The FIELD ARTILLERY Journal

IN THIS ISSUE:

Artillery in Bataan

APRIL, 1942

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MAJOR GENERAL WILLIAM J. SNOW

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AS WE GO to print, the new plan for reorganization of the War Department has not been revealed in detail. As has been announced in the press, the Chief's Office disappears from the picture until six months after the end of the war. Just what agencies will now take over the various functions of the Chief's Office will doubtless be disclosed shortly. In the meantime, our members can be assured that the United States Field Artillery Association and the FIELD ARTILLERY JOURNAL will continue to operate as before. Our address is 1218 CONNECTICUT AVENUE, WASHINGTON, D. C. We emphasize strongly that mail addressed to the Association or the JOURNAL "in care of the War Department," or at the "Office of the Chief of Field Artillery," or simply "Washington, D. C.," probably will not reach us at all. The officers on duty with the JOURNAL are assigned to Hq Army Ground Forces.

OUR POLICIES are not expected to be changed materially. We will still make it our prime effort to disseminate rapidly professional data which may be useful to all field artillery units in training and in battle. Lessons of the war will be pointed out specifically, or can be deduced from the combat accounts which we will continue to obtain from first-hand sources. Owing to the absence of a Chief of Field Artillery, there is reason to believe (more than ever) that announcements of interest to the Arm, and previews of training literature, methods, and materiel, will be found earliest in the FIELD ARTILLERY JOURNAL, and frequently exclusively therein.

FURTHERMORE, we hope that all members of the Arm will continue to regard the Association as a tie binding us together, assisting in promoting uniformity of training and methods; and that it will continue to serve as an indispensable medium for the exchange of professional ideas helpful to all. Share you discoveries with others by means of your JOURNAL.

The Field Artillery Journal

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

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Major General

Major General Robert M. Danford, fifth Chief of Field Artillery, upon completion of the customary four-year term as chief of the arm retired from active duty on February 28, 1942. He had given forty-one years of distinguished service to the Field Artillery, and leaves a record replete with enduring accomplishment.

General Danford was born in New Boston, Illinois, on July 7, 1879. After graduation from the Academy of Cornell College, Mt. Vernon, Iowa, he entered the United States Military Academy in 1900 and graduated in 1904. His first assignment was at Fort Riley, where he served for a time as A.D.C. to Gen. Edward S. Godfrey, the noted veteran of Custer's 7th Cavalry and its many battles against the Indians. Lieutenant Danford early interested himself in horse-mastership. He graduated from the Mounted Service School and became a recognized authority on the breeding, training, and conditioning of horses. His interest in and knowledge of the Thoroughbred blood lines resulted in practices which provided a better strain of animals bred for military purposes in the Remount Service.

After a brief tour at the Presidio of San Francisco in 1907, Lieutenant Danford sailed for the Philippines, where he served at Camp Stotsenburg with the 5th Field Artillery.

Upon his return to the United States Lieutenant Danford was again stationed at Fort Riley, Kansas, where he was Secretary of the Mounted Service School and was aid to Brigadier General F. K. Ward. In 1912 he rejoined his regiment, the 5th Field Artillery, at Fort Sill, where he remained until the end of 1915. During this period he was an instructor in the School of Fire. In the summer of 1915 he was on a board with Colonel E. F. McGlachlin, Captain Fox Conner and Lieutenant William Bryden, which wrote the famous "1916 Drill Regulations for Field Artillery," a military text whose excellence has not been surpassed through succeeding years.

In December of 1915 he went to New Haven, Connecticut, as Inspector-Instructor of the Connecticut National Guard and there organized the famous "Yale Battery." His success here is attested by the continuing esteem in which he is held by graduates of Yale, and by his having been awarded the degree of A.M., Yale University, 1917, with the following citation:

"A West Point graduate, a thorough student of artillery tactics and ballistics, since his detail for the instruction of our young men in his specialty, Major Danford has won respect, affection, and confidence from Faculty and students alike. To his enthusiasm, his professional skill, and gift of leadership, whatever reputation Yale has won in artillery training is largely due."

While at Yale, he was co-author with Captain Moretti of the text "Notes on Training Field Artillery Details," a book well known to Field Artillery officers of the World War period.

In August of 1917, promoted to the grade of Lieutenant Colonel, he was assigned to the 76th Division at Camp Devens, Massachusetts. A short time later he was placed in command of the field artillery with the Second Officers' Training Camp, Plattsburg, New York. He then was assigned to the temporary command of the 129th Field Artillery at Camp Doniphan, Oklahoma, until the organization of the Office of Chief of Field Artillery in February of 1918, when he was one of the first officers brought to that office by the new Chief, General Snow.

In April of 1918 General Snow sent him to organize and command the Field Artillery Replacement Depot at Camp Jackson, South Carolina, where in August of that year, at the age of 39, he was promoted to the grade of Brigadier General. So important was the training given at this depot and so excellent has been the replacement center idea that it has been carried over to our present war effort.

For his war service General Danford was awarded the Distinguished Service Medal with the following citation:

Robert Melville Danford

"While on duty in the Office of the Chief of Field Artillery, he displayed marked ability in planning the organization of field artillery replacement depots; he then proceeded to Camp Jackson, S. C., established this depot, and administered it during the remainder of the war with rare ability and judgment."

