

The
FIELD ARTILLERY
Journal



IN THIS ISSUE:

Marches

AUGUST, 1942

ATTACK

by F. O. MIKSCHÉ

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GREETINGS and all good wishes to the hundred officers of the Brazilian Army who have just subscribed to the JOURNAL. Our international flavor constantly becomes stronger: not only are our own units scattering farther and wider, but officers of our allies are finding the JOURNAL indispensable from Iceland to India (around the globe in any direction). We welcome their cooperation, and look forward to giving our members material from these variegated sources.

THANKS TOO to those battalions which are 100% members—five more in the last week alone!

IT IS EARLY to try to draw definite conclusions from recent events in Libya and Egypt. One item, however, appears to be a fact: the solid power of both Axis and Allies lies in the "old-fashioned" fighters and weapons. Transport was new, yes—tanks, armored troop carriers, and planes are of comparatively recent development. But *artillery* was what dislodged the British, and *artillery* stopped the Nazi advance in Egypt. 88's had their effect on British tanks, 25-pounders stopped the Mark IV's.

Men more than played their part, too. Nazis and Eyeties were thoroughly whipped by Maoris who charged with bayonets, and South African and other gunners, unable to see from conventional positions, ran their pieces far out in the desert to get the necessary observation and still have short communications to the guns. All honor to these!

WE REGRET that this issue concludes the fascinating diary of the Marquis de la Falaise. It has aroused tremendous interest—there is no substitute for personal experiences well told.

DURING FEBRUARY the Circulation Department made more than 4,000 changes of address. It is not that bad right now, but changes are still plentiful. We cannot trace you down through official orders—there isn't time. If you want your JOURNAL to reach you promptly, or at all, please send us your proper address in LEGIBLE form.

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The Field Artillery Journal

"Today's Field Artillery Journal is tomorrow's training regulations."

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Authors alone are responsible for statements made. No articles are official unless specifically so described.

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A NEW COMMANDANT, F. A. S.

On June 30th, Brigadier General George R. Allin, President of the U. S. Field Artillery Association and Commandant of the Field Artillery School, was retired from active military service. He continues as our President, but is succeeded at the School by Brigadier General Jesmond D. Balmer, another staunch friend of the Association.

Brigadier General Jesmond Dene Balmer was born at Pullman, Washington, on March 30, 1895. He attended the University of Washington and enlisted in the Army on September 29, 1917, serving as a private and sergeant until June 1, 1918, when he was commissioned a temporary second lieutenant of Field Artillery.

PROMOTIONS

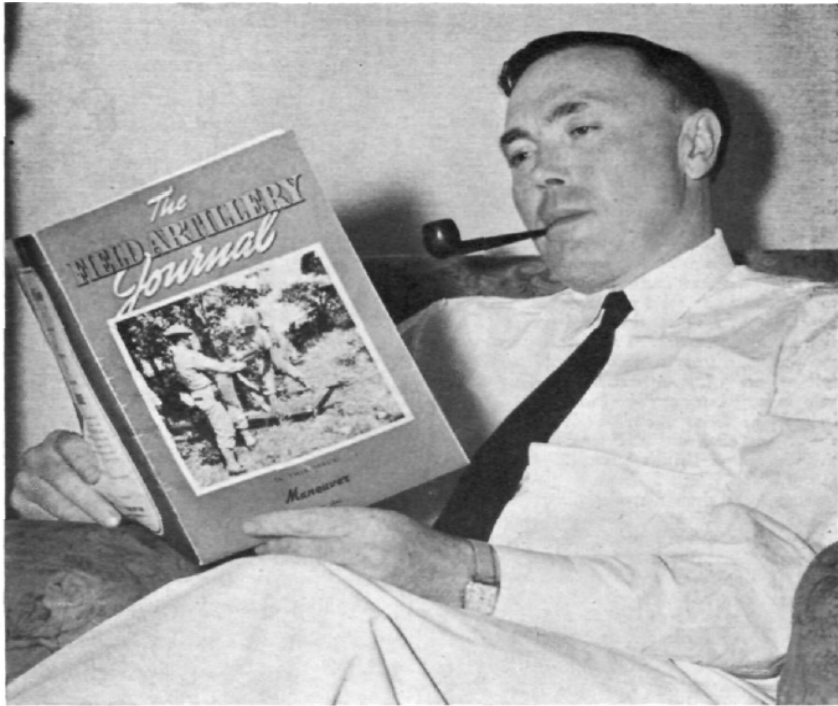
General Balmer was promoted to first lieutenant on April 8, 1919. He was commissioned a first lieutenant in the Field Artillery of the Regular Army on July 1, 1920; promoted to captain on January 1, 1934; to major on July 1, 1940; to lieutenant colonel (temporary) on September 15, 1941; to colonel (temporary) on February 1, 1942, and to brigadier general (temporary) on June 25, 1942.

SERVICE

As an enlisted man, General Balmer served with the 346th Field Artillery at Camp Lewis, Washington, from September, 1917, until April, 1918, and in April, 1918, went to France. Upon being commissioned, he was assigned to the 101st Field Artillery, later transferring to the 4th Field Artillery Brigade. He served at St. Mihiel and in the Meuse-Argonne Offensive and in January, 1919, went to Germany for service. In June, 1919, he was assigned to the 3rd Army Message Center in Germany and from July, 1919, until October, 1919, served as a special courier in France.

General Balmer returned to the United States in October, 1919, and was assigned to Camp Bragg, North Carolina, where he served with the 21st Field Artillery until March, 1920. He then went to Camp Benning, Georgia, to attend the Physical and Bayonet Training School until April, 1920, when he went to Camp Jackson, South Carolina, as an Instructor in bayonet training. From June, 1920, until August, 1920, he served as an Instructor of the Army Olympic Games entries and in August returned to the 21st Field Artillery at Camp Bragg. He transferred to the 17th Field Artillery there in September, 1921. He became Provost Marshal at Fort Bragg in June, 1923.

In September, 1925, General Balmer entered the Field Artillery School at Fort Sill, Oklahoma, and was graduated



Courtesy Washington Post

Brigadier General Jesmond D. Balmer

in June, 1926, remaining there for duty with the 1st Field Artillery. In July, 1926, he became also the Personnel Adjutant of the Field Artillery School and in July, 1927, was named Assistant Adjutant there. He became Assistant Secretary of the Field Artillery School in June, 1928, and in July, 1929, was designated Secretary of the school, serving also as an Instructor there.

General Balmer went to Fort Myer, Virginia, in July, 1932, and in October, 1932, was assigned to duty at Fort Stotsenburg, Philippine Islands with the 24th Field Artillery. Upon his return to the United States, he became Professor of Military Science and Tactics at Purdue University, Lafayette, Indiana, in September, 1935.

In August, 1936, General Balmer entered the Command and General Staff School at Fort Leavenworth, Kansas, and was graduated in June, 1937. He then became Professor of Military Science and Tactics at the University of Florida. In September, 1938, he entered the Army War College in Washington, D. C., and was graduated in June, 1939. He joined the Infantry School staff at Fort Benning, Georgia, as an Instructor in Field Artillery Tactics and in June, 1941, he entered the Naval War College, Newport, Rhode Island, to take the Command Course. In January, 1942, he was assigned to duty in the Office of the Chief of Staff in Washington and in March, 1942, was assigned to Operations Division of the War Department General Staff. He was named Commandant of the Field Artillery School at Fort Sill, Oklahoma, in June, 1942.

MOTORIZED MARCHES



Major Dr. Mann, in *Artilleristische Rundschau*,
July, 1941

*The advance into Russia: Traffic control detail
signalling to column by means of small discs.*

Movements of motorized units are among the most difficult tasks confronting the commander. This is especially true when units are large and when they involve various types of transportation. In the motorized march, there is rapid reaction, positive or negative, to every order; hence, clear foresight and sound decisions are absolutely essential.

There is a difference between *non-tactical* and *tactical* marches. In the first instance, the primary objective is to bring the command to its destination in the minimum time and with the minimum of untoward events. In the second case, the primary objective is to bring the command to its destination ready for action, in the most advantageous tactical formation. In the non-tactical march, the column normally will be formed according to classes or types of vehicles, and a quicker and smoother march will result. In the tactical march, such disposing of vehicles by type seldom will be possible.

The ideal form of march column is one made up of serials, each of which consists of a small unit (say a unit having 30 to 40 vehicles). Under ideal conditions, there should be an interval of from 3 to 5 miles between serials. This enables the serial to maintain a favorable speed, and results in a minimum of strain on the drivers. In the case of non-tactical marches, the movement is further facilitated when the heaviest and slowest vehicles in the serial are placed at the head of the serial.

It is not always possible to attain the ideal just described. However, difficulties often may be alleviated by moving in

small groups over several roads. It is always to be remembered that the rear elements of a long column arrive at the destination much later—perhaps hours later—than the leading elements; and that they (the rear elements) must be given time (perhaps the next day) for servicing and repairing their vehicles.

There are three important considerations about which the commander of a motorized unit must concern himself before undertaking a march:

- a. Reconnaissance of the route of march.
- b. Repair and maintenance of the roads involved.
- c. Control of the column.

Reconnaissance of route is a fundamental task which may be neglected only when the march is to be made on good highways under peacetime conditions. The reconnaissance should be entrusted only to an officer or to a competent NCO, and the reconnaissance party in addition should include several motorcyclists. The reconnaissance should be made piecemeal, so that information on the first part of the route is available before the column moves out. The commander of the reconnaissance party must be given a clear-cut mission: exactly what and where he is to reconnoiter; and exactly when, where and how he is to report. The technical aspects of the reconnaissance are covered in the training manuals; however, in all cases report should be made of all other friendly forces encountered on the route, and of all enemy activities observed.

The commander of the reconnaissance party usually must assign sub-missions to members of the party. As soon as any sub-mission is completed, a report should be sent back to the commander of the column. The submissions should be selected so that, if necessary, any impassable part of the route may be by-passed or improved. Careful study of the map before setting out on the reconnaissance is essential. Of course, a timely departure on the reconnaissance mission is likewise essential.

If a march is to extend over several days, it is often desirable to send out a reconnaissance party travelling one day ahead of the column. In this way, information on one day's route can be made available in the bivouac of the night before, and all details of the march order can be worked out deliberately. This system requires the setting up of two reconnaissance parties, which operate by leapfrogging each other.

If the reconnaissance (and weather) reports so indicate, the commander of the column should set up a *Route Improvement Detachment* (RID). The RID might consist of a party of men (perhaps as much as a platoon) equipped with pioneer tools, several trucks loaded with gravel and other road-surfacing materials, and, if practicable, a towing tractor. The mission of the RID is to travel ahead of the column, and to improve such sections of the road as threaten to hold up progress of the column. The work of the RID is likely to be time-consuming; therefore, the detachment should move out well ahead of the column.

The matter of control of the column itself is of vital importance, and must be given careful consideration. The chief agency used in effecting proper control is the so-called *Convoy Regulating Detachment* (CRD). The CRD normally consists of one officer, one NCO, (each in motorcycle with sidecar), and six to eight motorcyclists (all with motorcycles, solo). In general, the more motorcycles that can be given the CRD, the better. If the route to be traversed is very difficult—that is, if there are large towns to pass through, if there is heavy traffic on the roads, if there are many cross roads, or if the terrain is mountainous—then two CRD's should be constituted, and should operate by the leapfrog method. The commander of the CRD must be a competent officer who can "speak up" when in the presence of any amount of rank. He must have a passion for motorcycling and a knack for getting at the root of traffic problems.

Prior to the beginning of the march, the commander of the column and the commander of the CRD confer over the map, and, preferably, over the reports of the reconnaissance party. The two commanders determine as best they can where the critical traffic-control points are likely to be. The CRD then sets out, covering one section of the route at a time. The commander of the CRD must always keep in mind the locations of the next critical points, and he must always know where to find the column commander, or the latter's second in command.

All members of the CRD should wear distinctive arm bands.

The tasks of the CRD are many and varied. The CRD-day begins as the column moves out at the start of the march. At that time, it is the business of the CRD to keep the road free of interfering traffic. Later, the CRD posts guards at all important crossroads. As the column moves through an intersection, all traffic from other directions is held up, and is allowed to continue only after the intersection is clear.

The CRD maintains contact with all elements marching ahead of the column. When one of these advance elements halts for an extended time, word to that effect must be sent back immediately to the column in order that the latter does not pile up unexpectedly on the tail of the former. The CRD also reports back to the column all information concerning any difficult or significant aspects of the terrain. If the occasion demands, the commander of the CRD may recommend that the column be halted until some question or difficulty is cleared up. For example, the commander of the CRD may report the presence of a soft spot on the road, and may recommend that the column be halted while the vehicles are pulled through one at a time.

The CRD reconnoiters and selects halting places for the column. The progress of smaller faster-moving units which overtake the column must be regulated. The regulation is the business of the CRD, and is performed in cooperation with the commander of the overtaking unit.

The CRD must detect every condition which might result in delaying the column, and must take steps to insure that the delay will be eliminated or minimized. A case in point is travel through towns and cities. Here, it is the business of the CRD to reconnoiter routes through the town, and to post guards at critical points. The commander of the CRD, or his representative, should await the column at the edge of the town and guide it through. If it is a large city which is to be passed through, the commander of the CRD contacts the local police and arranges for their assistance. Obviously, the CRD must know the number of vehicles in, and the length of, the column. If the column has two CRD's, one of them passes on through the city and picks up the normal CRD functions along the route beyond.

The RID described several paragraphs above is *attached* to the CRD, and reports to the commander of the latter at a given time and place.

During night marches, the CRD must be so equipped as to be able to mark clearly all dangerous places.

In any given serial of the column, the motorcycles are grouped as follows: one of them at the rear of the serial; all others just in rear of the head of the column. If the column encounters a traffic guide left by the CRD, the guide's post is taken over by one of the serial's motorcyclists, whereupon the CRD guide rejoins his detachment. The motorcyclist guide of the serial is himself

relieved by a motorcyclist from the next serial, and so on. Under this system, there is no danger that, in a long column, the CRD and the various serials will lose the services of their motorcycles.

All details concerning a march are specified in the march order. Since the order normally must be issued very late, it is advisable for the column commander to issue a warning order, in which general information as to times and detachments to be formed is given. If subordinate commanders and drivers are inexperienced, the order itself should contain considerable detail. In any event, it should contain information concerning the CRD: assembly point, and time of departure (one-half to one hour before time of departure of the main column).

If a column consists of several units, each the size, say, of a battalion, it is preferable that there be a CRD for each unit.

Prior to beginning the march, all drivers of vehicles should be advised in detail as to the characteristics of the route. Especial attention should be given to acquainting the drivers with the names of towns through which they will pass. In case the march is through foreign territory, where the names of towns are strange and are pronounced differently than they are spelled, the instruction of drivers is especially important. In such a case, a good plan is to have the names in question printed or written on a piece of paper, the piece of paper then being pasted on the lower right hand corner of the windshield, in full view of the driver.

Maps should be distributed before the beginning of the march on the basis of a priority list maintained in the unit.

The time of departure set for the march refers to the time of moving out. Therefore, motors should be warmed up beforehand.

The movement proper is considered as beginning at the unit IP, by which point the column has been formed. No unit ever should be required to wait long in place. It should be remembered that every additional hour spent in bivouac is valuable.

At the beginning of the march, the speed of vehicles must be held down, in order that the motors may become properly warmed. The full speed of advance is attained slowly. This speed is predicated on that of the slowest vehicle in the column. One important consideration in this connection is that medium and heavy towing tractors (six to ten tons) cannot travel faster than about 20 miles per hour without damage to the tracks.

Under the regulations, no average and no maximum speed of advance may be specified. The speed of the column is changing constantly, being based on conditions at the moment. One vehicle at the head of the column is charged with setting the pace. That vehicle must *not* be the one of the column commander, since the latter must be free to travel on ahead to reconnoiter, or to fall back to inspect. Continuing inspection of the

column by the commander is a necessity, especially on long marches.

If a vehicle is forced to fall out of the column, the procedure is as follows: the driver of the casual vehicle gives the "pass-me" signal to the driver of the vehicle just behind, and then immediately pulls over hard to the right; there, he proceeds to inspect his vehicle and to ascertain the nature of his trouble. The unit mechanic, travelling in the last vehicle of the serial, stops and gives the driver of the casual vehicle any practicable assistance. If the trouble is corrected, the driver of the vehicle is given explicit directions as to the route being followed by his unit. In no case, however, may he rejoin the unit by passing other parts of the column while they are under way. Experience has shown that such attempts very often result in accidents. Rather, the driver of the casual vehicle must wait for the next long halt. During the halt, he may rejoin his unit.

If extensive repairs are required, the casual vehicle is taken in charge by the Repair Section travelling at the rear of the column. Eventually, the vehicle may be towed to the nearest Shop Unit.

Refueling on long marches is always a difficult problem. If it is necessary to use the mobile supply during the march, then trucks carrying the empty cans should be sent on ahead to the nearest refueling point, with definite instructions as to when and where to rejoin the column. In this way, the cans are always full at the end of the day's march.

Short and long rests must be made throughout the march. It is convenient to have the first short halt at the IP. During this halt, minor adjustments may be made and minor difficulties corrected. The next short halt may be made in three-quarters of an hour, and thereafter at hourly intervals. One long halt—*two and one-half hours*—should be made midway in each long march. During this long halt, vehicles may be refueled, and troops fed and rested. The long halt also offers opportunity for the CRD to come in, and for CRD motorcyclists to be relieved by fresh ones. The halting place preferably should be under cover, off the road, but with good approaches. The time at which the march is to be resumed should be announced soon after halting. The drivers, of course, must inspect their vehicles during each halt.

If it is necessary to halt on the road, generous intervals between vehicles and units should be maintained, so that passing traffic may work its way forward by weaving in and out of the intervals. The sizes of the intervals should be specified by order. Guards, equipped with signal discs, must be stationed along the column in order to regulate passing traffic. The guards must be detailed by order before the beginning of the march, and they must not be drawn from the ranks of vehicle drivers. All vehicles must halt hard to the right. Motorcycles are parked between vehicles, perpendicular to the axis of the road. This is in order that the motorcycles may be

ready to go quickly either to front or rear.

Before passing a halted unit, the commander of a moving unit should contact the commander of the halted one. The by-passing of the halted unit should be permitted only when it is clear that the halt will last long enough to enable the proper interval between units to be developed.

The control of a long column on the road is possible only through use of motorcycles. If signal discs are to be used, great care must be taken to give the signals clearly. Each signal must consist of a preparatory command and a command of execution. The latter may be given only when the former has been relayed back to the rear-most element. This system demands careful attention on the parts of drivers and assistant drivers. Such attention is an absolute essential in any frictionless march.

Indeed, the importance of careful attention on the parts of drivers and assistant drivers should be emphasized again and again. Drivers must pay attention to the road, to all other drivers, to all vehicles, to all signs and signals. They must always be on the alert, ready to make decisions covering any sort of emergency.

If a traffic snarl develops, it is the responsibility of all commanders (including subordinate ones) to see that the trouble is quickly corrected. If the trouble cannot be quickly corrected, the commander of the unit which stands before the snarl must immediately send back warnings to following units. This precaution is especially important if there is danger of attack from the air.

Most bad traffic jams and delays arise through inadequate regulation of traffic over bridges (especially over ponton bridges). Often, several hundred vehicles are piled up in front of a bridge, waiting for an opportunity to pass over. According to regulations, there is a Bridge Officer and a Traffic Officer for each bridge. As a column approaches such a bridge, the commander of the column, who will have been advised as to the presence and nature of the bridge by the CRD, travels out ahead and contacts the Bridge Officer. If it develops that a delay is inevitable, the commander halts his column under cover (if possible). He then sends forward to the bridge an officer and several motorcyclists. The officer thus sent forward establishes contact with the Bridge Officer and watches developments at the bridge. He calls elements of the column forward from the halting place as fast as they can be accommodated over the bridge.

Special preparations are necessary in the case of marches made in winter, over roads covered with snow or ice. In such case, every road, even the best, must be reconnoitered before beginning the march. Many slopes which are scarcely noticeable in summer, are impassable in winter. The results of the road reconnaissance must be available early. Based on the reconnaissance information, the column commander decides whether or not to put chains on his vehicles. In this connection, it is

to be remembered that chains used without snow or ice are damaging to tires and chains alike.

In winter, long intervals between vehicles are necessary. Definite times of arrival cannot be specified. Frequently, the time of march is double that which it would be under normal circumstances. Because of the lower speeds and the cold, the drivers become fatigued more quickly. The motorcyclists suffer even more severely than the truck drivers. In fact, it is desirable occasionally to take the motorcyclists out ahead under a leader to a farmhouse or other building where they can warm themselves while the column catches up with them.

Winter marches place a premium on the work of the RID. The RID must be strong enough, and well enough equipped, to take care of all difficulties which may be anticipated. The RID often is the factor which makes a winter march even possible. At some places along the route, it may be necessary to station push-and-pull parties. Each of the parties should be under the command of a competent NCO. Contact must be maintained between the column and all detachments sent out ahead, in order that the commander of the column may be promptly advised as to any enforced delays on the parts of the forward detachments.

The most difficult march of all, however, is the night march, especially the night march without lights. For the night march, there is one dominating principle: Short intervals! Never lose visual contact!

Thus, the principal consideration in a night march must be the holding of vehicles and units close together. The speed of march of course is relatively low. There must be frequent halts, during which the column is closed up and checked. Each driver must have been carefully advised as to the route, and each must have a flashlight. When signalling with the light, the signal must first be repeated to the front (to show that it has been correctly received), and then relayed to the rear. At points where there is no visibility, and at other dangerous points, guides with lamps must be posted. Especial care must be taken to avoid following strange vehicles which somehow have infiltrated into the column. As an aid in eliminating this danger, it is desirable that there be painted on the rear of each vehicle a white distinctive sign.

When the column halts on the road at night, guards equipped with red lamps must be posted 100 yards in front of and in rear of the column. These guards halt all vehicles, and warn them of the presence of the halted column.

Heavy dust calls for measures similar to those just described. In this case, intervals often must be increased. The danger of following strange vehicles must be guarded against.

In summary, it may be said that the march of motorized units demands painstaking planning and preparation, firm and observant leadership, teamwork through the command, and sound training of NCO's and drivers.

MOTORIZED ROAD MARCHES (Controlled)

**STRICTLY
ACCORDING
TO THE
BOOK**



See also the article "Loading of Field Artillery Materiel for Railway Transport" in the June, 1941, issue of this *Journal*.

By Lieutenant Colonel F. H. Canlett, FA

Suppose you are in command of a column of several hundred vehicles and are to make a march of several hundred miles. There are certain restrictions laid down by higher headquarters, but most of the details are left to you. Assume, for the purpose of this discussion, that the route and camp site for the first day have been given, as well as the hour of closing in the new camp site.

A reconnaissance of the route must be made to determine road conditions, traffic conditions, and locations of the IP, halts, and control points. If a physical reconnaissance is impracticable, a map reconnaissance must be made. This is quite normal when the total march is of such length that a reconnaissance detail cannot, after making the reconnaissance, return to the troops some time prior to the starting hour. When a map reconnaissance is made, it should not be confined to the study of one map, but all available information should be examined, including that to be had from gas stations and highway patrolmen.

COMMAND AND RECONNAISSANCE DECISIONS

IP. The first step is the selection of an initial point (IP). A study should be made of the locations of all components

of the march column and the road net available to them. The IP should then be selected at the nearest confluence of roads from the individual locations where road or traffic conditions stabilize, and where no unit will be forced to back-track. Thus the exit from a post or bivouac onto a main road is a logical IP.

Reconnaissance. The second step is to block off the route from the IP into sections containing like road conditions. For instance, in a 100-mile trip, considering carefully the capabilities of the vehicles involved and whether the march is to be made by daylight or dark, we might find the first 20 miles good gravel road, necessitating an average speed of 20 MPH. This might be followed by 30 miles of good hard surfaced road which would allow an average speed of 25 MPH. In turn this might be followed by 10 miles of poor range road at 10 MPH; then by 30 miles of 4-lane super highway at 30 MPH and finally by 10 miles of good hard surface at 25 MPH. These figures do not mean that all vehicles will be able to maintain such speed at all times over the particular stretch of road, but that they will be able to *average* that speed and that the variations therefrom will not be of long duration. These points of road change

may be called *control points* and should be located where they can be easily and definitely located on the ground, even though such locations do not exactly coincide with the change in road conditions. Large towns and cities should be avoided as control points, since the accurate location of an exact point within them cannot easily be determined both on the ground and on the map, and also routes for troop movements through cities are often left to the local police. Highway intersections and very small towns make ideal control points.

Having blocked off the route and determined the average speed for the type vehicle involved over each section, the march time for each section can be determined by simple multiplication or the use of a time-distance graph and the total march-time of the lead vehicle of the column computed, providing there are no halts.

Halts. The number and duration of the halts is a command decision and should be stated in the march order. It is customary to halt a motor column for about 15 minutes at the end of the first hour and for 10 minutes every two hours thereafter. A prolonged noon halt may or may not be prescribed. Some organizations prescribe that the 10-minute halts will be made simultaneously from the hour to 10 minutes past the hour. Picture what happens when a column of several hundred vehicles halt simultaneously on the hour—some vehicles are halted for driver relief in the middle of a busy city street and other vehicles have gone from zero to a few yards outside the motor park! No; halts must be prescribed by location. If a physical reconnaissance has been made, halts can be accurately located and marked. If only a map reconnaissance has been made, halts can be prescribed only within certain control point limitations wherein the map shows that the shoulders probably will be suitable for halts, and where the time-distance from the IP approximates the desirable interval between halts. Now if the halt is to be for 10 minutes and the second vehicle is only a few seconds behind the first and so on, the area picked for the halt must be large enough to accommodate all of the vehicles in that particular group at the same time at the prescribed spacing. Therefore the march column must be divided into groups called *serials*, whose size depends on road conditions and tactical considerations.

The distance between vehicles at halts is also a command decision and should be stated in the march order. If vehicles close up at a ten-minute halt, the BC can see all his vehicles together at least every two hours to check on their condition or give added instructions to drivers; but at the same time the unit becomes vulnerable to air attack. If it closes up at the prolonged noon halt the battalion commander receives a similar opportunity to see all the vehicles together, and also simplifies the feeding of a hot meal from the battery kitchens. The prolonged noon halt may often be accomplished off the road in a concealed location.

Vehicle-distance. FM 101-10, in arriving at its time-length of .08 minutes per vehicle, states that the figure is based on safe driving distance. This is a very elusive amount, and as computed in the same FM 101-10 is as follows:

<i>Speed (MPH)</i>	<i>Road space per truck</i>
10	23.5 yards
15	35.5 "
20	47.0 "
25	59.0 "
30	70.5 "
35	82.0 "

Imagine trying to get all our drivers to memorize this table and then training them to comply with it! The figures quoted above may be the averages in a mixed column, but the average safe driving distance depends not only on speeds and materiel but also on the human equation. The limit of one's hopes is to train drivers to maintain a set distance of a certain number of yards.

The distance to be required over and above the theoretical "safe driving distance" depends upon the tactical situation. It is generally conceded that if vehicles are spaced at great distances, they are less vulnerable to air attack, while vehicles closely spaced are better prepared for resistance against mechanized attack. Furthermore, it is usually desirable and frequently necessary to occupy as little road space as possible. All these factors must be weighed and a command decision made to fit the particular case. If the march is to be made in the zone of the interior and is not a practice for combat zone marches, it appears that a closed column would be desirable. If in the combat zone and we definitely have air superiority, the vehicles might also be closely spaced, whereas if the enemy has air superiority they should be infiltrated. If, however, the enemy has both air and mechanized superiority, decision is difficult. In any case, the distance between vehicles in the march is a command decision and should be stated in the march order. SOP (Standing Operating Procedure) can not fit all types of combat situations.

March units. As long as road and traffic conditions vary, speeds of individual vehicles and columns of vehicles will fluctuate. Hills, stop lights, and other obstructions will cause individual vehicles to slow down or speed up momentarily, causing the set distance between vehicles to fluctuate. Also when a change in average speed is encountered, the time-length of a column will change temporarily. The longer the column is without a break or cushion, the more this fluctuation is magnified and the more whip is developed. This accordion effect can never be entirely eliminated, but by breaking a long column of vehicles into smaller groups called march units, with the lead vehicles of each march unit traveling at a set average speed, it can be greatly reduced and controlled. Thus the necessity for breaking the column into march units depends primarily on the terrain, while the size of the march unit depends on the tactical organization. The smaller the group, the less the fluctuation will

pyramid, and the more groups (each with its accompanying cushion), the more road space will be required. From the tactical standpoint, it is highly desirable to maintain combat units intact, so a march unit should be composed of the smallest complete tactical organization. In the Field Artillery such an organization is the battery; experience has proved that its 15 to 25 vehicles make a very satisfactory march unit. March units of comparable size and tactical entity may be formed in other arms or services.

Cushion. If individual drivers strive to maintain a set distance between vehicles, minor individual fluctuations will be taken care of within the march unit by slight variations in these distances. If a pace-setting vehicle is established as the lead vehicle of each march unit and it strives to maintain the set average speed, variations in speed and distances of vehicles within one march unit will not affect the march unit following. However, changes in set average speed will change the time-length of the march units when fixed distances are prescribed. Thus, if a column of seventy-two vehicles spaced 100 yards apart and divided into four march units of eighteen vehicles each travels at fifteen miles an hour, the time-length of each march unit is 4 minutes; if it changes to an average speed of 30 MPH and the pace-setter of each march unit maintains the average speed set between control points, the time-length of each march unit becomes 2 minutes, leaving a gap of 2 minutes between the last vehicle of one march unit and the pace-setter of the following unit. This gap is commonly known as a cushion. If the column had been started with four minutes between pace-setters on the better road at a speed of 30 MPH, this cushion would have been present at the start and on entering the slower 15 MPH road would have been completely absorbed. In so operating it absorbs the column elasticity within the small march units instead of pyramiding it throughout the entire column. This operation does not take place with mathematical precision at the exact point of change in speed; there will necessarily be a short transition period, and the set average speed is not the lowest speed march units may encounter. March tables should definitely state the time-factor between *heads* of succeeding march units based on the lowest *average* speed expected to be encountered between scheduled halts. The accuracy of this time factor will depend on the state of training of the individual drivers and the experience, judgment and road information of the officer preparing the march table. As stated above, minor variations from the set average speed caused by small hills, etc., are absorbed by slight automatic variations in vehicle-distance.

The custom of prescribing a cushion between the tail of a march unit and the head of the following unit is impracticable. Such a factor is elusive and will exist only accidentally under particular combinations of fleeting circumstances and has no logical basis.

If it is important to reduce the occupied road space to the minimum at all times and a slow section of road is to be encountered which will require a large time-distance factor, this factor may be changed most conveniently by scheduling a halt before or after passing the slow road. If the halt is scheduled just prior to the slow road and an increased time-space factor for each march unit is desired, the duration of the halt is increased throughout the entire column by arithmetical progression for each march unit; in this way the march units are dispatched from the halt with increased time-distance factors. If the halt is scheduled just after passing the slow road, the procedure is reversed.

Serials. Having made command decisions as to the vehicle distance and the size of march units, and having prescribed, after a reconnaissance of the route, the average speeds and the time-factors between heads of march units, our column of vehicles could now march indefinitely without congestion and with a minimum whip if the decisions based on the reconnaissance were reasonably accurate. If the column is halted after the first hour, however, all vehicles must either halt simultaneously or close up and disrupt the entire formation. The reasons for not halting a large column simultaneously have already been discussed. Furthermore, vehicles of a column cannot be halted successively for ten minutes unless a cushion of at least ten minutes is prescribed between each two vehicles. This of course is normally out of the question, so that a combination of the simultaneous and successive plans must be developed. Halts must be made successively by definite groups of vehicles, and after each halting group an added time factor of the duration of the halt must be applied. Thus if 10-minute halts are contemplated, 10 minutes must be added to the time-length of the groups. We have already divided the march column into march units, which could very well be the halting units if 10 minutes were added to their time lengths. With a march unit of only 15 or 25 vehicles, this so increases the road space occupied by the column that it is usually more desirable to organize larger groups called *serials*. The size of serials depends mostly on the character of the terrain along the route to be traveled, the primary requisite being sufficient space for halts at approximately the desired times. In the northwestern states it has been found that many halting places can be found to accommodate a unit comparable to a battalion of field artillery, or about 100 to 125 vehicles at 100 yards apart, or from 5 to 7 miles. In certain parts of Texas the serial could conceivably consist of many more vehicles, while if the route were over mountainous country the size of the serial would have to be materially reduced, even in some cases to coincide with the march unit.

Correction factors. Theoretically, if 10-minute halts are scheduled, adding 10 minutes to the time length of each serial should be sufficient, but to take account of the state of training of individual drivers and to insure the preservation of the tactical entity of battalions or

serials it has been found advisable to add also a small safety factor. As driver training becomes more highly developed, this safety factor can be reduced. Usually a safety factor of one minute for each march unit is sufficient. This figure may be called the "serial correction factor."

To compute the time-length of the column, we must also know the *lowest* speed that the column will encounter which will affect more than one complete march unit. As has been stated already, by allowing minor fluctuations in the set distance between vehicles, minor retardations, such as stop signs and momentary halts will be taken care of. If in the low average section of 10 MPH the column encounters some bad road a mile or more in length which slows it down to seven and a half miles per hour, the time-length of the column would be increased. This lowest speed may be determined fairly accurately if a physical reconnaissance has been made, but when only a map reconnaissance can be made it must be estimated by some general rule. In the latter case a correction factor may be applied to the low *average* speed; it is usually satisfactory to take a low speed of about 20 or 25% below the low average speed. This factor may be called *the march unit correction factor*. It tends to insure preservation of the tactical entity of march units.

THE MARCH TABLE

All decisions, both command and reconnaissance, that are necessary for the preparation of the march table have now been made. Let us prepare it with the following assumptions:

1. Number of vehicles 270
2. Number of serials 3 (90 vehicles each)
3. Distance between vehicles 100 yards
4. Halts—10 min. after 1st hr. and thereafter every 2 hrs., by serial; vehicles maintain 100-yd. distance; march units close to 100 yds. Noon halt, 1 hr. in concealed bivouac; vehicles will close to 2 yds., btrys. to 50 yds. Noon halt will be marked by column commander; others by serial commanders.
5. Column to close in bivouac by 6:00 PM.
6. Route:
 - IP to control Point "A": 40 miles @ 20 MPH.
 - CP A to CP "B": 60 miles @ 25 " (range road)
 - CP B to CP "C": 10 miles @ 10 "
 - CP C to CP "D": 60 miles @ 30 "
 - CP D to Bivouac: 30 miles @ 25 "

Total distance: 200 miles
 Lowest speed to be encountered: 7½ MPH.
 Our road time can now be figured as follows:

40 × 3'	120'
60 × 2.4:	144'
10 × 6 :	60'
60 × 2 :	120'
30 × 2.4:	72'

Total Time: 516', or 8 hours, 36 minutes.

Ten-minute halts should be scheduled after the first, third, fifth and seventh hours, making a total halting time of 40 minutes. A one-hour halt for hot lunch has been directed; a convenient time for this would be during the halt after the fifth hour, so we may increase that 10-minute halt by 50 minutes, making the total halting time 90 minutes. Adding this to the road time, the total march time becomes 10 hours and six minute. This is the time it will take the lead



Too close on the move, too close or too far apart for a halt. (Signal Corps photo)

vehicle to make the march.

The lowest set average speed as shown by reconnaissance is 10 MPH over poor range roads, but the lowest speed to be encountered has been estimated as 7½ MPH. Our column consists of 270 vehicles × 100 yds. = 27,000 yds. or approximately 15 miles, which at 7½ MPH would consume two hours. Each of the three equal serials would consume 40 minutes, and fifteen minutes between serials adds another half hour to the total time. The time length of the column thus becomes 2½ hours, and if we add to this the march time of 10 hours and 6 minutes, the total time required for the last vehicle to close in bivouac is 12 hours and 36 minutes. Since the column must close in bivouac by 6:00 PM, the head must pass the IP at 6:00 less 12 hrs. 36 minutes or at 5:24 AM. Our column march table looks like this:

Control Point	Est. Miles	Total Miles	Control Speed	Control Time	Total Time	Arrival Time		
						Serial #1	Serial #2	Serial #3
IP	40	40	20	2°00'	2°00'	5:24 A	6:19 A	7:14 A
Halt A				10'	2°10'	7:34 A	8:29 A	9:24 A
Halt B	60	100	25	2°24'	4°34'	10:08 A	11:03 A	11:58 A
C	10	110	10	1°00'	5°44'	11:08 A	12:03 P	12:58 P
Halt D	60	170	30	2°00'	7°44'	2:08 P	3:03 P	3:58 P
Halt Bivouac	30	200	25	1°12'	9°56'	3:30 P	4:25 P	5:20 P
Close				10'	10°06'	4:10 P	5:05 P	6:00 P

The above march table shows an extreme situation wherein a bottleneck in the form of a very slow 7½ MPH range road appears. The time-length of the column depends on this bottleneck. If serials are dispatched at a closer time-distance than the time required to pass the bottleneck, the inevitable result is for succeeding serials, march units, and vehicles to jam up and halt on the leading element at unforeseen and possibly exposed places. No time is gained, and confusion and increased vulnerability usually result. Keeping in mind that the end of a march is only the beginning of the next operation and that the march is ended only when the last vehicle arrives, it is far better to avoid confusion and stalling of vehicles by assuring adequate staff reconnaissance and planning, rather than to try to

is allowed for the time-length of his serial of 90 vehicles. Forty minutes times 60 seconds equals 2,400 seconds; divided by 90 vehicles gives 26 2/3 seconds per vehicle. Suppose his serial is composed of Headquarters Battery, 27 vehicles; Battery A, 14 vehicles; Battery B, 14 vehicles; Battery C, 14 vehicles; and Service Battery, 21 vehicles, then he should allow Headquarters Battery 12 minutes, Batteries A, B, and C each 6 minutes and Service Battery 10 minutes (26 2/3 times number of vehicles taken to nearest even minute). Thus the time of departure shown on his march table would read: Headquarters Battery 5:24; A, 5:36; B, 5:42; C, 5:48; and Service, 5:54 A.

