to a regiment.

Thus, we have groups composed of weapons of nearly related functions—Group 1 will prevent enemy landings and keep smaller craft, such as destroyers and transports, away from the beach; Group 2, with its heavy guns, will engage the enemy fleet's heavier units. The Fishtown Groupment will coordinate the fires of the two groups. On the other side of the harbor entrance we have another groupment composed of a group of 155's and a group of railway guns.

The mine group in this example consists of the mine battery and three gun batteries. The fixed 6-inch guns and the mobile 155-mm. guns are present primarily to prevent the enemy from sweeping the mine field at the harbor entrance, but they will be used, of course, against any of the enemy's lighter units that may come within range.

What of the regimental organization? In the Harbor Defenses of Oldport we have a 155-mm. regiment, a Harbor Defense Regiment (Type B), and a Railway Battalion. The flexibility of the harbor defense command system makes it possible to use each battery in the proper manner to take advantage of the tactical situation without losing the element of control, and without requiring additional officers or command and administrative personnel. The battalion-regiment organization is temporarily shelved in favor of the group-groupment organization.

To aid in supply and administration, there are fort

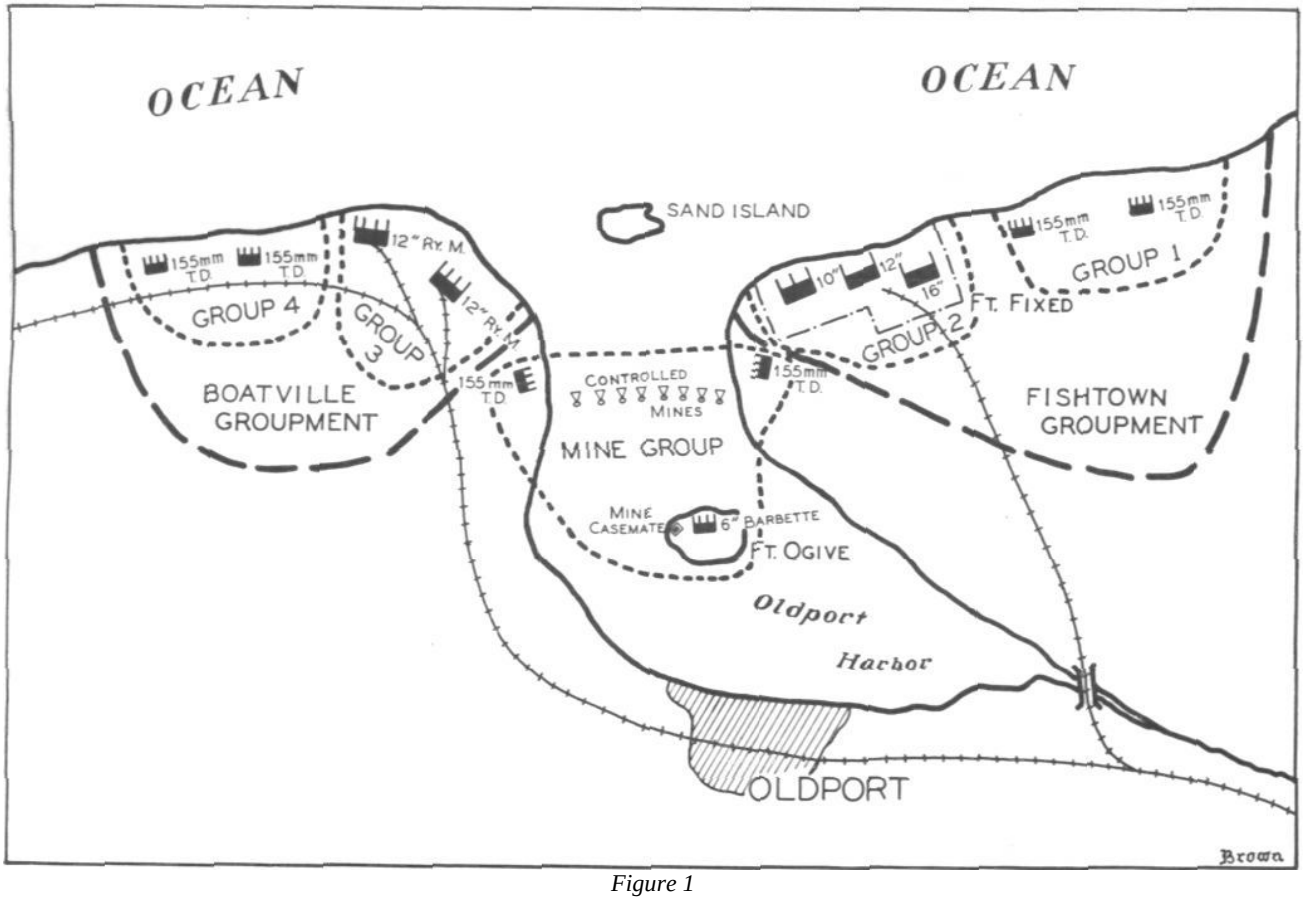
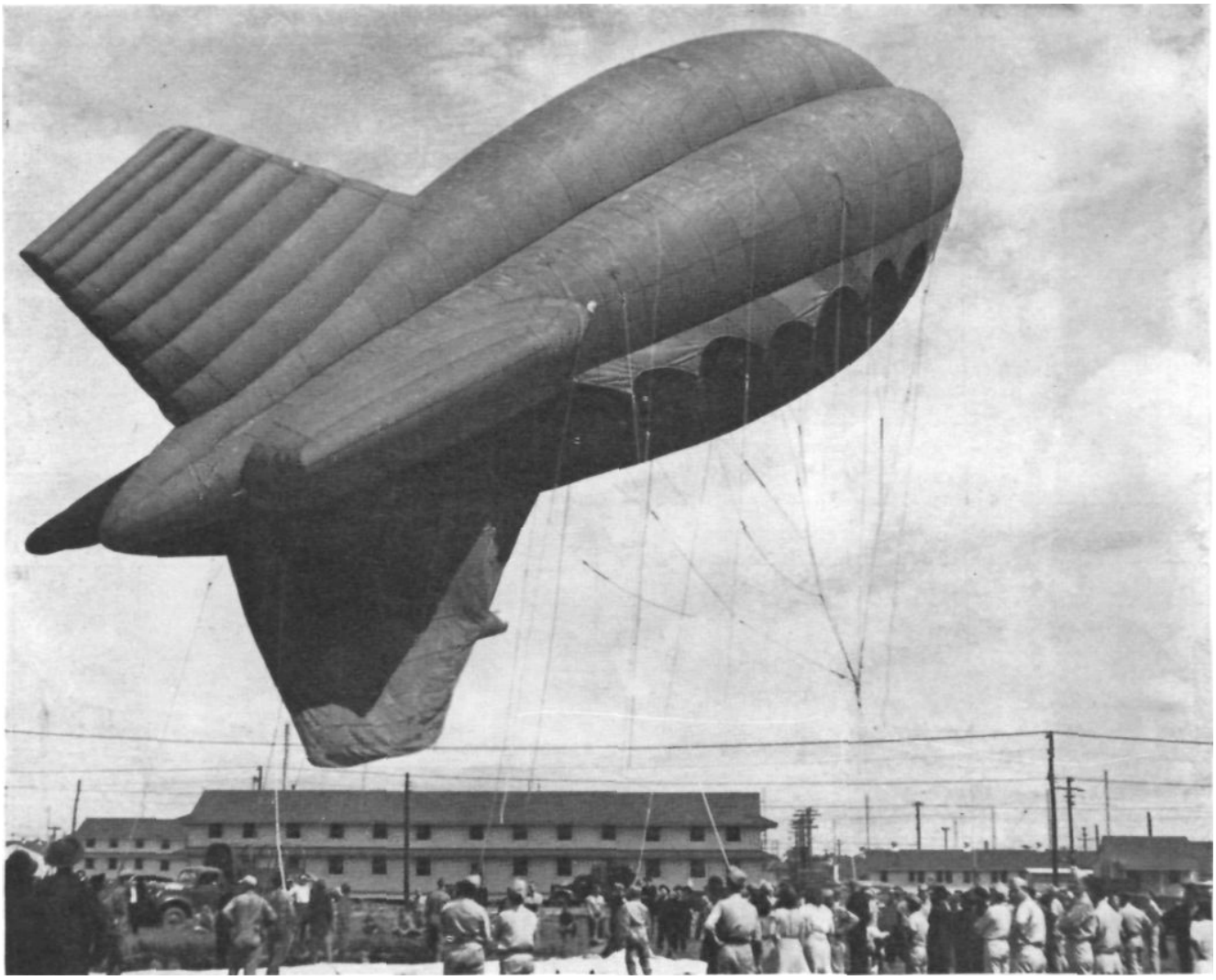


Figure 1

organizations, which closely parallel those of separate, though nearby, posts.

As a matter of actual practice, in the situation outlined there probably would not be a groupment organization, since this organization is of value primarly in the larger harbor defenses, covering two or more widely separated harbor entrances. Also, there probably would be several antiaircraft groups present. Searchlight installations are not shown.

It might be interesting to note the difference in organization of the 155-mm. regiments of the two branches. The Coast Artillery regiment includes a searchlight battery and three battalions of two batteries each. It is set up obviously for harbor defense operations; the use of searchlights on the battlefield would be rare. In harbor defense work, searchlights are most important. The enemy is quite mobile, and is more likely to appear in the field of fire during darkness than in daylight.



The Coast Artillery Corps first barrage balloon ascension: June 26, 1941

In the Coast Artillery, railway and 155-mm. guns are provided primarily for coast defense functions. They are used to amplify the effect of existing fixed defenses, and in places where fixed defenses do not exist. However, as World War experience brought out, both these types of artillery may be quite valuable in land warfare, and the Coast Artilleryman in a mobile regiment may expect to do his share of counterbattery and other land firing. His chances of standing shoulder-to-shoulder with the Field Artillery are rather good.

The Coast Artillery's antiaircraft organizations probably will be the most familiar to Field Artillerymen, since AAA will be used to the limit of its availability both in rear areas and forward areas. We will omit consideration of the fixed AA defenses in Harbor Defenses with the assurance that they will be present.

There are two types of mobile AA regiments—the mobile and the so-called semi-mobile regiments. The mobile regiment has a gun battalion manning fifteen searchlights and twelve 3-inch or 90-mm. AA guns, as

well as twelve .50 caliber AA machine guns for local defense against low-flying aircraft, and an automatic weapons battalion consisting of one battery of twelve .50 caliber machine guns and three batteries of 37-mm. AA cannon. The semi-mobile regiment has *two* of the gun battalions and one four-battery 37-mm. battalion.

The 3-inch and the 90-mm. guns are used to combat aircraft at high altitudes. The machine guns and automatic cannon are designed to bring down low-flying planes, especially dive-bombers and the type formerly designated as attack planes. Modern airplane armor and self-sealing gasoline tanks have limited the usefulness of machine-gun fire against aircraft, but the rapid-firing AA cannon, with supersensitive fuzes, have more than taken their place. It is hard to conceive that more than one hit from a 37 would be necessary to bring down a plane. With the larger calibers direct hits would be the exception, but the danger area of the exploding projectiles is such that a direct hit is not necessary. The danger space is shaped much like an inverted toadstool.

