The FIELD ARTILLERY Journal

IN THIS ISSUE:

Mountain Warfare

SEPTEMBER - OCTOBER, 1940

RECENT AND RECOMMENDED

WHY FRANCE LOST THE WAR

By A. Reithinger

Veritas Press, 1940, $1.25

Written early in the year, prior to the Norwegian campaign, this translation of a German book maintains that France can no longer be considered a world power, regardless of the outcome of the war, because the decline in her population and the weakness of her economic position automatically relegate her to a secondary status. This reviewer recalls that Prussia itself, with the smallest and poorest population in Europe, nevertheless became a great power, and therefore believes that the point is still debatable.

M-DAY, IF WAR COMES, WHAT YOUR GOVERNMENT PLANS FOR YOU

By Donald Edward Keyhoe

E. P. Dutton, 1940, $1.00

This is a somewhat sketchy picture of mobilization. It is of interest to army officers as an example of a method of presentation in popular form of the basic features of the mobilization plan.

THE HUNTING RIFLE

By Col. Townsend Whelen

Stackpole Sons, 1940, $4.75

Here is a book for the rifle sportsman, which has been given very favorable reviews lately, and deservedly so. Many enthusiasts, from squirrel hunters to those who stalk the Alaskan brown bears, are imperfectly acquainted with the characteristics of modern weapons, and consequently fail to get the most out of their hobby. Colonel Whelen has performed a valuable service in making available in one permanent volume all one needs to know concerning the modern hunting rifle, its accessories, and the ammunition which it fires. The sportsman who contemplates junking that "trusty old fowling piece" and buying what he has had his heart set on for lo! these many years, will find real help in Col. Whelen's book. He can obtain here unbiased information as to what type of action, what caliber, what sighting equipment, and what loads will best suit his purpose. This is Kephart brought up to date; and it describes only the finest (thought not necessarily the most expensive) rifles.

COMPANY ADMINISTRATION AND PERSONNEL RECORDS

By Capt. C. M. Virtue

Military Service, 1940
Paper cover, $1.25
Cloth, $1.75

The sixth edition of a detailed, working manual for the use of unit commanders, first sergeants and company clerks. It tackles all the problems and explains the procedure in every case confronting the company (or battery) office. All the standard forms are shown and the methods of filling them out are explained. Illus rative problems are given and solved.

ARMY MESS MANAGEMENT SIMPLIFIED

By Major E. A. Hyde

Revised edition, 1939, $2.00

The title of Major Hyde's book describes its scope and purpose. It simplifies the Management of the unit mess, it reduces the labor in connection with it, and if the system is carried out, a SUPERIOR MESS will be the result. The basic scheme of the book is the use of a 15-days Bill of Fare. Each Bill of Fare is followed by instructions and recipes for each of the items included in it. All the Company Commander has to do is to prescribe that the Bills of Fare be followed out in his kitchen, turn a couple of copies of the book over to his kitchen crew, and then see that the plan is being followed. In use in a thousand kitchens of the Regular Army and CCC. Specially adapted to the Field Training period of the National Guard.

BARBED-WIRE ENTANGLEMENTS

By Paul B. Malone

MAJ. GEN., U. S. A., RET.

Stackpole Sons, 1940, $2.50

This novel deals with the experiences of an American infantry regiment in the Great War, from the training camps in the United States to the front in France, ending with the Army of Occupation on the Rhine. The author was both Assistant Chief of Staff, G-5 (Training) of the A. E. F. and commanding general, 10th Infantry Brigade (5th Division) during the war, and he has obviously drawn on his own wide experience in writing the book. The last chapter is a rousing appeal for isolationism, warning Americans to keep out of European wars.

MAJOR W. S. NYE, FA, *Editor*
LIEUT. HARVEY S. FORD, FA-Res., *Assistant Editor*
LENNA PEDIGO, *Business Manager*

IN THIS ISSUE

COLONEL CARL A. BAEHR is Chief of Staff of the Philippine Department. He is also a good Red-Leg, who not long ago was head of the Animal Transport Department at Sill, and also was MFH. Recent press dispatches in the US highly praising his work in Manila come as no surprise to his many friends, who welcome his timely study on landing operations.

MAJOR CHARLES GILDART'S verse has been enjoyed in these pages previously. In our opinion his *Symphony* (FAJ, Jan '38) should take first rank in any Gunners' anthology that may be compiled. He also will be remembered for his excellent treatise on military leadership, which appeared last year.

CAPTAIN W. A. "SAMMY" SAMOUCE will be missed around Hummell Knoll and other spots at Fort Sill, where he was recently an instructor in the Animal Transport Department. Sammy is now with the 6th FA, a horse-drawn GHQ outfit to be stationed at Bragg.

MAJOR REX CHANDLER is the "Rex" of humorous illustrations fame. Until recently head of the Communications Section at the FAS, he is now in the Materiel Section in the Chief's office.

AINOLD (PAPPY) SHUTTER should spend more time at those maneuvers in the dark pine woods if it will induce him to send us more of his inimitable humorous philosophy in rhyme.

MAJOR THOMAS NORTH, after five years a FA representative on the Engineer Board at Belvoir, is now in the Training Section of the OCFA. He has promised to give us, in the near future, a study of the aerial mapping situation.

MAJOR LOWELL RILEY, now with G-2, War Department, has been military attaché in several European capitals.

The two foreign articles on tanks and armed units are, in our opinion, outstanding. Your JOURNAL will continue to search the field for the latest offerings on this subject, which is of such urgency at the present time.

We are not labeling as such the exclusive and behind-the-scenes bits of history which occasionally appear in these pages. But we hope you recognize and appreciate them.

The Field Artillery Journal

A Publication for the Field Artillery of the Regular Army, National Guard, and Organized Reserve

SEPTEMBER-OCTOBER, 1940—Vol. 30, No. 5

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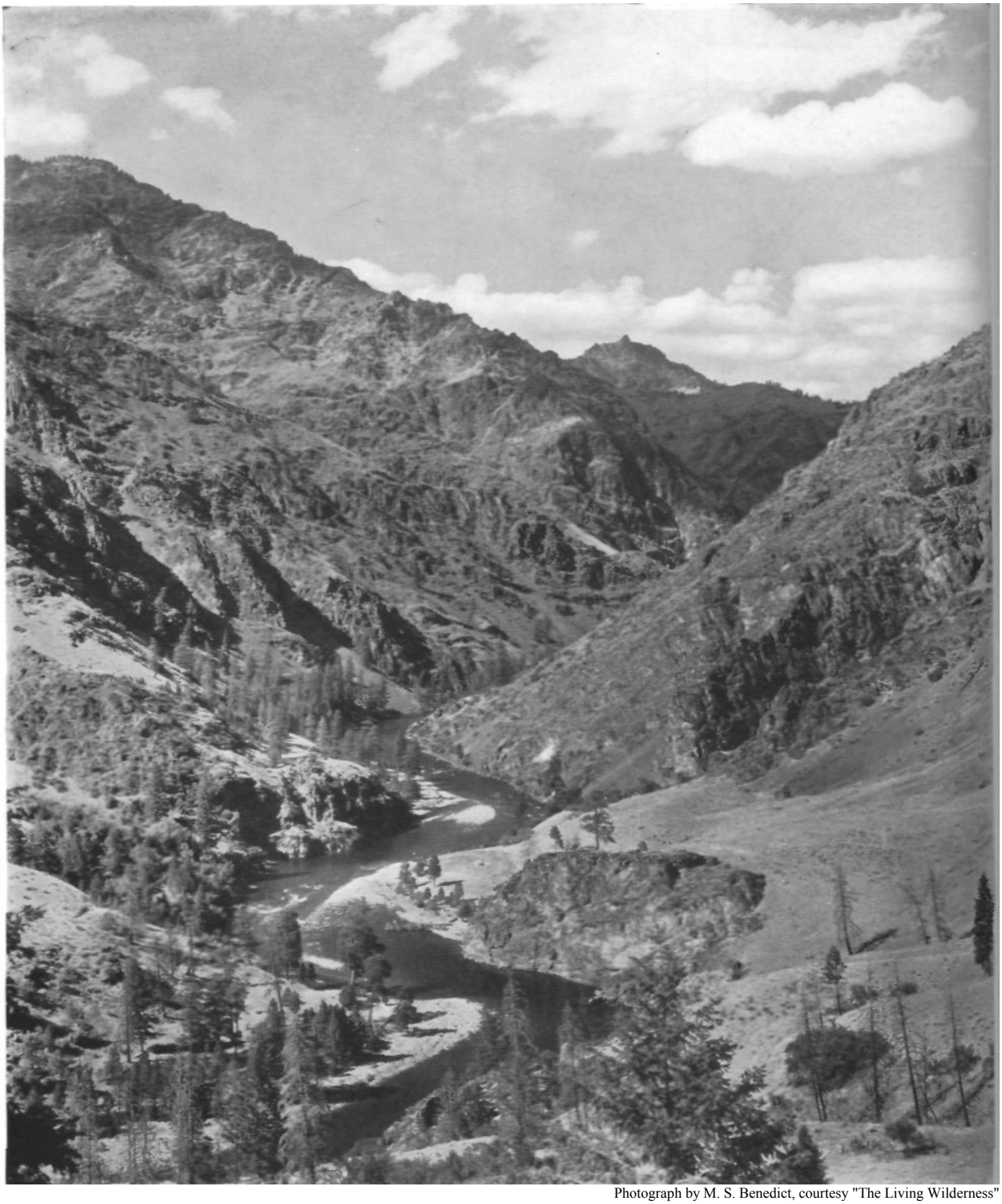

Photograph by M. S. Benedict, courtesy "The Living Wilderness"

Idaho Wilderness Area, Middle Fork

Special operations for which ordinary troops are not trained nor equipped

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By Lieut. Col. Charles David Griffiths

FOREWORD

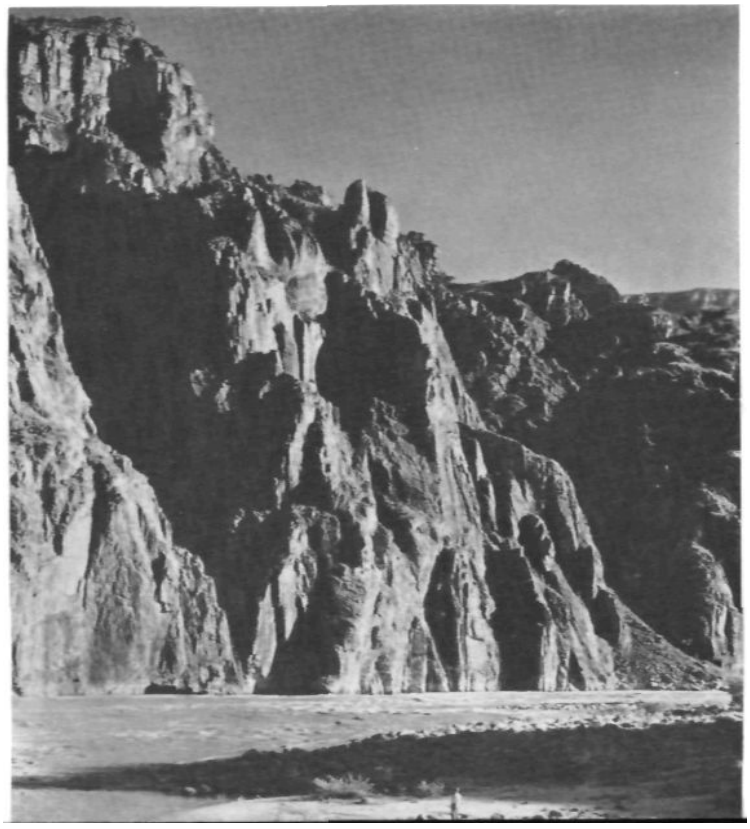
The statements contained herein are not necessarily in accordance with official doctrines and teachings. Neither is it claimed that this study is an exhaustive treatise nor in any way the "last word." It is presented to stimulate thought and discussion concerning a subject which, in the United States, has not received the attention which it deserves.

GENERAL

THE NEED FOR MOUNTAIN UNITS

Extensive portions of the western hemisphere consist of lofty and rugged mountain chains, with lesser foothills and outlying ranges. Most of our island possessions also are mountainous, as are other islands which we may be called upon to protect. It is only reasonable to suppose that hemisphere defense may involve considerable combat in the mountains, whether the latter be jungle - clad heights "south of the border" or the glacier-covered masses of the sub-Arctic regions.

Successful mountain warfare requires selected troops, specially trained and equipped; it demands variants of ordinary tactical concepts and methods. The Europeans — Austrians, Germans, Italians, French — have long recognized this. They maintain "Alpine" divisions, composed of men bred in the mountains— rugged individuals acclimated to the snows and hardened to swift movements over the difficult terrain. These units have special materiel and personal equipment, and are trained in the use thereof. Only the Americans, for many years unthreatened, have proceeded placidly on the assumption that ordinary troops, with lowland ideas and equipment, would do equally well for mountain warfare. Fortunately, we are facing the future with a more realistic attitude!



SELECTION OF PERSONNEL

For pack artillery an effort is made to recruit only men of more than average height and physical strength. It is necessary that they be able to lift heavy loads to the pack saddles of large mules and control these admirable beasts when they become temperamental. Furthermore, the men of a pack outfit do not ride—they walk, and drag the animals with them. The marching ability of our Regular Army pack artillery units has long been a source of pride to us all, but their characteristics are not generally as well known as they should be. This is evidenced by the fact that during a recent maneuver one of these units, after completing a forced march of some fifty miles, was ordered to start immediately on another march of similar length. The officer who ordered the movement (not an artilleryman) was surprised to learn that the personnel of the pack regiment marched *on foot*.

It is necessary that the soldiers of other arms who make up the personnel of a mountain division be as hardy as those of the pack artillery. Mountain men are needed. The lowlander is not wholly satisfactory, even if of good physique; he is at as much a disadvantage in the mountains as the landsman is on the ocean. His muscles are not accustomed to ascending and descending steep slopes. He is unsure of his footing in dangerous places and may be afflicted with vertigo. High altitude induces in him a weakness caused by lack of oxygen, and often produces a debilitating malady, the symptoms of which are similar to dysentery. The plainsman loses his sense of orientation in the mountains; he cannot judge distances accurately; he is affected by unaccustomed silences, the sense of power and loneliness. He probably is totally unskilled in the use of skis, snowshoes, and toboggans.

Briefly, mountain troops should be mountain men, and these units should be stationed permanently in mountainous country and trained there.

SELECTION OF EQUIPMENT

Much of our ordinary equipment will be useful in mountain warfare; motor vehicles, tanks, and parachutists were employed in Norway in addition to the older types of weapons and transport. There are many items of equipment, however, not possessed by ordinary units, which must be supplied plentifully to mountain troops. These include weapons, both small arms and artillery, capable of pack transport; climbing and pioneering tools; special clothing and footgear; sleds, dog teams and harness; cables and conveyances for transporting materiel and men across chasms; special rations and means for preparing cooked food in high altitudes; special medical equipment and pack transport for evacuation; numerous pack trains for assuring supply under all conditions; and many other things.

INFLUENCE OF THE TERRAIN

During the World War considerable decisive combat occurred in such unfavorable terrain as the Italian Alps, the Macedonian-Bulgarian borderland, and in the towering ranges of the Caucasus. More recent examples of mountain warfare include the Italian campaign in Ethiopia and the German campaigns in the Carpathians and in Norway. High mountains are an undoubted obstacle but history has demonstrated repeatedly that a determined army will cross them and will maintain itself in mountainous areas for months or even years despite almost insuperable difficulties of weather and terrain.

According to the classic conception, mountains restrict maneuver or even prevent it; units move very slowly and their actions are canalized; objectives usually are geographic, and are those terrain features which dominate areas vital to the maneuver, combat, or supply of troop. Doubtless these dictums are still true—at least basically. But they must be accepted with caution. Take the case of Norway, for example. Here is a rugged country composed mostly of fjords, mountains, lakes, and glaciers. Like all mountain country, it is sparsely inhabited; roads are few; for much of the year the climate is severe. Yet the Germans moved rapidly through Norway in all directions, employing tanks, motor cars, cyclists, airplanes, parachutists, and artillery of different types and traction. Austrian and German mountain troops were widely used. Objectives varied, but were as frequently the opposing troops as they were terrain features.

The point is, the airplane, the tank, the motor vehicle and the parachutists have changed the tempo of mountain warfare, and offer perhaps as great a departure from old-style mountain fighting as did Hannibal's elephants. High ridges and peaks are not the obstacles they used to be, at least not strategically.

Nevertheless, "to ignore the terrain in mountain warfare is to ignore the major part of the problem." Reconnaissance must be sufficiently thorough to insure that orders are not issued which are impossible of execution. Initial disposition of troops is of special importance and the scheme of maneuver must be well worked out ahead of time; later changes will not be easy. Logistics should not be based wholly on theoretical calculations; actual tests of routes and rates of movement should enter into this type of staff work.

Weather conditions may exert tremendous influence on operations in mountainous country. Temperatures change radically between daylight and dark. Sudden and violent storms surprise the unwary. In the tropics, the rainfall during twenty-four hours may equal that during twenty-four days in other localities. In other zones one may encounter cloudbursts, fogs, blizzards, powerful winds. All this may change the course of the fighting, especially if not foreseen and provided against. Scientific weather forecasting, possibly of the type developed by Dr. Irving Crick of California, should be utilized to the utmost. The Germans have made considerable progress in this; we may be sure that "Hitler weather" is not entirely a matter of luck.

Photo by Harold H. Lelch

Sierra summits

COMBAT

It is not the purpose here to repeat matters which are covered in our official military literature, except for emphasis or where new departures have been suggested by developments in Europe. Defensive combat in mountain warfare still contemplates the defense in a defile, defense in front of a defile, or defense in rear of a defile. Defensive combat should, *per se*, be easier than the offensive in mountain warfare, since the terrain exerts such a decisive influence. We must continually remind ourselves, however, that the aerial bomber and the vertical envelopment have made the task of the defender much less simple. Make no mistake, the use of parachute troops in the mountains is entirely feasible. Even in this country parachutists are currently being employed to fight forest fires in mountain regions. The threat of aerial bombing will compel the defender to adopt positions which are not obvious. Concentrations of troops and weapons on the shoulders of defiles or the location of reserves and artillery in the only defiladed canyon or pocket in the area will surely attract bombers even if they cannot see the troops themselves.

Similarly the task of the attacker will be complicated because of hostile aircraft. Columns or masses of troops caught in defiles will be slaughtered as were the Turks in Syria in 1918. The lesson of Norway seems to indicate that the strategical offensive—tactical defensive holds great advantages. The attacker should push small, highly mobile columns out fanwise, striving to seize key terrain quickly, then hold at all costs while waiting for reinforcements. The important thing is to get a few men on commanding ground before your opponent can do so. This was the lesson of the struggle for the Round Tops at Gettysburg, and it has been repeated in numerous other and more closely applicable historical examples. It seems obvious, yet the obvious is too often overlooked. Here again the parachutists—and a few tanks or motorized infantry, where roads exist—may do the trick. And, currently unpopular though the notion may be, horse cavalry will prove indispensable in the mountains, especially in the arid heights in the West.

ARTILLERY

GENERAL CONSIDERATIONS

Marshal Pietro Badoglio, speaking of the Ethiopian war, said, "The artillery accomplished a great deal in the war, a very great deal. In certain cases it did, perhaps by itself, resolve a situation — a particular given situation, an episode in the battle—thus contributing toward the common victory. The pack artillery proved equal to its old traditions in conveying its guns where required; the motorized artillery, even the heavier medium

calibers, performed extraordinary feats; greater results may be obtained from this specialized branch than are commonly expected."

Perhaps the most striking characteristic of artillery in the mountains is not that its mobility is reduced—mountain artillery can go almost anywhere—but that its speed of displacement is very low. Positions once occupied, groupings once made, ammunition once dumped—cannot readily nor quickly be changed.

The use of flat-trajectory weapons should be avoided if possible; since nearly all of our modern artillery is, or will be, capable of high-angle fire, this prescription should not be hard to fill.

Horse-drawn and motorized artillery in the mountains cannot move off roads. Hence their direction of movement, and the positions they will occupy, must be planned with special care.

There will never be enough pack artillery to fill the needs. That which is available will have to be assigned for close support of foot troops. It will be used advantageously in advance-guard action; and frequently, because of the difficulty of centralized control, it must be attached to the units which it is supporting. Often platoons or sections will be detached and will have to act independently. In such cases it may be necessary for the detachment commander to ask for infantry escort. This will be especially true in jungle country, or in other terrain where ambush by small, mobile hostile groups is possible. Troops trained solely for large scale combat of the World War type are apt to overlook this requirement, which was well known to our own people who fought on the western frontier or in the Philippines, and is specified in certain foreign teachings of today.

Since artillery units in the mountains will be hard to supply, they should be as nearly self - contained as possible. There will be none of this business of sending the motor sergeant off a hundred miles in a truck for a new engine-head gasket. Quite possibly tables of basic allowances will have to be revised for mountain outfits; but at the same time these organizations should not be loaded down with impedimental.

MARCHES, HALTS, BIVOUACS

During an advance, if there is any possibility that artillery support will be needed quickly, then some artillery be placed initially well forward in the columns. It will not be possible to "double" columns in the mountains. Depending on the existence and condition of roads, motorized artillery may be moved much more quickly than any other type, and with less fatigue to personnel. For this reason, some long-range artillery may well be placed in the advance guard to force hostile deployment at great range, or to assist forward elements in overcoming resistance.

Prior road reconnaissance is of great importance. Reconnaissance parties should report on routes, condition of roads and trails, pioneering effort necessary, and above all, on rates of march which may be expected. Early reports will be indispensable to the staff in planning the movement.

Where good roads exist, and a considerable distance is to be covered, it may be advantageous to transport all or a portion of the pack artillery in trucks or trailers. In lieu of this, mountain guns may be drawn in draught rather than packed. Where snow and ice are to be encountered, timely provision must be made for supplying toboggans, and in instructing personnel in their use. Ordinarily the mountain howitzer can be transported on the same number of sleds as mules. In this connection, sleds usually are not provided with adequate brakes.

These can be improvised from poles, or boughs and brush may be used to break the speed of descent. Sleds are valuable also in jungle terrain, where animals have difficulty in descending steep, slippery slopes. It might be well for our existing regiments to conduct tests with sleds under these conditions.

Pioneering detachments should march at the head of the artillery; in exceptionally difficult terrain it may be necessary for the artillery commander to request that the commander of troops assign additional men to assist the artillery over or around obstacles. The use of prolonges and block and tackle must be foreseen and provided for.

In planning antiaircraft protection, the artillery commander should take into consideration the fact that on mountain roads and trails it will be difficult, if not impossible, for units to extend the length of the column or to spread out laterally to avoid losses. This may necessitate the passage of especially dangerous defiles by infiltration, although this is to be kept to a minimum since columns move comparatively slowly, even under the best of conditions. Special antiaircraft protection may have to be stationed at critical points along the route. As a minimum, one machine gun should march at the head and rear of each battery.

March rates will, of course, vary with the terrain, but for pack and horse-drawn artillery it frequently will be no faster than one half mile per hour. The German regulations state that for each 300 meters gain in elevation and 500 meters loss in elevation, one hour longer will be marched; a good day's performance is 1,000 meters of grade elevation at 5 kilometers of horizontal distance.

On the march some ammunition must always be kept with the firing batteries. So far as pack artillery is concerned, mountain-climbing equipment, portable forges, medical, and veterinary equipment should also be kept with the unit. It may be necessary to place the food and forage at the tail of the column.

At halts and especially in bivouac, consideration must always be given to defense of the column. Scouts should immediately move to commanding points on the surrounding terrain, auxiliary weapons made ready or even emplaced for defense. The campaigns in Finland, where

Cavalry Combat

Serbian mountain troops during the advance to Uskub in September, 1918

the terrain was difficult, even though not mountainous, showed that small mobile groups can play havoc with long columns caught in a defile. At bivouac halts, every effort should be made to close up the command. It is very difficult to bring up rear elements quickly when attacked under such circumstances. If a rather ancient historical example may be pardoned, during Sherman's campaign through the Carolinas in 1864 it was found necessary to close up army corps each night; they were too vulnerable in the defiles formed by woods and swamps if they strung out along the road at night.

TACTICAL EMPLOYMENT

In general, the tactical employment of field artillery in mountain warfare follows the same rules as for combat in flat terrain. The massing of fire on critical areas is still as important as ever, but will be harder to accomplish. This is because it will be difficult to find areas where more than one battery may be emplaced, and units will be separated by ridges and canyons. Decentralization will increase with the height of the mountains, until finally in the most lofty ranges artillery support will consist of individual pack howitzers transported by animals or manpower.

Terrain reconnaissance will be even more important than in the lowlands, but will require much time. OP's will be numerous, but defilade and dead space will also increase. The solution, in general, is to employ additional reconnaissance parties, and to establish auxiliary OP's.

Camouflage and field fortification will present problems not encountered in level terrain, which will be solved only as specific problems. Again, timely reconnaissance or a prior knowledge of the terrain will prove invaluable. In this connection, it may be necessary to supply units with special demolition equipment for the removal of rocks, or the digging of emplacements, ammunition storage shelter, or cover for personnel.

Survey will require more triangulation and less traversing. Survey detachments should be trained in this. The fruits of the map maker should be accepted with suspicion as to accuracy. Often it will be found that what is shown on the map as a valley may be a ridge, or vice versa. This was the experience of the British in Macedonia. Yet in spite of this general unreliability of maps of mountainous terrain, there is increased need in the artillery for accurate data as to elevations. Hence survey sections will be very busy checking maps and supplementing information contained thereon.

Communication will present special problems. Wire will be difficult to establish and maintain. Short-wave radio and visual will work well provided dead-space is avoided. Usually it will be necessary to establish signal stations on ridges, with wire or runner connections to establishments in the defiladed areas nearby. Radio operators will discover that there is a great deal of dead space and fading, even for relatively low frequencies; detailed and intensive reconnaissance for suitable set-up will be necessary.

Conservation of ammunition will be imposed by the difficulty of resupply, and by the fact that indiscriminate firing will bring down counterbattery which cannot be avoided by quick displacement. It should be remembered that even in the mountains flash and sound ranging can be employed by an alert enemy, and that frequently flash-sound methods of location are easy because a terrain study combined with such results will point out the sure location of the firer. In other words, a suspected location is apt to be the true location, since frequently there will be no other possible place for a battery to be.

Liaison with the supported units will require special planning because of the difficulty of communication. It may be necessary to establish special forward communication centers. Since reliance will be on radio, steps must be taken to insure that successive positions of both the forward radio set and the rear set are not in dead-space areas.

On the defense, artillery positions may form the nucleii of islands of resistance, where infantry will collect. Positions should be chosen with this in mind, and natural terrain obstacles used to aid in the defense. Care should be taken that batteries are not located near prominent terrain features which will facilitate registration by hostile batteries. Another thing to keep in mind is the possibility that enemy fire or natural storms may cause avalanches of rock, earth, snow, or ice which will destroy our positions. Positions should be selected so as to minimize this danger.

GUNNERY

Two of the most striking differences, so far as gunnery is concerned, of mountain shooting from that on the level are angle-of-site corrections and metro corrections. Accurate determination of angle of site is of great importance, the reason being obvious. Similarly, weather corrections will be difficult to obtain and possibly will not follow the same rules as in ordinary terrain. Metro corrections are based on assumptions as to wind and temperature gradients under average conditions which may not prevail at all in the mountains. A special study of this question might yield interesting results.

As noted before, artillery fire may dislodge earth or rocks, so that the attacker should strive for this effect. This may mean that it is more of an advantage to fire on the terrain above a target than on the target itself.

Adjustment of fire on broad slopes over which observation is good is more simple than on level terrain; it is almost like blackboard firing, since range is readily sensed on terrain; and deflection sensings too are not difficult. Unfortunately much of the terrain in the mountains is irregular and broken. This makes it difficult to find the first burst and even to keep bursts in the field of view after the first one has been spotted. Exact determination of initial data will help; another worthwhile

trick, where the terrain in the immediate vicinity of the target is broken, is to calculate initial data for a point on good observing ground at a little distance from the target. Then shift the bursts to the target by small changes, so that none will be lost by bold changes. In these cases "creeping" may be perfectly justifiable. The use of smoke shells or time fire will, of course, facilitate adjustment in difficult terrain.

In making adjustments, the slope of the terrain at the point where it intersects the trajectory must be taken into account. This may affect the "factors" several times during an adjustment, and certainly will govern dispersion. When increasing the range up a steep slope, changes in elevation will produce small range changes, whereas in firing down a receding slope (reverse slope) slight changes in elevation may produce what seem to be unreasonable range changes. These considerations may appear obvious, but to one accustomed to firing solely on fairly level terrain, they may not be remembered or sufficiently taken into account.

Where initial rounds are lost, and are brought into the field of view by arbitrary changes, such changes should ordinarily be made by range and deflection separately. And even after rounds are observable, it may be necessary to make range and deflection changes separately during subsequent adjustment.

On narrow targets of little depth, time fire may offer the best possibilities in adjustment. In axial observation the burst is raised or lowered by corrector changes until half graze and half air bursts are obtained, after which fire for effect is commenced with the same settings. Changes in site should be made only after it is determined that the site is greatly in error, or where there is danger of running off the corrector scale. In lateral observation, however, it may be possible, and even better, to make changes in angle of site during the adjustment. In this case, it is possible to get a clearer conception of the trajectory.

In adjusting on targets on narrow crests, it must be remembered that all overs may be greatly over, and consequently ineffectual. Fire should be placed just short of the target, so that about 1/3 overs occur.

Owing to the difficulty of visualizing changes in data under the peculiar conditions of firing in mountains, the use of *graphical* firing charts may be better than tables. This will enable the officer conducting fire to determine more accurately the relations between site, range, and angle of impact. Such charts will also assist in determining possibilities of effect for different fuzes, projectiles, and charges, and for calculating dead space and dispersion. Since a disproportionate part of the descending branch of the trajectory may be below the horizontal, some weird results may occur, not wholly predictable by means of the firing tables.

As suggested previously, corrections of the moment will offer problems not encountered in lower altitudes. Our tables, rules, and methods are based on *average* values rather than on the instantaneous values which we really need, and these averages have been worked out for comparatively low elevations. In the mountains the temperature gradients may be reversed, winds and moisture content of the atmosphere may be of different and variable values, and air pressure is certainly less. This latter will considerably affect the time of burning of the old-style powder-train combination fuzes, and the other effects may influence the trajectory in a surprising manner known better by antiaircraft artillerymen. The effect of shortening of time of burning on the fuze range may require the calculation of this additional effect in figuring corrections of the moment.

Owing to a foreshortening of the dispersion zones on steep slopes, it may be necessary to alter the standard limits of schedule fires, and to change the size of bounds required for fire on different types of fleeting targets.

Greater knowledge of these matters and more skill in applying this knowledge will be gained only if we organize mountain units and train them in the mountains.

NOTICE OF ANNUAL MEETING, U. S. FIELD ARTILLERY ASSOCIATION

In compliance with Article VII. Section 1, of the Constitution, notice is hereby given that the Executive Council has fixed 4:45 PM, Monday, December 16, 1940, as the time of the annual meeting of the Association to be held at the Army and Navy Club, Washington, D. C.

The business to be disposed of will be the election of three members of the Executive Council (two Regular Army and one Organized Reserve), and the transaction of such other business as may properly come before the meeting.

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

"The long, steep hill was a toboggan slide of treacherous yellow dough"

THE SIGN BOARD

By Major C. R. Gildart, 2nd FA.

"The present issue headnet is unsatisfactory."

SONG

MAJ. C. R. GILDART, 2ND FA.

We paw at the sand of the Playa Grand
And swim with the men below:
We break through the shroud of the mountain cloud
Where the tall mahoganies grow;
We march to the stable's quadrangle
By the way of the Paja road,
And our long ears flap to the breeching's slaping—
Aristocrats of the Load!
We've followed the wake of Francis Drake
To the top of the Great Divide,

We've balanced our packs on our aching back
As we slid down the other side;
And the tinkle and jingle and jangle
That came from the bell up ahead!
Its cheery notes were as sweet as oats
To the mule who was all but dead!

Take heed, my son, I carry the gun
That is always the first to fire;
A remount new, I'm meaning you,
Should never be known to tire,
Nor suffer his head to dangle,
Nor kick in a dangerous way—
So learn the knack of the Phillips pack
And bray when you're told to bray.

OF PANAMA

of the Second

All men are mad, as mad, my lad,
As a jackrabbit born in March;
And you will be led, as I have said,
Up the side of a Gothic arch;
But it's useless to fight or to wrangle
And worse if you jig or you fuss;
So humor the guys—they can't be wise;
With the wisdom of hybrids like us!

We follow the knell of the sleek mare's bell
Toward the radiant Southern Cross;
Then welcome the day and oats and hay
With pensive and sad hee haws;
We eat every bit we can wangle
And steal without any remorse—
But let it be plain, you eight pounds of grain,
Be careful you steal from a horse!

Oh the wood-tick's bite and the screw-worm's blight
Are naught to the cruel trail
Where you bruise your hocks on the jagged rocks
While a driver hangs to your tail.
But our Spanish kin bore through the tangle
The golden Peruvian loot—
And you can take care that your gun gets there—
In Panama's Flying Foot.

When Morgan made his famous march across the Isthmus of Panama no doubt he was proud of his accomplishment as some kind of a record. But before him had been Drake, and before Drake the Conquistadores, and before the Conquistadores, Balboa, and before Balboa the aborigines. So when the 1st Battalion 2nd Field Artillery, Colonel G. H. Franke, commanding, undertook the transit from the Pacific to the Atlantic it was with the full realization that other marches, American, British, Spanish and Indian, had all been made before. Our record, we hoped, would lie in the speed with which this march would be made. Morgan, with 1,200 men, using boats to the headwaters of the Chagres, had done it in 10 days. Drake had made it from Nombre de Dios to Panama, also in ten days. The battalion, under Lt. Col. E. L. Gruber, had marched from Fort Davis to Fort Clayton in 1934, in five days. The 14th Infantry, in 1938, also arrived at its destination after five days. We were sure that, Jupiter being willing, we could make the march in three days, and the plans were made to attain that goal.

"They send us along where the roads are, But mostly we goes where they ain't; We'd climb up the side of a sign board And trust to the stick o' the paint."

—KIPLING

Therein we have the purpose of the undertaking. It lay, briefly, in the training to be gained from marching over exceptionally difficult terrain—a series of "sign boards" on which we hoped our mules would gain traction by virtue of the "stick of the paint." Problems of supply by quartermaster pack train, economy of weight of rolls, evacuation of men by pack litter, and others, affected our arrangements and developed new knowledge in execution.

How the gods were angered by the ambition of our plans and how they used their weapons to fight a successful delaying action against us will develop from the subsequent narrative.

First consideration was a reconnaissance of the trail. Gaillard Highway provided easy going, 14 miles, from Clayton to a half mile beyond Gamboa, and there the literal "jumping-off" place. Rugged mountain trail through cogon grass to Rio Frijole—3 miles, our first camp site. Extremely rugged mountain trail along a razor-back forested ridge, cut transversely by numerous deeply eroded, precipitous ravines—18 miles to the lower reaches of Rio Gatun. Four miles of same, but worse, to the Puerto Limon—France Field road, then a dirt road (comparatively easy grades to France Field, pavement to Davis)—21 miles.

Lieutenant Rudolph Laskowsky, and a party consisting of 1st Sgt. George Cunningham, two packers, a cook, three horses, two riding mules and three pack mules, made the preliminary reconnaissance. Rations for four days, a few cooking utensils, a pioneer kit, one eight-pigeon crate, two sacks of oats and rolls made up the loads. The period January 15 to 21 was used for the purpose. The trip developed the pioneer work needed and justified our belief that the march could be made in three days. Some of the trail was found to be overgrown, swampy and indiscernible where it traversed the cogon grass; and numerous large trees had fallen across the path through the mahogany forest. Communication by pigeon was satisfactory, though some of the birds were inclined to dally along the way, as was revealed by their shameful delay in arrival.

Then came the remounts. As the battalion set out

for its service practice at La Venta, January 22, 102 new mules arrived in the department for the 2nd Field Artillery. A detail was left behind for training and conditioning of these "recruits," and the fitting of the pack saddles. On February 12 the battalion returned to the welcome of a chorus of brays from new animals tied to corral fences. Conditioning, training and fitting continued until February 21, concurrently with equipment and supply preparations for the projected transisthmian "hike."

It soon appeared that the transition from motorized supply and the completion of training and condition of remounts to be effected in nine days was an ambitious undertaking. A mule is an animal of no mean intelligence. It is unusual for him to go on and on until, like a horse, he drops dead in his tracks. He is inclined to doubt the intelligence of humans (sometimes not without sufficient reason), and he is more likely to stop in a narrow trail, blocking all behind, rest until he has recovered his strength, and then quite willingly proceed. So it required considerable argument and persuasion to convince some of the remounts of the wisdom of the load, the meaning of pack saddle, and the necessity for exercise in large quantities. That this was done to the accompaniment of some pyrotechnics on the part of the mules can readily be imagined.

The remount mules were not long in convincing us of their recruit limitations, and as a policy of appeasement it was decided to limit the loads to three gun sections per gun battery and to economize on some wire loads in Headquarters Battery, in order to be able to provide loads for the new mules of not to exceed 150 pounds instead of the normal 250.

The other half of the problem, that of supply with no animal service section (our battalion service section is motorized), took some figuring. Rations for one day in the maintenance sections, and a day's grain in the usual way on the animals is all that can be carried except for short distances. However, two Quartermaster pack trains were available, one on each side of the Isthmus. It was decided to use the 61st Quartermaster Pack Train for supply on the Atlantic side, and to depend upon our own motorized service section as far as Gamboa, and, for the three miles from Gamboa to Rio Frijole, to backtrack some animals or to increase the lighter loads by the addition of the hay and grain for the first day, and to utilize the single mounts for the same purpose. Moreover, it was decided that as a factor of safety, rations and grain for the march from Rio Frijole to Rio Gatun should include the night meal of the second day, although it was arranged for the 61st Pack Train to make delivery at the Rio Gatun Camp just before the arrival of the column. The pack train was counted upon for rations for the first and second meals on the third day and for forage, long and short, for the stop at Rio Gatun, and for grain for the third day.

These considerable preparations were made and the column departed from Fort Clayton at 3:30 AM, February 21st, arriving without mishap at the end of the road at 8:00 AM. The dry season lived up to its best promises. The weather was clear and moderately cool. The service section delivered supplies at the end of the road, where a 15-minute halt was made for the purpose of packing them the 3 miles of trail remaining. All went merry as a marriage bell. The head of the column, Headquarters Battery, arriving at Rio Frijole camp at 8:53 AM—distance traveled 17.3 miles.

Lieutenant Laskowsky had preceded us with a detail of 49 men equipped with the necessary pioneer tools for the improvement of the trail, with orders to join the battalion at Rio Gatun, February 22nd. Radio communication was maintained between the column and the advance detachment, Fort Davis and Fort Clayton.

It was planned that the march for the following day, the 22nd, would be as follows: The leading battery would depart from Rio Frijole at 6:30 AM. Regular hourly halts would be made, plus a noon halt of one and one-half hours, and such other "blows" as the animals might need, by section, each section moving forward as the next succeeding approached. The time distance between batteries was to be 14 minutes, between section 3 minutes. Batteries would depart at thirty-minute intervals. The tail of the column would arrive after the eighteen-mile march, it was hoped, about 3:30 PM.

Battery A, in the lead, arrived at the Agua Sucia, as excellent watering place, at 10:09 AM. Noon halt was made at this point after crossing the river. Batteries B, C and Headquarters Battery fed oats along the trail, watering as they crossed the stream in the afternoon. During the noon halt the SCR 194 brought us the information that the tail of the column had passed bench mark Salud at 10:15 and as the head had passed it at 8:47 our column was thus one hour and twenty-eight minutes long.

Battery "A" resumed march at 12:15. Judging from the experience of our reconnaissance party, one could hope that "A" Battery would get to the camp at Rio Gatun by 2:45 PM, about an hour behind our previous estimate. No doubt it would have; and with a column approximately one and one-half hours long all batteries would have been in camp well before dark, had it not been for the deluge.

One expects heavy rains of long duration in Panama while the rainy season is on, but one does not expect almost continuous rain for two and a half days in the height of the dry season. "The rains came," at 2:00 PM, sufficient at first merely to convert the last long steep hill into a toboggan slide of slippery, treacherous, yellow dough. Then at 3:15 PM, and before the animals of "A" Battery arrived in camp, the heavens were relieved of all inhibitions and really commenced to pour down with light-hearted abandon, and to continue to do so without interruption until they tapered off with frequent intermittent showers after daylight the next day. These

showers continued for two more days.

The Rio Gatun camp was a spot near the mouth of that river as it empties into Gatun Lake, delightful when selected by the reconnaissance detail. And so it had been in every dry season on record, but when "A" Battery started in at 4:10 PM they slid down the high, steep clay bank into the worst mud-hole imaginable.

Colonel Franke, realizing that the column was having difficulty, started back on foot to the top of the ridge. There he found the trail churned up into a slippery, muddy mass that caused the mules to stop, to fall and slip off the path, thus making each load an individual transportation problem.

By 4:55 PM all of "A" Battery and one section of "B" had arrived at Rio Gatun. "A" Battery fed all men present, which included the pioneer detachment which had met us according to schedule. Two tent flies were up, one at the kitchen and one over the officers' bed rolls; and one or two canvas mantas were erected to protect fires. Raincoats had been left behind as excess baggage in the dry season, consideration being given to our heavily loaded mules. A few men slept on stacked forage, others on rigging lines and under the paulin coverings, others undertook to pitch shelter tents in standing water, but most of the men gathered around the fires and spent the night standing in mud from four to twelve inches deep.

It was apparent to all officers present that in the morning the battalion would face a serious ration and forage shortage. The radio was drowned out in the tropical downpour, and no way appeared to send for supplies except by messenger, and that dismounted, since it was probable that no animal would be able to traverse the steep, slippery grades. Two men volunteered, Corporal Lester L. Bordelon and Pvt. 1cl Arthur J. Johnson, both of whom were acquainted with so much of the trail as went through the jungle. The men left at 9:00 in the drenching rain, in the pitch black night, to travel four miles of steep, muddy, jungle, mountrain trail, and thirteen miles of bad road to France Field. Arriving at France Field at 3:30 AM, they delivered the message by telephone to Captain Thomas McGregor, the supply officer, who had been sent ahead to Fort Davis. Johnson was ordered by Captain McGregor to return immediately over the same route to Camp Young to intercept the quartermaster pack train with orders for it to halt in place. The soldier started out by truck, which soon became stalled in the mud. Dismounting, he plodded on through the night, adding another four miles to his march on foot. The total number of miles covered was twenty-five, twenty-one of which were on foot under conditions that exceeded the experience of the oldest inhabitant, considering the time of year. At any rate, the resourcefulness and endurance of the men accomplished the objective and the battalion was supplied by pack train and by boat, at 4:10 PM, February 23, in time to prevent undue hunger and hardships.