MARCH TABLE NOTES

Clearing IP. The ideal way of clearing an IP is for all vehicles to clear in the shortest possible time without halting and at the distance required by tactical considerations. However, some other factors must be considered. Both in peace and war there will be other vehicles crossing the IP—military, civilian, or both. The IP may be adequately protected from air observation or it may be in an open plain; it may be at the confluence of main highways, vulnerable to a mechanized attack, or it may be in a protected area. All these conditions must be thoroughly weighed and evaluated and a decision made as to how the IP will be crossed, the main objective being to cross it with march units as intact as possible and with the least confusion. In peace-time, care



Dive bombers attacking pontoon bridge over Wateru river. (Signal Corps photo)

obtain impossible speed under false hopes.

If a special situation exists wherein a particular section of road or a particular intersection must be cleared at a certain time, it may be necessary to shorten the time-length of the column while crossing this point. In this case, the duration of the halt just before or immediately following the particular spot can be progressively lengthened or shortened to meet the requirement. But if reasonably accurate reconnaissance has been made and the march table is based on reasonably accurate road-speed, *no change* can be made in the march time plus the column time-length.

The column march table should be studied by serial commanders and serial march tables prepared, breaking down the column table to show times for each march unit at intermediate control points or "check points," especially to narrow the limitations for halts. It already having been decided and published that a five-minute safety factor would be added to the serial time-lengths and that halts would be for 10 minutes by serial, if the serial commander subtracts 15 minutes from the 55 minutes shown on the march table (5:24A to 6:19A) he will find that 40 minutes

must be taken to interfere with civilian traffic as little as possible. Thus, when the tactical situation permits an approach to the IP to be blocked, march units should arrive slightly ahead of schedule, close up, and halt; this insures passing the IP at the proper time with units intact. When the IP is on a main highway and the movement is to be made with (rather than against) the flow of traffic, vehicles may leave at scheduled march distances. When clearing across the flow of traffic in a four-lane highway, less confusion and interference will result if march units are dispatched closed up to safe driving distance, obtaining the prescribed marching distance gradually and successively from the head of the column by the pace setting vehicle's increasing its speed to the maximum allowed immediately after passing the IP and dropping down to the control speed after proceeding the length of the march unit. However, when clearing across traffic on a two-lane highway, less interference usually results if vehicles leave at sufficient distance for civilians to infiltrate.

Speeds. The control speed has already been determined by reconnaissance, but, with inequalities in road conditions and the requirement that all vehicles maintain

a set distance from the next preceding vehicle, a latitude in *maximum* allowable speed is necessary. This increase should be at least 10 MPH above control speed, and since the control speed should never exceed 30 MPH it is simplest to set the maximum allowable speed for any vehicle at 40 MPH under any and all conditions.

HELPFUL HABITS

1. Synchronized time should be established prior to any unit leaving park.

2. A commissioned officer should ride in the pacesetter vehicle, preferably the heaviest vehicle in the march unit. He is responsible for exact compliance with the march table.

3. A commissioned officer, usually the battalion motor officer, should dispatch the march units from the IP.

4. Blackboards used at certain control points help in notifying all concerned of the time of clearance of preceding units. They can also be used to convey any message to commanders, such as a change in march table due to unforeseen delays.

5. Signal discs (8" discs mounted on handles about two feet long) carried and used by the assistant driver greatly facilitate passing along the column driving signals such as halts, slow down, speed up, extend or close up.

6. After exit from stretches of road requiring reduced speed, pace-setting vehicles should maintain the reduced speed for a distance equal to the respective march unit length. Acceleration will then be effected gradually and undue elongation prevented.

MISCELLANY

Passing Through Cities. Passing through cities in peace time is normally accomplished under police supervision. Probably because of past experience with army march columns over which little control was exercised, civilian police usually desire to close the vehicles up solid and escort the mass straight through, suspending all cross traffic as they pass. This has several disadvantages both to the army and to the civilian populace. If serials are closed up solid, they must be halted for this purpose before entering the city, thus wasting valuable time. Time is again lost after clearing the city in extending to marching distance. If a serial of about 100 vehicles is closed solid about one-half hour is lost on each end of town. In addition to this, the tighter the vehicles are closed, the slower the speed must be for safe driving even though the police assure a right way, making the total time loss even greater. If a column is escorted closed through a city, it ties up all civilian cross-traffic during its passage. This is not a desirable feature in peace time or in the zone of the interior.

It is believed that if army drivers are properly trained and proper supervision is exercised over a column, it can most easily pass through a city at proper distances and at proper speeds without inflicting hardship on anyone.

However, if it is not thought that the state of training warrants such confidence, a compromise may be effected. Vehicles may be closed up solid within march units without much loss of time and escorted by the civilian police as march unit masses. This does not make an unwieldy column and also does not tie up civilian traffic for a long time without a break, but does require more police officers to escort individually the larger number of vehicle groups.

Route Markers. Route markers and route-marking officers are not born, they are made. It is a fallacy to believe that, just prior to a march, an officer and a detail of men can be selected by roster at random and sent out to mark the route. Training in marking routes is necessary for both officers and men. March units must be trained to continue on the road on which they are travelling unless direction is changed by markers, and the officer marking the route must be trained in following a route on the map and in quickly locating places on the ground where markers or traffic control men are necessary. Markers should be equipped with some distinctive marking so that, especially where several units are passing the same point, each unit will recognize his particular marker and not blindly follow a strange vehicle into the wrong bivouac. Markers should always face the direction from which the convoy they are marking will approach. Time is saved by dispatching the marking detail sufficiently in advance of the first march unit for them to have ample time to mark the route properly and remain ahead of the first unit.

Billeting Detail. When a column is to camp in any place other than their home park, a billeting detail should be organized of sufficient size to insure rapid and orderly entrance into bivouac. The exact size of this detail depends on the conditions of the bivouac and the time of day. A night occupation requires a vastly larger detail than a daylight occupation, and terrain of limited protection and cover also requires a larger detail.

SUMMARY

It can be seen that the steps taken in planning and executing a motorized road march (*controlled*) can be grouped generally into three main groups: route reconnaissance, command decisions, and standard operating procedure.

Reconnaissance Decisions include:

- a. Selection of an IP;
- b. Estimate of the control speeds and the location of control points;
- c. Location of prescribed halts, within definite limits;
- d. Composition of the billeting detail.

Command Decisions are:

- a. The number and duration of halts and who is charged with marking them;

- b. The vehicle distance to be maintained both on the march and at halts;
- c. The size or unit designation of the march unit;
- d. The size or unit designation of serials;
- e. The size or unit designation and commander of the column, when applicable;
- f. Maximum allowable speeds, including those for pace-setters, column vehicles, and control vehicles;
- g. The method of clearing the IP;
- h. The method of passing through cities;
- i. Who will be responsible for marking the route, and his time of departure;
- j. The time of departure of the billeting detail;
- k. Time of clearing the IP.

The last five steps are also somewhat dependent on the results of the route reconnaissance.

Standing Operating Procedure may comprise the following:

- a. The cushion between serials to be added to their time-lengths plus the time-length of the halts;

- b. The method of supervision by control vehicles;
- c. The requirement for a commissioned dispatcher;
- d. The method and time of giving out synchronized time;
- e. The method of acceleration from lower speed road brackets;
- f. The use of blackboards;
- g. The use of the signal discs;
- h. The requirement for commissioned pace-setters;
- i. The training and functioning of route markers;
- j. The procedure to be followed when fall-outs occur.

The above listings and groupings are neither complete nor rigid. Conditions may suggest other decisions that should be made and included in the march order or march table, and some of the decisions listed in one group may also depend on those made under another group. It is believed, however, that much of the confusion and congestion of vehicles so prevalent in recent military marches can be materially reduced or even eliminated by more thorough and complete staff planning following this general procedure.



A good caution in any language!

Everybody likes to give advice. Nobody likes to receive it, so the next time you feel like giving advice, just praise instead. I mean to express to people honest appreciation. Risks of cheap flattery cannot be undertaken. And, if we would lead, we must recognize that the instinct of Ego flourishes in every one of us, and an Egoist necessarily assumes that the rest of the world attributes to his acts the same importance he himself assigns to them. The whole of creation responds to praise and is glad. Advice giving is just a habit.

W. N. D.

Motor Marching By Rail

Republished by Courtesy of Army Motors

All over the country, the Army is rustling its bones—getting the lead out, you might say. Military organizations suddenly rear up on their hind legs and disappear in the night, on their way to what could very easily be battle stations. Much of this movement is by rail, for no matter how good or how many the trucks, the iron horse is here to stay. Travel by rail is speedy, reduces wear and tear on men and trucks, and generally bypasses the accidents and breakdowns that plague trucks travelling over broken, crowded roads in dirty weather.

What's it mean to you? Get ready to move, you may be next.

Arrangements with the railroad company must be made about the number and type of railroad cars you'll need,

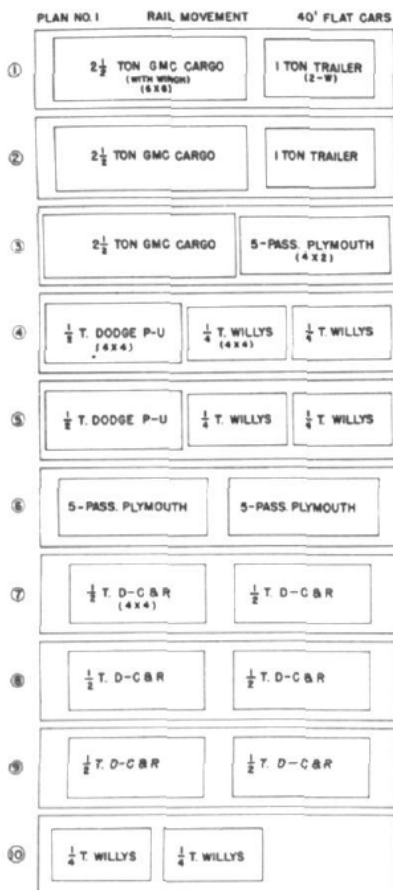


Fig. 1—No last minute headache—this template shows how to place vehicles on flatcars.

stating of course, the weight and what-not to be loaded.

Reconnoiter the place where you are to load. Sniff around, draw a map of the place, and investigate the roads you'll have to use to get there. Maybe you'll move at night: see that plenty of night-lighting is available. Know what you're going to do before you do it.

What you need most is a good, stiff Standing Operating Procedure, a *plan*.

Have someone who knows it thoroughly stay behind 'til everybody and everything has departed. If you change plans in mid-air, make sure

everybody concerned gets wind of the changes. If you're not taking all your property with you, see that the remnants are properly turned in or stored. As for the stuff you are

taking with you: record the number of the cars it's being shipped in, and list the property in each car.

Lieutenant J. F. Sinclair, Hq. and Hq. Co., Holabird Quartermaster Motor Base, worked out a pretty good plan. He devised a template or pattern to show how his vehicles should be distributed over the railroad cars. It shows clearly (Fig. 1), *how, what* vehicles will fit on *how many* cars. He sketched the area of a number of freight cars (to scale), then cut out pieces of paper of the proper size to represent his vehicles. By fitting the pieces of paper onto the sketches of the freight cars—juggling them around—he discovered how and in just what order his vehicles could best be entrained. Lt. Sinclair gives each driver a number, and they drive onto the freight cars one, two, three, four . . . with a minimum of confusion. He made an appropriate sketch for each of the different sizes of freight cars; if you're interested, here are the sizes:

Flat Cars—36 and 40 ft. long.

Box Cars—40 and 50 ft. long.

Gondolas—36, 40, 46, 50, 52 and 65 ft. long.

All are about 9½ ft. wide.

The conscientious traveler—that's you—will carefully look over AR 30-945 (and also in the 30-series: 930, 935, 940, 955), and War Department Circulars 149, 198, and 269 (all 1941). They're "must" reading. You'll get a funny feeling reading 30-945. Of course there have been a lot of changes, but the original was written in 1923 and you'll get a sense of the swift passage of time, what with the references to "animals" in transport.

FM 25-10 will help you and so will Field Manual 101-10, paragraphs 40 to 45, inclusive.

But getting down to cases, the real work of moving by rail is in getting the trucks up on the flatcars and keeping them there during a rough journey by fast freight. Think of your trucks balanced precariously on a narrow flatcar rushing sixty miles an hour around a bend, through a wet night. Then you'll begin to appreciate the precautions to be taken. You'll need plenty of chocks and blocks.

Maybe when you arrive at your destination, there won't be a ramp to help you detrain. You can't dropkick your vehicles off, so you'll have to have a ramp with you. As somebody has said, let's not get caught with our ramps down.

In building the ramps and blocking equipment, scrap lumber can largely be used. The chocks and blocks alone almost fill three 2½-ton trucks, so it's sheer recklessness to think of keeping it as permanent equipment. The stuff will have to be turned in at the end of the journey to the nearest Quartermaster. Besides, scrap lumber does the job as well as anything else, so why

spend money? (You'll probably have to buy those 3×12's, though, which are needed for the ramp.)

At Holabird it was found that for most outfits a 24-foot ramp would do. It satisfactorily handles anything up to and including a 2½-ton, 6×6. Anything over the size of a 2½-ton job—say a semi-trailer—requires a 36-foot ramp, otherwise the ascent to the flatcar is too steep and you have the pretty spectacle of the back wheels on the ramp and the front wheels dangling in the air.

As you can see by Fig. 2, the runways of the ramp consist of 3"×12" boards, 12 feet long. Supporting the runway are braces built up of lumber, roughly about the



Fig. 2—A 2½-ton takes the high road. The runway of the ramp is built of 3×12's.

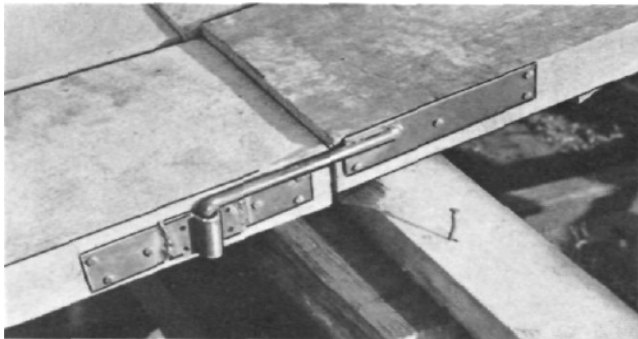


Fig. 3—This latch-socket idea prevents the ramp from parting in the middle (longways).

size of railroad ties. An ample number of these braces tactfully distributed, take all the dangerous "flex" out of the long boards. And believe us, when you try out your own ramp, you'll appreciate that.

To hold the 3×12's firmly together end to end, a latch-socket arrangement was worked out (Fig. 3). The male portion consists of a flat piece of metal with a hooked arm welded to it. The female is another piece of metal with a socket welded on. Nailed to the ends of the 3×12's and hooked together, they keep the ramp from pulling apart. Center each latch and socket so that interchangeability between latches and sockets is possible. When and if the ramp is abandoned, remove latch and socket and take them with you.

To keep the 3×12's from spreading out sideways and dropping the truck to the ground beneath like a load of bombs, cleats (Fig. 4) are nailed onto the underpinnings.

As you will discover when you put a truck on it, the ramp needs all the stability you can give it.



Fig. 4—Cleats keep the boards from spreading out sideways as the heavy trucks roll up.

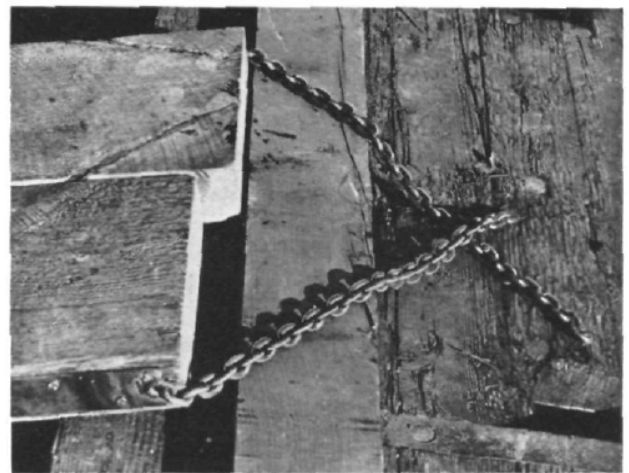


Fig. 5—These chains anchor the boards of the ramp to the flatcar, prevent "gapisis."

Something has to hold the top of the ramp to the end of the flatcar. The "something" (Fig. 5) is a couple more flat pieces of metal nailed to the end of the boards that rest on the flatcar. Chains, welded to the metal, lay crossways and are nailed securely to the floor of the flatcar. For best results, a piece of lumber laid across the flatcar and on top of the chains will make the ride over the threshold and onto the car a lot smoother. Then again, when the trucks are detrained this arrangement will take some of the load off the chain anchors and prevent the wheels of the truck from shoving the ends of the boards off the flatcar.

The railroad company announces that it will be very, very happy if you use some of your lumber to build an approach to the ramp. This will keep your heavy trucks from tearing the rails up, and the rails from wrenching your wheels out of line or even off, as the case may be. Just throw a bunch of long boards about as high as the rails, parallel to same (Fig. 6).



Fig. 6—The rails won't tear the wheels off your trucks if you pave 'em with lumber.

To set the braces at just the right height under the runway boards, stretch a piece of string or tape from the point where the edge of the boards will meet the flatcar, to the ground where the other end of the boards will rest. The string being twenty-four feet long (as long as our ramp is to be), you can easily determine the proper angle for the ramp. Then by building the braces up to the string, a lot of heavy lumber juggling can be saved.

Once the ramp is up, one man and one man only should guide the truck drivers up onto the flatcars (Fig. 7). With the nose of the truck aiming at the sky, the driver can't see where he's going and a Greek Chorus of directions shouted from all around him, if it doesn't turn his hair gray, will



Fig. 7—Man guides truck. The truck-guider is the driver's eyes. Sees all, tells all.

probably send him in a power dive off the upper reaches of the ramp.

"Spanners" bridge the gap between the flatcars. For details of construction examine Figure 8.

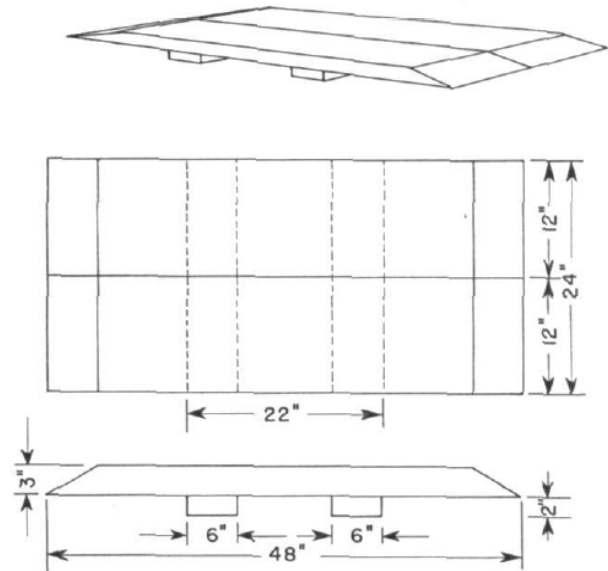


Fig. 8—Here's how to build the "spanner."

The purpose of the chocks under the tires is to prevent forward or backward movement of the truck; the sideboards keep the truck from waltzing sideways and overboard (Fig. 9). The best practice in chocking consists of placing a chock—tightly—front and back at every wheel, including a chock between the wheels of the bogies. We didn't have a between-the-bogie chock for



Fig. 9—This is the way to chock.

our pictures and you'll find that you have to build a special one. Ordinary chocks won't fit. Knock all chocks in *tightly* beneath the tires then nail them down using 4 or 5 inch spikes. Put sideblocks on the outside *and* inside of all wheels.

There's one other problem in connection with chocking: How to prevent side-sway and keep the wheels from leaping right out of the chocks and sideboards as the train jolts along. As one officer put it, "Harmonic motion sets in as the flatcar bumbles along. Like bouncing up and down on a bed spring, the vehicles go higher and higher." Several people in the crowd nodded their heads gravely as the officer said this. And then it was discovered that there are two schools of thought on the subject of tying vehicles down.

The first school clings to the old *wire* method. In Figures 10, 11, and 12, you will observe how this is done. Notice that the wire—which is "No. 8 gauge, black, annealed"—is fastened to sections of the vehicle that won't easily give way, and to the "stake boxes" at the sides of the car. In some cases you have to nail or bolt pieces of wood to the floor and run the wire up from them, but use the stake boxes if you can. In any case, don't fasten the wire to hand-holds or foot-steps on the flatcar or arrange them in any way so that these are fouled. In passing the wire through the holes in the truck wheels, please notice that these holes have sharp, knife-like edges. Under the constant jiggling of the train in transit, it shouldn't take any time at all before these wires are sawed in two. Try padding all such points of abrasion, including the stake boxes.

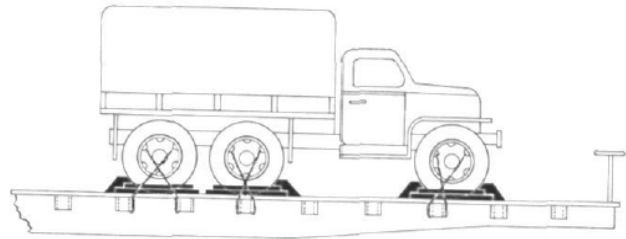


Fig. 10—Wire binds the vehicle to the flatcar. Use plenty of padding wherever sharp edges may chafe the wire in two.



Fig. 11—Tighten the wire with the drift pin—then sink the pin into the floor.

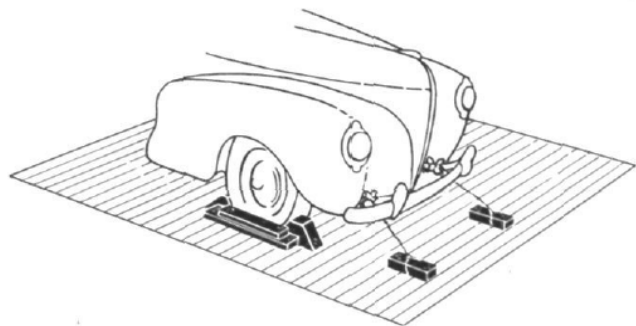


Fig. 12—Passenger cars have knee action. Wire from bumper bracket to the floor.

Tighten the wires by inserting a drift pin (Fig. 11) as a rack stick and twist the wire to the desired tension—then drive the point of the drift pin into the floor of the flatcar, to keep the wire from untwisting and loosening. Don't go wild on this matter of "desired tension," but leave some resilience in the wire. Let it be slightly relaxed to allow some room for up and down movement of the vehicle. Remember, all you're trying to do is keep the vehicle from hopping the six inches out of the chocks, not choke it to death.

Motorcycles are a special case and are best secured

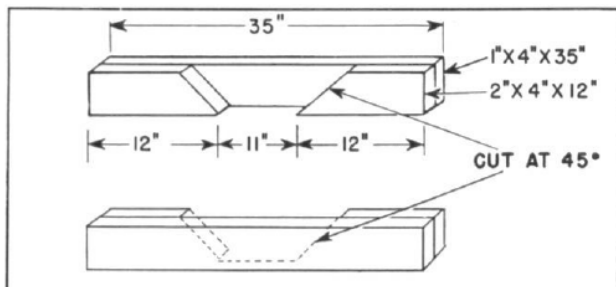


Fig. 13—Motorcycle wheels set in this kind of chock like a babe in a cradle.

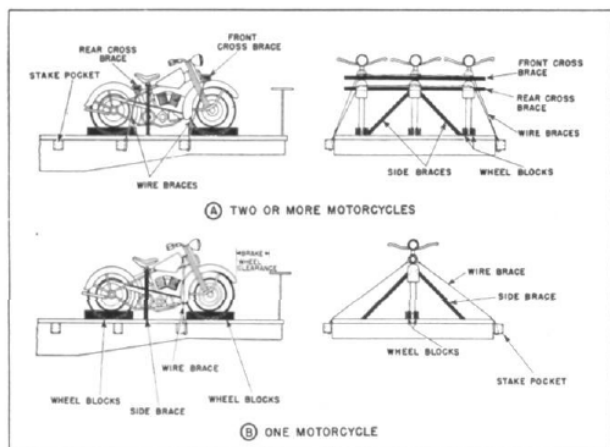


Fig. 14—How motorcycles are fastened to flatcars. Use plenty of wood and wire. Though you can't see them from here, there are nails on the lumber for the wire to hold to.

with the chock shown in Fig. 13 and the wiring method shown in Fig. 14.

In securing two or more motorcycles (Fig. 14-A), the "front cross brace" and the "rear cross brace" have nails hammered in here and there so that the wire has something to cling to. Likewise with the "side braces" in Fig. 14-B. These "side braces" are nailed to the flatcar at the bottom and are tied together where they almost meet at the top, with a short piece of wire.

The second school of thought on tying vehicles down, swears by the *metal strap and anchor* method. The metal strap is, well . . . metal strap. The anchor is a flat metal plate with a slot and eight nail holes in it. Both are in Figure 15. The idea (Fig. 16) is to pass the strap through the slot in the plate and nail the plate down (using drive screws illustrated in Fig. 15). Do this on one side of the axle, run the strap over the axle, and bolt it down on the other side the same way. Again, though, do not have too great tension and be sure the chocks are tight!

A *third* school of thought whispers *use both*—use the wire and the strap-and-anchor method together. We say, use your own judgment. The strap and anchor isn't regular issue and will probably have to be bought as a local

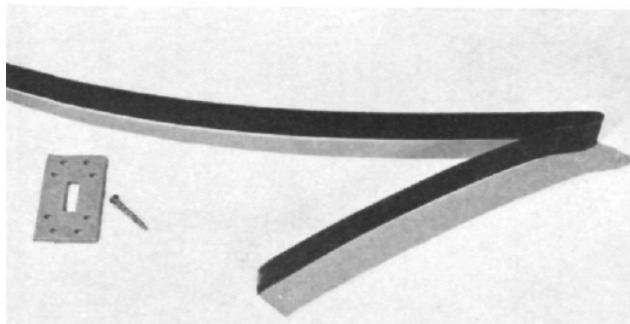


Fig. 15—The metal strap and one each of the anchor plate and drive screw.

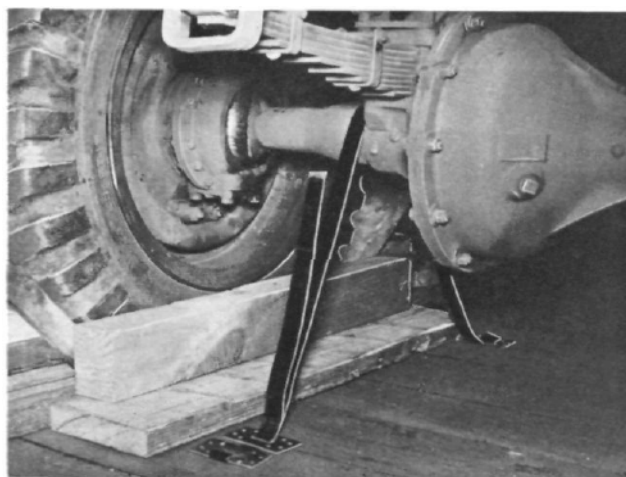


Fig. 16—The strap-and-anchor method of securing vehicles to flatcars. Leave about $\frac{3}{4}$ of an inch of play in the strap and get those chocks in tightly beneath the tires.

purchase by interested organizations in the field. (P.S. The metal anchor plates are called "Acme Anchors.")

Another good idea is that you don't have to throw the strap and anchor away. Each driver can keep it as part of his tools and equipment, as it doesn't take up much room.

Summarizing the whole business of blocking and chocking, it's fine when you have the equipment. But if you're ever out in wild country where they never heard of blocks and chocks and you've got orders to move by rail, don't have a nervous breakdown. Use your brains. Chop down some trees and use them for chocking. Just be careful and follow as close onto directions as you can. Remember that moving vehicles by rail can be easy or dangerous; it depends on you.

For some time now, there have been vague rumors about "brinelling" of the wheel bearings in vehicles shipped by rail. This simply means that the upper parts of the body constantly jarring up and down on the wheels, break down the film of grease over the bearings) and finally ruins them.

So far no one has been pinned down on this "brineling," but the rumors got so strong that Holabird engineers went to work on the case. Vehicle manufacturers who were questioned about it said that they weren't bothered with brineling because their cars and trucks, when shipped by rail, were shipped unloaded. They suggested that maybe military trucks loaded with equipment would come down heavy on the wheel bearings, thus breaking down the grease and brineling the bearings. But they weren't sure.

Holabird engineers thought maybe blocking the vehicle up off the floor would remove the danger to the bearings, but admitted that maybe this was a little too tough and risky. Then they thought perhaps a wooden block placed between the axle and the load would stop the bouncing on the bearings, but this is a hard and uncertain job.

Finally the engineers said, "Give us a little more time and we'll work something out." So that's what they are doing—but in the meantime, if there's anybody who's had any experience with brineling of the wheelbearings and has an idea on what to do about it, let Holabird hear from you.

Vehicles will have to be arranged tastefully over the tops of the flatcars with particular regard to the matter of clearance. A half dozen front ends lapping over the side of the car, or the top of a truck waving gayly on high will most assuredly pick up a few dents now and then as the train rushes through tunnels or swishes by other trains on adjoining tracks. Speaking of clearance, be sure that no part of the cargo is closer than six inches to the car brake wheel. A little more clearance than this will be heartily appreciated by whoever might have to jump for the wheel should trouble turn up.

Watch the load capacity of the flatcar, and the distribution of same. You'll notice the "capacity of the car" stenciled on the side of the car, and next to it the "light weight of car." This is to be subtracted from the total weight of *the car and the load* together, and will give the "permissible weight of the load."

In distributing the load, spread it out evenly over the entire car with never more than one-half the load over one truck of the flatcar, and no more weight on one side than the other. You won't rock the boat this way. In every case, don't forget to examine the floors of your flatcars; some of them are less than three inches thick. Make sure they're sound and good and strong. There have already been reports of vehicles breaking through these floors.

Setting the ramp up and fixing the vehicles can be worked out by anybody, it's that simple. But why not appoint a permanent crew, wherever possible, to do the loading and blocking? Constant practice at the job will make them smooth, efficient, and fast, whereas a new crew every time has to dilly around figuring things out.

Certain simple precautions are necessary to guarantee a bon voyage for vehicles traveling by rail. Put the gears in reverse and set the brakes. Tie down the canvas and head the vehicles in the direction the train is going. See that the anti-freeze will protect the cooling system to about 15 degrees below the lowest temperature you expect to run into. A 60% solution of prestone offers the maximum protection (62° below). Anything below this demands that you drain the system.

Lock up loose property; tops, end and side curtains; tarps and cushions better be secured against wind and weather. Close windshields and windows, lock and lash doors. Disconnect your batteries. To be really scientific about it, make a "check chart" covering all the points to be attended to.

Vehicles traveling in open flatcars are exposed to all kinds of hazards. One is the sparks flying back from coal-burning locomotives. Stage frequent inspections.

But in any case, if you ever travel by rail and expect a hot reception at the other end, be sure your vehicles are ready to go the minute the train arrives at your destination. And in detraining, don't back your vehicles off. This strictly invites trouble. Run them off head first.

P.S. Don't forget to put your ramp up first.

DIFFERENCE OF OPINION

often brings forth interesting items. We recently published a photograph in which several British officers thought (but were not sure) they identified the late, justly famous Brigadier "Jock" Campbell. Lt. Col. H. W. Ehrigott, CE, has another thought:

"On page 483 of the June JOURNAL is a photograph, presumably of the late Brigadier 'Jock' Campbell of the Royal Armored Corps. If I am not mistaken, you are in error. The officer in question is 'Brig. Briggs,' another equally legendary figure in the British Middle East Forces. The officers with him are part of his staff. The chap with map is S-2.

"Brigadier Briggs commands a brigade which has seen more fighting, taken greater losses, and accomplished more miracles, perhaps, than any other brigade of the Middle East Forces. I believe this picture was taken as the brigadier watched his troops repel a surprise attack by German tanks, after the capture of Sidi Omar, about November 25th.

"Just over a month later, his outfit was cut off at Benghazi and fought its way through greatly superior German forces to rejoin the rest of the Eighth Army. When last heard from, 'Brig. Briggs' was reported to be just as imperturbable as he appears in your photograph."

In any case, a real soldier!



PERIMETERS in PARAGRAPHS



By Colonel Conrad H. Lanza

THE LIBYA CAMPAIGN OF MAY-JUNE, 1942

At the beginning of May, the Axis front line extended south from Tmimi on the Mediterranean to Mekili, the British from El Gazala on the coast southeast to Bir Hacheim. Both lines consisted of a series of strong points, within supporting distance of each other but not connected by continuous trenches. The foreground of both sides had been planted with anti-tank mines. Both south flanks were open to envelopment, against which constant air and motorized ground patrols were maintained.

The theater of operations consisted of a coast belt only a few miles wide, containing occasional towns, some cultivated country, and a good east-west road. The principal towns were Bengazi, on the Axis side, and Tobruk on the British; both sea heads functioned regularly despite nightly bombings. Each had a permanent garrison and was supposed to be capable of self defense.

The south side of the coastal belt was bounded by a steep escarpment, several hundred feet high at the lowest places, on top of which was an uninhabited desert plateau, terrifically hot by day and cold at night. The desert can be traversed in all directions with varying facility, depending upon sand, rocks, and grades. Critical points are the infrequent water holes, of prime importance. On the plateau, strong winds frequently cause sand storms; when these occur, visibility is negligible, air reconnaissance worthless, and ground observation extremely limited. A summer campaign in this country had been assumed to be impracticable in view of the torrid heat and scant water supply.

The lines were defended by infantry divisions, having limited transportation, but a considerable distance in rear were approximately the following mobile forces:

BRITISH	AXIS
Eighth Army, Lieut. Gen. Neil M. Ritchie	Field Marshal Rommel
1st Armored Division,	1 Afrika Corps (German)
7th Armored Division,	15th Panzer Division,
3rd India Motorized	21st Panzer Division,
Brigade,	90th Motorized Division.
? Tank Brigades.	XX Corps (Italian)
	132nd Ariete Armd Div,
	101st Trieste Mtz Div.

On May 14th the British noted increased enemy air activity, which was continued on succeeding days. Counter air reconnaissance and photographing was therefore ordered, which by the 21st showed the enemy's mobile troops moving into forward areas with other indications that an offensive was probable. The RAF was ordered to start immediately a night counter-offensive against enemy airdromes, supplemented by daily dusk and dawn low-level attacks by light bombers and fighters. On the 26th, concentration of enemy armored forces toward his south flank was reported. As it was not certain but that this might be a feint, only precautionary measures were taken.

On this day, Field Marshal Rommel issued a General Order announcing that his army was passing to the offensive with superior numbers and perfected equipment. During the night 26/27 May he moved his forces across country with extraordinary rapidity, circling around the British flank at Bir Hacheim and coming north some ten miles in rear (east) of the British lines. By morning he was in rear of the British center, near a crossroad known as Knightsbridge; he had met no opposition.

Without waiting for rest, Rommel sent out detachments to north and south, and with his main body moved east. A German detachment moved north through Acroma toward the coast, taking position on the escarpment overlooking the coast road. At the same time Italian troops staged an attack against that place at Gazala, while an Axis naval expedition attempted, or made feints of attempting, to land an expedition. All three Axis forces were repelled by troops rushed from Tobruk and from El Gazala, but at the end of the day the British were uncertain, as to whether cutting the coast road was or was not a major mission of the enemy.

An Italian detachment dropped off by Rommel during the night attacked Bir Hacheim at daybreak, but the attack was not pushed. Both this detachment, and the German detachment sent north, thereafter acted as large combat patrols, guarding the respective Axis flanks.

The main Axis force moved east from Knightsbridge as far as Rezegh where they met and attacked the 3rd India Motorized Brigade which was alone, the British

armored divisions not yet having come up. It was overwhelmingly outnumbered and was rapidly and completely crushed by three Armored Divisions who closed in on it from all sides. It was practically annihilated by sheer weight of metal.