The high muzzle velocities and highly-developed fire-control systems of AAA make these weapons especially valuable in antitank defense. The need for AA will usually be so great that antitank work will be a secondary assignment, but it is one which AAA units must be prepared for in forward area positions.

Most of us are more or less familiar with the use of AAA in rear-area situations to protect cities, industrial plants, and other important installations, so we will not touch on it in this article.

The Army Corps includes an organic AA regiment, the functions of which are to protect front line units, especially those making the main effort; reserves and their routes forward, including their probable zone of action; artillery areas; command posts; and supply establishments and train bivouacs. Where the AAA present is not sufficient to protect all these installations and units, priority must be decided. On the march, the AA regiment is set up to protect columns, paying special attention to bridges, defiles, and other terrain features that are especially dangerous to marching columns. The AAA usually advances by bounds, taking up successive positions at critical points on the march.

The newly-organized barrage balloon battalions have their greatest value in protecting small but critical areas, such as power stations, dock areas, dams, and other important installations of small area, against low-altitude bombardment. If an enemy pilot knows that a balloon barrage protects the vital power plant he is to bomb, he will either (1) fly too high (above the barrage) for accurate bombing, (2) invade the area with all the probability of being brought down, or (3) ignore the target entirely. European experience seems to indicate that the first and third courses are being followed—balloon-protected targets have not been hit often, and few planes are being brought down by barrage balloons, at least as far as public knowledge is concerned.

Further proof of the versatility of the CAC, if it is required, is the Corps' "navy" of mine planters and smaller boats, and its Underwater Ranging batteries which are poison to submarines.

Seacoast gun—12-inch barbette mount

Awards of Field Artillery Medal

The Field Artillery Association Medal is awarded annually to one member of the First Year Advanced Course in Senior ROTC units of Field Artillery. Established in 1938, the awards are made to men outstanding not only in soldierly characteristics, but also in the academic, cultural and athletic phases of university activity. Some of the winners for 1941 are listed here, and others will be noted in future issues. THE FIELD ARTILLERY JOURNAL congratulates them all, and takes pleasure in presenting them to the members of the Association.

1. Cadet First Sergeant Raymond H. Fleming, Jr., New Orleans, La., Louisiana State University. 2. Cadet Master Sergeant Donald S. Walt, Fort Collins, Colo., Colorado State College; economics; Scabbard and Blade, football, wrestling. 3. Cadet Master Sergeant Lloyd E. Jones, Jr., University of Missouri. 4. Cadet Sergeant Thomas Lee Higginson, New York City, Harvard University; history and literature; polo. 5. Cadet Lieutenant Louie N. Rodgers, Luxora, Ark., Arkansas State College; Pi Gamma Mu, Pi Omega Pi, Scabbard and Blade; Student of Honor, 1939-40. 6. Cadet George Edmund Willis, Westfield, N. J., Michigan State College; engineering, fencing, track. 7. Cadet Corporal Austin Devine, Fort Knox, Ky., Yale University; Sheffield Scientific School; editor, Yale Scientific Magazine. 8. Cadet Thomas R. Wheeler, Whiting, Ind., University of Illinois; Phi Eta Sigma, Scabbard and Blade; wrestling, rifle team. 9. Cadet Colonel William G. Meese, Peru, Ind., Purdue University; electrical engineering; Tau Beta Pi, Eta Kappa Nu, Scabbard and Blade. 10. Cadet Sergeant Francis J. Sheridan, Duquesne University. 11. Cadet James M. Cake, Jr., Norfolk, Va., Cornell University; agricultural economics. 12. Cadet Lieutenant Jack Gordon Scharff, Memphis, Tenn., Culver Military Academy; wrestling, boxing.

ALL ROTC CADETS ARE ELIGIBLE TO BECOME ASSOCIATE MEMBERS OF THE FIELD ARTILLERY ASSOCIATION

WITH THE ARMIES OF FOREIGN NATIONS

Training Drivers of a Motorized Battery

Lt. Col. Elster, in *Artilleristische Rundschau*, June 1941

When Germany began to motorize part of her artillery, the experience with horse-drawn batteries, which had been gained over a long period of time, was taken as a basis. With regard to the organization of the batteries, in particular, everything remained almost as before. Battery headquarters, signal detachments, two ammunition sections and trains were retained as they formerly had existed in the horse-drawn batteries. The underlying principle was to have everything available for action at the right place as quickly as possible.

The motorized battery, with a maximum speed of nearly 50 kilometers an hour, offers the possibility of being in constant readiness to open fire under all tactical conditions, even from the rear of the marching column. By developing and introducing our tracklaying prime movers the artilleryman was given an instrument which enables him to overcome practically all terrain difficulties. In the present war the tractor has not only stood the test splendidly, but has proven the best of all motor vehicles, according to the unanimous opinion of nearly all regiments.

The following factors are decisive for the proper employment of a motorized unit: firstly, realization of the need of proper care and maintenance of the apparatus and in consequence thereof realization of the maximum (permissible) performance of the motorized vehicles: secondly, proper exploitation of the possible speed and, when in action, *maximum* exploitation of the possible speed. Much practice and experience is required to properly coordinate these factors. The results which can then be accomplished, however, have been fully demonstrated in the present war. On the whole, there are two opposing views regarding these questions. The one view, upheld by the older generation and frequently also by the ordnance specialists, inclines to attach excessive importance to the care of the vehicle, sparing the apparatus and demanding over-cautious driving. The representatives of the other view are our young soldiers for whom no speed is fast enough; and they like to forget "caring" and "sparing." Here, too, the mean of both views is the correct one. If we have a comparison with a horse-drawn battery we know how quickly, in hard work, horses fail which have been excessively cared for and carefully and splendidly nursed. With the motorized battery the idea is to train the drivers, apart from closest attention in upkeep and care of the various parts, in such a way as to familiarize them with the maximum performance of their vehicles (in addition to careful driving and driving in column), in order, if necessity arises, to know positively, after surveying the terrain, whether the obstacle is below or above the maximum performance of their machine.

As is the case almost everywhere in military life, the impossible should be demanded in order to achieve the possible. Withal, it is of great importance that the instructor, with much élan, ardor, and strong, personal force, instill his soldiers with confidence and pleasure in the fine vehicle and, on the other hand, strictly prevent reckless driving or neglect in care and upkeep. *Prerequisite for this is that the instructor himself is an expert driver*. As in all other branches of the service, the pupils in this case also have a sharp eye as to what the teacher is able to do and whether he personally performs with smartness and facility what is required of them.

Just as the commander of a horse-drawn battery rides on horseback on the outside along the column, constantly watching his battery on the march, so should the commander of a motorized battery drive back and forth on a solo motorcycle along his battery on the march and by much strict criticism accomplish clean and smooth driving of his unit. It is always wrong, if the commander of a battery during driving exercises of the entire unit drives in front of the battery in a car and passes his time looking at the map and demanding of his drivers to keep up a certain speed. In that way he never knows how things look, behind the third or fourth vehicle of his battery; he cannot judge the intervals between vehicles. A young lieutenant should occupy that place (head of unit); he should learn how to read maps and to lead. The marching speed for long distances is best regulated by the foremost tractor. It would be totally wrong if the forward sections of a battery proceeded in a clean, regular line at a speed of 30 kilometers, while the rear vehicles are hurrying to catch up at a speed of

50 kilometers. If such is the case, then the fault lies in the training. The desirable aim is to have the head of the battery column drive at exactly the same rate of speed as the tail. Only the length of march might be altered according to tachometer distances when changing speed. We might mention here that it is not advisable for our engines to drive at the same speed (35 kilometers) for any length of time. Here again the comparison with the horse should be recalled, which on long marches should change off between trotting and walking. As a rule, a motorized battery on longer stretches should hold to freer and faster driving, but in between it should change to a slower pace. Our auto highways offer the best possibilities for this kind of training. Such highways present no difficulties to the battery commander to watch his battery on his motorcycle, like a shepherd dog. Practice gained on such convenient highways should subsequently be continued on other roads. In a unit where the driver is aware how much his knowledge and expertness are valued, and where the achievements of his superior are to him a source of emulation, the feeling of a taxi-driver will never hold sway among motor drivers. The tractor driver must be a particularly proud driver who gets most satisfaction if he succeeds, while going into position in difficult terrain and in the haste then needed, to put his gun (all by himself) into the exact spot indicated by the flags stuck out for him. He has the biggest and strongest engine of the battery and therefore the most work as regards care and upkeep. His responsibility, also, is the greatest because a large number of his comrades are transported on his vehicle and because the precious weapon, the gun, is entrusted to him.

When the battery has progressed in training in driving on the road, so that all drivers can drive at an even speed at equal distances apart, then the battery commander still faces the important task to train his drivers in the same manner in driving across country. In this connection it should be emphasized that the battery commander should commence with simple exercises and only gradually take up the more difficult ones. If one starts at once with greater difficulties in cross country driving one not only causes mischief to the apparatus, but also spoils in the drivers the feeling for their machines which was imbued with so much toil. It is important that the instructor should know at a glance which cross-country difficulties his motor vehicles are capable of overcoming and which difficulties exceed the performance of these vehicles. The driver, like the mounted soldier, must often cast his heart across the obstacle first; on the other hand, no improper obstacles should be practiced. One should, furthermore, take into consideration that in a motorized battery the performance of the vehicles varies. What a car accomplishes can frequently not be performed by a motorcycle even though the driver aids with his physical strength. On the other hand, of course, there may be obstacles easier to overcome by the motorcycle than by the car. Likewise a motor truck can never be compared with a half-track vehicle or a tractor.

As everywhere in our soldier's profession, so it is also the case with a motorized battery, that the elan and the ardor with which the superior knows how to lead and train his soldiers, give the guarantee for success. Just as hesitation and excessive caution render good training impossible so may, on the other hand, heedless recklessness and youthful ardor bring on not only heavy damages but also grave accidents. This contrast, especially crass here, tells us that the nucleus of the secret lies in due moderation.

EDITORIAL COMMENTS

1. Note how the many years of knowledge passed on as a heritage of horse-drawn artillery has been utilized by the newer units.
2. The almost unanimous opinion of regimental officers was that the track-laying prime mover was superior to other types. As this conclusion was based on extensive combat experience, it is worthy of consideration.
3. Good driving avoids over-cautiousness as well as recklessness. Drivers should know vehicle capabilities in difficult terrain.
4. The instructor must be an expert driver.
5. The BC does not lead the column—he designates a junior officer for that duty while he himself watches the march from the best point of vantage.

How Infantry-Artillery Cooperation Is Secured In The Red Army

[Translated from the Russian, from *Artilleryiyskiy Zhurnal*, Moscow, U. S. S. R., No. 4, April, 1941, by Lieutenant Joseph Dasher, O. R. C.]