In the meantime, Batteries C and Headquarters, and most of B, were encamped on the trail. The path was on the ridge and dropped off sharply on both sides, like the spine of a razor-back hog. In spite of the elevation, the standing was soft and the conditions of mud were very nearly the equal of that in the camp below. Officers' bed-rolls, distributed along the column, were inaccessible and man-eating mosquitos made the night hideous.

Morning eventually came, suddenly, as it does in the tropics, but through a sad and weeping sky. The continuous rain gave way to showers in hysterical spurts, a condition which persisted throughout the day. The radio operators, using A Battery's kitchen, baked the moisture out of removable condensers and finally got communication with the tail of the column. Orders were received from Colonel Franke for "Captain Gildart or other officers to reconnoiter route to Cativa1." Here was a proposition for your scribe. He knew well that no

"The heavens were relieved of all inhibitions"

Many mules had fallen with their loads

other officer was on hand who was more available, but what he did not know was whether the trail was passable to an animal, and he visualized the possibility of the mission taking twenty-four hours to accomplish. The ascent from the Agua Clara, which lay ahead, was reputed to be the most difficult of all. So before he started out the writer was careful to check his first-aid kit, get sufficient rations and grain for twenty-four hours, fill his canteen and have a blanket strapped to his saddle. With an orderly similarly equipped, he set out. He reconnoitered the trail to Camp Young, where he met the pack train, the trucks and Captain McGregor, all working to transfer rations and forage from motors to mules, and obtained information from them of the road from Camp Young to Catival.

The trail was found difficult but passable, and the mules of the pack train came through without serious difficulty with their simple and lighter loads. Each wise animal stepped in the footprints of the mule ahead, and the column soon cut steps in the muddy path. Such is one advantage of herding over leading.

Upon his return to camp, he found that Headquarters Battery was just coming into camp, the tail completing the descent at 5:00 PM. So difficult had been the churned-up, slippery condition of the trail—stiff at best—that it had taken two batteries and part of another all day to travel one and two-thirds miles.

Pioneer detachments had labored all day long, cutting steps in the grades, slanting them into the risers. Many mules had fallen with their loads, necessitating the removal of the entire pack in each case and repacking. Several had sunk belly-deep in the mud. Mules had slipped off the "hog-back" and rolled, slid and fallen, in some cases, as much as forty feet down from the ridge. At night it had been necessary in such cases for the driver to scramble down to the mule's aid, remove the pack, tie the animal to a tree and wait for daylight to show him the way back up. The troops had gone without the noon meal, Colonel Franke having issued orders to conserve rations, so that a frugal meal remained in the battalion which could have been put to good use had the supply officer been unable to deliver. The going had been too hard for one of "C's" remounts and he had given up the ghost after the climb out of the Agua Sucia. It was an all-day fight against the elements and nature in her fiercest mood.

Night came with a drizzle which continued with varying intensity all night. Except for Headquarters Battery, however, better standing was found on the gravel bars of the stream, and on higher ground. Headquarters Battery, unfortunately, had to bivouac in the mud, but had found the most comfortable camp-site, the night before, of any of the batteries.

From the writer's reconnaissance he well knew what was in store for the fourth day, and the battalion was accordingly prepared for the ordeal. The climb out of Rio Gatun and the subsequent descent into the Agua Clara is followed by the steepest, and when wet, the most difficult climb of the entire trip. The order of march was B, C, Hq, A, the head of the column departing at 6:30 AM. The steps left by the pack train were of little help, being obliterated by the time two sections had passed, and had to be improved by the battery pioneer details. Steps were cut as described above. Men were posted at the trail's side to keep the steps free from mud and water as the rains and traffic filled them up. At some steep, slippery slopes, both up and down, footing was too dangerous for leading. Mules were turned loose under such circumstances and details were placed at the end of the stretch to catch up the animals.

Another remount mule was lost at the Agua Clara—diagnosis: ruptured diaphragm. He was dispatched by the veterinarian's pistol and interred on the spot.

As was expected, the ascent from the Agua Clara presented the most difficult obstacle. In 320 yards of horizontal distance the rise is 340 feet, with stretches reminiscent of Kipling's sign board, and no paint. The tail of the column, except for two mules, arrived at the top at about 4:00 PM. It had thus taken the battalion 9½ hours to clear a point 1¾ miles from the initial point, an indication of the difficulties experienced on the march.

The rain continued intermittently until about noon. With the soaked condition of all troops and equipment, the S-3 elected to insure a maximum of high ground for the Camp Young halt, and strung the battery camp sites along all available ridges, making a large, attenuated battalion site, but one which would be reasonably dry under condition of heavy rain.

The distance traveled on this day was nine miles, four of which were over the jungle trail and five over the France Field - Puerto Limon road. Since leaving Rio

Frijol, except for a few miles in the vicinity of Gatun Lake, our trail had been cut through dense jungle composed of tangled vines—some of tree-like proportions—palms, large mahogany trees as tall and as thick in girth as the big conifers of the Sierras (not meaning the giant Sequoias and redwoods), and equally large trees of the banyan family. So thick was the foliage that it was impossible for us to discover much about weather indications, the sky being almost completely shut out from view.

Some drying out was accomplished at Camp Young during the afternoon, and roll loads were correspondingly lightened by the evaporation, but the battalion did not get completely dehydrated for two more days. Some rain, doing little damage, fell during the night at Camp Young.

The march provided the following lessons:

Pack artillery can traverse any terrain practicable for a man on foot carrying a pack, in spite of the worst conditions of tropical weather.

When trails are dry, and have been properly improved by an advance pioneer detail, pack artillery can march over difficult mountain terrain at the rate of 2 miles per hour. The column length of a battalion may exceed four miles.

When such trails are subjected to heavy rains pack artillery may be slowed down to a rate of march of one fifth of a mile per hour, and the battalion column may be attenuated to a length of as much as seven miles.

On downward steep, slippery slopes, and, to a less degree on upward, it is better to turn mules loose than to lead, the governing factor being the safety of the driver's footing.

When animals are turned loose, men should be stationed at the side of the trail to herd animals along and to be on hand to come to an animal's assistance if he falls or has other difficulties.

The present issue of mosquito headnet is unsatisfactory. As furnished to troops it is green, a color which makes it opaque in a bad light. The troops improve it by dyeing it black, but it is still too opaque to enable a man to see where he is going or what he is doing. An older issue of head net, of which a few remain in the battalion, is made of finer thread and larger mesh and is far more transparent. There appears to be a field for considerable medical research here, which, no doubt, if exploited, would result in a preparation more effective than citronella, which might be rubbed on the skin and would be more of a nuisance to the mosquito and less of the same to a human than the present protection.

In loading officers' and men's rolls, allowance should be made for increased weight which may develop from being soaked by rain.

Animals should be provided in sufficient quantity so that no load will exceed 250 pounds when rain-soaked.

Over rough terrain lash ropes should be used to hold the gun loads in place, in addition to the regular fastenings.

Cinchas should be tightened before steep upward or downward slopes and loosened again on level ground.

An advance battalion pioneer group should precede the column to cut steps into slippery slopes, and batteries should station men along such stretches to maintain the steps. The tread of the step should incline forward and downward so that the mule's hoof may slip down into the angle of the tread and riser, in order to provide footing and traction of maximum efficiency.

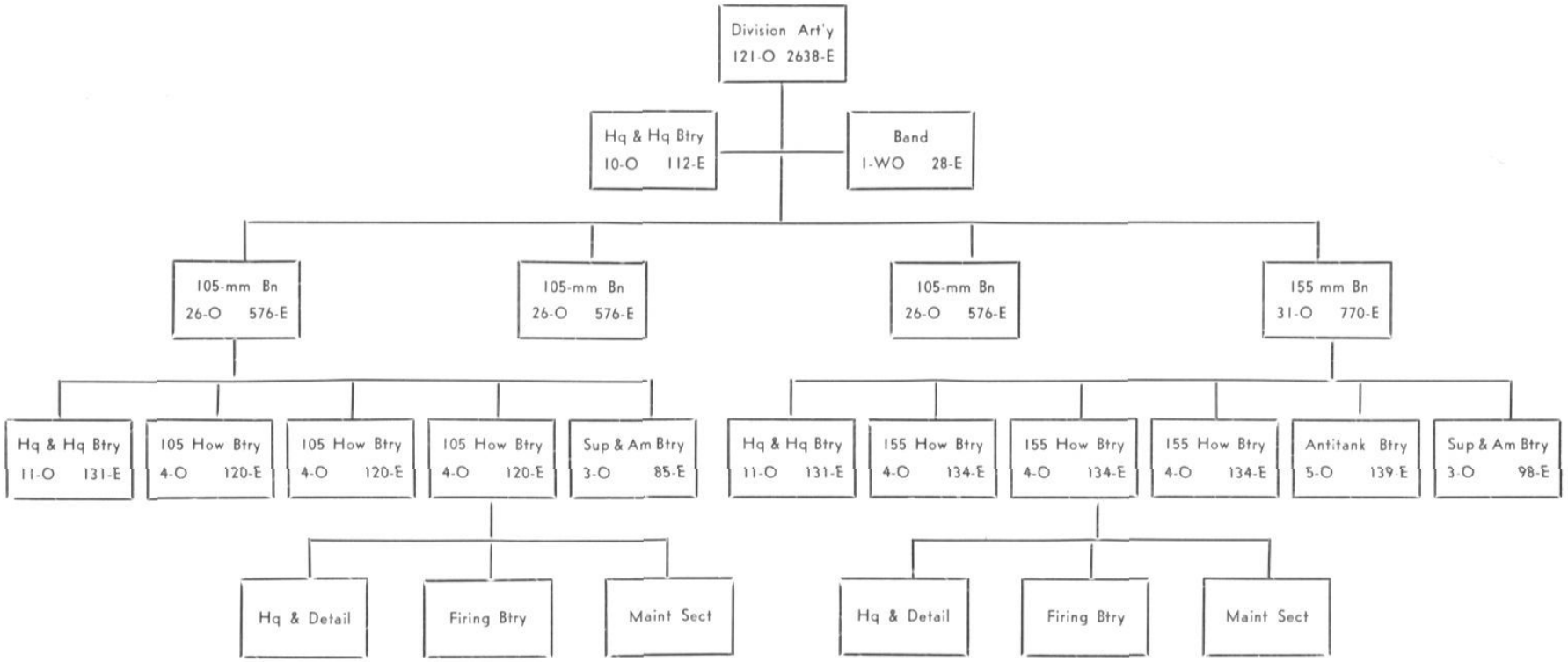
The present SCR 194 is unreliable in jungle-covered mountains. It was almost always impossible to communicate from the head to the tail of the column, a distance of from four to seven miles, by this means, even with the interposition of a third set at the mid-column for relay purposes, a measure which reduced the range requirements by one-half.

The ordinary ten-minute halts per hour are not sufficient for rugged terrain. Our arrangements for the first day were about correct for dry weather. However, in wet weather, batteries should be dispatched an hour apart, with five minutes between sections. These arrangements will permit "blows" as needed, and one element may then move forward as the next succeeding approaches. Dispatching elements at too short a time interval occasions much standing under heavy loads while others are held up ahead.

The 1st Battalion of the 2nd Field Artillery has long enjoyed a reputation in the Panama Canal Department for long and fast marching. Our soldiers are big, and with the dismounted men carrying the regulation infantry haversacks, the battalion is able to travel considerably farther and faster in a day than our friends the doughboys. As an index of the hardened condition of the men, of the 447 enlisted men on the march, three were evacuated by boat from the Rio Gatun camp after a very severe twenty-four hours of exposure and labor. Twelve men were evacuated from Camp Young, eleven of which were moved by ambulance and one by mule litter as far as Catival. Two men were hospitalized at Fort Davis. Only one case of malaria can be attributed to the march, and this record was attained only by the most rigid adherence to head-net and glove discipline, plus the heavy quinine and atabrin dosage required of all hands after the completion of the exercise. In spite of the exposure, the record of common respiratory diseases for the month of February showed less than half as many cases as for January and less than a third as many as for March.

Our goal for speed of the march was not realized, but for hazards and difficulties encountered by American troops, we believe that the gods, at least, can be accredited with a record not soon to be equalled.

NEWLY APPROVED ORGANIZATION, DIVISIONAL ARTILLERY—TRIANGULAR DIVISION



Note: The above personnel does not include attached medical and chaplains.

COMMENTS

1. *Noteworthy features. a*. The regimental organization has disappeared. Each battalion is a self-contained unit, and includes a service platoon and an ammunition train.

b. Each battalion headquarters battery contains a platoon known as the "Antiaircraft and antitank platoon." This platoon has nine ½-ton trucks in each of which is mounted a .50-caliber antiaircraft machine gun; six of these trucks tow 37-mm. antitank guns.

c. The 155-mm. battalion contains an antitank *battery* which is in addition to the antitank platoon of headquarters battery. This battery contains four antitank platoons, each commanded by an officer and armed with two 75-mm. guns. Each platoon commander keeps in touch with the battery commander by means of an SCR 245 radio set. This set is in the antitank warning system, and is in a net with division artillery headquarters. The addition of this battery avoids the necessity of breaking up howitzer batteries when there is a call for a powerful antitank unit for divisional purposes.

2. *Personnel items*.—The following ground rules were imposed by the War Department when the tables were formulated:

a. One cooks' helper (KP) is assigned for each 75 men or major fraction thereof, and one for each officers' mess of 10 officers or major fraction.

b. One orderly is assigned for each general officer, regimental commander, or separate unit commander; one for each two field officers; and one for each five company officers or major fraction thereof.

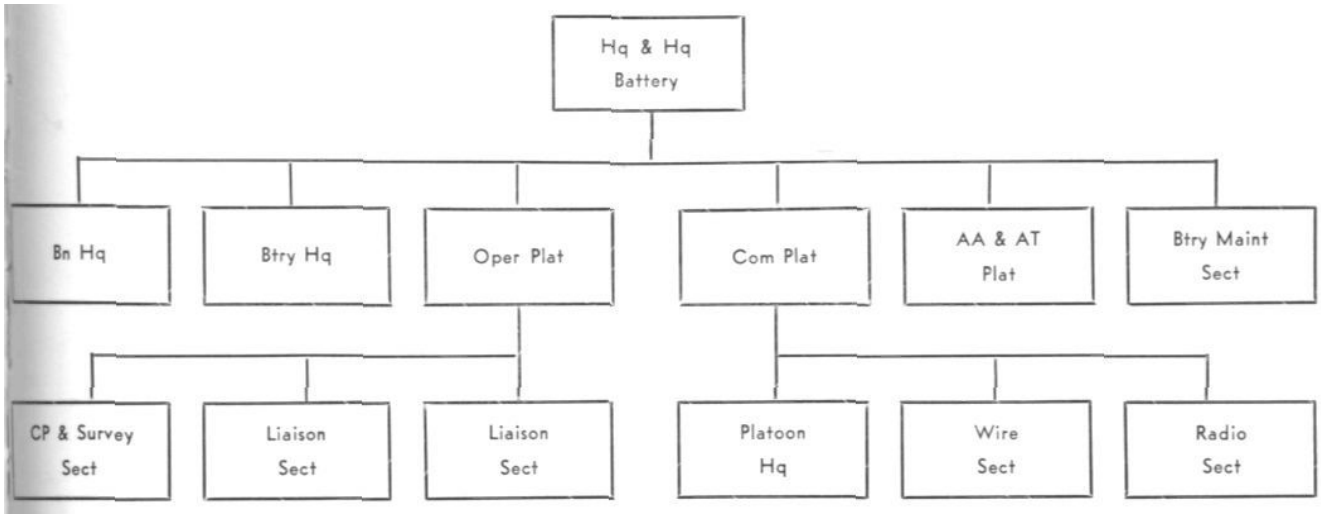
c. One mechanic is assigned for each 15 vehicles.

d. There is a motor sergeant for regiment or separate battalion.

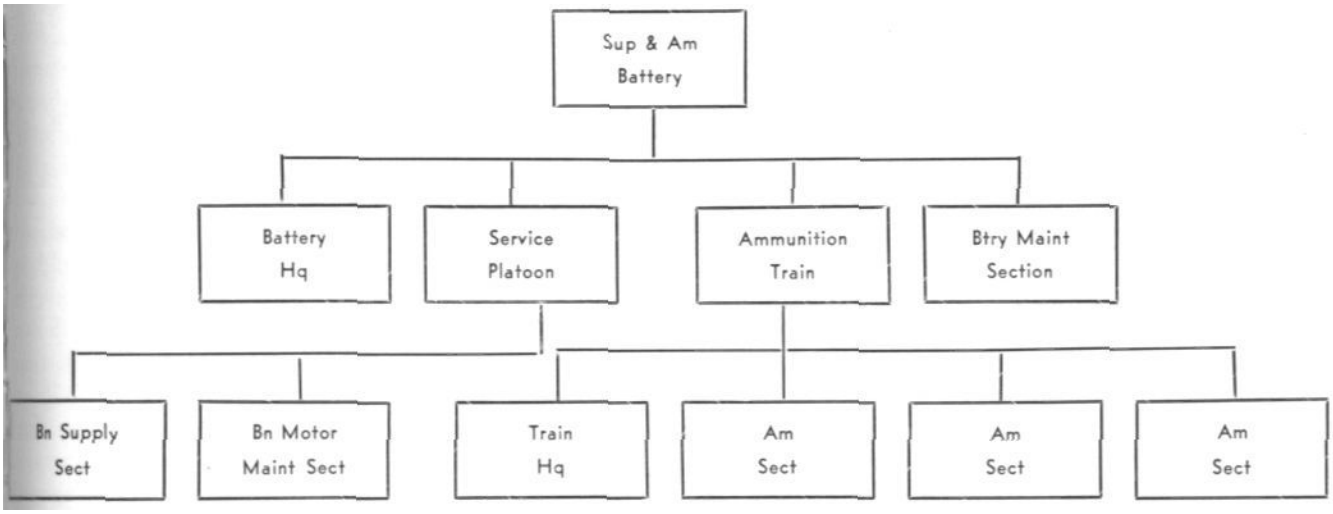
e. An allowance personnel, amounting to 10% of the strength as determined from specific assignments, is designed as a unit replacement pool to keep the unit at approximately full strength. These men are to be carried as basics.

f. Peace strength and war strength are the same.

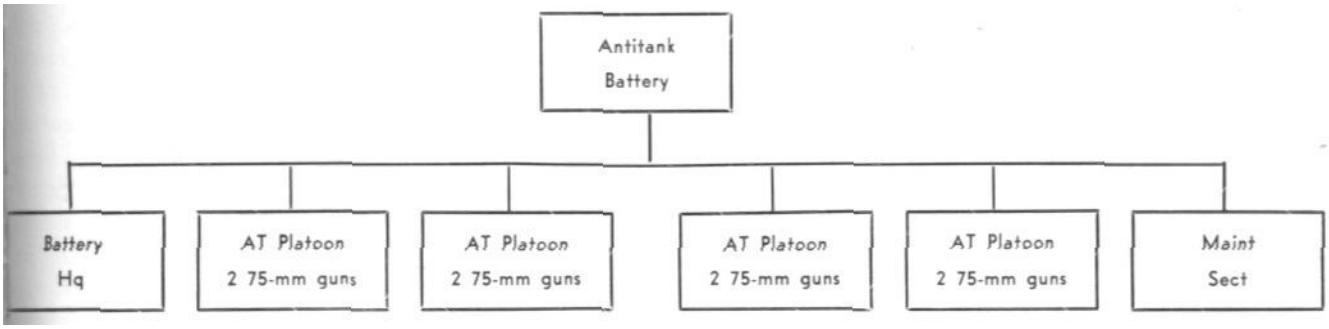
HEADQUARTERS AND HEADQUARTERS BATTERY, 105-MM. OR 155-MM. BATTALION



SUPPLY AND AMMUNITION BATTERY, 105-MM. OR 155-MM. BATTALION



ANTITANK BATTERY—155-MM. BATTALION



U. S. troops practicing landing operations near San Francisco

AMPHIBIOUS OPERATIONS

By Colonel C. A. Baehr, GSC.

The operation of transporting, supplying and protecting an army committed to an overseas expedition is the most difficult in warfare. The problem of proper organization, equipment and fitting of such an expedition is one of great magnitude, and experience has shown that an improperly prepared expedition has few chances for success.

Such an expedition involves concentrations at ports of embarkation, loading, transportation and debarkation of troops fully equipped and supplied; and then of maintaining them in a distant theatre of operations.

The first limiting factor is the amount of shipping available. To transport an expeditionary force of 300,000 men, for example, together with essential equipment and supplies for thirty days, would require approximately 1,500,000 tons of shipping (ships' tons are equal to 100 cubic feet). (The total maritime tonnage of the greatest sea power in the Pacific is approximately 4,700,000 tons; owing to rapidly changing factors, similar statistics for Atlantic powers cannot be estimated.)

This tonnage must be withdrawn from commerce and, to a considerable extent, be refitted for transport use. The operating personnel must be trained in convoy operation. Even a nation with extensive experience would require time and effort to meet these needs. *Command of the sea* is an essential prerequisite to success of an overseas expedition. Such expeditions would hardly be undertaken unless at least temporary control of the sea or almost complete surprise were assured. This does not mean that every hostile vessel must be driven off, but that a reasonable assurance exists that the expedition would not be seriously attacked.

In the Russo-Japanese War the Japanese secured temporary command of the sea at first by immobilizing the Russian naval units at Port Arthur. The initial movement of their army to Manchuria was delayed three months until an advance base had been established in the Elliot Islands. Later, defeating the main Russian Fleet, they secured complete control of the sea.

Where such risk was justified by the results expected, expeditions have been undertaken with a view to reenforcing outlying positions already held or seizing bases as a preliminary to further operations.

Agents and nationals working in the country to be invaded are certain to be provided to act so as to assist the expedition in every possible way. These would furnish much of the detailed preliminary information and assist in making the reconnaissances which are the necessary basis for carefully prepared plans. These necessarily must be in detail since the organization, equipment and loading of the expedition is governed by them. Variable and unexpected contingencies must be provided for. Factors such as weather, currents and tides are important. Every ship must be carefully loaded so that needed supplies can be readily available and handled with the limited facilities available to it, even when unloading must be done in an open roadstead. It was found necessary at the Dardanelles in 1915 to send some of the ships of the expedition all the way to Alexandria there to be completely reloaded so that needed equipment aboard could be made accessible when needed.

Naval convoy protection against air, surface and submarine attack must be provided for the helpless commercial vessels carrying troops and supplies of the expedition. If the expedition succeeds in reaching the coastal area of the defender safely it has many of the advantages inherent to offensive warfare. It will possess the initiative, with a considerable choice of initial objectives and lines of approach thereto. By retaining reserves afloat it has the opportunity to exploit initial

successes ashore. It may make several landings, demonstrations or feints. By retaining reserves afloat it has the opportunity to exploit initial successes gained ashore by any of these.

As ships carrying troops approach defended areas they must be protected against intensive attack from aircraft, naval vessels and gunfire from shore. Mine sweeping may be necessary to clear the way through channels and approaches to the sheltered positions where embarkation of troops into small boats is to take place. Troops cannot embark in small boats if the wind exceeds a force of twenty miles per hour. They cannot be beached in anything more than a light surf or ground swell. Debarkation from any large number of ships in a restricted area is a maneuver requiring skill, caution and time.

Landing of small boats on previously selected beaches, even if they are suitable and the seas smooth, is a delicate operation. In the Anzac landing of the Dardanelles a considerable force in boats missed its intended beach by a mile or so and found itself confronted by an entirely unexpected situation ashore.

The problems of the attack of a defended coast line approximate those of an attack on a stabilized position. Troops, after initial landing, will be without adequate transportation, support and supplies for a time. This usually limits their initial objectives. It is essential to their ultimate success to attack promptly to secure as wide a zone as possible, to avoid becoming immobilized near the beach, and to exploit any success gained by surprise.

Assaulting a coast line against a prepared enemy is costly. From the experience of the Dardanelles it appears that a suitably disposed force of infantry, machine guns and light artillery, if not surprised, can withstand at attack from the sea by from five to ten times its numbers.

Forced landings made during the World War in daytime were uniformly unsuccessful.* Some such landings reached the shore, but in every case either the landed troops were unable to remain on the shore at all or were unable to advance from the beach.

It may be taken as certain that surprise attained in some features of the landing is a necessary condition for success. Complete surprise is difficult, but where the landing is not on a large scale, or the expedition has a base near the proposed point of debarkation, the actual time of the landing may be readily concealed.

It is certain that every means to secure surprise in some of the details of the operations incident to a largescale expedition will be studied. Especially prepared and equipped boats and ships, such as "Beetles" or ships equipped with artillery, machine guns or landing facilities, may be employed and introduce unexpected developments in the action.

Neutralization of hostile fire from shore by ships' guns and/or air attack are measures which can be developed to such a sufficient extent as to constitute surprise.

The providing of smoke screens or utilization of darkness to cover the landing of first waves and for first stages of the assault is usually essential.

An overwhelming superiority in numbers landed at a particular point, organized into teams which have been carefully trained, and for which technique and equipment have been painstakingly developed, may bring about the success of the operation. Warning of the impending attack had already been given by the preliminary operations of the British in the Dardanelles area. The landing of the British at Suvla Bay was a surprise, as was their landing at Zeebrugge on the Belgian coast in 1918. In both of these cases they were able to assemble the landing forces a comparatively short distance from the point of proposed landing. Although the defenders were aware of the presence of the attacking troops, they did not know the date or the point selected for the landing. A dark night in the first case and a light fog in the second assisted the attacker in effecting surprise. (In both cases the date selected for the landing was determined with a view to securing the favorable conditions encountered.)

In the landing at the Dardanelles the British were held up by submerged barbed wire under close machine gun fire at one of the beaches. Boats on the flanks diverged to the right and left, landed men among rocks opposite steep bluffs, where no defenses had been prepared. They turned the line of the Turkish defenders of the beach and the landing succeeded in its object of securing a beach head. A landing on an adjacent beach at the same time was unopposed because the beach was at a difficult point and had been left undefended.

If and when an overseas expedition has succeeded in effecting a successful landing, it must then, based upon its landing places, enter upon a campaign along lines which become more and more normal military operations. These are not considered as of sufficiently distinctive character as to be discussed now. It is emphasized that successful landings will be immediately exploited and followed up by an alert and determined commander. Military history is replete with instances where a force had so exhausted itself in the initial phase of a difficult operation like a landing as to be for a time paralyzed as as far as immediate further attack is concerned. An alert commander of the landing force will do all in his power to drive on his troops, push up reserves and avoid giving such an opportunity to the defense.

In general, where available forces are prepared, initially well disposed and skillfully handled, the defense has a considerable advantage and can concentrate mobile forces more quickly at a threatened point than can be landed from ships and organized for attack.

Familiarity with the topography of the theatre of operations, gained by reconnaissance, study and field exercises,

*Except for the German capture of the Baltic islands in 1917, which was a model for operations of this kind.

confers an outstanding advantage upon commanders and units of the defense.

Development in automatic weapons and increased radius of action of mobile troops through use of mechanical transport, further increase the defensive power against landing operations.

The basis of a system of coast defense is the action of mobile field forces, the other agencies of defense and the services assisting and supporting that action.

Where harbors are provided with harbor defenses these resist direct attack and prevent landings within range of their defensive armament. Outside the range of their armament the mobile forces take measures to defeat hostile landings. If a landing is successful, the mobile forces conduct a step-by-step defense between the point of landing and the vital area which is the hostile objective, and finally conduct a defense of that area. Before the outbreak of hostilities the defensive measures undertaken include the employment of every known means for securing timely information of possible hostile intentions. Reports from our agents in possible enemy and neutral countries and from friendly neutrals form the basis for this, Major defensive works undertaken include construction of harbor defenses, development of road systems and signal communication facilities.

Preliminary defensive measures after the outbreak of hostilities include intensive employment of information agencies to guard against raids or surprise attacks. Cooperation between Army and Navy is secured by agreement between the commanders of the two services. Army and Navy aircraft and scouting vessels of the Navy maintain offshore patrols.

Based upon information of the enemy, mines are laid, obstacles constructed and demolitions executed. All navigation marks on land or water are removed.

The most probable landing places are organized for defense. The measures taken include wire entanglements at the water's edge, covered by fire of machine guns. They should be capable of sufficient initial resistance by a minimum numerical strength, so that the maximum number of men may be employed as supports or reserves.

When a hostile expedition starts from home ports the defense seeks to gain and maintain contact with it, attack its aircraft and attack the vessels of the expedition by its own aircraft, submarines and surface vessels.

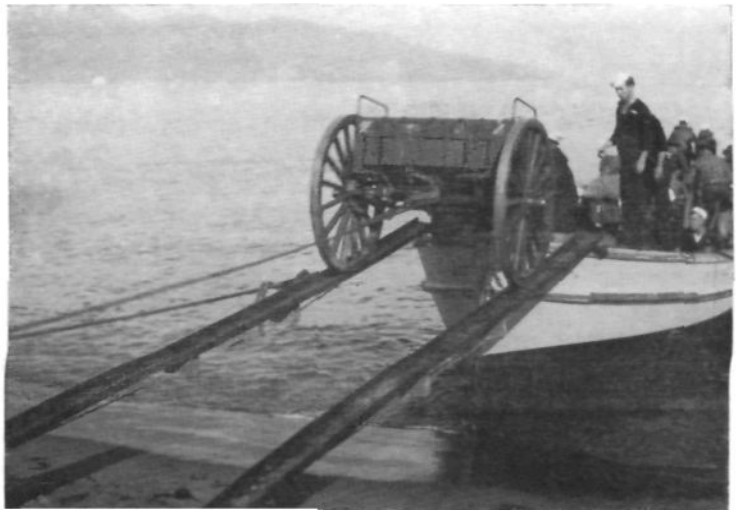
Provisions are made for illuminating probable landing places by searchlights, star shells or flares. Defenses of probable landing places are occupied. Constant patrolling between defended areas is provided. Supports are located so as to be available to several defended areas. Reserves are disposed so as to be readily moved in support of the threatened coast as a whole.

The defense against an attempted landing requires continuous information, great care being particularly necessary to ascertain that the attempt is not a feint made to cover a principal landing elsewhere.

Action of all forces is coordinated by plans and orders of the superior commander. Navy, airforce and heavy artillery cooperate to defeat or delay the approach of the hostile fleet. Mines are laid, obstacles constructed, supporting weapons are sited or positions therefore prepared. Tactical dispositions of mobile land forces are effected as information becomes sufficiently definite. These forces are disposed in depth, elaborateness of the plan depending upon forces available, as beach outposts, local supports, and reserves.

Counterattacks must be launched as soon as possible against troops that succeed in effecting a landing. The defense orders prescribe the commander who shall initiate counterattacks and these may be either local or general. Their object is to drive off the enemy and prevent him from obtaining a beach head and being able to land more troops and supplies. Such attacks must be properly organized and supported and carried out with determination.

Where such attacks are unsuccessful or impracticable the defensive forces occupy prepared defense lines covering hostile lines of advance, conduct a step-by-step defensive between points of landing and the vital area, and finally conduct a defense of that area.



Signposts of Experience

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

Editor's note: Although Gen. Snow's "Memoirs," of which the following is an extract, are fitted together in logical sequence in the manuscript, yet certain parts which appear toward the end are so appropriate today when the Nation is rearming, that we have taken the liberty of advancing them in time of publication. Consequently we are offering here an important topic which normally would appear elsewhere in the series.

A Method that Failed

Prior to the creation of the Office of the Chief of Field Artillery early in 1918, divisional field artillery brigades were organized and trained under War Department directives which provided that this vital work be done at divisional camps, that the units be organized and trained as component parts of the divisions. Theoretically this was the proper way to do it. But how did the method work in practice? Let us examine the record.

The following was the situation when I became Chief:

The First and Second Brigades had sailed overseas.

The Third Brigade, organized in October, 1917, was under orders for overseas. Its units had never been together, it had no brigade commander, and had received no brigade training as a unit.

The Fourth Brigade was practically under orders for overseas. The entire brigade had been together since its organization at Camp Greene, North Carolina. It was fairly well trained and organized. I could only give the Brigade Commander such small help as he asked for in the two or three weeks prior to departure.[1]

The Fifth Brigade, organized in November, 1917, still had its units scattered. I concentrated them, on February 14, 1918, a few days after I became Chief, and it sailed overseas in May, neither thoroughly organized nor trained.

The Sixth Brigade, organized November 16, 1917, still had its units scattered and had no brigade commander. I concentrated it at Camp Doniphan, Fort Sill, May 1, 1918, assigned to it a brigadier general, and it sailed for France in July, 1918. At the Sill Firing Center in two months it completed its organization and received practically all the field artillery training it ever received in this country. During the previous six months practically nothing had been done, and at Sill even the specialists, such as radio men, telephonists, liaison men, motor men, etc., etc., had to be made before it could hastily be put through firing practice.

The Seventh Brigade, organized November 16, 1917, had its regiments still scattered at Fort Bliss, Texas; Fort Riley, Kansas, and Fort Oglethorpe, Georgia. I concentrated it June 22, 1918, at Camp McClellan, Alabama. It sailed in August, 1918. After seven months of existence it was in about the same untrained condition as was the Sixth when it arrived at a Training Center, and the same procedure had to be followed.

I may add that all the regiments in the Third, Fourth, Fifth, Sixth, and Seventh Brigades were far below their strength when I came in as Chief, some as much as 60 per cent. Some regiments were short of officers and some had a surplus.

The Eighth Brigade, provided for by an order dated December 17, 1917, existed only on paper. By March 18, 1918, it was in being at Camp Fremont, California. Under Brigadier General Starbird, who had just been relieved from the Inspector General's Department where he had inspected every field artillery unit, Regular, National Guard, and National Army, it was at once energetically organized and trained until July 1, 1918, when it moved to the Sill Firing Center. On October 28th it embarked at Hoboken. General Starbird said: "It had by far the best training of any brigade sent overseas." Impartial reports made to my office from other sources corroborated this statement.

So much for the first eight brigades. Prior to the appointment of a Chief of Field Artillery there was certainly

[1] At Camp Greene, Charlotte, North Carolina, the soil is bottomless clay. The mud was so deep that some company streets were practically paved with baled hay. Latrines overflowed with rain. Shortly after I became Chief, the Secretary of War held a conference one night in his office. The Surgeon General feared an epidemic. About midnight a telegram was sent to the Commanding General, 4th Division, to move out of the Camp. He replied the next day that he could not get the Division out, the mud was too deep. These were not exactly ideal conditions for training.

nothing in the handling of these brigades to justify any pride in the War Department's system of training.

The desperate condition of the National Guard and National Army Brigades at the time of my appointment as Chief has already been described in the Questionnaire quoted earlier in this series, and it need not be repeated.

The whole situation with reference to training may be summed up by simply saying: "Wasted time, nothing accomplished."

A METHOD THAT SUCCEEDED

Upon discovering this situation, and after I had familiarized myself with the many deplorable conditions surrounding field artillery brigades at Divisional Camps, and had secured approval of my General Training Scheme, I came to the conclusion that I must have more power and direct control over field artillery brigades, from the moment their organization was proposed. On May 31, 1918, I accordingly submitted the following memorandum:

"Office Chief of Field Artillery,
War Department, Washington,
May 31, 1918.

MEMORANDUM FOR The Chief of Staff.
SUBJECT: Organization of new Field Artillery Brigades.

1. It will be necessary, in the near future, to organize new brigades of Field Artillery.

2. The system heretofore followed has been to organize and train these brigades as a component part of divisions. The result has not been satisfactory. The defects of this system are:

(a) Inadequate facilities for artillery training at many of the places where the brigades were organized.

(b) Shortage of competent instructors and materiel when distributed among so many different places for training.

(c) In many of the divisions, no adequate training schedules were prepared or followed. The training of many brigades has at times been practically at a standstill for weeks and, in many instances, vital subjects have been totally neglected.

3. Since the original brigades were organized, the Office of Chief of Field Artillery has been created and among its duties is responsibility for the training of the Field Artillery. To do this most effectively, the Chief of Field Artillery should exercise direct control of this training through the Brigade Commander. This is not the case in the divisional training system, where he can only act in an advisory capacity through the Division Commander. The Chief of Field Artillery should select the places for organizing brigades, which offer best facilities in the way of maneuver grounds and artillery ranges for the proper training of Field Artillery Brigades and should concentrate at those places competent officers and the necessary materiel for instruction and at those points organize and train two or more brigades as required and as its facilities permit. This system is believed to be the one in use in the A. E. F.

4. It is, therefore, *recommended* for additional field artillery brigades:

(a) That they be organized at points to be selected by the Chief of Field Artillery.

(b) That their training be directly under the control of the Chief of Field Artillery.

(c) That they be selected to join divisions when necessary for service overseas or otherwise by the Chief of Field Artillery in accordance with their fitness.

(Signed) WM. J. SNOW,
Brig. Gen., N. A.,
Chief of Field Artillery,

June 26, 1918.
APPROVED:
By order of the Secretary of War.
(Signed) Peyton C. March,
General,
Chief of Staff."

It will be noted that this proposal was really one to extend the work of the Brigade Firing Centers. These Firing Centers had been intended as the "finishing school" for brigades. Without modifying such intention I now proposed, in addition, that the Centers control training from the moment of brigade organization to the time when such units could be classed as trained and ready for combat.

It will be further noted that the Chief of Staff held this paper twenty-six days before approving it. That was due to the seemingly radical proposal therein to take away from the division commander all control over the early organization and training of his field artillery brigade. He would in fact have no field artillery brigade until I gave him one that was trained and ready for service. But I had thought over the matter a good deal before making my recommendation and I was satisfied that, much as I regretted it, it was by far the best thing to do. We still had in the states many brigades that had been in existence over a year, and were far from trained. They had been in camp with their divisions ever since organization over a year before, and their lack of training, in spite of the excellent work of the Inspector-Instructors, showed the hopelessness of ever expecting efficiency from brigades so organized and trained.

No one realized more fully than I the close relationship between all arms of a division and the necessity for fostering the "Infantry-Artillery Team" spirit. No one appreciated more fully than I that this spirit is largely developed by the close association of the Infantry and Field Artillery in their daily lives in the same camp. The recommendation I had made appeared to be the negation of this close union of the two arms; but it was not. You can not make an effective machine until you have first made and perfected the component parts. My

idea was to first make the field artillery part, then turn it over to the division commander to assemble with his other parts into the division machine. Undesirable as it appeared, not to have the field artillery brigade present with the rest of the division right from the start of organization, I was convinced that if the field artillery brigade was well trained when it finally joined its division and knew how to play its part in the combination, it would quickly establish itself in the confidence of the infantry, and particularly so in the first battle. On the other hand, no matter how friendly the two arms might have become by daily association in camp, if the field artillery were not well trained and efficient, the first battle would destroy this confidence forever. *Experience had proved that an efficient field artillery brigade could not be made in a divisional camp in a year*. I believed that I could make such a brigade in four months if given a free hand. In fact, the way the War Department program was shaping up I would *have* to do it; hence, the Memorandum.

It may be recalled that I submitted my General Training Scheme on March 27th; that, except for the Central Officers' Training Camp, it was approved on April 15th; and that finally this Officers' School was approved on May 20th, thus approving the Scheme in its entirety.

All the various activities provided for in the Scheme were started as soon as practicable and pushed as vigorously as possible. Yet, due to the great shortage of trained field artillery officers to act as instructors and the shortage of guns and equipment of every sort, kind, nature, and description for the training of these activities, frankness compels me to state that all of them were still creaking and groaning in every joint when new burdens were added.

On July 5, 1918, the Chief of Staff directed the organization of six more brigades of Field Artillery. They were organized at Firing Centers and were numbered 9 to 14, inclusive. The actual organization began July 10. The Camp Jackson Replacement Depot sent a nucleus of 75 officers and 221 men to each brigade, and the brigades were then filled up with recruits from the draft. They were fully organized, at full strength, fairly trained, and listed for early overseas shipment, when the Armistice came on November 11th. In detail, their status was as follows:

9th Brigade—Training completed and awaiting orders for overseas movement.

10th Brigade—Available for overseas about November 30th.

11th Brigade—Available for overseas about November 30th.

12th Brigade—Training completed and awaiting orders for overseas movement.

13th Brigade—Available for overseas about November 30th.

14th Brigade—Available for overseas about December.

This was accomplishment; it was achievement; it was the greatest satisfaction I had enjoyed as Chief of Field Artillery up to that moment; it was proof of the efficiency of the new system!

Further confirmation of the success of the new system is contained in the following extract of a report of an inspection of two brigades made by the Inspector General's Department in October:

"It is of the greatest benefit to the Field Artillery organizations now being organized to have their organization effected at one of these brigade firing centers. At these stations materiel and equipment sufficient for instruction purposes is on hand; a program of instruction is already prepared, organization commanders are saved an amount of time and study which ordinarily they would have to devote to the preparation of schedules and allows them to devote their time to the supervision of the training and instruction of their organizations. The system of schools included a corps of instructors who are specialists in their various lines and are able at once upon the arrival of officers and enlisted men to begin thorough and efficient instruction. It is believed that the results obtained at this camp amply justify the policy of the organization of brigades at firing centers. The —— Field Artillery Brigade will be ready for service in half the time brigades are ordinarily prepared, and will be far better instructed than any of the brigades sent from this country."

There is another point I want to mention in connection with organizing and training field artillery brigades away from their divisions. In general, these brigades were created only as fast as divisions were created. When a division was created, a commanding general was assigned to it. He thereupon assumed command of his entire division except his field artillery brigade. As soon as the division commander was designated, I wrote him a letter inviting him to frequently and freely inspect the field artillery brigade I had tentatively assigned to his division. The only restriction I placed on his inspection was a request that he give no orders to the Firing Center authorities or to the brigade or direct any criticism to them, but that he write me instead, stating fully and frankly his criticisms and suggestions, and I would take up the matter with the Center authorities. This course of procedure was of course necessary, as otherwise the Center Commander would be trying to serve two masters, and the Center Commander already had troubles enough without adding this impossible condition. One division commander, especially, took full advantage of this inspection privilege, frequently flying over to the Firing Center. *He never made an adverse criticism of the progress of the field artillery brigade*. Finally, he wrote me that this brigade had, right from the start, progressed faster than the infantry brigades at his own camp and under his own immediate direction *and that most of his trips to the field artillery brigade were made for the purpose of seeing whether he could*

pick up ideas there which would enable him to speed up the progress of his infantry brigades.