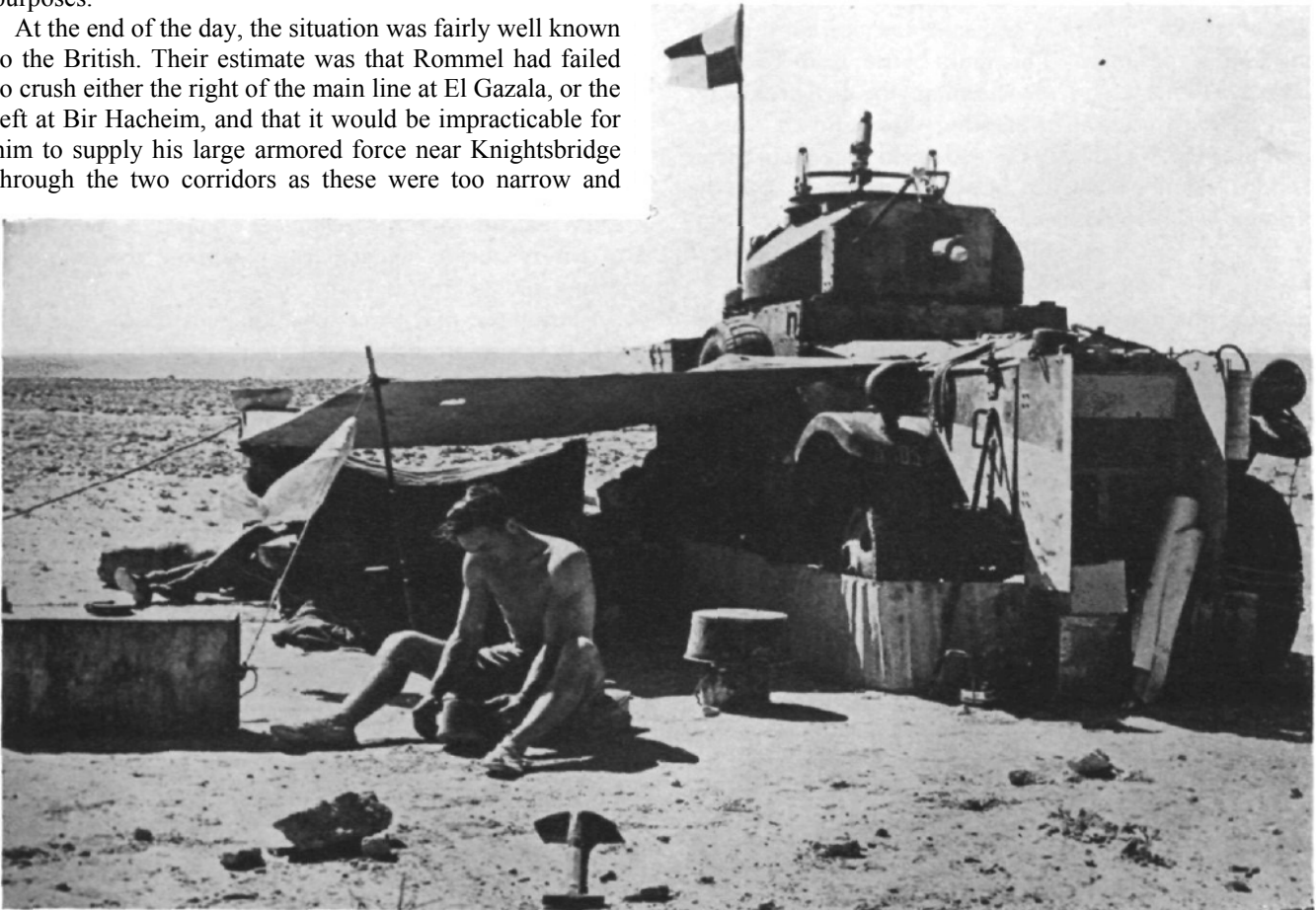
Forming a rear guard, Rommel now reversed his march, went westward, and fell upon a brigade of British infantry astride the east and west road, about seven miles west of Knightsbridge. This brigade normally faced west, but was now being attacked from the east. Demonstrating along the ten-mile front, Rommel made his main efforts against the extreme flanks. He was aided by an Italian attack from the permanent lines west of the British. The Axis Air Force aided the ground forces with great numbers of dive bombers. Forced to fight toward front and rear at the same time against vastly superior forces, the British brigade lost their extreme flank positions. Rommel thus established connection with his former lines through two gaps each about a mile wide. Italian infantry west of the British main line cleared the foreground of mines and other obstacles to truck navigation, while other troops built up through each gap two solid walls of infantry and artillery, back to back and initially about a mile apart; between these walls was a practicable, although narrow, passage, available for supply purposes.

At the end of the day, the situation was fairly well known to the British. Their estimate was that Rommel had failed to crush either the right of the main line at El Gazala, or the left at Bir Hacheim, and that it would be impracticable for him to supply his large armored force near Knightsbridge through the two corridors as these were too narrow and

traffic through them could be stopped by fire. His main body appeared to be in a precarious condition, as it must have expended a large part of its gasoline, oil, and ammunition in the extensive fighting of that day. It was decided to attack the enemy's main force next day near Knightsbridge with the 1st and 7th Armored Divisions, in the hope of finding it partly exhausted.

Very early on the 28th, the active Rommel moved his main body east from Knightsbridge to the vicinity of El Adem, where he met the oncoming British. A terrific tank battle ensued. The British maneuvered around the Axis position, seeking to take it in flank, and the battle swayed north to near Acroma and south nearly to Bir Hacheim, covering a front of some 40 miles and a depth of about 10 miles. By evening the battle died down, without either side having gained superiority.

During the day the Italians finished removing the mines and obstacles at the west exits of the two corridors, moved fresh infantry, artillery, and supplies into the corridors, and definitely organized the walls. Rommel assigned missions to the corridor commanders: the north wall of the north corridor and the south wall of the south one were to remain on the defensive; the interior



Just a few comforts make a "home" for armored units in the desert. (Air Ministry Photograph)

walls were to attack in the morning toward each other, against the enclosed British brigade, which would also be attacked by other troops from the west. Armored troops would prevent British mobile forces from rescuing the brigade, and would attack from the east as opportunity offered. The British did not change their estimate.

On May 29th the great tank battle was renewed. The British attempted to center their thrusts toward Knightsbridge in an effort to crush the enemy's main force. British air forces concentrated over the corridors, the Axis planes against supply trains in the British rear. By afternoon, wrecked and burning tanks, armored cars, and trucks were littered over the desert. Each side claimed that it had inflicted much larger losses on the enemy than it had received. When night came, salvage crews and mobile repair units dashed out to service and repair motor equipment. Medical detachments roamed over the field picking up the wounded. In the vast territory, at night, repair men and medical attendants picked up vehicles and individuals of both sides. During the day the corridor commanders had started pushing the interior walls toward each other, and materially enlarged the width of the corridors; supplies came through to the armored forces near Knightsbridge, and wounded were evacuated.

On the 30th, the inner walls of the corridors made considerable progress. The tank battle near Knightsbridge was renewed in the morning, the British changing the RAF's mission to assisting these ground troops. Little progress was made: the Axis held on to its central position. At noon, British headquarters knew that the corridors had been widened and that supplies were coming through, yet they still considered that the general situation was "not unfavorable."

During the afternoon Rommel launched a vicious attack with his armored divisions eastward from Knightsbridge. He had considerable success. It was found that the German Mark IV tanks were not easily put out of action by the British anti-tank guns, and could maneuver under fire better than the British or American-made tanks. The Axis captured quite a number of prisoners and disabled a notable number of British fighting vehicles.

On the 31st, fighting between the armored forces diminished; the Axis advance of the day before was not pushed. In British opinion this advance had been intended as an initial step to capture Tobruk and had obviously failed. It was considered that the worst of the fighting was over. The enemy had miscalculated his blitzkrieg, and was vainly trying to maintain his supplies through impossibly narrow corridors. Axis movements, though still orderly, were beginning to disintegrate. They had abandoned or destroyed 35 of their own tanks northeast of Bir Hacheim, either due to inability to refuel them or because of nervousness. Consideration

was given to ordering a general counter-attack by all forces to finish off the Axis troops.

By nightfall the British found that the Axis was withdrawing from the front into the corridors, which he then proceeded to protect from attacks from the east by emplacing numerous anti-tank batteries. The British decided to annihilate the Axis by attacking simultaneously from north, east, and south.

Rommel was not withdrawing, however. After temporarily driving the enemy to the east on the 30th, he turned his forces around on the 31st and attacked the British brigade between the two corridors. Early on June 1st this attack succeeded. About 3,000 prisoners (including a general) and about 120 guns were taken. The corridor was now 10 miles wide, ample for all troop and supply movements. It was right in the center of the British 70-mile line from El Gazala to Bir Hacheim.

British headquarters did not at once realize what had happened. During the morning it was of the opinion that the Axis was withdrawing through the two corridors and had accomplished this to some extent, but that a good deal of his force were still on the wrong side of the British main line where it was being constantly harried and would gradually be destroyed. Vigorous mopping was ordered. A mobile column had been detached, which circling around the south flanks reached Segnali, about 30 miles west of the permanent line and supposedly a good place to interfere with the enemy's line of communications to Knightsbridge.

Rommel ignored the detachment in his rear at Segnali, decided to wipe out next the British segment to the south extending for 20 miles from near Knightsbridge to Bir Hacheim, while in the meantime containing the enemy mobile forces.

During the next three days the Axis made good progress in taking strong points leading toward Bir Hacheim. The British recognized the situation on June 2nd, but they were not ready to take the initiative as their armored forces were greatly depleted by their recent battles and they were now confronted with the prospect that the enemy instead of being exhausted and in retreat was on the contrary most active. It was evident that the only way to stop him would be to attack his main forces once more, in an endeavor to definitely overcome them. A regrouping of forces was started with assembly of all possible mobile forces east of Knightsbridge.

On the 5th the British launched an attack on the Knightsbridge area. The leading by infantry divisions, one British and one Indian, made some progress. Armored divisions then passed through the lines and charged the Axis positions. This British attack met a murderous artillery fire which quickly disabled about 70 armored vehicles and caused the attack to break down. The Axis then counter-attacked, broke through

the armored troops and in among the infantry; they took about 4,000 prisoners. Darkness ended this hard battle. Next morning the Axis cleared the field of British, but did not push on. Instead Rommel returned to his uninterrupted mission of reducing the British south segment of fortifications, including Bir Hacheim.

Bir Hacheim (Arabic for *well of wisdom*) is one of those rare water holes, or oasis, at which numerous trails converge. It is on a plateau roughly four miles square. The low ground outside had been well planted with mines. The garrison (under General Pierre Koenig, an Alsatian) consisted of about 4,000 men: infantry, artillery, and tanks, including one battalion of Free French, a battalion of the French Foreign Legion (mostly French), French Marines, Senegalese Polynesians from Tahiti and New Caledonia — altogether a Free French command. Notwithstanding the mixture of races they were a brave lot.

At dawn on the 8th about 25 German dive-bombers attacked the forward positions, immediately followed by an artillery preparation fired by 150-mm. and 210-mm. batteries. About 10 o'clock a tank and infantry attack, mostly Italian, was delivered against the northwest corner. This attack got through the mine fields but was stopped by French 75-mm. batteries, which disabled 9 armored vehicles. The garrison thereupon reported by radio that they could hold out, provided supplies be sent to them.

On June 9th the Axis attacked again. British armored forces with some motorized infantry were sent south, and sought to intervene; they were driven off by the Italian Ariete Division, but the Axis attack failed in its turn.

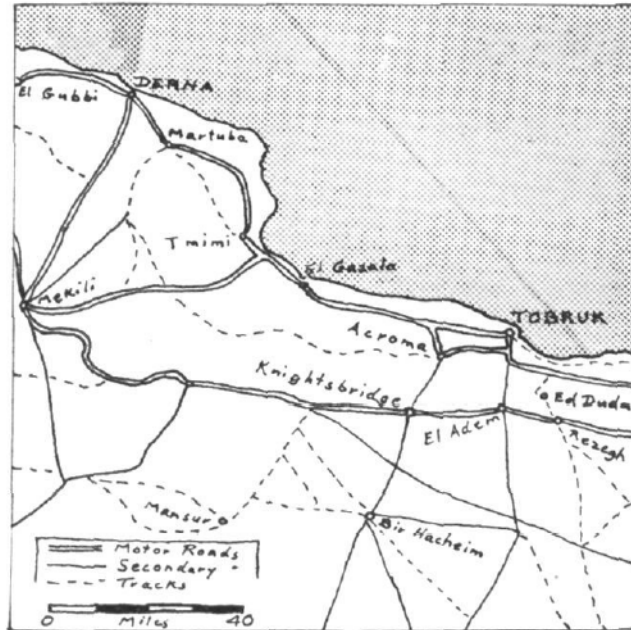
To save this strong point the British decided to attack once more in the direction of Knightsbridge. On the 10th this attack found a ring of German anti-tank batteries, with which the enemy was very well provided. In view of previous experience the attack was not pushed. The Axis launched yet another attack against Bir Hacheim, but postponed it until afternoon, when it had been definitely determined that the Knightsbridge area was safe. Shortly after 1:00 PM nearly 100 German dive bombers attacked the Bir Hacheim defenses. It was an extraordinarily hot day, and the sun was blazing. On the north and northeast sides of the French positions the Germans massed

batteries of 88-mm. guns, which fired most accurately against fortified points. Further away, out of range of the defenders' 75's, were 210-mm. batteries. A strong artillery preparation seconded the dive-bombers—shells seemed to come over in avalanches. At 1:30 the tanks jumped off. The extreme heat had caused mirages to arise, which it made it difficult for the defense to identify targets. The tanks worked through the mine field, covered all the time by the artillery and dive bombers, and by 4:10 had cleared their way through and entered the main position. By night the Axis had secured a considerable section of the plateau. Advised of this situation, General Ritchie decided to abandon the entire south segment from west of Knightsbridge to Bir Hacheim, inclusive.

The night withdrawal was in general successful. Not all got away, but most of the command did. The Axis, which did not discover the withdrawal, renewed its attack at dawn. About 900 prisoners, nearly all French, were taken here, and another 1,100 in other sections of the front, together with a large quantity of materiel. About 1,000 dead were found inside the defenses of Bir Hacheim.

Marshal Rommel decided for his next mission to envelop the north segment, which still held from El Gazala to west of Knightsbridge. It was defended (from north to south) by the 1st South African and the British 50th Divisions. Axis armored troops pushed north on the 12th and were approaching Acroma when they were intercepted by British armored forces. General Ritchie had correctly interpreted the enemy's intentions and moved rapidly from his positions east of Knightsbridge just in time. Bitter fighting occurred, but the Axis northward movement was stopped for the time being. General Ritchie, however, considered the situation untenable. He believed that the real Axis mission was the seizure of Tobruk, and that this could be better prevented by abandoning the line south from El Gazala, which no longer served any useful purpose, and withdrawing its two divisions into Tobruk. He ordered the withdrawal for that night.

On 13th June the British armored forces, assisted by troops from the Tobruk garrison, held the line from Acroma through El Adem to Rezegh. There was considerable



fighting, particularly around Acroma, but the line held, the withdrawal was made as ordered, and most of the two divisions reached Tobruk by the 14th. Italian infantry divisions discovered the withdrawal and extended Rommel's lines on the 15th from opposite Acroma to the sea.

On 16th June Rommel delivered a strong assault against the British line, with main efforts against Acroma and Rezegh. Dive bombers and artillery pounded the British, and at the conclusion of the artillery preparation tanks and infantry in armored trucks dashed across No Man's Land at such high speed that they were inside the British lines before effective measures could be taken to stop them. The Axis secured 6,000 more prisoners, and about 85 guns. The main British armored force had been posted at the center of the line, near El Adem. They stayed there all day, held by what they thought was the enemy's main armored force opposite them—which they believed would attack them, but never did.

As they had now been much weakened through twenty days' of fighting, it was believed best to withdraw the mobile forces into Egypt for reorganization: its depots were there, not in Tobruk. On the night of 16/17 June, the remainder of the British armored forces abandoned Tobruk to its fate, and marched off toward Egypt by two roads close to the coast.¹ By the time this movement was discovered by Italian planes, the columns were well on the way. Minor Axis assaults near Acroma and Rezegh on the 17th did not change the line around Tobruk, which ran through Acroma, El Adem, and Rezegh. The main Axis force was identified by the British as opposite El Adem, presumably refueling and reorganizing.

The British estimate of June 18th was that the Axis position was not unduly strong, despite their apparent success to date, for they now occupied a salient with the powerful fortress of Tobruk on one flank, and the Eighth British Army and Egypt on the other. To reach Egypt, they would first have to neutralize or storm Tobruk—a most unpromising prospect for any army, but Rommel might try it. The Eighth Army had a strong position on the Egyptian frontier, and was receiving reinforcements. Its mobile forces were operating through the desert to the south, and confining the enemy to the coastal region. On the whole the situation was not too bad.

During the 18th Axis combat patrols gathered in about 1,000 stragglers, but there was no serious fighting. In view of this lull in operations the British felt on the 19th that a period of stabilization would probably set in. Rommel, however, was not as inactive on the 18th and 19th as the British had believed: he was preparing to assault Tobruk. Since the tactics employed on the 16th had been very successful, he decided to repeat them on a

¹The withdrawal of the garrison of Tobruk was considered, but General Ritchie received instructions from higher authority not to do so.

larger scale. He was ready by the 20th.

Two sectors of the fortress were selected for the main attacks. The Italian XX Corps was to assault the southeast face early in the morning, the German I Afrika Corps the south face toward noon. The axes of advance converged on the town of Tobruk.

At 5:00 AM, June 20th, Italians started the artillery preparation. The rate of fire was very high and, while not certain, reports indicate that the I Afrika Corps' artillery assisted. All available air forces were placed at the disposition of the XX Corps, including all German and Italian dive bombers. At 7:00 o'clock the infantry and tanks jumped off. Armored vehicles of the Ariete Division dashed across No Man's Land at as high a speed as the desert terrain permitted, closely followed by the Trieste Division, with infantry in armored tractor trucks. This armored force arrived on the British front line so closely after the lifting of artillery fire that the British and Indian infantry, which had temporarily taken advantage of shelter in trenches, had no time to reoccupy combat positions. By 9:00 AM the British front was broken on a front of three miles, and the Italians spreading out fan-wise were advancing into rear areas. British reserves were ordered forward to stop this movement.

About this same time the greater part of the heavy artillery of both corps (which had supported the Italian attack) moved by the left flank, in rear of the lines, some 10 or 12 miles to new positions south of El Adem, where around 10 o'clock they commenced the artillery preparation for the Afrika Corps. It is presumed that during the two days of preparation preceding this battle battery positions, preparation of firing data, and ammunition supply had been provided for, so that the batteries opened fire shortly after arrival at the new sites.

The attack of the I Afrika Corps was similar to that of the Italians. Led by the Panzers, the 90th Motorized Division (men in tractor drawn armored trucks) raced into the enemy's positions on the heels of the artillery barrage. By early afternoon it reached the edge of the escarpment separating the desert plateau from the coastal plain; the town of Tobruk was before them. The accompanying artillery for both the Italian and German attacks were numerous batteries of 88-mm. dual-purpose guns, which kept well to the front.

The British attempted to block the roads centering in Tobruk. To gain time, all available tanks were ordered to counter-attack; these were small, no match for the 88-mm. guns firing down on them from the escarpment, and were destroyed one after another. Without waiting, Germans first and Italians shortly afterwards, in tanks and armored trucks, ran down into the coastal plain, fought their way across, and were in Tobruk before dark. Some British officers started to set fire to depots,

and great confusion existed. The Axis fought down and through the town, while other troops marched all night through the gaps to assist the armored forces. There was wild firing everywhere throughout the night. The British got no rest, with attacks and alarms and with the enemy inside and outside the lines.

Before 5:00 AM, on June 21st the battle restarted with great vigor. British troops could see the great fires in Tobruk, and that the naval forces had fled the harbor. Axis tanks scurried around inside the fortress, attacking troops, batteries, and fortifications from unexpected directions. British troops commenced to surrender individually. At 7:00 AM the Commanding General, whose CP was in the sector of the Italian attack formally raised the white flag. The May-June, 1942, Libya campaign was ended.

According to latest (June 24) reports, the British surrendered about 28,000 troops at Tobruk, and a very considerable quantity of stores which there had not been time to destroy and which included supplies received just a few days before.

COMMENTS

The immediate results of this campaign are to place the contending forces about where they were at the entrance of Italy into the war, just two years ago—on the frontier between Libya and Egypt.

The British seem to have lost in this campaign around 45,000 prisoners and large amounts of materiel, much of which can probably be advantageously used by the enemy. The terrain lost is not in itself valuable; it does, however, move the Axis forces some 200 miles closer to the Nile valley and the Suez canal, and removes the British forces that much further from Axis bases. It will henceforth be easier for the Axis to bomb the bases at Alexandria and at Suez, and harder for the Allies to bomb Tripoli, Crete, and Greece.

Now as to the reasons for the British defeat. Marshal Rommel stated when he started that he had superior numbers, and perfected equipment. He had both, but he had something else, more important still: *initiative*. All the moves in this campaign originated with Rommel—few were foreseen, or understood in time by his opponent.

According to all accounts, the latest German Mark IV tanks are superior to anything the Allies had in the campaign: heavier armor and heavier guns. The German 88-mm. dualpurpose batteries, in great numbers and ever at the front, were able to pierce the armor of the best Allied tanks (which were American made) and easily destroyed less powerful tanks. British tank casualties were very high, and greater than those of the Axis. The Germans also had 210-mm. batteries which were superior in caliber to any opposing batteries. The Allies had no artillery of the same class as the German 88's.

Axis team play between artillery, armored forces, and air forces was superior to that of the Allies. There were no coordinated attacks of this nature made by the British—there was cooperation, which is different.

Rommel's method of punching a hole in the enemy's center, near Knightsbridge, by attacking the selected point from front and rear at the same time, punching two corridors through, and then enlarging these toward each other until the corridors merged, was a new one on the British.

The Tobruk type of infantry attack, by mounting the infantry in armored motor vehicles rushing forward immediately in rear of the artillery barrage, was tried out on a small scale in Spain, and was thereafter discussed in the German press. It seems possible that in major battles large-scale infantry assaults on foot are past—fast-moving infantry is the infantry of the future. Behind an artillery barrage of smoke and shell, such attacks by vehicles spaced some 5 meters apart on an irregular line will require new defense tactics not yet perfected.

Reports indicate that the Axis repair units were more efficient than those of the Allies and were able to replace damaged vehicles in line in less time than the British repair units, although these were admittedly good. In war, speed is as important as the quality of repairs; perhaps we have not paid enough attention to this.

RECENT EVENTS IN RUSSIA: Kerch

At the beginning of May at least 200,000 Russians held a bridgehead in the Crimea, the Kerch peninsula. It was about 50 miles deep and 15 miles long, covered by the Parpach position across the exit of the peninsula. Kerch (a town of some 60,000) was not in itself important, but near it were the forts which guarded the strait into the Sea of Azov. The bridgehead was deep enough to contain very large forces to threaten the rear of the Axis force besieging Sevastopol. In fact, since February Russians from Kerch had made several attempts to break through the opposing Axis line toward Feodosiya as an initial step in relieving their besieged comrades.

German GHQ could not ignore this force. The German and Rumanian army of Colonel General von Mannstein and two air fleets under Colonel Generals Loehr and Baron von Richthofen were assigned to this mission. Their preparations did not attract attention. The plan was to crush the enemy's left, advance through the gap, and then envelop the entire Parpach position. Speed was essential, to deny the enemy time to regroup his large forces and organize a counter operation.

On May 8th the campaign opened. Two preliminary operations were conducted on the enemy's left: pioneer troops

were detailed to clear the enemy's foreground of mines, to permit armored troops to reach the main Russian line of defense; also, an expedition was sent by sea, landing in rear of the enemy's left where no one was ready to oppose them. By night, the pioneers had cleared the foreground of tank obstacles; a single pioneer battalion reported removing over 100,000 land mines.

Early on the 9th an armored division, closely supported by air and artillery fire, attacked the Russian left, greatly aided by the force in the enemy's rear. Motorized infantry divisions followed the armored force, turned to the left, and started to roll up the Parpach line. In rear of this force other Axis motorized troops followed still further into rear areas, already partially cleared by the expedition landed by sea. Over all, the two great air fleets pounded at centers of resistance. By noon, the advance was some ten miles within the Parpach position.

The armored division now turned north. As it advanced, motorized infantry fell out (alternatively to right and left) and built up two solid walls, one facing west toward the Parpach position, the other east toward Kerch, with a corridor between equal in width to the front of the armored division. More motorized troops

pushed forward, gradually extending the corridor to the north.

During the afternoon an unusually heavy rain turned the ground into a vast mud field. This delayed the advance, but it also delayed the counterattacks which the Russian command had ordered. These appear to have been made by local commanders utilizing any troops at hand. Due to haste, no artillery or air support could be arranged for. The Germans had both, and although both walls were attacked the corridor held. Shortly after dark the spearhead reached the Sea of Azov and the Parpach position was encircled. New attacks by tanks and infantry against the walls failed.

During the night the corridor troops were resupplied. Profiting by their experience of the previous autumn, the trains were tractor-drawn and so were not materially impeded by the muddy terrain.

By the morning of the 10th, the Russian Parpach force was completely separated from its base at Kerch, and knew it. Notwithstanding their numbers, the Russians' attacks on the corridor were not coordinated. Axis troops held the west wall corridor on the tactical defensive, being certain that sooner or later ammunition and food would give out in the Parpach position. But the east wall took the offensive and, taking advantage of Russian confusion from the unexpected presence of the enemy in their rear, pushed the wall forward toward Kerch.

The Russians now commenced to ship aid to their forces in Kerch by sea, but on the 12th the German air force sank two transports in the harbor. The Russian command therefore decided to abandon their comrades, withdraw

their other troops to a small bridgehead just west of Kerch, and evacuate by sea whatever troops and supplies they could.

The Parpach Russians apparently heard about this plan and felt their further resistance was useless. Large numbers surrendered, and by evening of the 13th the Germans reported that 40,000 prisoners had passed through their lines. On the 14th the Russians completed their withdrawal, and officially announced it.

On May 15th the last of the Parpach Russians had given up, and the Germans attacked the new line near Kerch, not wanting to give the Russians time to organize their hastily occupied position. By the next day the Germans were in Kerch, the Russians withdrawing again. The latter now held the comparatively modern Paul Fort, about 4 km. east of Kerch, old Fort Yenikale, 13 km. east of Kerch, and the Bulgnaski Mud Volcano (on the inactive list) some 4 km. north of the town.

On the 17th the Germans captured the Paul Fort and the Mud Volcano, leaving to the Russians only the tip of the peninsula containing the old fort and village of Yenikale. Russians fleeing from abandoned positions suffered considerably from the German air fleets.

On May 18th the Russians outside Yenikale held their lines against constant attacks although they had little artillery and few tanks. They had little air support, as the Russian air force was busy near Kharkov. The line gave way. By the 19th the last of the Russians were overcome and the Kerch campaign ended. On May 23d Russian GHQ acknowledged the loss of Kerch.

. . . Kharkov

While the Kerch campaign was in progress, the Russians initiated a major offensive east of Kharkov. This city, normally of about 800,000 people, was an important manufacturing center; it had been in Axis possession since the preceding autumn, together with a bridgehead extending some 40 km. to the east.

The Russians estimated that in this sector the enemy had only one armored division near Kharkov, the next nearest being near Kursk (240 km. to the north) and in the Crimea (over 500 km. to the south, and fully engaged in the Kerch campaign). There was information that four other German armored divisions were in GHQ Reserve, somewhere in the back areas. North of Kharkov, only 15 Axis divisions (partly belonging to allies) were holding a 350-km. front to the Sea of Azov. It therefore appeared to Marshal Semyon Timoshenko, commanding in south Russia, that if an attack were made on Kharkov itself, it would attract the German reserves to that sector and possibly into the bridgehead east of the Donets. It would then be possible, after allowing a few days for this situation to develop, to launch a strong Russian attack from a bridgehead he held east of Izyum. If this succeeded, it would threaten the Axis line to the south

and aid an advance toward Dnepropetrovsk, which in turn would be a strong beginning to recovery of the whole Ukraine, much needed by Russia on account of the food situation.

Timoshenko had at his disposition for this proposed campaign about 20 infantry divisions, 7 cavalry divisions, and 15 armored brigades (counted as 7½ divisions), or a total of some 34½ divisions (about double what was thought to be the enemy's strength).

According to German sources, the forces in the sector between Kharkov and Izyum (both inclusive) were under the South Group of Armies, commanded by Field Marshal Fedor von Bock. These were:

	<i>Divisions</i>
Army of Lieut. General von Kleist	(estimated) 20
Panzer Army of General Pauls	5
Rumanian Corps, General Dragalina	2
Hungarian Corps	2
Italian Corps	3
Slovak Detachment	1
	<hr/>
Total	33

to which are to be added the air fleets of Air Chief Marshal Pflugbeil and Colonel General Loehr (joined after participating in the Kerch campaign). The two opposing forces were thus about equal.

The Russian attack was launched on May 12th on a front of about 50 km. It broke through the outer German defense line, gained ground, and was continued on the four succeeding days. The Russians then announced that through the 16th they had advanced from 20 to 60 km. and liberated more than 300 populated places (presumably villages). These advances, if in a straight line, should have put the Russians at least in the outskirts of Kharkov; the Moscow press announced that this was just what had happened, the fall of Kharkov was impending, and this was just the initial step into the Ukraine. Silence was kept as to the force gathering near Izyum.

The German Intelligence Service appears to have been well oriented about the Izyum situation. On the 16th General von Bock felt that the Russian attack on Kharkov had about exhausted itself, and that there was no further danger in that direction. During the winter, the Germans had constructed new roads and railroads in their rear areas to enable prompt concentrations of troops. Izyum was very near the center of the south front, and about the best possible place for a quick concentration. Von Bock early decided that he would counterattack the enemy's main force (which was in the Izyum area). He waited until assured that Kharkov could be held, then ordered a major offensive. His plan was to drive wedges around both flanks of the Izyum Russians with the Panzer Army leading, then surround the enemy, who would be gradually destroyed in a hedgehog reduction program.

On May 17th, covered by the usual air and artillery preparation, the Panzer Army drove its wedges through the enemy's front, preparatory to swinging around in his rear. German, Hungarian, and Rumanian troops took part, but the circle was not so quickly accomplished this time: the Russians were now wise to this maneuver. Very hard fighting developed, with the teamwork between Panzers, artillery, and air forces superior to the Russian effort. It also appears that Russian tanks suffered heavily from the new German 88-mm. dual-purpose batteries. In spite of Russian endeavors, the circle closed around the Izyum force by the 21st.

On the 22nd, Germany stated that Russian attacks in the Kharkov area had materially declined in intensity. On the 23rd Russians announced that they were consolidating their

positions around Kharkov and that the Germans were attacking. Russia was probably withdrawing troops from Kharkov to relieve the pressure on the surrounded Izyum contingents.

Reduction of the Izyum hedgehog started in earnest on May 24th. Attacks on the north and southwest sides compressed the ends of the hedgehog, while Axis troops enveloped the enemy from both flanks. At the same time, Axis air fleets constantly bombed and machine gunned the encircled Russians, while reporting their every move. This combination of attacks and fire soon resulted in near chaos within the lines of the surrounded Russians.

By the 26th the hedgehog was disintegrating. Efforts to relieve it failed: Russia did not have sufficient troops. Seeing what appeared to be inevitable failure, large numbers of Russians surrendered, splitting the hedgehog into smaller ones. General Podlas, commanding the Soviet 57th Army, seeing no escape and refusing to surrender, committed suicide with his chief of staff. The end came soon: on May 30th, both German and Russian communique agreed that the Kharkov campaign was over.

COMMENTS

There is no reliable evidence at this time (June 20) that the Axis had any intention this year to attack toward Caucasia. They may have this intention, but if so it has not yet appeared. That it existed in May is doubtful: the then Axis position in Russia was the strategical defensive with the tactical offensive.

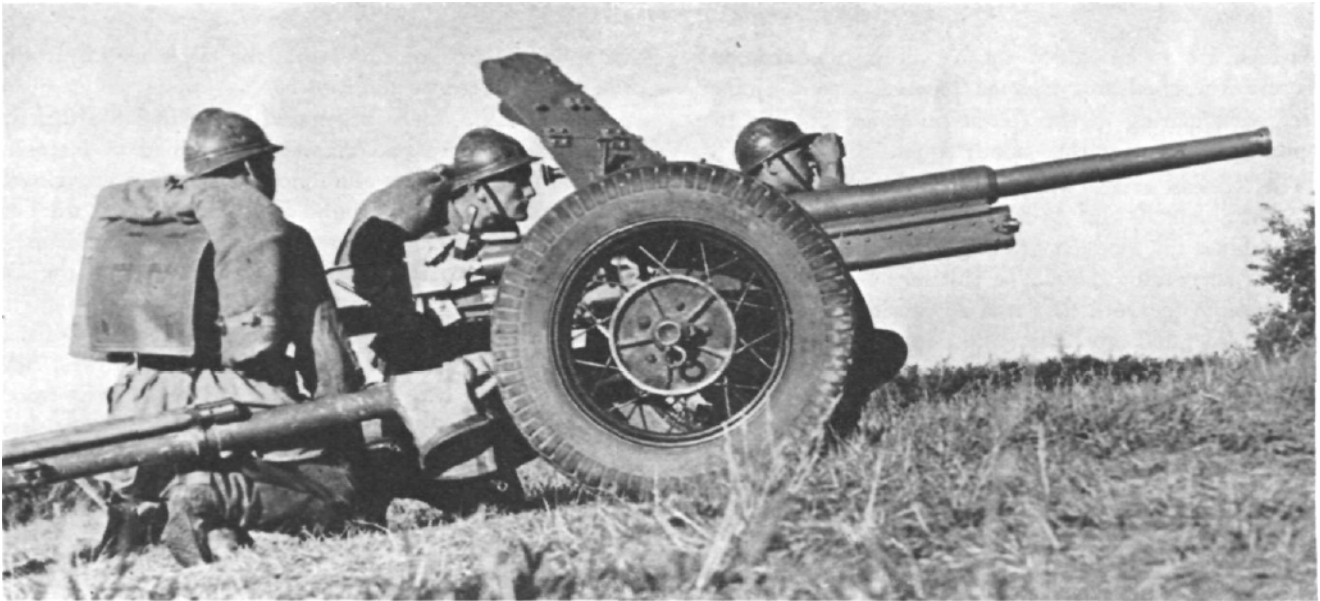
The attack on Kerch was preliminary to a pushing of the siege of Sevastopol, which soon developed. The Kharkov campaign was a welcomed opportunity to inflict heavy losses on the enemy, while consolidating and improving the Axis line in south Russia.

The Russian claim to have lost only 5,000 killed at Kharkov and Izyum combined, as against 90,000 enemy killed, is hard to explain. If losses were so relatively low, why was the offensive not continued, and how did it happen that 70,000 prisoners were admitted as lost? A casualty list of only 1/18th that of the enemy would ordinarily call for a most vigorous continuation of the offensive. Failure to do so under such conditions could only be justified by a failure of manpower or of supplies. As to this there is not now much information.

The net result of these two campaigns sums up to the Germans' having materially improved their position in the Crimea, which now seems to be well on the way of falling completely into Axis hands. Around Kharkov there has been no material change in the position of the lines.

The twentieth century opened with the defeat of the empire in Manchuria, involving Russia in serious circumstances. Defeat is an old tragedy with Russia. It marks for her the beginning of a new century. The eighteenth began at Narva; the nineteenth with Austerlitz; the twentieth with Mukden. But Narva was followed by Poltava, though twenty-one years elapsed before the Swedish power was broken. Austerlitz and Friedland were followed by Moscow and the seizure of Paris. Who shall say that there is not a sequel to Mukden?

Lea, The Day of the Saxon.



The Russian 37-mm. antitank gun weighs only 750 lbs. in firing position, fires a 1½-lb. shell some 6,500 yards with a muzzle velocity of 2,600 f/s. Tubular construction minimizes the weight of the split trail. This is one of the few types of Russian materiel fitted with pneumatic tires; these balloon ones make the light piece quite maneuverable by hand. Old-style helmets are worn during training. (Sovfoto)

ANTITANK ARTILLERY OF THE RED ARMY

By I. Alexeyev

Tank corps and divisions constitute the striking force of Hitler's army, but armored columns can advance unhindered only where they meet extremely weak opposition or where no resistance is offered them. This happened on the "Weygand Line," in Yugoslavia, and in Greece, but whenever a strong opponent is met the picture changes radically. In the Soviet Union their advance was stopped and their onslaught broken by antitank defenses, a complex of measures composed of various arms—from elaborate engineering works to the primitive fuel bottle which requires nothing but a steady hand. But the foundation of the defensive center around which the rest is grouped is antitank artillery.

Tank attack! Rows upon rows of tanks shooting as they rush like an avalanche toward the defensive lines, threatening to wipe out everything in their way. The wall of metal advances on the trenches with a clatter, but now our shots are heard from a group of bushes, from behind a ruined hut, from under a heap of last year's hay, or even from a hill top. Here and there a tank falters and stops dead in its tracks, others catch fire, and the remaining machines slow down as if halted by an invisible hand. Guns fire steadily and to their roars are added the rat-tat-tat of

antitank rifles. The tanks are unable to withstand all this; some of them rush back to hide in broken ground while others turn into heaps of mutilated burning metal. Small, maneuverable antitank cannon with high muzzle velocity are found not only within each unit but also as separate organizations at the disposal of higher commanders. This makes possible the timely erection of a wall of antitank fire on the threatened portion of the front.

One evening this spring there was a fierce engagement on the southern front. Remnants of the routed German garrison were retreating behind a row of hills, and the Soviet unit was busy fortifying the captured ground. The artillery commander in accordance with orders was emplacing his guns along the route of a probable tank counterattack. In one place he made use of a ruined house; his men widened the entrance to the cellar, which they connected with the surface of the ground by ramp. The gun emplacement was made ready above ground among half-burned logs and heaps of bricks. Until the start of the tank attack the gun remained well hidden in the basement, and when the crew raised it to its emplacement it looked like part of the surrounding ruins, being covered with soot and brick-dust. Only a sharp



Combat helmets resemble our own. This method of serving the piece should allow quite rapid fire. Ammunition appears to be in trays. (Sovfoto)

and well trained eye could discover thin gun barrels among the trees of a shelled garden, in a barn's half-open doorway, and in a roadside ditch.

The guns were mounted in groups, to assure mutual protection and to meet the probable tank advance. Before

dark the range to every critical point within a radius of one and a half kilometers was measured and studied by every gun crew and entered on antitank cards. Intervals between guns were occupied by antitank riflemen and by men armed with antitank grenades and fuel bottles.

In the morning the roar of airplane engines announced the beginning of a counterattack. Enemy fighters attacked with a hail of machine gun bullets and small splinter bombs; having combed the seemingly lifeless locality, the planes left pursued by shots from the ground. Then the tanks advanced from the west and southwest, trying to outbank our position. Behind them could be seen lines of infantry advancing by short dashes. Our guns remained in sight. Picking up speed, the tanks crossed the invisible line we had determined, and our guns suddenly spoke.

Senior Sergeant Didvv's guns were unnoticeable in the ruins of a building; he allowed four enemy tanks to approach within 600 meters. A gunner took good aim and three shells struck the leading tank; it trembled, stopped, and smoke arose above it. Its crew was seen jumping out through the hatch.

This unexpected reception caused the tanks to halt a moment and look for their hidden enemy. One shot was enough for the second tank, making it sink heavily on one side, crushing its mechanism under its own weight. The two remaining tanks opened fire and dashed out of sight pelted by shells from other guns into whose field of fire they had moved.

Platoon Commander Lebeda, concealed in a trench, directed the fire of a gun hidden among some fallen trees. Two tanks were destroyed by this gun, one of them being thoroughly burned and perforated by shells. The other came within 100 yards and the point blank fire shattered its turret and stopped the machine.

Within ten minutes everything was over. Eight tanks were destroyed or disabled and the mortar and artillery fire halted the infantry.

HOWITZERS AGAINST SOVIET TANKS

By War Correspondent Dr. Friedrich Wagner, in the *Berliner Illustrierte Ausgabe*, July 5, 1941

Editorial note. The guns mentioned are undoubtedly the 105-mm. howitzers of an infantry division, which are horse-drawn. The battery was emplaced by platoons, and used HE shell rather than solid-shot antitank projectiles. It appears to be German SOP to withhold fire until the hostile tanks are within point-blank range.