In August of 1919, General Danford, having reverted to his permanent grade of captain, was made lieutenant colonel, and assigned as Commandant of Cadets at West Point under the superintendency of General Douglas MacArthur. He served four years in this capacity, during the most critical period of the Academy's existence. Owing to the War, all classes, except one, had graduated. This class had had but five months of service at West Point, but under the inspired leadership of the Commandant and his assistants, the cherished ideals and traditions of West Point were passed on untarnished so that there has never been a break in the "long grey line." General Danford's firm but high character, his human kindliness and innate gentleness of spirit were indelibly impressed upon all who knew him at this time. In addition to the satisfaction of knowing that his work at West Point will last for all time, General Danford therefore should have the realization that his friends and disciples throughout the list of graduates from 1920 to 1923 carry an affectionate memory of him and a grateful appreciation of his influence during their formative years.

General Danford graduated from the Command and General Staff School in 1924 and from the War College in 1929. He has served in the Office of Chief of Field Artillery under each one of the four Chiefs that preceded him. He was in the Training Section 1924-28 and was executive from 1931 to 1935. He was with the 13th Field Artillery in Hawaii in 1929-31 and he commanded that regiment at Schofield Barracks in 1935-37. He was Chief of Staff, VI Corps Area, 1937-38. He became Chief of Field Artillery in March, 1938. During General Danford's incumbency as Chief, the Field Artillery has participated in the development, test, and adoption of the new 105-mm. howitzer, 4.5-inch gun, and 155-mm. howitzer. The most recent organization of field artillery units has been accomplished, the tables of basic allowances and organization re-written, the School expanded a thousand-fold, three great replacement centers established, and the arm expanded from some 20,000 officers and men to its present great size. These are only a few of the major accomplishments which must be credited to General Danford's regime. Others include the organizing and training of artillery antitank units, where General Danford's foresight is now paying dividends; the development and test of numerous items of modern equipment; and a revision of the Field Artillery literature program.

During General Danford's presidency of the U. S. Field Artillery Association, the membership of the association has grown from 3,000 to 12,000. He has consistently been a hearty supporter of all progressive measures designed to improve the Association and its *Journal*.

General Danford can retire with the assurance that he has builded well—that the Field Artillery is ready for the great war effort now confronting it. Its new weapons are the best in the world, its organization is sensible, its methods are completely sound.

On October 7, 1909, Robert M. Danford was married to Miss Katherine Van de Carr Hyde, a beautiful California girl whose charm has won her a host of warm friends throughout the Service. General and Mrs. Danford have one daughter, Janet, who is now the wife of Captain James B. Wells, Infantry. Though General and Mrs. Danford have not made public their plans for the future, the sincere regards and best wishes of their many friends go with them wherever they may be.

LUZON DIARY

By Captain Charles R. Lewis, 24th FA

TUESDAY, NOVEMBER 4, 1941

Up at 5:30 AM. Breakfast at 6:00. Gunpark 6:15. Check alert loads, two days' fire, two days' rations, 300 lbs. ice each battery. Gas to the gills. Leave park at 6:30½. Southwest through villages and cane-fields. Laughing brown boys and naked babies shouting and saluting. Schoolgirls with stacks of books balanced on their heads. Carabaos, goats, razorbacks, calessas, red-trousered lean natives working out their taxes on the highways.

Tail end of rainy season; getting so dusty the drivers rag up their noses. A brand new cantonment, O'Donnel. Stacks of bundled grass for thatching barracks roofs, straw-hatted laborers carrying pebbles in hammocks slung from shoulders to surface new roads. Only 7:30 AM, and everybody busy.

A blockade. Walk up ahead of station wagon to see what's wrong. Rebuilding bridge at the river bed. Opposite bank new and soft. Trucks detouring through ford and sticking after losing traction on incline. Company of engineers pull the first ones out on the ends of two long ropes. Our trucks at length come along and pull each other up with our own dismounted batteries pulling on ropes to help. I see now why our colonel insists on never having two weak trucks together in a jungle column. By the time our last battery crosses to the steep bank, the surface is sufficiently packed that the last vehicle makes it without help.

Another mile and we bivouac. Battalion detail with two vehicles advances alone to test the trail. Recent rains have washed away road surfaces down to the bed rock. The jungle has crowded in over the edges to where it brushes the trucks on both sides. All hands, including staff, jump to the ground and help the two drivers and staff sergeants pry loose boulders, shovel down shoulders, and trim protruding brush. On again. Someone says, "We can't make this one." The colonel says, "Oh, I think so." Again we grab picks and spades and tow ropes, and on we lurch over tree trunks and boulders.

We lose the trail in eight-foot grass. We spy a Baluga and entice him from the undergrowth. He finds the faint vestiges of the trail again for us and we string along single file after him, the vehicles in our wake. Just as we find a fordable spot at the river, it is time to return to lunch. A major who used to be the Provost Marshal in these parts is our observer-guest. I ask him where are the monkeys. He says, "The Balugas ate them."