EDITORIAL NOTE: This article illustrates, among other things, how the divisional artillery assigned in direct support of infantry units cooperates with the infantry organic regimental cannon units and other infantry heavy weapons.

Artillery firing training should point not only towards gaining proficiency in the technique of firing, but also towards the mastery of the planning and direction of fire on the basis of closest cooperation with infantry and tanks. This is achieved most completely *in joint exercises of artillery with infantry*. The basic foundations in which the details of cooperation are developed are the artillery battalion and the infantry battalion.

It is necessary to carefully organize and prepare joint exercises of artillery and infantry battalions, as provided for by the combat training programs of artillery and infantry.

Sovfoto

Camp of Red Army at Maneuver Area. Note that eye-wash is not unknown in Russia. The whitewashed croquet wickets around the tents are reminiscent of some of our own nonsense along these lines. See how the battery streets have been dragged, and little lawns planted in front of each tent. Pipe the bulletin board and the railings. It makes us homesick to get out and "rough it" once more.

The order of higher headquarters should attach every artillery battalion to a designated infantry regiment for the entire duration of the joint training exercises. In this manner is achieved the fullest coordination between the infantry and artillery commanders. Through joint solution of combat problems the commanders develop complete mutual understanding in the evaluation of the tactical situation, and strong combat teamwork is thus created.

The successes of the battalion commanded by Captain Ugryumov during the Finnish war were to a certain degree assured by the fact that he was supported by the same artillery battalion with which, in peace time, he always attended joint training exercises. Joint training with infantry must be preceded by a complete development and mastery on the part of the entire artillery personnel, in the course of their own preparatory training, of the full extent of every feature of tactics and firing. This is the reason why the regimental training directive for a given period should precisely designate the dates of joint exercises for every artillery battalion.

Preparation for exercises is conducted in accordance with the current regimental training program, and the subject of the forthcoming exercise should emanate from said program.

The commander of the artillery regiment is the organizer and leader of the joint exercises in as equal a measure as the commander of the infantry regiment, and their work should proceed in closest contact and in fullest consonance. The subjects of joint exercises are, as a rule, prescribed in the training plan of higher headquarters.

The training of the leader consists of:

(a) determination of individual purposes and general aim of the training, laying out of the training program and the tactical problem;

(b) selection and reconnaissance of terrain;

(c) drawing up of the training plan;

(d) the organization of the training field;

(e) the training of liaison personnel (mostly from among chiefs of staff of artillery and infantry regiments).

The organization (preparation) of an active training field (maneuver area) should receive the maximum attention, for on this depends the degree of similarity of the training exercise to conditions of actual combat. The field of training can be best organized by having units of the other battalions simulate the enemy. Their tactical training should be planned for the terrain selected

During maneuvers. 122-mm gun-howitzer at drill. Note use of note book by members of the section. Many photos shown recently indicate that heavy reliance is placed on the note book. The panoramic sight shown is apparently used with various models and calibers of weapons.

Sovfoto

for joint exercises, and the terrain can be diversified by artificial features.

These measures should be prepared in advance by headquarters of the artillery regiment.

If there is no opportunity to employ infantry units to simulate the enemy, then either the artillery or the infantry regiment will organize a detachment which will be supplied with explosive agents, blank cartridges and other artificial equipment, and which will imitate the enemy in combat deployment. The commander of this detachment receives full instructions as to terrain and a detailed plan as to time and means of the simulated action, as well as a plan for liaison and signals.

Joint exercises should be based on a tactical situation, which would demand of artillery and infantry the performance of missions under intense combat conditions.

The plan for and the designation of the "enemy" should be so constructed as to cause speedy and decisive action on the part of individuals and units, and must embrace the greatest number of participants among officers and enlisted personnel.

The activity of the artillery battalion commander and that of his staff takes central place during the exercise. On the degree of the productivity of their work depends the tempo and extent of the work of batteries and of the entire personnel of artillery units. Habits of cooperative organization with infantry and its supporting weapons should be acquired in the course of the exercise within the artillery battalion, and as between the artillery and infantry in the course of combat. During the process of joint training, the artillery battalion commander and his staff should work out the following elements:

(a) Single orientation as a foundation of common terminology in the designation of missions, and in the exchange of information (this is accomplished by careful, joint study of the map and terrain);

(b) Continuous exchange of information based on close liaison between the artillery and infantry battalion headquarters, aided by liaison agencies, personal contact, and a joint territorial distribution of CP's;

(c) Constant information on the situation of advanced infantry units, which depend on a precise organization of a system of advance observers, and on a secure contact with them;

(d) Dependability of the adopted plan of liaison, assuring the uninterrupted cooperation with infantry and its reinforcing units, dependability of command of the batteries, taking into consideration that radio is the fundamental liaison agency in modern combat.

The system of employing simplest radio signals and visual signals within the artillery battalion is included in the plan of liaison, especially when making hostile contact within the defensive depth and in the zone of approach.

Finally, there should be worked out the organization of combat activity of the artillery battalion, which organically emanates from the problems and actions of the battalion. This side of training activity should be built upon the principle of joint execution of a mission with the infantry battalion, defining the problems at hand on the terrain and their execution in the course of combat, distribution of firing tasks between the battalion heavy weapons and batteries, and the linking up of their fire on the terrain (in defense), cooperation of the artillery battalion to coincide with the movement of infantry and securing the capture of vital points in offensive action. The system of changing of firing position of the artillery battalion is determined in accordance

A Russian field piece in camouflaged position during training exercises in 1941. Note the German type shield; the equilibrators under the recoil mechanism; the heavy axle; the split trail. This is the late model weapon, probably a 76-mm modified Bofors type, or possibly a 122-mm gun-howitzer. Note the firs and birches, common to the northern latitudes.

with the movement of infantry. Mutual understanding as to the order of transfer of authority over the artillery battalion, signals for coordinated action, and places where such changes should occur, also must not be forgotten.

Battery commanders should work out jointly with commanders of the supported companies a precise plan for cooperation. Combat experience teaches that this can be best attained through the joint disposition of the battery and company CP's, which assures exchange of information as to problems and situation, and possibility of immediate action in response to any needs of the company engaged in combat.

Among the officer personnel of the battery it is necessary to develop the aspiration towards constant knowledge of the infantry's firing tasks, especially those of machine guns, mortars and 45-mm. or regimental guns engaged within the company. Such knowledge will assure the personnel full orientation in combat and a purposeful direction of the battery's fire. The work of the most advanced battery OP—the eyes of artillery in front-line infantry units—should be organized with special precision.

Systematic information on the situation of the companies, on the "enemy," the indication of targets and independent conduct of fire, are questions around which the training of infantry OP's should revolve during joint exercises. Fundamentally, the collaboration between the battery and the company depends on radio and the simplest visual signals, well mastered by the personnel of directing agencies and by all commanders.

While in combat, and when in direct contact with the company commander, the battery commander must use the opportunity to see to it that the 45-mm. and regimental guns supporting the company, as well as the battalion and regimental mortars, are properly utilized. He must help these weapons and teach the infantry commanders as to the most expedient employment of their heavy weapons. During joint exercises there must not be overlooked the fundamental rule of combat training requiring that the process of perfection of the training of the individual soldier and of small units must be continued at all times and in all places Non-commissioned personnel and privates of the artillery battalion, and especially those belonging to the headquarters squads should acquire the necessary practical habits and skill during the joint combat action with small infantry units and individual soldiers of that arm.

Scouts must comprehend the organization of the company CP, the functions of its HQ platoon, they must always know the direction (sector) of the company's action, they must acquire the habit of exchanging their information with the infantry observers, and they must be trained in observation while engaged with the forward echelons of the infantry units.

During defensive combat, artillery detail personnel should learn to give assistance to infantry heavy weapons units, by means of data on the plane table in establishing the distance to orienting points and to pre-determined

places on the terrain and in front of the outpost line.

Signal operators should learn the details of combat deployment of the infantry from the standpoint of selecting directions for the battery lines of communication, by taking into consideration the movement from the depth of the position by infantry and tanks. They must possess a sure knowledge of infantry signals for direction and cooperation, in order to secure the uninterrupted contact and, whenever necessary, to render aid to infantry commanders in directing infantry units.

Gun personnel must be acquainted with the mission and terrain situation of the infantry engaged in the vicinity of firing positions, and the infantry must be kept informed on the system of antitank fire from the basic and special firing positions. Liaison between gun personnel and neighboring infantry must be established, with the view of rendering mutual aid in the event of enemy attack.

Questions of the rear must also be determined from the viewpoint of cooperation. The distribution of rear elements (ammunition platoon, kitchens, medical and veterinary stations), the organization of a system of security and defense of rear units, and the utilization of the artillery battalion medical and veterinary stations must be borne in mind.

Thus, joint training of artillery and infantry bring the work of artillery units closer to actual combat conditions, permitting the command personnel to test in practice the degree of development of individual men and of units. Such joint exercises are the best school of cooperation for units of all arms.

Proposed Amendments to the Constitution, U.S.F.A. Association:

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

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

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

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

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

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

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

2. *Reasons for the amendments*.

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

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

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

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

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

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

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

R. M. Danford; W. C. Potter; I. T. Wyche; Thomas North; J. V. Phelps; M. McClure; Rex Chandler; J. A. Stewart; J. F. Uncles; Rex W. Beasley; Stuart L. Cowles; John B. Anderson; David S. Rumbough; J. A. Lester; L. M. Riley; H. E. Maguire; Townsend Heard; B. M. Sawbridge; C. G. Helmick; I. Spalding; B. M. Bryan; A. W. Waldron; J. W. Mackelvie; A. F. Kibler; I. L. Foster; A. C. McAuliffe; F. A. Henning; John H. Hinds; L. Whitlock.

PROBLEMS IN GUNNERY

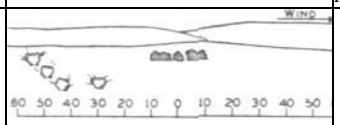
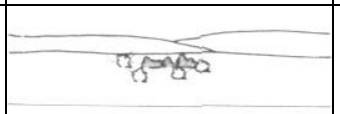
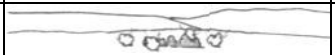
EXAMPLE 11

BRACKET, LARGE *T*

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

$T = 600$; $s = 16$; $d = 27$.

Initial commands: B Adj, BDR 135, Cv 4000, On No 1 Op 8, Si 300, Sh Mk I, FQ,

Commands	Results	Sensings Rn.	Sensings Df.	Remarks
BL, 4200			?	Burst center about 45 mils left. 45/27 = 1⅔ (use 2). (Fire for effect will be started whensplitting a bracket of 25 (100/4) mils or less or when making a shift of 12 mils or less.)
4400			+	2-s initial shift.
R 30, 4200			—	
L 15, 4300			+	Splitting deflection bracket of approximately 130 yards.
R 5, B 1 Rd, 4250		—	Approx, correct	R 5 instead of R 10 because salvo at 4300 appears closer than that at 4200.
4300		Correct	Approx, correct	The command for this volley is given as soon as the first volley is on the way.