On this hot battle morning there was a sound of clanking and the bursting of shells over the fields of Radziechow which recalled the fabulous smithies of the underworld. Iron rang on iron, destructive shells burst against steel plates. The fields reverberated as though knights were in battle, fighting with swords against coats of mail.

As the Soviet tanks drove from the south in a flank attack against the protection formed by the infantry and artillery along the road over which our tanks had

advanced toward the east, "Enemy tanks advancing!" was the report. The gunners went into position unusually tense, with that feeling of subdued excitement which fills everyone who meets the enemy for the first time. "Two guns in each battery and two in covered firing position," ran the orders.

Tanks advancing! Can the light field howitzers resist them? The men could not spend much time in considering the question and soon the first rounds rang out from the covered firing positions against the area where the enemy tanks were in readiness. Two hundred meters more, wait! Another hundred meters more! The tanks which had assembled on the slope continued to advance. How many are there? Forty or fifty certainly, according to the gunners' estimates, but they did not have much time for estimations. Armor piercing, high explosive projectiles were fired from the howitzers against the steel tanks; shell after shell was fired; everyone brought up ammunition or helped swing the guns around.

There was a heavy tank in front with thick armor plates—had it not already received a direct hit? No, it continued, directly toward the battalion command post. Everyone jumped into the individual fox-holes for protection against tanks, and the colossus rolled on over them, its treads spraying earth on the steel helmets below. Just over the foxhole of the adjutant it received another direct hit—he felt the concussion. The tank was scarcely across the holes when the gunners sprang out again like lightning, and continued their fire. Fifty meters farther and a direct hit blew up the tank with a wild burst of flame; its parts flew through the air in a powerful stream.

They then arrived from all sides. The gunners had to change direction constantly and everyone lent a hand, from the major to the last private. One howitzer especially picked off tank after tank. There stood Corporal Reiser at the panoramic sight. With imperturbable cold-bloodedness he made his calculations; during a short pause in the firing he lighted a cigarette. His gun stopped one tank after the other. Many men jumped about to bring up ammunition promptly enough; soon the supply became scarce, and if it gave out the tanks could break through! Ammunition must be brought up! How could it come in that bursting rain of steel? A corporal jumped back into the tank fire, seized horses, and drove the munitions wagon up between the guns. Two others hurried to a truck and also drove it safely to the guns.

A Russian tank drove toward a gun, bumped against it, and sagged back. At a distance of hardly more than a meter the gunners sprang to their places and fired a shell into its armored body. A high burst of flame came out and the gun crew fell at the explosion.

The battle raged for two hours or more. The sun burned down over the fields, the air was grey with smoke and cracked with explosions. The men had lost all feeling for their surroundings; they loaded, fired, loaded, brought up ammunition. The Soviet tank attack finally collapsed in the defensive fire. The few that were able to break through were put out of commission by antitank guns in rear.

The great bulk of Germany's artillery is horse-drawn. Note the railway patrol, equipped with machine gun on AA mount. (Dever from Black Star)



The Artillery Preparation

By Lieutenant Colonel John J. Burns, FA

The superior commander decides the scope, time of commencement, and duration of the artillery preparation. In making these decisions he usually consults his artillery, air, and armored force officers. He desires to overwhelm the enemy so completely prior to the jump-off that the attack is a walkover. How fully this can be accomplished depends on the total artillery, ammunition, and combat aviation available. The degree to which it is desirable to overwhelm him depends on the attacker's initial margin of superiority in artillery, air, and armored forces. A great superiority may even eliminate the necessity of a preparation and thereby insure the advantage of surprise.

No commander can hope to obtain the completely overwhelming effect he desires. The complete destruction of all objectives is impracticable because of the prohibitive amount of ammunition and degree of accuracy required. Interdiction, being limited to bottlenecks which cannot be by-passed and requiring accuracy to be effective, does not insure disruption of hostile traffic. Interdiction, by its nature, must last a long time and consume large quantities of ammunition. Nevertheless, some destructive and interdictionary missions must be executed if the attack is to succeed; certain paths in barbed wire entanglements and mine fields may have to be opened; strong points or block houses will have to be destroyed; important traffic arteries must be interdicted. Greatest dependence will be placed upon neutralizing fires because they are the only type effective against inaccurately located targets. But the effect of neutralization fire is incomplete and of short duration. With all these limitations in mind, the commander determines the relative importance of the destructions, neutralizations, and interdictions he desires, as well as the order of importance of various objectives.

WHEN?

If a period of stabilization has preceded the attack, surveys will have been accurately executed, targets exactly located, artillery and plenty of ammunition brought up. A night preparation executed by the artillery, acting alone, can accomplish the purpose set forth by the commander under these conditions.

But in a maneuver situation, time precludes bringing up large masses of artillery and great quantities of ammunition or locating many targets accurately. A night preparation under these conditions will be largely a waste of ammunition.

A daylight preparation, on the contrary, has the tremendous advantage of observation, both ground and air, with a resultant sharp decrease in the amount of ammunition required. Combat aviation, by taking part in the preparation, can compensate for the artillery and ammunition which cannot be brought up because of the time limitation. The ability of combat aviation to arrive in large numbers on the scene of action with lightning surprise, its lack of dead space, its long range and its tremendous destructive power, enhance the importance of the role it can play. It can round out, extend, and intensify the artillery action during the preparation, but it must operate in daylight to do this effectually.

Yet the commander should make the maximum use of his artillery in the preparation. Artillery is more economical than air force because it can sustain its fire, shift fires rapidly, and hurl tremendous weights of explosives. Every effort should be made to get up the greatest quantity of guns and ammunition that time will permit.

The time required to bring up the desired quantities necessarily influences the time of commencement of the preparation. Available means of transportation, capacity of the road net, condition of the roads, and distances to be covered are factors for the artilleryman to consider. In a fast moving situation it is probable that only the night preceding the attack will be available for bringing up the artillery. Advance planning, reconnaissance, and full exploitation of the speed of motorized artillery will increase the quantity that can be moved in.

It is likely that the whole period of darkness will have to be used to bring up guns and ammunition. The last-arriving batteries may arrive at the break of dawn and require time to occupy positions. A short period of daylight prior to the commencement of the preparation will enable them to do so. It would also be invaluable for a final daylight check by all units to increase accuracy of fire.

We must get the greatest return from the artillery in order to shorten the preparation. This is accomplished by having weapons fire at the maximum rate for short bursts of fire and by using the periods required to shift to new targets as cooling and cleaning periods. The length of periods allotted solely for shifting must be minimized.

HOW LONG?

The purpose of the preparation, as expressed by the number of destructive, neutralization, and interdictionary missions required, largely determines its length. A daylight

preparation, being observed, will require less ammunition and time to obtain the desired degree of softening of the enemy. Assistance from the air force will tend to shorten the preparation, but it must be long enough to permit the planes to reload and take part in the attack itself.

The degree of strategical and tactical surprise desired also influences the length of the preparation. The margin of superiority enjoyed by the attacker determines the amount of softening and the time required to obtain it prior to the jump off.

THE PLAN ITSELF

The commander having announced basic decisions regarding the purpose, time of commencement, and duration of the preparation, artillery officers of the various echelons work up the plans for it.

The artillery officer of army determines what artillery it will retain and that which it will allot to the corps. He defines the area of army responsibility and indicates particular targets outside that area which army will handle. In consultation with the army air officer, particular targets and the area of air force responsibility are agreed upon. He issues instructions to provide coordination among the corps.

Upon the corps artillery officers falls the task of drawing up the detailed plan of the preparation, since division and brigade artillery commanders are executants. The corps artillery officer reallots artillery not desired under corps control, and constitutes groupments from the remainder. This involves organization of command, a subject in itself. Briefly, if the corps artillery is formed into groupments of weapons having the same characteristics (of which range is the most important), simplicity and numerous other advantages accrue.

In simplicity lies the success of any plan for an artillery preparation to be fired in a maneuver situation. To this end everything possible should be incorporated in a standing operating procedure. Theoretically attractive refinements must give way to practical simplicity. The plan must be flexible so as to take care of the unpredictable. It must be issued early enough and in such form that subordinate commanders have time to put it into effect.

For simplicity in establishing the division of responsibility for the air force, army artillery, and subordinate units, the prescribed XX, YY, and ZZ lines and, in addition, an AF line may well be used. During the preparation, the air force should be responsible for all targets beyond the AF line and such others as are specially designated for it. Army should primarily handle all targets between the AF and ZZ lines and other specially designated ones. Corps is responsible for all targets short of the ZZ line; it will probably not subdivide its zone by XX and YY lines for the preparation, but will probably do so for the attack. During the attack, the division artillery will probably be responsible for all fires except counterbattery short of the XX line, and the corps artillery

for all counterbattery short of the ZZ line and all fires between the ZZ and XX lines; corps may divide its area with a YY line for medium and heavy groupments. These sub-divisions influence the artillery officer in the assignment of targets, for the artillery units are ordinarily emplaced to execute missions in their areas of responsibility.

The plan of the preparation will be further simplified if the artillery with the corps understands either by training or by a standing operating procedure that:

- a. The center of concentration circles indicates the center of impact desired.
- b. All fires and concentrations will be by battalion unless otherwise indicated.
- c. All concentrations will be of two minutes' duration with rates of fire:

<i>Weapon</i>	<i>R.G.M.</i>	<i>Bn. Total</i>
75-mm.-G	6	144
105-mm.-H	4	96
155-mm.-H	3	72
155-mm.-G	3	72

- d. When a heavier fire is desired more than one battalion will be assigned to fire the concentration.

e. When it is desired to fire a concentration longer than two minutes, it will be ordered repeated the desired number of times by following the number by (2X) or (3X). *Example:* 210 (3X).

f. If an area is too large to be covered by one battalion, separate concentrations fired simultaneously by different battalions will be placed to cover it.

g. All batteries fire with the center of their sheafs on the center of the concentration, using maximum effective width of sheaf.

h. If the batteries of a battalion are to fire with centers offset 50 yards in deflection and $\frac{1}{2}$ C apart, the concentration number will be followed by (C/2); if centers are to be 100 yards apart in range and deflection, the concentration number will be followed by (C). *Examples:* 214 (C/2); 222 (C).

i. The category and general nature of targets may be determined by their numbers, a block being assigned to each category as follows:

Category A: 1-49: CP's and OP's, radio stations, communication centrals.

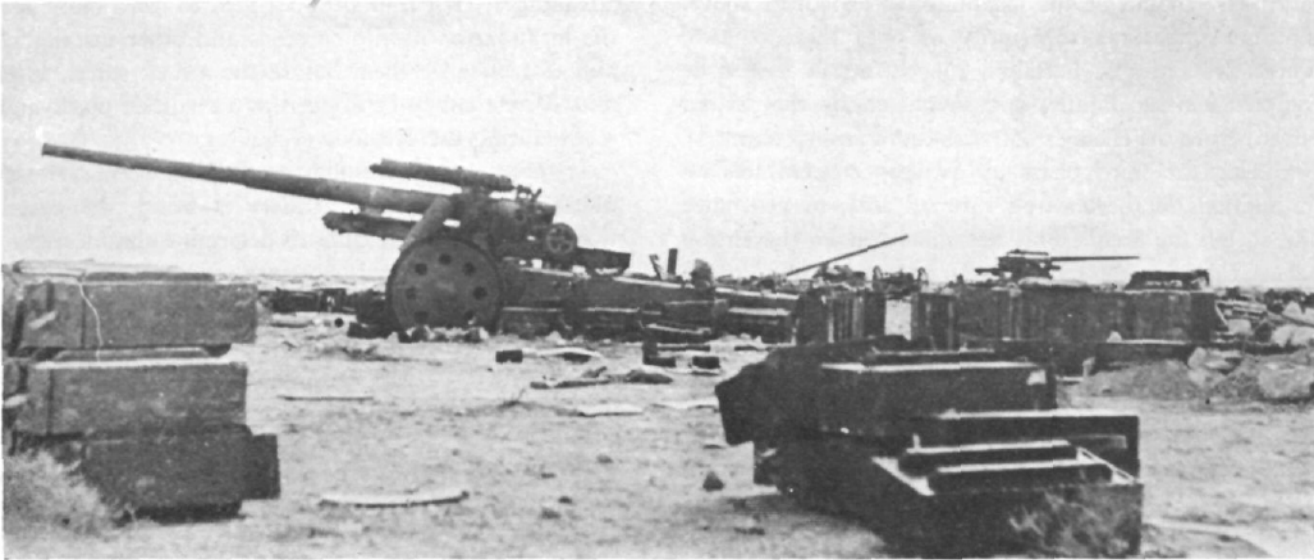
Category B: 50-99: Enemy batteries.

Category C: 100-149: Enemy weapons and installations in forward areas.

Category D: 150-189: Targets requiring interdictory or harassing fires.

Category E: 190-199: Targets to be destroyed: barbed wire, light bridges, etc.

j. An average of two minutes is allowed to shift from one concentration to another.



German 105-mm. guns sited for all-around protection. (British Press Service Photo)

k. Preparation is divided into cycles, phases and series. Series are designated alphabetically with capital letters and are always of two minutes duration.

l. All concentrations are to be fired to obtain neutralization unless otherwise indicated.

m. Concentration number followed by:

(D)—indicates target is to be destroyed.

(H)—indicates target is for harassment.

(I)—indicates target should be interdicted.

(S)—indicates smoke is required.

PRIORITIES OF TARGETS

First Cycle

A study of the probable reactions of the enemy after he is alerted is of great importance to the corps artillery officer in shaping his plan for the preparation. It is logical to assume that upon the opening of the preparation, enemy commanders will want to issue orders and instructions to meet the threat. Command posts, radio stations, and communication centers will become active. Observers will start sending in reports. Personnel will be aroused, batteries and weapons manned, front line trenches and strong points occupied. Troops in assembly and bivouac areas will be alerted and assembled. Reserves in other areas will be alerted.

This will be a period of confusion and hesitancy for the enemy. Many of his efforts will be futile. His troops will lose time getting to their posts.

If at the opening of the preparation we concentrate on his command and observation facilities, we will add to his confusion and keep him in the dark. In the opening phase, then, we should concentrate on his command posts, radio stations, communication centers and observation posts with a view to cutting wire lines, interfering with operations, and smoking his observers. For convenience, the opening phase can be called the Command Post-Observation Phase.

In the meantime, the hostile troops will be manning their various posts. Batteries will be preparing to fire counter preparations. This is our immediate and only ground threat, for our infantry, remaining under cover, should be fairly well protected from small arms fire. Now is the time to knock out his artillery, before he can reply, for his gun crews, unmolested up to now, are exposing themselves in their haste to fire. This can conveniently be designated the Counterbattery Phase. In executing this phase, the ideal would be to knock out all his batteries completely and simultaneously. A complete knockout blow would require three battalions per enemy battery. To knock them all out simultaneously would then require a superiority in artillery of nine to one, a ratio which rarely exists. Experience in the last war shows that at least a battalion concentration is required to stun or neutralize a battery for a short time. This concentration has to be violent and completed within two minutes, for within that short time all men capable of taking cover will have done so.

If heavy concentrations with a view of completely knocking out batteries are placed on a third of the enemy artillery in the first series of the counterbattery phase, two-thirds of his artillery is free to act against the attacking artillery. In the second series at least one third of his artillery can act. The battle may be lost. It appears better than to use one battalion against a battery to obtain a stunning effect, neutralizing all batteries simultaneously, or at most in two series if necessary, then to repeat the operation in later cycles.

The use of a battery against a battery to avoid having two series in the counterbattery phase does not promise the neutralization effect desired. The time required for a battery to fire the required amount of metal is too long. The gun crews will have taken cover before the fire is completed, if its accuracy and density are sufficient to force them to do so. Two series in the counterbattery

phase should be the maximum as explained above. This presupposes a superiority of only three to two. These two series of battalion concentrations should be completed in six minutes and should obtain the desired effect before the enemy's batteries can do much harm.

During the third phase all artillery concentrates on installations in the enemy's forward area, to neutralize and soften the area. This fire should make the enemy believe that the attack is about to be launched and cause him to reveal hidden batteries and weapons by firing. This phase, which can be referred to as the Front Line Phase, completes the first cycle.

H-hour Determination

If it is calculated that the desired softening effect will have been obtained, H-hour can be set at any time during or on completion of this last phase. It will be noted that no harassing fires were provided in the first cycle. The cycle is so short, about twenty minutes, that the neutralization effect obtained by concentrations of the most violent nature possible, is counted upon to last until the end of the cycle. As a matter of fact, the duration of the neutralization effect determines the length of the cycle.

Interdictory fires are not placed in the first cycle because it is felt that movements of reserves, motor columns, etc., would hardly be organized and started in twenty minutes.

Destructive fires should start preferably after the first cycle. This permits use of the greatest amount of artillery to deliver knockout blows. However, destructive fires are started sufficiently early to permit their completion in time. In some situations the time required to open up passageways in barbed wire may determine the length of the preparation.

By the end of the first cycle the enemy should have been shaken. Troops which were shelled for a couple of minutes and then left unmolested will be regaining their courage and quitting their holes. Linemen will be repairing lines. Command posts, observation posts, radio stations, and communication centrals will again function. Battery personnel will be returning to their guns. The men of the forward areas will reappear gradually.

What could be more demoralizing than the sudden burst of another avalanche of shells just when they feel that the storm is all over? If this happens three or four times, the men are likely to stop guessing that it is "all over." They are more likely to play sure so as to avoid the fate of their comrades who guessed wrong. They will probably stay in their holes and let the infantry attack actually be a walk-over.

Creation of uncertainty as to the exact time of the jump-off, in addition to further softening of the enemy, is the aim of the second and subsequent cycles. But having more than one cycle offers still other important

advantages. It permits the artillery to learn more about the locations of hostile batteries and other installations, and to neutralize them before the attack starts. It permits corrections to be applied as a result of observations made during the previous cycles.

If three or four minutes are left between cycles and none of the attacking artillery is firing, the observation battalion will be able to determine the locations of new targets. Time for necessary corrections, based upon previous observations, will be afforded. A vacant period is provided when all the artillery can be concentrated by the superior commander upon a critical area, should one develop.

Subsequent Cycles

During the second cycle harassing fires on assembly and bivouac areas, motor parks, dumps, etc., should be started. Interdictory fires on bottlenecks not readily by-passed should be undertaken. During the Counterbattery and Front Line Phases provision should be made to fire on targets discovered during the first cycle, opportunity being also provided for subordinate echelons to fire on targets which they discover. Harassing counterbattery fires should start upon completion of the Counterbattery Phase. Combining and alternating violent sporadic concentrations with periods of harassing fire should be demoralizing and keep ammunition expenditures down. In harassing enemy batteries, one harassing battery should be assigned to two hostile batteries. It should fire concentrations on them successively at the rate of about 70 rounds on each per hour. Varying the time interval between the successive battery concentrations will conserve ammunition with but little decrease in neutralizing effect.

The second and subsequent cycles, in view of the above, will consist of a greater number of series and require longer to fire. This is not serious because the enemy presumably has already been shaken. Furthermore, the variation in the program is confusing to him.

Subdivision of the preparation into one or more cycles of three phases, and of the phases into series, simplifies target assignment, introduces flexibility into the plan, and facilitates calculation of ammunition requirements.

Handling of Series

An exact following of the time of the schedule during a particular cycle is not essential. The two minutes allowed between two-minute concentrations is the average time it is calculated that artillery of wide-angle traverse will require to shift. However, it is desirable that cycles start and end promptly on schedule time. This avoids having bursts in the target area during the interval between cycles, interfering with the flash and sound ranging of the observation battalion in locating new enemy batteries which open up. It is very important

that all fires scheduled after H-hour be fired on time.

The use of series simplifies the calculation of time and ammunition required, for the time of each series is a constant (two minutes) and the amount of ammunition expended by each battalion for each series is also a constant. Since series are lettered, calculations are simple. Use of capital letters to designate series simplifies references to them and avoids the necessity of repeating numerous concentration numbers.

From a study of reported locations of enemy batteries and installations, maps, photographs and the ground, the corps artillery officer can construct a picture of the enemy dispositions. He can determine the location of suitable targets for interdiction, destruction, and harassment.

To follow a simple procedure, he places the concentrations to be fired in categories and numbers them as described above. In the first cycle he usually plans on using all battalions except those required for essential destructions, to deliver violent knockout blows. Concentrations are assigned according to their nature, location, and accuracy of location. Descriptive information for the assistance of observers in identifying targets should be furnished; this should be a separate section of the plan and should not delay its issuance.

In a maneuver situation the location of relatively few targets will be known and fewer still will be known accurately, so it is necessary to leave blank periods in the plan to take care of those discovered later. This also permits issuance of the basic plan at an earlier



hour, and of a last minute supplement to it. Subordinate echelons can then start their work early and incorporate the date of the supplement when it arrives.

All artillery with the corps should take part in the preparation. Division artillery should be released by H-hour to permit it to assume its normal mission of direct support of the infantry. Corps artillery should continue on schedule fires well into the attack, deepening the fires of the direct support artillery and executing counterbattery missions so that no lull occurs at H-hour.

The plan of the preparation can be conveniently issued on an overlay showing concentrations and firing schedule. Some of the overlays should be printed on opaque paper of a quality which will permit the horizontal control operators of FDC's to plot battery and base point locations and to work directly upon them. Other overlays should be on transparent paper for use by vertical control operators and command posts. The corps artillery section should furnish enough to take care of all echelons, to include battalions.

Brigade and divisional artillery commanders will find it convenient to write the name of the subordinate regiment or battalion on the top of the overlay destined for it, and to check the concentrations for which that unit will be responsible. This saves duplication and time.

ILLUSTRATIVE EXAMPLE

The army consists of two corps. The X Army Corps of which we are the artillery officer consists of two infantry divisions, 50th and 51st in line. The army has reserved a regiment of 240-mm. howitzers for certain destructive missions it assumes. It has allotted the 140th FA Brig, 280th FA (155-mm.-gun regiment), and 510th FA (105-mm. howitzer) to the X Army Corps.

We have organized the command of the artillery with the X Army Corps into two groupments:

WHITE GROUPMENT, General White comdg., consists of the X Army Corps' organic 10th FA Brig, less the 103d FA (155-mm. gun), with the two medium regiments of the 140th FA Brig attached. Total: Eight battalions of 155-mm. howitzers.

BLACK GROUPMENT, General Black comdg., consists of 140th FA Brig, less two medium regiments, with the 103d FA and 280th FA attached. Total: Six battalions of 155-mm. guns.

510th FA Bn is allotted to the 51st Inf Div.

Figure 2 shows the S-2 situation at 1:00 PM the day before the attack. It has been decided to work up the plan of the preparation based on the data at hand at that time.

A supplement to be issued before the attack will take care of targets discovered later.

A study of the photo reveals targets in the categories as follows:

Category A: 9 OP's, 8 CP's, 3 radio stations, 1 communication central. These can be numbered 1-21. Since there are 23 battalions, one series of concentrations will handle this category, leaving 2 battalions to spare.

Category B: 19 batteries, numbered 50-68. These can be also handled in one series, leaving 4 battalions to spare.

Category C: 16 MG's, 2 ATG's, 22 lengths of trench; numbered 100-139. These will require two series leaving 3 spare battalions in each series.

Category D: 6 interdictory and 10 harassing missions, numbered 150-165. Interdictory missions can be handled by one battery; enemy counterbattery harassing missions by one battery per two enemy batteries; area harassing missions by battalion firing batteries 100 yards apart in range and deflection. These can be started in the second cycle.

Category E: 1 wooden RR trestle, numbered 190. Destruction can be started by one battery of 155-mm. guns, in the second cycle.

Targets are numbered by category from left to right more or less on horizontal lines starting in the enemy's rear area.

In studying the schedule of fires tabulated in Figure 1, it is interesting to consider the total ammunition requirements for the preparation and the attack.

By definition, the preparation ends at H-hour. Since a 105-mm. howitzer battalion expends 96 rounds per series, each will require 2,208 rounds for the 23 series. Similarly each 155-mm. howitzer and gun battalion expending 72 rounds per series will require 1,656 rounds.

For the attack, the ammunition which it is estimated will be fired from the initial position, a reserve conveniently located, plus a complete mobile load will be required. This is estimated at one and one-half units of fire: 4,050 rounds of 105-mm. howitzer; 2,700 rounds of 155-mm. howitzer; 1,800 rounds of 155-mm. gun ammunition.

For the preparation and attack, there will be required per battalion: 6,258 rounds of 105-mm. howitzer; 4,356 rounds of 155-mm. howitzer; 3,456 rounds of 155-mm. gun ammunition. Since a 105-mm. howitzer battalion carries 2,367, 155-mm. howitzer battalion 1,512, and 155-mm. gun battalion 1,185 rounds organically, each battalion can itself transport the required ammunition in slightly less than two additional loads.

Annex 6b to FO 4 -- Hq. X Army Corps

ARTILLERY PREPARATION

SER.	H	TIME	PHASE & NO	BLACK CPMT	WHITE CPMT	1st IDA	2nd IDA	REMARKS
DES.	TIME	A.M.	OF CONC'S	16 BNS 155-G	18 BNS 154-H	15 BNS	4 BNS	TOTAL BNS - 23
A	H-92	1:58	CP-Obs.	21, 2, 3, 4	29, 11, 13, 15	25, 6, 7, 10, 28, 12, 19		To be assigned by suplt.; otherwise available to sub. units.
B	H-98	1:02	Counterbtry	150, 51, 52, 53	155, 56, 57, 58	159, 64, 65	162, 63	13 btrys from WHITE CPMT required to maintain smoke on 13 btrys rtrn; smoke on Ab; 16 Lt to H+14.
C	H-81	1:06	Front Line	1109, 111, 115	112, 113, 117	1101, 102	1122, 126	(C/2) Btrys 50 yds. apart in rn. and def
D	H-80	1:10	Front Line	110, 116, 118	105, 110, 124	1100, 104	1128, 130	(continued) 1121, 127, 136 (All C/2) 1137 (All C/2) 1139 (All C/2)
E	H-76	1:14	Front Line	104	102	102	102	
F	H-72	1:18	Front Line	104	102	102	102	
G	H-68	1:22						To be filled by suplt otherwise available sub. units.
NO FIRING BETWEEN H-66 AND H-62 (1:24 to 1:28) Period of flash and sound ranging.								
H	H-62	1:28	CP-Obs.	1A	1Ab	1Ag	1Ad	In Ab increase ratio of HE to S as much as practicable.
I	H-58	1:32	Counterbtry	184	182	182	184	See Remarks Bg above
J	H-54	1:36	D, H, I	190(D) 1 Btry; 16 Bns; 150-165 (2 Bns) to H-22; 150-152 (1 Bn) to H+14; 159(C); 162(C)	160(H) (2 Bns) to H-22; 153 (1 Bn) to H+14; 159(C); 162(C)	160(C) (2 Bns) to H-22; 153 (1 Bn) to H+14; 159(C); 162(C)	157(C) (2 Bns) to H-22; 153 (1 Bn) to H+14; 159(C); 162(C)	(C) - Btrys 100 yds apart in rn and def. Note 1
K	H-50	1:40	D, H, I	111, 120, 123	113, 117, 118	102	102	
L	H-46	1:44	D, H, I	115	121, 131, 134	102	102	
M	H-42	1:48	D, H, I	116	119, 124, 132	105, 109	125, 127	
N	H-38	1:52						To be filled by suplt for sub. units.
NO FIRING BETWEEN H-36 AND H-32 (1:54 to 1:58) Period of flash and sound ranging.								
O	H-32	1:58	D, H, I	104	102	102	102	

(continued)

Annex 6b to FO 4 -- Hq. X Army Corps

ARTILLERY PREPARATION

SER.	H	TIME	PHASE & NO	BLACK CPMT	WHITE CPMT	1st IDA	2nd IDA	REMARKS
DES.	TIME	A.M.	OF CONC'S	16 BNS 155-G	18 BNS 154-H	15 BNS	4 BNS	TOTAL BNS - 23
P	H-28	1:02	D, H, I	114	112	112	114	
Q	H-24	1:06	D, H, I	114	112	112	114	Cease harassing ifires started in J at H-22.
R	H-20	1:10	CP & Obs.	1Ag (less one)	1Ab (less one)	1Ag	1Ad	In Ab increase ratio of HE as much as practicable.
S	H-16	1:14	Counterbtry	184 (less one)	182 (less two)	182	184	See Remarks B above
T	H-12	1:18	Front Line	104 (less one)	102 (less one)	102	102	
U	H-8	1:22	Front Line	104 (less one)	102 (less one)	102	102	
V	H-4	1:26	Misc.					Fire cones not fired inot fired in H, S, T, U
W	H-	1:30	Front Line	104 (less one)	102 (less one)	102	102	(C) Btrys 100 yds. apart in rn and def;
X	H+4	1:34	Front Line	104 (less one)	102 (less one)	102	102	
Y	H+8	1:38	Front Line	104 (less one)	102 (less one)	102	102	Increase ranges of all concentrations ifired by corps arty in series C & D 500 yds and fire (C) apart.
Z	H+12	1:42	Front Line	104 (less one)	102 (less one)	102	102	All I & S (Interdictory / Smoke) ifires cease at H+14.
AA	H+16	1:46	Counterbtry	184	182	182	184	1 Bn WHITE CPMT reinforce fires 1st Div.
BB	H+20	1:50						
CC	H+24	1:54						See Remarks Q and Z above.

* Note 1 --- (C) Btrys fire 100 yards apart in range and deflection. (D) Destruction, 1 btry until completed. (H) Harassing, 1 btry per 2 enemy btrys; req. 2 bns until H+14. (I) Interdiction, 1 btry per interdictory; req. 2 bns until H+14. This still leaves available under columns G, H, I, and J (3-), (5-), (5) and (4) bns for later series until H-22 when there will be (5), (7), (5) and (4) available.

Note 2 --- When practicable, all battalions will fire every series. If additional targets are not discovered to use up vacant periods, fire will be repeated on concentrations already fired or superimposed on concentrations being fired.

Figure 1



"What, No Metro Message?"

A return to Civil War artillery tactics has taken place in many dramatic situations in Europe, and we hear the phrase "shooting from the hip" a great deal nowadays. The trend is very popular in our Army. We like things with an up-to-date flavor. We like action. Our younger officers have a tendency to view all battle as pure blitzkrieg, with the artillery firing from the midst of the infantry, at armored targets rushing in from all directions. Old Nathan Bedford Forrest used to march with a couple of brass eight pounders as his point; we, too, want to fight that way.

But whether we like it or whether we do not, we are still going to fire a great deal of the time without observation. We can not see in the dark. We can not see very far in the woods. For that matter, unless there are points of vantage, we can not see very far in normally open country. Aerial observation is not practical at night, and we can never count on having all we should like in the daytime. The wiser heads do not minimize the importance of fire from maps and map substitutes at the same time that they stress anti-tank protection. We should not breathe a sigh of relief, on reading of panzer attacks, and feel that the day of figuring metro messages is over.

Of course the new slide rule and graphical methods are distinct advances, and the work is not as burdensome as it used to be, but it is still far from fun. It is, however, extremely necessary. If K is 10 mils in deflection and 50 yds./M in range, corrections of the moment mean the difference between hitting a target 5,000 yards away and missing it entirely. Hence the metro section of the divisional artillery battery, and four-hourly broadcasts to the battalions which it serves.

But what if weather conditions or enemy interference prevent reception? The neighborhood of a divisional headquarters was never very healthy in France; with the aid of radio triangulation and fifth columnists, the Germans kept the French generals skipping. The metro section can easily be knocked out. Or radio silence may be enjoined, or weather conditions may interfere with reception, or the enemy may jam assigned frequencies. What if the battalions do not get their message?

The first thought in such a situation would be a high burst adjustment. This requires accurate location of base piece and lateral observer, which may take an hour or so and may not be feasible. Is it the only way?

There is nothing occult about making the metro message. The minimum equipment for a substitute metro message would cost about a hundred dollars. It could be carried in a foot locker by each battalion. Any member of the instrument section could learn to operate all the equipment in a couple of hours, and the important

weather factors are only two, wind and powder temperature.

Wind direction is obtained by a small wind vane (ML73) consisting of the vane proper, three jointed bamboo rods, and two carrying cases. The direction markers on the vane must be oriented by a magnetic compass or other similar means. (See TM 3-240). Wind velocity is measured by the hand anemometer, direct reading. This small instrument consists of three curved blades mounted on a vertical shaft. The shaft operates a speed dial, encased in the top part of the instrument and graduated in miles per hour, like the speedometer on a car. While the use of these two simple devices is not as refined a system for recording wind direction and velocity as tracing hydrogen balloons with a theodolite and stop watch, and while it gives only surface readings, displacement of the guns from a metro station in space and lapse of time make a jest of decimal places anyhow. The simpler method is certainly a great deal better than no correction at all, and better than most guesses.

Powder temperature is measured in the battery. (See June, 1941, F. A. J.)

There remain two lesser weather factors. One is air temperature. It seems shiftless, somehow, to assume that the temperature is plus 59 degrees F. (the basis upon which our firing tables are constructed) when a glance at a thermometer may show that it is minus 10 degrees or plus 90 degrees.

Ballistic density, the remaining factor, is not just air pressure, as read from the usual aneroid barometer; it is a composite of the factors of humidity and pressure, with certain corrections. For hasty use, however, an aneroid barometer will give far better density corrections than none at all (density is rarely the even 100 per cent contemplated by the tables), and only under extreme conditions will the short cut produce material error. The aneroid barometer is spring-actuated, and is contained in a small, sealed box. It is portable, cheap, and convenient to read.

The rules used in compensating for the difference in height between battery and the MDP will give approximate temperature and density at the proper altitude for the trajectory desired. The figures, it will be recalled, are minus 2° F. in temperature and minus 3 per cent in density for ever 100 feet of increase in height of battery.

A battalion provided with standby metro equipment gains the ability to fulfill its mission at times when otherwise it could not do so. The cost in equipment, in training, and in cargo space are slight indeed.

By 1st Lieutenant Edward A. Raymond, FA

CADRE TEST - 3

(For solutions, see page 628)

Prepared by the Fort Bragg Provisional Field Artillery Brigade

COMMUNICATION CHIEFS

Part "A"—Weight, 60.0

(Note: Answer all 60 questions. Put a "T" in front of the question if the statement is True. Put an "F," if False. A statement partly wrong is false.)

1. Personnel of the Signal Corps provide communication for all units down through the Corps Artillery Brigade.
2. Responsibility for Signal Communication is a function of command.
3. The establishment and maintenance of Signal Communication between subordinate and superior units are the responsibility of the subordinate commander.
4. The establishment and maintenance of Signal Communication between adjacent units is directed by their common superior.
5. The establishment and maintenance of Signal Communication between a unit which supports another unit by fire and the other unit is the responsibility of the unit supported.
6. The supervision of communication exercised by the signal or communications officer is not subject to the approval of the commander.
7. The sole purpose of the M/C is to speed the transmission of messages.
8. The M/C of division and higher units are operated by signal units.
9. The M/C is prepared to perform authorized stenographic work.
10. Messages ordinarily used by Field Artillery are classified according to speed of transmission as Urgent, Priority, and Routine.
11. In actual tactical operations all messages not classified as "Secret" will be considered "Confidential."
12. The responsibility of the M/C for an outgoing message begins when a message is received by the M/C.
13. The M/C is not responsible for the following messages:
 - a. Transmitted directly by writer.
 - b. Handled by military or civil postal service.
 - c. Relay messages.
14. Flexibility in procedure of and organization of a M/C is not desirable.
15. Urgent and Priority messages should be usually sent by telephone.
16. Routine administrative reports should be transmitted by radio.
17. The code clerk's file contains the original clear copy of all outgoing messages sent in code and original copies of all incoming code messages.
18. Telephone directory names are not intended for secrecy but are prescribed for purposes of simplicity, accuracy, and speed.

Military Cryptography

19. Commanders may authorize the normal transmission of artillery fire-control messages in clear.
20. Messages sent by radio in the clear may be authorized by any officer who must write "sent in clear" on the message over his signature.
21. In general, it may be said that code is a more rapid and more simple method of signal communication than is cipher.
22. Cryptographic messages should be short and concise.
23. The following code and cipher names have the number of letter groups set opposite their names:

Cipher Device.....	5
DFC	4
Fire-Control Code.....	3
Air-Ground Liaison Code....	2
24. When in danger of capture, the alphabet disks of a device that has recently been used to cryptograph or decryptograph a message must be taken off, thoroughly disarranged, and reassembled.

Messenger Communication

25. An agent is a messenger.
26. A runner is used when other means of signal communication will not function in a dependable manner.

Radio Communication

27. Break-in operation is operation wherein a receiving operator can interrupt the transmitting operator at any time.
28. The SCR-178 (-179) has "break-in" ability.
29. A traffic log is a chronological record of traffic kept at a station.
30. Weather conditions may have a serious effect on range and quality of radio operation.
31. Radio communication cannot be readily intercepted by hostile stations.
32. The approximate number, types, and locations of our radio stations can be determined by hostile position finder stations.

33. A radio station will transmit *only* those messages authorized by competent authority.
34. The operator's service consists of the time transmission of message is complete, and the personal sign of the operator.
35. The amount of detail which appears on a log sheet varies according to the number of operators on duty.
36. Radio station records do not usually contain information of value to the enemy.
37. The duty of NCS may be assigned to any station in the net which can best fulfill the duties.
38. In a directed net, no station can communicate with any other station without permission of NCS.
39. Normally, all messages sent by radio are encoded.
40. NC2 is the designation of any secondary station which takes control of the net when the NCS is out of it.

Visual Communication

41. Normally, visual communication is an auxiliary means, supplementing wire and radio.
42. Visual communication is generally unsuited for transmission of long messages.
43. One advantage of visual communication is the speed with which communication can be established.
44. Another advantage of visual communication is its independence from weather and terrain.
45. Panels are used in combat on signal from the infantry liaison airplane in order that the airplane may report progress of ground troops and their locations.
46. Panels are displayed continuously at the organization CP.
47. In order to commence working with the airplane, an initial display of 000 under the index group is displayed.
48. An airplane requests the ground station to identify itself by zooming over the ground station and throttling the motor twice.
49. The headquarters with which an airplane is working will authorize the signal meaning "Go Home."