Back in bivouac while awaiting lunch, I slip over the bank and down to the river where I have a bath. Too shallow here to swim but I cling to a rock and let the swift cool current run over me. Not bad!

After lunch the batteries go out on a march to exploit our trail breaking. I take a detail a mile back to the Engineers' water supply depot for 300 gallons of water. Here we load from a hose out of a thousand-gallon canvas drum on a platform. It is replenished by a rotary pump from the river and through a chlorinization cylinder. Back in time to distribute water and take another plunge before the batteries return.

At supper we are entertained by our guest major.* He has been an attache with the British Army on their recent desert operations. This boy has been places. And that ain't all. He's seen things and understands their significance. Best of all, he

EDITOR'S NOTE: *This account describes one of the units which recently has been one of the bulwarks of the defense of Bataan. The Field Artillery has been proud of the exploits of its batteries which are serving with General MacArthur, and thrills to each press dispatch telling of their stalwart contribution to the fight. Captain Lewis' article was written less than two weeks before the Jap invasion began. Evidently the manuscript left the islands on the last regular liner to sail* (*it was postmarked Nov. 27*), *and was* THREE MONTHS *in reaching the* JOURNAL *office. Note the author's last statement. It is prophetic in the extreme.*

"I see why our colonel insists on never having two weak trucks together in column."

*This was Dave Larr, on his way home from Libya.—Ed.

knows how to tell it. I know now how so much rank and youthfulness got mixed up together (a lesson to us greying captains).

This major is an apostle of decentralization. He would counter the Axis "Vertical Envelopment" with movement and trickery. Don't carry too much around with you. Only your grub. Each vehicle carries its own rations and heating unit so there's no converging on points at meal times. Your vehicle is your refuge and your source of food. You will guard it as life itself and leave no tires or carburetors for "George" to repair "tomorrow when he takes over." He says to take whatever the Lord leaves lying around on the ground for your use whether it be hills, tomato cans, holes, deserted ammunition dumps, materiel, or natives. Use all the wire you have and when you run out of it keep shooting; move a little faster and oftener.

Once out of wire, if there is the essential spiritual rapport between battery commanders in the battalion. as there evidently is amongst the British, they can talk over the same radio wave-net at once without disaster so long as the enemy, under the cloak of the King's English, doesn't wedge himself into the net with screwy commands. Recent annoyances of this nature have ushered in the expedient of challenging. "I seh theah Percy ould thing. If you'll be so kind as to stand out a minute while my own battery poops off a few!"

"Are you pink?"

"Yes, I'm green."

"Then 'urry up!"

It seems that in the British antitank battery there is not, as in our prescribed procedure, a choice between "readiness" and "emplacement." There must be both readiness and emplacement. Hence the pieces are mounted on vehicles from which they are fired. The whole carriage is an emplacement, but with exits therefrom not too steep for it to climb if it has to displace.

After supper we stand around and pump desert warfare out of our guest until he breaks and charges for his tent with a hysterical giggle.

"We lose the trail in eight-foot grass."

An account of the days immediately preceding the invasion

The battery kitchen is easy to conceal in the jungle.

My tent partner is the Regimental Padre; the Iron Priest, I call him, because he's no cream puff. Looks like a Minute Man, but is in truth a ten-second man and a tennis champ. Naturally, very popular.

WEDNESDAY, NOVEMBER 5TH

The cook calls me this morning at 4:30. I prowl forth in the moonlight to wash my hands and face on the dripping foliage. Eat at 4:45. At 5:00 am off to Stotsenburg with the station wagon and two trucks for ice, rations, and mail. On the first hill out of the river bed, the station wagon breaks a torque rod and, not being able to wait on account of having to get the ice back in the cool of the morning, we abandon it and I climb into the head truck. At Stotsenburg we load the ice right out and have it on its way. The ration truck waits for me to attend to the mail and laundry business. I have some mail, for the colonel, marked "Urgent." It means that we are to lose one of our good senior officers by transfer to brigade headquarters.

Going back to bivouac I get so jolted up on the boulder-ballast through Camp O'Donnel that I at last understand why it is the habit of officers to wear their "Bethlehem Stetsons" while riding the jungle in vehicles with steel tops. Back at the river I learn that about half our ice has melted. One mess officer complains that out of 200 lbs. of ice he received only three ten-pound cakes. It seems that the ice truck was held up for a long time by a tank maneuver, and going over the rough roads, what hadn't melted was pretty well broken up. Tomorrow, instead of drizzling a stream for thirty miles, we'll have sawdust.

After supper, there is the usual council of war.

THURSDAY, NOVEMBER 6TH

Today I let the sergeants convoy the ice and rations without me. I arose at 5:00 AM and shaved by the most beautiful moonlight I ever saw.