"IT NEVER RAINS BUT IT POURS!"

On July 25th I received a copy of the 80 division program, which had just been approved by the Chief of Staff. The preceding sentence is short and easily written, it is quickly read, but its significance is tremendous. The two words "eighty divisions" may not seem like much, but in reality they meant that when carried out (by June 30, 1919) the American Army would be largest of any nation in France, and would be greater than the combined French and British armies on the Western Front. The eighty-division program meant that we were preparing to take over the war from our worn-out allies, and that America would fight it out to a finish. This was indeed inspiration for superhuman effort.[2]

This program meant a veritable avalanche of perplexing troubles for the field artillery. Under the 80-division program, a great number of new brigades had to be organized. A computation showed that, from July 1, 1918, to June 30, 1919, there would be an addition to the field artillery of 431,700 enlisted men. We at once worked out a table showing the required monthly rate of organization, based on four months' training for each brigade from its organization to its departure for the port of embarkation.

But now a new complication was added. To the existing shortage of field artillery officers was added a shortage of enlisted men. We were nearing the exhaustion of the draft. It will be recalled that the law authorized us to draft men between the ages of 21 and 30, and there were only a few of them left. Thus, in August we drafted 118,000 fewer men than in July; and in September we drafted 138,000 fewer than in July. The Chief of Staff, who was keenly alive to this approaching shortage, gave instruction to the Chief of Operations on July 31 to transfer to the Field Artillery the 15 National Army Cavalry Regiments then in existence.[3] The commanding officers of these regiments, belonging as they did to the Regular Cavalry, were given the option by telegraph of going back to the Regular Cavalry or coming over to the field artillery. Most of them chose the latter. By this transfer, I got about 800 officers (knowing no field artillery) and about 16,500 enlisted men (also knowing no field artillery). However, it was at least good material, already in the service, having basic military training, and this was really a great asset. It is no where near as difficult a task to convert enlisted men from one arm of the service into another as it is to convert the officers.

As each cavalry regiment contained 12 troops, it naturally split up into 2 field artillery regiments of 6 batteries each. Machine gun troops became trench mortar batteries; headquarters troops and supply troops furnished nuclei for headquarters batteries and supply batteries, respectively. As a troop of cavalry is much smaller than a battery of field artillery, it was, when turned into a battery, little more than a good sized nucleus. For this reason, there was still needed between 60,000 and 70,000 men to fill up the new organizations thus created. However, this conversion of cavalry did give the nucleus for 10 field artillery brigades, and was a God-send. These brigades were numbered from 15 to 20, inclusive, and the 24th, 170th, 171st, and 172d Field Artillery Brigades. I cannot now recall the reason for this seemingly peculiar numbering, but there doubtless was a good and compelling reason, odd as it seems now in looking back at it after twenty odd years.[4]

The 15 cavalry regiments referred to were stationed in general, along the Mexican border and at some interior army posts west of the Mississippi; but in almost no case were they at any place where there was any field artillery materiel for them to use in training. Nor could we spare a single gun to send to them where they were. On the contrary, the four large field artillery activities were not much over half supplied, and no individual camp was any better off. This was another illustration of the handicap under which we labored all during the war, due to the shortage of adequate training materiel. I think I can truthfully say that in no plan we ever made during the war for accomplishing training could we neglect the consideration of our shortage of guns and other necessary equipment. Frequently, if not generally, this was the determining factor in the formulation of our plans. So, in planning for these brigades made from converted cavalry we did the best we could by sending these new organizations away from their old cavalry stations to new places where we had some training materiel. It would have been an ideal arrangement could I at once have moved them to Firing Centers; but these latter were only partly developed, partly equipped, and "full up" with Field Artillery brigades, and others on the prioring

[2]In this 80-division program, a division, for computation purposes, was taken as 40,000 men, this number including the division proper and service of supply, army and corps troops. General Pershing had, some months before, asked for 100 divisions. The General Staff here in the War Department then studied three plans—60 divisions, 80 divisions, and 100 divisions. The study showed that we could do better than 60 divisions. In the 100-division program, one of the first obstacles encountered was the fact that even if we got this force to France, we could not supply it. There were not enough harbors, and not enough berths for ships in France. There were also many other apparently insurmountable difficulties, but this alone was enough. Eighty divisions, therefore, came very near to being our maximum effort. In addition to the 80 divisions to be in France, there were also to be 18 divisions maintained under training in the United States.

[3]This was, of course, in addition to the Regular Army Cavalry previously converted to Field Artillery for the duration of the War.

[4]More in detail, the brigades created after July 1, 1918, were organized and designated as follows: The 9th, 10th, 12th, 15th, 16th, 18th, 19th, 24th, 170th, and 171st, each consisted of two regiments of 75-millimeter guns, and one regiment of 155-millimeter howitzer the 11th, 17th, and 172d consisted of one regiment of 75-millimeter guns, one regiment of 4.7-inch guns and one regiment of 155-millimeter guns (G.P.F.); the 14th and 20th consisted of one regiment of 75-millimeter guns, horsed, one regiment of 75-millimeter gun motorized, and one regiment of 155-millimeter howitzers. Each brigade included an ammunition train bearing the same number as its brigade in the case of the 9th to the 20th brigades, inclusive; the ammunition trains for the 170th, 171st, and 172d brigades were numbered 320 321, and 322. Each brigade also included a trench mortar batteries these batteries were numbered from 9 to 29, inclusive.

list for sailing had to come ahead of the new ones. As finally worked out, the following divisional camps were utilized for these converted Cavalry brigades:

Leon Springs, Texas.	Fort Ethan Allen, Vt.
Camp Kearney, California.	Fort Myer, Virginia.
Camp Bowie, Texas.	West Point, Kentucky.
Camp Travis, Texas.	Fort Sheridan, Illinois.
El Paso, Texas.	

The organization of the last three of these brigades was not commenced until the end of August, and consequently was still incomplete on November 11th. In addition to these brigades, there were the 8th Corps Artillery Park and several Trench Mortar Batteries with organization also incomplete. The slowing down of the draft in August and September retarded the training of all 10 brigades.[5]

The September 30th Return shows that, considering only the brigades organized after July 1, 1918, there was a shortage of 42,494 men, or 40 per cent. Notwithstanding this handicap, however, the 24th and 170th Brigades would have been ready for shipment overseas in December.

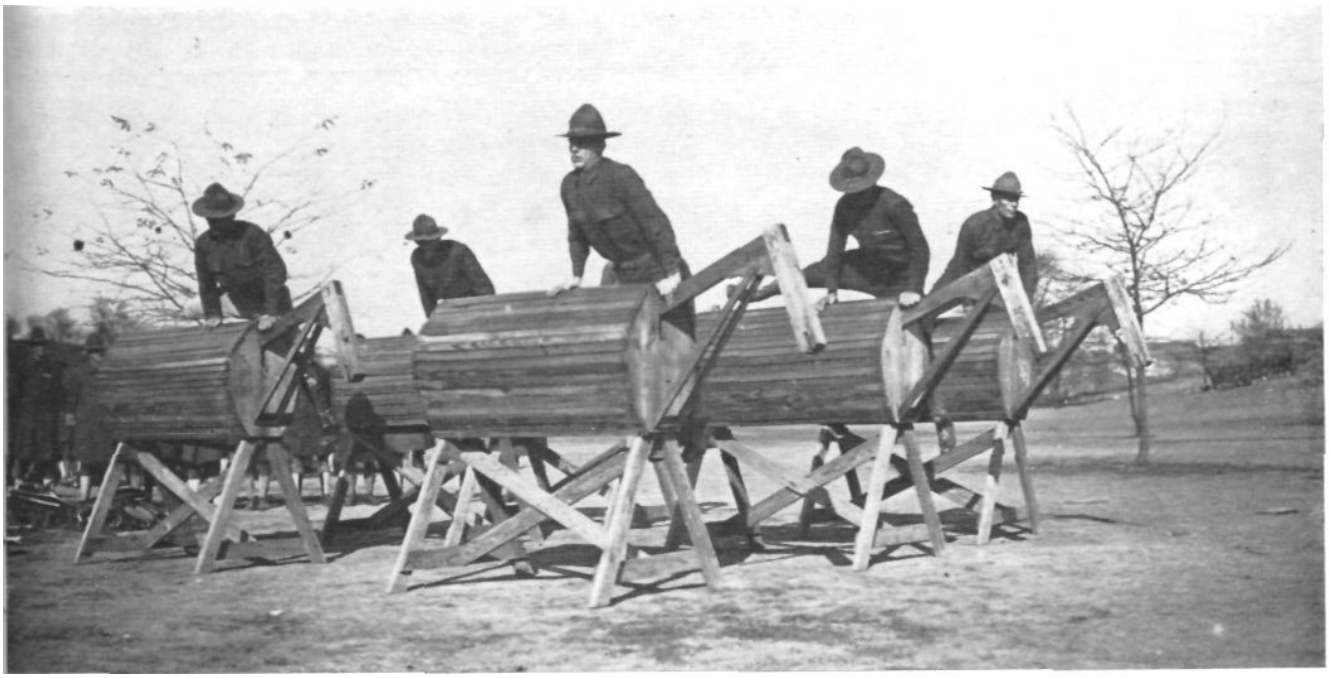
This shortage of enlisted men was a good example of one of the lessons I learned during the War, that there is never enough of anything, including human beings, to satisfy the demand.

Two other brigades were contemplated but never organized. One would have been colored for the 93d (colored) Division, and the other was planned to be made up of Porto Rican men. I believe the Porto Rican division was never organized.

An Important Lesson

The definite conclusion to which I finally came, after carefully analyzing all factors and based on my observations up to the Armistice, was that brigades, organized and trained under the direct supervision of the Chief of Field Artillery, could be made efficient in one-fourth the time required under the Division Commander, or the War Department General Staff without a Chief of Field Artillery. My Annual Report for 1919, and, more particularly, the records of the Field Artillery Brigades themselves, substantiate this statement.

[5]The numbers of men drafted during this period were as follows: July, 1918—401,000; August, 1918—283,000; September, 1918—263,000; October, 1918—249,000.



Equitation instruction—1917

Albert Wessman, one-time first sergeant of Headquarters Battery, 17th Field Artillery, was the man who first called the meteorological message the "mythological message." Perhaps he was also the unconscious humorist who used to refer to horizontical and vertical angles.

MEN IN ARMOR

FOREWORD

Soldiers of the American Armored Corps lack battle experiences by means of which a sprinkling of veterans can season a new unit. In September of 1939 the personnel of German armored units similarly were ignorant of the realities of combat. But by May of 1940 those who had been in Poland had given intensive instruction to the newer cadres, so that all were acquainted, even if only vicariously, with what they might expect to encounter when they rode to war in the Low Countries.

This is our reason for printing the following personal-experience monographs. They should be of immediate interest to those assigned to tank units. And they should also furnish a few lessons to artillerymen. May we suggest some?

The tank can win a position but cannot hold it indefinitely without infantry-artillery support.

The most vulnerable part of a tank is its running gear.

A concentration of indirect fire is apt to be ineffective in stopping a determined tank attack.

Crews of armored vehicles should be equipped and trained for emergency repairs and pioneer work.

Antitank defense will be helped by advanced OP's which, well concealed, remain in action even after overrun by tanks.

The man who turns and runs will not escape the tank.

Doubtless the reader will discover additional lessons. The article from which the following was digested was published in "Die Panzertrupp," December, 1939.

Personal Experiences of German Tank Commanders

FIGHTING IN FRONT OF PETRIKAU. By Pvt. Schultze.

Someone wakes me by shaking my shoulder. Morning has come again, too soon. I take a swallow from my flask and feel in good form. When I open the flaps, I see that it is still dark outside. We are still in the field of maize just behind Laski Bridge, over which we had seized a bridgehead last evening. Left and right on the horizon, houses and villages are blazing like beacons.

"No. 1 party to the Commander's tank!" The company commander gives out his order for the day: "Our company will lead. Be prepared for contact with the enemy from the outset. Mount! Start up!"

Immediately after comes the caution, by now well known, "Clear for action!" Turrets and flaps are closed down everywhere. Guns are directed toward the enemy and from now on we are again just a crew of five men, dependent entirely upon ourselves, bound with the crews of other tanks only by radio-telephone.

The company surges forward in line ahead at antiaircraft intervals along the road. The inhabitants of the next village, terrified at our appearance, bolt out of their houses just as they are and take refuge in the surrounding woods. Now we reach the river bed, or rather, a stream. The bridge is blown.

"Headquarters to the left, No. 1 section to the right. Hunt for a crossing," comes the company commander's calm order. In a short time Headquarters has found a crossing and we move forward again.

We were coming out of another village and the road curved around one single country house lying by itself. We had just passed this country house and were again on a straight stretch with the next village rising in front of us when the first shells of the Polish defenders scream towards us, and then all hell breaks loose. Bujny, a suburb of Petrikau, seems to be strongly occupied; we had not yet met such stiff resistance. Before us, behind us, and beside us fall shells of all calibers, but the company commander's order comes over clear and calm: "No. 1 section to the right, No. 2 and No. 3 sections down the road. Headquarters will follow the company commander on the road. Open fire with all weapons."

* * *

We soon picked up the enemy, who had tucked himself, well camouflaged, into the edge of the town; and then limbs of men and animals flying into the air showed only too well how accurately our shells were falling. From then on there was no more peace inside the tank. Each man cramped himself behind his telescope or his slit to help observe and to find the targets.

"Left of the road going into town; muzzle flashes," the crew commander calls to his gunner. "There, ahead, man, just there by the lone tree, they are running like rabbits," shouts the driver from down below, and then the radio operator and the loader, too, spied something. The poor gunner has to traverse as fast as he can to compete with the number of targets.

Damn me, those Polish gunners are not shooting so badly! We can see clearly how they bring fire to bear at once on any stationary tank. The whole time we have to keep moving about. We discovered later why the observation was so accurate. The Polish OP was in the country house, on either side of which we had deployed. Luckily one of our tanks went for this house and dealt with them.

The company received the order "Hold the line reached until the riflemen arrive," and so we cruise about as best we can for four long hours, under enemy fire, waiting for the arrival of the riflemen. One tank after another stops, runs on to a mine, slips its track, etc. Two tanks to the left of the road give no answer to radio calls. Finally the section commander signals, "Both tanks hit. Crews apparently wounded or dead."

It is gradually becoming unpleasant inside the tank. The air is bad from the continuous firing. The transmission under me is so hot that I can hardly bear to touch it. One's limbs gradually get stiff from sitting so long. From time to time one shell after another falls beside us. One machine gun burst after another rattles on the tank. A 10.5-cm. shell bursts just behind our tank. The splinters smash our exhaust and set off our smoke candles. From a distance it must seem as if our tank is on fire. The Poles must be pleased with this. Our ammunition is running short. I myself am already shooting with my machine pistol to economize on machine gun ammunition.

Finally, about 2 o'clock, we saw our riflemen coming up in front of us. High time, too! The greater part of our tanks had been stopped. We were lucky in that our jumbo was still running. Our section commander beside us had been stopped but his turret was still turning and his machine gun fire was still knocking out Poles. He saw some more well-hidden in their armored fire pits but could not take them on with his machine gun, so he directed another tank at them by radio, which crushed them beneath its tracks.

We drive up beside our section commander's tank to take on his fire task while we see if we can get his tank going again. We dismount and examine the damage. A number of track links have been torn away and it will take some time before we can get him running again. Shells are still roaring overhead to our rear, but yet they

A light tank column operating in the first part of September in the wooded foothills of the Carpathian Mountains in Galicia. In the left background is visible a halted column of command cars. The vehicle on the extremt left is a new type provided with a four-wheel drive.

are falling farther back. Suddenly a burst of infantry fire hisses past us and we look around with revolvers and machine pistols in hand; we find we have to deal first with 40 Poles tucked away in their armored pits all around us, before we can start on the job. Now we can examine the tank properly. He must have had the devil's own luck. Among many other shot marks, he showed 3 direct hits from a 3.7 gun and several from antitank rifles; but German steel holds!

The riflemen now coming up lent a ready hand so that, undisturbed, we could tow on tracks and tow the tank to get it away. Then what was left of the proud Eighth rallied in the country house of Bujny. The casualties of this day were two dead and one seriously wounded, who, however, got over his wounds.

TANKS IN ACTION. By Lieut. Rudolph Behr.

"Our infantry have been stopped by strong defensive fire from the Poles. Our company's task is to carry the infantry attack forward to capture hills 190 and 188 and to reach hill 202 on the first objective. Strong antitank defense is to be expected. Two minutes to put your crews into the picture, then mount, start up, ready for action!"

We section commanders saluted and ran away from the company commander back to our sections. The heavy tanks were in clumps of bushes roughly the height of a man, camouflaged against aerial or ground observation. The dull grey, thick barrels of their guns are pointed reassuring toward the enemy. The crews, in their smart and practical black uniform, with the death's head on the collar, once more checked the maintenance of their vehicles, filled up and took aboard more shells.

At this time the crews were lying down under the bushes fast asleep. Sleep, on these occasions, is a duty. Every free minute must thus be utilized to build up the endurance and nerves of the men's bodies, which are under a perpetual strain. I called out: "No. 1 Section: Half circle." They all sprang up and gathered round me in the shade of a tree. I gave the situation briefly and added a few necessary orders on particular measures concerning the nature of the terrain and of the formation, and then let them go to their tanks. In the next minute engines were roaring left and right, and farther in rear was the higher-toned noise of the smaller tanks. The Tank Brigade was moving forward to the attack.

The sections pulled out on to the road. The company moved forward in line ahead. First we had to go through a village. Just ahead of us was the noise of battle. Single shots, machine-gun fire, and heavier shell bursts. The heads of the tank commanders were seen looking out of their turrets to get their bearings and take one more look at the ground. Howitzer batteries were in position on both sides of the road, and were firing towards the scene of action. Then I heard a crackling in my earphones. The company commander wirelessed the order. "Clear for action!" All heads bob down at once in the tanks. Turret tops and flaps were closed. The tanks were ready to speak their piece.

We got through the village. The company swung left from the road into the fields, forded a brook and deployed. The tanks moved forward against the enemy in a broad and loose formation.

Looking through the narrow slit of my commander's turret, I could see the tanks of my section moving forward to the right and left; and tensely I watched the ground in front of us. No movement is seen on the enemy's side and all seems dead, and yet there must be enemy there, in behind the hummocks and in the hovels between the groups of trees. I and all my crew listening hard hear a sudden sharp metallic ringing blow that shakes the whole tank. A direct hit from an antitank gun, apparently in the track.

The other tanks are moving swiftly forward. They have recognized the antitank gun and are attacking it. Thus we were, for the moment, secure from this gun; so out of the tank. One man stays at the machine gun for protection, and the others change the damaged track plate. It was soon fixed. We were well away with that. Luck is a good thing to have, especially in war. Six inches further to the left, and this attack would probably have been our last, but there was no time for such reflections. In a few minutes the damage was made good, and in a short time at top speed we had caught up with the leading tanks again. So far in this fight we had not fired a shot, nor had we seen any worthy target, and now, 500 yards in front of us, we can see moving brown figures, Polish infantry. They would not stand up to the concentrated power of a tank attack, and were running away in masses. That was a tid-bit for us. I yelled to my gun layer the direction and range; to the loader, the type of shell, and told the driver through the internal radio, "straight ahead, top speed, at the enemy." I ordered my section by radio, "Half left in front; lone tree; enemy infantry; destroy."

Now the tanks are speaking. The first few shells opening the storm fall in the thickly packed groups. I observe the effect. It was marvelous. Over yonder on the edge of the wood some are seeking cover. We catch them with the fire of our machine guns. They are finished. A small detachment disappears into a house, from the roof and windows of which a fierce fire soon falls upon us. One HE shell in the roof and another in front of the house jolts the survivors. The civilian inhabitants of the house were among them. I cannot help it. This is war.

Several fountains of earth are now rising high among our tanks. The Polish artillery wishes to show us that they are still there. Let them shoot! We are shooting too, and we are scoring hits! A machine-gun nest, defending itself fiercely, is dealt with by a shell and becomes silent. All around us is machine gun fire, shell bursts, machine guns and, again, shells.

The loader is sweating. He can hardly bring the

shells out of the racks as quickly as the gunner fires them. Powder smoke is pouring out of the gun's breech and colors our sweat-covered faces black. Our shirts stick to our backs. The roar of our motors, the banging of our guns, the heat, the fumes, and the natural excitement of the fight together with joy at the visible German victory, all these things together bring an atmosphere that only a tank man knows, to which he becomes accustomed, and which he likes. Add to this the semi-darkness of the tank turret, the lighting-up of colored bulbs, my method of communicating with the radio operator, who the whole time is receiving or sending orders and messages between the company, myself, and the tanks of my section.

Meanwhile the gallant driver of our heavy vehicle rocks it forward without mistake across country. He can only see the furrows, the meadows, the ditches, the manifold obstacles in front of him, through a very small field of vision. They appear before him suddenly and force him to quick decisions. He bears the heavy responsibility for everything to do with the technical efficiency of the tank. The heat is worst where he is. He must stear the heavy tank. He must change gears quickly and often. He must keep his dials perpetually in sight and with my help he has to seek and find a way across country, in order to give the gunner the best opportunities for fire. He has also to help me to pick up targets. The driver is always wide awake, always "on the line." He drives in battle, he drives on the march, by day and by night. On the march the whole crew goes to sleep in the turret. Only the crew commander stands up in the turret and the driver drives. With tank crews, it thus becomes an indivisible comradeship of battle; and faultless cooperation makes effective tank fighting possible, since every man of the crew must look after the equipment entrusted to him thoroughly and entirely, and must carry out the duties he had learned during a time of hard training. But the principal responsibility, if not always the immediate responsibility, for our success rests on the driver.

Later on we reach mid-day. The hours seem to fly by, with the unholy noise, rough and tumble, and shooting. It was a great pity that a stretch of broad stream held up our tireless tanks and compelled them, unwillingly, to rest until the pioneers had found crossings or fords. The enemy, however, has been thrown back or destroyed, and instead of a beautiful picture of villages and farms about the countryside, which had afforded strong points for Polish soldiers or lurking places for guerrilas, we see all round us only naked chimneys, stuck up from the smoking ruins of broken beams, silent witnesses to culpable Polish madness.

At the end of the day's bloody work, the next task was to hold the conquered ground until our infantry could relieve us to withdraw behind their protection. The infantry had not been able to keep up with the rate of advance of the tank attack. In a short time, parts of the battalion were harbored in camouflaged positions, with a good field of fire toward the enemy, while the bulk of the tanks lay farther back resting. Now for the first time we could open our flaps and covers and the crews could creep out.

Mountain guns of the type used with armored divisions.

ARTILLERY
OF ARMORED DIVISIONS

By Brig. Gen. Guiseppe de Stefanis, Italian Army*

The creation of armored units has raised some serious problems of which we may mention those relating to the organization of the movement of the considerable complex of automotive vehicles, to the maneuver on the tactical field of the imposing assault mass made up of the great number and divers types of tanks, and to the artillery.

This latter problem, which at the present time is one of particular interest, is here briefly taken under examination in its fundamental aspects.

The artillery of a mechanized division must normally operate against:

—observation posts, for the purpose of blinding and destroying them;

—passive obstacles and mined fields, for the purpose of eliminating them;

—antitank arms, for the purpose of neutralizing and, if possible, destroying them;

—hostile tanks, for the purpose of stopping them;

—units of cavalry or rapid infantry, for the purpose of stopping or neutralizing them;

—artilleries of small or medium caliber for the purpose of neutralizing them.

The action against the antitank arms and the tanks can as a rule be carried out effectively only at short distances, whether because the former disclose themselves at the last moment, or because the latter represent a target which is very resistant and highly mobile; while the actions against the other objectives require, by their nature and their behavior on the tactical field, great rapidity of fire, precision, power and flexibility.

Artillery with mechanized units, therefore, should be equipped with:

a) A self-propelled track-laying carriage permitting of maximum speeds on the road and mobility in varied terrain greater than that of the tanks with which it must cooperate in order to have the possibility of displacing itself by successive bounds, during the combat, to the most effective firing distances; and all-around traverse, which can be effected with an armored turret or with an installation open at the top but protected on the front, sides and rear, and suitable for acting promptly in all directions;

b) A gun of caliber 75-mm. or more, with semiautomatic breech mechanism, a single armor-piercing and explosive projectile having a high percentage of smoke-producing material, to permit of great force of impact at short distances and minimum dispersion at mid-ranges.

Of the two types of gun installation, the turret proves to be better adapted to individual actions at very short range, but could be adopted also for batteries of 4 or 6 pieces in case the gun tank should be provided with a suitable radio station, and each battery with appropriate fire control instrument (centrale di puntamento). The protected installation open at the top, on the other hand, better meets the requirements of employment such as we

*From *Rivista di Artiglieria e Genio*, May, 1940.

are accustomed to consider from the artillery in general and would lend itself splendidly to those peculiar to the true artillery for mechanized divisions.

In the present state of the matter we find in the organization of the most complex tank units in almost all the armies, tanks armed with guns which enter into the formations of the tank units to be employed individually with direct laying and at very short range, and motorized normal artilleries organized in batteries, battalions, regiments.

For these latter artilleries, the criteria of employment can naturally not differ essentially from those fixed for the artilleries of the normal divisions, but their application is greatly influenced by two main elements: the time available for preparing and developing the different actions, which almost always is very restricted, and the nature of the objectives, which are normally fleeting, almost invisible and extremely mobile, while others have a particular intrinsic constitution and a singular manner of fighting.

For the mechanized artilleries rapid interventions on their own initiative are normal. Changes of objectives are unforeseen and continuous, and changes of position are necessarily frequent. Security and liaison increase in importance—and in difficulty.

Ground observation accordingly acquires preeminent value, to such a degree as to require the subordination to it of all the operations which precede the entry into action of the batteries and all the acts which conduct to the further development of the action itself.

Thus, in reconnaissance, absolute precedence is given to the search for observation posts, which must permit of seeing all the terrain which the tank units are to traverse prior to reaching the final objectives assigned them. But since in practice this condition is very hard to realize, in view also of the depth of penetration which a mechanized division is capable of attaining, we are faced with the constant and absolute necessity of taking detailed measures in advance for the maneuver (change of location) of the observation posts, for the purpose of assuring their prompt functioning immediately in rear of the tank units.

Well adapted to this purpose are observation tanks, appropriately designed and provided with radio and with the necessary means for fire control and for observation; or else patrol elements in small armored vehicles or on motorcycles, which likewise are provided with the means for fire control, liaison, and observation.

In the absence of such means, artillery units with mechanized divisions make use of the most expeditious means of transportation at their disposal in order to reduce to the minimum the absence of observation, and to confer upon the action of the artillery the necessary continuity.

Observation posts having been selected, the artillery position areas are sought in the immediate vicinity of those posts, since the tendency is to provide the possibility of commanding the batteries by voice direct, which assures their quickest and surest intervention in the unexpected and changeable vicissitudes of the special combat.

When this can not possibly be effected, positions are occupied which permit of short telephone connections, with wire routes which follow terrain as covered as possible.

In the search for these positions, there is always borne in mind the necessity of suitably reconciling defilade, indispensable for impeding rapid location of the batteries on the part of the enemy and their consequent neutralization, with the possibility of acting quickly with direct laying against probable actions of hostile tanks. This is provided for, if practicable, by assigning initially for the purpose a few pieces in the batteries or a battery in the battalion; but putting immediately into execution the most suitable measures for being able to displace the artilleries quickly onto previously selected positions which are reconnoitered when it might be necessary to stop a dangerous counterattack of hostile tanks.

In relation to the above-indicated "maneuver" of the observation posts the successive positions of the batteries are located on the map or air photo, and the different displacements are arranged. These take place normally by battery, and are initiated as soon as the new observation posts have come into operation.

The preeminence acquired by ground observation does not, however, exclude aerial observation, which is useful to the tank commanders and to the artillery commander for the purpose of forming a concrete idea of the terrain of attack and of the possibilities offered the artillery in the matter of the successive supporting fires and the displacements of the battalions; and it is indispensable for locating and firing upon hostile artilleries, reinforcements coming up, assembly zones and waiting or starting positions of hostile tanks. Nor does it exclude the previous understandings, which must be minute, complete and precise, based on the examination of the terrain, which is carried out by the ground observation posts but more frequently by the aerial observers, and by study of the photographs taken by the observation flights, in which, more than is the practice of the normal large units, airplanes are kept directly and permanently in liaison with the artillery commander of the mechanized division.

Selection of the observation posts and search for firing positions, as well as coordination between action of the tank units and action of the artilleries, are greatly facilitated by fixing beforehand *reference lines,* called also *lines of objectives* when they turn out to be actually occupied by the enemy.

Such lines, made up in general of a succession of localities or of characteristic points of the terrain or of heights suitably oriented with respect to the direction of attack, are determined by the commanders of the mechanized divisions in number and reciprocal distance depending on the information which such commanders

possess regarding enemy occupation and on the possibilities offered by the intervening terrain for direct observation of the artillery.

Such determination, though usually possible whenever a mechanized division is employed in completing the tactical success, is not always practicable during the exploitation of the success, when the division is launched with a broad sweeping movement against the flank or the rear of the hostile disposition, squeezed on the front by large units of normal composition.

However, in order that the artillery of the mechanized division may be capable of entering effectively into action in the restricted limits of time which in the most probable situations of employment will be available for the organization of the attack, it is felt to be very important that the eyes and brains of the arm—that is, patrols and commands—during the great movements, be protected far forward and that the remaining elements be echeloned in great depth.

In this way the "artillery exploration," detached by the division command immediately following the motorcycle detachments in distant security, has possibility of recognizing the generic conditions provided for the deployment of the battalions in the zone or zones contemplated for the entry into action of the mechanized division or in those zones which might be imposed by contingent situations; and of collecting and transmitting to its commanding officer, by means of radio or motorcyclists, timely information regarding the terrain of attack and regarding the enemy. The artillery commander, in his turn, is then in a position to take appropriate measures for the order of battle of the battalions, if the mechanized division acts in isolation, or to harmonize the order of battle with that of the artilleries already in action whenever the division is obliged to operate with the support or in the framework of other large units (completion of the success, or breaking-down action in cooperation with rapid or motorized large units). In these two latter cases, the earliest possible contact with the commanders of the artilleries in position on the part of the artillery commander of the mechanized division enables this latter to make a more accurate examination of the possibilities of the artilleries in action and consequently puts him in a better position to decide what assistance is to be requested and what initial tasks should be assigned to his own artilleries in relation to the operation intentions of his commanding officer.

Accompanying artillery of the Italian "Blue Arrow" division.

In its turn, the echelonment in depth of the batteries and of the pertinent organs of supply enables the commander of the mechanized division to make adequate provision for the most varied requirements.

Thus, if at the end of a sweeping movement he is obliged, during the establishment of contact, to furnish support and protection to motorized elements which he has intended either for the occupation of positions indispensable to the artillery in the next phase of attack, in order to assure himself direct observation, or for the holding of localities necessary for giving the desired security to the approach, unloading and alinement of the tank units, the echelonment in depth of the artillery units enables him to proportion the means in relation to the actual contingent needs.

And the same thing comes about when the mechanized division is employed in completing the success, in that the magnitude of the initial intervention of the organic artilleries can be determined only as a function of the possibilities offered by the artilleries already in place; possibilities which can be defined at the moment in relation to the number of these latter artilleries, to the general orientation of the order of battle of these artilleries with respect to the sector of attack assigned to the mechanized division and to the penetration and progression of the advanced elements. The entry into action of the tank units is almost always facilitated by an artillery preparation.

In the mechanized units this preparation assumes a particular character. Not complex nor minutely prearranged actions nor carried out in advance of the irruption of the tank units; but an action which is brief, violent and released simultaneously with the beginning of the tank movement from the line of departure and directed against the anti-tank arms, the complexes of fire centers and any batteries which have disclosed their presence during and after the establishment of contact or which may in any way exert an action upon the axis or axes of attack.

It is participated in by all the organic artilleries of the mechanized division and by any artilleries assigned to reinforce it; and it is organized rapidly by the division artillery commander with the advice of the commanders of the tank units.

The artillery preparation assumes greater magnitude whenever the mechanized division—called upon to complete a tactical success—is to operate in the framework

of other large units already in place. There take part in it all the corps and army artilleries whose action is more effective in the sector of attack assigned to the mechanized division, while the organic artilleries of this division come into action in the final phase, that is, the one which shortly precedes the jump-off of the tanks from the line of departure.

When the preparation has been completed, these latter artilleries forthwith commence the fire support which tends to eliminate essentially the active obstacles which may impede the advance of the tanks. Specifically, these targets will include: antitank arms which will enter into action in ever-greater number with the progress of the attack waves of enemy tanks launched to stop our advanced tanks; and units of hostile infantry which with the support of other waves of tanks will try to engage the advance elements of our mechanized division in order to stop them and isolate them from the tank units.

The organization of these fires has varied characteristics, depending on whether or not it has been possible to determine reference lines or lines of objectives (phase lines). In the first case, the support is effected by means of fire actions applied to these different lines, mainly in relation to the axes of attack of the tank battalions and passing successively from one line to another in harmony with the advance of the tanks; in the second case, it takes the form of successive interventions on the terrain astride these axes, being displaced with bounds of a size proportional to the speed of the most advanced tanks.

The application of such complex procedures confirms the indispensability of direct observation of the terrain of attack, and consequently the necessity of assuring it in advance and of maintaining it at any cost throughout the action.

The availability of observation tanks would provide great possibilities and appreciable assistance. In the lack of them reliance is placed upon the ardor, the intelligence, and the spirit of sacrifice of the observation and liaison patrols for assuring the rapid maneuver of the observation posts. The preparatory measures in this respect are never sufficiently minute, nor is their application ever sufficiently cared for, watched over, and hastened.

The formation of fire masses and their timely coordination with the progression of the tanks are hard to bring about except in the completion of the success when it has been possible to avail oneself of a previous phase of organization of sufficient duration. In such case, the tendency must be to unit employment of the artilleries of the mechanized division, especially in the attack of the first and perhaps of the second reference line, such employment being the one which permits of meeting with the maximum degree of efficiency the particular needs of the special combat.

The attack of the mechanized division is always oriented in depth because it must tend to reach the zone of deployment of the hostile artilleries for the purpose of annihilating them and to arrive, ahead of the enemy, upon rearward positions which may enable him to take another stand, or which are suitable for facilitating the debouchment and penetration of rapid or motorized large units.

Consequently, after a certain time, the combat assumes an increasingly rapid rate of progress, while the objectives become increasingly sparse and less consistent.

The artillery support is then assured at first by the battalion commanders and later by the commanders of the individual batteries, who, previously advised regarding the final objectives to be attained, the axes of attack, and the maneuver of the tank units, act on their own initiative, supervised in so far as possible by the battalion commanders who provide for assuring liaison and for timely displacement of the organs of supply in order to guarantee prompt replenishment of ammunition.

The final objectives having been won or reached, the tank units halt for the purpose of reorganizing and replenishing themselves and making ready for further employment, while the rapid units included in the composition of the mechanized division generally continue the pursuit in accordance with methods fixed by the division commander and within well-defined limits of space.

In this final phase of the combat, the artillery commander, after having detached some element (section or battery) to the rapid units in pursuit, reforms and promptly takes in hand again the organic battalions and with them takes measures for laying down a barrage in front of the localities in which the tanks assemble and for interdiction along the lines of communication which are most important or most dangerous.

The replenishment of munitions in the mechanized division almost always presents very serious difficulties, whether because of the rapid rhythm with which the combat unfolds, or because the action is constantly mobile, or finally because the automotive columns of ammunition are often obliged to cover long distances on itineraries poorly organized and little protected.

If follows that the batteries are usually obliged to rely exclusively upon the unit allowances, a circumstance which makes it advisable, whenever possible, to establish near the pieces, at the beginning of each action, a supply of ammunition on the ground, corresponding to the foreseeable consumption for the preparation and first phase of the attack. Independently of this measure, there is always the need for utmost economy in the expenditures, and hence the necessity of intervention only when the reason for them is clear, of firing procedures which are always adequate, and of absolute fire discipline.

The first replenishment—namely, the one corresponding to our front-line supply columns—being frequently obliged to meet needs which are imperious and sometimes tragic, is normally pushed far forward and for this reason is entrusted to personnel selected for a high spirit of collaboration and for great daring.

Finally, the medium in which the mechanized divisions are normally obliged to operate and the particular manners of their action make it indispensable to provide a minimum of security to the artilleries of such divisions.

So that in the course of the large displacements, in addition to the service for which measures are taken by the command of the division or of the column, each artillery unit must provide for its own security by means of small patrols, well commanded, preferably on motorcycles, and charged essentially with giving the alarm; and in case of attack it must defend itself by having recourse to the individual arms, to the machine guns and upon occasion to one or more pieces of artillery.

During combat, on the other hand, the necessary security must be guaranteed by a suitable escort. Its commander, constantly advised regarding the order of battle of the elements of the units to which the escort is assigned—in general, the battalion—and regarding successive displacements of these elements, moves about at proper times, directing his attention especially to the hostile strong points which have remained in action after the passage of the tank units and which must forthwith be fired upon or annihilated in so far as they are able to hamper or even prevent the displacement of our details, batteries, and battalions.

Escorts are in general furnished by the rapid or auto-transported troops which form an organic part of the mechanized divisions, and their commanders are responsible for the measures prescribed by the commanders of the units to whom they are subordinated.

Now that we have set forth the most characteristic principles of employment of the artilleries of the mechanized divisions, the following deductions seem natural and logical:

First of all, these artilleries must be considered a *specialty in themselves,* for they are called upon to operate in situations and with methods which are quite particular.

As a specialty, they must have officers and private who fill certain requirements. They must be physically robust (displacement of the pieces by hand must be regarded as normal), professionally well-posted, mentally ever prepared.

To obtain such results, indispensable means are a perfect training field artillery and an adequate and continuous training in cooperation with other arms; and consequently the mechanized divisions must be normally stationed in terrains suitable to their employment and the units in the division must be stationed in such manner as to permit the maximum contacts between tank and artillery units.

Tactical and technical training and, above all, mental preparation require the maximum stability in the commanders, in the subaltern officers and in the enlisted specialists, and require, even in time of peace, strength equal or fairly close to those of war.

For the specialists, we need longer terms of enlistment and consequently higher rates of pay than the normal ones.

Finally, the equipment of the commands and subordinate units must be in relation to their special employment, that is, perfected in quality and reduced in quantity. It must permit of acting at any moment, securely quickly and well.

GENERAL DANFORD VISITS MANEUVERS

On August 18, Major General Robert M. Danford, Chief of Field Artillery, returned to Washington after a visit to units of the Fourth Army in the maneuver area in Minnesota. General Danford describes the terrain near Camp Ripley as being flat to slightly rolling; woods alternate with meadowland and cultivated areas—ideal for maneuvers, especially where troops are permitted to enter the fields. The 34th and 35th Divisions manifested commendable interest in the exercises, and there was considerable improvement over the spring maneuvers in that the troops showed less inclination to be tied to the roads. General Bishop in his critique, however, stressed the need for more and better reconnaissance.

Excellent though the 1:10,000 map of the Camp Ripley was, maps of the terrain elsewhere were not, in general, sufficiently detailed nor accurate for artillery fire control. These maneuvers, like the war in Europe, are emphasizing the great need for OBSERVED artillery fire. Fast-moving situations make it imperative that artillery continually strive for terrestrial, forward observation. Map firing, possible only with accurate maps, must not be permitted to tempt us to discard observed fires wherever it is practicable to secure observation.

Generals Trott and Bishop spoke of the fact that on account of the continued reorganization of the Regular Army and the number of new men therein and in the National Guard, both components need considerable basic training. It was urged that all units return to their home stations and concentrate on that type of work.

Aerial Observation

A graphic account by a newspaper correspondent who witnessed the shelling of Dunkirk from behind the German lines mentioned that the German artillery used observation planes to locate the targets and adjust the fire. Descriptions of combat between German and Allied tank units also indicate that the Germans were able to adjust artillery efficiently because of aerial observation. "We learned to fear the German artillery more than their antitank gun," says one commander. "Their gunners got on their targets quickly and accurately; apparently the spotting was done from a plane."

The remarkable photo shown herewith was taken by a German army photographer; the German caption states that the plane is adjusting artillery on the column of French tanks (shown advancing along the road). This light plane is a two-seater type widely used by the Germans for artillery work and command liaison. It carries no armament, but because of its maneuverability and low speed can take off and land in small fields.

The balloon shown is of a late German pattern, but seems to have had very limited use during the recent campaigns. According to articles in the *Artilleristische Rundschau* a "balloon battery" is attached to an artillery observation battalion when balloon observation is to be employed.

The U. S. press has failed to furnish clear or detailed accounts of the rupture of the Maginot line in June. For this we must turn to German magazines, which give it considerable prominence. The artillery participation is, of course, most interesting to us, and it was more important than some would have us believe. Take the attack on Forts 678, 685, and 699, for example. According to "Signal," the artillery preparation, consisting of fire from division weapons and 38 and 42 cm. howitzers, lasted from 8 AM to 10. Then for 20 minutes dive bombers and AT and AA guns joined in. Finally the pioneers crept forward. By 10:50 the forts were captured.

Radio Intercept and Interference

By Major Rex Chandler, FA.

The possibility and disastrous effects of hostile radio intercept and interference are receiving scant attention in this day of "Blitzkrieg" maneuvers and increasing dependence upon radio as a means of communication. Every officer wants a vest pocket radio set with which he can talk to his motor sergeant at the tail of his column or to General Marshall in Washington.