Wire Communication

50. Local battery is a term used to describe a telephone system in which current is supplied at each telephone.
51. Marline is a small wire of two strands used for tying field wire to a support.
52. A repeating coil is a 2:1 ratio transformer used to superimpose additional circuits on field wire lines.
53. A wire circuit is an electrical circuit consisting of more than one conductor.
54. A trunk circuit connects a switchboard and a telephone.
55. Two metallic telephone circuits providing an additional telephone circuit without mutual interference is called a phantom circuit.

56. The circuit diagram includes telephone centrals, switching centrals, test stations, and all locals.
57. A line route map is a map, map substitute, or overlay on which is shown the schematic wire set-up.
58. The loop knot tie is used in long spans and overhead crossings.
59. Circuit marking tags show the code name of the units connected by the wire.
60. Linemen should lay the wire in the road ahead of anyone picking it up.

Part "B"

Wt. No.

- 5 1. Draw a diagram of a C-161, and show to what each terminal is connected.
 - 5 2. Draw a simplex circuit constructed with repeating coils, between two telephones, going through two switchboards.
 - 5 3. *a.* Draw an example of a line route map of your unit (battalion or regiment), showing all details.
b. Draw an example of a traffic diagram of your own unit (battalion or regiment), showing all details.
 - 5 4. List the things pertinent to communication sections, both radio and wire, which can be found in an S. O. I.
 - 5 5. List the kinds of codes and ciphers used by your battalion or regiment.
 - 5 6. Write out the phonetic alphabet.
 - 5 7. Fill in the chart below, of approximate set capabilities:
- | Radio Set | Weight | Range—
Voice | Range
—CW | Type
Trans. |
|-----------|--------|-----------------|--------------|----------------|
| SCR 161 | | | | |
| SCR 178 | | | | |
| SCR 179 | | | | |
| SCR 194 | | | | |
| SCR 288 | | | | |
- 5 8. Draw a typical radio net of your battalion or regiment, acting as a part of a next higher unit.

MOTOR SERGEANTS

(Note: Answer any fifty (50) questions. Put a "T" in front of the question if the statement is true, an "F" if false. A statement partly wrong is false. Line out the five (5) questions you do not answer.)

1. "Backlash" results when gears become disengaged (Par. 3, TM 10-510).
2. "Camber" is the backward tilt or inclination of the front axle from a vertical plane (Par. 3, TM 10-510).
3. An "I-head" (or valve-in-head) engine is one with valves placed in the cylinder head above the cylinder bore (Par. 3, TM 10-510).

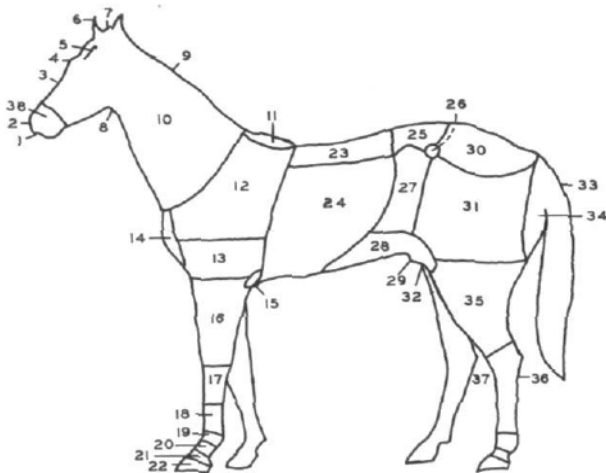
4. The "ampere" is the unit of measurement of electrical resistance.
5. Military motor vehicles are divided into three classes: General Purpose, Special Purpose, and Plant vehicles. Most Field Artillery vehicles are General Purpose vehicles (Par. 4 and 6, TM 10-510).
6. A chassis type indicated by "6 × 6 (4-dt)" means a vehicle with 6 wheels, 6 of them driving, and 4 having dual tires (Par. 27, TM 10-510).
7. The "clutch unit" engages or disengages the engine from the transmission (Par. 37, TM 10-510).
8. An oil filter cleans and cools all or part of the circulated oil each time it passes through the pump (Par. 47 *c*, TM 10-510).
9. Kerosene oil is appropriate as a lubricant for some special purposes (Par. 10, TM 10-540).
10. Petrolatum, commonly known as vaseline, must never be used on the breaker cam of distributors (Par. 12 *h*, TM 10-540).
11. "Viscosity" is the characteristic of a lubricant that makes it cling or adhere to surfaces (Pars. 14 and 16, TM 10-540).
12. If the proper oil is in the engine, cold engines may be raced immediately after starting (Par. 26 *c*, TM 10-540).
13. SAE oil is a heavier oil than SAE 50 oil (Par. 30, TM 10-540).
14. Oil pressure gages show how much oil is in the crankcase (Par. 31, TM 10-540).
15. Engine oil, among other things, absorbs heat from the pistons and transmits it to the cylinder walls (Par. 32, TM 10-540).
16. The splash method of engine lubrication is still common in modern engine design (Par. 32 *e*, TM 10-540).
17. All types of clutch plates require lubrication (Par. 33 *d*, TM 10-540).
18. Spring shackles should be lubricated approximately every 1,000 miles or more often (Par. 39 *b*, TM 10-540).
19. Generally speaking, it is impossible to get too much oil in transmissions and transfer cases (Par. 34, TM 10-540).
20. Great care must be exercised in lubricating wheel bearings to avoid forcing the seals (Par. 38 *b*, TM 10-540).
21. Army motor vehicles are lubricated on a mileage basis only (Par. 47, TM 10-540).
22. Army motor vehicles are so constructed that submersion incident to stream crossings can be disregarded as far as lubrication is concerned (Par. 47 *b*, TM 10-540).
23. Steering gears require a pressure resistant lubricant because the heavy pressures and slow sliding motion of the surfaces in contact tend to scrape off any film of lubricant and cause metal-to-metal contact (Par. 36, TM 10-540).
24. Any regular lubricating oil may be used in hydraulic shock absorbers (Par. 39 *c*, TM 10-540).
25. The type of spring most extensively used on motor vehicles is the leaf spring (Par. 11, TM 10-560).
26. A motor vehicle can pull a heavier load than it can safely carry (Par. 66, TM 10-560).
27. The lubricants for steering gears are all the same (Par. 44, TM 10-560).
28. Speed does not materially affect the life of a tire, provided the proper air pressure is maintained (Par. 59 *c*, TM 10-560).
29. Tire inflation should be checked every ten days.
30. Unbalanced wheel assemblies cause excessive vibration which accelerates tire and king-pin wear (Par. 60, TM 10-560).
31. Other things being equal, the stopping distance of a vehicle going 40 MPH is twice that of a vehicle going 20 MPH (Par. 5, TM 10-565).
32. Four-wheel brakes give increased braking effect but they increase the tendency to skid (Par. 18, TM 10-565).
33. Mechanical brake systems need frequent adjustment in order to obtain uniform application of shoes on all brakes (Par. 25, TM 10-565).
34. In a hydraulic brake system, the brake pedal operates the piston of the master cylinder by means of linkage (Par. 27, TM 10-565).
35. Modern engines use low compression ratios of about 3 to 1 (Par. 10 *b*, TM 10-570).
36. Piston rings assist in cooling the pistons (Par. 22, TM 10-570).
37. The connecting rod is an integral part of the steering mechanism (Par. 23, TM 10-570).
38. No fixed rule governs the frequency of crankcase oil changes (Par. 33, TM 10-570).
39. A frozen cooling system in an engine may be thawed out by running it very slowly (Par. 46 *b*, TM 10-570).
40. A vehicle should never leave park without an Accident Report (QMC Form 26) in it.
41. Vehicles will not exceed 25 MPH at night without lights on good roads (Par. 66, TM 5, I Army Corps, 1942).
42. A vehicle which loses its place in column will get back into its normal place as soon as possible by "leap-frogging."
43. Drivers should be made responsible for the tools and equipment that go with their vehicles (Par. 44, FM 25-10).
44. The only attention a good storage battery needs is to see that the electrolyte (water) does not fall below the prescribed level (Par. 46, FM 25-10).
45. The Driver's Trip Ticket and Performance Record (QMC Form 237) is normally kept in the possession of the battery motor sergeant.

46. To lubricate a GMC that has a "banjo" axle, lubricant is put in level with the top filler hole.
47. Since the GMC differential is the hypoid gear type, only high pressure lubricant or universal lubricant is used in it.
48. The tires of a set of duals should be matched for over-all diameters even though they work on a bogie axle.
49. When a winch is used to move a truck, the winch should be in low gear, the transmission in its lowest gear, and the transfer case in low range.
50. The needle bearings of the universal joint drive shaft on 1941 Dodge C & R cars do not require lubrication.
51. Being of the "oilite" type, the steering knuckle bronze bushings on 1/2-ton cars require no lubrication.
52. The following brake adjustments are necessary on 1941 GMC units: free pedal play of at least one inch, 0.30 inch clearance for booster pick-up lever, and heel and toe adjustment on brake shoes.
53. A complete record of all vehicle lubrication must be kept in the Service Record.
54. Technical Inspection Report (QMC Form 260) is not used to record the 6,000-mile inspection.
55. On 1941 1/4-ton units the propeller shaft must be removed and lubricated during a 6,000-mile inspection.

STABLE SERGEANTS

Part "A"—Weight 10.0

Write the name of any twenty (20) of the regions of the horse opposite the proper number below. (List of numbers omitted.—Ed.)



Part "B"—Weight, 90.0

(Note: Answer any 45 questions. Put a "T" in front of the question if the statement is True. Put an "F" if False. A statement partly wrong is false. Line out the 5 questions you do not answer.)

1. A man of normal strength *cannot* cinch tight enough to interfere with a horse's breathing (Par. 84 *d*, FM 25-5).
2. The *average* animal lives about 20 years (Par. 38, FM 25-5).
3. Horses 10 years of age or over are better able to stand the hardships of campaign than younger horses (Par. 38, FM 25-5).
4. The walk, trot, and gallop, are the *only* gaits desired for military animals (Par. 89, FM 25-5).
5. In general, animals should be watered after feeding (Par. 91 *e*, FM 25-5).
6. Horses and mules have good-sized stomachs and can be fed eight (8) pounds of oats at one time (Par. 94, FM 25-5).
7. Linseed meal is an excellent food for animals that are in a run-down condition (Par. 100, FM 25-5).
8. A horse that is passing loose, running droppings should be fed bran (Par. 101, FM 25-5).
9. With the exception of alfalfa, all classes of hay are of practically equal feeding value (Par. 103, FM 25-5).
10. Grazing is very dangerous because it is apt to result in colic (Par. 104, FM 25-5).
11. A suitable field ration for animals in active operations might be:

	Heavy Horses	Mules
Grain	14	10
Hay	16	14
	(Par. 106, FM 25-5.)	

12. Wind suckers and cribbers should be fed apart from other animals (Par. 110 *b*, FM 25-5).
13. No special precautions are necessary in the care and storage of forage (Par. 111, FM 25-5).
14. Hay should *never* be fed to a heated animal (Par. 112, FM 25-5).
15. Most of the ration, *especially* the hay, should be fed at night.
16. Hay should *never* be fed before grain (Par. 112, FM 25-5).
17. Animals are not fussy and do not mind noise or confusion while drinking (Par. 114, FM 25-5).
18. Water troughs should be emptied and cleaned thoroughly once a week (Par. 119, FM 25-5).
19. In a *permanent* camp, the picket line should be *not* over 4 feet high (Par. 121, FM 25-5).
20. Smoking in stables is authorized if an officer is present (Par. 123, FM 25-5).
21. Animals in a stable rarely suffer from cold air, provided there is no draft (Par. 124, FM 25-5).
22. Grooming is essential to the general health, condition, and appearance of animals (Par. 126, FM 25-5).
23. The sheath should be cleaned every week with cool water and GI soap.

24. The quickest and best way to get mud and dirt off an animal's legs is to wash them with water (Par. 132, FM 25-5).
25. The minimum amount of systematic exercise necessary to maintain animals in working condition is two (2) hours daily (Par. 134 *c*, FM 25-5).
26. Biting is usually the result of animals being teased by men (Par. 136 *c*, FM 25-5).
27. The twitch is the simplest, handiest, and most common method of restraint.
28. The stable sergeant is only responsible for the animal Morning Report and Sick Report, as far as records are concerned (Par. 139, FM 25-5).
29. Despite popular stories, it is neither practicable nor safe to swim animals across streams (Par. 141 *c*, FM 25-5).
30. One of the common indications that an animal is sick is loss of appetite (Par. 144, FM 25-5).
31. White lotion tablets are used in solutions and are for external use only (Par. 147 *c*, FM 25-5).
32. Pine tar should never be used around open wounds because it attracts flies (Par. 147 *e*, FM 25-5).
33. One of the symptoms of strangles is profuse watery nasal discharge which later becomes thick and yellow (Par. 149 *c* (3), FM 25-5).
34. The most effective weapon in preventing glanders is the mallein test (Par. 149 *f* (2), FM 25-5).
35. Glanders can be cured if caught in time (Par. 149 *f*, FM 25-5).
36. Fortunately, horses and mules never attract lice (Par. 149 *k*, FM 25-5).
37. Scratches is a disease resulting from poor shoeing (Par. 150 *h*, FM 25-5).
38. A hoof that is properly groomed once each day will not develop thrush (Par. 150 *j* (2), FM 25-5).
39. Lameness may best be detected at the walk (Par. 151 *b*, FM 25-5).
40. Corns are sometimes caused by over-reaching (Par. 151 *k*, FM 25-5).
41. The serviceability of military animals depends largely on the condition of the feet (Par. 152, FM 25-5).
42. Normally shoes are left on the feet from 3 to 7 weeks (Par. 154, FM 25-5).
43. Normally lightweight shoes are used on riding and pack animals in the field (Par. 155 *b*, FM 25-5).
44. An expert horseshoer can remove an old shoe without cutting the clinches of the nails (Par. 157, FM 25-5).
45. Never put a bar shoe on a foot with corns (Par. 160 *b*, FM 25-5).
46. Animals, like women, like to be talked to and fondled.
47. A pritchel is used to repair damaged creases in horse shoes (Par. 27, TM 2-220).
48. The tapered side of the head of a horseshoe nail is roughened (Par. 35, TM 2-220).
49. An expert horseshoer will generally cut off the heels of a properly shaped shoe without heating (Par. 46 *g*, TM 2-220).
50. Feet broken forward may result in cast shoes (Par. 50 *c*, TM 2-220).



"Dammit, man—next time don't wait until the last second!"

PVT. DOUGLAS BORGSTEDT

Courtesy Collier's

ROAD TO DUNKIRK

By Henri de la Falaise

Leaves from my diary in Flanders

SUNDAY, MAY 26TH

We pull out at 3:30 hrs. The traffic situation has not improved, but we finally reach Nieuwkerke around 5 and halt on the square in front of the church, exhausted from lack of food and sleep. Our transport echelon spent the night in a farm a mile southwest of the village.

The church door is open.

I can see the altar brightly lit with candles, and the priest standing in his white and gold vestments giving communion. I walk into this unbelievable haven of peace, and the sight of the rituals unchanged for generations through wars, revolutions, and peace suddenly gives me back some faith in myself and in humanity. When I leave the church a few minutes later, feeling a great deal better mentally, the major tells me I need a little rest and should stay here this morning. I am to keep the staff car and he will send for me if necessary—he is to go with the armored cars to Ypres. My driver and I gratefully find a small house on the main street where the owner lets us have two beds.

8:00 hrs. Shattered glass from window panes and terrific crashes wake me up. The house rocks. Everything in the room falls to the floor. I run downstairs. Bombs are falling all around, shaking the earth. The Luftwaffe is apparently set on destroying this village. Up and down the main street they fly, dropping their deadly bombs. The place is an inferno of smoke and fire, falling bricks, geysers of earth, and tongues of flame. For three minutes or so that seem like a lifetime, I cower under a wall, holding my breath, while houses to right and left are smashed to the ground. Two hundred yards up the street a convoy of more than twenty ammunition trucks is hit repeatedly and blows up with deafening explosions. Shells and bodies fly through the air. For more than an hour after the planes disappear the ammunition cases keep exploding, making it impossible for anyone to rescue the wounded.

As soon as we can reach the staff car, which by a miracle is undamaged, we jump into it and drive to the farm where our transport echelon is billeted. The narrow road leading up to it is in many places torn by huge craters, beside which lie many maimed bodies. I find our

Conclusion

Throughout the Battle of France, the Marquis de la Falaise served as Liaison Officer with a British mechanized squadron that was in almost constant contact with the advancing Germans. This concluding chapter of his experiences takes him through the final evacuation from Dunkirk.

transport echelon about to bury Corp. Chandler, who happily is our only casualty. It seems the bombs dropped mostly in the fields around the farm, killing ten cows.

11:00 hrs. More planes come over, but two are shot down by anti-aircraft fire. This time they are after Bailleul and Armentieres. During the whole morning there had

been loud and incessant artillery bombardment in the east, toward Warneton and Ypres.

14:00 hrs. I receive orders from the major to proceed at once to Woeston, five miles northwest of Ypres. I am to avoid the Ypres road, which is filled with civilians, and also Poperingen as the French D.L.M. transports are moving through that sector. I decide to go through Vlamertinge and Elverdinge.

17:00 hrs. Our armored cars arrive and the CO tells us we are going on to Westvleteren, five miles northwest, a village near Highway 65. I get into Lt. Phil S.'s armored car and we speed on. He tells me Germans have broken through between Menin and Warneton and are driving a wedge between the Belgian and British troops in the direction of the Wijtschate-Ypres road.

20:00 hrs. I have been trying desperately to find shelter in this village for our cars and men, but it is already filled with troops and refugees. I finally get the transport echelon, the armored cars, and their crews some space in a farm just outside the village near a crossroads. It is far from ideal, as there is constant traffic going by.

21:00 hrs. I have to drag the Burgomaster from his dinner to force the unwilling owner of a small house to accept our mess. We must sleep on a brick floor, but our cook has wangled a corner of the stove and says he can give us a hot meal. Lts. S. and B. are already asleep, sitting on the floor with their backs against the wall. The major thinks we will get a few hours' sleep and not leave till morning.

MONDAY, MAY 27TH

We are packed and ready to go at 5, awaiting further orders. They come at 6: we are to stay here probably

all day, and rest up. This is very welcome news, as our cars need plenty of attention.

11:00 hrs. Enemy aircraft, mostly bombers, have been active all morning, bombing the roads. Poperingen, five miles south, has been a constant target. Our village has been bombed too, but the Germans are flying high as they are finding antiaircraft opposition. Their aim is not very accurate, and here, at least, their bombs have fallen wide of the mark in meadows just west of our farm.

12:00 hrs. Our colonel comes to visit and we learn the seriousness of the situation. There is no question any more of trying to make a break for it through the German lines to join up with the French armies in the south. The only way out of the trap is to make for the coast around Dunkirk and try to get off as many men as possible while some troops hold the enemy at bay; these, of course, will be sacrificed. This does not look so good for us, especially as we have been acting as rear guard ever since May 12th!

There is also bad news from the Belgian side—talk of surrender. If that happens our left flank will be completely unprotected and we must shorten our line by withdrawing behind the canals running from Nieuport to the region south of Dunkirk. Ypres is still in British hands, but Roulers has fallen and there seems to be little cohesion in the Belgian lines. German patrols have been encountered and wiped out many miles this side of them, near the Yser-Ypres canal, six miles east of here.

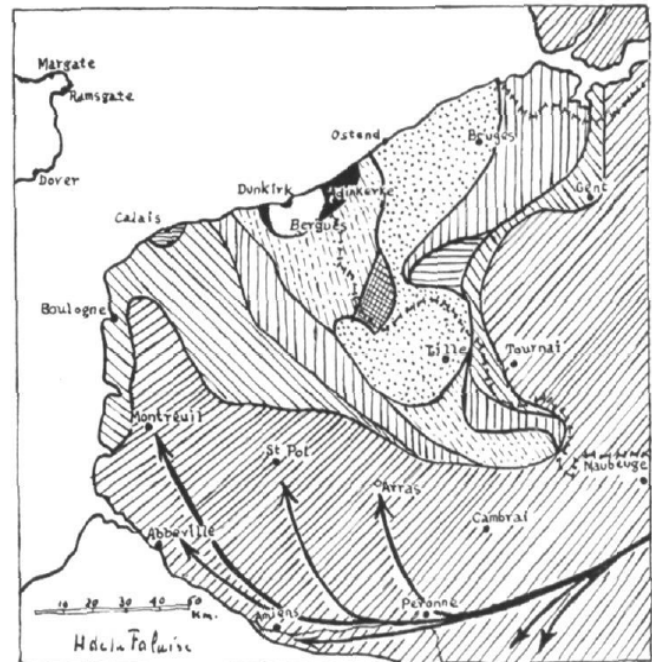
15:00 hrs. We are to stay here tonight. Sound of heavy firing comes from the east and southeast, and German bombers fly over us by the dozen. There was a lull about an hour ago during which three British Hurricanes flew over us—a most welcome and unusual sight, and they were wildly cheered as they flipped their wings to show their markings.

TUESDAY, MAY 28TH

Rain is falling when we awake at six after a good night's sleep on the brick floor. Though my ribs ache a little I feel quite relaxed, but not for long. I hear that what was only a rumor yesterday is official news today, the King of the Belgians has capitulated in the field, surrendering himself and his army to the German commanders just as Napoleon III did to Bismarck at Sedan in 1870. The order to the Belgian army to cease firing was at four this morning, two hours ago. Our left flank is wide open!

9:45 hrs. As a result of the Belgian surrender our squadron is ordered to proceed immediately to the north to patrol east of the Loo Canal between Alveringen and Furnes.

I am totally unprepared for the sight that greets us as we reach Highway 65. It recalls the famous painting of Napoleon's retreat from Russia: brand new trucks, tractors, guns of every caliber line the ditches and fields. Millions of dollars' worth of British equipment, some of it



German advance on:

	May 23, 1940		May 28
	May 25		May 29
	May 26		May 30
	May 27		May 31

scarcely used, lies in the mud, abandoned by troops that are already on their way to embarkation.

We turn right at the Vinken crossroad and reach Oeren, a mile and a half north of Alveringen, by ten o'clock. Our mission is to patrol the area beyond the canal which is held by dragoons of the D.L.M. The soldiers of these hard-fighting cavalry divisions had long since won the admiration and respect of everyone in our squadron, whose faces always brightened when they knew we were fighting with the D.L.M.'s at our side.

14:00 hrs. The downpour continues. Thousands of Belgian soldiers silently pass us on their way to Nieuport to give themselves up. It is an overwhelmingly mournful sight.

18:00 hrs. We withdraw behind the canal as the bridge at Alveringen is blown up, then proceed to the small farm at Oeren where our transport is waiting for us.

23:00 hrs. We have just had something to eat. There are five armored cars left in the squadron; in a few hours they leave to support the dragoons holding the bridge at Furnes. German patrols went through Dixmude at 18:00 hrs. and are already approaching the

canal, half a mile away, and we can hear machine-gun and artillery fire all along the front. But we are greatly heartened after a talk with our colonel, a truly remarkable man who, to me, is an example of everything a commander should be. His untiring courage and intelligent leadership have just been rewarded by a D.S.O.

WEDNESDAY,
MAY 29TH

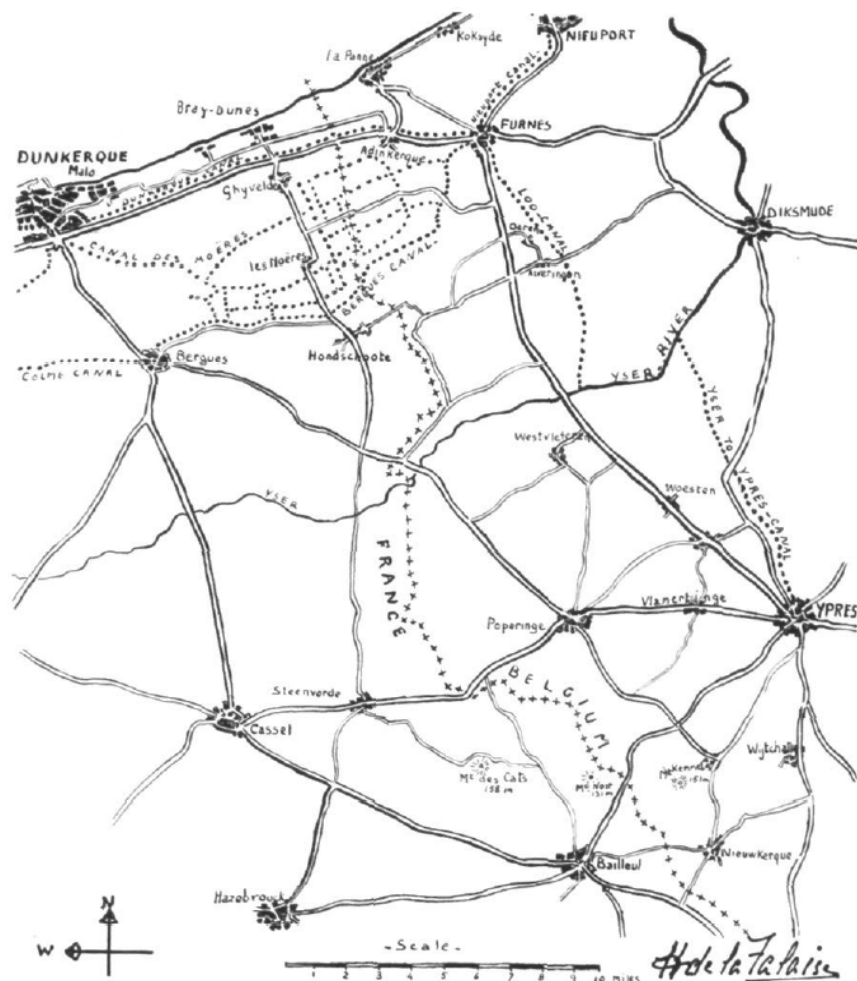
The colonel leaves at 1 AM, so we lie down on the wooden floor to snatch some sleep. At 3:30 we are up again, ready to go.

4:00 hrs. Our five armored cars rumble slowly out of the farm through slushing mud in a cold grey dawn, heading north on Highway 65 toward Furnes and Nieupoort. Our transport echelon will leave at five for Ghyvelde, a village six miles northeast of Dunkirk.

The further we go, the more the roads are lined with what once was the proud new materiel of the B.E.F. Overturned trucks, spilled equipment, canned food, cigarettes by the thousands, clothing, are strewn in the mud. As the day lightens we can see many freshly dug graves and several dead and bloated horses lying in the fields. Long lines of tired troops trudge wearily on, troops of every description, French, British, Belgian, all in great disorder.

5:00 hrs. The squadron cars have taken positions back of the bridges at Nieupoort. We find the dragoons already established there and liaison is made easier by the fact that their Lt. Bure is a pre-war friend of mine. The enemy has not shown up so far, but German field guns are getting the range of the bridges and several 105-mm. shells burst above them while a Henschel observation plane hovers over us, an ominous warning of things to come.

14:00 hrs. My lunch biscuit has been ruined by a very disagreeable dive - bomber attack which lasted a full half



hour. The dragoons have suffered many casualties as the Stukkas took turns diving down at us with sirens screaming, their light bombs exploding on stone-paved streets.

All the bridges on the canal are being blown up. The Belgians who haven't already crossed over will have to remain on our side.

15:00 hrs. We receive orders to withdraw and join the regimental rendezvous at Ghyvelde. The French have flooded the whole district south of Furnes and the narrow roads, barely above the level of water-covered fields, are

so jammed with retreating troops that we proceed only with the greatest difficulty. Highway 65 which we have to follow for a while is shelled intermittently by 105-mm. HE which appear to come from the direction of Poperingen southeast of us. We finally reach the French border and halt south of Ghyvelde.

The moment which we have all dreaded has arrived. The battle-scarred armored cars are lined up alongside the canal. The CO gives the order to dismount, and directs that all cars be stripped of weapons, ammunition, and any other equipment which can be of any use. When this is over, the major quickly gives another order and the cars are pushed into the canal.

Heavily laden we move toward Ghyvelde, trudging slowly under our burdens, and many a head turns back to give a sad farewell look at our armored cars, faithful companions which though inadequate in many ways had rendered unflinching service through the most difficult conditions, now but empty hulks of steel slowly sinking into muddy graves.

19:00 hrs. Our men are gathered in a large field on the outskirts of Ghyvelde. Officers and men alike are

destroying and burning all their personal kit, everything they will not be able to carry personally along with them. A huge bonfire has been built and suitcases full of linen, boots, records, etc., are thrown into it.

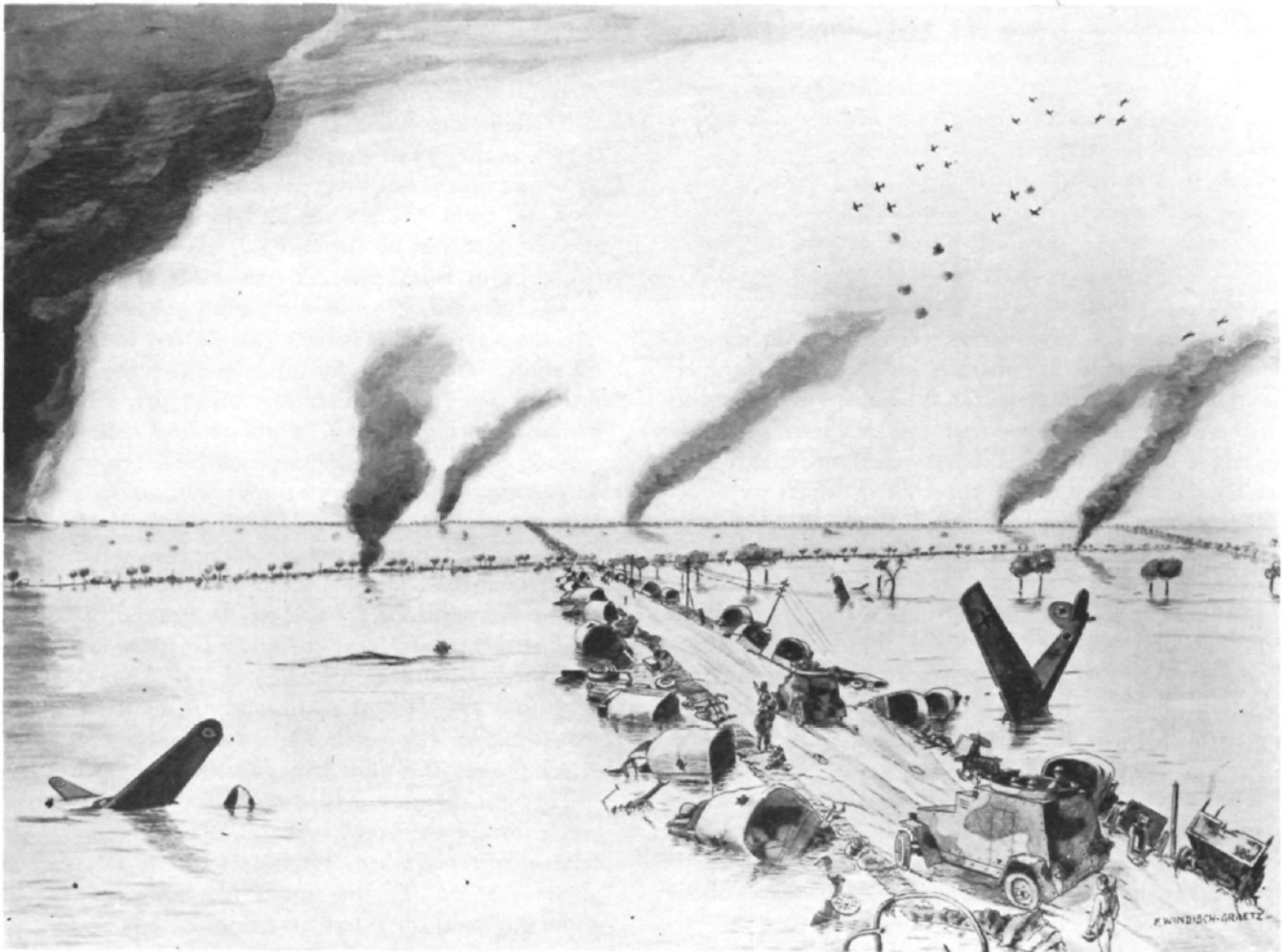
The sky is filled with black smoke from the blazing city of Dunkirk. Six British fighter planes flash over us and vanish toward the channel. They are followed by a flight of enemy bombers heading for Dunkirk and the roar of all those engines mingles curiously with the rumble of artillery fire from the southeast.

20.00 hrs. We are under a strong and vicious air attack. Squadrons of Heinkels and Messerschmidts are machine gunning and bombing the village with terrific din. Several abandoned French artillery horses that were grazing in our field have been killed, others are whinnying and galloping around us, trying to escape. Every available weapon has been turned against the planes and thousands of bullets are whizzing in every direction. I have taken refuge in a shallow ditch, and to quiet my nerves I too am shooting at them with a borrowed rifle. I crouch low, for the danger from the ground is as great as that from the air.

21:00 hrs. The noise has subsided and we stand around, waiting for orders. Our colonel arrives and says we must be ready to leave at 3 AM. Many ships have been sunk by the German air-force this afternoon and evening so the evacuation is not moving very fast, but it appears that tomorrow we are going to get air protection. Feeling very miserable, I roll up in a blanket, lie down near an abandoned truck, and try to sleep and not think of tomorrow.

THURSDAY, MAY 30TH

It is hardly past three when we assemble in the dark and move off toward Adinkerque carrying on our shoulders Bren guns, heavy Boys antitank rifles, and cases of ammunition. We follow a ridge of sand dunes lying a mile south of Highway 40; it is heavy going. After about two miles we cross the French border and, turning north, reach the highway which runs alongside the Dunkirk-Furnes canal. We have to halt frequently on account of the heavy and cumbersome weights we are carrying. Two more miles that feel like ten bring us



HQ troop on its way to Ghyvelde, through the flooded district around Moeres. Flames and black smoke are rising over Dunkirk, which can be seen in the distance at the extreme left.

to Adinkerque, where we halt back of a farm near a narrow bridge over the canal.

I am worn out and soaked with perspiration. There is an old fashioned well in the courtyard with plenty of clear water, so the cooks make some tea and we wash up a bit.

The colonel arrives to warn us that to board a ship we will probably have to swim, and to advise us to get rid of everything except our weapons. We find some abandoned bicycles and strap some of the heavier guns and ammunition cases onto them to make the going easier when we move.

11:00 hrs. We are to cross the bridge leading to La Panne, a summer resort on the coast in happier days, in troop column formation with wide intervals between each troop. A platoon of British infantry guards the bridge, and British officers segregate the soldiers who want to cross to go toward the coast. Only British soldiers are allowed on this road, and my major has to vouch for me personally while I show my liaison credentials, for me to go on with my squadron. At the other end of the bridge stands Captain A. C., liaison officer with this British Army Corps; his job is to direct the French troops toward the south, Bray Dunes and Malo les Bains. After marching two more miles we reach La Panne, which is under artillery fire as well as being bombed from the air. We rest a while just outside town, while our major goes for orders. The two other squadrons are already halted here and I see my friend G. de B., liaison officer with Squadron C, for the first time in a month. We have plenty to talk about and Pierre, our colleague from B Squadron, whom I have not seen since Neuville St. Vaast, joins us.

14:00 hrs. We have our orders and are on the seafront at La Panne, but there is no immediate prospect of embarkation. Our squadron is assigned to police duty on the beach, to see that what embarkations are made, are made in good order. Four Bofors anti-aircraft guns are on the beach, opposite the villa in which we establish squadron headquarters. A little further on large tarpaulins have been spread over the sand, and trucks have been driven over them at low tide, down to the sea, to form a kind of jetty at high water. The sun is very hot and the sea very calm, blue, and inviting. Thousands of British soldiers line the waterfront, patiently waiting for a boat; but no boats seem to be coming, and German shells are dropping into the water where the boats should be.

The battery that is firing them is not very far away, perhaps three miles up the beach at Koksyde, and its shells splash up and down the beach with great regularity, breaking the roll of the small, peaceful waves about fifty yards from the beach.

15:00 hrs. I have wandered off through the town in search of food for the squadron, and been partially successful. Every house is overflowing with panic-stricken refugees who have reached the western shores

of their country only to find themselves hopelessly trapped.

On reaching the waterfront with Trooper Machin and Lance Corporal Aldridge, laden with supplies, I see two destroyers have moved close into shore and are taking on some men. They keep moving to avoid the shells that are still dropping around them, and after a while, as the fire increases in intensity, they move off toward Dunkirk.

The range is shortened and HE are now falling on the beach and boardwalk. There is no place to get under cover, so we just stand where we are and watch the sand geysers which they raise.

18:30 hrs. Several destroyers and a light cruiser are standing about two miles offshore, all their guns barking and hurling heavy shells over our heads onto the German batteries around Furnes, four miles southeast of here. The black cloud of smoke rising from Dunkirk seems to be getting thicker.

All of a sudden the roar of engines fills the air and a huge formation of heavy German bombers flies straight at us. The crews of the Bofors battery have seen them, and the four guns open up at full speed. Tracer shells streak through the air which is rapidly filling with black smoke. Bren guns are shouldered and add their sharp rattle to the ear-rending noise. Unperturbed, in perfect formation, the bombers fly over us, dropping their bombs as they pass; they are quite low, about nine hundred feet up. They keep coming—there must be a hundred of them. I can see anti-aircraft shells pumping straight into one of them; his left wing is on fire but he keeps in formation and drops his bombs; then he swings seaward, becomes a flaming torch and plunges into the waves with a terrific crash a few hundred yards off shore. Another is hit, and another; they too crash into the sea. The anti-aircraft crews are working like madmen, swinging their guns around and changing red-hot barrels every minute, but black bombers keep on coming. The noise and commotion are so great that I feel my legs shaking under me, yet the excitement is so intense that there is no place for fear. I am crouching against the wall of a villa, and two British soldiers of another regiment are flat on the ground by my side. One of them seems near the breaking point and keeps a handkerchief stuffed in his mouth so as not to scream; his face is the color of earth, and his dilated eyes alone show what he is going through. I have a flask of brandy in my pocket and offer him some, but he refuses it.