From the sensings obtained thus far, a bracket of either 4200—4400 or 4150—4350 is satisfactory.

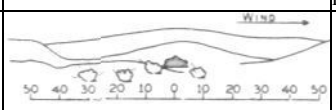
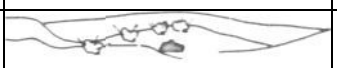
EXAMPLE 12

BRACKET, LARGE *T*

Target: Command post in vicinity of terrain feature. Mission: Neutralization. Materiel: 155-mm. howitzer. Ammunition: HE shell, quick fuze.

$T = 450$; $s = 9$; $c = 10$; $d = 16$; $c/d = 0.6$.

Initial commands: BDR 220, Cv 5500, On No 1 Op 6, Sh Mk I, Ch 4, FQ, BR,

Commands	Results	Sensings Rn.	Sensings Df.	Remarks
Q, 360			—	Deviation of burst center is ignored until seeing next salvo. 4 - s initial bound. (Fire for effect will be started when splitting a deflection bracket of 200 yards or less, or when making a deflection shift of 18 mils or less.)
R 35,400			■ +	Deviation of 10 mils left for both salvos should be corrected by $(10 \times c/d) = (10 \times .6) = 6$ mils elevation change. Deflection bracket is slightly less than the open sheaf of 200 yards.
L 15, On No. 2 Op 6, B 1 Rd, 374		Correct	Approx, correct	380 — 6 = 374.
384		+	Approx, correct	Second volley is fired as soon as first volley is reported on the way.

A good bracket is 364—384.

Lieutenant C. E. Welsh, 76th FA Bn, tells how to

Determine

Weather Corrections

by simple graphical methods

Over a period of many years established procedure for computation of the effect of weather on the trajectory of artillery fire involved the use of firing tables without much, if any, consideration given to the now particularly important elements of time and simplicity.

The illustrated device is offered as a solution. It eliminates the use of firing tables and contributes to the efficiency in determining total weather effect. In this respect it is similar in scope to a recent Field Artillery School slide rule from which the weather corrections for the corners of a weather-correction diagram may be computed. The Fort Sill method has the advantage of being extremely simple to operate, but it can not be used to calculate an individual correction problem. This device is slightly more complicated but less bulky* and enables one to calculate corrections for all ranges.

*If plotted on suitable material, it can be folded and carried in your pocket.—Ed.

The device as illustrated consists of two parts, a series of graphs on one chart (Fig. 1) and the units of weather effects on the other (Fig. 2). The graphs are drawn on a sheet of four-cycle semi-log paper. They consist of the effect, in mils, of one unit of VE, air temperature, rear wind, density and weight of projectile—one graph for each effect. These unit effects are computed from the range tables by converting yard effects to mils. The second diagram, consisting of units of weather, when used in conjunction with the first chart serves as a slide rule for multiplication of unit effects. For example, using the charts to calculate the effects at a range of 6,200 yards, place the index of the second chart under the intersection of the VE graph and 6,200 as illustrated in Figure 3. Assume the old VE used is

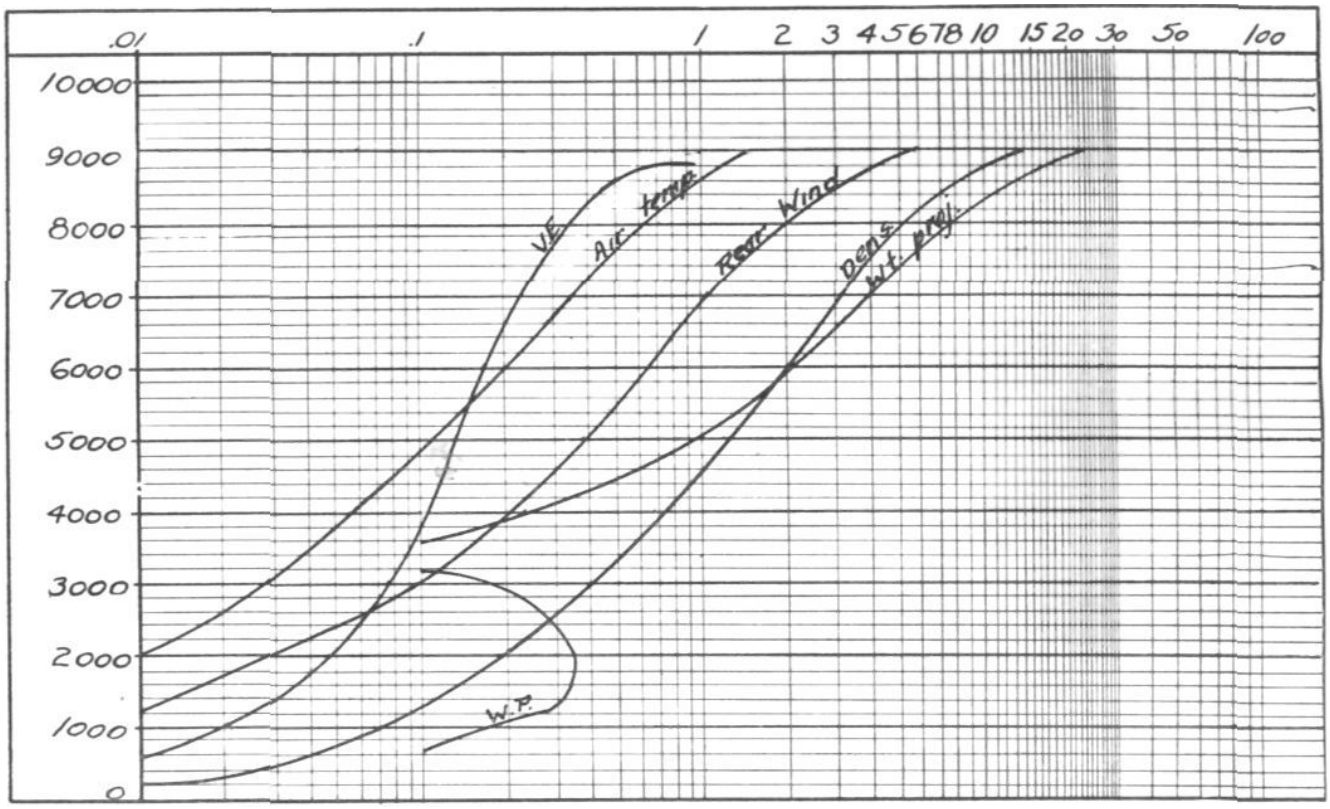


Figure 1

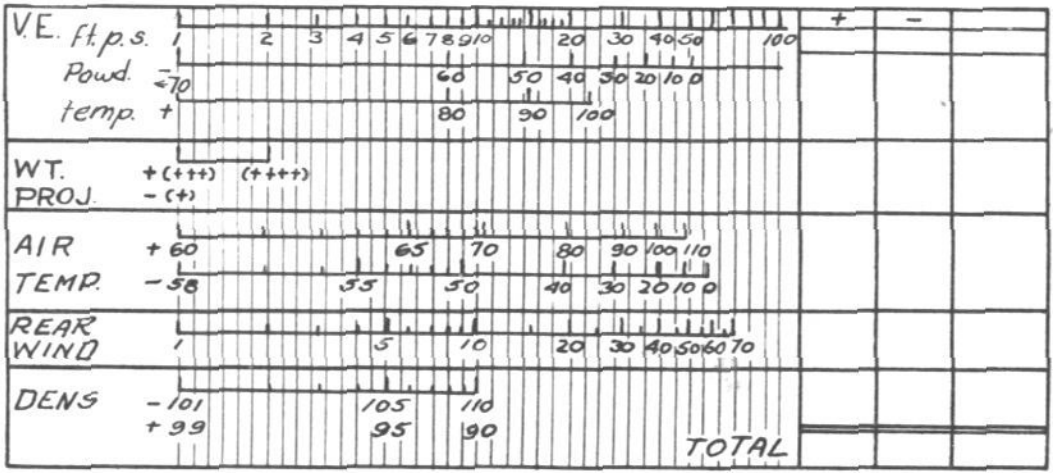


Figure 2

30 f.p.s., read over the f.p.s. column on Chart 2 to 30, then read upward on Chart 1. The result in mils is apparent—5.5 mils. Leaving Chart 2 in a fixed position, read the effect of powder temperature. With a powder temperature of 80 degrees the result will be 1.5 mils. Remaining on the 6,200 yard line move the index of Chart 2 to air-temperature graph and read the effect indicated. Each effect can be read in the same manner.

Totals of each effect can be noted in pencil in the blank columns on Chart 2 opposite the effect and the sum total added. These notes can later be erased.

Note that the weight of projectile graph disappears between 3,200 and 3,600. Here the unit value approaches O; the total effects are negligible and need not be figured.

This chart is figured for Shell MK1, Fuze M46 and M47. For other charges and fuzes Chart 1 is incorrect. A similar chart can, however, be easily constructed.

This four-cycle semi-log graph paper is stocked or can be ordered by most stationery stores. If the paper is not available the chart can be constructed using the log scale of your slide rule. The graphs can be drawn by plotting every 1,000 yards and drawing in with a French curve.