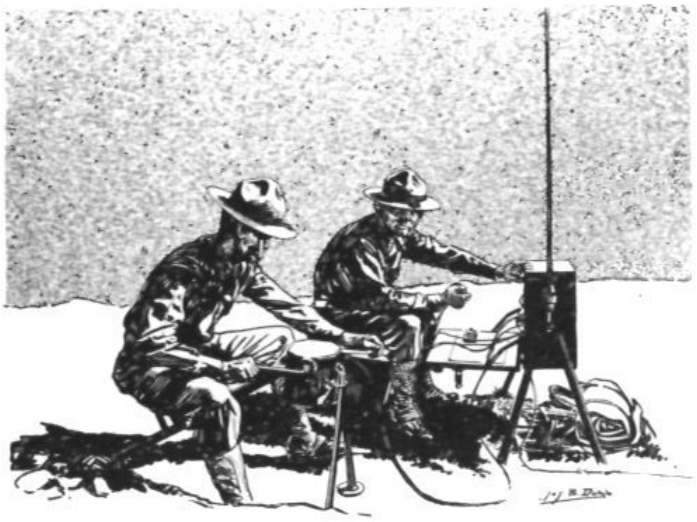
Generally we find two extremes in the use of radio. At one extreme the ether above any maneuver area is literally filled with clear text messages or conversation by voice radio giving the location, disposition, movement, and condition of tactical units, not to mention a multitude of administrative instructions and orders. Officers are hypnotized into a false feeling of security by the impression that the enemy will be gentlemanly about the whole thing and won't interfere with our radio if we reciprocate. At the other extreme we find strict radio silence pinned on every tactical echelon for long periods of time. An analysis will show that a common sense attitude toward the use of radio and full knowledge of its characteristics will do much to alleviate the conditions which do exist. These two primary characteristics should be kept in mind:

(1) The transmissions from present day radio sets are broadcast in every direction and can be received by friendly and hostile stations alike within the radius of the range of the transmitters.

(2) The international morse code used in radio-telegraph is a universal language. Language barriers offer little security in radio-telephone transmissions. When a radio operator plucks a message out of the ether with his receiver he has little assurance that the radio waves which carried the message emanated from a friendly station or a hostile station.

RADIO INTERCEPT AND INTERFERENCE ARE GIVEN TEST

During the period of April 11 to June 5, 1939, the Field Artillery School conducted a series of tests to determine the effect of hostile radio intercept and interference and methods of combating same. The following extracts of the report of these tests are entertaining reading, and should give every officer of Field Artillery a clearer picture of the problem and its solution.



Reports from Europe have indicated that German radio sections have been distinguished for their excellent radio discipline, generally exercising self-imposed restrictions to avoid confusion, intercept, and interference. It is with some surprise, therefore, that we now learn that during the big battles of May and June the air was filled with German—mostly voice-radio in "the clear." Evidently the Germans decided that the situation was moving so fast that (*so far as front-line units were concerned*) *there would be little danger in operating in the clear, especially if short, quick transmissions were employed. This does not relieve us, however, from the necessity of taking such steps as are possible consistent with the need for free communication between contact units, to preserve some measure of radio secrecy and discipline. Many situations will arise where close supervision is necessary. Furthermore, it will be simpler to relax radio discipline once gained than it will be to impose, suddenly, a discipline to which personnel are unaccustomed and for which they have not been trained. Major Chandler's study of this matter will furnish a valuable guide to us in training units in this vital phase of preparation for combat.*—EDITOR.

The purposes of the tests conducted at the Field Artillery School were to determine:

a. To what extent an enemy, using relatively low-power radio equipment, could intercept and interfere with our radio installations.

b. The effects that such intercept and interference would have upon field artillery communication and fire-direction systems.

c. Methods of combating intercept and interference.

The equipment consisted of standard, unmodified radio sets exactly as issued to field artillery units. For each test the intercept and interference stations were located as nearly as possible to conform to the tactical situation. Locations selected were within the hostile front lines by at least 1,500 yards. When safety restrictions

(caused by actual firing) prevented such locations, the stations were placed on one flank at least 2,000 yards from the nearest radio set used on the problem.

Battalion field exercise—75-mm. regiment in delaying action (with one active battalion); displacing by battalion (firing):

SCR-178 net: When the air observer checked in with the ground station and during air missions, the interference station interfered using tone transmissions. When either the air observer or the ground station would start a transmission, the interfering station would place a steady tone signal on the same frequency. The observer and ground station were using voice signals. Constant repeats were necessary. Not one mission was completed during the time the interference was on the air.

SCR-194 nets: Several erroneous messages, sent by the intercept station, were accepted. Operators gave considerable information as to their location and the location of other units in the battalion. Sets with firing batteries were closed out by the intercept station and ordered to report to the battalion command post. One operator complied, others apparently checked with the Command Post by telephone, because they were on the air again after a short delay. The delays caused confusion, as evidenced by attempts of the operators to identify one another by the use of surnames and nicknames. Fire missions were interfered with by giving erroneous sensings, some of which, it is believed, were accepted and acted upon by the battery firing. The following extract from the interference operator's log will illustrate such a mission:

Time	*To*	*From*	
2:07P		3D	Battery ready.
		5I	Fire.
		3D	Battery fired.
2:08	Interference		Range correct, fire for effect.
		5I	Red, I didn't say that.
		3D	I know you.
		5I	100 left, 300 short.
	Interference		300 over.
		3D	Battery fired.
	Interference		150 left, sheaf wide, 100 over.
		3D	Battery fired.
	Interference		50 right, short, fire for effect.
2:14		3D	Will fire for effect.
		5I	Red cease firing.

Comments: During this period operators gave valuable information to intercept stations when asked. There seemed to be little effort made at keeping clear-text transmissions to a minimum. No method of identification was used where uncertainty existed as to the authenticity of the message. The operators apparently depended upon their ability to recognize voices and upon the use of surnames and nicknames. The failure of the air-ground communication can probably be attributed to the lack of training of both observer and ground operator in working through interference. The mild tone interference used against the air-ground net was not so severe as to disrupt communication the way it did. The observer, being unfamiliar with radiotelegraph, continued to use voice. The ground station was uncertain, in many transmissions which did get through, whether it was the same person speaking each time. This doubt caused delay and confusion. It was apparent to all concerned that it was impossible to recognize the voice of an individual even though his voice and peculiarities of speech were well known.

Battalion Field Exercise — 75-mm. battalion (HD) with cavalry, including fire-direction:

SCR-178 net: The interference operator saw a plane in the air. He transmitted, without a call-up, "Checking into net, answer." The ground station replied, with a call-up, "8NN from YW5, Readability 5, go ahead." The interference operator gave a target using the coordinates of a hilltop upon which he had observed a number of men and horses. He fired a complete adjustment (simulated) and asked for fire for effect. When the plane did report a target to the battalion, the interference operator delayed the mission for twenty minutes, using tone and voice transmissions while the ground station and air observer were transmitting.

SCR-194 nets: Several valuable pieces of information were given by the battalion operators. Erroneous messages were sent by the intercept and accepted by the battalion operators. The following extracts of the interference operator's report will show the type of messages heard and used:

Time	*To*	*From*	
			The interference station heard 2L calling 6S. Acting as 6S, he answered.
1:53	6S	2L	Answer.
		Interference	Readability 5. Answer.
		2L	Readability 5. I have message for Lt. Chapman. Answer.
		Interference	Go ahead.
1:55		2L	Bring battalion forward immediately, fast gait. Cross railroad bridge, turn next left to white house. Assembly area. Signed. Lt. X (S-3). Answer.
		Interference	Okay.
1:58		2L	Who is this anyway?
		Interference	We better not give names because those intercept people from the school might be listening in.
2:00P		2L	Guess you are right. Okay.
2:06		2L	Are you with "A" Battery?
		Interference	Yes.
		2L	Where are you?
		Interference	Battery commander won't let me tell.
2:23P	6S	2L	How am I coming in?
		Interference	Readability 5. Why?
		2L	Seems like too many stations on this frequency.
		Interference	Don't let it bother you. Where are you located now?
		2L	We are now at KIOWA HILL RANGE CENTRAL.

Time	*To*	*From*	
		Interference	Okay.
		2L	Okay. Am checking out for 20 minutes.
			2L returned to the net and the interference station accepted him by using the call of 3H.
3:25	3H	2L	Answer.
		Interference	Readability 5. I have a message for you. Answer.
		2L	Readability 5. Go ahead.
		Interference	Ln O and detail report to CP at once.
		2L	What is approximate location of Bn CP?
		Interference	I think it is about 400 yards west of DODGE HILL.
		2L	Okay. Checking out of net.
		Interference	Okay.
3:35	3H	2Q	This is Simpson. What should I do? I'm sitting up here on top of this damned hill with no one to talk to and nobody to work with.
		Interference	Close up your set and report to CP.
		2Q	Okay. Am closing station.
		Interference	Okay.

Comments: Even though both students and School Troops operators had been warned that there would be intercept and interference on this problem, no apparent measures were taken to keep down the number of clear transmissions or to identify the station making the transmission. Messages were accepted and acted upon. A liaison section returned to the Command Post of the battalion on order from the interference. The way in which radio operators have been trained to accept the call-up as a station identification was decidedly advantageous to the interference station. It was apparent that the call-up, even though changed frequently, is not a satisfactory method of station identification in the face of active enemy interference.

Artillery staff duty exercise—Brigade in the attack:

SCR-178 Net: The brigade air-ground net opened about 4:15 PM. The interference-station operator using the call letters of the net control (brigade) station which he had previously identified by hearing AK8 call and announce himself as net control, would answer each station as it reported into the net. Using their own procedure, the intercept station would shift each station off frequency as much as 100 kilocycles. The intercept station was in control of the net most of the time. The procedure used by the intercept station in shifting the stations off frequency is shown in the following extract of the interference operator's log:

Time	*To*	*From*	
4:25P	XT6	ZN8	Station reports into net. Answer.
		Interference	Readability 5. Your frequency is 75 kilocycles too high.
4:32	AK8	YT6	Station reports into net. Answer.
		Interference	Your frequency is 50 kilocycles too low.

By this time the most of the stations in the brigade air-ground net were off frequency. Each was trying to call the net control station (AK8), and AK8 in turn was trying frantically to get the stations back on frequency. At this point an airplane reported into the net with a mission. After considerable delay the observer was told by AK8 to work with WZ4 on frequency X. Needless to say, WZ4 did not hear the transmission. The plane shifted its frequency and the observer called WZ4 for about twenty minutes. When the observer returned to the net the interference station prevented him from explaining the situation to AK8. The plane went home without having accomplished the mission.

At 7:37 PM the entire brigade air-ground net was closed out by the intercept station using the call letters of AK8 and procedure signals.

SCR-194 Nets: During this problem the SCR-194 sets used by the interference station were given increased power and range by increasing the plate voltage of the transmitter. The increased plate voltage gave the sets about 25% increase in range and considerable increase in the strength of signals. This advantage was apparent in the way in which the interference station could blank out the signals of weaker stations. From 2:55 PM until 4:28 PM, station 5I (a liaison station) was worked continuously by the interference station acting as 2B and 3D. Messages in the clear and in code were accepted by the interference station and never reached their destination. Considerable information of value was obtained from this one station. The following extract of the interference operator's log will show the types of messages sent and received.

Time	*To*	*From*	
2:55P	2B	5I	Answer.
		Interference	Have you any instructions for me? Answer.
		5I	Wait.
2:58P		5I	Fire mission liaison I.
		Interference	Not in position yet.
		5I	Are you still displacing?
3:00P		Interference	Yes.

3:28P	2B	5I	To Co 1st Bn 1st FA (Text in code.) Signed Ln O 1. Answer.
		Interference	Okay. Where are you?
3:30P		5I	I am with CO 1st Bn 1st Inf.
4:07P	2B	5I	Message to S-3 (Text in code.) Signed Ln O 1. Answer.
		Interference	Message received Okay.

4:15		5I	---------- attack at 4:30 P. Signed Ln O 1. Answer (Missed first part of message).
		Interference	Repeat.
		5I	Is there any change in the position of Battery A prior to the attack at 4:30 P. Signed Ln O 1. Answer.
4:17P		Interference	Message received. Wait.

4:28		Interference	Give me the location of our front lines. Answer.
		5I	Okay. Wait.

(Note: Front lines given in map coordinate code.)

"I'm sitting up here on top of this damned hill with no one to talk to. What should I do?"

Comments: It was apparent from the confusion resulting from the interference of the SCR-178 net that the more stations in a net the easier it is to interfere. In both the SCR-178 net and the SCR-194 nets, procedure signs and signals and messages in clear text were accepted from the interference station without question. Clear text and coded messages were given to the interference station and the receipt accepted. Important messages were sent by radio and the receipt given by the interference station was accepted as an indication that the message had reached its proper destination. One such message was later traced through with the following results. A battalion commander forward on reconnaissance sent an encoded message presumably to the battalion executive to move the battalion forward. The interference station answering as the station with the column receipted for the message. The radio operator assured the battalion commander that the message had been delivered. The reconnaissance party waited over an hour and then the battalion commander himself returned to the column to find that his message had never been received. Several similar instances of messages which did not reach their destination caused considerable delay and confusion. For this problem the communication officers had prepared an excellent and elaborate identification code, the groups of which were to be usd preceding each transmission. However, liaison sections departed to join the supported infantry before this code could be delivered to the liaison radio operators. This error opened all liaison nets to interference.

General Field Exercise.—Regiment of horse artillery with cavalry division:

Because of the firing incident to this exercise, the interference and intercept stations were located off the reservation about 500 yards west of Rabbit Hill. The ranges to the various radio installations were between 2,000 yards and 6,000 yards throughout the problem.

SCR-178 net: Two SCR-178 sets were used to create interference. One set was used to broadcast tone over a 20-kilocycle frequency spread by varying the transmitter dial setting rapidly while transmitting. The other set simultaneously broadcast CW signals. This interference was put on in a succession of two-minute periods, with short pauses between. At 3:00 PM one station of the net attempted to send a short message of about 10 words to another station in the net. It took 30 minutes to get the message through by the stations taking advantage of the pauses between the interference-station transmissions. At 4:42 PM a plane appeared and was heard to call the ground net control station. Using the call sign of the plane, the interference station checked into the air-ground net and was accepted as the airplane. A target was given by the interference station. The net control station assigned a battalion to adjust and the entire mission was actually fired (5 rounds expended). In the meantime, the actual air observer was trying to check in to the battalion to which it had been assigned and was trying to stop the adjustment. No attention was paid to the observer. Finally the observer, an instructor from the Department of Tactics and Communication, called the interference station and directed the operator to cease interference. The interference had been in control of the air-ground net of the regiment for about thirty minutes.

SCR-194 nets: During the early part of this problem, the SCR-194 operators were using a single-letter identification code as follows:

U — Phonetic equivalent UNIT
V — Phonetic equivalent VICTOR
H — Phonetic equivalent HYPO
I — Phonetic equivalent INTER
D — Phonetic equivalent DOG
etc.----------

As each operator would complete a transmission, he would check off on his code list the code letter transmitted. The receiving operator would check off the same letter on his list and in reply would use the next letter on the list. This method was very effective, for a short time, in preventing the interference station from breaking in and giving erroneous information. The following extract from the interference operator's log will show how this was used:

Time	*To*	*From*	
9:50A	3D	5P	Readability 5. UNIT. Answer.
		3D	Readability 4. VICTOR, Okay.
		5P	Any information yet? HYPO.
		3D	Not yet. INTER.
9:52A		3D	Listen Johnson, will call you later. DOG.
		5P	Okay.
10:42A	Interference		(Acting as 9V calling 7D) Answer.
		7D	Have you had any instructions for using code with message? Answer.
	Interference		Yes. Is this correct CAST, QUEEN, GEORGE, CAST?
		7D	GEORGE after CAST. You are on the wrong part.

By afternoon the interference stations had copied the entire code and determined the sequence of the letters. They then began to break into nets, causing considerable confusion. Most of the problems from about 2:00 PM on were called off because of the uncertainty of the source of the data. The following is typical:

Time	*To*	*From*	
2:33P	Interference		(Acting as 5W, calling 4V) Fire Mission. INTER. Answer.
		4V	Go ahead. HYPO.
2:35P	Interference		Compass 4700, converge at 4500, on number 1 open 7, site 305, shell mark 1, fuze long, at my command, 4000.
		5W	Hey Fliver, that wasn't me giving those last commands.
		4V	Who was it then?
	Interference		The mission is okay, Fliver.
		5W	No it ain't, Fliver. That wasn't me talking. Cease firing.
		4V	Will not fire problem due to uncertainty of data.

At 3:15 PM, after a displacement had been made, everyone seemed to throw caution to the winds and any call was accepted. This resulted in the interference station actually firing an entire mission on a target, observing and adjusting the fire of one battery (10 rounds of ammunition expended).

SCR-161 net: The interference of the SCR-161 net was comparable to the interference used against the SCR-178 net. A varying interfering signal on the frequency being used slowed down the transmission of messages and caused constant repeats. This net was using a two-letter identification code similar to the single-letter code of the SCR-194 nets. It was impossible for the interference station to break in and give erroneous messages during the early part of the problem. The code used was limited in the number of groups available. By the afternoon, the intercept station had a complete copy of the code. Thereafter interference was easy.

Comments: The use of an identification code following each transmission proved very effective in preventing hostile interference stations from breaking into a net and giving erroneous messages or information. Its use slowed down traffic in the net and caused some confusion. It is believed that these limitations can be eliminated with training. It was apparent that such a code, to be effective, must be continuous. That is, there must be no repetitions of a sequence of code groups or letters. Two other important points were brought out in this problem. First, once an operator becomes uncertain of the source of a message, it will be difficult to get him to take a message from any station. It was found that five minutes of interference caused confusion and uncertainty in a net for an hour thereafter. Second, it is possible for a hostile interference station to break into a net and actually control our artillery fire for short periods.

Following this General Field Exercise, concentrated efforts to interfere with tactical problems were discontinued, particularly where actual firing was taking place. The interference-station operators were instructed to interfere for only five to ten minutes out of each hour. The objective of the lessening interference was to give radio personnel an opportunity to devise methods of combating interference and continue their training with interference actually present or threatened. The intercept of all nets was continued.

General Field Exercise No. 7 — Brigade of division artillery, involving night occupation of position and a displacement:

Intercept stations were unable to pick up any radio activity prior to 4:45 AM, May 12th. Radio silence had been ordered and no violation was observed. All nets were using two-letter identification code groups very effectively. Apparently, operators had been trained in their use as it was impossible for the interference station to get any transmission accepted. The air-observer had also been furnished with a copy of the code. The identification code groups were sent preceding each transmission as shown on the extract of the intercept operator's log sheet below:

Time	*To*	*From*	
5:08	MZ2	AK8	HY Station reports into net.
		MZ2	PF R5 ZGQ AR Station reports into net.
		AK8	LY R5 ZWG ZN8 WZ4 AR The following stations are in net: ZN8 and WZ4.
	Airplane	3NC	Reports target.
5:50	AK8	3NC	HX Battery in position at _____. Will adjust.
		AK8	JV Okay. Wait.
5:53		AK8	NC Work with ZN8 on frequency W.
		3NC	TJ Okay.
5:57	ZN8	3NC	35 YA Answer.

(In this transmission a number was sent preceding the identification code group. Apparently this was the number of the code group YA and was sent by the air observer when ZN8 did not reply. This procedure was used several times during the morning, particularly when a station had been out of the net for some time.)

Comments: The use of a well-prepared identification code was very effective in preventing interference stations from breaking into a net and giving erroneous information

and fire commands. Each station, including the air observer, was furnished with a list of code groups sufficiently long for the problem. Each group was numbered. By using the number preceding a code group the NCS could notify any calling station of the code group then in use, thereby enabling the called station to pick up quickly the next group in the sequence.

General Field Exercise—75-mm. Regiment involving a displacement:

The interference station interfered with the SCR-178 net for a short time. Varying tone interference was used. The effective use of an identification code prevented the interference from breaking in with deceptive messages. In the SCR-161 net, it was noted by the intercept station that two stations were using a numeral or letter as a prefix or suffix to a single call sign. Call-ups such as the following were recorded: "BK9 V BK9-1" and "MZ2 V X-MZ2." This indicated that a displacement was taking place. The intercept stations were then fully aware that they could expect considerable radio activity. The SCR-194 nets, which had been quiet up to this time, began to handle fire missions. It was noted that liaison stations were working with base stations of another battalion and that their attempts to use the identification code failed. Liaison officers identified themselves by name. It was very easy for the interference station to check into those nets and give erroneous information and cause confusion.

Comments: When a battalion is displacing and its missions are to be taken over by another battalion, the use of the identification code must be coordinated. It is impracticable to have each battalion prepare separately identification codes and expect intercommunication by radio. Special identification codes for such emergencies should be prepared by the regiment, their use explained, and distribution made before displacement.

General Field Exercise 1—Groupment of Artillery:

The ground stations of the SCR-178 net were using an identification code. Several attempts of the interference station to break in and give erroneous messages were unsuccessful. The threat of interference did, however, cause the delay of an air-ground mission. An air observer tried to check into the air-ground net at 4:50 AM without using the identification code. The ground stations refused to accept him. At 5:30 AM, after repeated attempts to get a message accepted, the air observer gave his name and the name of the pilot. At 5:40 AM the mission was started. The interference stations had little success against the SCR-194 nets. It was apparent that wire had been laid to liaison officers and forward observers and that radio was used only as an alternate means of communication. Several fire missions were completed by radio. They were fired at irregular intervals and so rapidly that the interference stations were unable to do much damage.

Comments: The identification code is useless unless all stations which may operate with each other have a copy. In this case, the units in the field failed to provide the air observer with a copy of the code. Knowing that an interference station was on the air, the threat of interference alone caused the group stations to refuse to accept the air observer when he did arrive in the area. It was apparent that the threat of interference to SCR-194 nets was causing the communication details to get wire forward to liaison officers and observers and to use radio as an alternate means of communication.

General Field Exercise—Brigade of division artillery:

June 1: SCR-194 and SCR-161 nets were inactive in this position. At 2:05 PM an airplane, 8NN, checked into the brigade air-ground net. Attempts to take control of the plane were unsuccessful because of the use of identification code groups. By using previously transmitted code groups, the interference was able to confuse the air observer to the extent that 13 minutes was required to complete one message. At 2:25 PM the air observer tried to send a message to brigade and finally gave up because of interference. He then attempted to fire a mission with YT6 at 2:40 PM. At 2:58 PM the air observer sent "results accomplished" without having completed the adjustment. It is believed that the results of this problem were unsatisfactory because of interference.

June 2: Interference of the air-ground (SCR-178) net was discontinued for the remainder of the problem. Up to this time no air mission had been satisfactorily completed. It was conceded by all concerned that hostile interference could prevent or delay air-ground radio communication. Further information was desired as to the extent which the threat of interference would delay air missions. Interference of the SCR-161 and SCR-194 nets was continued. At 6:10 AM station 4V was heard to check with station 5M on channel 32. 5M asked if code cards should be used. The interference broke in and replied "It is not at all necessary" and received an "Okay" from 5M. 4V insisted that code cards should be used, but 5M apparently paid no attention to him. At 6:40 AM, the intercept station, acting as 7K, checked with 4V and obtained the information that the operator at 4V was "Jughead" Archer operating the base set at the command post of the 2nd Bn. 18th FA. "Jughead" later accepted and fired a simulated fire mission from the interference station. 5M tried to prevent the firing but 4V would pay no attention. For the next two hours, neither of those stations, 5M and 4V, would answer the other. 4V would call and 5M would not answer. 5M tried to send three fire missions but none was accepted by 4V.

June 3: Intercept stations listened in for information but met with little success, as all messages were encoded. Apparently the situation was moving very rapidly because stations would check in for a few minutes and check out again, stating that they were moving forward.

Intercept and interference stations moved at 8:00 AM. Radio seemed more active. There appeared to be a set on every channel, with the heaviest activity taking place in battery nets. Several messages in code were intercepted.

The intercept copied a number of identification code groups in this position. It was apparent that some system similar to the Playfair Cipher was being used for forming the code groups. The intercept operators began to build up a chart to decipher the system.

At 9:30 AM, the stations moved. Radio activity continued. 5I was heard to call 2B and inquire as to the next group of the identification code. To the surprise of the intercept operators, the chart which had been constructed was hitting each time. 5I, 2B, 2B-1, and 2B-2 were all working on channel 19. The interference checked into this net as 2B-1 and was accepted. Several erroneous messages were sent and accepted and the entire net thrown into confusion and finally closed down by the interference station.

The following messages, which followed authorized and prescribed procedure, were intercepted the evening of June 3:

7:34 PM—YW5 left net *until 5:15 AM*

7:37 PM—YT6 left net *until 5:15 AM*

8:16 PM—WZ4 left net *until 5:15 AM*

8:30 PM—AK8 told MZ2 to call him *at 5:15 AM*.

It was apparent to the intercept stations that something was going to happen at 5:15 AM, June 4.

June 4.—Interference and intercept stations were in position at 4:45 AM. Batteries started to register, using radio communication between observation posts and guns at 5:15 AM. The intercept was in position to observe the fire, identify the base point, and follow the adjustment. The battery observers then reported their adjusted compass and range to the battalion by radio. This procedure would have allowed an active enemy to plot the location of each battery with reasonable accuracy in a very few minutes.

CONCLUSIONS

Intercept: The amount of information given to hostile radio intercept stations is a matter of training of our own operators in radio discipline. During the early part of these tests, most school troops operators would answer any request by the intercept operators concerning the location, disposition, and designation of their own and adjacent units. Even when they learned to refuse these requests, their normal conversation and many tactical messages sent in clear text gave sufficient information to determine the intentions, probable movements, unit designation, and disposition of troops used for the problem. Carelessness in radio discipline became less evident as each violation was reported and action taken to prevent its recurrence. It is believed that information given to hostile radio intercept stations can be minimized by strict insistence upon radio discipline among the operators and by each officer exercising care in the type of tactical messages he authorizes to be transmitted in clear text by radio.

Interference: It is entirely possible for an enemy, using radio equipment of no more power and similar to our own radio sets, to delay, disrupt, confuse and even prevent the use of our present radio communication. Two methods of interference were used with success during these tests.

The first method was an attempt to block communication by transmitting on the frequency used by an artillery radio net. It was found that a continuous, unvarying tone used as interference caused very little delay or confusion after the operators became used to it. Using varying-tone transmissions or using voice transmissions for interference and speaking unrelated words or reading any text during the transmissions of the unit being interfered with, caused delays in time varying from 800% to 2,000% above the normal time. This method of interference may not block communication completely, but it can delay any message long enough to make it worthless at the time of final receipt. This is especially true of fire-direction messages or fire commands, from either ground or air observers.

The second method used was that of deceptive messages in which the interference operators impersonated friendly observers. This method was successful far beyond the expectations of the interfering stations. There were many occasions when the interference operators fired problems that were supposed to have been fired by air observers, liaison officers, and forward observers. In one case, the interference operator impersonated the air observer, asked for, received, and fired a battalion mission. The request by interference personnel for the marking of the base point was in general granted. This method can completely ruin an air mission by erroneous sensings and commands. It can partially paralyze a fire-direction center for a considerable period of time. It was determined that only a few deceptive messages planted so much distrust and doubt in the minds of both radio operators and staff officers that when all interference ceased, delay was tremendous due to checking and rechecking, and doubt of the authenticity of all messages.

From the results, which were far more effective than the most extravagant expectations, it is concluded that interference by either of the above-quoted methods represents a very grave and serious problem confronting the present system of radio communication and, to a certain extent, fire direction.

Combating hostile intercept and interference.—It is impossible to prevent hostile radio intercept and radio interference as long as the artillery is provided with its present type of radio equipment. Transmissions are broadcast in every direction and are available to friendly and enemy stations alike within and even beyond the ranges of the equipment. There is no way to prevent an enemy from intercepting radio messages. The effects of hostile intercept can be minimized by strict radio discipline, short prearranged messages for fire control, and the strict insistence upon the use of cumbersome codes

and ciphers for tactical messages. It is impossible to eliminate hostile radio interference. Strict observance of the following simple rules appears to be the best method of minimizing its effects:

(1) Nets should be organized with as few stations as possible. Two-station nets are best.

(2) The use of call signs and the conventional call-up should be restricted.

(3) An identification code should be used, one group to be used preceding each transmission.

(4) The identification code should be used at all times, regardless of whether an enemy may be listening or not.

(5) Any message from a station which can not be identified by the identification code in use at the time should be refused.

(6) Inter net communication always should be prearranged and an identification code provided for the purpose.

(7) In making up the code, each group should be numbered, the sequence of groups should not be repeated, and a system or cipher should not be employed. An arbitrary list of code groups of sufficient length for the period of time during which it will be used will be most satisfactory. After it has been used once, it should be destroyed.

(8) Procedure signs and signals which have to do with the movement of a station, the time it will report out of a net, and the like, should be eliminated.

(9) Short, quick transmissions should be employed.

(10) *Above all, operators should be trained to work through interference of all kinds*.

ARKANSAS STATE COLLEGE'S LIAISON BETWEEN ROTC AND CAA

BY LT. EDWIN H. GARRISON, FA-RES.

Editor's Note: This article was written by a graduate of Arkansas State College, who has just received his commission in the ORC, and who also has received his Private Pilot's License through the CAA Program. The experiment described is directly in line with present trends to utilize field artillerymen flying light commercial planes for observation of artillery fire.

"Airplane 20 calling fire-direction center" . . . "Airplane 20 calling fire-direction center" . . . "Come in, fire-direction center."

With these few words perhaps the first communication was established between Civil Aeronautics Authority students and ROTC cadets that has been recorded since the installation of the CAA in American colleges and universities.

The plan was conceived by Major W. E. Corkill, PMS&T at Arkansas State College, Jonesboro, Arkansas, and was carried out through the co-operation of the head Flight Instructor, V. W. "Tex" Russell, of the CAA at State College.

Last year through special concession, several of our ROTC students were allowed to finish their course in three years and were appointed 2nd Lieutenants of Field Artillery and ordered to Fort Riley, Kansas, under the Thomason Act, for one year's active duty. Others were sent to Fort Sill, Oklahoma, and Fort D. A. Russell, Texas, for active duty for 6 months' active duty training. Others enlisted in aviation schools at Dallas, Texas, and Tulsa, Oklahoma, to prepare for Randolph Field, Texas.

Year after year, the leading students on the campus have been officers in the ROTC, and it was surprising to see how many of them enrolled in the first CAA flight training program ever offered at State. Exactly 90% of the students who received their private pilot's license were members of the ROTC. Of the 20 boys allowed to take flying, 18 were members of the ROTC at State.

The flight training program was started at State December 8, 1939, when the first group of 10 students were taken up with their instructor, "Tex" Russell. Later, 10 more boys started their flying when the assistant instructor, Earl Thomas, arrived from Texas. After considerable bad weather, but with not one accident, all 20 of the aviation enthusiasts received their private pilot's license.

After the work was over, Major Corkill suggested the idea of having the airplane observation with two students—members of both the ROTC and CAA—flying the plane and working the "walkie-talkie" (SCR-194) radio and obtaining communication with the group at the fire-direction center. Each unit had one of the government radios, SCR-194.

This writer operated the radio from the rear seat of the two-seated Cub plane. Because the pilot was not allowed to fly from the front seat, I took the plane off and landed it, but while it was in the air, Cadet Lloyd Price piloted the plane.

Communication was established early as we flew over the fire-direction center. Our duty was to fly on a direct line from the gun to the base point, and when we were exactly over the BP, we would flap our wings. Everything went smoothly at first but when we were some distance away, we lost communication and were unable to re-establish it.

It is believed by the writer that with a little change these "walkie-talkie" radios could be made to function efficiently and would allow all colleges and universities with CAA to give training in this important function.

Especially should this co-operation and work be done today for we have seen by the foreign war that success must come through observation and contact between ground and air forces. If this can be gained in colleges while the men are cadets, it will facilitate training at a later period.

DUTY as MILITARY ATTACHE

by

Major Lowell M. Riley, GSC

Military attachés in Gmünden, Austria, September, 1937. (*The author is the American officer near the center of the picture.*)

There was a time when the profession of arms promised a reasonably simple life. An officer was, upon his entry into the service, assigned to a regiment, and in that regiment he served year in and year out as lieutenant, captain, major, perhaps with only an occasional school, Indian Campaign or foreign service tour to interrupt the otherwise even tenor of his way. He was simply an infantryman, a cavalryman, and artilleryman and spent his time training or fighting.

Nowadays the life and work of an officer have become as complex and varied as the fighting forces themselves and a great variety of possibilities is opened to him. So many are they, in fact, that he is forced to specialize. He finds, more and more, as his service increases, that he is becoming, for example, a specialist in staff work, a tank specialist, an expert in the work of the R.O.T.C., an air corps engineering specialist or adept in one of the hundreds of side lines to the business of preparation against war. Circumstances of service often impose a choice of his specialty upon him, but, more important, the limitations of human endeavor. The best officer cannot be good at all branches of the work which military men are called upon to do.

A specialized work of which comparatively little is known is that of Military Attaché. The officer who is selected for service in the post of Military Attaché or observer abroad will be, more and more, an officer who has prepared himself for the task.

Thirty years ago we had but two or three Military Attachés abroad and some of them were kept there year after year, partly for the reason that an Ambassador insisted they remain on the Embassy Staff—now we have many and, in addition, members of military missions as well.

This discussion is designed to guide the young officer who wishes to prepare himself for this important and interesting work, and to record impressions on the subject of an officer who has had some varied experience along this line. With this in mind let us first review the qualifications desired in an officer who is to be selected for duty as Military Attaché abroad.

First, he must be an officer of experience and must have behind him the basic training in his arm. He must as the saying goes, "speak the language." A sound knowledge of military things, like the ability to judge "horse flesh," comes only after some years of close experience. The Military Attaché should be an army officer in the most complete sense, and the more experience he has had the better, consistent with an energy and enthusiasm for seeking information, which implies that he must not be too old. If he has served in more than one branch it will be to his advantage. Officers of any of the combat arms may be sent for this work and in special cases those of the technical branches as well. It happens at present that there are more Field Artillery officers abroad than those of any other Arm. The reason for this, says a gentleman who should know, is that in the Field Artillery, more than in any other Arm, tactics and technique meet. Perhaps it would be more accurate to say that in the training of the Field Artillery, maneuver and material are mutually important.

In addition to experience in the basic arm or arms or in the staff or technical branch for which he is to gain information, the prospective Military Attaché must have certain personal attributes which experience has shown us are desirable in an excellent or superior officer. Efficiency reports comment year after year upon the degree of these attributes possessed by a particular officer, and they are considered in choosing him for assignments. They become, for obvious reasons, of even more importance in the selection of officers who are to represent the United States Army abroad. Initiative, intelligence, force, judgment and common sense, cooperation—all these characteristics with which we are so familiar in reporting as to our brother officers are demanded, to a degree, in the officer who is to work for the government thousands of miles from home, under circumstances which may be important and at the same time most difficult, and which demand judgment, tact, and energy, of an unusual degree, if the work is to be successfully done.

In short, an officer who seeks to qualify for this work must look to his laurels, and in addition to the language preparation, miss no opportunity over a period of years to justify an excellent or superior rating.

Schools are important in the professional progress of all officers. Interspersed with periods of training on duty with troops or in other instructional work which is included in this category, they round out the experience and knowledge which is so essential in the finished military commissioned "product." A background of schools is therefore desirable in the officer who is to be sent abroad. The more schools he has had, the better prospect for the specialized work he becomes. An officer with War College training is sought for the most important posts and while it is not always possible to find an officer who has this training and the other necessary qualifications, a C.&G.S.S. diploma is considered a minimum requirement for selection.

An officer will prove of little use abroad unless he can speak the language of the country to which he is assigned, or a language generally used in that country which will furnish him a medium of intercourse with his colleagues. Thus, anywhere in northern Europe it may be sufficient to know German, whereas in southern Europe a knowledge of French will probably suffice for diplomatic and military intercourse. But in South and Central America, Spanish must be known, and in Brazil, Portuguese as well.

French has been the language of diplomacy for many years and a working knowledge of French is desirable for any officer who is to serve abroad. I recently heard one of our Military Attachés (non-French speaking) who has served four years in Europe say, that no one should be sent on this work who speaks no French.

The Germans in recent years have been endeavoring to have their language replace French as the diplomatic language in Europe. In the light of recent events there, it would appear that this ambition may prove successful. However, it will take time. I mention this fact to indicate the increasing importance of the German language.

It is significant and natural that people consider it a compliment when foreign representatives speak their language well and the officer who is able to accomplish exceptional language facility will find his work made progressively easy. His brain as well as his ear will be attuned to events, and information which comes only thus will be available to him.

All this points to serious language preparation on the part of the officer who wishes to prepare himself for work abroad. Learning well a foreign language is a formidable task and takes time. An officer should decide what country specially interests him, where, abroad, he wants particularly to work, and should proceed to undertake a conscientious study of the language.

It may be, and should be, some years later that his opportunity will come and evidence of specialization will be his best supporter. It should be added here that machinery to test and record an officer's proficiency in languages has been set up and is in operation at Corps Area Headquarters.

In addition to a language study, a study of the history (especially the military history), geography, economics, and politics of the country should be conducted and will provide the most valuable background of preparation for service in that country. If such a study is undertaken after an officer is assigned to a distant post, it is sure to be haphazard and will probably, with the pressure of work undertaken, prove impossible. The best military attachés know intimately the history of the country in which they serve and are experts in the knowledge of its military policy and background.

Military attachés and observers; Army maneuvers, upper Austria, September, 1937

It has always been thought, and there is some ground for the belief, that considerable outside means, a large independent income, are prerequisites for service as military attaché. While desirable and perhaps essential in one or two of the most expensive and important capitals, it will be less and less the case as time goes on. Among a great many military attachés whom I have known, almost none were wealthy men. The post of military attaché is less and less a social cynosure and more and more a "he man," "go-getter" information job. A certain amount of social "going about" and entertainment is necessary, of course, but the military attaché's wife, in case he has one, can take a great deal of the burden of this off his shoulders and in this as well as other ways she can be of great help to him.

My associates hold, and I conform to this belief, that the men we send abroad to represent the United States Army should be representative Americans in every way. Even in our democratic Army, birth and breeding still have their place—but principally ours is an aristocracy of accomplishment, a "noblesse" of recorded and proven worth—and the officers we send abroad should be the best in ability, personality, and professional achievement which our system, our way of life, has produced.

To sum up, our "corps" of military attachés should and will as time goes on be less the officers whom circumstance alone has made available for the detail and more the specialist who, with a fine record as an officer of the line and staff as his background, has prepared himself as an expert in this special branch of G-2 work by study and qualifications in the language and particular knowledge of the country in which he is to serve.

VALUE OF AN ATTACHÉ

The following letter from the U. S. Ambassador to Belgium to the Secretary of State is quoted not to make invidious comparisons but to show, in conjunction with Major Riley's article, the extreme value a competent, trained military attaché can be to his country—EDITOR.

It will be recalled that I came, because of the threat of an attack against Belgium, from Dublin precipitously to Brussels on January 16, 1940. From that time until the invasion of the country by Germany on May 10, an appraisal of the military situation was of paramount importance in the reporting of this mission, and for information in this respect the Embassy has relied upon Colonel Brown, who greatly influenced Embassy appraisals and reporting.

I learned soon after my arrival, January 16th, that Colonel Brown was on excellent terms with the highest officers of the Belgian General Staff who gave him access to such military information as was made available to foreign Military Attachés.

I found him a diligent, profound student as well as an astute observer of military affairs.

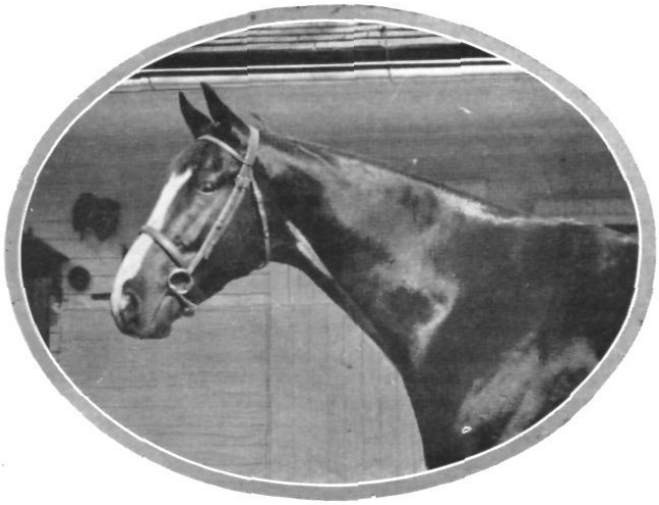
From the outset he took the position that a German attack against Belgium and Holland was inevitable and from this position he never deviated, despite the strong dissenting opinion of most of his colleagues. He argued that the Low Countries were the natural battlefield in an attack by Germany against France, and that this attack would proceed across Limburg near Maastricht, would be synchronized with a military movement north and south of Liegé, with an objective of invading Franct across the French frontier from Armentiéres to Maubeuge. In such an enveloping movement Brussels would be invested as a matter of course.

The majority opinion among Military Attachés in Brussels was against this thesis, and there were very few of my diplomatic colleagues who took the view that an attack against Belgium and Holland was possible. They argued that the two Low Countries could put in the field effective armies and that, backed by strong defenses, they could take enormous toll from German attacking forces and resist vigorously. This majority argued that Germany could not afford to risk such a great military gamble and would wage rather a war of economic attrition. They reasoned that the cost in men and material would be crushing if Germany attempted to move in armies against the Maginot Line or against the strong defensive positions in Belgium and Holland. There were not three Chiefs of Mission among the Diplomatic Corps (and not one from a prominent Power) who believed that Germany would seek a military decision this summer.

This Embassy from the time of the January 16th crisis mentioned supra, however, consistently reported that the elements of the situation made an attack against Belgium appear to be inevitable and only a matter of time. This is mentioned now, simply to emphasize that this consistent, unvarying view was based upon the opinion given to the Embassy by the Military Attaché, Colonel Brown. His analysis of the outlook was so clear and so well-informed, and his conviction that Germany must seek a military decision this summer was so unshakable, that this view controlled the reporting of the Embassy, and enabled us to keep the Department reliably and—as it has developed—accurately advised.

Since the German occupation of Brussels on May 16, Colonel Brown has been of tremendous assistance in the rationing work of the Embassy, and in service connected with the representation undertaken by the Embassy of British, French, Dutch, Luxemburg, Canadian and South African interests. His service in this regard has been accomplished with thoroughness and effectiveness; one had always a satisfied feeling that any duty entrusted to his care would be despatched with the utmost fidelity and thoroughness.

If, after the battle is over, your infantry don't like you, you are a poor artilleryman.
—CAPTAIN HENRY J. REILLY



DRAFT REMOUNT TRAINING

By Captain W. A. Samouce, FA.

In discussing the training of the draft remount, one must not regard him as of a species entirely apart from other types of horses. Basically, the draft remount is no different from his more artistocratic brother—the riding remount. Therefore, his basic elementary training should be designed along lines similar to those used in training riding horses.