The last bomber has flown over, heading up the beach toward the north. The guns have stopped; all is calm once more when, coming from the sea, six more planes soar out of the smoke like gray flashes. The gunners give them a terrific reception, but as they pass overhead we see the circles of the R.A.F. under their wings. Luckily none have been hit. Off shore the signal lamp of one of the warships is blinking; one of the men

next to me is a signaller and reads the message: "The aircraft which you have so enthusiastically received are friendly."

19:00 hrs. Two destroyers have moved inshore, and embarkation has been resumed. The major comes up from the waterline where he has been wading ankle-deep, helping soldiers get into longboats. While he drinks a cup of tea and eats a sandwich, we talk about our chances of getting to England. He will be on duty all night, sharing shifts with Phil and a captain from C Squadron who has just been assigned to him as second-in-command.

FRIDAY, MAY 31ST

105-mm. shells falling in the streets around our villa wake me up after a good sleep on the wooden floor of a back room. I find Elliot in the front room, worn out from his vigil and standing so long in the cold water. We have a light breakfast, and as it seems we are to stay here all day I am asked to see again what food I can find.

12:00 hrs. The destroyers that have been lying off-shore and taking off men all morning, have pulled out because of intense shelling from German heavy batteries. 155-mm. shells are falling now, and the fire is getting too accurate for safety. Each time the boats pull out to sea, gloom settles along the beach and everyone has a long face. The anti-aircraft battery has been withdrawn during the night and we are now without any protection in case of a new bombing attack.

13:00 hrs. More and more 155-mm. HE are dropping on the town, tearing up the streets and smashing the pretty villas along the boardwalk.

The squadron has been relieved of police duty. It looks as if we might get off after all. No boats have yet appeared but the morale of our men is good, and they are optimistic.

14:00 hrs. We are ready to move when our CO arrives with news that the whole regiment is to assemble near the dunes at the western end of town. We leave the boardwalk without any regrets! We find the two other squadrons waiting there, the men lying around in the sun. I am about to imitate them when the sound of aircraft makes me sit up and take notice. A flight of German light bombers is coming straight for us from the east; fifteen seconds later bombs are crashing on the dunes, the beach, and the hotel at the western tip of the town. The commander in chief of the B.E.F. was resting in this same hotel only twenty-four hours ago. I dig into the sand as fast as I can, and I can't help remembering childhood days when I used to dig similar holes on beaches with a little wooden shovel. The

planes fly two miles out to sea and attack a destroyer that shoots one of them down. Then, thinking we are an easier target, they make a wide turn, come back, dive low to machine gun us, rise up again, drop five more bombs, and, following the beach, disappear toward the smoke cloud which covers the Dunkirk area.

15:00 hrs. Our colonel arrives in a small car his driver has found on the beach. The heavier weapons are placed in it and we are ordered to march to Dunkirk, ten miles away. Our major places us in arrow formation and we start off, walking very slowly through the thick sands.

16:00 hrs. We are still marching on under a blazing sun, but our formation has drawn out somewhat as we have been machine gunned and bombed three times, several of our men being wounded. Our major walks ahead; he is



Fox Photo

shouldering part of the kits of many tired men and has not once slackened his pace or tried to dodge bombs or bullets. His magnificent bravery gives us courage to keep on going. The beach is littered with ships that have run ashore. One of them, a fairly large steamer, has been almost cut in two by a bomb. Dead bodies lie on the sand, others are swept in by the waves. The dunes to our left seem filled with French soldiers whose machine guns vainly try to keep the German planes away.

19:00 hrs. We are still stumbling along and dodging bombs, just past the sanatorium of Bray Dunes, and about a mile ahead we can see the hotels of Malo Terminus. We have marched over seven miles since leaving La Panne, and it has been tough going every inch of the way. A small staff car approaches; in it is our colonel, who tells us we have reached the end of the road and must now take to water.

We are going to embark! A small steamer filled with

French soldiers is grounded a hundred yards offshore, waiting for the tide and an easy target for the Heinkels flying above. About a mile out to sea two boats are slowly moving in our direction. The first is a small excursion steamer, the other a queer looking craft, a sand-dredge. Everyone wades into the sea and we are soon shoulder-deep.

Some R.A.F. fighters have engaged the Heinkels and dispersed them but I am too busy keeping my head above the heavy surf to enjoy the dog-fights. I do see two enemy bombers hit the waves and blow up, and a Hurricane dives straight into the sea a few hundred yards away.

All the men have clambered into launches and one by one they board the steamer which pulls out rapidly as soon as it is full. The only ones left now are the colonel, the three squadron commanders, two French liaison officers, and myself, plus a handful of men, and we are to climb onto the dredge.

21:00 hrs. Sitting on a heap of coal in the boiler-room, I am trying to get warm and dry after spending more than an hour in cold water. I am cold, my body is shaking. I don't want to move any more, but sit here where it is warm and stare at the red flames of the boiler. We are crawling along slowly, because a bomb that missed but fell very close, loosened some bow plates; the stoker says we are averaging only about two knots.

SATURDAY, JUNE 1ST

2 hrs. The chug-chugging of the engine has stopped, and I open my eyes. The stoker tells me we are off our course

and lost in a mine field; we are going to wait for daylight, and hope for the best.

6 hrs. A new day has begun. I am standing on the small deck; all around me men are sleeping, lying on the filthy boards. The skipper has hailed a passing mine-sweeper and been given his course through a megaphone, so we are on our way again. I lean over the rail to watch the widening wake, feeling very low and tired. I have lost all my personal kit; all that is left are the soiled clothes on my body, some papers, and this diary which I had kept in my pocket. Even my revolver dropped out of its holster when I was being pulled aboard, and fell into the water.

I can't yet fully understand what has happened or how it happened, during these twenty-one mad days. I suddenly realize for the first time that the dead we have left behind are really dead.

Some mistakes must have been made, and the fortunes of war seem to have been heavily stacked against us, but then, I have also had the privilege of witnessing the undaunted courage of the officers and men of the French Light Mechanized Divisions, the magnificent discipline and quiet bravery of the British troops, the patience of all the allied armies in Flanders who carried on so gallantly without any air-force whatsoever to support them. . . .

Sea gulls are screaming overhead, land is near. I turn my head into the morning breeze to face the cliffs of England, that tough bastion of the British Empire which is waiting to welcome us. We may have lost the first round, but we have gained much experience, and there will be many more rounds . . . many, many more. . . .



Photo from European

SUGGESTIONS ABOUT BASE ANGLES

By Captain T. N. Dupuy, FA

Under normal circumstances the Executive need have no worries about base angles. If he is ready to lay his battery before the survey personnel have completed the gun position survey, he merely lays it in the general direction of fire by means of compass, the O-3200 line-in-the-direction-of-fire method, or by distant aiming point, whichever seems most appropriate. When the place mark is put in he can, if it is conveniently located, set the aiming circle over it, have the instrument laid reciprocally by the base piece, then just measure the base angle by sighting along the orienting line. But due to vagaries of the terrain it is sometimes impossible to locate an orienting line that is convenient to all three batteries of a battalion; if his place mark is not convenient, then the Executive is faced with a problem.

The simplest and most obvious way out is to use two aiming circles in laying the battery. One instrument is set up over the place mark and the other is placed where both the place mark and the sights of the pieces are visible from it. The intermediate aiming circle is laid by the instrument over the place mark, and the battery, in turn, is laid by this intermediate instrument. Similarly, if the battery was laid parallel before the survey was complete the intermediate instrument can be laid by the base piece and can then lay the place mark aiming circle; the base angle is measured as described in the preceding paragraph.

If the place mark is inconveniently located, however, it is likely to be so inconvenient as to prevent the Executive from availing himself of the above expedient. It may also be very possible that two aiming circles will not be available. It is true that a BC scope, if available, might be used, but it is necessary to tilt the telescope containing the reticule so that it is directly above the azimuth scale of the instrument. This can only be done approximately and the scope should be used for laying the battery only as a last resort.

There is another method available by means of which the Executive can lay the battery on a base angle with one instrument from a convenient location regardless of where the place mark may be. We will assume that he lays the battery parallel before the survey party has completed its work. Part of this survey, whether done by battalion or battery, will include the location of the base piece of the battery. The last station over which the surveyors set up their instrument while locating the base piece must, obviously, be visible from the base piece. The Executive has them drive a stake at that point, and makes sure that the previous station of the traverse is also staked. The survey notes of the survey section will give the azimuth of the line thus staked on the ground (by using the method described in "Speed Up Your Surveys," FIELD ARTILLERY JOURNAL

for April 1942, the calculation of the desired azimuth is practically automatic). By means of this azimuth and that of the orienting line, also furnished by the survey section, the Executive can solve his problem.

Using the staked-out line as an "arbitrary orienting line" (which it will be termed throughout this article), the Executive measures the base angle by the means described above. He then draws himself a rough sketch (see Fig. 1) showing the direction of fire, the orienting line, and the arbitrary orienting line. In the figure the arrow shows the direction of fire, OL is the orienting line, BA the base angle, and EBA (Executive's Base Angle) is the angle measured by the Executive when he sets up his instrument on the arbitrary orienting line. The difference between the azimuths of OL and AOL is found by subtraction and is the angle x . In Fig. 1 we see how easily we can apply the old geometrical theorem that an exterior angle of a triangle is equal to the sum of the opposite interior angles. Subtracting angle x from angle EBA we get angle BA, which is the actual base angle (with respect to the true orienting line) on which the guns are laid. If a base angle is sent down subsequently, the battery can be laid on it by

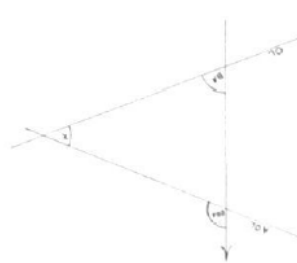


Figure 1

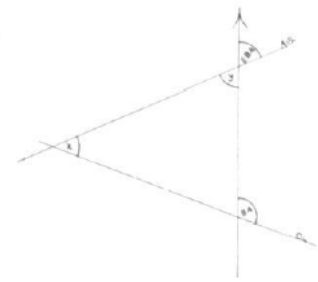


Figure 2

means of a base-deflection shift. In Fig. 2 we find the solution by means of the same geometrical theorem except that we also avail ourselves of the theorem stating that vertical angles are equal. Angle y , this second theorem tells us, is equal to angle EBA. In this case angle BA is the exterior angle and angles x and y , or x and EBA (the equivalent of y) are the interior angles. This time we *add* x and EBA to get the true base angle.

The corollary of the above method is to lay the battery originally by means of the arbitrary orienting line, when the place mark is not convenient. This will usually be the case in a deliberate occupation of position following a complete survey. The survey party should be trained to recognize a situation in which the Executive will need the arbitrary orienting line, have it staked out, and be prepared to give the Executive its azimuth.

He also gets the azimuth of the orienting line from them and works the above problem exactly backwards in order to find EBA. Then setting off this executive's base angle on his instrument he can lay the battery just as if it were the true base angle. The result will be the same, of course, as if he had actually laid the battery by means of that true base angle. Battalion and battery commanders don't care what angle is used to lay the pieces, so long as the desired results are attained.

Sometimes there is not time for the battalion survey section to measure the azimuth of the orienting line and it is merely staked out on the ground to tie the batteries together. Fire Direction Center will get the adjusted base angle from an adjusting battery and compute the base angles for the other two batteries. In that case the survey party can only use deflection angles and will be unable to

give the Executive the azimuth of the arbitrary orienting line. It will be no trouble, however, for them to give him angle x directly so he can solve his base angle problem, since this angle will either appear in, or can be readily figured from, their survey notes.

In practice the methods outlined above are extremely simple. A rough sketch, simple addition and subtraction, and you have the base angle. Many Executives have had the survey section stake out on the ground convenient to the firing battery, a line parallel to the orienting line when that line and the battery place mark have not been readily accessible. This is slow, tedious, and actually fraught with more possibility for error than the methods outlined above. The situation envisaged is not too often encountered, but it is frequent enough to require the Executive to be able to meet the problem without hesitation or delay.

SOLUTIONS TO CADRE TESTS

(See page 615)

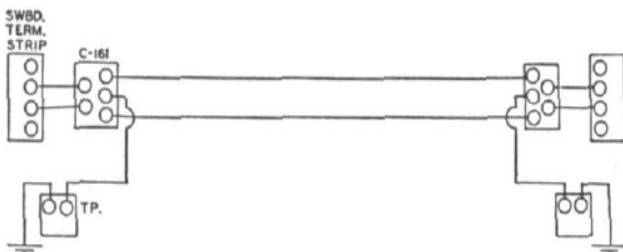
COMMUNICATION CHIEFS

Part "A"

1. F	13. F	25. T	37. T	49. F
2. T	14. F	26. T	38. T	50. T
3. F	15. F	27. T	39. F	51. T
4. T	16. F	28. T	40. T	52. F
5. F	17. T	29. T	41. T	53. F
6. F	18. T	30. T	42. T	54. F
7. T	19. T	31. F	43. T	55. T
8. T	20. F	32. T	44. F	56. F
9. F	21. T	33. T	45. T	57. F
10. F	22. T	34. T	46. F	58. F
11. T	23. F	35. T	47. T	59. F
12. T	24. T	36. F	48. F	60. T

Part "B"

1. and 2.



4. Wire: telephone code names, telephone numbers, pertinent codes and ciphers.

Radio: radio call signs and frequencies; panel code numbers; current code index numbers; current codes and ciphers; radio instructions; airplane and sound signals; composition of radio nets; pyrotechnic code.

6. Affirm	Hypo	Option	Unit
Baker	Inter	Prep	Victor
Cast	Jig	Queen	William
Dog	King	Roger	X-Ray
Easy	Love	Sail	Yoke
Fox	Mike	Tare	Zed
George	Negat		

MOTOR SERGEANTS

1. F	12. F	23. T	34. T	45. F
2. T	13. F	24. F	35. F	46. F
3. T	14. F	25. T	36. T	47. T
4. F	15. T	26. T	37. F	48. T
5. T	16. F	27. F	38. T	49. T
6. T	17. F	28. F	39. F	50. F
7. T	18. T	29. F	40. T	51. F
8. F	19. F	30. T	41. F	52. T
9. T	20. T	31. F	42. F	53. T
10. F	21. F	32. F	43. T	54. F
11. F	22. F	33. T	44. F	55. T

STABLE SERGEANTS

1. Lips.	21. Coronary band.
2. Nostril.	22. Hoof.
3. Face.	23. Back.
4. Eye.	24. Ribs or costal region.
5. Forehead.	25. Loins.
6. Ear.	26. Point of hip.
7. Poll.	27. Flank.
8. Throat.	28. Abdomen or belly.
9. Crest of neck and mane.	29. Sheath.
10. Neck.	30. Croup.
11. Withers.	31. Thigh.
12. Shoulder.	32. Stifle.
13. Arm.	33. Tail.
14. Breast.	34. Buttocks.
15. Elbow.	35. Leg.
16. Forearm.	36. Hock.
17. Knee joint.	37. Chestnut.
18. Cannon.	38. Muzzle (includes lips, mouth, nostrils, and nose).
19. Fetlock joint.	
20. Pastern.	

Part "B"

1. F	11. T	21. T	31. T	41. T
2. T	12. T	22. T	32. F	42. T
3. T	13. F	23. F	33. T	43. T
4. T	14. F	24. F	34. T	44. F
5. F	15. T	25. T	35. F	45. F
6. F	16. F	26. T	36. F	46. T
7. T	17. F	27. T	37. F	47. F
8. F	18. F	28. F	38. T	48. T
9. T	19. F	29. F	39. F	49. F
10. F	20. F	30. T	40. F	50. F

RUSSO-GERMAN WAR

PART III

By Colonel Conrad H. Lanza

THE VYASMA-BRYANSK CAMPAIGN

At the first of October, 1941, Russia expected that the Axis would vigorously continue the war and that the capture of Moscow would be a major objective. Russia had no plan other than to resist everywhere, paying particular attention to the defense of the capital. Russia thought there was no immediate danger here, for the capital city was protected by a very large force under Marshal Timoschenko, who had recently conducted an offensive in which he envisaged the recapture of Smolensk by a giant pincer movement. Before the jaws closed supplies had given out due to bad road conditions, and for the last week Timoschenko's men had been mainly quiescent, awaiting an opportunity to attack. However, the enemy seemed to have been badly beaten—very badly according to Russian reports—and Timoschenko felt that nothing unusual was likely to happen in his sector. If the enemy made a movement toward Moscow he could stop it.

On October 1st an international conference at Moscow ended after arranging for the free shipment of large quantities of supplies by Great Britain and the United States. With what Russia had in depots and that which she could continue to produce, it was believed possible to maintain the large Russian armies. All in all, the situation appeared to be fairly satisfactory. Winter was approaching, and any new enemy offensive would have to be a short one.

On the German side, a new estimate of the situation had been made at the end of September after the defeat of Kirponos' large armies in the Ukraine. The main mission was unchanged—defeat and destruction of the enemy's principal armies. At that time, the enemy's major force appeared to be that of Timoschenko, estimated at between 60 and 70 divisions, the best-equipped and-trained that the Russians yet had in the field. It was covering Moscow in the Vyasma and Bryansk areas, holding the line Sychevka—Nikitinka—Yartsevo—Yelnya—Desna River—Bryansk—Orel, about 500 kms. long. For a month Timoschenko had been trying to take Smolensk, but had been stopped with severe losses before he had accomplished his mission. He was now known to be having supply difficulties. The Russian troops were well forward in accord with their offensive intentions, and between them and Moscow (about 300 kilometers away) were no important reserves. If anything happened to Timoschenko's armies it would take time to reenforce him.



Taking a leaf from the Navy, German engineers serve as "minesweepers." (Dever from Black Star)

It was decided to destroy this large body of Russian troops, estimated as well over a million men, by using Panzer armies to pierce their center to separate them into two groups, combined with an envelopment of both outer flanks by other Panzer armies. Infantry divisions would follow the Panzers and encircle the split enemy groups, while the present front held. If the encirclement succeeded, the enemy would be cut off from all supplies and would be forced to attack in attempt to escape; the encircling troops, once in position, could adopt the tactical defensive if they so desired and might therefore be inferior in strength to the enemy before them.

It would probably take some time to complete the destruction of such a formidable force as one million men. After the infantry divisions were in place, Panzer troops would be relieved to form a covering line facing east, to prevent relief of the surrounded troops in the Vyasma-Bryansk areas by an advance from the direction of Moscow.

The following plan was ordered:

(a) Two Panzer Armies (Hoth and Reinhardt) following a violent artillery and air preparation, at H hour would break through the enemy's center in the Roslavl area and drive straight towards Vyasma. H hour was to be late in the day. Under cover of darkness, the Panzers moving deep in the enemy's rear would sweep respectively to north and to south, disrupting lines of communication, capturing CP's, destroying dumps and depots, and closing in on the enemy from his rear in cooperation with forces (b) and (c). Light covering forces would watch toward the east.

(b) One Panzer Army (Hoepfner) from the Rzhev area, at H hour to break through, sweep on to the south, and cooperate with force (a) in the initial surrounding of the enemy north of the axis Roslavl-Vyasma.

(c) One Panzer Army (Guderian) at H hour to break through the front between Karachov and Orel, then sweep north and cooperate with force (a) in the initial surrounding of the enemy south of the axis Roslavl-Vyasma.

(d) Two Armies (9th and 4th), while holding on entire front to prevent enemy breaking away to the west, would send their main force as rapidly as possible at H plus 12 hours, motorized divisions leading, in rear of force (a), and after arrival in enemy rear areas, sweep respectively to north and

south and establish siege lines around the enemy, relieving the Panzers.

(e) One Army (16th) similarly to follow force (b).

(f) One Army (14th) similarly to follow force (c).

(g) Two Air Fleets (Kesselring and Keller) were to assist in the artillery preparation and thereafter guide troop movements in enemy rear areas by locating enemy positions, strengths, and movements, and attacking enemy as necessary, to enable the rapid formation of the initial encircling siege lines. The Air Force was also responsible for giving ample notice as to the approach of any enemy reserves near the expected theater of operations.

GHQ selected the 2nd of October for D day. In view of the lateness of the season, it was decided that this forthcoming campaign would be the last major operation of the year.

1 OCTOBER

A joint operation by Finn and German troops was completed between Lakes Ladoga and Onega; the objective was Petrozavodsk, which appears to have been recaptured by the Russians after temporary occupation. The main Finn force advanced from the south, while a flanking column (including a German division) approached from the west. Due to deep mud, the flanking column was late. The main attack drove the enemy out of Petrozavodsk, but he was able to withdraw to the north.

In the Ukraine, Axis troops continued their eastward advance on a broad front, exploiting the victory over Kirponos' armies. They reported taking 91,572 more prisoners, indicating that fleeing Russians were surrendering easily.

A force of Russians undertook to defend Lozovaya. A Panzer division circled them and attacked the artillery line from both rear and flank. Several batteries were captured before they could turn their guns, and about half of the 80 tanks in division reserve were overcome. The Russians thereupon abandoned their position and fell back.

2 OCTOBER

A Russian expeditionary force sailed from Leningrad and landed on the south side of the Gulf of Finland, in rear of German siege lines. In the far south, the Russian 9th Army started west from Melitopol to relieve the defenders of the Perekop Isthmus leading to the Crimea, now being attacked by what appeared to be a major hostile force. It was intended to take this enemy in flank and rear.

In the center it was D day for the great Vyasma-Bryansk campaign. On the whole 500-kilometer front a violent artillery and air preparation started, with particular attention to those points where the Panzer armies were scheduled to break through. The length of this preparation is not known, but German accounts state it was the most powerful one in this war. Massed air attacks so destroyed Russian lines of communication as to prevent the high command from obtaining clear reports. Late in the day the four great Panzer armies, apparently on a front of about 5



miles each for the center penetration and about 8 miles for the end attacks, stormed through the enemy lines and on into his rear areas.

Timoschenko was taken completely by surprise; in fact, it appears that he was in Moscow. No Russian reserves were in the back areas, and nothing particular was done to stop the unforeseen attack.

3 OCTOBER

The Panzer armies found no strong opposition in the back areas. Their center column reached Vyasma and, having cleared the axis of advance and put out covering forces to the east, circled north and south to drive in toward the Russian front all troops were not captured or destroyed in place. The south Panzer column occupied both Bryansk and Orel, making a large gap for the infantry divisions to follow through; it then worked north to round up Russians south of the axis of penetration. The north column made liaison with the center and cooperated in rounding up the enemy.

Early in the morning, at H plus 12 hours and following a terrific artillery preparation, German infantry divisions

dashed through the gaps and at once began to turn right and left to definitely separate the huge Russian armies. Other infantry divisions pushed through the end gaps and worked south and north respectively, to form a line facing east to surround the enemy; these new lines were each some 200 kilometers long, requiring an advance of about 100 kilometers toward one flank or the other by the infantry divisions, exclusive of the distance to that point in the enemy's rear where direction was changed.

This German movement went on night and day until completed. The details, including supply arrangements over a restricted number of roads appear to have been most difficult. The Germans simplified this part of the problem by not providing anything for the Panzers except promises of ammunition by air transport. Gasoline, oil, rations, etc., they were expected to obtain by captures from the enemy. Infantry divisions were issued iron rations and told to look out for themselves for the next few days, so far as Class I supplies were concerned. This scheme seems to have worked, as the rapidity of the German advance enabled them to capture considerable quantities of enemy stores.

Infantry divisions passing through the gaps received strong artillery and air support; the Air Force saw to it that the advance was not retarded by minor enemy forces. Delay for ground reconnaissances in a country largely covered with woods was avoided. Some divisions made considerable advances, and a start was made in erecting siege lines in rear of the enemy at an average distance of over 20 miles from the Russian front, in some places 40 miles in rear of the front. Leading German divisions had to march a minimum of 30 miles to reach the first positions; each following division had to go beyond its predecessor and then turn on right (or left) into line, thereby gradually extending the lines of circumvallation until forces from the

center met those coming from the ends.

The Russians had no plan to meet the German maneuver. In general they resisted on their front line. They seem to have been under the impression that the Panzers in their rear would run out of supplies in a short time and could then be corraled and properly exterminated. In the meantime they held their lines, which was exactly what the Germans wanted them to do.

In the north, the Russian EF which had landed on the Gulf of Finland moved inland and occupied Krasnoe Selo. They had only about 2,000 men, and now met a superior enemy force. The Russians lacked artillery and supporting weapons; the Germans had both, so before the day was over these Russians were surrounded and what was left of them surrendered. Krasnoe Selo is the site of the ancient palace of the Czars, and the Germans found the palace practically uninjured; to prevent possible damage to this historic place, appropriate arrangements were initiated without delay to remove everything of value to Germany.

The German advance in the north Ukraine sector continued without much opposition. In the south sector the Russian 9th Army moved westward, but not very rapidly. Their information service appears to have been poor: they did not know much about the enemy, but the Germans knew a lot about them and started out strong forces to turn those Russians. Being ignorant about this, the Russians kept on.

4 OCTOBER

The German penetration of the Russian front along the Desna River east of Roslavl had progressed so far that the gap had been widened and the enemy completely separated into main groups as planned, one toward Vyasma and the other toward Bryansk. German lines in their rear were closing fast, with little being done to prevent it. As soon as a German division arrived in its assigned place, it constructed field fortifications facing west and prepared to hold a defensive position should the enemy seek to withdraw. These divisions appear to have been specially reinforced with artillery, for some German reports mention as many as three artillery lines in depth.

In the north, about two Russian divisions from Leningrad attacked the Germans in their front to aid the expeditionary force. Other troops debarked, supported by the fire of warships. These attempts came too late; the expeditionary force collapsed, and the 2-division attack was discontinued.

6 OCTOBER

At the end of four days, the last of the German infantry divisions was about to arrive in place. Through rapid marches, the greater part of the Panzer armies were already relieved and assembling in new positions to the east. The Russians were now permanently separated into two major groups, without liaison with each other.



This "210" is German. (Black Star)

In the south, the Germans being ready, the Russian 9th Army met strong hostile resistance west of Melitopol. They attacked, and immediately afterward received a counterattack from very strong German and Rumanian forces. Panzer troops attacked their right flank. Air forces mercilessly pounded them. Axis troops broke through on front and flank after only a short combat. The CP of the 9th Army was captured; its commander, Major General Kharitov, fled to the airfield and abandoned his army. The Russians lost heavily.

The Russian commander at Leningrad was not satisfied as to his expeditionary force, and ordered a new landing in the vicinity of those previously made, near Krasnoe Selo. Now there were large numbers of German troops in that vicinity, which had not been the case when the initial landing was made on 2 October from transports close inshore to facilitate debarkations. They repeated this operation! As soon as troops were embarked the German artillery, which had been holding its fire, shelled boats and ships, which made wonderful targets. Some batteries had the boats as moving targets. Not many Russians reached shore, and these were captured or destroyed.

Russian GHQ at Moscow made some decisions; they had begun to see what was happening. They were particularly concerned with the situation in the south, where it now appeared very probable that the victorious Axis armies would capture the great industrial region of the Donets basin and might keep on into the oil country east of the sea of Azov. With the defeat of their 9th Army and information of retirement to the vicinity of Stalino, the way to the enemy through Rostov might be opened. Additional troops were needed here, others further north in the Donets valley. Where could new troops be found?

GHQ decided to abandon Odessa, whose garrison was holding out. According to reports from that city the enemy was not aggressive, and might not interfere with a withdrawal if it could be concealed. Orders were issued to evacuate by water to ports in Caucasus, there to be ready to move north to the lower Donets valley. Secrecy was enjoined. Citizens and factory machinery were to be sent too, so far as shipping permitted.

7 OCTOBER

The separated Russian groups (Vyasma - Bryansk) realized they had been surrounded and cut off from their bases. They adopted all-around hedgehog formations and commenced operations to find a weak point to get out; some fierce fighting occurred. The Germans knew that the Russian supplies of ammunition and food were limited to what they had with them, and would give out anyway with time; they also knew there were no reserves in sight to rescue the surrounded troops, and used artillery fire and air bombing to destroy Russian groups; particular attention was given to destruction of commissary dumps. Initial German offensives were restricted to obtaining points which would gradually cause further splitting of large

groups. Anticipating that sooner or later the Russians would attempt to break out, German lines were disposed in considerable depth.

The four Panzer Armies, relieved of watching the surrounded enemy, formed a stronger line facing east. They seized and held Kalinin, Vyasma, Kaluga, and Tula, prepared to hold this line should attempts at rescue be made, and sent out exploring detachments to learn more of the enemy's intentions.

In the south, von Kleist's Panzer Army passed around the north of the retreating Russian 9th and 18th Armies to interfere with their retreat. The Russians, having no armored forces to compete with the Germans, were powerless to prevent this maneuver; they continued to retire northeast of Melitopol.

8 OCTOBER

The Leningrad commander, still determined on an expeditionary force on the Gulf of Finland, decided the previous effort failed because it had been made by day; he ordered a new one for the night 7/8 October. This time the German batteries opened fire on the transports before they had debarked any men; the local commander decided the project was impracticable and abandoned his mission, returning to Leningrad.

In the south, the retreating elements of the Russian 9th and 18th Armies found their way to Stalino cut off by von Kleist. The Russians had about the equivalent of 6 to 7 divisions, but they were not well supplied and in no condition to force their way through. They changed direction to the south, intending to reach the Sea of Azov where marine transportation might reach them. They did not know it, but all Russian ships had just been earmarked for the Odessa withdrawal and none were left for this new task. Large Axis forces began to surround these Russians from north, east, and west. The Rumanian 11th Army began to arrive at Berdyansk. Troops from the minor Axis Powers—Hungarians, Slovaks, and Italians—gathered around the Russians who hastily formed a beach-head with their backs to the sea.

The evacuation of Odessa got under way. Units complete with materiel sailed for the Caucasus. The siege lines belonging to the Rumanian 4th Army, General Jacobvici commanding, were far enough out to prevent Axis forces from shelling the harbor to interfere with orderly departures. OP's noted unusual ship movements and the Rumanian intelligence section was much concerned, but its interpretation of this maneuver was that the enemy was bringing strong reinforcements to Odessa, obviously to lift the siege, which had not been making much progress. The lines were therefore alerted and precautions taken to have reserves at hand for an expected attack.

9 OCTOBER

Very severe fighting occurred around the Vyasma and Bryansk hedgehogs, each of which had three Russian

armies; a seventh army was split, the major part appearing to be near Bryansk. Russian attacks to get out were not coordinated, each being undertaken by a local commander who had no particular plan other than to attack whatever was in his way. The Germans, advised by the Air Force's hourly photographs of enemy movements and dispositions, began to break up the hedgehogs into smaller ones by advancing into intervals where there was little opposition to be expected.

Notwithstanding the lack of plans, the Russian attacks were in places made with considerable persistence and, as they used nearly a million men, were serious. It was necessary in places to call on the Panzer armies for aid. The Germans found that their defensive positions had been constructed none too soon; in general they held.

10 OCTOBER

Russian attempts to break out of the hedgehogs were noticeably weaker. Panzer troops were released and reestablished their defense line in strength; their advance forces occupied the high ground extending north and south through Gzhatsk.

Russian GHQ at Moscow became much worried over the situation—not about the two surrounded hedgehogs, but rather the possibility of the enemy taking Moscow; arrival of German troops at Gzhatsk especially alarmed them. Orders were issued for Russian forces in the area north of Rzhev to advance south between the Panzers and the main German armies, to cut the Panzers off. Apparently nothing was done to help the hedgehogs.

11 OCTOBER

During the night 10/11 October, Russians within the Bryansk hedgehog made strong attacks to break out; the weather was favorable, roads dry and dusty. The strong German artillery placed thick barrages in front of their lines. Machine gun nests were numerous. Notwithstanding that large numbers were mowed down, Russians poured on into the night and in places broke through the German first line; when daylight came, they were stopped in front of the second. Now came the German Air Fleet, no further progress was practicable, and during the day the attempt had to be given up.

Panzer armies reconnoitered toward Moscow, which was rushing troops to the front but with the mission to stop the advance (believed to be in progress) toward the capital. The forces met about 65 miles out.

The elements of the Russian 9th and 18th Armies for a time continued to fight. One division found a hole in the enemy's line and escaped, the remainder surrendered. Somehow the commander of the Russian 9th Army escaped again, but the commander of the 18th Army stayed with his men and fell at their head. The surrendered Russians totaled 64,235 prisoners, 126 tanks, 519 guns.

12 OCTOBER

The German 18th Army landed a division on Dagoe

Island in the Baltic, which was the last island still held by Russians.

Moscow announced that the German advance had been slowed as the result of the troops sent out the day before. GHQ made the first of numerous estimates to the effect that all information indicated the Germans were at their high water mark and had no reserves left, while Russia had enormous reserves. Attention was called to the constant arrival in Moscow of new troops which were being immediately forwarded to the front; these were stated to be fresh, experienced, well-equipped troops, but where they came from is not yet known. The Russian offensive ordered to proceed south from Rzhev either did not start or was made with such small forces that it failed to receive mention; possibly too many troops from this sector had already been sent to Moscow so there were not enough left for a major offensive.

German infantry divisions, knowing that the enemy within the hedgehogs were disorganized and short of ammunition and supplies, attacked from all sides, vigorously supported by the two air fleets. The Vyasma hedgehog was roughly circular, with a diameter of about 62 kilometers; the Bryansk one was elliptical, with the major (north and south) axis about 87 kilometers long, and the minor one about 31 kilometers; each required an encircling line of some 200 kilometers. German operations were by this time well organized: as the hedgehogs became smaller each day, encircling lines were shortened and some divisions were sent east to support the Panzers watching toward Moscow where, it was now known, important new forces were assembling.

13 OCTOBER

The Vyasma hedgehog was considerably reduced, whereas that at Bryansk, despite constant severe shelling and bombing, put up severe resistance and even started an offensive. It still had nearly half a million men; deciding that night attacks were not suitable for modern warfare (as their recent experience had shown that it was impracticable at night to control large masses or keep track of events), it planned a day attack. Assaulting infantry was deployed in great depth, there being as many as 15 waves in some sectors. Leading waves were to advance as far and as fast as possible; any wave stopped was to be leapfrogged by the next, and the attack as a whole kept rolling forward. Theory turned out to be better than practice. What really happened was that the Russian waves jammed against each other, resulting in extraordinarily crowded masses within restricted spaces. Attacked by great swarms of planes and under terrific artillery and machine gun fire, the great attack broke down with tremendous losses.

While this fighting was going on, the Panzers, who now had some infantry division in support, were occupying a covering line facing toward Moscow: on the north Volga River from Kalinin (exc.) to Zubtsov; in the

center, high ground north and south through Gzhatsk; on the south, Ugra River, from Yukhnov to Oka River, thence to Tula (exc.). Other troops extended this line to Orel. The German North Group of Armies held the line from Rzhev (exc.) north along the Volga and Pola Rivers to Lake Ilmen. The South Group of Armies were on the approximate line Sumy—Krasnograd—Zaporozhe—Mariupol.

14 OCTOBER

The Vyasma hedgehog was practically overcome, large numbers of Russians surrendering, but the Bryansk troops fought well and refused to give up. Panzers pushed forward and occupied Mozhaisk. In the north Kalinin was seized, and a bridgehead was started across the Volga River south of it. In the south, the Oka River was crossed, Kaluga taken, and a good sized bridgehead established here. The Germans began to be embarrassed by the large number of prisoners on their hands, which now numbered well over 300,000 mostly from the Vyasma hedgehog.

The advance of the German Panzers once more greatly agitated Russian GHQ. The government ordered the removal of the principal civil bureaus to Kuibyshev, together with important records, machinery and stores. Defense of the city to the last available man was envisaged. More trenches and tank traps and obstacles were started all around Moscow. Civilians were required to help construct these, after completing their usual daily tasks. Nothing was done to help the hedgehogs, now on their last legs.

15 OCTOBER

The Vyasma hedgehog made its last fight. Out of supplies and surrounded, a small force escaped to the northeast; the remainder surrendered. Reduction of the Bryansk hedgehog was continued by attacking from both ends of the major axis of the ellipse. The Germans on the flanks assisted by delivering enfilading fire. This plan worked rapidly, over 60,000 prisoners being taken to add to some 500,000 on hand coming from the collapse of the Vyasma hedgehog. The Russian loss in killed and wounded within the Bryansk hedgehog is nowhere accounted for, but seems to have been exceedingly high due to the valiant resistance.

The German South Group of Armies reached the line Sumy—Bogodukhov—Valki—Lozovaya—Mariupol, all inclusive.

16 OCTOBER

During the night 15/16 October the Russians completed the evacuation of Odessa. It had really gone off

"according to plan." Practically all the troops and their basic weapons and transportation were removed. Only a very few men were left to attend to demolitions which due to the need for secrecy had to be deferred until now, although they were prepared in advance. As the last of the Russians sailed out of the harbor just before daylight, huge fires and explosions occurred all over the city. The flames spread rapidly and were of course noted by the Rumanian OP's. As the usual morning artillery and patrol activity failed to appear, Rumanian HQ suspected something had happened. Patrols were sent out—they advanced with caution, but found no opposition. It was nearly noon before the Rumanians were convinced the enemy had gone, whereupon a "triumphal parade" was arranged which entered the city during the afternoon with a great celebration of the "victory." Only a few Germans were present, the investing force being limited to about a reinforced corps.

North of Lake Ilmen a Spanish "Blue" Division entered line on the German side, one of the first volunteer divisions organized by the Axis. Later some small contingents from occupied territory arrived, but their total number was insufficient to aid the Axis materially.

18 OCTOBER

Reduction of the Bryansk hedgehog ended with its capitulation.

19 OCTOBER

Russian troops drawn from north, south and from Siberia were arriving in Moscow in considerable numbers. New levies were being organized, armed, and equipped, both in the metropolis and in rear areas. New troops in line included Mongolians, Serbs, and other races. Women from all classes and employments, street car employees, teachers and scholars, city workers—everyone not required for hard manual labor during



Nazis take a "breather" during fighting in the East. (Photo from European)

usual work hours and who could possibly be spared, even children, were enrolled in home guards or in labor battalions and sent out in all directions either to fight or to work on defenses. New tank traps and obstacles, barricades, pill boxes, went up on a 24-hour-a-day schedule. A state of siege was declared.