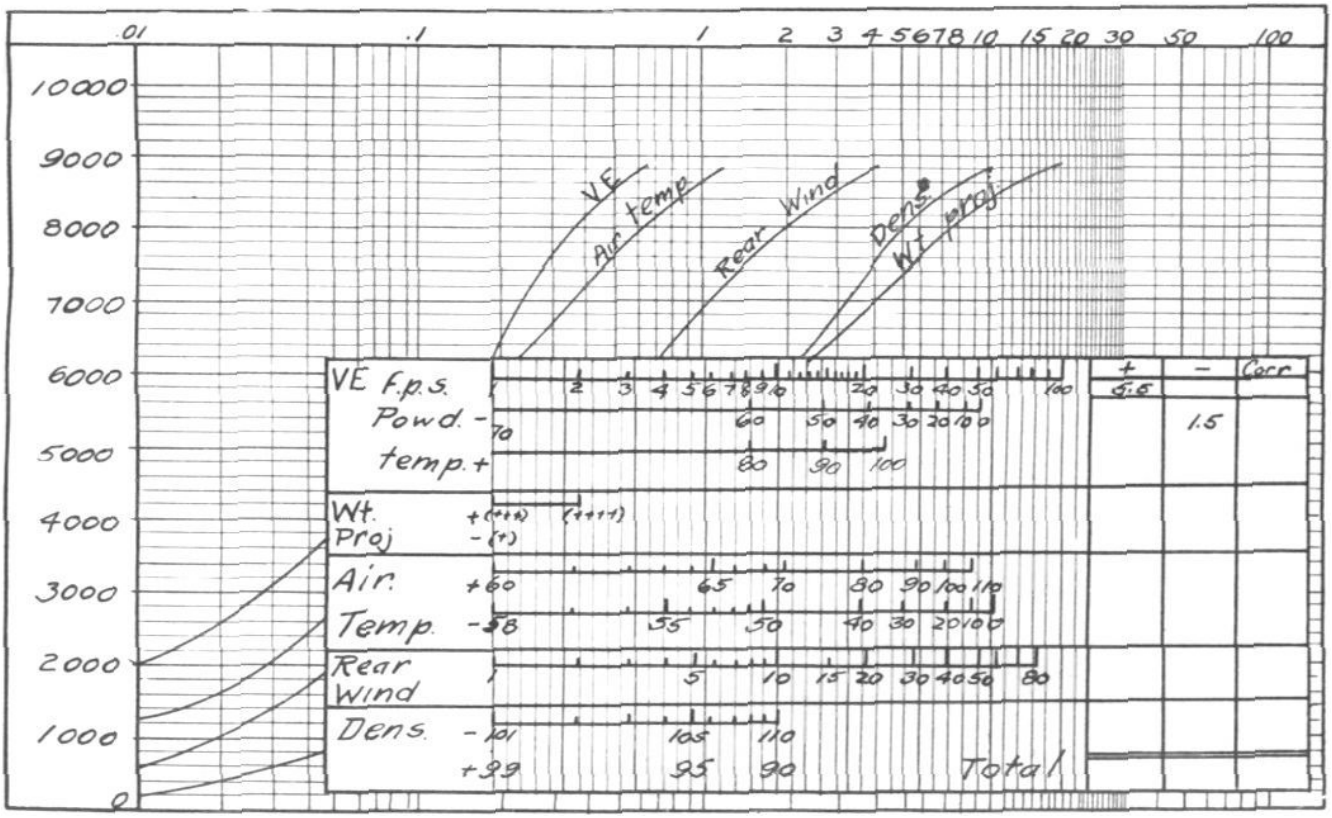


Figure 3

Not in the BOOK

EDITOR'S NOTE: *The short article of this title in the July issue proved so popular that we have decided to run it as a regular feature. This will be dependent, of course, on the number and quality of the contributions received for inclusion in this column. Other artillerymen, old and new, are hereby invited to send in their suggestions for this column. Make them short and practical—no Rube Goldberg inventions, please.*

SURVEY UNDER DIFFICULTIES

One of the most difficult terrains over which artillery can operate is a broad, flat, treeless plain. Forward observation and often lateral observation are of importance because of the difficulty of observation at great ranges over ground of this type.

It is almost impossible for a detail to operate their instruments over such ground without being observed by the enemy; the necessity arises for a means of running a traverse on hands and knees or flat on one's stomach. This obviously can not be done with the instruments provided.

Such a condition was encountered during the last war by the artillery of the 1st and 2d Divisions in the attack on the Marne salient in July, 1918. The following method proved accurate and was accomplished with little loss of life.

The 'phone wire to be used to connect the forward post with the firing batteries was rolled from one reel to another and small ribbons of friction tape were wound around it at ten-meter intervals.

The plotting board was set up near the firing batteries and a sight taken along the direction of the wire as it was strung forward. The wiremen and instrument men advanced on hands and knees through low wheat and over stubble. They advanced as far as possible in a straight line, counting the tape marks on the wire to measure the distance. When a change in direction became necessary, a stake was set and a turn taken around it with the wire. The instrument corporal had provided himself with a drawing compass made from two tent pegs and a length of wire. The length of the wire from peg to peg was 5 feet 2½ inches.

Using the change-of-direction stake, mentioned above, as a center point, he scratched an arc on the ground between the sections of wire on each side of the stake and measured the distance along this arc with a flexible carpenter's rule. This distance in sixteenths of an inch equalled the angle in mils. In other words, he measured in mils the change in direction of the wire.

The wiremen then cut in on the line and phoned the length of the first leg and the angle between the first and second leg to the sergeant who had remained at the plotting board. He plotted this information as it came in so that by the time the detail arrived at the forward station its location was plotted and it was unnecessary to send a man back over dangerous ground with the data.

This whole operation was accomplished without having to rise above a kneeling position. As the guns moved forward the operation was continued by using the plotted forward observation post as a known point and running a traverse (as described) to the new battery positions to establish their location. The resulting fire from this data was sufficiently accurate to accomplish the object of protection for the infantry.

—By Corporal H. H. Crane.

WIRE TO THE FORWARD OBSERVER

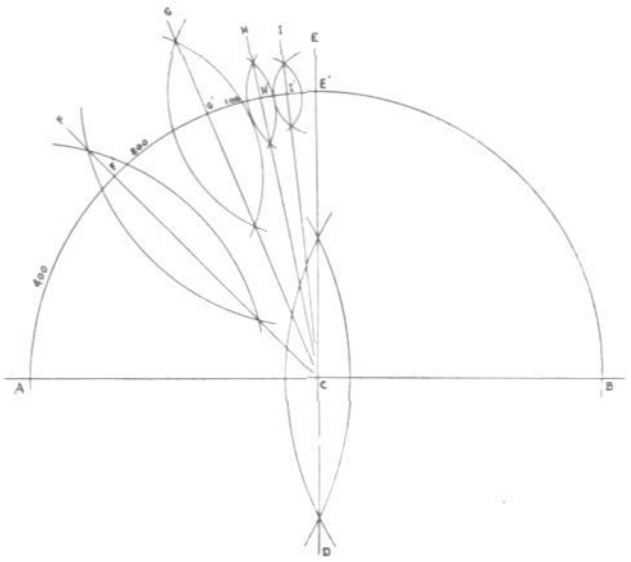
We were moving fast. Battery positions were being shifted two and three times a day and the battalion OP never stayed in the same place for more than an hour or so.

The Old Man, deciding that he needed some forward observation, sent the detail forward with instructions to stay as close in behind the infantry as possible.

Our 'phone wire had more splices than a Hollywood actress could acquire in a lifetime and Sgt. Noland (the Wire Chief) wat fit to be tied. The prospect of maintaining communication for an advancing observer seemed very poor. Those are the kinds of conditions that hatch ideas.

Noland stretched a reel of wire on the ground, doubled it and then rolled it back on the reel from the center, leaving the two ends free. With two men on the reel and a couple more to drag wire behind the observer, we advanced without breaking connection with the battalion switchboard.

—By Corporal H. H. Crane.



IMPROVISED PROTRACTOR

So your protractor got lost, did it? Sit down and we will draw one on the plotting board that will be more accurate than the old one, if you still have a compass.

Draw line AB.

With a radius slightly greater than one-half the distance AB, draw two arcs with centers at A and B.

Draw line DE through the two intersection points of the arcs. This line is perpendicular to line AB.

At point C where these two lines intersect draw the arc AB with radius AC.

With A and E' as centers, draw two arcs whose radius is slightly greater than one-half the distance from A to E' along the arc AE'. Join the intersections of these arcs to point C to form line FC.

You have bisected the angle ACE and you may continue by the same method to bisect the angle FCE and each of the subsequent angles until all are divided as small as your draftsmanship will permit.

You will find this a very satisfactory protractor if you are careful and accurate in your work.

—By Corporal H. H. Crane.

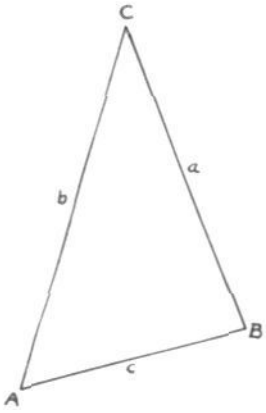
COMPUTING THE RANGE

The article by Mr. H. H. Crane on page 484 of the July issue of THE FIELD ARTILLERY JOURNAL gives an interesting method of improvising survey methods, and provides much food for thought. So many things can happen to instruments in warfare that training in laying guns, figuring ranges, and survey work without full equipment would not be amiss.

Some of the improvisations that come to mind are variations of the method suggested by Mr. Crane, and can be made more accurate or more rapid if any instruments at all are available.

For instance, in the situation which confronted Mr. Crane, if the target was directly to the front of the battery and could be seen by two guns (preferably No. 1 and No. 4), each piece could have read the angle from target to the other piece, No. 1 counter clockwise and No. 4 clockwise. The addition of the two angles subtracted from 3200 mils and divided into the distance between guns gives a quick and fairly accurate range in thousands of yards. This method is reasonably correct only if the target is located directly to the front so that the two angles are nearly equal. If not, the angles and the range could be plotted.

A more accurate method is to measure the angles as above and solve by using the natural functions. This method becomes less accurate as the angle at the target becomes smaller. Consequently, the longer the range, the greater should be the base.



Target at C
Guns or instruments at A and B
b = range of one gun.
c = distance between guns or instruments, in yards.
Angle C = 3200 (Angle A + Angle B)
Formula: b = c × (sin B) / (sin C)
(See F.M. 6-200, par. 77.)

Range can be figured by using two guns; one gun and one aiming circle (or B.C. Scope); two aiming circles; one aiming circle and stakes (setting up instrument twice and reading back to stake); plane table, protractor and alidade; or the method used by Mr. Crane. Such methods might be particularly useful for close defense of battery positions. As soon as guns are in position, ranges to various avenues of approach could be figured quickly.

So often, such survey work can be done quickly and done more accurately than using a range finder or measuring from an inaccurate or small-scale map. Many artillerymen overlook the possibilities of survey.

Methods of laying a battery for direction when no aiming points can be seen and no aiming circles are available include the simultaneous drawing of lines on shadows on plane tables set up at OP and gun position. This method using a thread with a weight hung so that it casts a shadow on the plane table was tried by my regiment and proved to be reasonably accurate. However, it can be used only when the sun shines, and is more accurate in the morning and evening than at midday.

If a map is available, but no compass or other instrument, one gun can be placed in the middle of a road and sighted directly along the road. Another gun can be put in position at a selected location in sight of the gun on the road. The gun in position is laid parallel to the one in the road by reciprocal laying. The rest of the battery is then laid parallel to this piece, including the one in the road which is moved into the firing position.

—By Col. Henry C. Evans, 110th FA.

SIGNAL FOR BARRAGE

It might be well in the course of these little articles to tell of a bright idea or two that did not work out so well.

Early in June, 1918, the batteries were in position back of Belleau Wood and to the left of the town of Copru. The positions were well selected, but observation was most difficult and, because of an almost constant harassing fire by the enemy, we had difficulty maintaining communications by 'phone.

The infantry were in shallow, hastily-dug trenches that were nothing more than disconnected individual holes. Woods and crests intervened between the artillery and the infantry, and the constant threat of night attack made it highly important that we establish some type of visual signal.

The only point close to the batteries from which a barrage rocket could be seen was the church tower in the town of Copru, but this tower was not visible from the batteries. After much head-scratching it was decided to place two observers in the tower to watch for the barrage rocket and to have them strike the church bell as a signal to the batteries to begin firing.