Much has been written on how to train a remount so that he will accept a rider on his back without exhibiting undesirable traits of character. Whatever method is used, it must conform with two basic principles of horsemanship, which may be stated as follows:

1. *Work* accounts for approximately 80% of the progress in the training of a horse.
2. To make rapid progress, *proceed slowly*.

These two principles are applicable in all horse training activities and their importance in the training of the draft remount cannot be overemphasized.

The progressive training of a draft remount may be subdivided into three general phases, according to the requirements demanded of a trained draft horse. These requirements may be stated as follows:

1. He must be able to carry a rider on his back.
2. He must be able to pull a heavy load individually.
3. He must be able to work efficiently as a member of a team under all kinds of conditions.

Naturally, these phases merge into one another and overlap, so that we cannot deal with them as separate subjects. Hence, it is proposed to treat this subject as an elaborate schedule which may be used as a guide from week to week.

1ST WEEK

1. Gentling—leading, grooming, picking up feet.
2. Use of neck ropes and snubbing post.
3. Breaking halter pullers.
4. Leading for exercise from quiet horses.
5. Use of blanket and surcingle, and riding the more gentle remounts as single mounts.

EXPLANATION: In general, the first week is devoted to various gentling processes and in sizing up the dispositions and traits of character of the horses, classifying them into two categories—gentle and fractious. This classification is easily determined by observing their behavior on the picket line and in the stable stalls or corral, and by watching them led out to exercise the first two or three days. By the end of the first week the gentle horses can be used as single mounts from

Editor's note: Twenty years ago our Arm was mostly horse-drawn, and behind it were generations of tradition and experience in horsemastership. Today, for various reasons, much of that hard-won knowledge is in danger of being lost. Yet we have no positive assurance that we will not require a considerable number of animal-drawn units in the not-distant future. Indeed, the Germans possess not less than 120 horse-drawn artillery regiments, and have used them in Poland, Norway, and Western Europe. Consequently none of us—not even the most rabid motormen amongst us—should begrudge some space in our literature to a seasoned, practical article such as the one presented herewith.

which the fractious ones may be led. Occasionally, in leading, a horse will become frightened and break away. The horse's herd instinct will prompt him to return to the flock. Halt the whole column and remain quiet until the horse returns.

There will always be a small percentage of halter pullers in each group. An effective way to break this vice is by the use of the belly rope. Put a blanket and surcingle on the horse's back. Take a one-inch rope with a loop woven in one end and pass it around the horse's barrel, the free end passing through the loop, thence between the forelegs through the chin strap of the halter and then snubbed to a heavy post. As the horse lunges back, the noose tightens around his flanks, constricting his breathing and causing him to lunge forward in order to escape the pressure of the rope. After the horse has lunged back two or three times, he will lose his desire to pull back. Fractious horses frequently break away without actually pulling back on the halter. These may be kept tied up by one of three methods:

1. Use of snubbing rope. This is a one-inch rope with a loop in one end large enough to pass over the horse's head, padded with felt to avoid chafing. The loose end is passed through the chin strap of the halter and tied to a heavy post by a clove hitch. The rope should be tied high in order to prevent the horse from stepping over it with his forelegs.
2. Reinforce the crown piece and chin strap of the halter by an extra thickness of leather and snap to two halter shanks. If snapped to only one, the swivel snap will break before any part of the halter will give way.
3. Use of neck strap with halter. Attach the swivel snap of a halter shank ring to the halter. Pass the end of the halter rope through the throat latch of the halter, thence through the neck strap, and tie the end with a clove hitch to a solid timber.

Grooming and picking up front feet must be introduced gradually and slowly, always stopping before the horse gives any indication of a defense. In picking up feet, either fore or hind, the general principle to follow is to stand close to the horse. In this position, if the horse lunges, strikes to the front, or kicks to the side, the trainer will only be pushed away, whereas, if he stands away from the horse, he may get a sharp blow, severe enough to cause serious injury. In early lessons, the foot should be kept close to the ground and held for a short period only. Once the horse's leg is picked up, do not allow him to snatch it away from the hand. Hold the hand on the leg and do not release until the leg is replaced on the ground. The hind feet of a vicious kicker may be picked up by the use of the side line. When the leg is held up by the side line in a helpless position, gentling processes may be resumed until he accepts the feel of the hand.

In approaching a remount with a blanket for the first time, wad it up like a grooming cloth, rub his head and neck with it, then the shoulder and finally the back and gradually unfold it on his back. His belly should then be trained to accept the cincha by the use of a surcingle. The same process is used in placing the saddle on the back. Do not take the hand away from the pommel until the cincha is tightened, for much damage may be done if the horse breaks away carrying the unsecured saddle with him.

2ND WEEK

1. Riding gentle remounts and leading the more fractious ones.
2. Continue gentling processes, emphasizing grooming and picking up feet. Shoeing the gentle remounts.
3. Use of snubbing post and snubbing horse until all fractious remounts are confirmed in carrying a rider on their backs.

EXPLANATION: In mounting a remount for the first time take him to an enclosure, such as a bull pen or riding hall. Have an assistant feed him oats in small quantities while you gently raise yourself into the near stirrup. Remain there for an appreciable time until he becomes accustomed to your weight, then slowly swing the right leg over the croup, making sure that you do not touch him on the loins or croup, and quietly settle into the saddle. Remain immobile, grasping the pommel, while your assistant induces forward motion, continuing the feeding of oats while doing so. Gradually take up the reins and have your assistant release his hold on the halter, requiring him to walk alongside until you are sure the horse will move without further aid. If the horse attempts to buck, snatch his head up and leg him forward. A horse cannot buck as hard while running.

The more fractious remounts may be successfully mounted by the following process: Snub the horse to a post. His first reaction will be to lunge, buck, or kick. Leave him alone until he decides to remain quiet. Reward him with oats and mount him as described in the paragraph above. Remain on his back until you are assured that he is accustomed to your weight. Then lead him to a bull pen, and there snub him very short to the horn of a stock saddle on a quiet horse. Mount up and remain immobile on him while the quiet horse moves him around the pen. Gradually increase the length of the snubbing rope and eventually substitute an ordinary halter shank for the snubbing rope. As progress is made, the halter shank may be unsnapped and the remount allowed to move at liberty beside the quiet horse. This method is highly recommended for bucking horses. It is impossible for a horse to buck if his head is snubbed high to the horn of a stock saddle.

3RD WEEK

1. Suppling exercises as single mounts.
2. Put on back, loin, and hip straps, cruppers, and collar.
3. Use of cavesson with two long reins as preliminary to attaching traces.

EXPLANATION: Suppling exercises should be of the simplest nature, using the most elementary aids. Long periods in the bull pen, with frequent rewards in the nature of stroking the neck, moving at liberty, and feeding of oats should be indulged in at this time. All turns should be accompanied by complete aids for the true turn, that is, inside leg on the girth, outside behind, inside leading rein, outside indirect.

To put the collar on, allow the horse to put his muzzle into a bucket of oats, and pull the collar over his head slowly and quietly while he is busy eating. Shake it around until he becomes accustomed to feeling it around his shoulders.

When the back strap with its attachments (hip and loin straps, breeching and crupper) is first put on, snap the end of a halter shank into the buckle of the crupper and work the whole assembly over the loins and croup from one side to the other until he no longer resists the tickling effect. Then, gently ease the halter shank under his tail and gradually pull until the crupper is drawn under the root of the tail. This process should be preceded by much rubbing and twisting of the tail until he is used to such handling. Never attempt to manipulate the back strap assembly before securing the saddle to the horse's back with the cincha.

Work with the cavesson with two long reins serves a dual purpose:

1. It helps to supple the horse.
2. It trains him to accept the rubbing effect later to be produced by traces. The inside rein is used exactly as a longeing rein while the outside rein hangs along his flanks and hind quarters, massaging him with every step. It is also used to

induce a change of hand while in motion. Several precautions should be taken in long-reining a horse:

1. Wear gloves to prevent burns by the reins.
2. Walk on a circle concentric with the path described by the horse and far enough in the rear and to the inside to be out of kicking range.
3. Remove spurs to prevent becoming entangled in the reins should the horse become frightened.
4. Keep a sharp knife on hand in the event a trainer does become entangled in the reins. The reins may be quickly cut before the trainer is dragged very far.

Greatest emphasis should be placed on riding hall movements during this week with the object of completing the first phase of training, i.e., accepting a rider on his back without showing undesirable defenses and executing elementary schooling movements with a considerable degree of smoothness. The following is a list of simple movements which may be used as a guide; Mounting and dismounting, the start from the halt, movements by the flank, obliques, abouts, half turns in reverse, circles, figures of eight and serpentines (in column and individually), transitions from the walk to the trot and gallop and back to the trot and walk, the halt (requiring immobility), and backing. At least one hour each day should be devoted to this drill. It is well to remember in connection with this work that riders should make every effort to induce forward motion in borses which show a tendency to buck, rear, or balk upon being mounted. This may be done by leading from a quiet horse, by having an assistant precede the horse with an oat can or, in extreme cases, by snubbing to a stock saddle on a quiet horse.

In the event a rider has been unsuccessful in riding a particularly fractious horse, he should drop that particular phase of instruction and go back to something the horse will do quietly and well. Do not attempt to ride him again for several days or even a week. In this way he is given an opportunity to forget a bad lesson.

4TH WEEK

1. Prolonged periods across country, completely harnessed, at all gaits.
2. Continue use of long reins, substituting for them traces with halter-shank extensions, gradually attaching light drags to halter shanks.

EXPLANATION: During the fourth week, the second phase of training commences; that is, training the horse to pull a load as an individual and confirming in him a desire to move forward regardless of the effort required. This is one of the most important phases in his training and one which is often entirely neglected. One shirker in a team can do more harm in heavy draft than if he were taken out and the team permitted to work without him. He not only does not do his share of the work, but by quitting he induces other horses (normally good pullers) to quit. It is much better to maneuver a carriage with four good pullers than with five good pullers and one shirker.

The general principle involved in training horses to pull is to start with the very lightest type of load, increasing it very slowly and gradually until the horse is capable of pulling alone a carriage with wheels locked. The greatest harm is done when the trainer becomes too optimistic about a horse's pulling capabilities and adds weights on too rapidly, resulting in a stall. Know "a good stopping place" when you see one and do not let your enthusiasm run away with you. As an analogy: If you are training a 3′ 9″ horse to jump 4′ 0″ and you have successfully negotiated five 4′ 0″ jumps after a preliminary period of thirty 3′ 9″ jumps, do not try him over the same course at 4′ 6″. By that time, he is probably too tired to jump a 3′ 6″ course successfully. Give him a handful of oats and send him back to the stables.

If you have the misfortune of permitting your horse to stall, remove the entire load immediately. Start at the beginning and do not work up to the load which produced the stall for several days. By that time he may have forgotten all about stalling.

The following procedure is recommended in teaching a horse to pull weights. After the horse has accepted the outside longeing rein, described in the work of the previous week, harness him completely. Attach halter-shank extensions to the traces and have an assistant walk behind holding the traces in a position parallel to the ground. He should rub the flanks and hind quarters with the traces and occasionally apply pressure to the collar by pulling to the rear. After he has accepted the pressure on the collar, attach a weight to the halter shanks for him to pull. A sled consisting of two runners with cross pieces made out of 2″ × 6″ material will serve the purpose. This apparatus has the advantage of permitting a gradual increase in the load to be pulled by adding first a rider to the sled and later adding in tandem one or two more sleds with riders, as the horse becomes confirmed in pulling.

During the fourth week, it is well to continue suppling the more backward remounts by the methods prescribed in the work for the third week, postponing the weight-pulling phase of their training until the following week.

5TH WEEK

1. Pair drill and across country, at all gaits.
2. Dragging heavy weights in the bull pen.
3. Hitching to escort wagon with a quiet mule.
4. Use of kicking rope.
5. Hitching the more gentle remounts as wheelers in a carriage.

EXPLANATION: The fifth week should complete the second phase of remount training. Continue the drag-pulling work of the previous week, attaching heavy weights, such as logs, steel beams, or any suitable load at hand until the maximum effort of the horse is attained. Here again, caution must be used lest a load too heavy for the horse to pull is attached, producing a stall.

The next step, and a very important one, is to break the horse to the rumble and noise of a carriage. The best method is to hook a remount with a quiet mule to an escort wagon. The mule starts the wagon rolling and the first reaction of the horse is to plunge, buck, rear, or kick. The mule generally pays no attention to these antics and continues to move the wagon forward. In a very few minutes the horse calms down and works smoothly alongside the mule. A quiet mule is better than a quiet horse for this work because of the more obstinate and phlegmatic disposition of the mule. If a mule and an escort wagon are not available, this work may be done with an artillery carriage, but is not nearly as satisfactory since the trainer has less control.

The escort wagon is also used to break a vicious kicker. After the horse is hooked in, snap a halter shank to the martingale ring under the horse's belly, and run the other end between his hind legs to an assistant in the wagon. Tickle the horse between his hind legs by pulling on the halter shank, inducing kicking. Allow him to kick at will. In a very short time, he will stop and pay no more attention to the kicking rope. This procedure should be followed for several days until the horse becomes confirmed. Later, when the horse is hooked to a carriage and a trace gets between his legs accidentally, he will generally pay no attention to it.

The most important thing to remember in escort wagon

work is to maintain forward motion of the wagon. The driver generally has his hands full controlling the pair. An assistant should be in the wagon with him equipped with a long blunt stick to prod the mule along. A whip should not be used because it would further excite the remount. Occasionally, a horse will lie down in harness, in which case the mule should be induced to move forward and a whip should be applied simultaneously to the horse.

The weight pulling and escort wagon work should always be preceded by quiet road or cross-country work and pair drill, harnessed at all gaits for a period of two hours.

Time permitting, some of the more gentle remounts may be hooked in the wheel positions of an artillery carriage and permitted to pull the carriage over even terrain before the end of the fifth week.

6TH WEEK

1. Pairs formed as a team (unhitched) across country over varied and difficult terrain.
2. Hitching three pairs to a carriage.
3. Elementary draft (starts, halts, wide turns on even terrain).

EXPLANATION: Pair drill is continued and cross-country work (harnessed) over more varied and difficult terrain should be a preliminary to elementary work hitched to carriages. This confirms horses in negotiating natural obstacles which will be encountered later in difficult draft. In crossing ditches or logs, horses should not be permitted to jump. Steep slopes or slides should be negotiated at a slow walk.

In pair drill, the circles and figures of eight should be emphasized. The off horses should be urged to move out ahead to the full limit allowed by the coupling rein on turns to the right and held back so that their heads are even with the drivers' knees on turns to the left.

Following this preliminary drill and cross-country work, pairs should be hooked to a carriage. Each pair must be able to pull a carriage smoothly in the wheel position before progressing to the swing or lead. The more fractious remounts must be worked over prolonged periods of time in the off wheel position beside a quiet near wheeler. As they qualify in wheel position they may be moved up until by the end of the week each carriage is pulled smoothly and quietly by its full team of six horses. No effort should be made to go beyond elementary draft on level ground. This includes starts, halts, and wide turns at the walk and trot.

7TH WEEK

1. Prolonged periods over smooth level roads at the walk and trot (complete teams hitched). Cover ten to fifteen miles daily in order to confirm horses in moving a carriage smoothly as a team.

EXPLANATION: As complete teams are formed, they should be taken out daily for a period of one week over smooth level roads (preferably dirt) where there is no traffic and very little draft. Ten to fifteen miles each day at the walk and trot confirms horses in moving a carriage smoothly as a team. They are now in the best physical condition and capable of performing fatiguing marches. They will become accustomed to the rumble of the carriage and to work in their proper positions. No attempt should be made to change the position of any horse unless it is obviously necessary. Drivers should permit complete freedom of rein and allow the horses to move with the minimum of restraint.

In the early stages of training a team to trot, allow the horses to set their own pace. Make very little effort to restrain them to a slower rate until they have had considerable experience in trotting at their own natural pace. Avoid hard concrete roads because considerable harm may be done to horses' legs if they are allowed to trot faster than eight miles per hour over prolonged periods of time on pavement.

Whenever a carriage is started, move it straight to the front so that it is rolling freely before attemping to make any turns. This rule should be followed whether you are working with remounts or trained teams. Never go directly into a turn from the halt if you can possibly avoid it, for such a turn will causes the horses to sidestep.

Horses that still resent pulling by remaining behind the collar and shortening their strides must be returned to pulling drags in the pull pen.

8TH WEEK

1. Continue long road marches, changing individual horses and pairs until best combinations are obtained.
2. Long, easy ascents and descents.
3. Galloping over easy terrain.

EXPLANATION: Every artillery team should be able to gallop at a comparatively slow, effortless gallop. In commencing this type of training, a long, smooth dirt road with a slight upgrade should be selected. Make a gradual transition from the normal trot to the extended trot and allow them to break into the gallop of their own accord. Start with only a few galloping strides, returning to the trot at once. Gradually increase the duration of the gallop. Another procedure is to gallop on a large circle to the left. Do not attempt the gallop to the right until you get a smooth performance to the left. Galloping is a tiring gait and should not be indulged in for a period long enough to produce fatigue.

During the eighth week, training in maneuvering the team up and down long, easy slopes may be started. Never attempt an ascent steep enough to stall the carriage, as horses quickly become routined in stopping. If this happens, go immediately to an easier ascent, one which you are certain the team is able to negotiate. Similarly, do not attempt a descent which will cause the horses to scramble down hill. The training of the wheelers to sit back in the breeching in order to hold the carriage on a descent should be very gradual.

9TH, 10TH, 11TH, AND 12TH WEEKS

1. Short, difficult pulls, increasing draft.
2. Medium draft over varied terrain.
3. Galloping on circles, figures of eight, and across country.
4. Schooling on a rectangle, stressing gaiting and the execution of the sharp turn.
5. Difficult draft to include steep ascents and descents, drop offs, banks, slides, crossing sunken roads, difficult stream crossings, and winding around trees.
6. Rushing sharp steep slopes with loose footing at the extended gallop.
7. Heavy draft over moderately easy terrain, wheels locked to further confirm horses in pulling.
8. Heavy draft over difficult terrain.

EXPLANATION: By this time, all horses should be capable of maneuvering correctly over ordinary terrain and of executing all drill ground movements with a high degree of precision and flexibility. Hence, the explanation of the work for the succeeding four weeks, consisting principally of difficult and heavy draft, is combined, since the order in which the various elements are taken up is of little importance as long as it is of a progressive nature.

Habitually, start the day's work with a one-hour warming-up period for the purpose of suppling the horses. Maneuvers limbered and work on the gaiting rectangle are excellent exercises which settle the horses down to smooth work. Some work at the gallop should be included during these warming-up periods. After galloping on circles on either hand, change to a large figure of eight, bringing the teams down to the trot at the point of change of hand and exaggerating the staggered positions of near and off horses, keeping the inside horses well ahead of the outside. As progress is made, decrease the size of the figure of eight.

Follow the warning-up periods by slow work over varied terrain to include easy natural cross-country obstacles such as small ditches, mounds, logs, low brush, and an occasional sharp ascent and descent. Conclude the day's work by negotiating two or three obstacles involving difficult or heavy draft. A number of such obstacles with an explanation of the proper method of negotiation is given below:

1. LONG STEEP DESCENT (GOOD FOOTING): Lead and swing drivers continually look back, keeping out of the way of the wheelers and restraining their pairs from pulling. The wheel driver must check his pair the instant the weight of the carriage acts on the breeching. The main initial shock must be absorbed by the application of the brake. Unless the descent is made slowly, a scramble may result by the gathering of momentum by the carriage.

2. LONG STEEP DESCENT (LOOSE OR SLIPPERY FOOTING): In this case, the wheelers are unable to hold the carriage and actually sit down on their haunches in an effort to check the weight of the carriage. To prevent this, a prolong consisting of a section of picket line is attached to the rear of the carriage. Cannoneers, in tug of war fashion, help ease the carriage down by pulling back on the rope as the carriage proceeds down hill.

3. PERPENDICULAR DROP OFF: This is a very difficult obstacle to negotiate without turning over the limber, caisson, or piece. In order to permit each pair of wheels to drop off simultaneously, the carriage must be brought exactly perpendicular to the edge of the drop off. The lead driver moves his pair boldly to the edge and without hesitation, drops down. Swing and wheel drivers obtain slack traces by closing in strongly on the leaders and dropping off consecutively. The entire team must continue on the original line, terrain permitting, until the entire carriage has dropped off. If the leaders turn, they may change the direction of the carriage sufficiently to overturn the caisson or piece although the limber dropped off squarely. In taking a high drop off, it may be necessary to lengthen the traces and to hold the rear end of the caisson down by rope to prevent tipping forward.

4. SUNKEN ROAD CROSSING: The approach is the same as described above for the perpendicular drop off. There will be a tendency on the part of the lead pair to avoid climbing up the opposite bank as soon as they reach the road bed. The lead driver should keep his pair abreast and continue on a straight line. In doing this, the leaders should remain out of draft, for a pull by them on top of the bank while the swing pair are in the road bed may bounce the swing driver entirely out of the saddle by the tension of the traces. As the lead and swing pairs arrive on the opposite bank, the drivers look back and bring their pairs into draft the moment they see the front legs of the wheelers arriving on top of the bank. In this manner, all six horses will be in draft when it becomes necessary to pull the carriage up the opposite bank.

5. V-SHAPED DITCH: The greatest difficulty in negotiating this obstacle is in preventing a tendency on the part of the horses to jump the ditch. Much harness can be torn if a horse lunges instead of walks through. The lead pair must continue at a normal pace, walking boldly through as the carriage is brought up strongly by the swing and wheel pairs. Each driver in turn must be on the alert and check quickly any tendency to lunge or jump, at the same time bringing them into the ditch without hesitation.

6. HEAVY BRUSH AND SAPLINGS: Drivers uncouple their off horses and drive through with the heads of each pair held close together, the lead pair forming a wedge with which to penetrate the brush. The team should be taken through boldly so that the momentum of the carriage will be able to bend the larger saplings.

7. SIDE HILL: Owing to the tendency of the carriage to skid downhill, it is necessary for the entire team to move obliquely uphill, the lead pair considerably higher up than the wheel pair. The drivers must keep their horses abreast and prevent the uphill horses from crowding or "riding off" the downhill horses. To prevent the carriage from tipping over, cannoneers hold the carriage by halter shanks attached to the uphill side.

8. DEEP STREAM CROSSING: A carriage cannot be maneuvered across a stream deep enough to require the entire team to swim, without unhitching. At least one pair must be on solid footing in order to have sufficient draft to keep the carriage moving. In negotiating the latter type of crossing, each driver must be careful not to pull suddenly on the reins when his pair is swimming. Such a pull may overturn the horse backwards. If the current is rapid, the lead pair must be urged at an angle upstream, using the upstream leading reins, otherwise they may be swept downstream. It is well to have a bold single mount precede the lead pair. As the lead pair reaches solid footing again, it must be prepared to pull the entire carriage, for at that instant the swing and wheel pairs may be in the portion of the stream requiring swimming. In crossing a deep wide stream, unhitch the teams and swim them across. The carriage may then be pulled across by attaching a picket line to the pole, taking the other end across the stream, and attaching it to a single tree. One, two, three, or four horses working in tandem can pull the carriage across.

9. EXTRICATING A CARRIAGE MIRED IN A BOG: If a team of five pairs working on solid footing through the medium of a picket line attached to a limber are unable to extricate the mired carriage, other means must be improvised, as adding more pairs would not materially increase the power of the team. One method is to attach two or three teams with their limbers abreast to a stout timber or log which is in turn attached to the mired carriage. This method doubles or trebles the drawbar pull of one team. Motor trucks or any other type of artillery vehicles may be extricated in this manner. If a block and tackle is available, it may be employed to great advantage. Carriages may be pulled out of deep ravines in a similar way. In lowering a carriage into a deep ravine, it is best to use a block and tackle in order to obtain mechanical advantage and to change the direction of pull.

10. THE SHARP TURN (SUCH AS A TURN INTO A NARROW GATE FROM A NARROW LANE): The wheel driver is solely responsible for the movement of the carriage. The lead driver makes the abrupt turn at a normal pace. Swing and wheel pairs move on the same ground, obtaining slack traces by moving up strongly, increasing the pace for a few steps. In this manner the carriage completes the turn without causing carriages behind to slow down.

11. MANEUVERING THROUGH A DENSE FOREST: This type of obstacle entails maneuvering in close quarters and making frequent sharp turns around trees. Make use of the sharp turn as described in 10 above, remembering that to prevent snagging a carriage on a tree, maximum use must be made of draft on the inside of the turn. If a carriage is snagged, back it up about one foot. Obtain a fair sized log (about four inches in diameter) and hold it against the tree at

an angle of forty-five degrees. As the wheel strikes this log, is skids laterally far enough to clear the tree trunk. If no log is available, unlimber the carriage and move it by hand around the tree.

12. STARTING A STALLED CARRIAGE: If a carriage is stalled on a hill, the certainty of starting is insured if the team is started and moved forward a stride or two before the full load is felt in the collars, or if the horses are allowed to move a few strides with no weight in the collars. There are three methods recommended for obtaining this:

a. If the ground permits, the team and pole may be turned toward one flank (preferably the right), and, when ready, the team moved out in the new direction. After the team has the carriage rolling, the upward climb may be resumed.

b. If the carriage is on a narrow road or must resume the march along the same road, cut and back the limber until the trail of the carriage points across the road, straighten the team and pole to point up the road, and when ready start the team. As the team starts, it first feels only the pull of the limber and does not feel the pull of the entire carriage until the carriage straightens out.

c. Let the horses stand for a minute or so to quiet them, then back them until they are as close as possible. Move the lead pair out quietly. Have the swing driver watch the lead traces, and, as soon as they start to tighten, he should move his pair forward. The wheel driver watches the traces of the swing and moves out when they tighten. As soon as all traces tighten, the horses must be required to give their maximum effort by the use of aids and voice. The above method is usually successful because the lead pair has taken six or eight steps forward before any pressure comes to their shoulders, the swing pair three or four, and the wheel pair sees the other horses going to the front. This conveys to the horses the idea that everything is all right and they are willing to try again. Furthermore, the inertia of their bodies is overcome separately from that of the carriage and their momentum aids in moving it.

13. HEAVY DRAFT WITH WHEELS LOCKED: As previously stated, each draft animal must be trained to exert his maximum effort pulling drags and must be confirmed in the habit of pulling before he may be expected to work harmoniously in a team. After teams have been trained to pull easy and medium ascents, they may be started on heavy draft, using the principle of gradually working up to the maximum effort of the team by stopping short of a stall. As the team is working on level ground, the brake may be applied one notch at a time until the wheels become locked. Later, practice starting a carriage with wheels locked. To save wear and tear on the brake lining, a 2″ × 4″ can be inserted between the spokes of the carriage wheels. Ultimately, enough power should be developed in a team to drag a locked carriage up fairly steep ascents. Only a short period should be devoted to this work, as prolonged periods become extremely fatiguing to the horses.

Most other obstacles encountered are simply modifications or combinations of those described above and the principles involved are the same. Common sense, coupled with a thorough knowledge of the teams' capabilities and the experience of the drivers, should dictate the procedure to be followed. A great many hazards may be reduced or eliminated by simple pioneer work and this should always be done, time permitting. Because difficult draft is very fatiguing to the horses, every effort should be made to conserve their energy. Frequently, time and energy may be saved by reconnoitering detours around difficult obstacles.

In conclusion, it may be stated that successful draft remount training requires a great deal of common sense, patience, judgment, and powers of perception on the part of the instructor. A schedule such as the one just described is helpful principally as a guide. It should not be followed blindly. Many short cuts may be employed in individual cases. Others require longer and more patient work to achieve best results. The foregoing schedule is one which should work successfully in training the most fractious type of remount.

It is realized that draft remounts frequently have to be trained under conditions far from ideal. The principles and methods described above are still applicable since they are based upon many years of actual experience. However, the schedule lends itself to a great deal of elasticity, so that modifications can be made because of lack of time or equipment. A few of the short cuts that may be used to shorten the period of training are described below:

1. Remounts which have been used as riding horses but have never pulled in draft may be started on pulling drags during the second week. By this time, they are in good enough physical condition to withstand fairly fatiguing work. This reduces the first phase of training by two weeks.

2. Remounts which have been used in ordinary farm work such as plowing or pulling a wagon need not spend any more time on drags or escort wagon work than is necessary to determine their qualifications. This can be determined in a few minutes. However, more time may well be spent on working them as single mounts to obtain suppleness and flexibility.

3. Should the time allotted to training remounts be limited to six weeks, the foregoing schedule may be modified as follows: During the first two weeks cover the work outlined for the first three weeks. Likewise, during the next two weeks cover the schedule for the fourth, fifth and sixth weeks. Then, during the fifth week include the work given for the seventh and eighth weeks and devote only one week to difficult and heavy draft explained in the schedule for the last four weeks.

Finally, it is desired to emphasize the fact that smoothworking, powerful Artillery teams can be obtained only by thorough basic training of each horse. Particularly does this apply in his training to pull heavy loads as an individual.

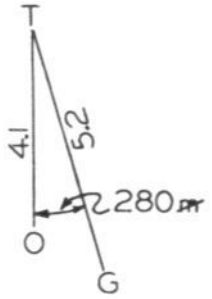
Need for training still exists; following radio message received at division headquarters during night maneuvers:—"RADIO TUCK REPORTS: WE ARE FOLLOWING WRONG MAJOR AROUND, MP'S GAVE US WRONG INFORMATION. DON'T KNOW WHERE WE ARE. WHAT SHALL WE DO? RADIO OPERATOR. 10:35 P."

Field Artillery School is testing panoramic cameras to determine suitability for field artillery survey work.

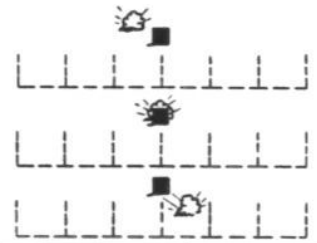
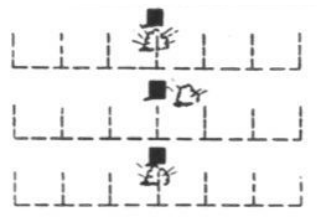
PROBLEMS IN GUNNERY

Type problem, precisions, small T.—In order to simplify procedure, the officer firing uses *c* instead of the fork, and ignores small deviations.

Mission: Registration on a check point. Materiel: 75-mm. M2 gun (on the right). Ammunition: Shell Mk I, fuze quick. T = 280 mils; *r* = 4.1; R = 5.2; *c* = 7; *s* = 6; *r/R* = .8; data are plotted.



Initial commands: No 1 ADJUST, CA 4960, SH MK I, FQ, NO 1, 1 RD, Q 200.

Rd. No.	*Commands*	*Elevation*	*Sensing*	*Dev.*	*Rn.*	*Def.*	*Remarks*
1	Q	200		30 R	?		.8 × 30 = 24
2	L 24	200			—		Small deviation is ignored.
3	R 12	214			+		A two-*s* change in deflection to compensate for 2-*c* range change.
4	L 6	207			—		Small deviation is ignored.
5	R 3, 3 Rds.	210 (211)			+	?	Range may be sensed by rule. Deflection is over and is changed ½-*s* to get a deflection bracket.
6					+	+	
7					—	?	
8	L 3	210 (211)			—	—	First group of 6 rds. is completed. Fired at 210 (211). *c* = 7. 4 shorts, 2 overs. 2/12 × 7 = 1.2. 210 (211) + 1.2 = 211.2 (212.2), adjusted elevation.
9					—	?	
10					—	—	
	R 2	211.2 (212.2)	Not fired				Fire should be continued in series of 3 rds. until deflection is correct.

Locating Points From Oblique Airphotos

By Major Thomas North, FA.

One of the leaders in the practical application of the relatively new science of photogrammetry is the German Dr. O. von Gruber. In his texts, which have been translated and copied, there appears a discussion of the principles of perspective in so far as they apply to his subject. A simplified form of one of his figures follows:

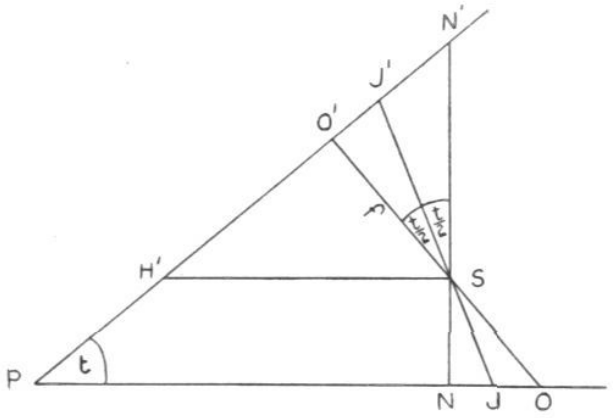


Fig. 1

PN' and PO are the side elevations of two planes inclined to each other at an angle t
S is the camera lens
OSO' is perpendicular to PN'
N'SN is the vertical through S
H'S is parallel to PO
The angle O'SN' = N'PO = t
J'SJ is the bisector of the angle O'SN'
Now in the triangle J'H'S, the angle H'J'S = 90° — *t*/2
the angle J'SH' = 90° —t/2
therefore H'J' = H'S

If we consider the plane PN' to be that of an oblique photograph (negative), and PO to be the earth's surface, certain of the points on the diagram become recognizable, viz.:

H' is the trace, on the photograph, of the true horizon
O' is the principal point (center point) of the photograph
J' is the isocenter. Further delving into the mathematics of the subject brings out that on a photograph the angle formed at the isocenter by rays from any two image points is equal to the angle formed on the earth's surface at the point J by rays from the two objects themselves. Expressed more briefly, directions from the isocenter to image points are angularly true.
N' is the image of the plumb-point N, lying vertically below the camera lens. Displacements of the positions of images resulting from relief are radial from the plumb-point. (On a perfect vertical airphoto O', J', and N' coincide.)
SO' is the principal distance, or somewhat inexactly, the focal length f of the lens.

This geometry provides a simple graphic solution to the problem of locating targets on a map from an oblique airphoto.

Photography

The method requires that photos of the target area be taken as follows:

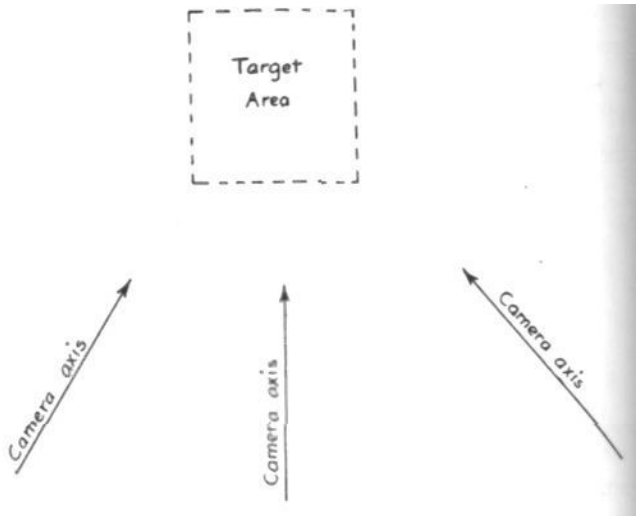


Fig. 2

1. Three photos must be taken, with the respective axes of the camera pointings converging by not less than 20°. The airplane altitude need not be uniform, but must be known approximately.
2. The horizon must appear on each photo.

3. Each photo must show three points which can be identified on the map and which are located with sufficient accuracy to be used as control points.

Drafting

1. Locate the principal point of each photograph (intersection of the true diagonals).
2. Identify the apparent horizon, h.
3. Measure the distance hO' from the principal point to the apparent horizon.

From Fig. 3 it will be noted that this distance, divided by the focal length of the camera, would be the tangent of the

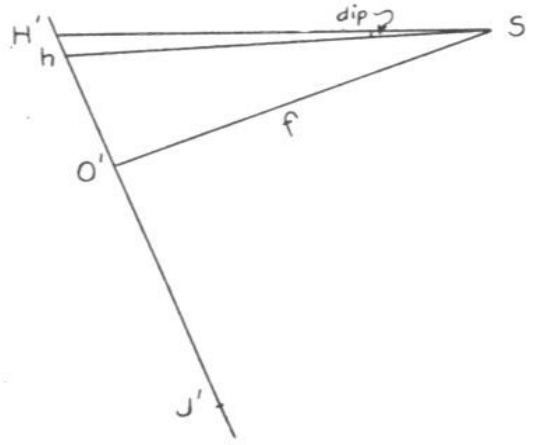


Fig. 3
(*In this figure H'J' represents the plane of a positive print, instead of the negative.*)

angle of depression of the camera if the true horizon H' showed on the photo instead of the apparent horizon. The true horizon is always above the apparent horizon by an angle, called the "dip," equal to: $59\sqrt{\text{Flight altitude in feet}}$ seconds of arc. By adding this dip to the apparent angle of depression (h SO'), the true angle of depression may be obtained.

Practically it will be found that using photographs of 12″ focal length, for instance, the true horizon is above the apparent horizon by these amounts:

Airplane altitude	*Dip*
2,000 feet	0.15 inch
4,000 feet	0.22 inch
6,000 feet	0.26 inch
8,000 feet	0.31 inch

It is a simple matter to prepare a table giving the distance H'S for any measured distance hO'. Select an altitude, for example, 4,000 feet, and solve the equation: $H'S = \sqrt{(hO' + 0.22)^2 + f^2}$ in inches, for values of hO' increasing by 0.2″ from 0 to 4½″; note that H'S must be corrected for other altitudes according to the difference in the dip.

4. Place a sheet of tracing paper over the photograph. Trace the apparent horizon and the perpendicular to it through the principal point O' (Fig. 4).
5. Find point J' by measuring H'S minus dip along this perpendicular from the apparent horizon. (H'S minus dip may be incorporated in the table described above; for a focal length of 12″ it will be found that not much error is introduced by assuming hJ' [= H'S minus dip] to be 12¼″ irrespective of the altitude.)

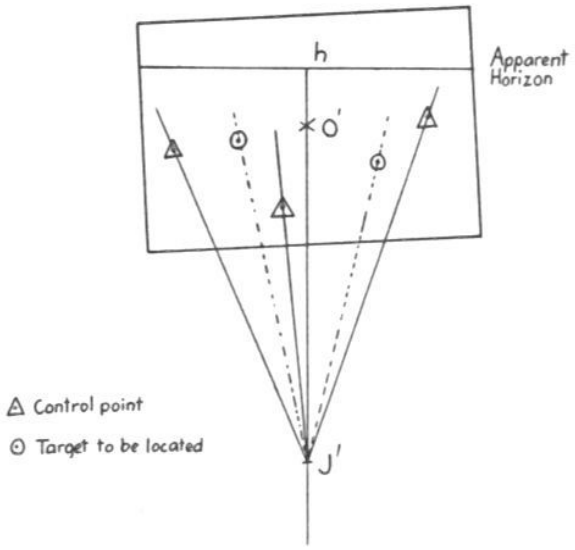


Fig. 4

Referring back to Fig. 1, it will be noted that because H'S equals H'J' we have located J', the isocenter of the photograph, from which directions to image points on the photograph are angularly true. Therefore we can resect the position of J' on the map.

6. Draw lines on the tracing paper from J' to the three or more image points corresponding to the points to be used for control. Draw other lines to the images of the targets to be located.
7. Make a tracing-paper resection on the map of the position of J'.
8. Prick through to the map the directions from J' to the targets. Repeat operations 1 to 8 using the other two photographs. The intersection of corresponding rays to targets gives their map position.

The direction of rays from J' to the various points will not be absolutely true if there is appreciable difference in relief; however, the error is normally quite small for the reason that displacements due to relief radiate from the plumb-point N' which is also located on the perpendicular hO'J', but at a greater distance from the apparent horizon.

It will be found that the method is much more rapid, and much simpler than the description would indicate. It would be interesting to learn if it is as suitable in practice as other methods which may be more familiar to field artillerymen.

ORIGINS
of a
MAJOR WAR

By Colonel Conrad H. Lanza, FA.

Editor's note: In previous issues Col. Lanza has traced the causes of the European War from the assassination of Doll-fuss through the annexation of Czechoslovakia. Herein he concludes this important historical analysis by describing the events leading up to the invasion of Poland. The opinions expressed and conclusions drawn are solely those of the author.

GERMANY MAKES THE FIRST MOVE

Taking advantage of the prestige acquired by successes in Austria and Czechoslovakia, Germany moved, in 1939, to recover the small territory of Memel. An excellent port, with a German population, it was just what was needed as a base to receive, by the sea route, reserves and resources for possible future operations in East Prussia. This would avoid the necessity of sending these across the Corridor, where they would be surely observed, and possibly stopped, by Poland.

First serious agitation occurred in Memel on 15 March. Poland, recognizing the symptoms as a first step to something else, took alarm. Her secret service reported that Germany proposed to seize Memel on or about 25 March. The Polish people intensely disliked and feared the Germans; they believed the intended movement was a preliminary step to war against them. Noisy demonstrations against the German embassy in Warsaw occurred on 17 March. Agitation in Memel increased. On German representations, Lithuania, too small to fight, on 21 March agreed to peaceful cession of Memel. Thus the base for East Prussia was secured. One more step had been taken toward the ultimate mission of uniting all German peoples in one solid bloc in Central Europe.

On 21 March the Polish ambassador at Berlin was asked to arrange the cession of Danzig to Germany, subject to retention by Poland of her port rights. Poland was asked also to grant extraterritorial rights for a motor highway and a railroad across the Corridor. On 26 March Poland replied that she could not accept the German proposition. Perhaps she was too abrupt in her statements and showed too much dislike for even discussing the German requests. She notified the German ambassador an Warsaw that she was mobilizing 600,000 men; a strong detachment was already at Tchew, some 45 kilometers from Danzig, where they had excellent motor roads and railroads to enable them to advance rapidly into that city. At this time Germany did nothing. The necessary preliminary measures for war with Poland were not yet completed. The issue was however, defined: A German desire, and a Polish refusal, for reorganization of the Corridor, and cession of Danzig to Germany.

ALLIES COUNTER WITH POLICY OF ENCIRCLEMENT

The democracies had been taken off guard by the seizure and disarming of Czechoslovakia. They were frightened by the boldness and the swiftness of Hitler's actions. They now realized that the Dictators could probably be stopped only by war, or by a very serious threat.

All three democracies refused to recognize as legal the occupation of Czechoslovakia. On 18 March, the United States, which had withdrawn its ambassador from Germany the previous December, announced the imposition of penalty duties on German goods. The press of the democracies was hostile to the Dictators.