At the battery OP

Breakfast about 5:30. We all leave for firing position No. 3. That's the one bordering on O'Donnel with the left range limit "Cow." This terrain feature is the most remarkable one I've seen in these parts. It's what the sage brushers in Colorado would call a "Squaw Tit" but to me it resembles the Mosque of Omar draped in ivy. Its local name doubtless is derived from its apparent attractiveness to cows. After taking out our instruments and plane tables in the rain and doing a lot of figuring for *S* and *d* out of the Gunnery Scriptures, our mess officer has to plunge us all into gloom. It's too bad to see so young and promising an officer start to slip. Here our mess had been in the field three days and not a snipe, a carabao, or fresh milk. When he peers through the BC scope and espies meat, instead of discreetly waiting to give the alarm after we have registered on a bush under which one of these luscious beasts is ruminating, he ups and raises a piping voice in protest. The O'Donnel administration has been apprised of our firing schedule but has neglected to clear the range. Our range officer and the chaplain take a command car forward to dislodge the critters. One of the latter counterattacks the padre with such vigor that he puts to excellent use those superb tennis legs. After the detail returns, there are still countless animals as well as some laborers and carts in our sector, so we pack up and leave.

Each battery returns to the south to reconnoiter new jungle positions. I remain with headquarters detail. We drive southward until we enter Sima Trail, and follow it clear to Lockwood Acres. This is across the creek from Baluga Flats on the alluvial plane beyond Waggoner's Ford. I understand that by virtue of certain cash inducements disbursed by him to augment soldier operations by civilian brawn, a colonel has a mechanic's lien on this section. I must remind our range officer to consult this colonel before firing through his demesne next week.

At the trail head, the battery dismounts and we all start rolling rocks and cutting down reeds with bolos. By lunch time we have pioneered another half mile, so we return to eat. En route, another officer and two sergeants and myself go swimming in the rapids below the ford. After lunch, the battery takes shovels and picks and goes "surfacing" while the rest of us walk a couple miles ahead to chart the trail. By the time we return, the men have made a good crown for several hundred yards. Then we return to bivouac.

This evening we eat at 5:00 PM and by six are packed up. By dusk we are on our way back to Stotsenburg. Aside from some minor traffic mishaps and being serenaded by a troop of Filipino boys with their guitars, the trip is uneventful.

FRIDAY, NOVEMBER 8TH

This morning I learn the number of persons in bivouac and the number of gallons of water used by them. I compute that our mean consumption per man per day is 2.1 gallons. When our visiting major told me that the British figured 2 gallons per day per man in desert warfare, I thought them wasteful, but we will use this consumption as a yardstick for future allowances of water.

Officers' Call is at 11:30 AM. The colonel discusses the concertina characteristics of our night maneuvers. I hope we will improve and not let him down again.

I must confide that this is a most unusual battalion. There is a silent efficiency that I had thought existed only in the diseased minds of war correspondents. In tight places there is no bullying, no "brass." Not even "bitchin'" by the junior officers. Maybe it's because most of the officers are scientists. Possibly, too, it's because the colonel is kind of a magician.* He includes them all in his brain trust, lures their secret hunches out into the air where they can either propagate or dry. He makes them change the didies on their own brain children; keeps them feeling necessary, and happy. *If the colonel ever gets into it, I think his cadre and their brown devils will see him through.*

*The colonel was Louis Dougherty.—Ed.

Breaking a road through the jungle

Corregidor Cable No. 79

From Melville Jacoby, February 17, 1942

WITH USAFFE HEADQUARTERS IN BATAAN.—With a hastily amassed army of Filipino Reservists having as little as three weeks' refresher training, skeleton units of Regulars with much of their equipment from World War I, and pilots, some of whose planes are still on the high seas, MacArthur's forces began fighting a Jap army which is not only better and more modernly equipped, but which showed years of such complete preparations that the Jap soldiers spoke in Philippine dialect and the officers carried maps outlining trails unknown to even the Filipinos themselves.

Spread over the principal part of the Island of Luzon and lacking air superiority from the first day the war began, MacArthur's then hastily formed army attempted to meet the avalanches of Jap soldiers pouring from naval escorted transports landing almost at will in North and South Luzon. As sweating crews and workers on the big Manila piers were rushing the last minute unloading of tanks, guns, and equipment, the Army was hastily requisitioning supplies of every sort, taking over all transport including even Manila's taxicabs which were often seen rushing down Bataan roads. Men were drawn into service, working even before they had time to don khaki. Into uniform went civilian engineers, Baguio miners, businessmen, transport workers, dockhands, Filipinos, including school teachers and shopkeepers.

By the second week of the war MacArthur's forces at Luzon could still be termed group units of partly trained men. Though they had a few highly trained staffers, including officers who had spent years working in the Philippine army, and a nucleus of trained Regulars, the majority of the Filipino troops—with the exception of Philippine scouts, toughened by years of hard training and tradition—were unseasoned. Aside from the task of trying to season green troops overnight, the problem of getting special service units organized was terrific. General Spencer Aken, Chief of the Signal Corps, arrived a month before the war via clipper and after December 8 had to dig deep in civilian life for men and materials. The same with engineers, air-warning service and quartermasters. Organizing combat units with only a few scattered pieces of equipment, even after the second week of war, was carried out. For instance, to utilize a number of self-propelled 75's without their crews meant forming a tank destroyer battalion by robbing existing units and shuffling men—taking gunners

Lieutenant Colonel Ralph Hirsch, senior instructor of Philippine Army Field Artillery, talks to his staff of instructors at Camp del Pilar. This photograph was taken by Carl Mydans of the staff of "Life" just prior to the outbreak of the war.

from antiaircraft, drivers from scouts and others from the Philippine army. Getting the best from green troops meant shuffling trained American officers to these fresh outfits, which meant the officers had to set an example and lead the fight. While all this was going on the Japanese were closing in towards Manila and food and equipment were being stacked up in Bataan, no withdrawal to be effected until MacArthur could mold a compact fighting army from makeshift groups. It was on each individual officer and man that the continuance of the fight depended. In MacArthur's letter that his troops must stand and fight at Bataan and if they did not they would merely be destroyed, lies the keynote to their resistance—from there on it meant making the best of equipment, each man doing more than his share, giving the greatest opportunity for individual initiative.