An Irishman and a Kentuckian were selected for this duty. They climbed the church tower up a rickety ladder which looked to be about two centuries old. The Kentuckian and his hundred and thirty pounds managed it well enough but the Irishman and his two hundred and something caused creaks and groans from the old wood.

The early part of the night passed with the Kentuckian at the glasses which had been set on the rocket location and with the Irishman speculating on the chances of the ladder holding together long enough for his descent in the morning.

At midnight the Irishman took over. At about two AM a random 77 shell nicked a small corner out of the lower section of the tower and the old stones rocked like a ship in a gale. It was no time to place faith in a bundle of wood; the Irishman made a flying dive at the bell rope and slid sixty feet to safety while the bell let out a peal that started every battery in the regiment.

There was an inquiry, of course, but the Kentuckian's description of the Irishman's descent detracted from the dignity of the proceedings, and it seemed a bit futile to try to collect a hundred-thousand-dollar ammunition bill out of the pay of a couple of scared corporals.

The report that the Kentuckian jumped from the tower over the parish house into the priest's manure pile was circumstantial and without foundation in fact.

—By Corporal H. H. Crane.

A RING IN HER NOSE

By Rosalee C. Porter

The telephone was ringing for the eighteenth time that morning. Before I had the receiver off the hook I knew who it was and what she wanted. I had invited the nineteen wives of the married officers in my husband's battalion for supper on a night when the men were in the field. Eighteen had already phoned and I knew the nineteenth was about to ask me what she should wear.

How I wished that I could say, "Long dress" or "Short dress," definitely, just like that. I couldn't. Twenty-one years ago I started asking my hostesses what I should wear to their parties and I am still doing it. Twenty-one years ago a certain Major Moss was telling young officers what they should do and say on different occasions but no man has ever had courage enough to do the same for the ladies.

Emily Post has covered every conceivable situation that most women in civilian life will ever encounter. Her information, as far as army women are concerned, is full of gaps.

Army regulations govern what the men will wear but by following that lead, only indifferent results are possible for a woman. No mental agony in the world can compare with that of the only woman at a party wearing a dinner gown when all the others are in daytime clothes; yet by following an escort's lead, that can happen.

If we followed his "tuxedo after six" regulation and wore our long dresses to the post movie, we would look funny. If we went to a dinner party before and did the same thing, that would be perfectly all right. If he wore his uniform it would still be all right. If he wore his uniform to a parade and went to a cocktail party, even after six, then the long dress would be all wrong. If he wore his uniform or his blues or his tux and we went calling after six, or according to usage, after eight o'clock in the evening, we should wear a short dress, with our hats, and our white mittens, our card cases in hand. If we went calling on a Sunday afternoon after four and before six, we'd wear the same outfit but papa wouldn't ever wear his tux. So it goes.

Even the calls themselves are a source of confusion. An officer reporting to a new station must make an official call upon his commanding officer at the latter's office, and a social one within twenty-four hours, at his quarters. Wives accompany their husband on their social calls, but what if the C. O.'s wife is away? How many of the commanding officers rate calls? Should a married second lieutenant and his wife go calling on the commanding general, the regimental commander, the battalion commander, the battery or company commander, and all the married first lieutenants in the outfit? Certainly not. They call on the regimental commander and if his wife isn't home, that is just too bad. As for the others, they have responsibilities too, they go calling on the new people in their outfits—if they're not in the throes of an unlimited emergency!

The same questions arise about whom to entertain. I

don't know how Emily Post manages that one. Probably advises people to entertain their friends. Army people who try that lead lonesome lives. Of a necessity guests do often become one's very best friends. Entertaining new people is one of the nicest things we do, just for that reason. Entertaining friends of long standing and acquaintances who have served on other posts with us, compensates for many a hardship. Swapping reminiscences about mutual friends and shared experiences is one of life's chief delights.

What to do from then on? The presumption is that when one is invited, one is wanted, and wanted at a certain time. Quoting a medical corps officer who was telling a group of young doctors what Major Moss wanted the others to know, he said that there was no such thing as being a little late, any more than it was possible to be "a little pregnant." If the invitation says seven o'clock, then seven is the time the guest is wanted.

Some people think that an invitation to a party means that a return one is expected and they are absolutely right. That doesn't mean that army people entertain just to be entertained themselves. They couldn't afford that; there are too many cheaper ways of amusing themselves. An invitation means that the hostess has some reason for wanting the guest; the guest should feel flattered and grateful. What nicer way of showing gratitude than going to the party, being the life of it if necessary, and at the first opportunity, returning the favor?

I don't know one person today who belongs to the tea for a tea, dinner for a dinner, school of thought. Such an arrangement would be monotonous to say the least; it would also be beyond the budgets of many of the most popular guests.

Twenty-one years ago when the problem of entertaining presented itself to me, I felt as if a wave of the impossible were sweeping over me. I called my husband's major's wife and told her my little tale of woe.

"I just can't have people for dinner—I have no silver, no plates, no cook. I just can't have a tea party—I don't have enough plates and cups and spoons," I wailed.

"How many cups do you have, my dear?" she asked.

"Just six, the ones for my blue tea set," I admitted ruefully.

"Why that will be lovely," she said. "Just ask five girls for tea and toast, every afternoon you can, until you have had them all to your house."

"Oh that will be easy," I said. "Thank you so much for being so sweet to me. Please tell me, what should I wear?"

The phone was still ringing. I reached for it, my answer ready on my lips.

"Yes, this is she. . . . I am so glad you can come. . . . Why my dear, whatever you will be most comfortable in; it really doesn't matter. . . . You're quite welcome, I'm sure. I'll see you at six."

And at six o'clock there we all were, half of us in long dresses and half in short ones. I think that I speak for all my sisters in the service when I say that I would be comfortable with a ring in my nose, if others at the party were wearing them too.

Editor's Foreword: Army wives who, these many years, have enjoyed their quarters "on the post" are somewhat more unhappily placed of late. Husbands are being assigned to battalions at the new cantonments; families often are forced to live in "nearby" towns up to one hundred miles distant. This condition has inspired the following study which, the author intimates, was produced only after exhaustive research:

MONOGRAPH ON NATIONAL DEFENSE

By Agnes Randle

For the camp follower life is
getting hollower.

We have commented previously on the manufacture of folding canvas cots for the Army, but regret to report that this item, which should be a source of comfort and solace to the soldier, will still be made by the Telescope Folding Furniture Co. and the Perfection Oak Flooring Co. The soldier will just have to get his sleep catch-as-catch-can. Over-size boys, however, will be glad to know that over a hundred thousand cots are to be made by (and perhaps for) the Pratt Corporation.

FROM  THE CHIEF'S OFFICE

MOTOR MAINTENANCE

COMMENTS ON RECENT MANEUVERS AND INSPECTIONS

Efficient enforcement of preventive maintenance is the responsibility of commanding officers of all units operating motor vehicles.

—FM 25-10.

Because of the importance of preventive motor maintenance to the mobility of the arm and of its apparent neglect by all ranks, extension of comments previously published on this subject are given below, with special reference to maintenance of tires.

Among the notes of one observer attending recent maneuvers appears the following significant statement—significant primarily because the reports of various competent observers leave no doubt as to the inadequacy of the first and second echelon maintenance and where the final responsibility therefor rests: *Higher officers are not motor-maintenance conscious*.

It seems almost paradoxical for commanding officers to complain of vehicles on the dead-line for lack of spare parts when many of them are there because of poor preventive maintenance. For example, one unit's dead-line as reported to this office:

One Diamond-T truck, mileage 1706. Bearings burned out of transfer case for lack of grease.

One GMC, mileage 3068. Transfer case damaged for lack of grease.

One GMC, mileage 3916. Transfer case shot for lack of grease.

It was particularly noticeable that units and accessories which require constant attention or which are inaccessible were neglected. Examples: Air filters of Ford ¼-ton trucks are inaccessible; they either lacked oil or the screens were caked with dust. Access to the storage battery of the 1940 GMC 2½-ton trucks is difficult; many batteries were dry. Efforts are being made to partially alleviate such instances by so engineering units as to permit easier access. Special supervision, however, must be given difficult-to-service units now in use.

While the mortality of 2½-ton GMC steering assemblies was mentioned in previously published comments, the matter warrants repetition. The condition is usually caused by a lack of preventive maintenance in keeping cabs tight.

In one division 50 transfer cases were repaired during the maneuvers—damaged largely by striking stumps and other objects.

A high mortality of gasoline filler tubes is occurring—flexible nozzles broken at the base; threads in gas tube plug destroyed by using the plug as a hammer to loosen gas drum plugs.

Many vehicles are being operated with valve caps of tire tubes missing. These caps serve two purposes; namely, to keep out dirt so that valve plungers will last longer and to retain the air in case the valve plunger leaks.

There is no standard procedure or forms by which preventive maintenance is carried out. In isolated cases preventive maintenance operations as outlined in Basic Field Manual 25-10 are being carried out by means of a home-made system.

*In order to maintain the vehicles in as near perfect operating condition as possible, schedule maintenance operations followed by maintenance inspections are necessary. These should be positive operations in accordance with a definite schedule based on time, mileage, or a combination of both. This schedule must be planned well in advance and coordinated with anticipated demands for vehicles. Maintenance personnel should have available for their use a guide for the various maintenance operations, modified to meet the requirements of different types and makes of vehicles or particular operating conditions. * * * —FM 25-10.*

In addition to the discussion of motor maintenance contained in Chapter 5 of FM 25-10, special attention is called to an article in the FIELD ARTILLERY JOURNAL of May, 1941, on the same subject. The methods outlined in this article are the result of years of study and actual maintenance of motor vehicles by the School and School Troops at Sill. They are effective as witnessed by the casual remark of an experienced officer, formerly at Sill, upon his examining recent inspection reports of the motor transportation of certain units: "It seems that the field artillery organizations are not quite on a par with the old Fort Sill gang."

There has been brought to the attention of the office the report of a special investigation into some 60 engine failures in a large organization, Model ACKWX and Model CCKWX 2½-ton GMC truck engines. The Corps Area Commander concluded that the investigations indicated the lack of adequate first and second echelon maintenance, poor training of drivers, and improper supervision over operation of motor vehicles. The civilian engineer assisting in the investigation listed the contributing causes of these failures, in the order of their importance, as follows:

(1) Improper servicing and not frequent enough cleaning and checking of oil bath carburetor oil filter.

(2) Improper servicing and not frequent enough checking of oil filter cartridge units.

(3 Poorly trained drivers, in the matter of use of proper gear to be used in relation to the r.p.m. of engine under operating conditions.

(4) Loose carburetor oil bath filter units.

(5) Oil drained from engines not properly warmed up.

(6) Excessive driving speed.

(7) Carburetor adjustment set for too low an idling speed.

(8) Poor engine tune up.

(9) Warped plates and inadequately serviced oil pumps.

The unit's motor transport officer listed the contributing causes of the failures, from an operating standpoint, in the order of their importance, as follows:

(1) The laboring or "lugging" of the engines and failure to use the proper driving range and proper gear reduction.