Great Britain and France decided to accept the risk of war, but to attempt to avoid it by organizing a ring of nations around Germany and Italy. Each country in the ring was to be ready to go to war whenever any one of them believed itself threatened by the Dictators, and requested intervention. The argument was that if the ring was guaranteed by the mighty British and French Empires, the combination would be so strong that even Hitler and Mussolini might realize that their game of bluff and intimidation of their small neighbors must stop. Otherwise the two Empires, plus the ring, would be in an excellent position to attack, and would most certainly destroy the Dictators by their ability to institute a blockade and cut off essential resources. It was decided to give maximum publicity to the encirclement idea, in the hope that the Dictators, seeing the trouble ahead, would abandon aggression. The encirclement was to be explained as a purely defensive measure, which had

no meaning if aggression did not occur.

The nations most likely to join the ring would seem to be those who were probably next in line as victims of Germany and Italy. Who were they? Nobody knew for sure. Poland and Rumania seemed to be next possible objectives for Germany; Greece might be for Italy. Holland, Belgium and Switzerland had reasons to fear Germany; Turkey—Italy. It was possible that Hungary and Yugoslavia might be victims of either Germany or Italy. It was decided to suggest to all these states that as a matter of self interest they associate themselves in a joint "stop the Dictators" movement, by arranging for collective action by all in case of danger to any.

It seemed reasonably certain that Russia was vitally interested in preventing Germany from seizing territory at the expense of Poland, Rumania or the small Baltic states. It was assumed that Russia would undoubtedly join in a "stop Hitler" movement, that she could not afford not to do so.

On 31 March, Great Britain unilaterally announced that a guarantee to Poland had been given; she extended this on 13 April to Greece and Rumania. France joined in the guarantee. Poland was sympathetic, and indicated that she would gladly accept the proffered aid. Poland had strong military forces; it was thought that if backed by Russian supplies, which were expected, she would be able to occupy for a long time the German army on an active east front. It was particularly desirable to have Rumania join in this, as her army was of considerable size. More important, her entrance as a partner in the ring would deprive Germany of oil and grain, and materially assist in maintaining the blockade. Greece afforded valuable bases for the British fleet. It was believed that Rumania and Greece would follow Poland in accepting the guarantee offered for their protection. Many thought that the totalitarian states would never date to force conclusions with the democracies and their allies, now organized and aroused to active opposition.

Flirtation with Russia Commences

The Allies and Germany both sought to obtain the assistance of Russia. The Allies operated openly, confident that Russia would not refuse it; Germany worked secretly. The Allies announced their progress at short intervals, principally by government speeches in the House of Commons. It was believed this would encourage their own peoples, and correspondingly discourage Germany and Italy, now plainly confronted with powerful enemies, from commencing new adventures. The possibility of a German-Russian agreement was judged to be so improbable as not to be worth considering.

The first Russian objection to joining the Allies was made on 15 April. It was based on the ground that the guarantee to Poland was obviously directed against Germany, and no one else. Consequently Russia preferred that Germany be designated by name, rather than by using the word aggressor. She objected to a secondary role, which required her to act, whenever any state to whom a guarantee had been given should so decide, regardless of the circumstances which might have brought the situation to a critical point. Poland and Rumania had in 1926 signed a military treaty against Russia, and now Russia was being asked to guarantee them. Nevertheless Russia was ready to guarantee her border states, provided they and Greece signed treaties not to act against Russia. She noted that the Allies had guaranteed Belgium, Holland and Switzerland, and asked Russia to join in these; this might be done, under condition that the Allies similarly guaranteed the small Baltic states.

Replying to the British threat of encirclement, Hitler in a speech on 1 April, stated in substance that if Great Britain wished to fight, Germany was ready. He was considering abolishing the British-German Navy Pact of 18 June, 1935. On 28 April he did denounce the Pact on the ground that it had been founded on a condition of peaceful relations, but that now all British politics were centered on organizing alliances and guarantees for a war against Germany. He also denounced the nonaggression treaty with Poland, on the ground that Poland had refused German efforts to solve the Danzig problem.

Italy strengthened her position on 7-8 April, by seizing the small state of Albania, which contains oil resources and affords a base for land and air operations against Yugoslavia and/or Greece. This act was condemned by the democracies as one more aggression and another violation of international law. It strengthened the popular approval to preparing for war against the Dictators.

On 2 May, the Allies, confident that Russia would arrive at an agreement with them, rejected the Russian proposals. They asked Russia to guarantee Poland, Rumania and Greece jointly with them; Russia to be free to unilaterally guarantee the small Baltic states.

Allies Fail to Heed Warnings of Berlin-Moscow Rapprochement

The next day the Russian Commissar for Foreign Affairs, Litvinov, was suddenly relieved; he was replaced by V. M. Molotov. The Allies attributed the change of ministers to interior politics, and of no special importance. Yet they might have taken warning. Litvinov had, since 1933, earnestly tried to cooperate with Great Britain, France and the League of Nations. He had broken away from a previous policy of friendliness to Germany. He was a Jew; he disliked Hitler and the Nazis. The possibility that Litvinov's relief indicated a veering of Russia towards Germany was considered, but the Allies believed this to be so improbable as not to warrant any change of policy. Taking no alarm, Colonel Beck, Polish Minister for Foreign Affairs, on 5 May made a belligerent speech. He recognized that Danzig

was a German city, but it was necessary to Poland. It must remain under her control. Poland would never surrender any extraterritorial road, railroad, or anything else to Germany. Provided this was understood, he was ready for discussions if Germany had any grievances to submit.

Reports were received in the United States on 6 May that Russia desired to occupy Finland, Esthonia and Latvia, in order to forestall eventual German occupation. On 8 May, Mr. Tolischus, New York *Times* correspondent at Berlin, wired that Hitler was seeking an alliance with Moscow, to be concluded before any operations against Poland were started. The same day, the Russian government released from confinement and restored to duty Karl Radek, known to be a friend of Germany. On 15 May, Russia declined the latest Allied proposals as too one-sided. The Allies ignored these events as being without significance, and proceeded with their plan.

Hungary, Yugoslavia, and other states were offered guarantees. Excepting one, all declined. They did not wish to commit themselves to a war which they saw in the making. They were intensely interested, but they were small and weak, and it would be fatal to associate themselves with the wrong side. Better to remain neutral, conserve what they had, with the privilege of entering the war later, if and when this might be to their advantage. For the present they wished only to be left alone.

Turkey was the exception. She appeared to be reasonably safe from a German invasion. The navies of the Allies would be protection against Italy. The Turks had disliked the Italians since the loss of Tripoli and the Dodecanese Islands in 1911. They would like to recover some of this territory. Provided sufficient inducements were offered, Turkey would negotiate an alliance with the Allies. Mr. Chamberlain announced this success on 12 May. This was the second country to join the encirclement. As Turkey controlled the Dardanelles, it was expected that in case of war that important strait would be open to the Allies and closed to the Dictators. As Great Britain held the Gibraltar and Suez exits from the Mediterranean, the addition of the Dardanelles promised a control of that sea which should make it almost an Allied lake. All this was widely published, and was duly noted in Germany and Italy. Contrary to some hopes, it did not frighten these nations. It drew them closer together, and stimulated their war measures in order to escape from what they considered the intolerable dictation of the democracies.

On 19 May, Walter Lippmann in the Paris *Herald-Tribune* wrote that Russia no longer felt it necessary to seek allies, and hesitated to join herself with the British and the French, to whom she was under no obligations, and who might involve her in great difficulties. The Allies, still confident that Russia would join the encirclement nations, paid no attention to this warning.

German-Italian Alliance

On 22 May, Germany and Italy, alive to the danger of the British policy of encirclement, signed a military alliance. It provided for joint action in war. The details are not yet known. The internal evidence of that part of the treaty which has been made public, indicates that it was of German origin. The treaty uses terms not found in Italian, such as *Lebensraum* (living space); *Weltanschaung* (world view), etc. In the title, the German leader is mentioned ahead of the Italian king. The treaty was first referred to by Hitler, who in a speech on 28 April mentioned an *alliance* with Italy. This passed unnoticed at the time. The idea probably had been agreed to before this date. Von Ribbentrop, German Minister for Foreign Affairs, visited Hitler at Berchtesgaden on 5 May. He may have brought a draft of the treaty, and had it approved or corrected by Hitler. On 6 May he proceeded to Milan, where on that day and 7 May he met with Count Ciano and concluded the treaty. An economic treaty was signed on 28 May.

On 26 May the Allies made a new offer to Russia. They suggested that the three Powers agree to assist each other, if

a) Any of them should be attacked;
b) If any state in Europe, having a collateral or unilateral guarantee, be attacked;
c) If a state desiring to be neutral appealed for assistance.

On 4 June, M. Bailly, a well-known French correspondent, reported that Russia suspected Finland of having a secret agreement with Germany. Consequently Russia objected to a proposal, then under discussion, for fortification of the Aland Islands, as this might furnish a base for the German navy. Russia desired the right to occupy Finland, Esthonia and Latvia, regardless of their consent, if this were deemed necessary to head off possible German occupation. An indirect aggression by any one of these states, such as the installation of a government favorable to Germany, would be considered cause for war. Russia was not interested in Lithuania, as there was no common frontier between the two countries. She did not desire to sign any pact or alliance with Great Britain and France unless the foregoing was first agreed to. Furthermore, she in no way cared about guarantees to Holland and Switzerland, as these two states had always refused diplomatic relations with the Soviet government.

Failure of Allies in Moscow

Relations of Russia with the small Baltic states was the rock on which the Allies' negotiations broke down. The Baltic states were completely unwilling to be dominated, guaranteed, or occupied, by either of the contending parties. Esthonia and Latvia recalled what the Allies had done during the winter of 1918 and 1919. They had at that time requested the Allies to send military forces to restore order, and to properly establish their newly organized states. The Allies had designated and

authorized Germany to perform this task. German troops duly arrived. They were very efficient, and did restore law and order, but their manner of doing this had not been pleasant to the inhabitants. When the Germans withdrew, the Russians moved in, and were considered more objectionable than the Germans had been. The little nations struggling to maintain their independence made another appeal to the Allies for help. The Allies then designated Baron Wrangel and his army as their authorized representatives to expel the Russians. Wrangel was one of the German barons. He was well known; did not have a very good reputation. His army was composed of a rough lot of adventurers, dangerous and disagreeable to both friend and foe. Recollecting these two sad experiences of twenty years past, Finland, Esthonia and Latvia, on 6 June, 1939, gave formal notification that they wanted no guarantee from the Allies, nor were they willing to grant a right to Russia to send troops into their states on pretext that the safety of themselves or of Russia was threatened. The same day Marshal Voroshilov declined an invitation to attend the British maneuvers.

The negotiations between the Allies and Russia were now stalled. The Allies could not understand where the trouble lay. To them it seemed to be over a quibble as to wording an alliance. Were Poland menaced, it was inconceivable that Russia could fail to enter a war on the side of the Allies. Yet something was wrong. It was decided on 7 June to send Sir William Strang, an experienced diplomat, to Moscow to expedite the signing of an alliance, by arriving at some kind of agreement over what it was assumed were unimportant details.

About the middle of June, reports reached the Allies that considerable numbers of German troops were assembling near the Polish frontier, and that Germany would be completely mobilized, allegedly for maneuvers, by the end of July. London lost no time in repeatedly announcing that war was bound to come if Germany occupied Danzig, either by request of its inhabitants, or otherwise, or invaded Polish territory. Great Britain, France and Germany were openly and actively preparing for war; all three were issuing propaganda to place the blame for initiating a war on the other side.

On 18 June another American warning came. Mr. Knickerbocker, correspondent for the Hearst papers, wired from Prague that von Schulenberg, German ambassador at Moscow, was negotiating a pact with Stalin.

On 21 June Molotov rejected Sir William Strang's first efforts to find a formula for an alliance.

On 23 June a tentative arrangement was arrived at between the Allies and Turkey. In consideration for benevolent neutrality, the right of passage through the Dardanelles, and active military support in a war against Italy, or in the Balkans, France ceded to Turkey the vector of Hatay in Syria which contained the important port of Alexandretta. A minority of the inhabitants of Hatay were Turks; but the majority, and all of the rest of Syria, resented the cession. The Syrian government resigned. As no responsible local stateman could be found to carry on, France shortly afterwards established a military administration for Syria. It was later agreed (on 25 October, 1939) to "loan" Turkey £25,000,000. There is no record of a further consideration for the Turkish assistance, but, since in the Near East it is a well known rule of the game, it seems probable that backsheesh was distributed where it would do the most good and would be continued as long as the aid of the beneficiaries was needed.

On 1 July Holland announced that she had asked for no guarantee, did not want one, and wished to be left alone to preserve her own neutrality. The same day, Sir William Strang advised Russia in regard to the Baltic states that a change of ministers, a revolution, or a treaty with Germany would not in the opinion of Great Britain be an aggression. Two days later Molotov replied stating that indirect aggression must be provided for to the most minute detail. Negotiations continued to drag on during July.

MOBILIZATION

The commencement of August saw Europe mobilized. All nations expected war; they did not desire it, but thought it to be inevitable. Germany was demanding cession of Danzig on the ground that it was German and that its inhabitants desired annexation. The democracies were equally opposed to allowing Germany to seize more territory, except as the result of the submission of a case to the Powers for examination. They made no decision in advance as to the justness of the German cause; they did announce that if Poland unilaterally considered its independence threatened by German action they were solemnly bound by such decision to enter a war on the side of Poland.

According to the Allies' information German mobilization was to be completed by 12 August. The prevailing opinion was that Germany would march against Poland. Some thought this might be a camouflage. The reported positions of the German forces could be interpreted as directed against Rumania, a very probable objective, and considered by many a more suitable one for Germany, and to be undertaken before an attack upon Poland. Others thought that Hungary might be the victim.

Complying with her new treaty obligations, Turkey massed troops on the Bulgarian frontier under an assumption that, were Rumania to be attacked by Germany, Bulgaria might assist her. The Allies believed, after considering all available information, that Germany and Italy were preparing some kind of surprise for about 20 August. They found it impossible to discover what this could be. According to their estimates, the forces mobilized on this date would be around:

Germany	2,500,000	Poland	1,000,000
Italy	960,000	Great Britain	750,000
Bulgaria	390,000	Turkey	380,000
Hungary	300,000	Rumania	550,000
France	1,000,000	Greece	360,000
		Yugoslavia	340,000

ALLIES ADOPT LIDDELL HART'S PLAN

On 8 August, the London evening papers published a proposed plan for operations in case of war. The article was signed by Liddell Hart. At the time this gentleman had no official position but he was the most prominent and best-known military critic in England, and known to be in close relations with high officials of the British government. He proposed that in a war against the Dictators, and especially Germany, no great military offensive should be undertaken on the French frontier, as it promised no results commensurate with the losses which would probably result. He recommended only such limited operations as would insure retention of a considerable number of German divisions, thus reducing the number available for use against Poland. An active east front was foreseen to be maintained by the Poles with Russian help. An economic blockade was to be started through which it was believed Germany would be deprived of resources essential to prosecuting a war. This alone would eventually, as soon as stocks on hand were exhausted, lead to her capitulation. Believing that a large part of the German people were opposed to Hitler and Nazism, an active propaganda was to be directed with a view of creating a revolution within Germany, which would overthrow Hitler and his associates, and replace them with a government which would accede to the terms of the Allies.

Liddell Hart's plan was moderately supported in the French press by some writers who agreed as to limited operations on the French front and a blockade of Germany. There were criticisms, however, especially as to whether a blockade could be made effective within a reasonable time, and as to whether a revolt in Germany could be accomplished.

At the date this plan was published the Allies were under the impression that Russia was on their side, would at least aid in the blockade of Germany and furnish some help to Poland, considered as a vital protection of Russia itself. Rumania was allied to Poland. If troops and supplies were sent through the Dardanelles and Rumania to Poland it seemed possible that an active front could be maintained in the east which would exhaust German resources and thereby hasten the day when through lack of them Germany would have to acknowledge defeat.

Whether the Liddell Hart plan was published with the intent to frighten Germany and Italy into avoiding a war, by proving an impossibility of success, is not known. It had just the contrary effect. It enabled the German and Italian staffs to know exactly what the Allies probably would do. They proceeded with their own plan.

On 11, 12, and 13 August, Count Ciano of Italy conferred at Salzburg and at Berchtesgaden with von Ribbentrop and Hitler. The conversations were lengthy, were obviously highly important. Telephone communications between the conference and Rome were most active. Great anxiety was felt throughout Europe. Similar conversations in the past had usually been followed by some surprising event; there was no doubt but that another one was being prepared. What could it be. The best intelligence services of the Allies were unable to discover what the meeting was about.

According to speeches made by Count Ciano in December, 1939, Hitler explained at the foregoing conference that war could not be avoided. The German-Italian alliance of the preceding May had been based upon an understanding that there would be no war for at least three years, the minimum time required by Italy to complete her preparations, or better for five years, date advised by Germany as desirable for her. Now if war was to come at once, the role of Italy remained to be agreed upon. Standing on her treaty rights and knowing that the mission of the war would be the cession of Danzig to Germany, Italy's benevolent neutrality appears to have been all that was arranged. Ciano was told nothing at this time as to an agreement between Germany and Russia.

ALLIED DIPLOMATS CONTINUE EFFORTS TO SECURE RUSSIAN SUPPORT

Sir William Strang continued his efforts to secure an alliance with Russia. With war approaching rapidly, it was important that a definite agreement be had without further delay. First, Poland needed assistance from Russia in case of war with Germany; second, stopping of Russian supplies to Germany was a major item in the blockade scheme. The disagreement at Moscow centered around what constituted indirect aggression in the Baltic states. This did not seem very important to the Allies. It was unbelievable that the big idea of opposing Germany would fail because of such a minor point. Time was pressing; and what was really needed was an understanding between Great Britain, France and Russia as to what each would do when the war came. Coordination of ground, sea and air forces was essential. This ought, and could be, arranged at once. The formal agreement could be signed later after the minor question of wording a description of indirect aggression had been worked out. On 11 August, British and French general staff generals arrived at Moscow to arrange for common military action of their forces with the Russians. The generals were warmly greeted. They were royally entertained, taken to imposing reviews, shown interesting demonstrations and allowed to inspect selected military establishments. Conversations on cooperation lagged. So did the diplomatic efforts, lost in a whirl of gay entertaining.

London and Paris agreed that Italy would not enter a war to assist Germany over Danzig, a city whose fate in no way concerned Italy. London thought that Italy would at first adopt an attitude of armed neutrality. When her Alpine frontier with France became impassable from snow, which usually occurred late in September, Italy might then enter the war. Should Italy be allowed to select her own date for attacking? Might it

not be better to attack Italy at once, in Libya, in the Dodecanese Islands, and Ethiopia? The latter could be invaded by an oversea expedition from India, assisted by an invasion from Uganda.

Paris agreed that Italy would not go to war for Danzig and that Germany knew this. Possibly details along this line were being arranged at joint conferences. On 13 August, London revised its estimate of the situation. Due to recent reports of German troop concentrations in Slovakia, it suggested that maybe Germany intended to attack Hungary as an easier mission. Or the troops might act with the Hungarians against Rumania. On the 14th, Paris accepted this estimate of the situation. It appeared to be supported by news that Russia was withdrawing its west armies, supposed to be 250,000 strong, from the Polish border. This was interpreted as a friendly token towards Poland.

German press reports on the Salzburg conference stated that it had covered everything. Danzig had been considered, but this was a minor question. The important thing to do was to break the British and French plan of encirclement, and to do it at once before the ring was completed. Otherwise the Axis states would forever be subject to being dictated to by the democracies. Both the German and Italian press warned that the democracies had their last chance to avoid war. They had better take it. The Axis would no longer submit to being dominated by foreign Powers.

For the Allies, it was clear that war was near. The burning question was—what did the Axis states, and particularly Germany, propose to do? They certainly had concocted some kind of plan at Salzburg, which was brewing now, soon to be sprung as a surprise.

On 16 August, Sir Neville Henderson, British ambassador at Berlin, in a conversation at the Foreign office was told that in case of war, Russian help to Poland would be "entirely negligible," and that Russia would "join in sharing the Polish spoils." No attention was paid to this; it was assumed that these statements were personal opinions, not justified by the facts. The Allies continued their diplomatic and military negotiations at Moscow, amid a constant round of dinners, teas, inspections and amusements.

On 18 August, Germany signed an agreement with Slovakia for military occupation of that country. According to reports from neutral observers, strong German forces, estimated at 100,000 men plus 300,000 Slovak troops, were there assembled. Slovakia now presented a claim for cession of certain adjacent Polish districts, on the ground that at one time they had formed part of Slovakia; anyway they were inhabited by Slovakians.

A trade treaty between Germany and Russia was proclaimed on 19 August. It provided for an increase of commerce, based upon long term German credits. The Allies did not feel alarmed over this development. They were sure as to their securing an alliance with Russia; the objections to signing which had been so far presented were only trivial. War was now expected soon. In her own interest, Russia could not acquiesce in a German advance into Poland. She just would have to assist the Allies, regardless of whether a formal treaty had or had not been completed.

Italy, announcing that she expected war to occur, gave no information as to what she proposed to do. Reports that German troops were moving into Italy; that German submarines had arrived at widely separated posts in the Atlantic; and other alarming news appeared. Diplomatic activity was intense.

THE "BOMBSHELL"

The crisis came on 21 August. As the Prime Minister of Great Britain described it, it was a "bombshell"—totally unforeseen. Berlin announced that a non-aggression pact with Russia had been arranged and that their Minister for Foreign Affairs, von Ribbentrop, would go to Moscow in time to sign it on the 23rd. Until the last minute the Allies could not believe that this was real; it seemed so utterly contrary to reason. But the treaty was duly signed and published on the 23rd. It provided for mutual non-aggression; not to support any third Power hostile to the other signatory; not to associate, directly or indirectly, with any hostile third Power. The published parts did not mention military assistance.

No doubt remained as to the realignment of the European Powers. The seriousness of the situation for the Allies was evident; but they met it bravely. Mr. Chamberlain announced that the Allied guarantee to Poland still stood and that the Allies would fight if that country called for aid to preserve its independence. The Allied plan for the war does not appear to have been changed. Liddell Hart's proposed plan appears to have been accepted notwithstanding the important change in the situation.

How did Germany and Russia manage to conclude this treaty? The Russian Dictator, Stalin, had for many years feared a major war, particularly against Germany. He desired friendly terms with that country. As early as 13 December, 1931, in one of his rare interviews, he told Emil Ludwig: "We have never been a guarantor of Poland, and never will be, just as Poland has never been and never will be a guarantor of our frontiers. Our friendly relations with Germany remain the same as they have been up to now. That is my firm conviction." In general, Stalin has been consistently hostile to Poland.

Following the accession of the Nazis to power in Germany, the previous friendly relations between Germans and Russians fell off. No one seems to have regretted this more than Stalin. It increased the danger of a major war with his neighbor. He seems to have made decided efforts to improve relations. He considered it essential that a major war be avoided, and he could only be sure of this were Germany friendly. On its part, German GHQ considered a war on two or more fronts

to be impossible to win. Great Britain and France were actively engaged in forging a ring around Germany. These countries must be beaten before they succeeded. If war with them were to come, it was absolutely essential that there be no war to the east or to the south.

The German south frontier seemed to be safe by reason of the alliance with Italy and friendly relations with Hungary and Yugoslavia. The Polish front was decidedly hostile. Through careful reading of the Polish press and technical and scientific magazines, German G-2 had divined, as early as March, 1939, what the Poles proposed to do in case of war. Knowing this, GHQ believed that with their superior forces and better training and equipment they could overcome the Poles within 30 days provided the Poles were not joined by the Russians. GHQ considered that elimination of Russia as one of the Allied ring of enemies must be accomplished before war started.

DID HITLER EXECUTE AN ABOUT-FACE WITH REGARD TO BOLSHEVIKS?

With German GHQ and Stalin both desiring an agreement between themselves, the only obstacle appears to have been the repeated dislike of Russia expressed by Hitler. In spite of some opinions to the contrary, Hitler receives advice, even if he does not always act on it. In this case he found the advice good. Laying aside, at least for the time being, his antagonism to Russia, he consented to the arranging of a deal between the two countries, to be concluded before war was commenced.

Has Hitler thus changed his prior views? There is doubt on this. As late as 30 January, 1937, in his speech to the Reichstag, Hitler stated: "Any contractual liaison with Soviet Russia would be for us void of value. It is impossible to imagine that the National Socialist Germans could ever consent to accept aid under Bolshevik protection, any more than we could accept any kind of assistance from a Bolshevik state. For I fear that any people that might accept such aid would only find their destruction."

In his book *Mein Kampf*, Hitler expressed his dislike for Russian Communism; he wrote at length on the need of German expansion towards the east. Many writers, especially foreign writers, construed these statements, often repeated, as showing an intent to ultimately acquire the Ukraine for Germany. His own people had this idea.

In his Danzig speech of 19 September, 1939, Hitler referred to Germans being Germans, and Russians Russians. Perhaps he did not change his mind as to Communism, Russians, and Bolshevism. More probably, he laid his antipathies aside under the pressure of GHQ that this was essential if war was to be waged against Great Britain and France.

What considerations were given to Russia for her aid? Russia wanted to collaborate with Germany, but she had also certain aspirations. Those relating to the Baltic states have been discussed. According to statements first published in the Paris *Figaro* on 19 September, 1939, Russia had informed Great Britain and France that she required recognition of the right not only to occupy the Baltic states but also those parts of Poland inhabited by Russians and Ukrainians. Naturally the Allies had said nothing about this, as they were proceeding on a basis of seeking to preserve the independence of Poland. To all these things Germany acquiesced. It seems probable that it was agreed that Kovno should be ceded to Lithuania in compensation for her having peacefully surrendered Memel to Germany. If there was any promise of military collaboration on either side, it has not yet become known.

Germany had succeeded in protecting her south frontier by arranging for friendly relations with her south neighbors. Her east frontier was safe under the new arrangement, except for the necessity of overcoming Poland, estimated as a matter of about one month. How would she meet the military efforts of the Allies to the west? Their plan had been published in the newspapers, and consisted of minor attacks against the West Wall, blockade, and propaganda. The West Wall had been greatly strengthened, was in shape to stop expected attacks. The blockade was serious, but with the north, east, and south frontiers open, the general staff's calculations indicated it would not be decisive. Propaganda at home was not feared. There was opposition to the Nazi government, but it was believed to be by a small minority, most of whom would rally, under foreign attack, to the German government, whoever might be at the head of it.

GERMAN PLAN OF ACTION

It was decided to strike while the iron was hot. Overcome Poland, and thereby break the encirclement on the east front, was the mission. If the Allies interfered, and this was expected, a war with them on the west, on the plan they had themselves selected, and had so kindly published, would be accepted.

Various diplomatic moves were made by both sides to the approaching war. Each side sought to place the blame morally on the other side. Events, however, moved swiftly. On 1 September, 1939, Germany having without results demanded cession of Danzig, the Corridor, and Polish Silesia, invaded Poland. The Allies waited two days during which they asked Germany to withdraw her forces from Poland and agree to negotiate, or else face a war against the overwhelming might of the democracies. Germany did not even reply to these demands.

The issue was clear. A major war, carefully prepared for over a term of years, had been started.

The Duck-billed Platypus

We meet this evening to discuss
The well-known duck-billed platypus,
In whose design the indecision
Of character provokes derision.

As this enigma once surveyed
The creatures which the Lord had made,
He found in each some conformation
Considered fit for emulation.

And so in him you see we find,
Both fish and flesh and fowl combined,
A product, even when perfected,
Which leaves utility neglected.

So when we meet for contemplation
Of Army Motor Transportation,
We find, as you will plainly see,
A very close analogy.

We want a truck with racing speed,
But power and traction is our need,
High pressure hypoid is a factor;
Each truck should tote at least one tractor.

High clearance now is thought essential,
We need a rubber differential,
It should be fast, it should be slow,
The gravity must be kept low.

The truck should steer with greatest ease,
And climb the larger size of trees,
It should cross rivers eight feet deep,
We want it adequate but cheap.

We want the plain commercial type,
We want a lot of other tripe,
We want—which seems a heap of rot—
Most anything but what we've got.

And so I leave this thought behind,
For Heaven's sake, make up your mind!
Or we'll deserve that name obnoxious:
Ornythorincus Paradoxus.

—LIEUT. COL. A. W. SHUTTER, FA.

GUNNER IN LUZON

PART VI

South Line—Zapote River

By Brigadier General Ernest D. Scott, USA-Ret.

After the outbreak of the insurrection on February 5, 1899, what came to be known as the "South Line" was established, running from the shore of Manila Bay easterly through Pasay, thence northeasterly to San Pedro Macati on the Pasig River. It was a front of about four miles and was just about that distance from GHQ in the Walled City. An almost continuous infantry trench ran along it and in rear of its western half a few rather sketchy support positions were constructed. The only artillery in the line was my platoon of Light Battery D, 6th Artillery, in the cemetery at San Pedro Macati—a part of the infantry line. Another platoon and Hawthorne's Separate Mountain Battery were held in reserve in Paco.

Operations up the Pasig in March resulted in the establishment of garrisons along the south side of that river and the east side of the Tayug. The former maintained an outpost line from Haystack Knoll east to the Tayug. Little was done to strengthen this, the enemy opposite confined his activities to an occasional affair of patrols, and as we found later, did not expend much energy trying to construct trenches in the brick-hard ground. West from Haystack Knoll the line remained unchanged until the operations now to be described, beginning on June 10. There was little activity on the eastern half of this sector but a good deal on the western half, and it formed a very good training ground for new troops—at least to get them over their first nervousness. The insurgents constructed a very good trench system here, No Man's Land being from 400 to 600 yards wide. Invariably new troops were sent in about nightfall; invariably someone fired his rifle, and firing quickly became general; invariably more seasoned troops on either side managed to quiet them down after awhile; sometimes there was confusion as to directions and American bullets fell in American lines. One night a sort of relay post near Cingalon, some distance in rear of our front line, got to firing and kept it up intermittently for an hour or two. Next day I met at Headquarters, Major Rucker of the 4th Cavalry, who was Field Officer of the Day in that sector. He had been summoned for an explanation of the affair. He said General Otis had asked why he had not gone there and stopped it and that his reply had been, "Go down that road with twenty scared recruits at the other end—not much!" Sometimes the firing would spread along the entire length of the trench line; sometimes there was evidence next day that insurgents had advanced close to our trenches, more often it was certain that they had not left their own. Patroling No Man's Land was exceedingly unsafe when raw troops were in any part of the line, and their immediate front left free from such activities. Of course the insurgents realized that the time was drawing near when the Americans would drive them further from the city, as had been done on the north and east. So they kept their trenches well manned and any signs of activity on our part brought plenty of fire from them. But the Americans did not contemplate a frontal attack on trenches when a break through of the lightly held insurgent center and a swing toward Paranaque would compel the enemy to abandon their trenches or be bottled up in them.

COMPOSITION OF THE FORCE

For the operation the following troops were assembled at San Pedro Macati by the evening of June 9, and formed in two provisional brigades:

First Brigade—

Eight companies 9th Inf. — Capt. J. A. Baldwin comdg.

Eight companies 21st Inf. — Major W. H. Boyle comdg.

Six companies Colorado Inf.—Col. H. B. McCoy comdg.

Troop A, Nevada Cavalry (dismounted).

Second Brigade—

Two companies 12th Inf.—Capt. C. H. Barth comdg.

13th Inf.—Col. Smith comdg.

Nine companies 14th Inf.—Major L. A. Matile comdg.

Field Artillery—

Light Battery E 1st Arty. (4 1.65-inch mountain guns) Capt. H. M. Andrews.

Separate Mountain Battery (4 3.0-inch mountain guns), Lt. B. M. Koehler.

Light Battery D 6th Arty. (4 3.2-inch field guns), Lt. E. D. Scott.

That grim old fighter, Brig. Gen. Lloyd Wheaton, was borrowed from the 2nd Division and assigned to the First Brigade, General Ovenshine was in command of the Second.

Noteworthy was the dearth of field officers and of regimental headquarters. The only regular colonel present gave out early the following morning and had to turn over command of his regiment to his second in command—a captain. Companies varied in strength from 70 to 95, with about one officer each. The batteries averaged 44 men. All troops had been supplied with Chinese coolies as litter bearers, and some with sufficient to carry kitchen equipment, rations and ammunition. Some of the troops arrived about dusk, sweated through, staggering under their loads of filled cartridge belts and what appeared to be exceptionally large rolls and bulging haversacks. We "veterans" certainly pitied them and wondered how long they would stand up to the gruelling work anticipated for the next day.

By some chance I was not notified of an assembly to discuss the operations for the following day until it was about over. Arrived at headquarters, General Wheaton greeted me with a handshake, and turning to General Lawton, told him that whatever disposition was made of the artillery he wanted me to command the part that fell to him. Lawton laughingly agreed and said he meant to give the brigades equal strength in guns. Some problem to divide three batteries of different type guns—but the solution was promptly announced and was simple indeed. Captain Andrews was informed that as senior he was Chief of Artillery and would turn over his battery to his one lieutenant, William Kenly; the three batteries were to be split down the center, as it were, half going to each brigade; Koehler was attached to Kenly, I was to command the provisional battery with the First Brigade.

This was late in the evening. I could not even get a look at the new elements of my command, and we were to march out an hour before daylight in the morning. It was a curious lot—two 3.2-inch guns using separate ammunition, smokeless powder, 16-lb, shell and shrapnel, drawn by four mules each; two 3-inch mountain guns, fixed ammunition, black powder, 12-lb, shell and shrapnel, drawn by ponies in shafts; two 1.65-inch mountain guns, fixed ammunition, black powder, 2-lb, shell, drawn by hand. Spare ammunition for the first was on the carriages and in a wagon, for the others in pony carts and carried by coolies, of whom there were about thirty.

Plan of Operation

The plan of operation was simple. Wheaton was to move south from Guadalupe, south by southeast, drive any enemy encountered towards the Laguna de Bay and capture it, his objective Muntinlupa, twelve miles distant. Army gunboats on the Laguna were to co operate. Ovenshine was to parallel Wheaton's march until opposite Paranaque, then march on that place, so cutting off the insurgents in the western half of the south line. San Pedro Macati to Paranaque is five miles airline.

In the execution of this Ovenshine's brigade followed Wheaton's by way of Guadalupe, only breaking off when the outpost line south of that place was reached. That seems to have been contemplated by Lawton, who was there when the brigade arrived. It meant that this brigade marched three miles—half of it in darkness—to reach the outpost line, only a mile south of its bivouacs. Why it did not move directly south is not explained. It could now take a line of march parallel to that of the First Brigade, but could not possibly get up abreast—unless the First was delayed by enemy action.

The order of march in Wheaton's brigade was—Colorados and Nevada cavalry, artillery, 9th Inf., 21st Inf. In those days each infantry unit had a group of selected men (called "scouts" or "sharpshooters") whose function was to precede the advance guard. In this case the scouts of the 14th Infantry—belonging to Ovenshine's brigade—were on hand, perhaps having been taken there by Lawton, and were sent on ahead. It was noon when they rejoined their proper command. General officers were prone to interfere with or take over the functions

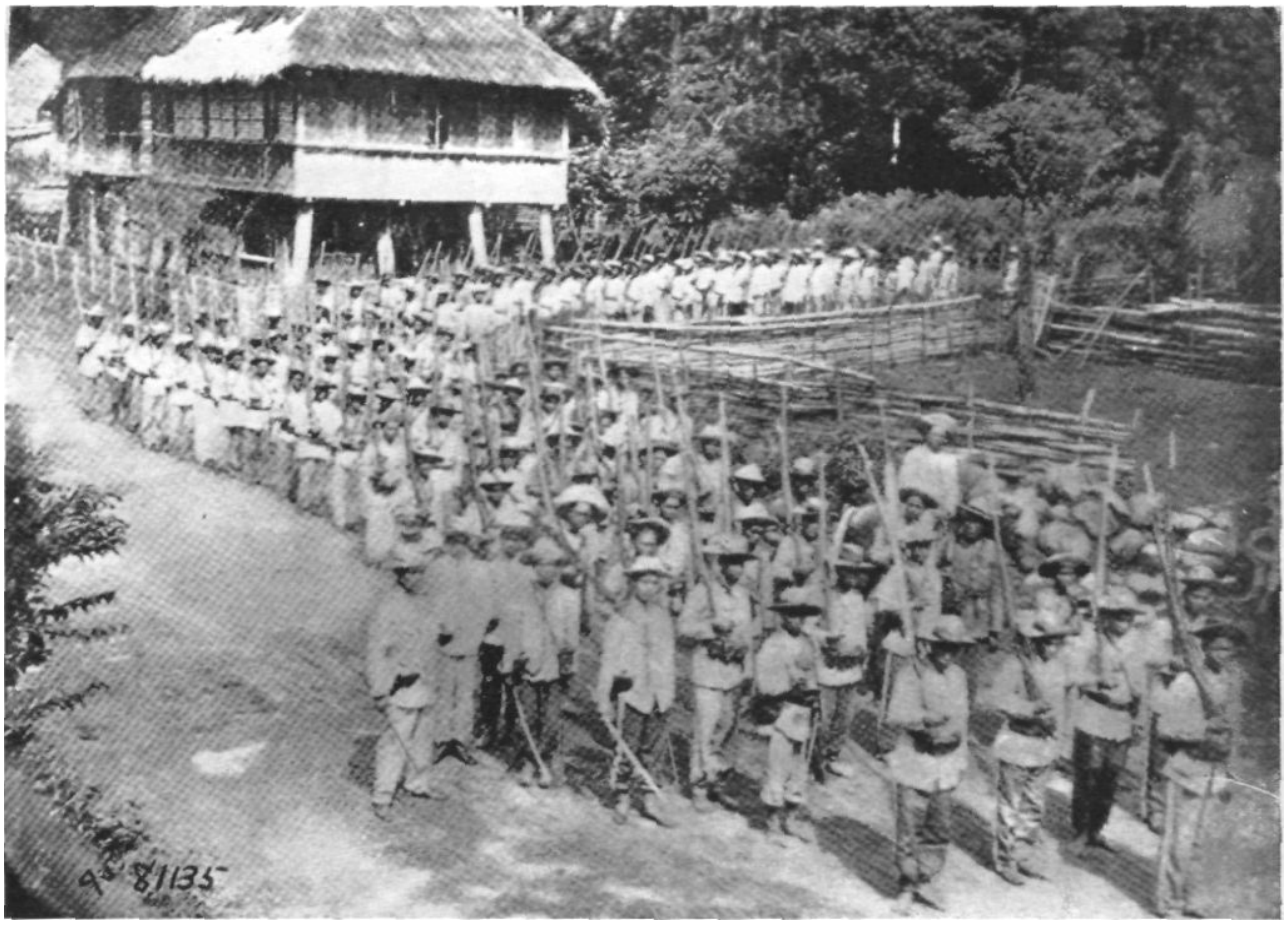
The noon halt.

of their subordinates. When the Colorados reached the outpost line it was General Wheaton who personally directed Colonel McCoy to advance with four companies deployed and two as reserve. Later he changed McCoy's disposition already made for an attack; again he sent orders during an attack to one of McCoy's flank companies—but found the Division Commander had beat him to it, and had given still other orders to the company; he shifted the position of the dismounted Nevada cavalry and it got lost, joined the Second Brigade, and did not show up again until evening. Another bad practice was that of staff officers giving orders in the name of their Generals, and it was quite common for the latter to send staff officers to supervise senior as well as junior officers. My toes were trodden upon several times by such, but I was a very junior lieutenant—it must have been bitter medicine to gray haired captains and field officers.

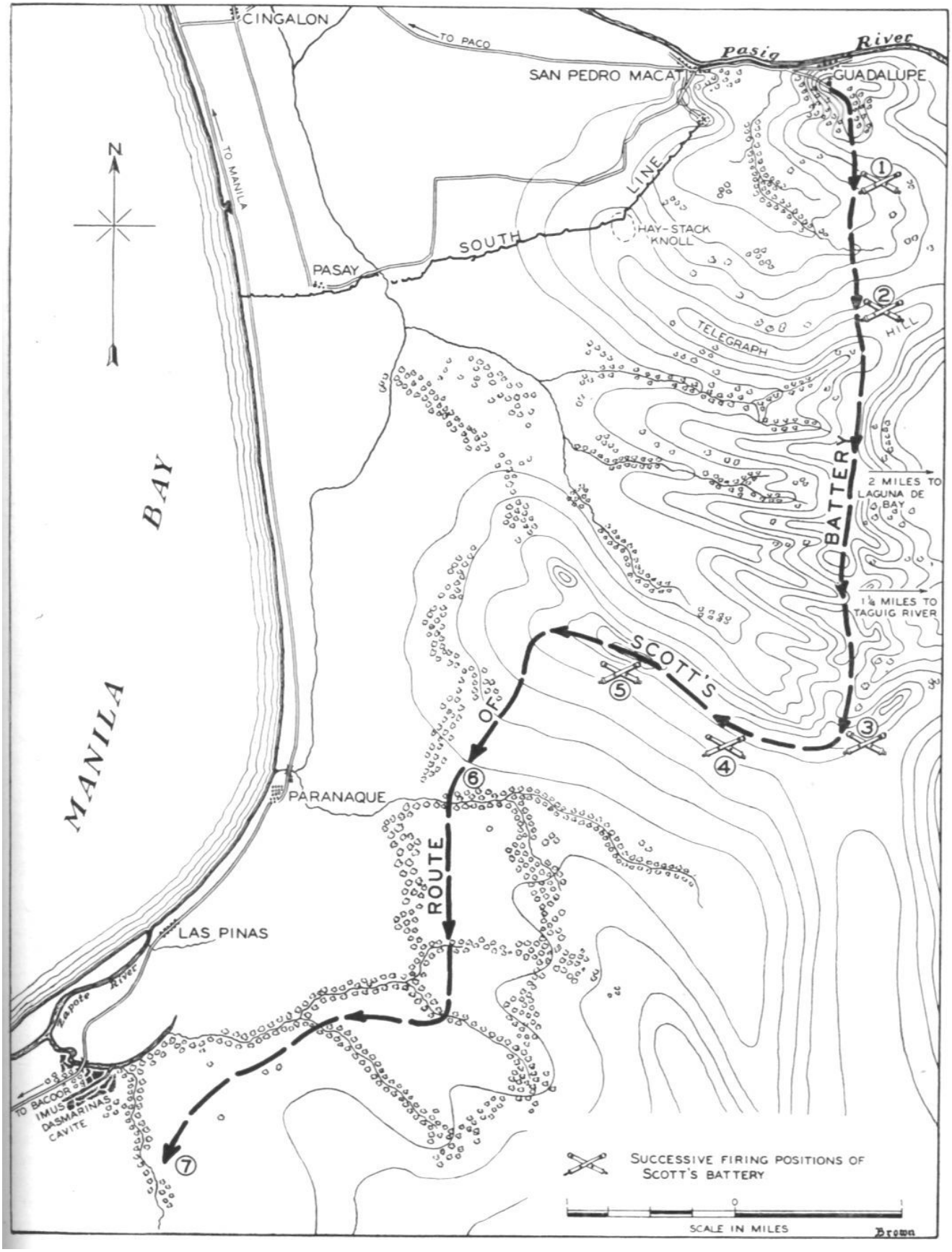
CONTACT ESTABLISHED

The march began at four o'clock, that is, an hour and a half before daylight. At six-fifteen the Colorados were crossing the outpost line, less than two miles airline from their bivouacs. Here (see 1 on map) the brigade commander directed me to fire with the 3.2's and the 1.65's on enemy positions in front of our lines at Haystack Knoll, and while this was going on he took the 3.0's to another point and had them fire on another part of the enemy lines.