As far as Americans are concerned, the entire Battle of the Philippines' success or failure has been up to individuals. During the first days of the war, forces withdrawing to Bataan units were often on their own—though naturally under the General's orders. In Bataan the same things were true—where trench warfare was not successful in a sector, the unit commander must be able to show the men how to fight Indian style. There is no telephoning back to headquarters in this war, asking for reserves or special sniper units when the outfit gets in trouble.

Probably the one best example where an officer has taken each problem in his stride is one of the Army's younger Brigadier Generals, Engineer Chief 43-year old H. J. Pat Casey from New York, who was a captain in World War I at 19. MacArthur asked the War Department for Casey last November and got him by clipper to head the Engineering Corps which had some very tough assignments in this war. Casey, whose steel-gray hair and mustache give him the appearance of a New York playboy, is a general who goes right up to the front lines to see what's doing. Recently at an outpost, he saw a number of carabao roaming and helped drive them back to our lines for food reserve; when an oil fire was burning in Corregidor Casey, with Tech. Sergent Chester Peterson from Dashel, Minn., put it out. Casey is the kind of guy who awakes at night, gets something on his mind and goes right to work, as he did when the problem of our grenades being of old stock bothered him. In a few minutes he sketched a successful design for the Bataan-made Casey cookie dynamite sticks and bamboo casing. In the early days of the war, when Casey did not have sufficient men to do demolition work on the bridges and railways the entire length of the Island of Luzon, he collected civilians and found uniforms and arms for them by going to the army hospitals and taking stuff belonging to the wounded. As our forces moved into Bataan, Casey's engineers were destroying airfields, power plants, docks, oil stocks, radio stations, railroads and 200 bridges. Casey's engineers build, destroy and fight. In the early part of the war his men working in the airfields went through 30 bombings and 6 strafings in 10 days while filling craters, also manning machine guns.

Private James York of Syracuse, New York, with Private Ellsworth C. Harker of Bayonne, New Jersey, were on Nichols Field when a dive bomber strafed heavily. Instead of taking cover both men jumped on a truck, opened on the planes with machine gun fire and, despite the fact that the guns jammed, they repaired them three

Battery of the 24th Field Artillery in Luzon, just before the invasion

times during the attack, helped shoot down two planes and then went back to grading the field. When Casey put engineers up and down the Luzon roads they were waiting for our troops to clear before the Japanese appeared and then blow up the bridges, although his men have to fight besides do the destruction. More than one engineer found himself the last of the forces, facing the Japanese crossing the bridge about the time he was ready to set it off—Lt. Robert Silhavey of St. Louis, Missouri, is one. Silhavey was waiting for our troops to clear a bridge in one small South Luzon town when he saw a group of Japs, coming along in trains, swing up a machine gun mounted on a flatcar. Silhavey blew the charge but it did not go off and the Japs began firing at him, but while the enginers behind covered, Silhavey sprinted 100 yards, bringing another dynamite charge and setting off the bridge. Silhavey then joined a handful of other men, including Lt. Matt P. Dobrinic, clearing out of south Luzon at the last minute. The same group fought a battle behind the lines against the Japanese, Dobrinic himself carrying an automatic rifle, shooting a number of Japanese including an officer whose maps Dobrinic brought back to Bataan 30 days later after wandering through Jap lines, walking nearly 350 miles, and hiding nights.

Lt. Col. N. L. Manzano with Capt. Mitchell Major of Carbondale, Pennsylvania, and others are engineers who have gone through the mill—Manzano and Major set out at the last minute just before the gates at Bataan closed to blow up the last remaining seven bridges in the north. The Japanese were coming down the main highway from the north, also moving up from the south. Manzana with engineers, waiting our last tank to clear into Bataan, were caught between two Jap forces. Instead of retreating, Manzano decided to work towards the north Jap forces, blowing the remaining bridges. Working quickly, they managed to destroy the sixth bridge when the Japs started closing in and machine guns came in sight. Manzano and Major were by a small village when the Japanese fired on them, slightly wounding Major. They jumped into a clump of bamboo, hiding as a large body of Jap troops appeared. Manzano, being a Filipino Scout officer, could have posed as a native, escaping, but stuck with the American officer Major. Fortunately the Japanese did not think to look for them in the bamboo clump and at nightfall they slipped through the snapping twigs and attracted a small barking dog. Afterwards they took off most of their clothes, carried them on their heads as the natives do in baskets, and in the darkness walked through the Japanese. On the same day this happened, other engineers in Manila managed to destroy 75 million dollars' worth of gas, oil and other supplies before the Japanese entered the city.