The German screen was pushed forward to Maloyaroslavets, giving a line approximately as Klin—Volokolamsk—Mozhaisk—Maloyaroslavets—Aleksin—Tula—Uzlovaya.

COMMENTS

The German campaign of Vyasma-Bryansk was tactically the same as previous campaigns against large Russian forces, and like its predecessors around Bialystok, Smolensk, Uman, and Priluki succeeded in rapidly enclosing the Russians and then systematically capturing or destroying them.

The lack of Russian initiative is most extraordinary. The Russians fought bravely, and although exact numbers are not yet available, they do not appear to have been outnumbered. They were out-manuevered.

In October, Russian GHQ appears to have been obsessed with two ideas—to save Moscow and to save the Caucasus, supposedly the German objectives. In trying to save Moscow, they concentrated as many troops as they could get around that city and allowed their great armies around Vyasma and Bryansk to be sacrificed with hardly a move to save them. In the south they abandoned Odessa (which was holding out well) to save the Caucasus, while they lost their armies in the south Ukraine.

Only in Leningrad did the Russian lines hold. In this area the Russian command was usually on the offensive. It was not a very intelligent offensive and made no gains, but troops maintained themselves—which was more than was accomplished on the other Russian fronts.

In general, the Russian defense was concerned with protecting *localities*; the German offense with destroying *enemy forces*. It may seem strange, but both sides accomplished their missions. The Russians kept Leningrad, Moscow, and the Caucasus within their lines, while the Germans made unparalleled captures of troops and materiel.

It will take more time to decide whether, considering all factors, the Russians were wise.

ST. BARBARA

Patron Saint of the Artillery

In Helopolis in Egypt dwelt
A pagan lord. Right cruelly he dealt
With his young daughter, Barbara the fair,
Immuring her in lofty tower where,
Secluded, she was doomed to pass her days,
Her beauty unrevealed to lover's gaze.
Yet neither walls nor watchful guard deterred
A holy man who brought her Christ, His word.

Her new-won faith aroused the furious ire
Within the zealot's bosom of her sire.
In vain he smote her with the scourge's strand—
It turned to peacock feather in his hand.
Then in his rage gained he the king's accord
That Barbara should perish by the sword
Of her own father. Swift he raised the blade
And smote. So bravely died the steadfast maid.

But ere the shelter of his home he won,
Ominously gathered clouds before the sun
In fearful storm. The rumbling thunder crashed.
The dread artillery of Heaven flashed
And bolt of lightning struck the pagan down.
Thus retribution and a martyr's crown
Were calendared posterity to acquaint
How Barbara became the gunner's saint.

—Major Fairfax Downey, FA

THROUGH THE MILL

Third of Series

The first requirement for teaching a dog tricks is to know more than the dog. But that knowledge alone is not enough. No matter what great stores of information you accumulate, you cannot successfully instruct until you acquire adequate means of expression, either by speech or by written words, action, diagrams, or a combination of all.

It is highly important that, as officers, you know the subject you are to teach; it is equally necessary that you know how to plan your courses, allot your time for subtopics, and approach the subject.

Seriously compare your instructors in the college, university, or military school you attended. Make allowances for your natural interest in the different subjects taught by each and decide which class was most enjoyable and instructive. When your decision is reached, make a short study of that instructor's methods, his character, his mannerisms. Figuratively place yourself beside him and check off your shortcomings. It may be that you'll find yourself easily adjusted to his standards. Perhaps you'll realize you can never make it. Nevertheless, when you decide what your best is, try hard to remember that your job is important, that it is more than teaching men the exacting art of dealing out death to the enemy, and that it should and must include a large proportion of how to save lives and to avoid being killed.

A little training of the proper sort goes a long way with the recruit. The traits you instill in him may well save his life or destroy it. The state of training in your battery is an open index to your ability and resourcefulness. You must remember at all times that you are charged with preparing your men for duty in far off places under difficult conditions.

SOME STRAIGHT STUFF

Lieutenant General Ben Lear, Commanding Second Army, rightly informs his officers "If you want to condition men to march long distances with full equipment, march long distances with full equipment."

By Lieutenant John Hughes, FA

Beyond doubt that bit of logic cannot be successfully questioned.

General Lear adds, "Soldiers who are physically fit as well as proficient in their military training will meet the enemy confident in their individual superiority and it is with such men that victories are won."

That easily divides to this: "Physical Conditioning" and "Military Training." Those two jobs are yours to supervise. They are inseparable in a winning army, must go hand in hand.

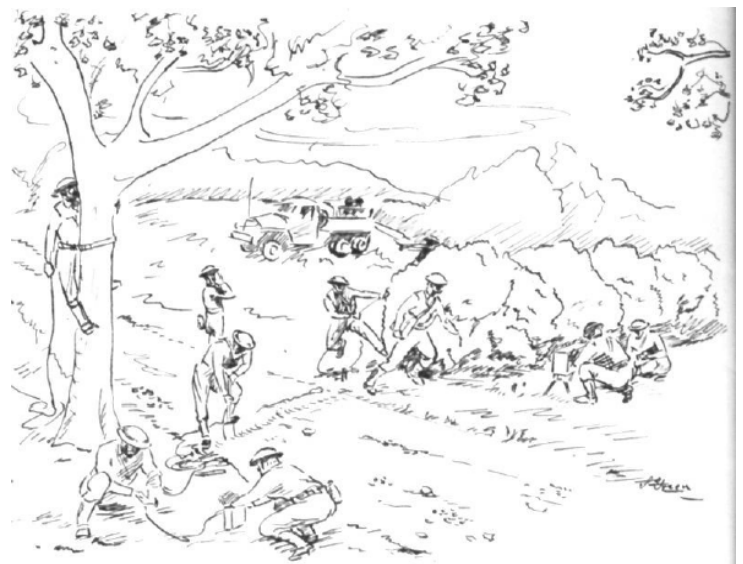
Then as a new officer you will need to suit your notions of instruction to the ideas of some one or many who carry more weight on their shoulders than your single bars can muster.

Almost regardless of how carefully you plan your classes and exercises, often they will be disrupted. There will, in the due course of events, come down from Battalion, Brigade, Post, Division, or Army, blanket training directives which you must incorporate in your schedules. Then changes will be announced at irregular intervals. Your task is to take all the dope that's sent to you, appropriate it to your use, and boil it down for the consumption of your men.

Another problem you will face is that of a great difference in educational qualifications among your men. Your instruction must be high enough not to discourage or disgust the better prepared, low enough to reach the uneducated.

You must try hard every class to make your sessions as interesting as is possible with dry subjects. Remember that the duller of moments can be somewhat enlivened by a proper approach.

How to acquire that obscure knack that makes you a



Practical work

good instructor is difficult to ascertain; however, examples of good and bad approach should offer food for concerted thought and effort.

EXAMPLES, EFFORTS, ERRORS

I remember well that for a few weeks in the summer of 1941 my unit became interested in camouflage. My BC informed me that I would instruct the entire battery in the art and allotted a few hours for classes. Having considerable interest in the matter, I made careful preparations.

In the first session (held indoors) I explained the meaning of the word, gave examples of its value during actual operations, showed newspaper, magazine, and official pictures on the subject, and answered questions.

At the next session we went outside and I selected (at random) from the class a gun section to put up a net. The battery mechanic had been instructed in the matter at Sill and knew how to get the job done. I told them briefly what was expected and turned them loose. They put up the net poorly. Another group pulled it down only to be supplanted by still another group who immediately erected it again, this time with considerable success. We had a howitzer in place, so a little comment was made on the proper placing of slit trenches and sandbags. Just as we finished the class period, the Battalion Commander came by. His comment was, "I want you to leave it up there tonight and I'll have the other batteries see it tomorrow. A very good job."

Next class we took a single section and hit for the open range. There we occupied one position after another—all positions picked for natural concealment and ease of camouflage as well as for firing.

Later an officer from another battery was talking about camouflage nets.

"Remember," he said, "when you had that 'exhibition net' behind barracks? Well, we intended to put one up also, but it was torn too badly to look good."



.... vs. indoor classes

He could have had no better chance in peacetime or when not actually fighting to give some valuable instruction. One or more of his classes should have been devoted to repairing the net or in improvising one. Mine was the better approach.

Along in our course of instruction there was allotted four hours for wire, that is, wire as used in telephone communication. My BC informed me that I would do the instructing the following day and that he thought I'd better spend three hours in the classroom and one outside in practical work. "However," he said, "draw up your schedule and submit it for my approval."

I submitted my schedule and was immediately called up on the carpet and asked to explain why I wanted only 30 minutes classroom and 3½ hours in the field. "There are many book references you could have given," he said. "Then they could have been prepared for your lectures. Why didn't you assign them some reading matter?"

"Sir," I explained, "already those same men have had reading assignments for your classes on sanitation, Lt. Arnold's classes in calisthenics, and my classes in camouflage, survey, and firing data for tomorrow."

"And what do you plan to do if you don't lecture most of the period?"

"Sir, I intend to tell them in 30 minutes the little I know about wire, then we're going out on the range and lay some, stake and tag it, put in switchboards and telephones, and see if it'll work."

"You know about the Field Exercise day after tomorrow?"

"Yes, sir."

"I will hold you responsible for the functioning of that communications group. Do you want to change your schedule?"

"No, sir, I'll use the present schedule."

I believe that too much cannot be said of the relative value of work in the field, practical work, over lectures in barracks. In the classroom you can't show a man how to run his wire under, across or over a highway; in the field you actually do the job and a man sees at least one way to work it. In the classroom 20 per cent slack means almost nothing to the recruit, but in the field broken communications and a half-mile trot across broken terrain resolves itself into instruction of the first magnitude.

Imagine, if you can (I can't) giving indoor instruction in running wire through trees, crossing roads and ditches when the whole countryside offers room for practice. Get your men outside every time you can do so. Keep them busy on a scheduled project that means instruction for the recruit, a meaningful task for the instructors.

I remember numerous cases wherein the officer-instructor foolishly and unnecessarily made himself the laughing-stock of the outfit.

There was a young horse in an outfit I was once in.

We called him Bad Boy and not without reason. He was a splendid thoroughbred, but tricky and dangerous. Occasionally one of the men would give him a trial, but ordinarily only in emergencies. A new BC assumed command and was duly warned of the "kickers," "strikers," "biters," and the like.

Early one morning we were out for a shakedown march and had been halted in a circle. Sharp blasts of a whistle ordered all officers and chiefs of section to the BC. As we approached, Bad Boy lived up to his name, pitching violently and throwing his sergeant rider. The BC was furious. "That's a damn poor exhibition of horsemanship," he lambasted the bewildered sergeant; "never let a horse catch you unaware. Don't do what he wants to do. Be master of your horse, make him go where you want him." He discoursed loudly and at length before the battery on the utter foolishness of allowing a horse (a mere horse) to get the upper hand.

"Now," he said, "I'm going to ride this horse, just to show you that he will not pitch if properly handled and controlled."

I was hoping he wouldn't try it, for I knew the horse well, but he mounted, the battery looking on expectantly. He walked around a bit, began to trot, circled to the right and left, then came to a halt facing the men. "Notice how I'm holding the reins? A horse cannot pitch with his head held in that manner. However, if he should manage to get loose, see how my legs clamp the saddle! He could not possibly unseat me."

About that time Bad Boy sunfished one — two — three times. On the third trip aloft, the erstwhile Conquering Captain continued in flight for a triple somersault and a bruising landing. There were some hidden snickers among the recruits, but not a sign from the older men. The captain was helped to his feet still belligerent, but he had learned his lesson.

I've seen similar things several times. To me it seems foolhardy that an officer must show his divers abilities to his men in such fashion. A good officer-leader can find a more gratifying and dignified approach.

OF GENERALS AND SUCH

When I entered the Service, generals were as rare as Hitler's chances. The RANKest officer I had seen previous to Army camps was a lieutenant colonel who came by on an inspection tour of ROTC units. I was overawed by him and can still remember when I looked way up, and longingly so, at a corporal in our National Guard unit. You can well see that mine was a field fertile for enlightenment.

I know a man (greyhaired too) who despite his creaking joints climbed a tall tree overlooking a road on which our President was to pass, because taller people crowded in front and his admiration was such that he'd risk life and limb for a mere glance. I always swore I wouldn't do any such thing, but the first time I stood inspection for a



Instruction by example!!

lieutenant general I almost ruined my eyes searching for those multiple stars. Most of my dealings with generals have been in books and newspapers, and a few times in interesting indorsements which decried my lack of propriety when I thoughtlessly submitted letters—not through channels.

Now a little research shows me that few of them started as generals, most of them spent above 30 years hunting the star, and a good many came from the ranks. My neophyte belief that their counsel was infallible was punctured on the Ark-La-Tex maneuvers and on subsequent occasions. One night about 2:30 I was directing traffic and clearing the road of jammed vehicles when up ran a jeep and a pleasant voice summoned me to the car.

"Lieutenant," someone asked, "Can you tell me where I am?"

"Yes, sir. Do you have a map, sir?"

He had a map and I found the spot, showed him where he was on the road.

"Then, if I go to this corner and turn right, it will take me to the Blank Brigade," and he pointed to a place on the map.

"No, sir, you are going in the wrong direction."

"Are you sure, Lieutenant?"

"Why, yes, sir."

The jeep jumped away into the darkness, feeble moonlight glistening on the single star of a Brigadier. Presently I mopped a damp brow. I was not so sure any more, but later I remembered that somewhere in the conversation he said his Brigade had moved four hours previously and he couldn't find it.

YOU NEVER KNOW

Back in barracks I lived just above the post "Guest

Rooms." Visiting dignitaries used those quarters, so I bumped into many of them. On nights when generals were there, I skipped my customary stomping around, just in case they might want to rest.

One Sunday morning I ambled down to breakfast, still half asleep. Without looking I jerked open the door to the dining hall and sauntered inside. Suddenly I came to life. A 3-star General was coming out just as I was getting in. There wasn't room to pass, so I backtracked to hold the door for the Army Commander. When I opened the door, Duke, a German police dog, stood eagerly awaiting his master. It wasn't his master, but Duke reared up on the General. Instead of biting the dog's head off, as I half expected, the general rubbed the animal's sleek head and without so much as brushing the dusty paw marks from his otherwise very correct uniform, he called a "good morning" to me and strode away, snapping his fingers at the friendly pup. His stock rose in my markets quite a lot.

Always be courteous to your juniors, especially enlisted men. You are a gentleman, so treat your juniors as you expect your seniors to treat you. One point is this: due to the way things are working out, you are likely to have in your outfit a few men whose social, educational, and financial backgrounds will put yours in the red. Consider them as men—that's what they are—and they'll reciprocate by working for you and with you.

A captain once told me that the colonel commanding his battalion had introduced him to an inspecting general. The general failed to acknowledge the introduction, completely ignoring a captain who was hurt and resentful. That general officer naturally will never hold the respect of a captain he unnecessarily slighted.

We were to have an inspection by an Army Commander. My energetic BC went through every room in the battery area. Stopping here and there along the route, he'd point out items. "Dispose of that, get rid of those," he would order.

In the mechanic's shop there was a complicated affair of sheet metal, wires, batteries, nuts, and screws. One of the men was working nightly and holidays on a radiotelevision set. The captain pointed it out: "Get rid of it."

There was no chance that it could be stored somewhere, stuck in a barracks bag or in an empty locker, it was much too large. That interesting piece of work was junked and with it went weeks of anxious planning and hard work and the dreams of a private who could do little about it.

I could not—and cannot—understand the mental maneuvers of a man who would give such an order because of his fear that the Army Commander would not approve such an apparatus in the Battery Mechanic's Shop. I feel sure that I would have displayed it prominently and proudly, with the man who constructed it 'longside. And I believe the general would have been glad

to find a man and machine like that in his Army. In case the general failed to approve, he would have my deepest sympathy and I would bear his criticism willingly.

. . . WHAT TO EXPECT

Early one spring morning the battalion was standing inspection for a general officer. One of the batteries was commanded by an able captain with considerable service; however, he was small of stature, the inspector a large towering man. Heels clicked and lips trembled as the general strode along the front questioning officers and men at random.

Directly in front of the nervous battery commander, the inspecting general stopped short. He stood there facing the captain, looking him over from head to foot, foot to head. Not a word from anyone as the general stood, looking up and down, up and down. The general's staff moved nervously about, in the battalion the silence was heavy, oppressive.

"Hm-m-m," the gruff voiced general growled loudly, "aren't you kinda small for those bars you're wearin'?"

The captain's jaw dropped, his lips moved but no sound issued, in the ranks a nervous movement, the general moved on along his tour leaving a speechless but infuriated battery commander.

During another inspection by the same officer, we junior officers were to stand by at our several departments: Mess Officer at the mess, Supply Officer in the supply room, and the like. Over at C Battery Lieutenant Websterly was standing by waiting for the inspection of his kitchen and storage room; when the inspecting officers arrived, he snapped to attention, "Lieutenant Websterly, Mess Officer, reporting, sir." The general ignored him and strode ahead into the center of the large mess hall. So many generals and colonels were following the inspector that Lieutenant Websterly could find no room to join the group in his proper position, so he trailed along in the rear.

The general stopped, bellowed loudly, "Where's that lieutenant?"

"Here, sir."

"Get up here where you belong. You're on inspection with the mess."

As they went rapidly over the dining hall and kitchen, the general asked questions.

"What's the price of bread, lieutenant?"

"Two cents, sir."

"Hm-m-m. Try again."

"Two cents, sir."

"That's wrong, just like your first guess."

They were nearing the exit, the general stopped. "Lieutenant," he said rather kindly, "Two cents is correct, absolutely correct. You have an excellent mess."

You never know what to expect.

SUBCALIBER

SIGNAL MOUNTAIN TRANSPLANTED

BY SERGEANT M. H. WILLIAMS

A light weight terrain board, easily moved and handled yet possessing contours that remain rigid under all conditions, has been constructed for the Officers' Pool of the Field Artillery Replacement Training Center at Camp Roberts. Despite these novel advantages the board did not require the use of a single expensive material. Giving firing students important visual experience with terrain problems they may encounter as battery commanders, it was made of lumber, paint, and plaster of paris at a total cost of \$5.40. Most of the work was completed in only three evenings by Lieut. Col. Fred B. Inglis, commanding officer, Capt. A. M. Gini, head

of the gunnery department, and the staff of that department.

When made from sand or clay, the boards lose portability. They must also be protected from the weather, as wind or rain will ruin the contours and require that they be reconstructed. Both objections were overcome in preparing the 40-pound board for the Officers' Pool.

The first step was to select a 1/20,000 contour map of the terrain to be used as a model. This was the Signal Mountain area of the Fort Sill firing range. The Pool instructors and many of the officers in the refresher course are familiar with Fort Sill and the enlisted men



Photo by Cpl. R. L. McCormack

Capt. A. M. Gini depresses the deflection arm and the white thumb tack shows the "burst." Lt.

Col. Fred B. Inglis watches.

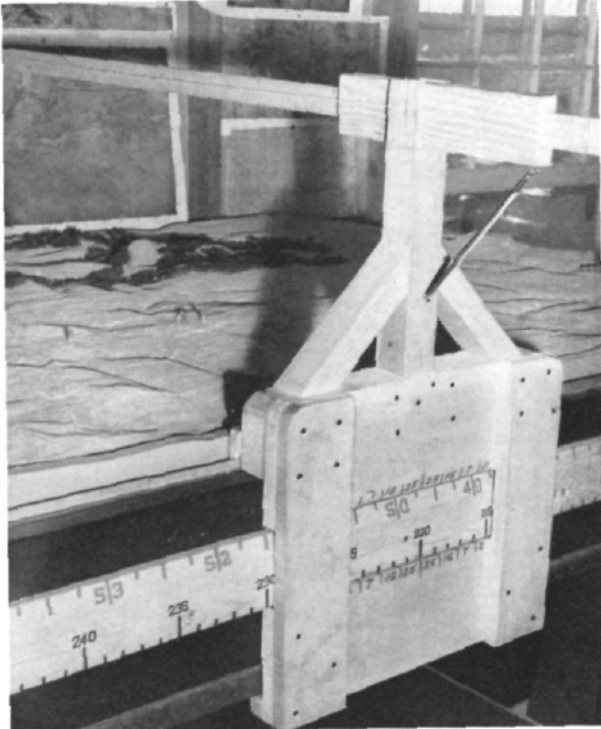


Photo by Cpl. R. L. McCormack

A close-up of the carriage showing the range and quadrant calibrations and the deflection arm, which is marked off in mils. The spring controls the position of the arm, which can be lowered to let the burst touch the target.

will train there for commissions. Knowledge of the terrain for the latter was considered especially important.

Profiles were drawn on wrapping paper and pasted on thin boards, which were then band-sawed. In making up the terrain board, representing an area of 5,500 yards by 9,000 yards in its dimensions of about 5 feet by 8 feet, 18 profiles were used. Four of these were longitudinal. Extra profiles built up the peaks of Signal Mountain and the Medicine Bluffs.

Window screen was placed over the profiles and tacked to the top edges. The screen, shaped with a thumb-like wooden chisel, closely followed the topographic characteristics of the terrain map.

To cover the screen, 1½-inch newspaper strips were cut the length of the board, then run through a thin solution of plaster of paris. Working swiftly, for the thin paper dissolves unless put on the frame immediately, the screen was covered. Each strip has a quarter-inch overlap on the preceding strip, locking all firmly in place. A chemical retarder was added to the plaster of paris solution in order to keep it from setting too quickly.

With one layer complete another was added in the same manner except that the strips were laid at right angles to the first. A third layer, with strips at right angles to the second, completed this phase of the work.

Two days later the plaster was firm and dry. A coat of varnish was applied with an air gun, followed by a coat of

yellowish brown paint that gave the board the sandy color familiar to all who know the Fort Sill countryside. Gullies and other depressions were touched up with a fine spray of O.D. paint. In this manner an effect of depth was obtained. Medicine Creek and the roads running through the range were penciled in and painted realistically.

Tiny howitzers, trucks, guns and the four range towers were produced in a session of whittling with soft pine. These were set on the board, and at the east end, exactly as they lie at Fort Sill, are scale model officers' quarters, barracks, stables, and blacksmith shops of the New Post.

As a replica of the Signal Mountain range, the terrain board is complete. Even the block house on Signal Mountain is in place. Clumps and wooded portions of the range were duplicated by slices of sponge dyed green and glued to the board. The outlines of the woods follow exactly those shown on the relief maps.

Along the south side runs the carriage developed by Col. Inglis and Capt. Gini. The calibrated scale runs the full length of the board with the top scale in hundreds of yards and the bottom marked off in mils. A 10-inch "window" covering 2 forks or 8 probable errors passes along the calibrations.

In adjusting the carriage to the student's range the probable errors are used to provide realism. Thus, an officer manipulates the carriage while the student sits 20 feet away. As the student fires a full problem the officer at the carriage considers the laws of probability and scatters the bursts over the dispersion scale as they would probably scatter in a field firing problem.

Extending from the carriage is a 16-inch wooden post supported by two braces. A long arm extends from the post covering the entire width of the terrain board. Calibrated in mils, this sliding arm provides a means for making deflection corrections or changes. A piece of piano wire with a thumb tack soldered to its lower end hangs from the end of the long deflection arm. The face of the tack, painted white, represents the burst. By providing two "stops" made of pins, one on each side of the wire, and a crank at the upper end of the piano wire, the thumbtack can be turned. By pulling the string the burst is visible to the student and when released, only the thin edge of the tack is visible to him.

The mount through which the arm slides is fitted with a hinge and spring attachment permitting it to be bent down so that the burst touches the terrain at the point called for by the student. Then the spring returns the arm to the horizontal position.

Flanges that slide along the metal strips bent to form right angles hold the carriage to the terrain board. Occasionally a candle is run over the sheet metal guides to permit the mechanism to slide easily.

Adding up the cost of the materials, it was found that 108 feet of lumber valued at \$5.05 was the chief expense. Ten cents' worth of plaster of paris and 25 cents' of varnish and paints were the only other materials.



FIG. 1

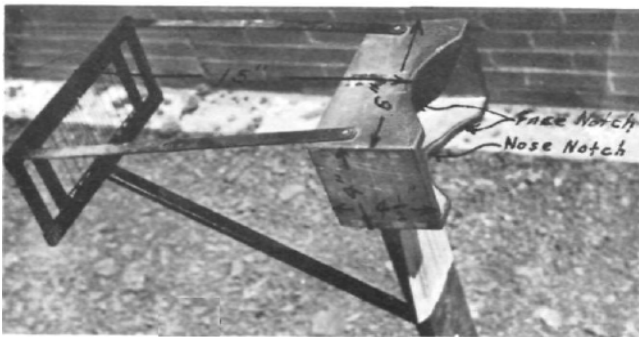


FIG. 2

Anyone using the Train Board day after day soon becomes dissatisfied with the celluloid mil scales which come with it. This is because of the limited number of OP positions and because the celluloid scale becomes so scratched as to be unreadable. The apparatus shown here is an improvement on the celluloid mil scale.

The "scope" is shown in Fig. 1 with a firing table thumbtacked to the upright for convenient reference. Dimensions are as shown in Figs. 1 and 2. The seat (Fig. 1) has a weight under the rear end to provide a counterbalance for the reticule attachment. On the front face of the seat two $1'' \times 2'' \times 4''$ guides are nailed 4 inches apart to steady and guide the upright. The upright has a $\frac{1}{2}''$ slot 8 inches long at the lower end to allow for adjusting the height of the eyepiece. Upright and seat are held together by two $\frac{1}{4}'' \times 2\frac{1}{2}''$ stove bolts with wing nuts and washers. It is convenient to make the washers of two pieces of $\frac{1}{8}'' \times 2'' \times 4''$ steel plates, each with two holes drilled $2\frac{1}{2}''$ apart.

The eyepiece (Fig. 2) is attached to the upper end of the upright. Curved notches are provided in the upper and lower plates to center the eyes of the observer. The lower plate has a smaller notch in the bottom of the face notch to receive the observer's nose and further insure fixing the position of his eyes.

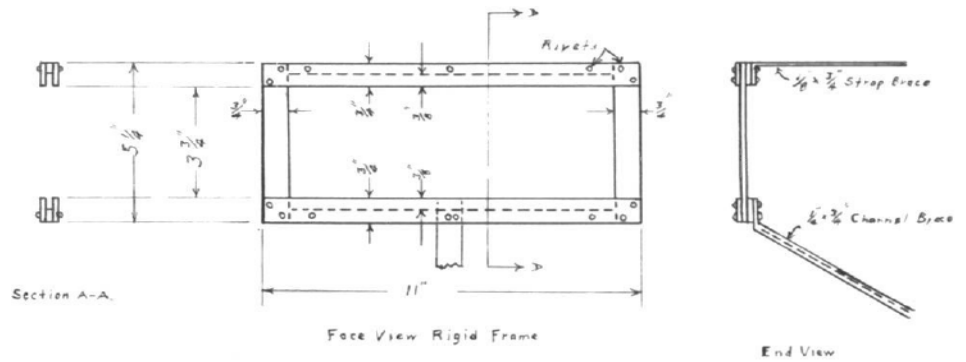


Fig. 3 a

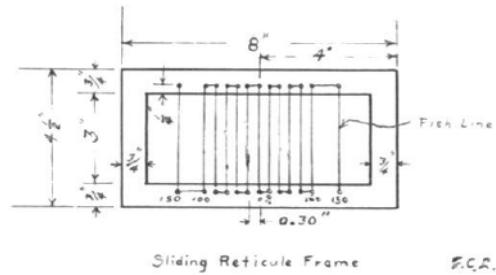


Fig. 3 b

A "SCOPE" FOR THE TRAIN BOARD

BY MAJOR FRED C. LUNDBERG, FA

The reticule assembly is attached as shown in Figs. 1 and 2. It consists of a rigid frame and a sliding frame. The rigid frame (Fig. 3a) is constructed of $\frac{1}{12}'' \times \frac{3}{4}''$ strap iron riveted as shown to provide a channel in which the inner frame slides. The sliding frame (Fig. 3b) is cut out of a $\frac{1}{12}''$ steel plate to the dimensions shown. The reticule was made by drilling $\frac{1}{16}''$ holes in the sliding frame at the proper distances apart, and threading fish line tautly between them. The center line is whitened with chalk.

To use the "scope," the observer seats himself and places his face against the eyepiece. He then moves the scope until the center line of the reticule is approximately on the target. The final adjustment is made by moving the sliding frame of the reticule assembly.

It is necessary for an observer to practice bringing the reticule into focus after observing the burst, but this is not objectionable because the same procedure is necessary when using the celluloid mil scale.

With this scope the observation post can be placed at any desired distance from the Train Board, thereby giving the student instruction in the method of estimating ranges and length of perpendiculars. The range of use of the Train Board is thus increased to include preparation of fire as well as conduct of fire.

SUBCALIBER AT USMA

BY CAPT. H. E. MIKKELSEN, Ord. Dept.

About a year ago a pilot battery of Field Artillery Trainers equipped with compressed air attachments was made for the U. S. M. A. Field Artillery Detachment. These compressed air attachments, as well as the results obtained by using them, were described in the September, 1941 issue of the FIELD ARTILLERY JOURNAL in an article entitled, "Subcaliber."

While the performance of these compressed air guns was superior to that of guns using the .22 cal. ammunition, there were still a few "bugs" in them to be eliminated. One of the main troubles was that the last gun to be fired during a "battery right" or "battery left" usually fired shorter than the first gun. This showed that the $\frac{3}{4}$ " feeder pipe used could not refill the guns quickly enough with the required volume of air at the proper pressure. Replacing the $\frac{3}{4}$ " pipe with a 2" pipe eliminated this "starving" of the last guns to be fired and further reduced the dispersion of volleys and salvos.

Leaky quick opening valves were another source of trouble. Several types of valves were tried out until Capt. R. W. Timothy brought back a leak-proof valve from the Lunkenheimer Company.

Mr. E. C. Schuman, a former civil engineering instructor at Lewis Institute of Chicago and now employed by the government in the concrete testing laboratory at West Point, heard of our experiments and designed a trigger mechanism utilizing the Lunkenheimer valve. His second model (that shown in the picture) amply meets our requirements. The only effort now required to fire the gun is to put in a ball and push a small button; compressed air does the rest. Detailed drawings of the air attachment have been sent into the office of the Chief of Ground Forces for consideration in connection with artillery and antitank training purposes.

Figure 1 shows one of six batteries operated from an air compressor located on the floor above. The vertical 2" pipe at the left of the photograph brings air from a 25 cu. ft. tank upstairs at 45 lbs. per sq. in. to a 2" horizontal pipe running left and right through the six gun pits, across the room beneath the guns (see Figure 2).

The close up (Figure 3) shows one air attachment removed from its mount. When the trigger button (A) is depressed, compressed air forces a piston inside cylinder (B) to act on the stem of valve (C), thus opening it. When the valve opens, compressed air stored in small tank (D) passes through valve (C) to propel the projectile out of the tube (E). Then springs immediately make the attachment ready to fire the next round.

This model of the air gun is exceedingly accurate. Its



Figure 1



Figure 2

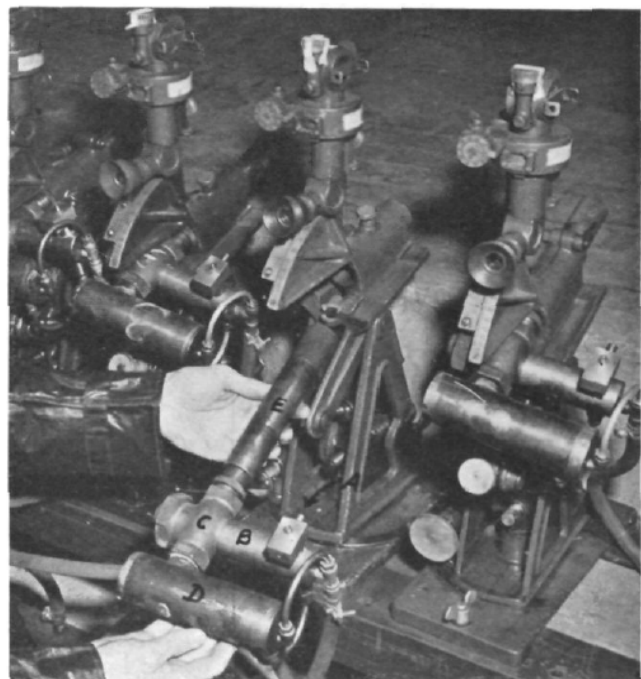


Figure 3

probable error corresponds to less than that of the full scale 75-mm. gun. Using a gunner and one man to load and fire, the air gun has a rate of fire of over 30 rounds per minute, making it ideal for direct laying. A surprisingly large number of hits have been made on a miniature tank traveling at a scale speed of 50 miles per hour.

During the past months of cadet instruction, it has been demonstrated locally that this air gun is practical and excellent for training in the technique of firing. I believe that the accuracy and performance now obtained by using compressed air is what General Bishop had hoped for when he designed the Field Artillery Trainer a dozen or so years ago.

IMPROVISED SIGHT FOR FA TRAINER

BY MAJOR FRED C. LUNDBERG, FA

Soon after the beginning of the 1941-42 school year, all panoramic telescope sights were withdrawn from R.O.T.C. units. Shortly thereafter, we were offered additional Field Artillery Trainer batteries less the panoramic telescope sights. Faced as we were at the University of Utah with a 100 per cent increase in the size of gunnery classes, we asked for two additional batteries, and began to work on a sight for them. After experimenting with various makeshifts, we finally arrived at a method of using the head of a French aiming circle in place of the panoramic sight.

The method adopted is illustrated in Figs. 1 and 2. A spindle, Fig. 3, was constructed to adapt the aiming circle head to the trainer sight mount. One end of the spindle was milled to fit into the T-shaped slot in the trainer sight mount; the other end was turned in a lathe to fit into the aiming circle spindle housing. A collar was placed over the center of the spindle to provide a base for the aiming circle housing. The dimensions are as shown in Fig. 3. The collar can be of any desired length instead of that shown.

The unit illustrated was constructed in one piece but could be made at less cost by making the parts separately and then welding them together. A length of the T-shaped section could be milled, which would be sufficient for all the units needed. Likewise, a length of the cylindrical section could be turned in a lathe. After cutting these two bars into the desired lengths, the sections could be placed in a jig and welded together, making the weld large enough to form the collar.

To adjust the line of sight of the aiming circle parallel to the bore of the gun, it is necessary first to mark both the aiming circle spindle housing and the spindle as shown in Fig. 2. Then set the index of the upper scale on 3200 of the lower scale and the micrometer on zero. The bore sight is then placed in the bore and sighted on some distant point. By means of the slow lower motion, the aiming circle is sighted on the same point. A scratch mark is then made on the under side of the lower part of the aiming circle, and also on the spindle-housing so that the instrument can later be readily set up without bore



FIG. 1

sighting. Return the upper index to zero and the line of sight of the aiming circle has been adjusted parallel to the bore.

To insure accuracy of adjustment, it is necessary to check the 0-3200 marks on the aiming circle to see that they are exactly 3200 mils apart when the micrometer is at zero on either mark. It is also necessary to construct the spindle carefully and to be especially careful in adjusting the line of sight parallel to the bore.



FIG. 2

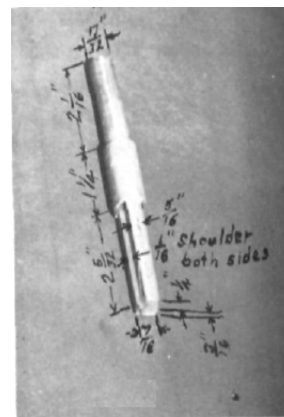


FIG. 3

THE DOL-LUC IMPROVISED MOUNT

BY CAPTAIN BERTRAND A. GRIFFITH, FA

A sub-caliber mount for the 105-mm. howitzer using a thirty caliber rifle as the sub-caliber weapon takes its name and origin from 1st Lt. Robert S. Dollar, Jr., and Sgt. John B. Lucas; Lt. Dollar conceived the idea, Sgt. Lucas took care of the construction. The battery was anxious to fire its new 105-mm. howitzers, but this of course could not be done until the personnel had received preliminary sub-caliber training. The catch was that there were no mounts for 37's at the time, but "necessity is the mother of invention."

Construction is simple and inexpensive. A couple of blocks of wood, ten bolts, an old inner tube, and two pieces of steel, together with the ingenuity of a good sergeant, and you have the job done.

It is primarily designed for training in direct laying. The impact of a .30-cal. projectile is not a very large burst for sensing, but if used on sand, water, or dusty terrain, it can be seen at satisfactory distances. On sand, ranges of 200 to 300 yards work well; on dry dusty soil, 200 to 500 yards; and on water, from 200 to 800 yards. At these distances adequate training for the gunner and No. 1 in the mechanics of direct laying is secured.