By and by we got into column of march again, but soon I was able to fire with the 3.2's (see 2 on map) on some enemy troops withdrawing from trenches far to the west. We then moved up to the skirmish line of the Colorados, just in time to come under a hot fire from the left, and I again used the 3.2's with good effect, at 1,100 yards. There was no breeze that morning, the air was heavy, and the smoke from the mountain guns had previously interfered greatly with our fire. The Colorados moved on. After a time we got in march again, but had hardly gone 200 yards when a line of the enemy appeared on our right and opened a vigorous fire from a low ridge paralleling our line of march and only 600 yards away. I again used the 3.2's and drove them off (see 3 on map). This surprise attack had proved too much for the nerves of our coolies, who dropped their loads and fled. A few were held by their queues by men who had been detailed to guard them and I sent some men back to try and catch others. Then I discarded some of the impedimenta on our vehicles in favor of part of the ammunition of the mountain guns and prepared



Battalion of Insurrectos


CINGALON
TO PACO
Pasig River
SAN PEDRO MACATI
GUADALUPE
TO MANILA
N
SOUTH LINE
HAY-STACK KNOLL
PASAY
TELEGRAPH HILL
BATTERY
2 MILES TO LAGUNA DE BAY
1¼ MILES TO TAGUIG RIVER
SCOTT'S
OF
ROUTE
MANILA BAY
PARANAQUE
LAS PINAS
Zapote River
TO BACOOR
IMUS
DASMARINAS
CAVITE
SUCCESSIVE FIRING POSITIONS OF SCOTT'S BATTERY
SCALE IN MILES
Brown

to move on, but Captain Andrews, as Chief of Artillery, ordered me to remain where I was until all of it could be carried along. In about an hour this had been done, most of the coolies having been rounded up. This stampede was not characteristic of coolies—they quite generally won the regard of the Americans by their indifference to danger, litter bearers in particular sticking to their companies in any circumstances. But this sudden and violent attack at such close range when no enemy was supposed to be near, and our infantry far in advance of us, might well have shaken any men unaccustomed to fire. Curious, we had one casualty—a pony shot through the jaws.

Soon thereafter came orders for the 9th and 21st—still behind me—to deploy and march in the direction of Paranaque, my battery to go along. The Colorados continued on to the south for two or three miles before similar orders reached them. The brigade commander directed me to follow the center of the infantry line but we had not gone far when a message from the division commander directed me to bring the battery to him, somewhere off to the northwest. Arrived there, we went into action against a body of insurgents at 1,400 yards, and drove it off (see 4 on map). Then I was left to my own devices. I was on a low ridge running northwesterly with a trail that helped a bit in traction, so I went on. General Ovenshine came up with his aide, my classmate, M. C. Kerth, and inquired if I knew the whereabouts of any of his troops. Answered in the negative, they rode off towards the east. That added to a feeling of uncertainty and apprehension I was beginning to experience. Some time had elapsed since I had last seen a doughboy, and I did not know whether any were ahead or behind me. I decided to wait on a convenient rise until the situation cleared up. So we unlimbered and prepared for action (see 5 on map). There was a fairly good view in all directions but neither friend nor foe was visible in the shimmering heat haze that covered the parched earth. I had not the slightest idea that the heat and hard going had practically immobilized the 2nd Brigade in the country to the north, and that the 1st Brigade was abreast of me to the south but taking a much-needed rest in the shade of the first trees they had met with that day.

River crossing—1899 style.

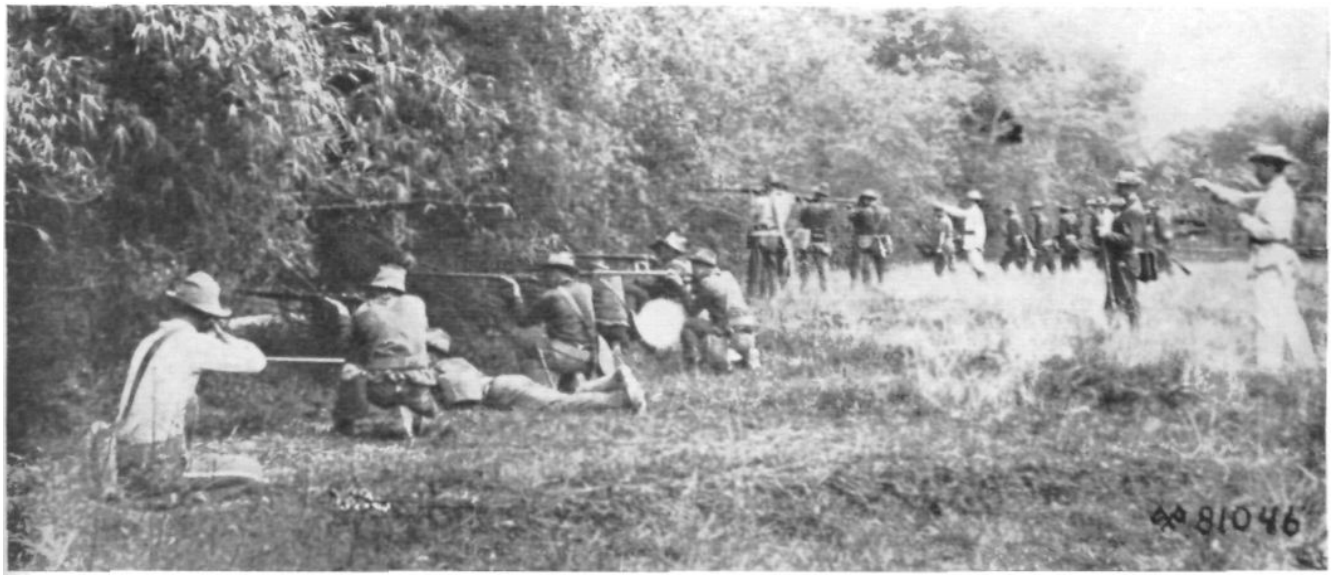
Skirmish on the Ridge

Presently General Lawton rode up accompanied by an orderly. I could not offer him the customary cup of coffee—no water for its making—and every canteen had been empty for hours. The General was much disturbed, seemed angry and bewildered, had lost all track of his brigades, had his staff out trying to find them, had seen my battery on its hilltop, and had come to learn what I might know. We were talking things over when a yell went up and the men dropped everything and jumped to the guns. Off to the west and certainly not over a quarter of a mile away, at least a battalion of Filipinos were marching toward us in line. They must have been approaching under cover for some time and finally reaching a little rise beyond which they would be exposed to our view, had boldly formed line and marched straight on to attack. Had they crawled to the top of the rise and made known their presence by a vigorous fire, they might have done us a lot of damage. I took one quick look, designated the projectile, and gave "Fire at will." The enemy got in the first fire, mostly high in the air, broke and fled as the first shrapnel burst in their faces. We raked the area into which they had disappeared. General Lawton was much pleased with this affair, and, with the remark that the artillery fire would surely draw our own infantry, rode away. Soon infantry units, scattered widely, began passing us on both sides, heading for Paranaque, and we followed suit; fighting was over for that day—so we thought.

The next couple of hours were pretty bad. It was very hot and still no wind stirring. There was less wild country but more old rice fields, with the usual numerous little dikes. It was heart-breaking work for men and animals to get the guns along, but at last we came up with the infantry, taking up an assembly formation about a mile east of Paranaque. There was a well of brackish water—and stern measures in effect to insure orderly filling of canteens by the thirst-crazed soldiers. I was told that we would probably remain for the night, also that the infantry were pretty well used up and that a great many stragglers had been left behind.

A Lost Opportunity

After resting up, my curiosity arose as to the situation before us. The top of the church tower at Paranaque was visible over the trees and I started off in that direction. Not far from the bivouac



"A furious firing of rifles . . . evidently beyond the bamboos."

area (see 6 on map) I came to the bank of the estero that parallels the coast of Manila Bay for miles, and empties into it through a channel in Paranaque itself. Infantry outposts were at intervals along the bank. At one of these I was told that portions of the road from Manila through Paranaque were in view and that small units of Insurretos had been seen on it, all headed south and marching fast. While we were talking a column appeared passing one of the places and it soon became evident that this was no small unit but a long column—a regiment at least. It dawned on me that the insurgents had delayed until then to withdraw from our south front and were now hurrying to get out by the only road left open. If our troops could cross the estero—even a small force—the bridge in Paranaque could be blocked and the whole of the enemy captured, except those already past it. If the estero could not be crossed, rifle and artillery fire from its eastern bank could inflict heavy losses on the enemy—perhaps even turn him back into the pocket.

Filled with these ideas, I hurried back and sought out headquarters. A singular thing about that headquarters was that when the General was in a temper the Staff quietly slipped out and returned when the storm had blown over. Sometimes time could not be spared from duty, and then Major Edwards was accustomed to direct a certain officer to report to the General. He always objected but he went, and the General poured out his wrath on him. Then the others returned! Well, that was the situation then; the General was alone, his face a thundercloud. I found Major Edwards and eagerly told him what I had seen and my estimate of the situation. He said he had no intention of going near the "Old Man" in his present mood, and sugested that I had better do so. I declined at first but after some delay while I tried to convince Edwards that it was up to him, I walked over towards where the General was standing. He saw me coming, kept his eyes fixed on me, and the look in them was most menacing—I felt like a mouse must when the cat is about to pounce! I stopped, hesitated about on one foot and the other, looked in vain for some sign of friendliness on that scowling countenance—and walked away. By this time the column I had seen probably passed the danger point, but it might not be the last so I hunted up the Chief of Artillery, with whom I had no more success than with the Adjutant General. Disgusted and sick at heart, trying to believe that after all it was no business of mine, I returned to my battery. A golden opportunity to deal a crushing blow to the insurrection was passing—actually insurgent troops were passing through Paranaque until late that night.

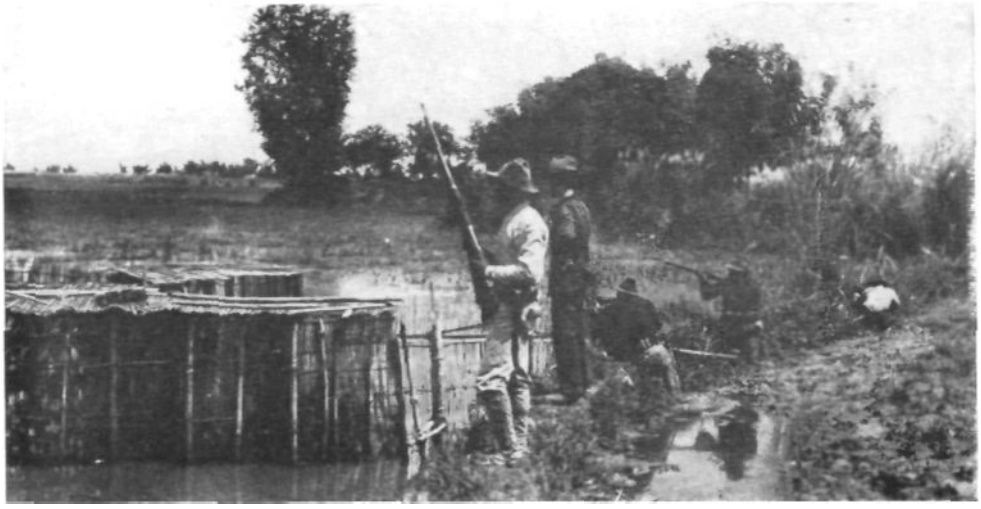
Probably the outposts were sending in the same information, for suddenly the word came that Wheaton's brigade was to march at once on Las Pinas, a couple of miles below Paranaque. Its occupation would cut off the retreating insurgents. But the latter were on a good road, the Americans had only a winding and indifferent trail, had twice as far to go—they were beaten before the race began.

FIGHT OF THE FORD

The order of march was as in the morning but the Colorados kept to the banks of the estero hoping to find a ford. They eventually did, and some of their men under heavy fire from the insurgents on the opposite bank, swam over and brought back a casco to aid in crossing. All this brought the advance of those troops to a standstill for some time. I had kept to the road—passing half a mile or so in rear of where the Colorados were operating—and a battalion of the 9th Infantry passed me to form a new advance guard. We had gone perhaps a mile and the infantry had disappeared beyond a bamboo-grown stream bed, when suddenly a furious firing of rifles began to the left front, and evidently beyond the bamboos. Leaving the battery to follow the road I rode

directly toward the sound of the firing. But after penetrating the bamboo for some distance the crack of bullets and bursting of bamboo joints began to get on my nerves. Besides, I recalled what had happened at San Isidro! Troops coming up to reinforce the advance guard would deploy on the left of the road and advance through the woods where I was. So I made my way quickly back to the open, waved to my men to identify myself, then followed the edge of the bamboos to the point where the road crossed the stream. On the other side of the stream the road led up a narrow diagonal cut to the level ground, about ten or twelve feet above the water. In the cut I found several wounded men and Major Edwards. After a few words with him I went on up and out. The whole situation was clear before me. Little more than a hundred yards in front was the 9th, mostly in skirmish order, lying down and firing at a line of about equal strength of insurgents, not more than 600 yards further on. About fifty yards to my right was General Lawton on his big black horse, alone, looking on. He and his horse were in full view of the insurgents and they must have been sending a lot of bullets his way.

I turned back to bring up my guns, asking Edwards as I passed through the cut to try to get the wounded men out of the way before they came up. I decided to take only the two 1.65's and in a few minutes we had passed the cut and were out in the open behind the infantry. But the latter were now advancing by rushes and it was not safe to fire over them. I tried to overtake them but the ground was too rough and my men too winded. But we did get to about fifty yards behind a company that was in a slight depression; I yelled to them to keep down and opened fire. We made fast work of it for a few minutes and then the insurgents disappeared. I could not help laughing at the doughboys under our fire. The shells passed about three feet over them, and they could be seen to involuntarily flatten against the ground at each shot. Several cautiously twisted their heads to get a view to the rear, and certainly they had murder in their eyes! Weeks later I met a Captain Schoeffel in the Club at Manila and he wanted to know if I was the blankety-blanked artilleryman who had kept his nose in the dirt? He seemed to feel some resentment, but it passed.



Fighting in the rice paddies

Thereafter progress was very slow and at last the order came to close up and bivouac in assembly formation. About at dusk the enemy were reported in force in woods just to the south and the brigade commander directed a vigorous shelling of them for some minutes. That ended our activities for the memorable 10th of June.

Operations of Second Brigade

Of the operations of the 2nd Brigade I had seen nothing, but a fair account can be drawn from the reports—apparently every unit commander made one.

The 14th Infantry was leading and when it reached our outpost line on the T-Tree Ridge (Telegraph Hill) it inclined to the right to gain the distance necessary to parallel the march of the 1st Brigade. But it soon met enemy opposition from the west, deployed and drove the enemy, and quite naturally followed them. The 12th and 13th, further to the rear, deployed to their right front in the general direction of the firing. This resulted in the whole brigade moving in a direction parallel to the front of our south line. When Lawton learned of this he sent orders to move to the left and get in contact with the 1st Brigade. Ovenshine ordered his brigade to move by the left flank. It must have been some problem to get this to the scattered units in that rough terrain. Later came orders to march on Paranaque. So in the worst part of El Desierto the 2nd Brigade in deployed formation, executed a sort of gigantic letter "Z." There were a few light skirmishes in the early morning, with some casualties, but these were as nothing compared with the ravages wrought by the heat and the broken ground. Canteens were empty by seven A. M. and there was no water with which to refill them. Men fell out in increasing numbers and when a unit moved on, a guard of able men equal in number to the casualties, was left to guard them. The result was that when the brigade reached the rendezvous east of Paranaque the 13th had about half its men present and the other units also had many missing. Guards with their charges and stragglers came in all that afternoon and night and next day. Most of these had clung to at least their rifles and cartridge belts, but some had abandoned even these.

Kenly's battery got into action about six AM, firing a few rounds at 400 yards. Later

he gave up hope of getting his 3.2's through and sent them back to San Pedro Macati. He had no further action during the day but twice in his report relates how he was ordered to join me with his battery, but each time on his arrival found he was not needed and returned. He may have come over personally—I do not recall seeing his guns.

A False Alarm

Our bivouac that night (see 7 on map) was in rice fields—which can be excellent or abominable for the purpose. To explain: when the rice is harvested grass springs up and the fields are grazing grounds for carabao until the next plowing season. Carabao hoofs make deep impressions in the soft ground. As the dry season advances the "paddies" gradually dry out and if enough carabao are on pasture the hoof prints get tramped out, leaving practically smooth ground. Otherwise the hoof prints remain and a paddie becomes a sort of honeycomb of brick-hard ridges. That was the sort the battery had drawn. To add to the discomfort, rain began soon after dark—forerunner of the rainy season, now due. A low dike, over a foot broad and covered with a thick mat of dead grass, offered a place to sleep—provided I lay flat on my back and did not roll! And believe me it took no time at all to be dead to the world; I was utterly fagged out.

Next thing I knew something struck my side and tumbled on over, rolling me off my dike, and I realized that all about was confusion and shouting. My men were on their feet trying to stop other men who were coming among them in the darkness, shrieking, sobbing, gasping—it was pandemonium. Some little time was required to restore order. So far as I could learn later, a cry of "Bolomen" had gone up in the bivouac on our left, and instantly the men were on their feet and running. Somehow their direction was diagonally across our bivouac. It was one of them whose knees had rolled me out of bed. That this incident ever occurred was denied in an official report, and long afterward in an article published by an officer of the regiment concerned. But I was in the middle of it—no dream.

How large a portion of that regiment was involved I do not know. But the affair was no such discredit to the regiment as might be thought. Those men were wholly unacclimated; they had been overclad and overloaded and marched in the hottest part of the day before until nearly ready to drop; they had bivouacked for the first time on hard ground and in darkness; they had been turned out between three and four in the morning and marched in darkness, stumbling along and under the strain of anticipated battle; they had been led hither and yon all day under a broiling sun, in a roadless and rough terrain; they had been without water from about sunrise until the middle of the afternoon; finally they had been bivouacked on the outskirts of the bivouac area instead of within it, and on the side towards the enemy at that. It was said that a carabao had wandered into the bivouac, probably frightened by the strange sounds and smell he ran about, stepping on people. Little wonder that there was a bit of panic—greater wonder that it so quickly passed.

Bringing in Missing Guns

Morning came and the advance was resumed with some troops deployed, but expected enemy opposition did not develop and the town of Las Pinas was occupied during the early hours. My battery parked on the plaza in front of the church. We dried out, rested, and drew ammunition and rations that arrived from Manila during the day. The Colorados and 13th Infantry were started for Manila, via Paranaque.

In the evening I was called to headquarters and told that part of my battery had not come in, was miles away, and why? I was astonished, and assured the staff that I had personally led my battery in and seen to its being settled down. What happened was this; Kenly had tired of trying to get the 3.2's attached to him from my battery through the rough country the day before, and had ordered them back to San Pedro Macati, where they had arrived late in the afternoon. The local commander blew up the sergeant in charge and made him march to rejoin his command. Result, for twenty-four hours the little command, about twenty in number, had been slowly making its way through country we had traversed but which might well contain enemy forces for which it would be easy picking. Where they were now was not known and a search for them by night would probably be hopeless. If attacked, the sound of their guns would bring assistance to them.

The problem of getting them in was surely Kenly's. But no; since they were a part of my battery proper, I was told to get them. Stuart's troop of the 4th Cavalry, mounted on native ponies, was detailed as escort and we started before daylight on the 12th. Some miles out we found them, one gun stuck in a stream crossing, the team worn out and utterly refusing to pull. The first sergeant was in charge and showing no head at all. I had poles cut and organized a man-power system to help out, but the men—mostly recruits or who had spent the war so far with battery headquarters in Manila—acted like small boys afraid of getting their feet wet. For the second time since being commissioned I laid violent hands on an enlisted man. I told him to get down in the mud where he could work to advantage; he hesitated about the edge and I threw him in bodily. The others rushed in without a word and the gun was soon on dry ground. By nine AM we were back in Las Pinas.

This party had loaded themselves down with equipment they had picked up. As one example—they had thirty-six rifles.

Battle at Zapote Bridge

Later in the day I was sent for and told the outpost to the west was desirous of having a gun or two, and

how about it? I had no objection, provided I did not have to furnish it. There were two officers with the other battery, an officer should be with the gun or guns, why not let them have it? Which was done, and as it turned out that was one of my mistakes. It resulted in my playing second fiddle at the battle of Zapote Bridge next day, in fact to miss all but the tail-end of that affair. I asked and received assurance that I would have a first on any fighting that might occur, but it did not turn out that way.

Next morning outpost firing began and grew to some volume and heavy firing developed to the right, towards the beach. I became very uneasy, but was assured that the General had gone out to make a strong reconnaissance, leaving word that no general action was contemplated or would be made. But as the day wore on it became evident that a general action was developing. Kenly took his remaining guns up to the outpost position; I received specific orders to remain where I was. By and by Kenly's guns could be heard and an order came to me to send him part of my ammunition for the mountain guns. I swore and sweated and fumed, but whoever was in charge at headquarters was adamant—I would await orders.

Late in the afternoon a pony came racing along the road from the front, on his back the First Sergeant. He was white and gasping and had to be supported as he rather rolled off, and I gave him a drink from my pocket flask. "Get all the guns to the front fast," was all we could make out, so we left him in the shade and off we went. I trotted ahead with the 3.2's through and beyond the outpost line. There beside the road stood the other platoon in firing position, and Sergeant Sparrevohn's voice shook as he said they had done nothing for hours, left behind there. "Ve alvays got in it ven de Lieutenant vas mit us." And he said the First Sergeant was a coward, that when the message came to send up the rest of the artillery, instead of sending a messenger, he himself seized the opportunity to get out of danger. I regretted that drink of whiskey! Weeks later I heard a story of the First Sergeant having tried to withdraw the platoon and being threatened with extinction by Sparrevohn.

A straight road led through cornfields to the bridge, about half a mile ahead, and I left the guns and went on to reconnoiter. Kenly and some of his men were there with two 1.65's with which they had been firing into the enemy trenches across the stream, the nearest about 40 or 50 yards away. They had got in oblique fire on trenches further along and I saw the results later—actually counted more than 60 Filipinos, many of them horribly mangled. Five or six of Kenly's cannoneers were dead or wounded, his ammunition was nearly gone. White flags were displayed all along the opposite side of the stream, our infantry bugles were sounding the "Cease firing." My two 1.65's were coming up—those men had alternately walked and ran with them for two miles to meet the emergency inferred from the action of the First Sergeant! The center span of the bridge was gone—I have carried the impression that it was hit by a Navy shell early in the day—and I set my men to tearing down some shacks to lay a flooring over which the guns might pass, when a yell went up somewhere and a ragged firing began. The fields beyond the Filipino trenches had suddenly become alive with insurgents running for the shelter of the woods in their rear. The Americans had naturally taken the white flags as token of surrender, and the ruse worked. Some of our men fired, but whole companies were held from doing so by their officers—who had received no orders from higher up. Discipline can be disadvantageous at times!

General Wheaton quickly organized a pursuit and conducted it in his usual vigorous fashion. I got the two 1.65's and one 3.0 over the bridge and joined in. The pursuit continued for about a mile, my guns getting into action twice. By dark we had returned and bivouacked near the bridge.

Roughly the story of the day is as follows.

THE PURSUIT

The country about Las Pinas is flat and low, and generally well cultivated; streams are sluggish and have mud bottoms. Land not under cultivation is generally jungle except near the shores of Manila Bay, where high and coarse grass is the usual coverage. A single road follows the Bay from Manila to Cavite, at varying distances from the shore. From Las Pinas it bears southerly to a small stream which it crosses on a stone bridge, thence southwesterly about one mile to the Zapote River, which it crosses on a wooden bridge. The Zapote at that point runs slightly west of north, but a couple of hundred yards north of the bridge turns sharply northeast and by a series of large ox-bows reaches the Bay at Las Pinas. The section in which the bridge is located is 100 feet wide and unfordable, the banks vertical and 10 or 12 feet high. Insurgent trenches ran along the west side of this section, a 6-inch muzzle loading cannon was emplaced at the bridge, and a smaller gun—believed to be a 1-pounder Hotchkiss—operated elsewhere.

Our outpost was a battalion of the 14th Infantry, bivouacked about 300 yards west of the stone bridge. Early on the morning of the 13th Kenly's platoon of 3.2's, under Lt. Koehler, went into firing position just in front of the bridge, in support of the outpost.

Lawton had been advised by Otis as to the enemy defenses on the Zapote, had reconnoitered the shore of the Bay from the Navy cruiser *Helena*, and thought a turning movement via the beach might be practicable. While on the *Helena* he arranged for inter-communication with the Navy in case of need. This was on the 12th.

About 8 AM on the morning of the 13th he started on a personal reconnaissance toward the shore with Major Starr of his staff, Captain Sage of Ovenshine's staff, and two companies of the 21st Infantry. At the outpost

line the force turned northwest and was lucky enough to pick up an old native who conducted it to a ford across the Zapote and to the beach, a short distance beyond. Here one company was left to cover the ford and a possible withdrawal (Major Starr in charge), and the party followed the beach to the southwest for half a mile and then turned inland. A real fight developed here that came near being disastrous for the Americans, who had to retreat to the sand dunes along the beach. Ammunition ran low, Captain Sage won the Medal of Honor with a rifle at 40 yards, the Navy was signalled and sent two landing parties to assist.

Lawton meantime returned to the outpost and sent his Adjutant General, Major Clarence Edwards, with a battalion of the 9th Infantry to join the party on the beach and with them attack the enemy left. Ovenshine was directed to move out and attack the enemy position in front. Kenly opened fire on the position—which could not be seen but was well marked by a line of high trees—with his 3.2's, but their fire was soon blanketed by the advancing infantry, but he kept his 3.0's and 1.65's advancing on the infantry line, moving them by hand. He used his ammunition freely and that which I had sent up to him. When I came up to the bridge as previously described, he had four rounds left for the 3.0's and twelve for the 1.65's. He had one killed and seven wounded, of whom one died.

Wheaton had been pushing his troops in the country between the road and the beach and finally the 14th got in position close to and flanking the left of the enemy position. Ovenshine's command had reached the bank opposite the enemy front and had been keeping their fire down for an hour. The enemy position was now desperate—and the white flags went up.

This was one of the toughest fights of the war. Our losses were 5 officers wounded, 12 enlisted men killed and 56 wounded. While it was in progress Lawton sent his famous telegram to Otis, "We are having a beautiful battle. . ." He loved a fight for its own sake.

Next day we returned to Las Pinas and on the next I was shipped to hospital in Manila. Captain Dyer had already been shipped home, Hawthorne had been hospitalized the second day of the Morong expedition, I found Fleming in the hospital and Koehler entered a few days later—last of the group of officers who had gone into battle with Light Battery D, 6th Artillery, on February 5, less than five months before.

MOPPING UP

Following the battle of Zapote Bridge the town of Bacoor was occupied and then Imus. An attempt to extend the advance along the Bay to Cavite was unsuccessful, principally because of road difficulties, and was not renewed until October. From Bacoor the town of Imus, four miles to the south, was occupied. A battalion of the 4th Infantry with one 3.2 gun sent on reconnaissance from that town towards Dasmarinas, six miles further south, was attacked, surrounded and roughly handled. Wheaton with the remainder of the regiment and another 3.2 rescued the force and next day went on to Dasmarinas, meeting little opposition. The formation of the march that day is interesting from the artillery point of view. Most of the infantry were deployed in a long skirmish line astride the road. Two 1.65's were on that line to the west of the road; one 3.2 was on that line on the road; two 3.2's and two 3.0's followed this 3.2 at 400 yards, on the road. The 1.65's on the right were engaged and fired 35 shell, the 3.2's fired 21 shrapnel.

Next day Kenly performed quite a feat in indirect fire. About three miles to the west of Dasmarinas was a small town, and one of the buildings about its plaza was said to be an arsenal. It was not visible from the ground about Dasmarinas, but was from the belfry of the church. The sights of the 3.2 were graduated to 4,500 yards. From the belfry Kenly lined in bamboo poles on the target and established an auxiliary aiming point for a gun. Out of 15 shell fired, 6 hits were made.

Soon after Light Battery D and the Separate Mountain Battery were back in Manila, their field service at an end. The mountain battery was disbanded, the infantry serving with both were returned to their proper units, discharges skeletonized D Battery.

SPECIAL NOTICE

The annual Prize Essay Contest will not be held this year. Instead, a prize of fifty dollars will be awarded the author of that article which, in the majority opinion of the members of the Association, as expressed on their proxy cards, was the most outstanding original work published in THE FIELD ARTILLERY JOURNAL *in 1940.*

Rules for eligibility:

1. The author must be an officer in the Field Artillery of the Regular Army. National Guard, or Organized Reserves.

2. The article must be an original study, not a translation, a digest, or reprint of some other work either foreign or domestic. Such other works may be used as authority or source, and brief quotations used, but the treatment, thought, and presentation must be that of the author.

3. In case of doubt as to eligibility, it is suggested that voting members name an alternate choice.

4. Members of the staff of the JOURNAL *are not eligible for the award.*

AWARDS OF FIELD ARTILLERY MEDAL

The Field Artillery Association Medal is awarded annually to one member of the First Year Advanced Course in Senior ROTC units of Field Artillery. Established in 1938, the awards are made to men outstanding not only in soldierly characteristics, but also in the academic, cultural and athletic phases of university activity. Some of the winners for 1940 are listed here, and the others will be noted in future issues as their records are received. THE FIELD ARTILLERY JOURNAL congratulate them all, and takes pleasure in presenting them to the members of the Association.

I. Cadet Second Lieutenant David K. Craig, Schofield Barracks, T. H., University of Oklahoma; petroleum engineering; Scabbard and Blade, Delta Tau Delta. 2. Cadet Captain Julian Keith Rose, Aberdeen Proving Ground, Md., Virginia Military Institute; chemistry; staff of "Cadet." 3. Cadet Second Lieutenant Adrien V. Lorentz, San Jose, Cal., University of Santa Clara; Arts and Sciences, flying course; Sabres' Society, Dramatic Society; 4. Cadet Corporal Carl Victor Hansen, New Haven, Conn., Yale University. 5. Cadet Master Sergeant E. Duane Schroeder, Carr, Colo., Colorado State College; chemistry; Scabbard and Blade, American Chemical Society, 6. Cadet Lieutenant Luther Dickson Griffith, Huntingdon, W. Va., Culver Military Academy; football, track. 7. Cadet Lieutenant James Ray Haynes, Pocahontas, Ark., Arkansas State College; Scabbard and Blade, Pi Gamma Mu. 8. Cadet William J. F. Roll, Jr., Cincinnati, O., Xavier University; editor, "Musketeer," past editor, "Xavier U News," associate editor, "Athenaeum." 9. Cadet Sergeant Major Hugh B. Barton, Louisiana State University; Scabbard and Blade, Geological and Mining Society, 10. Cadet Master Sergeant James Paul Giles, Jr., Okmulgee, Okla., Agricultural and Mechanical College of Texas; Scholarship Honor Society, American Institute of Chemical Engineers. 11. Cadet Corporal Edward Gabbard, Ravenna, Ky., Eastern State Teachers College; Sigma Tau Pi.

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

Some Observations on Training of CMTC

Captain George L. Hart, Jr., FA-Res.

Background

The following observations are based on experiences during the summer of 1939 as a member of a reserve regiment training the CMTC. The trainees were divided, for training purposes, into two battalions of three batteries each. Two of the batteries in each battalion were designated advanced batteries and were composed of blue, white, and red candidates. The third battery in each battalion was designated a basic battery and was composed of basic candidates only. There were two separate training schedules, one for the advanced batteries and one for the basic batteries. My own assignment was as BC of one of the advanced batteries; therefore my observations will necessarily be directed primarily towards the training of the advanced batteries. The place of training was a small post, garrisoned only by one regiment of light field artillery, horsedrawn. The location, climate, and facilities of the post were ideal for all types of field artillery training except service practice, for which latter purpose the impact areas were so restricted as to oversimplify the problems of conduct of fire. While the training of the candidates was, on the whole, efficiently conducted, and the results obtained such as to reflect credit on both the trainees and officers, there were many things that could be improved upon, and it is with the sincere desire to offer constructive suggestions that these observations are made.

Frequent Change of Regiments Giving Instruction

The training period for the CMTC candidates was 30 days. During this period the trainees were instructed and trained by three separate reserve regiments, each reserve regiment taking charge of the training for ten days. After a three-day refresher course, the reserve regiment with which I served took charge for the middle or second ten-day period.

When we arrived at camp, the officers whom we were relieving complained bitterly that just as they were beginning to hit their stride in training and beginning to know their men and their men to know them they were forced to relinquish their commands. These officers felt that they were just reaching the peak of their effectiveness when they were forced to turn over their batteries to us.

Nor was this feeling confined only to the officers whom we relieved. The trainees, too, entertained a feeling of resentfulness, which they could not conceal altogether, over having the officers whom they had grown to like and understand replaced by new officers who were strangers to them. Naturally our methods differed in many details from those of the officers whom we had succeeded. Half of the ten days that we were to be with the battery had elapsed before the men gave full approval to our methods and before we gained their complete confidence. During the second half of our ten days the training and instruction hit a groove of ever-increasing efficiency and effectiveness. At the end of the ten-day period we knew and understood the personalities of most of the men of our battery and the capabilities of those occupying key positions. They in turn knew us and knew and understood our methods. Then we were relieved and the remaining ten days of the training was taken over by still a third reserve regiment. The cycle of resentfulness and suspicion of new methods began all over again for the candidates. This feeling appeared even stronger on the second change than it had on the occasion of the first change. I strongly suspect that had there been a third and fourth change the feeling would have been so strong that no group of officers would have been able to overcome it in a period of ten days.

A further cause for complaint against the frequent change of officers was the inability of succeeding battery officers to determine just how far the training in particular subjects had progressed before the new officers took over. A study of the training schedule for the preceding period did not solve this difficulty, since these schedules were necessarily somewhat general in nature. We found many instances where we were repeating phases of instruction which had previously been given. There were also many instances when we omitted important phases of instruction in a subject, believing they had been covered in previous instruction, only to learn later that they had not been. In some cases the omission could be supplied, in others it could not be due to lack of time and the necessity to conform to the day-to-day schedule.

It is impossible, of course, to state with any degree of exactness the actual loss in training effectiveness which results from this frequent change of officers. It is no exaggeration to say that the loss is very considerable. The remedy for the situation is immediately apparent. Reserve Officers training with the CMTC should be ordered to active duty for the full 30-day period that the CMTC's are trained, and the officers who begin the training should carry it through to completion.

Fitness of Reserve Officers for Duties as Instructors

The proper and effective instruction and training of an advanced battery of CMTC requires a very considerable knowledge of a wide variety of subjects. To instruct

properly in any given subject requires a much more thorough knowledge of that subject than is required merely to practice the subject. For example, many officers who can prepare the necessary data and fire a satisfactory problem with either axial or lateral conduct of fire have not sufficient knowledge to instruct blue trainees in gunnery.

We should not lose sight of the fact that reserve officers are part-time civilian soldiers; that their main efforts in life must be expended in earning a living from civilian pursuits. A reserve officer's military knowledge and experience must be gained by study in the evenings and over week-ends and by occasional fourteen-day active duty training periods. The average reserve officer of battery grade has a fair knowledge of a few subjects relating to the field artillery arm; many other subjects he has once known but has become so rusty on that he requires considerable study to refresh his knowledge of them. And it is a rare reserve officer who has not obtained his commission and even advanced as far as the grade of captain without ever having learned some important phase or subject related to his arm.

It is easy to understand, therefore, that a battery officer who is training CMTC must, during the training period, spend many hours each evening boning up on and studying some subject that he must instruct on the morrow. It is not at all uncommon to find battery officers who are engaged in this training studying until three or four o'clock in the morning to prepare themselves for the day's instruction. It is a pace that an officer cannot stand for long and there is a limit to the amount of knowledge that can be crammed into a brain in one evening. There comes a point when the mind becomes so fatigued that it will absorb no more.

Reserve officers who are to train CMTC's should be selected at least two months prior to the date that the training is to begin. As soon as selected, their particular assignments for the training period should be designated by their regimental commander and each officer should be notified of his assignment. With his notification of assignment should go a training schedule and texts on all subjects that the particular officer's assignment will require him to instruct in during the training period. This would insure each reserve officer a minimum of six weeks to prepare himself for the training duties which he will be required to perform. The increased efficiency and effectiveness of the reserve officer who takes advantage of the opportunity thus afforded him, and most of them will take advantage of it, will more than justify the trouble that such a program will entail on the part of the War Department, unit instructors, and regimental commanders.

TRAINING SCHEDULES

A. Maximum Training in Limited Time

There is never sufficient time in any intensive training program to train CMTC's thoroughly in all subjects of which they should have a thorough knowledge. The training schedule which we followed was devised with a view to giving fundamental instruction and training is the greatest number of subjects possible in the time available. The result of this was that the trainees gained a little knowledge on a wide variety of subjects relating to the arm, but learned none of the subjects thoroughly. I have no suggestions to make with regard to the general purpose of the schedule. In the application of the schedule, however, we found that many precious minutes of training time were wasted, and it is with regard to these matters that I would suggest changes and improvement be made in the future.

One example of this was in the matter of dismounted pistol instruction. The schedule provided for a total of four hours of pistol instruction for red candidates price to firing by them on the range. This total of four hours of pistol instruction was broken down into eight half-hour periods on eight different days. The pistols used by all batteries in the instruction were kept locked in pistol racks in a central store room near the CMTC area, under the supervision of the CMTC supply officer. The pistols had to be drawn by each battery at the beginning of the instruction period and checked in to the supply officer at the end of the instruction period. A minimum of ten minutes were required for drawing the pistols and a like time for checking the pistols in. This left a maximum of ten minutes out of each half-hour period for the business of instruction. By scheduling four one-hour periods for this instruction, instead of eight half-hour periods, the time which could actually have been devoted to pistol instruction would have been doubled, and this, of course, without increasing the total number of hours assigned to the subject.

Another example of time being wasted by breaking down the total time allotted for training in a subject in to too many short periods was in the case of the training of blue and white trainees in the duties of officers and noncommissioned officers on reconnaissance, occupation and organization of position. The schedule provided two periods of two hours each or a total of four hours for instruction and practice in the subject. It required forty-five minutes for the BC detail to saddle, harness, hitch, and march to the area designated for the instruction and practice. A like period of forty-five minutes was required to march back to the stables, unhitch, unharness and unsaddle. This left just thirty minutes out of each two-hour period, or a total of one hour, for actual instruction and practice in this important subject. By combining these two periods of two hours into one four-hour period the actual time available for instruction and practice of the Roop would have been increased to two and one-half hours.

B. "Hurry and Wait!"

Such was the motto of the battery officers of the regiment for the summer training period. From the medical inspection on the day of arrival at camp until the pay

tables had been passed on the day of departure from camp, the life of a battery officer seemed to consist of a series of mad dashes to reach a given place for a particular purpose only to find upon arrival that a senseless and wasteful period of waiting was necessary before the purpose could be undertaken or accomplished.

One example of this morale-straining "hurrying and waiting" was on the occasion of a chemical warfare lecture and demonstration. The published training schedule specified the time for the lecture and demonstration as between 8:00 AM and 11:30 AM, designating as the place of the instruction a general area only. At reveille on the morning designated for this lecture and demonstration the battery commanders were told to have their batteries formed and ready to march out of the battery streets at 7:20 AM, ten minutes earlier than the usual scheduled time for forming for morning instruction. The battalion commanders were advised that a regimental staff officer would report to them at 7:30 AM and guide the battalions to the place where the instruction was to be given.

The batteries left the battery streets promptly at 7:20 AM and marched a mile and a half to an open field, where they arrived at 7:40 AM, and were halted. The day was exceptionally hot, the temperature having risen to 90° F, by 7:30 AM. There was no vestige of cover or shade in the field in which the batteries were forced to wait.

At eight o'clock many of the men were already beginning to suffer considerably from the heat. The minutes dragged slowly by with no sign of the chemical warfare officer who was to give the lecture. Finally, at 8:30 AM, after the men had been sitting for 50 minutes in the searing sun, the chemical warfare officer appeared and began to make a few preliminary preparations for his lecture and demonstration. Another fifteen minutes elapsed before the lecture actually began. By this time the men had been exposed to the heat and the direct rays of the sun for sixty-five unnecessary minutes. Several men had already been evacuated to camp, suffering from mild heat stroke. By the time the lecture and demonstration began the men were very little interested in anything connected with chemical warfare and got no benefit from the instruction.

A preliminary reconnaissance and measurement by the staff of the route of march to the place of instruction would have eliminated the twenty-minute wait necessitated by the early arrival of the batteries at the place of instruction. Proper liaison between the staff and the chemical warfare officer would have eliminated the forty-five minute delay caused by the late arrival of the chemical warfare officer. Later investigation showed that the officer conducting the lecture and demonstration had not understood the time it was scheduled to begin. He was from another post and no copy of our training schedule was available to him.

There were many other occasions when the vice of "hurry and wait" obtained.

C. "Best Battery" Guidon

To promote a competitive spirit between the batteries there was awarded each day a "Best Battery Guidon" to that battery which on the preceding day had accumulated the highest number of points based on the following grading:

	Maximum Points
Police of tents and battery street	30
Training	30
March and class discipline	20
Promptness at formations	10
Parade or Review	10
Total Maximum Points	100

This system of grading placed "spit and polish" on the same level of importance with efficient training. A well-policed and neat tent area is highly desirable, but certainly it cannot compare in importance with training. A more appropriate system of grading would be to assign to training a basis of 40 points and to police of tents and battery streets a basis of 20 points.