In Bataan Casey's men do everything from fight to build roads, pack trails, and repair barbed wire. The Engineers group has been used on more than one front as an outpost unit or a small attack group. On the east side of the Bataan line they were on a front outpost for 14 days without relief after helping push through 3 lines of Japanese entrenchments, and holding positions so the Philippine army could move in.

With the artillery in the Philippines. "Life" photo by Carl Mydans.

The engineers have already built 100 kilometers of new roads and trails in Bataan defended areas, hacking through brush, pushing bulldozers through sniper-infested country, always ready to jump off the tractor, rifle in hand.

Lots of MacArthur's men got their first taste of battle and the Japanese in the first weeks of war. Three boys in their early twenties, all from Salinas, California, who had been together through school and then joined the Tank Corps of the National Guard coming to the Philippines, got their excitement the day after Christmas. Their company, moving through some cocoanut palms, suddenly rounded a curve and met heavy Jap fire. Trying to turn around, the tanks were blasted off the road into a rice paddy, some turning over. Ed de Benideta, bank clerk, got a rivet from a tank lodged in his neck, and hid in the tank 28 hours while the Japanese swarmed over, prying the doors with bayonets. William Anson, statistician, Sergeant Robert Mitchell, theater doorman. crawled from their tanks under crossfire to fields and there hid in the weeds below a fence while Japanese came and leaned on the fence. At nightfall the trio began a five-day trek to Manila through the lines, twice getting caught in crossfire engagements of the Filipinos and Japanese, unable to tell which was friendly fire. De Benideta was unable to eat, talk or swallow, finally arriving barefoot, hungry and exhausted from loss of blood. Said Anson: "If he went through all that and came out O.K., it convinces me he is going to die of old age."

In Bataan the troops fight with their backs to the seawall and no longer wear clean shirts but have learned to eat the thick Bataan dust, lick gritty teeth and take blood. Whether it is the Philippine Scouts or the American 31st Infantry—which the Japanese always question the prisoners most about—each outfit has its own set of heroes, its own personalities who keep their comrades fighting. The ordinary scout soldier, a stubby, dusky fellow with broad shoulders, speaking English with an indescribable accent, was selected for the organization years ago. He's proud of his outfit, knows how to use a rifle or bayonet, but prefers the latter. Where the Japanese set us back temporarily by putting snipers in the trees, the scouts learned how to clean them out faster than they could be put in. When there is a tough job to be done, the scouts, with their American officers who know each man by name, are called.

Corporal Narcisco Ortilano, machine gunner of the 57th Scout Infantry, is now hospitalized with head wounds, and others in his arms, legs, back, chest and neck. Ortilano smiles and says that all I remember there were 11 Japs trying to scare me. We do not have to worry about them any more. Ortilano was sitting behind his machine gun when he saw 11 Japs coming his way. He dropped 4 with his machine gun, which jammed. A second later he whipped out his .45 pistol and dropped another 5 Japs in quick succession, then the pistol jammed. Two other Japs jumped with fixed bayonets. Ortilano grabbed the first Jap's bayonet as he thrust, and lost one finger on the blade. When the two, wrestling, fell, the second Jap struck him in the back but dropped his rifle, and Ortilano bayonetted the first while firing pointblank at the other.

Stories about the stocky, hard-fighting tough little Philippine scouts are many — Fernando Tan, private, crept from a fox-hole to rescue the body of his commanding officer, facing machine gun and rifle fire from the Japs a few hundred yards away. The next day Tan on patrol with 3 other scouts was ambushed and captured by 63 Japanese. Tan's and the others' bodies were found at the bottom of a creek, with their hands tied and bayonet wounds in their backs.

Well known is a story of a wounded scout rescued by an officer. While the officer was carrying him, fragments from a bursting shell wounded the Scout again in the elbow. At the hospital the Scout was very proud of his elbow wound because it had saved his C.O. from being hit. But it is not only the Scouts themselves who are showing courage—their American officers are best typified by the now legendary "one man army" of Lt. Arthur W. Wermuth. (*See* AP's Jan. 13 Wermuth yarn for details).

Wermuth, credited with over 100 snipers, is a stirring example of an American fighter showing initiative. Wermuth had one of the first patrols to wipe out snipers who were raising havoc in the jungles, trying to pick off American officers. Wermuth is husky, tall, bow-legged from early ranch life when he used to break horses and hunt. When he first started the patrols in Bataan he carried a silver plated .45 which he had to abandon, due to sun glint, for an automatic rifle and service pistol. He is adventurous, and has a big collection of Jap trophies. On one raid Wermuth spotted three pack horses and the Scout with him said: "Sir, those are not Calesa horses, they're too fat." Wermuth ambled over, found them to be cavalry horses, turned them loose and sent them running with a rump slap. A few minutes later three Jap cavalrymen rose up. Wermuth, waiting, shot them and took the horses and equipment. Wermuth is the son of a World War I colonel from Rapid City, South Dakota. An amazing thing about Wermuth is that when sent on a reconnaissance mission for information he always cleans up at least a couple of Japanese, bringing in trophies as evidence. On one mission when Wermuth was sent scouting, carrying dynamite for destruction purposes, he encountered two enemy scout cars which he destroyed with some dynamite. Then he had to go back to his own lines, wading a stream with the rest of the dynamite he did not want to waste on his shoulder, while the Japs were firing at him. Every time Wermuth returns from a mission he sits around, wanting another assignment, like a big football player saying "put me in again, Coach."