(2) Failure to inspect or change oil at the proper time.

(3) Trucks operated without a proper engine warm-up period.

(4) Dirty oil filter elements.

(5) Excessive driving speeds.

(6) Dirty and loose carburetor oil baths.

(7) Over loading.

(8) Oil drained from cold engines.

(9) Warped oil pump plates.

(10) Poor engine tune-up.

(11) Oil not properly protected in storage from dirt and grit.

Many complaints of excessive tire wear are being received from the field. The inspection report of a tire expert states in part:

"In general air pressures in truck tires were found from 25% to 30% under inflated, all tires wiping and cupping away very fast. Front tires were worn 15% to 35% with from 2,500 to 8,000 miles on them. Due to this low pressure, tires are going out of service at very low mileage. In some cases vehicles with 10,000 miles were found to have a complete set of new tires.

"Upon inspecting a group of trucks belonging to one company, I found almost all the vehicles in the 2½-ton class had their tires replaced. Average mileage on these vehicles was 15,000 miles. Air pressures were below the average in this latter group of vehicles, which undoubtedly caused the early replacements.

"The ½-ton vehicles are showing an excessive amount of wear for the three or four thousand miles they have been operated—caused directly by under inflation. Undoubtedly these vehicles will start to shimmy in the near future because of this bad tire wear.

"Fifty per cent of tires removed from service, which were inspected, had breaks on the inside caused by under inflation.

"Inflation checks on 1-ton cargo trailers show these tires are being operated from 20% over inflated to 70% under inflated—a very small percentage over inflated."

A number of valve stems were found to be bent in such a way that they were riding on brake drums. This not only heats up the valve, thus causing it to leak, but makes it difficult to attach an air hose or a gauge.

Quite a large number of tires were found to be mounted with the valves turned the wrong way; that is, the valves pointed to the back of the wheel away from the disc instead of to the front of the wheel or through the disc. Results: Danger of damage to valve stem because it protrudes over outside edge of rim; difficulty of checking pressure or inserting air.

Now to examine what may be expected from properly maintained tires. The testing section of the Holabird Quartermaster Depot has recently completed a test of 14 GMC 2½-ton, 6 × 6 trucks, each equipped with 7.50 × 20 tires, for the investigation of wearing qualities of tires of different tread design. Each of these trucks was equipped with a different tread-designed tire. Trucks were operated 14,000 miles under full load of 5,000 pounds each. During the first 500 miles the speed was 30 m.p.h.; it averaged 35 m.p.h. thereafter. Tires were changed from truck to truck every 500 miles, but the wheel position on the truck was not changed. The important thing to note is that the tire pressure was brought to 55 pounds per square inch each morning. At intervals during the test the loss of tread was determined by using a depth gauge, and the tires were removed from the wheels and weighed. At the end of 9,000 miles the average loss of tread on the five best types of tires in the fleet was 9.4% and the average loss of rubber was 2.02 pounds. After 14,000 miles the average tread loss was 18.9% and the average loss of rubber 3.2 pounds. Based on these figures the tread design which had the *most* wear has a predicted life of 40,000 usable miles. This is ten times greater than the tire mileage being reported on military trucks.

The important thing to note is that the tire pressure was brought to 55 pounds per square inch each morning.

FM 25-10, paragraph 45, Care of Tires—Extracts: The chief responsibility of the driver in caring for tires is that of proper inflation. Tires should be inflated to recommended pressures and the pressures checked daily with a reliable gauge. Air pressure cannot be determined satisfactorily by looking at the tire. * * *

The most common causes of excessive tire wear are:

(1) *Improper inflation, including under and over inflation and bleeding*.

(2) *Poor driving, including fast starting and stopping and improper use of brakes*.

(3) *Rocks or other foreign material wedged between dual tires*.

(4) *Misalignment*.

(5) *Overloading and improper loading*.

(6) *Improper sizing of tires* (*different size tires on the same axle, etc*.)

Rubber is a strategic material and conservation thereof must be practiced. Note has previously been made of effort of the Chief's office to provide more adequate tire inflation equipment at an early date. In the meantime every advantage must be taken of present equipment to keep tires properly inflated.

Diamond-T 4-ton Trucks.

There are two series of Diamond-T trucks in the hands of field artillery units. Trucks of the first production series are Model 967; those of the second production series, Model 968. Principal differences appear below:

	Model 967	*Model 968*
Engine	Hercules RXB	Hercules RXC
Cu. in. displacement	501	529
Torque at 1,000 r.p.m.	350	390
Front axle	Wisconsin F-2090-TW	Wisconsin F-2090-W
Brake lining	¼″	⅜″ (F) ¾″ (R)
Bogie	Timken SFD-153-TW with 7⅞″ 10-spline shafts and 16″ × 3½″ brakes.	Timken SFD-154-W with 2″ 16-spline shafts and 17¼″ × 4″ brakes.
Clutch	Borg and Beck 14-inch.	W. C. Lipe 15-inch

Three-quarter inch brake lining would have been desirable on front axle brakes, but it was found impossible to use it because of the space required by the steering drive end. The brakes on Model 968 are of an improved type and are interchangeable with those used on the 155-mm howitzer, M1918A1. The 2-inch axle shafts throughout on Model 968 result in all differential assemblies being interchangeable. Those of this model manufactured recently are equipped with standard QMC-SAE panel instruments and certain of the other newly standardized parts such as interchangeable oil filters. Further, the wheel bearing spread of Model 968 is a little wider than that of Model 967 and tires up to 11.00 × 20 can be installed as an option, if desired, with adequate clearance for chains or traction devices. Both models have 9.00 × 20 tires initially; the oversize tires cannot be installed on Model 967.

The Field Artillery Board's report of comparative test of 11.00 × 20 and 9.00 × 20 tires on these trucks indicates definite advantages for 11.00 × 20 tires. The Chief has recommended that tires of this size be provided on all 4-ton trucks manufactured hereafter and that they be made available as replacements on all Model 968 trucks.

Maintenance Manuals for 4-ton Trucks.

The original maintenance manual furnished with the Diamond-A 4-ton 6 × 6 truck Model 967, was an abbreviated one and bears the Diamond-T Motor Car Company imprint "Form 967-2." Later a complete manual was published bearing the Diamond-T Motor Car Company imprint "Form 967-3" as well as the War Department designation "T-M-10-1603." Sufficient complete manuals of the latest edition for 100 per cent replacement were distributed to Motor Parts Depots for automatic distribution. The maintenance manual for the Model 968 is not yet available, but will be furnished Motor Parts Depots as soon as published. It is evident that troops in the field are not aware of the difference in maintenance manuals and in many cases they either have none or have the wrong one. A spot check at Fort Bragg made recently shows the following:

One regiment has Form 967-2, but has Model 968 trucks.

One regiment has no maintenance manuals.

Certain replacement center units have both manuals.

Organizations equipped with 4-ton 6 × 6 trucks which have not received TM-10-1603 (Form 967-3) should request them by letter to the Quartermaster Motor Transport Depot in the area *where they originally received their trucks*, since the manuals were sent to the depot in that area and not necessarily the area in which the organization is now serving.

Drive-away of Trucks.

Several reports have been received of confusion and of unsatisfactory service of vehicles by the manufacturer at motor vehicle factories when field artillery troops have arrived to take drive-away delivery of trucks. It is suggested that officers ordered to motor vehicle plants to accept drive-away delivery communicate personally prior to departure with the officer in charge of Motor Inspection Service, Fort Wayne, Detroit, Michigan, for factories in the Detroit area. For other areas he should communicate with the Senior Army Motor Inspector at the factory designated to furnish the vehicles. This will insure proper arrangements being made prior to the arrival of the troops and will eliminate such conditions as occurred when 250 men arrived at a factory on Sunday and were unable to make contact with responsible persons to take delivery of the vehicles.

FROM THE FILES OF THE OFFICE

MEMORANDUM TO:
.....
.....

SUBJECT: Issue of Certain Third and Fourth Echelon Tool Equipment to the ..... Field Artillery.

1. For years there has been, and continues to be, a constant tendency for operating organizations to go beyond their proper field in motor maintenance and to urge the addition of item after item to their tool sets, in contravention of one of the basic principles upon which the

present system is based; namely, providing these organizations with facilities to meet "the normal needs of operation (not the unusual needs)." Further, during study and experimentation which preceded the establishment of the present system and the provision of means to implement it, the Field Artillery Board concluded that no *special* facilities for motor maintenance were needed by Corps and GHQ artillery regiments. AR 850-15 definitely indicates "close and adequate support by the supply service motor maintenance units" for *all* operating organizations. If, in fact, certain organizations are finding a need for some third and fourth echelon shop equipment, they lack that "close and adequate support" upon which the system is predicated. The solution is obvious.

2. In connection with the subject requisition your memorandum states: "Records of this office indicate that the following maintenance organizations are located at Camp .....:

.....

.....

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.....

.....

If all these units are active, are equipped, and are operating, the need for 3rd and 4th echelon shop equipment by operating organizations at Camp is not apparent; if these units are not equipped, it is likely that operating organizations there are in need of some third and fourth echelon tools.

3. While the Chief of Field Artillery will urge the provision of all facilities which experience indicates as necessary to the normal operation of field artillery motor maintenance units, he is impressed with the necessity to resist constantly the addition of "luxury" items of equipment to the end that the mobility of the arm and the already-too-limited ammunition capacity of field artillery units be not reduced further.

4. It is recommended that the third and fourth echelon equipment requested by the inclosed requisition be not provided, but that inquiry be made into the adequacy of motor maintenance facilities at Camp and the remedial action, if any, indicated thereby be effected.

LIGHT RIFLE FOR FIELD ARTILLERY

The need of a light weapon to replace the pistol and revolver — weapons primarily designed for defense, and effective only in the hands of experts at short ranges—has long been apparent. It was first suggested by the Infantry in the fall of 1938 when they recommended the development and adoption of a light carbine for their men whose duties were such as to prevent the use of the regular shoulder rifle. The recommendation was not favorably considered at the time as it was felt that the disadvantages of introducing another type of rifle greatly outweighed the advantages.

Lessons already learned from the Second World War, however, have emphasized this need. The use of the armored division and airborne and parachute troops has brought about a fluid state in the modern battlefield and rendered position areas and installations many miles in rear of the so-called front lines very vulnerable to attack. It has, therefore, become vitally necessary to arm all men more effectively for both defense and offense.

Consequently the development of a light rifle was again urged by the Infantry; last year the Ordnance Department was directed by the Secretary of War, on recommendation of the Chiefs of the Combat Arms, to develop such a weapon with characteristics, in general, as follows: (1) Weight not to exceed five pounds including sling. (2) Range effective up to 300 yards. (3) To be carried by a sling or some comparable carrying device. (4) The rifle to function with a cartridge of caliber .30.

Further consideration of possible tactical uses indicated that the weapon should be capable of either semiautomatic or automatic fire.