D. Suggestions re Preparation of Training Schedules

Since a well integrated training schedule is so important in obtaining the maximum training of CMTC in the limited time available, these schedules should be prepared by the staffs of the reserve regiments which are to carry out the training. If the 30-day training is to be carried out by a single regiment, that regiment should prepare the schedule. If the 30-day training is to be carried out by two or more regiments, the regiment which is to carry on the training for the first period should prepare the schedule, submitting it to the staffs of the succeeding regiments for study and suggestions before final approval. Work on this schedule should begin in the fall preceding the summer training. The staff preparing the schedule should undertake a thorough reconnaissance of the situs of the training to determine the following: (1) the availability of materiel, (2) the suitability of particular locations for particular phases of training, (3) time-and-space factors involved in reaching training areas and in moving to successive training areas. The staffs should request and consider suggestions by all battery officers in the regiment who have had previous experience in training CMTC.

CONCLUSION

The foregoing observations are all critical. It must not be thought from this that the 1939 training period was wasted, either from the point of view of the officers giving the instruction or the candidates receiving the instruction. To the contrary, the training was very valuable to both groups. The many things in connection with the training which were excellently carried out far exceeded, both in number and importance, the things which were poorly done.

Experiences of a reserve officer called to FAIRLY ACTIVE DUTY for one year

By G. D. Resoff, FA-Res.

The reserve lieutenant stepped forward to the Commanding Officer's desk and performed a self-conscious salute. "Lieutenant Bayard reports for a year of active duty with the 'Teenth Field Artillery, in accordance with General Orders No. 999, Twelfth Corps Area," he stated.

The Colonel was handsome, with high color and a flowing grey mustache; he rose to what appeared a tremendous height, returned the salute, and extended his hand. "Delighted to have you with us, Lieutenant. Sit down."

Questions regarding the young man's education, occupation and military experience were asked and answered. The Colonel knew reserve officers of old, and soon formed a close evaluation of the new arrival. He ended the interview by saying, "When you were on duty before, everything was directed toward furthering your training. That will not be true here. You will have a specific assignment. You will be given work initially which you can reasonably be expected to handle. That work is your job. You will be given added responsibilities as you show yourself ready to handle them, but you must advance your own training as best you can; we shall all be too busy to assume that responsibility—it is up to you. I hope that you will soon feel at home in the regiment, and I have asked Lieutenant Jones to see that you are comfortably settled in your quarters. Your assignment will be published in tomorrow's orders."

In private life Lieutenant Bayard was known to his familiars as "Bunny," for physical reasons. Army work was his avocation, as another man's might be lodge activities or local politics. The other officers of his reserve regiment had formed the nucleus of his friends. He had gone to two camps and completed the Army Extension Course, Thirty Series. His job in an office was a good one, and in it he learned to work all day, every day. He was a typical reserve officer, and had the chief virtue of that group—he was perpetually willing to exert himself. When the present emergency arose he foresaw that tens of thousands of reserve officers would be called up to train new cadres, and might have to perform extensive field service. He decided to obtain a head start and go on extended active duty. He did not think of the military profession in terms of a permanent career; his orders were temporary, and did they not read active duty *with* the regular army and not *in* it? His move seemed to him an adventure, for he was stepping, as if through a looking glass, into the military world he had inhabited in his imagination for so long. He was keenly aware of the dramatic side of army life as he said goodbye to his family and took the train for his post. He was not entirely free from nervousness as the hours on the train went by he contemplated how much he did not know. There was little cocksureness in his attitude when he arrived.

After his interview with the Commanding Officer, Bunny reported for physical examination at the station hospital. He knew that the requirements for extended active duty were well above the minimum for the Reserve Corps; indeed, that they were the same as for continuance in grade within the regular army. He had no uneasiness on that score, however, as he had gone through the same mill only two weeks before at his home station.

He repaired to the Post Exchange, where he purchased insignia and the fourragere and divisional patch of a famous unit. They made him feel important. So, too, his quarters gave him a sense of integration. He spent the day in unpacking his things and wandering around. The standard army brick quarters, the whitewash on trees along the walks, the well-kept parade ground, all combined to give an atmosphere to the post and an impression of routine and order. That evening he watched formal guard mount, his attention whetted by the realization that he would shortly be holding the center of that stage himself. All during the day he tasted the sensation which would haunt him for the succeeding months—a feeling of uncertainty as to what would become of him next day. The army was in a turmoil over its huge expansion program, and a man might find himself whipped from a quiet eddy and slung far away by the swift current at any moment.

Casuals without regimental assignment ate with Headquarters Battery. At mess, Bunny found five other reserve officers who had reported within a few days of his own arrival. One was a classmate he had not seen since graduation. They were exceptionally good fellows.

He heard the recent history of the regiment, which six months before had had but one battalion. Its second had been formed during winter maneuvers in the South. Over sixty per cent of the enlisted men had had less than

155-mm. howitzer regiment in camp during maneuvers near Fort Benning.

five months' service, and reserve lieutenants were commanding batteries—most of the officers, in fact, were reservists. Few of these were captains and none were field officers.

It was conceded by everyone that at the close of summer maneuvers the regiment would be transferred to some divisional post. Rumored locations for the division ranged north to Boston, south to Jacksonville and west to the Mississippi. And then there was gossip concerning personnel being taken every few weeks from regular army units and sent to six projected divisions to be formed in the South. In fact, reserve officers with a little seasoning in a regular line outfit were being sent in all directions. Within two months of his arrival, only Bunny and one other were to remain in the regiment from the six officers assigned together.

Bunny corresponded with several of the officers who had left. Jack wrote from the Field Artillery School: "Thanks for your note. I am a wreck. We are living in tents here at Sill. We get up around 5:30, have classes from 7 to 12 and 1 to 4, or sometimes 5, and three hours' preparation at night. This course is actually Mobilization Course No. 1—we are the guinea pig class. We are divided into sections according to the armament of our regiment, so that I am getting the dope on truck-drawn 155's only, which saves a lot of time. The course is highly specific—only Gunnery, Tactics and Armament, with a smattering of Motor Transport. No administration at all. Firing is constant. Even Sundays the range is busy. So far I have no U's—but I am holding my thumbs. . . ."

From the South Tom wrote: "Here I was, coming to a huge post from a small one, and the social outlook seemed very promising. How little I knew! I was sent to a tent area several miles from the post and I haven't had time to budge from it in the two weeks I've been here. We are quite well fixed up, with great pine trees all through the area. When we get cement floors for the tents, and permanent latrines in, we shall be perfectly comfortable—in the summer time.

"We are on a hurdy-gurdy. The regular officers are the only ones equal to the administration problems, which are nothing short of a struggle for existence. Half the stuff which should have arrived before the men got here is still on the way. Drill is left entirely to reserve officers and non-coms. The enlisted cadre of this battery is a problem. Some of the NCO's are 'culls,' sent by battery commanders who wanted to be rid of them. The best are young fellows whose way up was blocked by older men in their former outfits. The cadre has been here five weeks, and only a few service records have arrived, so most of the non-coms have not been paid. Enlisted men are the new volunteers—hastily signed on to fill quotas. Many of the rookies are willing, but they all seem to think military discipline is Sunday School stuff and unmanly. I hope we have time — plenty of it — before we get our new mechanized equipment.

"As far as I am concerned personally, I find it a lot easier to work with recruits who know nothing than with a lot of hawk-eyed old soldiers watching for every slip I make. Teaching is a dandy way to learn, and believe it or not, I am getting to be a darn good executive."

Bunny had a letter from Dick, too. It was postmarked Fort Clayton, Canal Zone. "This transfer surely was a break! A swell trip down on a Panama R.R. vessel built last year. Six days, at a dollar a day. I could have come down on a transport for nothing or taken a Grace or United Fruit ship at a special rate. That really would have been a vacation. As it was, I got in some good licks on the 75-mm. pack howitzer. That weapon really is a jewel. From mule to full recoil in a minute flat! All the enlisted men in the battalion to which I have been assigned must be six feet tall so that they can shove balky mules past precipices.

"Clayton is over east on the Pacific side of the Isthmus. The parade ground is large enough for divisional reviews. It is six miles from Panama City, where some of the officers live on commutation. There are no customs formalities at the boundary. I wish I had brought a car; shipment is free, and gas here is only six cents a gallon. The Century Club and a lot of other places give the army crowd a big social life in Panama City. The number of troops down here has been doubled recently

and the army is overflowing all its posts—Amador, Albrook Field, Corozal, and some others I have not seen yet.

"We will wait until the rainy season to go on maneuvers. The rains last nine months of the year, but often fall only fifteen minutes a day. Right now it gets too hot to work at midday, and I find myself burning a lot of electricity at night, when it is always cool.

"You should see the neat little bay mare which has been assigned to me. All in all, I surely am glad that foreign service orders are issued to reserve officers for two years of duty instead of one."

The day after Bunny's arrival in the 'teenth he picked up the mimeographed "daily bull" with shaky hands. What would his assignment be? He knew that there were a lot of "dum-dum" details for reserve officers who were not deemed well suited for service with troops—details in the Post Exchange, or on various maintenance jobs. He also knew that the firing batteries were far from uniformly trained. He swore delightedly as he found himself in Battery B.

He reported to the battery at nine-thirty that morning, and from ten to eleven held gun drill. The regiment was normally equipped with 155-mm. howitzers, but it was scheduled to give summer training with 75-mm. guns to Organized Reserve regiments a week later, and all batteries were practicing with these. Confusion reigned. Bunny grew a bit rattled; his sequence of commands faltered; he failed to follow the deflection and when arguments developed between gunners and recorder, he could only stand by as an ignorant bystander. He went over the heads of chiefs of section and spoke directly to the members of gun squads; he announced convergence to the gunners; he even invented some mistakes so strange that not even the long-suffering Santa Barbara had ever heard them before. His performance that morning and for several succeeding days was to cloud his relations with the battery for months.

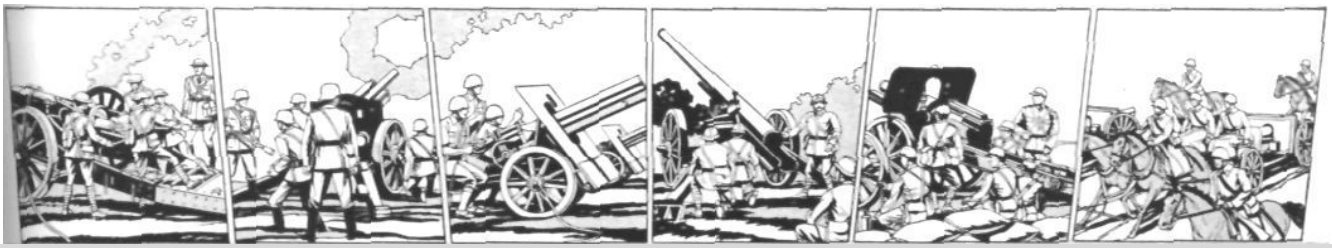
In time, however, his difficulties straightened themselves out, and at the end of two months he was able to function as an executive with full confidence. He still had not conducted any fire—service practice is infrequent in the regular army—but in other technical departments he could actually be termed proficient. He was still only starting to become a good battery officer, however. Paper work remained a tortuous maze, in which he frequently went astray, and he had not yet had the long association with enlisted men which is necessary to fit a battery commander for the role of patriarch.

Training of Organized Reserves and the CMTC lasted until two days before maneuvers. On the next to last day an enlisted cadre of one hundred and twenty men departed for the South. In B Battery the detail was worst hit; no noncommissioned officer remained who could compute work and command sheets, and the battery agent became instrument sergeant. Bunny was switched from executive to reconnaissance officer. Fortunately, the first week's schedule was designed to let the National Guard "shake down" in the field, and the regular army staggered to its feet. The final four-day problem made a great impression on Bunny. It pointed-up the meaning of his job and gave him at least an inkling of how the French must have felt as they fought along the Seine. B Battery was in position only six hundred yards from the enemy. Between it and the hostile lines was one platoon of infantry. At dawn firing was heard not only to the front, but to the rear on either flank as well. Still no orders to move came down. The battery commander sent Bunny back to get in touch with the battalion and to select a new position. The division had been caught with a river across its rear; the nearest bridges, both up and down stream, were in enemy hands; the water was three feet deep and swift. Infantry columns were milling in all directions and defeat was in the air. Higher command had decided to leave the guns forward to serve as centers of resistance. Bunny returned to the battery, which he found already on the road. The howitzers were swung off the highway, the vehicles scattered.

It was very good to get into a bed at base camp after cold, rainy nights on the ground. Even as he dozed off, his mind reeled with the many mistakes he had made and the confusion he had seen. Granted that the situation of the division had been artificial, he was extremely grateful that the battle had been a "dry run." He felt profoundly thankful for the months upon months of training which still lay ahead.

Life is mostly froth and bubble,
Two things stand like stone;
Kindness in another's trouble,
Courage in our own.

—ADAM LINDSAY GORDON, quoted in
The Gunner (London), June 1940.



FIELD ARTILLERY ABROAD

IMPROVED BATTALION FIRE DIRECTION. Lieut. Col. Graszmann, in *Artilleristische Rundschau*, Dec., 1939.

According to paragraph 273 of the Firing Regulations, it is possible to fire from a map by an entire battalion even though only one battery has registered.*

Lacking a recent weather report, or having an unreliable weather report, a more accurate method of firing the battalion by map is desired. In any case, an appropriate check point and ground observation is required.

According to Firing Regulations the improved method requires the following:

1. Battery positions must be accurately located on a map of sufficiently large scale (1:25,000 to 1:50,000).
2. Check point (usually the base point) and target must be accurately located on the map.

There is no doubt that lack of success in firing is caused in part by faulty surveying. Unfortunately, surveying is not yet everywhere given the importance it deserves. It should not be a mystery to the artilleryman, but a matter of every day routine. Accurate surveying will be obtained only when the superior officer takes an active interest in it.

Important as it is for us to learn to act with lightning speed, and, in observed firing, to achieve success with the simplest data to work upon, it is none the less important to use every available minute to improve basic data. In time of war there will be a great number of situations that will require accurate work. This, then, in some way or other will always be based on surveying operations, and no hit or miss method can be tolerated.

Another source of error is to be found in the determination of the base lines. We are here confronted (and this is often overlooked) with a situation different from that prevailing in the case of registration of a battery using ground observation. In observed fire it is of no importance whether the initial determination of the base line is correct or not. An error in the base line is eliminated through registration upon the check point. It is true that the lateral components of the weather correction determined by registration are affected by any existing error of the base line, but this is of no importance. It is, however, important when the weather conditions determined by registration of one battery are used by an entire battalion. Here, not only the registering battery shifts to the target, but the entire battalion.

Thus the error in the base line of the registering battery will be induced as an error to the other batteries notwithstanding the fact that there may be no errors in the determination of their base lines.

If the registering battery did report (after firing with a correct base line) correct lateral components of the weather corrections, the application of these lateral components upon incorrect base lines of the other batteries will, nevertheless, result in unsatisfactory firing.

If the base line of the registering battery is not correct, the application of the resultant incorrect lateral components of the weather corrections, upon correct base lines of the other batteries, will necessarily result, for the latter, in an initial error in deflection.

If there are errors in the base lines of the registering, as well as of the other batteries, it is merely a matter of chance whether those errors will accumulate or will counteract one another.

What are the requirements, then, which must be fulfilled by the base lines in order to carry out our method of battalion fire direction from a map?

First, the check points must be exactly located on the map.

Second, the base lines must be either absolutely correct (that is to say, the base lines must unerringly pass through the check point, which of course is the better alternative), or all the base lines must be affected in the same direction by the same error.

The absolutely accurate base line is assured if it has been conscientiously verified, either by means of a secondary survey or by means of a trial shot, and, in the latter case, only if atmospheric influences be known through exact weather report.

Whether or not the weather report is in error cannot be known for certain either by battery or battalion. It follows that it is not permissible within the battalion to mix both methods, namely, the secondary survey and the trial shot. Otherwise it may happen that those base lines that have been verified by means of a secondary survey

*There is even reason to believe that the Germans can register with a single 105 howitzer, then open for effect with several 105-mm. and 15-cm. batteries.—Ed.

do actually pass through the reference point, whereas those verified by means of trial shot are affected by a hidden error of atmospheric conditions.

An atmospheric error in the base lines occurs when the base lines have been verified by means of the trial shot and the atmospheric corrections are either based on incorrect report or not applied at all. The error is one and the same throughout the battalion if the base lines have been verified under the same weather conditions, that is to say, at the same time, and if an eventual elimination of atmospheric conditions has been made on the basis of the same weather report. If one and the same error exists in all base lines, it is eliminated through one battery determining atmospheric conditions by trial shot and can be ignored in the use of the method here considered.

Now, still another remark concerning the verification of the base lines by means of the trial shot:

A base line that has been verified by means of the trial shot is, according to paragraph 147 of the Firing Regulations, a proper basis for map firing. It follows that the base line must have been verified in such a way that it can be a proper basis.

Because of the wording in paragraph 151 of the Firing Manual which stresses lateral observed fire, one is led to believe that rule-of-thumb firing is sufficient. When the burst falls on the OT line with an angle T of 200 or 300 mils an erroneous range may result.

Even in the case of a relatively small angle T, the actual distance from the battery to the point at which the shell falls is different from the distance between the battery and the check point on account of inaccurate calculation and atmospheric conditions; such difference in range between the actual shot and check point will cause even in medium ranges considerable deflection error.

The extent of that error is shown in the following table:

Distance from battery position to check point about 4000 meters					Distance from battery position to check point about 5000 meters				
Distance error					Distance error				
T	100m	200m	300m	400m	T	100m	200m	300m	400m
50	11	2	4	5	50	1	2	3	4
100	2	5	8	10	100	2	4	6	8
150	4	8	11	15	150	3	6	9	12
200	5	10	15	20	200	4	8	12	16
250	6	12	19	25	250	5	10	15	20
300	8	15	22	30	300	6	12	18	24
350	9	18	26	35	350	7	14	21	28
400	10	20	31	41	400	8	16	24	32

From the table we conclude the following:

If it is not possible to have axial observation to verify the base line, it is necessary, even in the case of relatively small angles T, to obtain a bracket in order to avoid large errors in range and deflection.

Now, there are no doubt many cases where such accuracy is not required, such as when our purpose is merely to get an approximate idea about the value of the base line as a basis for observed fire. But in that case, we should not use the term "verification of the base line." The expression "verification of the base line" must be reserved for an operation which can really be considered as a basis for map firing.

In the selection of the check point, to determine the means of the trial shot) the weather conditions, the requirements of paragraph 217 of the Firing Regulation will have to be observed, namely:

1. The shift from check point to target and actual fire must not be more than 200 mils.
2. The distance from batteries to target as compared with that from registering battery to check point must not differ more than 1500 meters.

Finally, care must be taken to have all the batteries shoot at the target with the same charge and with projectiles of the same weight by which the particular weather conditions have been determined. If a battery is unable to shoot over an obstacle at a given target with the same charge, it should not fire at all. Battalion headquarters will prescribe the charge to be used. If possible the center battery is chosen for registration, as it represents more nearly the average base deflection of all three batteries, and is the most convenient for observation of, and firing on, the check point.

In such kind of firing, the fire control order might possibly be as follows (over a co-ordinated party line connection):

"Battalion will fire a concentration on battery target No. 560 (75.185-67.315), elevation 125m. Center battery will determine by trial shot the atmospheric conditions for charge No. 4, and report."

The center battery fires and then reports:

"Atmospheric corrections: Deflection left 5, K = + 5.5m. per 100m. Weight class III."

Battalion then orders over a party line:

"Weather corrections for target No. 560: charge No. 4. Weight class III. Deflection left 5, K = + 5.5 per 100m. Report when ready to fire 20 rounds per battery!"

BATTALION PROBLEMS. Gen Böttcher in *Artilleristische Rundschau*, Jan.-March, 1940.

Firing Problem (*Smoke*)

A battalion of light howitzers (105-mm.) has the following mission:

"From x to x + 30 screen possible enemy OPs on the Ameisenberg hill, paying particular attention to the wooded slopes. Registration with one piece only.

Solution

It is assumed that the battalion has the 1/100,000 map available. On it have been plotted the directing piece of the 2d Btry and the base point. These are transferred to a 1/25,000 firing chart, and the line directing piece-base point is drawn. The directing guns of the other two batteries are plotted.

German 105-mm. howitzer

The screening mission is executed best with smoke shell, but HE shell may be used if there is not much wind at the target. In this case:

1. Smoke shell is available
2. The width of the hill is 600 meters

The battalion commander decides to adjust to obtain a 400-meter bracket using HE shell instead of smoke from the registering piece for greater surprise effect.

The results of fire with the directing piece are as follows:

Number of Round	*Commands*	*Deflection*	*Range*	*Sensings Dev.*	*Sensings Range*	*Remarks*
1	Zone 5, Fuze short, No 1 only Base deflection R 300 4200 Site 300 Fire	BDR 300	4200	L	—	Short of left edge of woods
2	R 30 same range	R 30	4200	L	—	Slightly off line of left of woods
3	4600	—	4600	L	+	smoke behind woods

The wind at the target is blowing from right to left at about 4 meters a second. The battery reports results to the battalion.

Using this data, the battalion commander divides the target among his three batteries and sends them the following order (all batteries connected on battalion commander's line):

Screen the Ameisenberg at x hour

1st Battery
2d Battery
3d Battery } (Firing Commands)
Smoke Shell

200 rounds per battery

The batteries fire 8 to 16 rounds each to establish the screen, and then fire 60 to 90 rounds each every fifteen minutes to maintain it. Battery orders are as follows:

Zone 5, Smoke Shell
Battery, Base direction R —
Range
Site 300
3 Rounds

TRAINING THE BATTALION DETAIL. Digested from an article by Lieut. Laube in *Artilleristische Rundschau*, May, 1940.

Whereas the battalion adjutant may train the "combat staff" of battalion headquarters, the training of the major part of the battalion detail is the responsibility of a very young lieutenant who scarcely has sufficient experience for this important ask. This officer, having already served as an enlisted man in various capacities in a firing battery, is really better qualified to take over the command of such a battery than he is to take charge of the battalion detail. "On many occasions in garrison, as a young officer, he has probably commanded a firing battery when the regular commander thereof was conducting the exercises. But now, in addition to finding himself placed all at once over 100 men and 70 horses, there is the added difficulty in that he must train not only gunners but telephone operators, radiomen, surveyors, and that he must no longer think in terms of the battery but in terms of the battalion."

His first feeling is one of joy at becoming his own boss. His heart is still with his former battery, which is looked upon with a certain contempt on the part of the "staff crowd." However, he finally comes to realize that his new duty is an important one, and that the smooth functioning of the firing batteries depends to a certain extent on the efficient work of the battalion detail. "We say all this for those who have not progressed beyond the stage of confusing cannon with signal corps vehicles and shells with Morse code."

The objective is to weld into one unit the communication section, the survey troop, and the intelligence detail. To do this it is necessary to conduct classes for: telephone operators, radio operators, chauffeurs, surveyors, and instrument men and other intelligence personnel. To accomplish this the officer has as assistants the sergeant major, 1 platoon sergeant, 1 sergeant major of survey troop, 6 "front" NCO's, and the communication chief.

He is at a disadvantage in that if he wishes to assign a combat situation he cannot personally supervise the work of all the sections—they will be too scattered. Hence the exercises of the different sections must be held separately. This means that the survey troop must practice in the forenoon and the communication section in the afternoon, or vice versa.

A firing battery can conduct an exercise in which the other elements of the battalion are merely simulated, but for the battalion detail this does not work so well. Therefore it is desirable for the lieutenant to ask the battalion

commander to schedule a number of battalion problems so that the battalion detail can get proper combined training.

The training of the classes requires careful preliminary preparation of each exercise, and planning ahead. The NCO's should be properly utilized in this training. Assign each section to the enlisted chief thereof and hold him responsible for the achievement of the training aim. Each evening at six o'clock the section chiefs hand the officer a written statement of the training plans for the following day, giving—on the basis of the officer's general directive—the duration, place, and scope of the work.

The officer then visits each class in turn, wherever he thinks his presence will be most needed. In the beginning he will generally be with the transport (drivers') group, then he goes to the telephone operators or the radio section. It may be that the transport master can handle the training of his group alone, but it will not suffice to have the instruction of the telephone and radio groups solely under an NCO.

One who has had experience in battalion firing in peace or war knows that 90% of the total traffic consists of orders, observation reports, and fire-control messages, which may be transmitted in key words or in one or two short sentences. For example, shall the order of the Bn CO: "4th Btry fire on MG nest 200 meters south of CR 205" be written down by the telephone operator at the battalion OP only after he has filled out in detail the message-blank form as required by regulations? Is this message then to be dictated word for word over the wire to the operator at the battery, and is the latter then to delay giving the message sheet to the officer who is to conduct the fire until the sheet has been filled out according to regulation? With such a procedure, the machine gun would have disappeared long before. Fire control requires another method of operation: The telephone operator must be so trained that he can retain fire-control orders which are not over three sentences long, until the desired connections are made, and then transmit the message. The receiving operator must be so trained that he can, without writing it down, repeat it over the wire, then turn to his BC, RO, or whoever it is intended for, and give the message distinctly word for word. This is the goal of training, and it will not be attained by spending hours in filling out message blanks. The point is, telephone operators within the battalion are not concerned (in combat) with long tactical messages, and we should not waste time training them in the transmission of such messages.

Now as to training of radio operators:

"What artillery communication officer has not found after giving his radio operators careful training in the use of Morse code and encipherment that they cannot yet, in actual work, encipher a message and send it? Then, too, who has not found to his regret that it was precisely in the more important exercises, in the firing practice of the fall maneuvers, that the radio operators seemed to have forgotten more than they had learned, because they had spent very little time transmitting spoken messages, had had too little actual key work (transmitting)? Was this any wonder when most of their training time had been spent in setting up and taking down the station? In combat a different situation will obtain. Wire communication will go out, and we will have heavy radio traffic."

Radio exercises should be held two or three times a week. The purpose is to train the operator simultaneously in code reception, transmission, and in the use of the map target indicator, as well as in equitation and map reading. The following procedure has proved worthwhile:

The operators are divided into two mounted sections and two dismounted sections. The mounted sections are those who go to the OP's of the batteries and the dismounted sections are those at the OP of the battalion. Each radio section is sent out to a separate point on the terrain in the vicinity of the garrison; here it opens an envelope containing 4 or 5 messages. At the end of each message is, for example, the sentence, "Displace position to ..... ." From this point the exercise proceeds by itself. The sections alternately displace to various points on the terrain, and transmit messages to each other. The exercise may be so planned that the last displacement brings the sections back to the post. Thus the personnel obtain practice in setting up and taking down of equipment, enciphering and deciphering messages, and in transmission and reception. They also get practice in the use of the map target indicator, and in riding. The knapsack set may be used by the officer and NCO to monitor the operation of the net, and check radio discipline, discussing matters with the men after the exercise. These problems, lasting from 4 to 6 hours, give full employment to the mental and physical faculties of the men, increase their self-confidence, and afford pleasure to all enthusiastic soldiers.

Operators should practice code for 45 minutes each day.

Now for a few words concerning the survey troops. The ambition of every staff officer is to perfect the survey troop in coupling firing positions (tying firing positions together by survey so that one piece may register for the battalion). Many commanders have had little faith in this. However, it can be used successfully, and the secret of success is constant drill on the part of the survey detail. Some instructors prefer to deliver learned lectures on the method, but the only proper way is to have the men actually get out and practice measuring angles and distances. A good way to check their accuracy is to have them traverse over courses which have been laid out ahead of time and the correct data determined by the instructor.

The survey troop is divided into two sections so that one section surveys to the right battery (from the center) while the other surveys to the left battery. They must be trained to act in unison.

"Train separately and fight together" is a motto which is better suited for the battalion detail than for any other unit.

TRAINING OF RESERVE OFFICERS AND CADETS IN A MOTORIZED RESERVE ARTILLERY BATTALION. By Capt. Leitreuter, in *Artilleristische Rundschau,* March, 1940. Digested by J. S. W.

After the Polish campaign the Germans spent the winter months in organizing and training additional divisions and in "polishing up" the training of reserve units not yet employed. Capt. Leitreuter's article shows the intensive training schedule followed. He points out that the mission of the training schedule is preparation for field duty, that only the essentials can be covered, and that everything else must be set aside. Most of the reserve officers and cadets had completed their peacetime reserve training (corresponds somewhat to our National Guard units) and some had taken part in service practice. A four-weeks' course covering the duties they were most likely to perform was established as follows:

1st Week

Gunnery: Commands, use of firing tables, instruments, laying, overhead fire, dispersion, projectiles and fuzes, angles of fall and incidence, choice of zones.

Basic tactics: Organization of the reinforced infantry regiment, march formations, march security, security against air and armored-vehicle attack, employment of battery in attack and defense.

2d Week

Gunnery: Preparation of fire, firing charts and observed-fire charts, base deflection, observation, use of metro tables, and determination of map data corrected.

Tactics: Kinds of fire, methods of fire, tactical conceptions, meeting engagement, position in readiness, forward observation, attached and direct-support artillery.

3d Week

Gunnery: Conduct of fire, adjustment, fire for effect, registration and use of check points, fire against aircraft, standing barrages.

Tactics: Attack, defense, exploitation; special situations; communications; motorized units; estimate of situation—decision; combat orders.

4th Week

Gunnery: Survey, use of instruments, fire against tanks, smoke, rolling barrage.

Tactics: Reconnaissance, forward detachments, observation battalion, attack of fortified areas, employment of reinforcing artillery.

The course included practical work with the battery throughout, and instruction in firing the rifle, light machine gun, and pistol. It was later changed as follows:

1st Week

Theory: Duties of section chief; use of maps; grids; declination; compass laying.

Practice: Service of the piece; sketching; use of aiming circle.

2d Week

Theory: Use of range tables; rapid methods of laying; trajectory; minimum elevation; minimum range; dispersion; angles of fall and incidence; fuzes and projectiles; duties of range officer.

Practice: Supervision of service of the piece; rifle and pistol instruction; forward observation.

3d Week

Theory: Preparation of fire; firing chart; observed-fire chart; verification of base direction; factors; adjustment; fire for effect, ricochet fire; standing barrage; smoke.

Practice: Section field service; close defense; observation—smoke bombs and detonating bombs; judgment of terrain.

4th Week

Theory: Operation of battery OP; instruments; organization of position; employment of battery; camouflage; security; reconnaissance; antitank and antiaircraft defense; marching a motorized battery.

Practice: Location of OP; use of charts, maps, sketches, etc., at the OP; dead-space charts; artillery advance reconnaissance on the march.

Additional changes in the officers' course:

1st Week

Tactics: Security—experiences in Poland; combat in special situations—night, towns, woods, etc.; experiences in Poland (conferences); written exercise—estimate of the situation.

Field training: Battalion employment; judgment of terrain—selection of position; organization of OP.

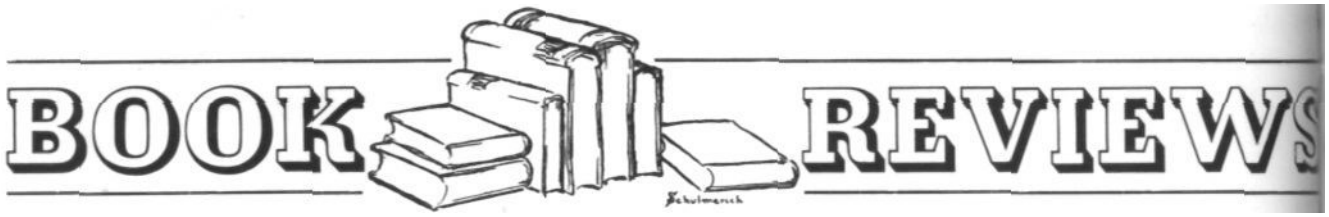
Conduct of fire: Choice of zones; occupation of position by motorized battery; rules of fire; service of the piece.

2d Week

Tactics: Employment of and defense against tanks; artillery-infantry liaison; artillery in direct support and attached; march formation of reinforced infantry regiment.

Field training: Employment of battery; selection of position; selection of targets; security.

Conduct of fire: Rules of fire; dispersion and slope factors; antiaircraft fire; firing charts; barrages; graphical range tables.



THEY WANTED WAR. By Otto D. Tolischus. Reynal and Hitchcock, New York, 1940. 331 pages. $3.00.

This is the best and most important book produced so far by the European War, and we mean just that. As Mr. Tolischus says, future historians for many years will be trying to solve the mystery of Germany's sudden and overwhelming success on the continent, and the corresponding weakness and blindness of her opponents. *They Wanted War* will come closer to answering these questions—at least those pertaining to Germany itself—than anything which has come to our attention. It is, in effect, a *combat estimate* of the Third Reich, and an exceedingly keen and accurate one. Colonel Lanza, in his study of the causes of the War, now appearing in this JOURNAL, mentions several times the dispatches of Otto D. Tolischus from Berlin during the crises of the past three years. He points out how the course of history might have been different had certain Powers paid closer attention to Tolischus' reports and forecasts. *They Wanted War* is based in part on these same dispatches; they are worth reading again in the light of what has happened in the meantime. Although the entire volume deserves careful study, we recommend that the military reader scrutinize particularly Chapters 3 and 4, dealing with Germany's military preparations, and a brief but excellent analysis of what happened in May and June of 1940; and Chapter 21, which concerns the Polish campaign. There are several bits in this last which will be of special interest to field artillerymen. These describe how German artillery was employed to soften the fortifications along the Narew and quotes German officers who stated that that line never would have been broken except for two things; the effect of German artillery fire, especially on Polish morale; and the insufficiency of Polish artillery support. Otherwise, the Germans said, the Poles "might be fighting there yet."

THE SOLDIER'S LOG — 10,000 MILES OF BATTLE. By Masaru Taniguchi. The Hokuseido Press, Japan, 1940. 176 pages. $1.50.

This is a very curious book, its peculiar flavor being caused, no doubt, by the fact that the translators have chosen to couch the narrative in a breezy, slangy American idiom which seems quite out of place. The book is the personal story of a common Japanese infantryman who fought through many recent bloody campaigns in China. Although this story reaches us through one ghost writer and two translators, some of whom have seen fit to inject some naive and rather clumsy bits of propaganda, it still retains sufficient flavor of the original to give some insight into the thoughts and reactions of the narrator. The book is worth reading; it gives you a better picture of the fighting than can be obtained from most press releases, especially if you want a worms eye view. And it takes you into the heart of the Japanese soldier, reveals his patriotic fervor, his courage and endurance in face of great hardship, and will give you a fair idea as to what "makes him tick." Further, it will enlighten you somewhat as to Japanese minor tactics and combat principles. The Japanese soldier is a well-disciplined fighter, who can march for surprising distances, endure considerable hell in the shape of hostile fire, and still have plenty of will to get in with the bayonet at the end.

EFFECTIVE SPEAKING FOR EVERY OCCASION. By Willard Hayes Yeager, Prentice-Hall, New York, 1940, $3.50.

Have you known a half-panicky feeling when the Rotary Club of the Chamber of Commerce has asked you to speak at the luncheon a week from next Tuesday? If you have, you will appreciate the practical aid that Professor Yeager offers in his new book.

The book is based on a large fund of experience in teaching public speaking. The author is professor at George Washington University. He has given special courses at some of the Army Service Schools. He is recognized as one of the nation's outstanding educators in the subject.

Professor Yeager warns that there is no magic formula, no short cut that can produce a finished speaker overnight. However, he has analyzed some sixty short public addresses of all types. From these, he has established the common elements that made them successful.

He has classified speeches into useful groups so that the amateur speaker is very likely to find something that is of the category that confronts him. For instance, the author classes nominating speeches, speeches of presentation, of introduction, and of welcome together. He makes suggestions for their preparation and choice of subject matter. He quotes examples of these various types of speeches that have been successful.

Other classifications discussed include speeches of response and farewell, speeches of celebration, of factual explanation, and of inspiration. Good will speeches,

those whose principal object is to entertain the audience, speeches to persuade the hearers to believe in and to act on proposed courses of conduct are all analyzed; helpful suggestions on their preparation are given, together with good models that have been successful in achieving the results desired.

The general problems of selecting the material and composing the speech are covered in a common-sense manner. Should one memorize outlines and speak extempore? Is it better to memorize the whole speech or to read it? Professor Yeager gives the pros and cons on these questions together with helpful suggestions on delivery.

In the opinion of the reviewer this book is a most helpful adjunct to an officer's literary equipment. It should have a place on the bookshelf of every officer who may be called upon to speak in public. And there are few who do not come within that category at some time during their service.

—R. C. S.

OLD BALD HEAD. By Percy Gatling Hamlin. Shenandoah Publishing House, Strasburg, Va., 1940. 206 pages. $2.50.

Although this biography of Lieut. Gen. R. S. Ewell, C.S.A., is an unpretentious book, it represents a surprising amount of original research. This, together with the fine way in which it is written, entitles it to rank with more prominent works dealing with the Southern military leaders. Dr. Hamlin has done a fine job. He his made Ewell really live again. In addition to this, he has taken the pains (and this requires real study) to recapture for us the flavor of the times, the manner of speech, the things people ate, what they wore, their ails and their pleasures. Particularly noteworthy is the first part of the book, describing Ewell's early service in the western Indian country. Whether Dr. Hamlin is familiar with the prairies from first-hand knowledge, or has merely studied it from books, he describes it so familiarly that he brings nostalgia to one who knows that country well. A splendid historical work which deserves better presentation.

BEDBUGS—OR WORSE?

A recent War Department release announces that a contract for $60,000 worth of folding cots has been awarded to the Animal Trap Company of America. *Bank fatigue artists may be even more alarmed to learn that another contract for $80,000 worth of folding cots has been awarded to the* Telescope Folding Furniture Co.

PANTS

Considerable satisfaction will be felt that OD trousers for our augmented army are to be made by the Buffalo Faultless Pants Co. *and* The Perfect Trouser Co. *Denim trousers, however, are to be supplied by the* Buttnick Mfg. Co.

THE AMERICAN WAR OF INDEPENDENCE IN PERSPECTIVE. By Lieut. General Sir George MacMunn, G. Bell & Sons, London. 370 pages. 15 shillings.

This book is heartily recommended to the American military reader. He will be a better educated soldier after he has read it, primarily because he will never again accept anything as military history without considering carefully the viewpoint of the author. Gen. Munn delivers his opening jolt to the American mind on the first page of his book when he states that the King's Army during the War of Independence "won every fight in which it was engaged." This reviewer is still somewhat bewildered by that statement, even if he accepts Gen. Munn's classification of the Lexington fight as "the distressing affair at Lexington," charges Trenton to the Hessians, Saratoga to the Brunswickers and Indians, Cowpens to the Loyalists, and throws in Yorktown,—although it is difficult to account for the two Guards battalions and several line battalions surrendered there as other than part of the King's Army.

Seriously, this book will be of real interest to every student of the American Revolution. Its distinguished author's writings are highly respected in British military circles, and his evaluation of the various phases of the war is a distinct contribution to the history of the conflict.—H. W. B.

Δ WHEN the War broke out last fall a number of questions were propounded editorially in this magazine, the answers to which, it was suggested, should be sought in a study of such reports as might be released. Although the final word certainly has not been said, press dispatches and periodicals here and abroad, as well as a few official war films, permit us to arrive at partial answers. It might be well to reorient ourselves by considering them:

Δ THE FIRST group of questions was:

"Will air power do all that its protagonists have claimed for it? Will 'orthodox' doctrines be followed in its employment—attack of such vital targets as airdromes, defiles in supply arteries, industrial establishments devoted to production of war materials, large formed bodies of troops—or will it be used against everything that moves and lives? To what extent will air infantry be employed? Will defensive measures planned by field artillery and other arms be effective? Will the bomb replace the artillery shell in reducing resistance on the actual front?"

Only frank answers will suffice here. Air power showed tremendous strategic importance, just as its supporters anticipated it would. In addition, planes were used for close support of ground and naval forces. The only major question unanswered is, Can the bomb sink a capital ship?

Air infantry and parachutists proved their worth in limited though important enterprises. They may, where conditions are favorable, be used on a larger scale. One no longer smiles when he speaks of the vertical envelopment.

Antiair measures for field artillery and other arms? We would say: coolness, fire, dispersion, cover; in that order. And at all times unceasing vigilance.

Lastly, the bomb has not replaced anything; but it has vastly extended and amplified all other fire power including that of artillery.

Δ THE SECOND group of questions which we asked were:

"Will mechanized forces find their principal role in making sweeping envelopments, or in power drives through a prepared position, or in exploiting a breakthrough made by other arms? Will they keep war from settling down to stabilized fronts? Will defensive doctrines be changed so that tank obstacles rather than fields of fire are deciding factors in selection of position? What antimechanized provisions will be most effective-mines, barriers, antitank guns, or field artillery? Will field artillery have to protect itself against mechanized attack? . . . . ."

Here again the questions touched vital matters. Weasel answers will not satisfy. Armed fighting men—call them infantry or what you will—still constitute the basic arm. All other arms and weapons still exist for the purpose of aiding infantry to close with the enemy and to overcome him. The war has proved that armored units are a *major weapon* in accomplishing this. Like air power, they will be used for any and all suitable purposes, but assuredly *in great strength where the decision is sought*.

A good field of fire constitutes, as of yore, the best defensive terrain. To their sorrow the French learned this below the Ardennes and along the Meuse, the Aisne and the Rhine. Obstacles inadequately covered by defensive fire cannot stop a skilled attacker who is willing to take losses.

In effective antitank fire the field gun has emerged with increased prestige, yet field artillery is a prime target for armored attack and must defend *itself* with all means in its power, meanwhile clinging to its principal mission.

The antitank mine did not have a fair chance to demonstrate its worth. The forty-hour week and the Popular Front made sure that France would have pitifully few mines in her hour of need. Furthermore, there is some doubt that those available were properly used.

The remaining questions, for various reasons, cannon be answered at this time.

Δ LET US look to the future, and in so doing view events and developments more objectively. Undue skepticism is as harmful as credulity. Stabilized warfare and its methods are gone; possibly not forever, but our generation may not see it again. Field artillery will find its use today and tomorrow as yesterday, but deliberate fire methods will take reduced rank. Forward observation, forward firing positions, observed fire, some direct fire, frequent and rapid displacement—aggressive, fast and courageous action—these are the elements which will distinguish successful support of modern battle units. We may congratulate ourselves that our tradition, our materiel, and our native "Sill" doctrines are GOOD. We must hold fast to them! And, since blitzkrieg follows no pattern, the alert mind *well founded in basic training* can best meet the unexpected and unusual which paradoxically, are the ordinary in warfare of today.

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