The situation in Bataan is always arising where individual prowess counts. Many once-green Filipino soldiers are showing pluck and gaining confidence. Recently one Filipino Lieutenant led a small counterattack, got caught by our enemy's artillery fire and couldn't move. When he returned the commanding officer asked if he wasn't scared and he answered, Hell no, he was between two fires and even the Japs couldn't get to him there.

One general in the Filipino soldiers' action is a West Pointer—the first from the Philippines to graduate—swarthy, barking General Vicente Lim, whose soldiers say if they don't jump at his command, he'll kick them in the tail. Lim was most pleased the other day when he needed 50 volunteers from his men for a patrol mission and 200 stepped forward. One of the hardest jobs of the American officers has been leading the green Filipino troops and getting them accustomed to action. Men like First Lieutenant George L. Williams have done remarkable jobs in leadership. Williams, for example, was in command of the Philippine army men on patrol. They managed to ambush a Jap motor patrol of 3 trucks loaded with Jap soldiers which was pursuing some of Williams' men. Williams, standing in front of his men, attacked the trucks with grenades, then a pistol, managing to kill and wound several Japs, then burn one truck. Then he overtook a machine gun which had been abandoned and fired on the other two trucks—kept fighting until dark, then led his patrol back to our lines after snatching maps and equipment from the Jap dead. More than once quick thinking on the part of the American

officer saved the day when the Japs suddenly attacked.

On the west coast of Bataan where the enemy landed men during the night on the beaches to work into jungle positions behind the shore, Lt. Colonel Irwin Alexander of San Antonio, Texas, heard that a Filipino company had lost their officer. Alexander, who had been assigned to duty with the constabulary, rushing through the jungle found the Filipino soldiers, disorganized and confused after the loss of their officer, were drifting back from the lines. Alexander quickly sent them back to position and walked right into the Jap fire himself leading the men, and organizing them. They attacked to within 35 yards of the Jap position. He kept going until he dropped from exhaustion and two slight wounds, and the intelligence officer then on tour, Colonel Charles A. Willoughby, carried Alexander off the field.

A strong point in MacArthur's Bataan defenses is General E. P. King's artillery. Portly, bemoustached General King, who has been through, and also taught at, every staff school in the U. S. A. understates well the value of his batteries when he says, with his eyes twinkling, "We aren't very spectacular but sometimes very effective." However, there are some spectacular stories connected with the Bataan artillery, too. Lack of observation planes makes it necessary to have observation posts well forward, close to the Jap lines. Lt. Colonel Lester S. Tacy with "155" batteries had been sending men to the observation post, lost 21 lieutenants in succession, then decided to go himself. He arrived at the observation post, phoned the gun position and added, "For God's sake don't phone me. Seventeen Japanese just passed. They'll hear the ring." Then he wrapped his handkerchief around the bell. A few minutes later the Japanese attacked the observation post. Tacy was wounded but with a Filipino soldier drove off the Japanese, afterwards remained 24 hours longer continually phoning reports to the gun positions to direct the fire. Finally Tacy was ordered back—returning he ran into a Japanese patrol and was last seen by the Filipinos with him lying in the dirt wounded again but emptying his .45 at the Japanese. When the gun was emptied Tacy rolled over the bank into a ditch and covered himself with leaves so the Japs would not find him. At nightfall he began a five-day walk taking him across the entire Bataan Peninsula to General J. M. "Skinny" Wainwright's headquarters.

The stories are unending—it's hard to say who has the most colorful personality in Corregidor and Bataan. Maybe it is the big thick-skulled Texas AA battery breech operator who is untalkative and illiterate and learned to work the gun "by ear" but when a shell jammed in his gun with the fuse already cut he hauled off and punched the shell home with his bare fist. Maybe it's men like Captain Horace Greeley, former Air Attache at Chungking, who, like the majority of the other airmen, grows a beard and tramps through the jungles fighting the Japanese on the ground or

Gasoline drums cached in the jungle on Bataan. "Life" photo.

sits in a foxhole at the front line wishing for an airplane he can fly. Maybe it is six-goal polo-playing lanky Pete Perkins now tending mules, or one of the sailors fighting on the ground and wishing for ships, or the little Filipino Chaplain carrying an altar in a little black satchel serving his regiment practically in No-Man's-Land, reachable only by a four-day pack trip, or the machine gunner of the 31st who refused to withdraw and held the position alone when the lines were straightened and was found dead behind his gun with the Jap dead piled before it. Maybe it is the MP who got bored with duties behind the line, swiped a motorcycle, went AWOL to the front, jumped on a machine gun nest facing the Japanese and wiped them out. Maybe the most colorful are the civilian volunteer workers like the men with the water transports' crew who slip up the Bataan coasts in the darkness, salvaging, and drawing fire from our troops and from the Nips, causing them to call themselves "clay pigeons." Or maybe the most colorful of all is the 120-pound 21-year-old Filipino private whom the Japs captured behind their lines. The Jap officer and his men escorted him towards their headquarters. When the Japs went a little ahead leaving the Filipino youngster with the Jap officer, he grabbed the latter's saber, stabbed him in the neck, and ran back to our lines carrying the dripping saber and the officer's medals, announcing proudly there is nothing to the story about the Japanese being good at jiu-jitsu. All kinds of men make up MacArthur's Army—all John Does and Juan de la Cruzes who have learned to improvise adopt the Japs' tricks, and stick it out.