Tests of the proposed rifle were set for February 1, 1941, but due to unforeseen difficulties in production of the ammunition, the date was postponed to May 1, 1941. On the latter date pilot models were submitted by nine different competitors—arms companies or individual inventors—and, as it was apparent that all were suitable for functioning tests, a schedule of tests was set up at the Aberdeen Proving Grounds which permitted each entrant to submit his weapon individually.

As a result of these tests certain changes in the specifications of the rifle were indicated. For example—it has been deemed advisable to remove the requirement for full automatic fire, making the rifle strictly semiautomatic.

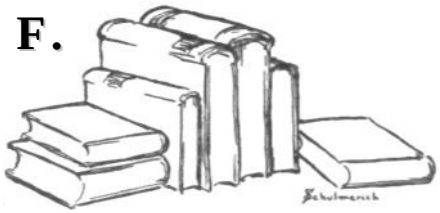
Service test of the rifles will begin September 15, at Aberdeen. These tests will cover a period of approximately two weeks and will be conducted by personnel of the Infantry Board under supervision of Lt. Colonel Walter G. Layman, of the Office of the Chief of Infantry.

Consequently within the next few months there will be selected and put into production a light-weight rifle which will permit our men, now armed with the pistol, to perform their basic military functions with a minimum of interference and, in addition, make them available for sustained offensive or defensive action.

The proposed basis of issue for the Field Artillery is one light rifle per enlisted man, except NCO's of the first four grades and men armed with the automatic rifle.

BOOK REVIEWS

By H. S. F.



"Fools say that they learn by experience. I prefer to learn by other people's experience."

—BISMARCK

DYNAMIC DEFENSE. By Liddell Hart. Faber and Faber, Limited, London. 2/6.

Many reputations have suffered in the current war and not the least of these is that of Liddell Hart. Yet it has always been this reviewer's opinion that those who hastened to condemn him were, to a large extent, unfamiliar with his work. Certainly anyone who has studied the whole body of his writing is bound to admit that he was amazingly accurate in his forecasts of the war.

This little book is a strong indictment of the British pre-war Imperial General Staff, particularly with regard to the problem of mechanization. The tank was a British invention, and in the 1920's the British had a clear superiority over all other armies in this weapon. Yet this lead was deliberately permitted to diminish, until finally, it was taken over by the Germans. Nor was this lead lost without ample warning of its consequences; the author points out how both he and General Fuller repeatedly urged the importance of the tank. Liddell Hart's writings on tanks date as far back as 1919, and in many of them, as he clearly demonstrates by apt quotations from his previous books, he describes and suggests tactical and stategical methods for armored troops which the Germans utilized in their victories in 1940. The author likewise shows how air power, the significance of the air-armored team, and antitank and antiaircraft defense, were neglected by the pre-war British Imperial General Staff.

The author insists that the French and British were not beaten because they stood upon the defensive, but rather because they were lured into making an ill-advised offensive into Flanders. Once they had been drawn out of their defensive positions the Germans attacked their flank and rear through the Sedan area—which had been seriously weakened for the Allied offensive—and the trap was closed.

Liddell Hart maintains that to insist upon the offensive at all times is absurd. An army should be able to shift rapidly from the offensive to the defensive and back again, in various sectors and at various times, as the exigencies of the different situations demand. He further holds that the defensive, well handled and bolstered by modern weapons, will yet be supreme—and about this there may be considerable doubt. But if our antitank enthusiasts are correct, and if the tank can be stopped or seriously checked, then the defensive actually will be supreme, and his views vindicated.

A ROVING COMMISSION. MY EARLY LIFE. By the Rt. Hon. Winston S. Churchill. New York, Charles Scribner's Sons, 1941. $1.75.

This book, first published in 1930, is here reprinted with, it must be added, the addition of a wholly inappropriate foreword by Dorothy Thompson. For the book has nothing whatever to do with current affairs, and is instead primarily a record of military adventure in a series of wars all of which are now more than forty years in the past.

Churchill was born in 1874. His father was Lord Randolph Churchill, the famous Conservative leader, and his mother was Jennie Jerome, an American and a noted figure in nineteenth century society. His grandfather was the seventh Duke of Marlborough. With such a background it is not surprising that Churchill's earliest memories concern the greatest men of that period. After an undistinguished record at Harrow—Churchill detested the classical languages which seem to have been a predominant feature of the curriculum—he went to Sandhurst, where he did much better. In 1895 he passed out of the military academy and was gazetted to the 4th Hussars. In addition to service with this unit, Churchill was to serve, at one time or another in Asia, Africa and Europe, with the 31st Punjab Infantry, the 21st Lancers, the South African Light Horse, the Oxfordshire Yeomanry, the 2nd Grenadier Guards, the Royal Scots Fusileers, and the Oxfordshire Artillery.

Shortly after joining his regiment Churchill obtained leave and went out to Cuba, where he was attached to the Spanish army engaged in suppressing the revolution. He records that here he observed his twenty-first birthday under fire. Returning home, he went to India with his regiment, and soon developed into a first class polo player. In India he served in two campaigns on the northwest frontier, with the Malakand Field Force and in the Tirah Expedition, and yet found time to write a history of the campaigns and a novel. In 1898 he served with Kitchener in his victorious campaign in the Sudan, about which he also wrote a book. In 1899 he left the army, stood for Parliament as a Conservative, and was defeated. When the Boer War broke out Churchill went out as war correspondent for the *Morning Post*. He was taken prisoner, escaped, and and after a series of spectacular adventures succeeded in getting to Portuguese East Africa. He returned to the British forces, rejoined the army, and served until the capture of Pretoria. Churchill then went home to

England, and was triumphantly elected to Parliament. Here the book ends.

From this book Churchill emerges as a brash and somewhat foolhardy young man, self-confident and ambitious to equal or exceed the accomplishments of his brilliant ancestors. At that stage of life he was a Tory in politics with little use for what we commonly term idealism. He tells his story with abundant humor, and those familiar with Churchill's books need no recommendation for his literary style.

LEADERSHIP FOR AMERICAN ARMY LEADERS. By Major Edward Lyman Munson, Jr. The Infantry Journal, Washington, 1941. $1.00.

This little book might well be subtitled, "or. How to Make an Efficient Command." In reading it one consciously or unconsciously measures oneself against the do's and do not's outlined and explained by the author, for it is the type of book which invites self-criticism and analysis. Every possible relationship between the leader and his subordinates is discussed, even to a few words upon the touchy subject of political and social problems. Brief and easily read, the book is never pedantic or dull, and is rather a guide to the problems of leadership than an exhaustive treatise. Senior officers may find in it many useful suggestions, and junior officers certainly will.

ELIAS BOUDINOT, Cherokee, and His America. By Ralph Henry Gabriel. The University of Oklahoma Press, Norman, 1941. 190 pages, $2.00.

This is the true story of a Cherokee Indian from Georgia who in 1818 went to Connecticut to be educated in a Foreign Mission School. Here he met and won Harriet, the daughter of Benjamin Gold. One can imagine the hostility of the white Puritans to the marriage of their daughter to a southern Indian. Boudinot became one of the leaders of the numerous and powerful Cherokee Nation, and was concerned in their forced removal from their plantations in Georgia to the prairies of Oklahoma. This tale of the Indian removal is a tragic one, for these people were mostly civilized, owned farms, had their own schools and churches, and even their own alphabet. Boudinot's part in the campaign for removal (many of the Cherokees favored it as they felt it would end their troubles with the whites in Georgia) gained him the hostility of other factions of the tribe, including that of John Ross. Army people who have been stationed at or passed through Fort Oglethorpe will remember John Ross' old home near the post. The book ends with Boudinot's murder by some of his opponents. His name is greatly revered in Oklahoma today. The author, Dr. Gabriel, is a member of the faculty at Yale University, and this work is based on source material.

THE BAD MAN OF THE WEST. By George D. Hendricks. The Naylor Company, San Antonio, 1941, $3.50.

The author of this book has an M. A. from the University of Texas, and until his induction into the military service he was a high school English instructor. He is now a soldier at Camp Bowie, Texas. The western bad man was the result of unusual conditions—i. e., the Civil War and the rapid development of the vast trans-Mississippi regions—and therefore, while he was certainly no Robin Hood, he differed decidedly from the ordinary criminal.

BRITISH CITIES AT WAR. By James L. Sundquist. Public Administration Service, Chicago, 1941. $1.00.

A scholarly and analytical account of the measures taken by British municipalities to alleviate the effects of air raids.

SOCIAL CASE WORK IN NATIONAL DEFENSE. By Pauline V. Young. Prentice-Hall, Inc., New York, 1941. $2.50.

With cool realism Dr. Pauline V. Young faces the facts of national emergency and quite literally gets down to cases. Her book *Social Case Work in National Defense* is singularly free from misty generalities and abstractions. She presents numerous cases in the process of disorganization and underlines the factors contributing to the unhappy conditions.

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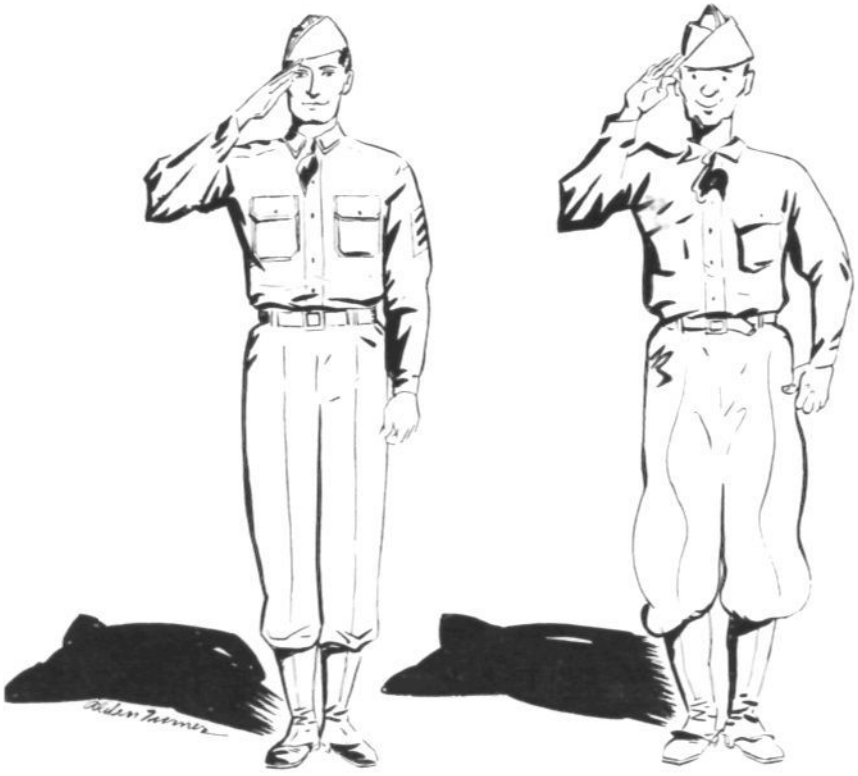

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