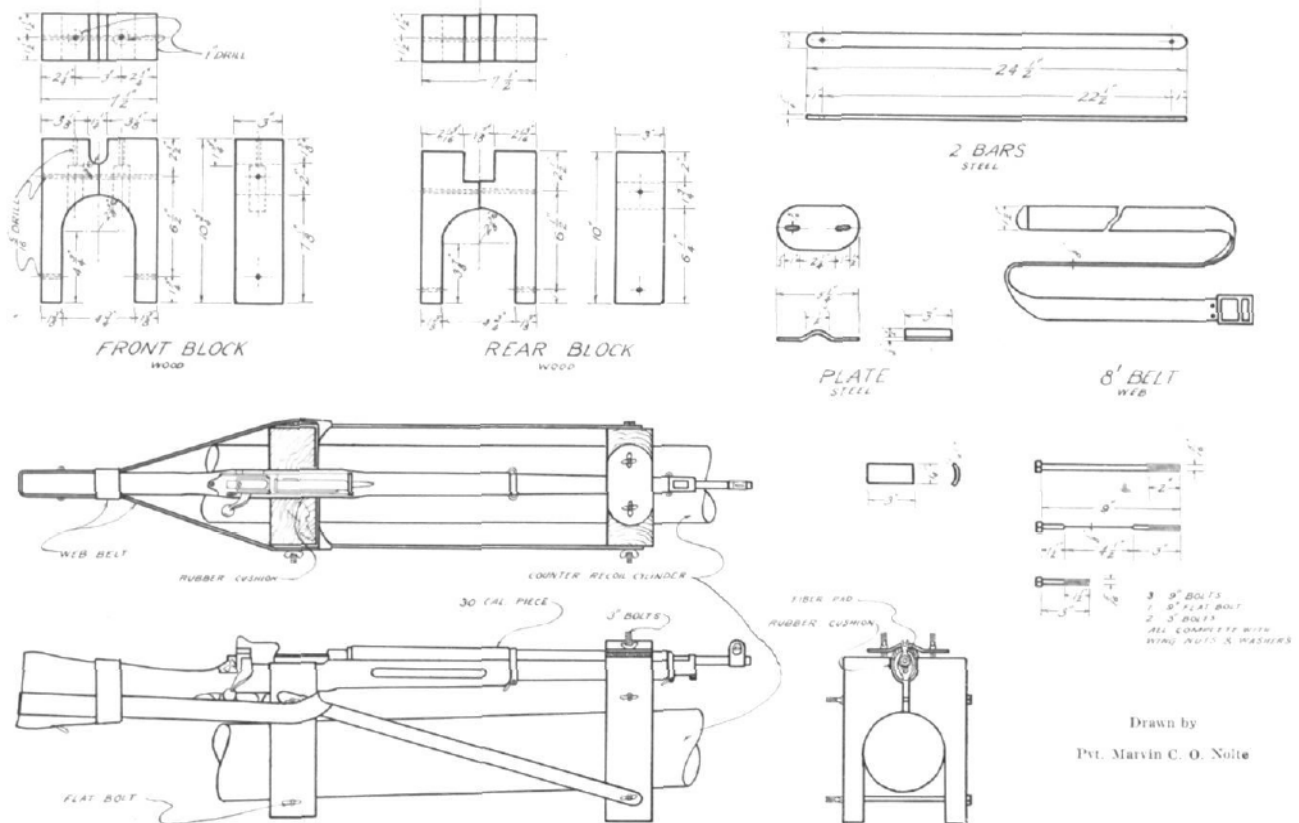
The sub-caliber weapon may be boresighted either by the normal, accurate method or bringing the sight of the

howitzer into coincidence with the sight of the rifle. An error is applied by the executive to both elevation and deflection so that the gunner will not secure a hit on the first round fired. The procedure after the first shot is, of course, the choice of the officer conducting the firing, depending upon the type of firing he is teaching at the moment. We have found that by announcing a deflection and elevation which is known will throw the burst off the target, then announcing at least one correction prior to turning the firing over to the gunner to fire at will, a most realistic effect is obtained on the miniature range and target.

A satisfactory towed target can be made by fastening a white panel about ten inches square on some small wooden skids, using a couple of hundred yards of unserviceable telephone wire for towing, manpower being the prime mover.

We have not as yet tried indirect conduct of fire but believe it has its possibilities. During direct laying practice we were able to develop range tables. For example, the range to the target is 200 yards; we announced a minus sight of 200 mils at a range of 4300 yards. A range change of 100 yards will give us about ten yards' actual change on the ground. The reason for this is that our gun position is higher than the target area, and, of course, under these circumstances satisfactory results are obtained. Only a few rounds are needed to develop tables for the range used.

FOR USE ON THE 105 MM HOWITZER



Factors in Good Morale

By Cadet Sergeant Benjamin Suchoff, FA, ROTC

Four main categories of psychological situations in which the soldier is placed which are essentially different from his life as a civilian are:

1. He has the job of killing, which throughout civilian life has been emphasized as anti-social.
2. He is faced with new and different dangers which he would not normally meet.
3. He is deprived of many of the essentials of life which he would have in civilian life; some of these are:
 - a. Normal sex relations.
 - b. Physical comforts.
 - c. Social relations, such as clubs, activities, etc.
4. He is forced to fit himself into new conventions and activities.

All these situations, since they are new to the soldier, can be conducive to poor morale.

The job of killing is new to the drafted soldier. Throughout his life he has been taught by his school, by his church, and by his home that killing is a crime which is condemned and severely punished by society. Then he is thrown into a situation which is based upon the sanctification of homicide, yet he receives the support of society, his church, and his friends. The change from one concept to the other is very often difficult. It is hard for the man to break down all the inhibitions which have been fostered in him against such conduct. As a result there is serious opportunity for poor morale. Too, the feeling of guilt on the mind of the soldier when he engages in combat is a factor which can disturb satisfactory conduct of military operations.

New dangers which face the soldier probably are the greatest factor toward low morale. In the first place he is subjected to the same sort of activity on the part of the enemy which he is engaging against the enemy. Capt. J. H. Burns points out that a man confronted by danger may stand his ground, but he cannot eliminate the feeling of fear nor the tendency to flee which flows from this feeling. These things are automatic and beyond control, but he can control the action of flight. This tendency towards flight in the new soldier is greater than in the experienced fighter, and is a strong morale factor.

Upon entering military life the soldier is deprived of many things which are common in civil life. Deprivation of normal sex relations on the part of the soldier may lead to serious disruption of morale. Furthermore, he is faced with partial loss of physical comforts to which he has become accustomed; he must live in barracks, during combat there are few suitable accommodations, food is not always the best. In military life he is deprived of normal activities with

his family, his friends at home, his clubs and organizations, and with his civilian job or business. These very important factors often lead to resentment, hatred, shirking of duty, apathy, and desertion.

The new soldier is required to fit himself to new conventions and activities. He must meet a military code which is new to him, is required to drill and develop new skills and techniques. In learning these, resentment may develop from the feeling that he has been improperly placed, that he has knowledge which could be used elsewhere to good advantage. He is forced to obey orders from men who were his inferiors in civilian life, but who are above him in military rank, he loses his individuality, he is entering a world with a new outlook and must adapt himself to conditions different from those he has known. This process is difficult, and if he does not meet it with willingness, problems of morale may develop.

What can be done to lessen the effect of these conditions and to direct the man into a pattern leading to good morale? This is one of the big problems facing the officer. How can I organize and direct my outfit so as to minimize the adverse effects of these conditions?

A technique that may be used is to cushion the impact of the conditions described above. The soldier's objection to killing can be lessened if the righteousness of the cause for which he is fighting is firmly planted in his mind. The task of the officer is at all times to reimpres upon the minds of the men the fact that our cause is the cause of truth and justice. Indoctrination of this sort is essential to the man's peace of mind.

The adverse effects of danger can be lessened if, when at the front, the men are given frequent leaves so as to remove the constant pressure which rests upon them. Also the danger problem can be decreased if the soldier is not impressed with the destructive ability of his weapons. He should be taught how to handle them efficiently, but their destructive potential should not be emphasized. Also if possible, he should not be able to see the results of the use of his weapons, as in the artillery. In this way his fear of similar enemy weapons will be reduced. The condition of danger's effect can be reduced if the men are kept occupied at all times. Inactivity gives opportunity to brood and brings psychological problems to the fore.

The adverse effect of the necessary deprivations can be lessened through leaves. If the soldier can see his folk and his acquaintances and occasionally spend some time in normal living conditions, psychologically he will be more fit for his job. Such techniques as service clubs, and free time to read and work with hobbies, are effective

means of raising morale. Most of these methods have to do with the men in permanent encampments.

From a constructive point of view, the officer should help develop pride in group membership. Since so much of his life's activities depend upon other people, man is a herd creature. He likes social recognition and in the group he can get favorable attention by conforming to the majority. The soldier must be made to feel proud of his unit, proud of its traditions, of its insignia, and above all proud of his uniform. This pride can be developed through athletic competitions between units through drill competitions and through sincere admiration for the officers who are identified with his unit. Pride in his uniform can be developed through civilian recognition and through the feeling of status which the soldier has when admired for his work by the civilian population.

The use of incentives to personal betterment is worth while. Opportunity to advance in rank and in pay should be emphasized to the soldier. He should be shown that merit in the army reaps rewards. Use of marksmanship medals, higher rank, and increased pay will urge the man to work harder. Rewards for outstanding service and valor should be made immediately following their occurrence, if possible. These things give the man greater prestige in the eyes of his companions—something every man will work for consciously.

The will to obey orders must be developed in the man by increasing his respect for the men giving orders. Officers must show willingness to assume dangerous tasks, they must prove to the men their ability and their knowledge. The officer must be concerned with the problems of his men. He must be sympathetic and understanding. He must assure adequate provisions for his men before he considers his own position. He must develop in them good military habits by example. If the officer will do these things his position with his men will rise and there will result willingness to obey commands. The disgrace of not obeying must be implanted in the minds of men. This fear of disgrace in the eyes of their comrades must be greater than the fear of death. If a favorable attitude toward the officer is engendered in the minds of the men, willingness to follow and obey will result.

Better morale may be assured through greater confidence in themselves; it can be developed through increased proficiency in the use of equipment. This confidence will be maintained if at all times the soldier's equipment is kept in excellent condition. Replacements of old or worn items should be made quickly. A man should be allowed to remain at his given task without shifting to other types of skill and equipment. The man should be impressed that his equipment is of the best and that his training makes him a fine soldier.

The chief avenue of building an individual's morale is in his relations with his immediate fellows. The use of close order drill is very helpful, for it gives the man a strong feeling of group affiliation. He sees himself as part of a group which can not function properly if he is out of it. The close order drill makes him conscious of his membership in the group and thus develops quick compliance to orders. He knows that if he is out of step, or does not follow the commands as given, he will be the butt of derision from his fellows. Therefore he becomes a part of the group, taking pride in its activities. There should develop a feeling of companionship and comradery between the men of a single unit. These friendships with bunkmates, gun crew, or squad can become a strong source through which to reduce boredom on the part of the men during periods of inactivity. The general rule that men who train together should fight together should be followed. Officers of the unit should remain the same, so that men can get used to their ways of doing things and not be disrupted by the new techniques of new officers. Also, the officers who train men should lead them in battle.

A high standard of morale can be developed if officers will remember that the man is not a soldier by profession, that he is entering the army because his country is facing a crisis. Wherever possible the contrast between the former life and army life should be lessened. The soldier should be treated as a single personality and his welfare closely supervised. Good morale is not a goal impossible to achieve. With sympathetic understanding and with supreme confidence in victory, officers can be certain of high morale.

Confusion is never the fate of those who are resolved on a definite line of conduct. Calmness is a state of mind willed and chosen. It is self mastery that permits us to choose with reflection the act we wish to accomplish.

Man is not always master of his feelings, but he is master of his acts. If you would be a man who must be reckoned with, you must preserve your self possession under circumstances in which other persons lose their heads, and preserve this control in the presence of praise as well as unfair antagonism.

W. N. D.

Diary of War Events

JUNE, 1942

- 1st Germans "avenge" Cologne flattening by raid on Canterbury. Rommel withdrawing westward in Libya. Japs start 3-pronged drive in south Kwantung to open Hankow-Canton railway.
- 2nd 1,000 British planes bomb Essen; 35 missing. Germans holding southwest of Tobruk; both sides suffer heavy tank losses. British-U. S. convoy loses 6 ships reaching Russian Arctic port.
- 3rd Japs bomb our Dutch Harbor, Alaska, base twice. Rommel widens breach in British Bir Hacheim line. Japs push toward Hangchow-Nanchang railway.
- 4th Japs raid Midway Island. MacArthur sub sinks Jap transport, 2 supply ships. British hold point of German Libyan advance, attack Rommel's rear near Bir Hacheim.
- 5th Jap attack on Midway repulsed; sea-battle raging. MacArthur planes sink 2 Jap subs off Australia. 1,000 British planes make daylight raid on Europe.
- 6th U. S. Navy planes and land-based Army bombers trounce Jap task force near Midway, sink at least 3 carriers, damage 3 battleships, 4 cruisers, 3 transports. Japs capture air base on Hangchow-Nanchang railway, 700 miles from Japan. U. S. planes sink 6th Jap sub in week off Australia. British attack German positions near Knightsbridge, Libya.
- 7th Jap task force withdraws from Midway area. 2 German tank attacks near Knightsbridge repulsed. Germans attack Sevastopol heavily. Sydney and Newcastle, Australia, shelled by Jap subs.
- 8th British artillery stops German tank attack at Knightsbridge; Free French hold off attack at Bir Hacheim, to south.
- 9th Germans take fortifications, advance on Sevastopol. Japs by-pass town of Chuhsien, still held by Chinese; push along railway. British bomb Ruhr 4th time in week.
- 10th Japs occupy unfortified Attu and Kiska Islands in Aleutians. Germans launch new Kharkov offensive, gain ground at Sevastopol.
- 11th Bir Hacheim abandoned to Axis. Jap forces from east and west nearing juncture along Hangchow-Nanchang railway. Germans advance slowly, straightening Kharkov lines; Sevastopol defenses hold.
- 12th U. S. carrier *Lexi??* on sunk in May's Coral Sea battle; Jap carrier losses ?? Midway put at 3, probably 4. Heavy Axis tank attack 30 miles southwest of Tobruk opens final Libyan drive. Russians fall back northeast of Sevastopol, counter-attack at Kharkov.
- 13th U. S. Egypt-based planes bomb Rumanian ports, oil-fields. British repulse Axis tank assault on El Adem, 15 miles south of Tobruk. Chinese hold railway against 2 Jap forces only 100 miles apart.
- 14th Russian artillery blocks German bridgehead attempt at Kharkov. Axis Libyan drive hits Knightsbridge-Acroma salient; British column attacks enemy's rear.
- 15th British battle Rommel's envelopment near Tobruk; German 88-mm. guns batter outranged British tanks. Russian Black Sea fleet aids Sevastopol defenders. Japs closing pincers on Hangchow railway. U. S. planes hammer Jap Aleutian naval units.
- 16th British withdraw from El Gazala, escaping encirclement; beat off 3 attacks on El Adem. U. S., British planes sink Italian cruiser, 2 destroyers in Mediterranean, but convoys to Tobruk & Malta are damaged heavily.
- 17th Axis attack pushes forward southeast of Tobruk. Japs have all but 50 miles of Hangchow-Nanchang railway.
- 18th British evacuate El Adem, Rezegh; Tobruk isolated except for coast road. Germans take fort 2 miles from Sevastopol harbor entrance.
- 19th Rommel cuts road from Tobruk to new British defense line 80 miles east. Nine merchantmen sunk in Atlantic and Caribbean.
- 20th Tobruk cut off; Bardia, 7 miles from Egypt, captured. Germans advance slightly at Kharkov. U. S. bombing Jap Aleutian force, weather permitting.
- 21st Tobruk captured, with 28,000 prisoners; British dig in on Egyptian border. Sevastopol defenders fall back to straighten lines. British bombers attack Emden, German sub base, in force.
- 22nd Sevastopol coastal fort taken, wedge driven in city's northern defense line.
- 23rd Sevastopol garrison reinforced from sea. Only British planes oppose Axis advance toward Egypt. 13 U. S. ships sunk in Caribbean early this month; 88 die on one sunk off New England coast; Argentine freighter sunk.
- 24th Rommel's force moves south, threatens flanking of British coast positions. Russian marines land in force on southern Crimea; Sevastopol holding. Chinese block one arm of pincer on Hangchow railway.
- 25th British abandon border positions in face of flanking from south; Axis 60 miles inside Egypt.
- 26th British digging new defense line as Rommel penetrates another 40 miles. 1,000 British planes bomb Bremen, German industrial port.
- 27th Germans capture Kupyansk on Kharkov front. Rommel 15 miles from Matruh, coast anchor of new British Egyptian line; subs blocked Axis convoys to Libya for past two weeks. Chinese lose last of Kiangsi-Chekiang air bases, within range of Japan.
- 28th U. S. bombers attack Axis columns advancing on Matruh. Germans launch new offensive at Kursk, 280 miles south of Moscow; Kharkov quiet, Sevastopol holds. Bremen bombed again.
- 29th British abandon Matruh; Rommel 50 miles to east. Russians check new Kursk offensive, yield slightly at Sevastopol. U. S. bombers smash surface installations on Jap-held Wake I.
- 30th Rommel only 100 miles from Alexandria, still advancing. R.A.F. raids Bremen 3rd time in week.

Not in the BOOK

RECORDER'S FIELD DESK

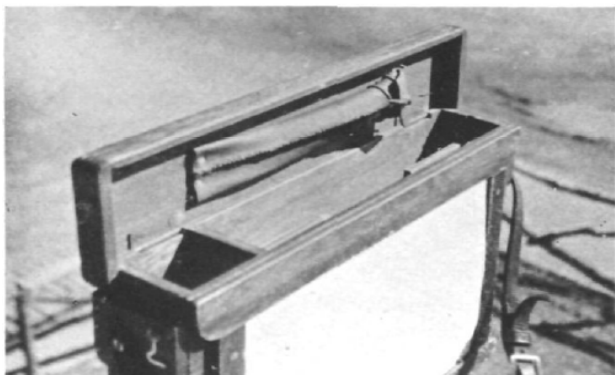
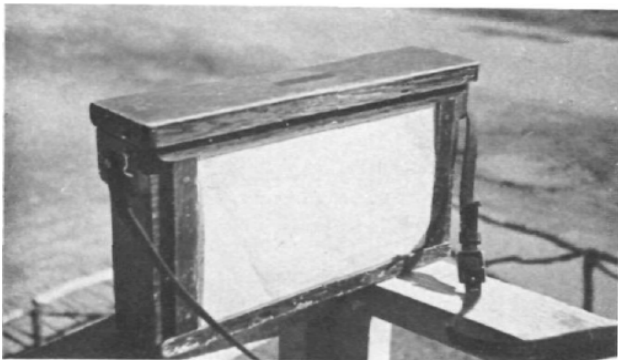
From the comments of range officers and my own officers, I believe a Recorder's Field Desk will interest most field artillerymen. Computers might also find a similar desk useful.

The desk is a box whose dimensions are roughly 15" x 9½" x 3¾", made from ¼-inch 3-ply wood, inside surfaces shellaced before assembly, and all joints glued and fastened with brads. The outside is painted with non-lustrous O.D. paint.

The inside space is 13¼" x 9" x 2". A small compartment is designed to hold a flashlight, and the remaining space is divided equally to hold new sheets and recorded firings, respectively. The cover is fitted as tightly as possible with two small brass hinges; two small hooks hold it closed. A leather case fastened to the inside of the cover helps keep track of pencils. A ½-inch leather strap is used for a carrying strap. On the side next to the body of the person carrying the desk, are placed two strips of wood under which the top and bottom of the sheet being used are slipped, and two more strips butted to the sides of the sheet keep it from blowing away. An acetate transparent sheet fitted over the sheet being used, keeps the sheet fairly dry in wet weather.

My own field desk has been in use since the first of the year and has shown that it is well worth its small cost. My only criticism is that maps, overlays, orders, etc., that no one quite knows what to do with at the moment, find their way into the desk.

PVT. CHARLES R. PARKINSON.



EDITOR'S NOTE: This feature is devoted to ideas sent in by our readers describing methods or devices which, though not specified by official literature, have proved useful in service.

INTRA-BATTERY COMMUNICATION

Our 6-piece, 105-mm. self-propelled howitzer battery has tried various methods for intra-battery communication from the executive to each gun section.

Voice has been used, but with mechanized materiel where there is a lot of noise it is not very effective: too many commands have to be repeated.

Megaphone could be used, but because the battery has, at least, a 200-yard base, it is still almost impossible for the chiefs of section to receive accurately all the commands from the executive, who is about 50 yards behind the guns.

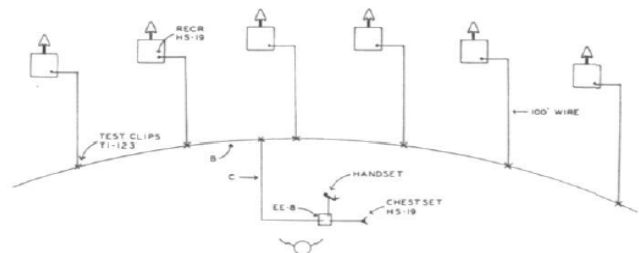
Semaphore, also a rapid means of communication, might be used, but the gun section gets confused because each man already has a special job while on a fire mission. Too, another man is needed for recorder at the piece, for in semaphore the receiver has to keep both eyes on the sender to get all the letters.

Radio, a very effective and accurate means of transmitting messages, has not been tried due to the cost of materiel.

Last is wire, the most reliable method for this purpose. It can be installed rapidly in a simple net, is easy to maintain, uses only standard and comparatively inexpensive materials.

Our method is to equip each gun section with one receiver (from HS-19), two test clips, and 100 feet of wire. The wire is assembled and run to the rear or flank of the piece by No. 7 cannoneer, to the main line (see diagram). This main line (B) is about 200 yards long, run out on the executive's bantam on which we use a reel DR-4 and axle RL-27.

The executive's phone (EE-8) is placed near the radio truck (line C) with one man listening on the hand set. The executive may use the transmitter from an HS-19, which straps about the body allowing freedom of the hands for computing, or the plug may be removed from the phone to allow his moving about. The chiefs of section, plotting personnel, and radio still function while he checks the various guns over the phone itself.



This method does not interfere with voice. Also, with this receiver the section chiefs can speak to the executive's handset powered by the phone's batteries in case they miss a command, or to check deflections, and each chief of section can talk to the other chiefs of section.

The signal equipment needed is: 1 telephone, EE-8; 1 chest set (transmitter only) from HS-19; 6 earphones; 14 test clips, TI-123; 400 yards of wire, 110-B; 1 reel, DR-4; 1 axle, RL-27.

CPL. CHARLES J. LiVECCHI

BOOK REVIEWS

WILL GERMANY CRACK? By Paul Hagen. Harper and Brothers, New York and London, 1942. \$2.75. (Translated by Anna Caples.)

Paul Hagen, Austrian by birth, has lived and worked in Germany. He was there when Hitler was rising to power, continued his underground work from outside Germany for several years, and finally reached the United States where he is now Research Director of The American Friends of German Freedom.

Elmer Davis in his introduction says, "I have known Paul Hagen for some years, and since the war began have been a constant reader of the *Inside Germany Reports* of the American Friends of German Freedom, for which he is largely responsible. With impressive frequency those reports have been borne out by subsequent events; for Hagen, though more passionately eager for the fall of Nazism than any but an exile can be, has the rare virtue of never letting his hopes run away with his judgment, of never confusing what he would like to see with what his eyes tell him is actually there. . . . What you read here may not be what you are hoping for. . . . It is a report of what is there, as it appears to a man who is not only unusually well informed, but gifted with an unusual capacity for detached judgment."

Can we expect Germany to crack from the inside? Are our friends there strongly organized? Do the German people favor Hitler's Government? What is the common man's position? What is the lot of the farmer, the industrialist, the small shopkeeper, the Jew?

Will Germany Crack answers a lot of your questions, not the way you would like them answered, perhaps, but the way a clear thinker sees them. Of particular interest to me is Hagen's descriptions and explanations of Nazi propaganda and how they use it. "It made the danger

appear even greater than it was and exaggerated the difficulties."

So long as Hitler produced victories at slight cost a wave of enthusiasm swept Germany, but when the United States entered the war and toll from the Russian front became known, war came home to the German people and they were no longer sure. They remembered the last war and began to question their chances in this one. The propaganda changed from "We Will Win the War" to "We Must Win the War." There is a great disparity in those outlooks. The first shows bravado and confidence, the latter displays fear and desperation.

Germany has many weak links in her national chain, an important one being the several millions of alien workers in her factories. Her labor problem, possibly, is her greatest weakness; for every time a man is taken from the factory and sent to the front an enemy must replace him. There are no labor reserves to push the Nazi production schedule; alien workers slow up production regardless of efforts to increase the output.

Fuel—coal, wood, and oil—is ultra important in the Nazi economic scheme; but there is a shortage which they have been unable to overcome. Even with the slave labor and the combined production of all the occupied countries there is not enough. True, in a few districts coal piles up around the mines, but there are no trains to distribute it over Germany.

Transportation, then, is another serious factor. The Kaiser started his war with more locomotives than Hitler could assemble. Those taken from France solved the problem for a short time but the demands grew enormously when Russia was invaded and the transport system broke down again. Italy, Norway, and Switzerland get only a small per cent of the supplies Germany promised

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for them, largely because there are no trains to haul the enormous loads. There is no time for major repair on trains or other heavy machinery. They will run at full speed only a few more years, then must be repaired. Under the present situation Germany cannot make those replacements.

Clothing is important to an Army and to a people. Germany cannot supply adequate clothes for either. But where there is definite shortage, the Army is cared for first and best, at the expense of civilian comfort. Substitutes and ersatz materials combine in the Nazi cloth. Neither is of good quality, neither can be acquired in sufficient quantity.

Hagen knows these things are important but he claims no one of them is great enough to arouse rebellion. For a possible beginning at real internal trouble he goes to the farmer who was almost independent and who fights continually against the encroachment of the "white collars" who plan everyone's entire life. Apparently the agricultural class is naturally independent and would like to be left alone. But their labor has been dissipated and their tractors are idle for lack of fuel. They are required to keep extensive books and records on their crops, on their dairies, for every item on their small farms.

The same is true of the shop-keeper, who must account for every item in his business. Small shops are forced to close because of the competition of great industrialists.

Big business helped put Hitler in power, now it is under his thumb and he controls it. However, he has to make concessions there occasionally because a few big business men control the war production of Germany. It is certain that there is mutual fear and distrust between Hitler and his industrial leaders.

Hagen devotes considerable effort to contrasting the "party" and the "Army." Definitely they are often in unarmed conflict. Usually the SS wins. There may come a time when that conflict will break into open warfare, but that hope is forlorn because they are forced together by the struggle for existence.

There is opposition to Hitler in Germany but it can make little headway from the inside. If Hagen shows anything conclusively I believe it is that Hitler is strong enough to carry on almost indefinitely over all internal opposition. It is only through invasion of the Fatherland that Nazi Germany can be subdued.

This book is a powerful and invaluable study of Germany in this war. There is excellent insight into the real and tremendous problems of Germany. It shows specifically what has been done to solve these problems and what we may expect in results. I do not find the book interesting from a literary viewpoint, but from its military, historical, and economic aspects it is a valuable contribution.

—A. V. R.

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THE FIELD ARTILLERY JOURNAL
1218 Connecticut Ave., Washington, D. C.

TIME RUNS OUT. By Henry J. Taylor. Doubleday, Doran & Co., Inc., New York. \$3.00.

Time is short! Make all haste! Time is fleeting! Hurry to the utmost! Time . . . runs . . . out!

This is the ever-recurring theme of this account of a last-minute survey of Europe—Allied, Axis, occupied, and neutral. Even when there is no special mention of the urgency of the moment, the constant undercurrent of Mr. Taylor's warning impresses the reader.

Not the least important thing in his book is Taylor's synthesis of the events of the last twenty years, of his observations and conversations during his frequent European trips. Described as a business man and economist as well as reporter, his background enabled him to appreciate and evaluate the incidents of his last mad gallop, mostly by plane, from October 4 to December 15, 1941: Lisbon, London, Stockholm, Helsinki, Berlin, Vichy, Madrid, Gibraltar—all the "hot spots," as it were—and home via Africa and South America. Widely and well acquainted, he had access to planes, places, and personages that are closed to the average traveller. Unfortunately the fore-part of Taylor's book is too taken up by his difficulties in getting clearance to go from here to there and thence on further, but once he hits his stride he succeeds in giving a powerful picture of the world today.

The consistent German policy, from even before the "ruinous" inflation twenty years ago, is clarified beyond previous works that have come our way—and the arguments are sound. De Gaulle is shrewdly appraised and there are excellent comments on how his movement should be viewed. But perhaps most illuminating of all are the last chapters, beginning with his visit to Gibraltar; this portion is a "must," and the whole makes profitable and enjoyable reading once the "I" and "my troubles" are passed.

CANADA MOVES NORTH. By Richard Finnie. The Macmillan Company, 1942. 216 pages. \$3.50.

Now that the U. S. Army has commenced to build a military road from Seattle to Alaska many of our readers will wish to learn more concerning the more or less unknown northwestern portion of this continent through which the highway will pass. There has been considerable misinformation printed on this subject. Stefansson has done much to straighten us out on these matters, especially with respect to the life of the Eskimos, the climate, and the flora and fauna of the land. Mr. Finnie, who appears to be a disciple of Stefansson, was born in the Far North and has spent considerable time exploring it. Army people who will be concerned in building the highway and traveling it or who may be stationed in Alaska will find considerable profit in reading the book. So too will those who are "brushing up" or just now really learning of our neighbors.

THE DAY OF THE SAXON. By Homer Lea. Harper and Brothers, New York. \$2.50.

Although originally published three years apart, Lea's two most important books carry one essential theme, were greatly neglected by those who should have heeded (*The Valor of Ignorance* ran to only 18,000 copies, *The Day of the Saxon* merely 7,000), and received careful attention abroad (the earlier book ran to twenty-four Japanese editions in a month). Both are concerned with Anglo-Saxons' future, but this work examines the British Empire as the earlier one did the United States. The picture was not a pretty one, and still is not even when one reads with allowances for changes time has made in details. As Lea himself says, "There has been much that is bitter in what we have written and the inevitability of our conclusions. It could not be otherwise. We have shunned hope and its illusions, theory and its pitfalls, evasions and its massacres."

Besides making a careful study of his subjects, Lea had the fortune in 1910 to visit England as the guest of Field Marshal Lord Roberts, and Germany as that of Wilhelm II. He clearly saw the brutality of the German attitude and character, and pulled no punches in describing Teutonic warfare. He clearly saw—bitterly—the blind spot in Anglican eyes which makes war a personal matter, emphasizes the wickedness of enemy leaders, and blinds the Saxon to the true character of the peoples who choose or accept those leaders. Plainly too did he realize how ephemeral was the Triple Alliance, and that Italy could never be Germany's true ally; the truth of this prophecy was shown not only in '15, but even more so today.

The British Empire is considered in its entirety: Australia and Australasia with relation to India and Japan; India as affected by Japan and Russia; the mother country in connection with Germany and Russia; and other portions of the empire as they fit into the picture. A strong warning rings throughout, one that has been partially heeded but must be more thoroughly understood—a warning that conditions, not persons, determine the course of nations, and that the principles of "natural" laws must be observed if empires shall continue; in short, roll with the punches, don't try to buck them all.

Another estimate, which had we read Lea some time back would have seemed fantastic, has been demonstrated to be utterly correct: "Russia in her progress is no more concerned with the devastation of her wars and her appalling losses on the battlefields than is Russian nature with the havoc of her winters."

Writing in terms of at least the rest of our century, Lea accurately assayed and appraised the major powers as he saw them thirty-odd years ago. He was right in major movements and minor details, even to the point of predicting World War I as one of nations, and the present conflict as one of races. By mentally reading "air force" as well as "navy" where he discusses the

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fleets, we can obtain as good an analysis from Lea's writings as from most recent sources. For at least the "short pull" of war we should know his thesis thoroughly, even though some of it might be unpalatable as a design for living in time of peace.

GET TOUGH! By Captain W. E. Fairbairn. D. Appleton-Century Company, New York, 1942. \$1.00.

Marches, obstacle courses, maneuvers—all these help toughen our soldiers, but that isn't what Fairbairn means. His sub-title is *How to Win in Hand-to-Hand Fighting*, and brother, he lives up to it! He knows the how and the why, too—he had to, to survive thirty years on the Shanghai Police with the toughest waterfront in the world to look after. He not only survived, but organized and led the famous Shanghai Riot Squad and later became Assistant Police Commissioner, which position he held when he instructed our Marines for many years. Fairbairn knows the tricks of Chinese "boxing," and was the first foreigner ever admitted to Kodokan Jiu-Jitsu University in Tokyo, where he was awarded the Black Belt, Second Degree. His combination of study and practical experience makes him speak with authority.

But speak how?—with brief, clear explanation of graphic line drawings which plainly show exactly what he is talking about. The Fairbairn System as thus given is now standard instruction for the British forces, including Commando units. Although he is now in this country teaching close-combat to our instructors, few of us will have actual contact with him. This book is a mighty good substitute—but when you practice blows, throws, releases, and holds with your pals, take it easy. And be sure they do too, when you're the "victim"!

AN ATLAS OF FAR EASTERN POLITICS. By G. F. Hudson, Marthe Rajchman, and George E. Taylor. The John Day Company, New York, 1942. \$2.50.

Text and 40—count 'em, 40—maps dovetail perfectly to give a remarkably clear and understandable picture of the Far East. Together they analyze and explain the geography, population, and resources of this area; outline the history of China, Japan, Siberia, southern Asia, and Oceania; and interpret Japan's several thrusts for empire. This is a large order, but one that is deftly and competently handled by an expert trio.

G. F. Hudson, an English authority on this section, wrote the text of the fore-part of this book, originally published in England in 1938. His work was brought up to date by George E. Taylor, author of *America in the New Pacific*, an outstanding volume on American-Japanese relations (see the JOURNAL for May, 1942, p. 411). Maps for both parts were prepared by Marthe Rajchman, author of *A New Atlas of China*. The complete story is sponsored in this American edition by the Institute of Pacific Relations.

Surprisingly little of the earlier edition has been outmoded by more recent developments, even those portions tending to forecast the (then) future. It behooves us to learn all we can of the potential battle areas of the war—which of course means the entire globe. We might concentrate for the moment, then, on what are trouble spots now and probably next. The breadth and clarity of this *Atlas* makes it ideal for this purpose, especially since it is practically the only volume adequately explained by maps. As background and foreground material, it is tops.

MEN ON BATAAN. By John Hersey. Alfred Knopf, New York. \$2.50.

When Hersey's book reached my desk I looked at it morosely, as I look at most books, thumbed through it to see the pictures and finding none started reading on page 203. Presently, there was page 229 and I found that I was drifting along on his words, eagerly absorbing his stories, and marveling at the ease of his writing. That night I settled comfortably in a deep chair and read the thing through. Today I've read parts of it again.

Time magazine's John Hersey plucks strongly on a responsive chord in his cleverly prepared tale of MacArthur and his men. His system for the heading of a chapter to repeat a catching phrase from the preceding page is very carefully managed and appears to have flowed naturally across MacArthur's life and the epic that is Bataan. His arrangement of alternate chapters delving into MacArthur and world affairs is new (to me) and wholly pleasing.

Doubtless, many other stories of the Philippines and our men there will tell a longer, more detailed saga, but I doubt that another will attain the arresting style that Hersey gives. His story is not complete and does not pretend to be so, but it offers a great assortment of items that have not appeared in print before this book.

"He (MacArthur) was their hero, their shining knight, the guy who would win their war. With MacArthur in Australia, they could get out their old kit-bags and pack up their troubles and smile for a change, they thought.

"In wonderful healthy American ways they worshiped their MacArthur."

Americans worshiped MacArthur mostly without knowing exactly why. He was a hero, he would win the war, he was the world's greatest general. Our people believed he would swoop from Australia down on the Japanese on Bataan and avenge our losses there. MacArthur was a sort of God, but in all those beliefs and hopes there was little thought of MacArthur the Man with his flair for rhetoric and flowery phrases, his wife and son, his *business* of being a soldier.

Men on Bataan makes conscious effort to bring us back to reality, down to earth. It gives a story of MacArthur that tries to make of him a man, a good American. True, even with trying, it was impossible to cover

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the truth that MacArthur has never been the ordinary man.

An ordinary man is not a Brigadier General while his classmates are still Majors and Lieutenant Colonels. An ordinary man does not become Chief of Staff of the United States Army. An ordinary man did not reorganize our land armed forces into Four Field Armies, fight for and get a GHQ Air Force, evict the bonus marchers from Washington, and beat the congressional bill that would have placed about half the Regular Army officers on furlough at half-pay.

No, he isn't the ordinary man, but he has those qualities that cause the ordinary man to fight for him and with him to the last. I think you'll get a new slant on the General when you read this story of him. It is so different.

But then MacArthur takes only one half the book—men on Bataan get the other. That other half is full of Kellys, Wagners, Villomars, and men like them. They have stories to tell you. Through Hersey they look you square in the face and tell that they suffered and worked and prayed for three long months, all the time one eye on the horizon looking for the help that couldn't come. Most of them believed to the very last that the Japs would be pushed off the Philippines. With that courage and devotion found only in a free man they fought savagely until there was no strength to fight.

This book of Hersey's is an admirable thing. Written by a journalist, it is, perhaps, journalism; but it is the very best journalism with a rhythmic style that engages you relentlessly.

Perhaps, in a few years, the book may not be remembered: right now it holds a conspicuous spot on my desk.

A. V. R.

BUILDING MORALE. By Jay B. Nash. A. S. Barnes and Company, New York, 1942. \$1.00.

It is very difficult to "pass" on this 154-page accumulation by Dr. Nash. He purports to write of morale and includes in his findings material on biology, physical training, co-operative society, juvenile delinquency, character, law of diminishing returns (and other laws), and a comparison of Axis and United Nations' methods of building morale.

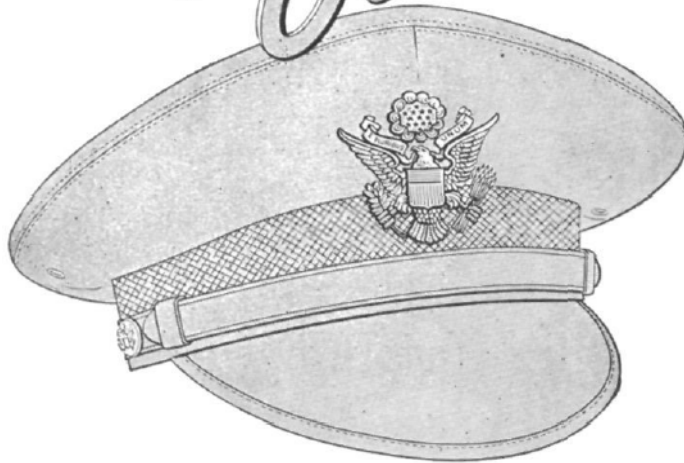
He talks boldly and well on various problems that concern each of us for ourselves and for each successive generation. Strangely, in these times, our armed services are not played up in this little book. Most of the work deals with the civilian before he reaches military service age.

I sorta like *Building Morale* because it has a definite purpose and Dr. Nash tells his story concisely in readable form without fanfare and extraneous materials. The book isn't a cure-all but it has some good points and should have a little niche in your library.

Particularly recommended for use in college and high school libraries.

A. V. R.

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