ARTILLERY AMMUNITION SUPPLY

By Lieutenant Colonel H. D. Kehm, FA

Principles and Command Responsibilities

It is not necessary to indicate to field artillerymen the importance of ammunition supply, for they all realize that cannon without ammunition are just so much expensive hardware on the battlefield. However, it is always well to recall that tremendous quantities and tonnages are expended in action.

In the World War the 1st Field Artillery Brigade in one day fired some 14,000 rounds of 75-mm. ammunition weighing roughly 180 tons, and 3,550 rounds of 155-mm. ammunition weighing about the same amount. General Bishop reports that the artillery support in the battle of St. Mihiel was furnished by 667 batteries of over 3,000 guns, including 26 calibers and 49 models, firing 75 kinds of ammunition. For this battle, 3,300,000 rounds of ammunition were provided, *of which about 840,000 rounds were expended*. The 75-mm. ammunition brought in weighed about 24,000 tons and that supplied for the 155-mm. weapons weighed some 55,000 tons. Cargo space requirements for the ammunition of these two calibers, expressed in modern terms, were 79 railway ammunition trains, or 26,000 2½-ton trucks each with a 1-ton trailer.

In the history of the 6th Field Artillery there is a report that one battery fired 1,500 rounds (about 19 tons) of 75-mm. ammunition in one hour.

Method Within an Army

Supplying the required amounts of the proper kinds at the right time and place requires good organization, careful planning, and thorough execution. In a field army, the ammunition supply system functions in the following manner: Based upon estimates of requirements made by the army artillery officer, GHQ authorizes the issue of credits to the army to cover a given period of time. Detailed instructions worked out by the army G-4 in collaboration with the army artillery officer and army ordnance officer provide for the establishment of army supply points, which may be depots or simply rail (truck) (navigation) heads. The number of supply points depends upon the tactical situation, the terrain, the rail and road net, and the amount and distribution of the artillery. Two supply points per corps are normal; these establishments are stocked and operated by ordnance ammunition companies or detachments. Distributing points for particular divisions and for corps artillery may also be established.

Constant collaboration between the three officers above-mentioned is necessary to assure that the several supply points are properly stocked to meet the needs of the units they serve. Stockages are made to fit expected needs, as determined from records of allocations of credits and ammunition reports returned by artillery units.

The army artillery officer recommends the allocation to the army artillery and to the corps of the ammunition credits made available to the army. He may initially hold a portion of the credit as a reserve. Allocations of credits should show the amounts and kinds of ammunition made available, the period the credits cover, the supply points from which they may be secured, and any special instructions as to distribution.

The corps artillery officer likewise allocates to the corps artillery and the divisions the credits granted to the army corps. The division artillery officer in turn repeats the process. The army corps or the division may establish distributing points or dumps or both, forward of the army supply points if the situation indicates need for them; but the current belief is that supply direct from army depots or railheads will usually be the most practicable.

Army corps and division quartermaster trains carry such items as the corps or division commander prescribes, and some cargo space for artillery ammunition could be allotted; however, the consensus of opinion seems to be that the commander who does so will be an *avis rara* indeed. Thus it follows that no transportation other than that within artillery battalions is earmarked for artillery

ammunition transport and that the haulage problem forward of the army supply points is normally an artillery job.

Last July, Training Circular No. 42 prescribed a rather elaborate system of supply within the division. Briefly, it provided for a system of check and control through a division ammunition office (DAO) established (by the division ordnance officer) forward of the supply points. Most artillerymen encountered this phenomenon in the recent maneuvers, so little discussion of it is needed. Many officers feel that the plan is unduly complicated and results in a waste rather than a saving of time and effort.

Regardless of details, the principle is that the ammunition trains with proper authority proceed to the designated supply point, are loaded up, the issue is checked off against the credit of the drawing unit, and the trains "take it away."

AMMUNITION SUPPLY PRINCIPLES

The fundamental principles which govern artillery ammunition supply are those which control supply in general, but some additional ones need special mention.

The first of these is that *normally the only reserves of ammunition carried within any artillery command are the amounts carried in the batteries and in the battalion ammunition trains*. There are no organic artillery ammunition trains in units above the battalion. Furthermore, as we have noted, the artillery can not count on any cargo space in corps and division quartermaster trains. It is possible that when GHQ reinforcing artillery is made available to certain commands, some ammunition transport may come with it. Here again, however, there is nothing certain about this.

The second is that *supply is normally by credits*. This means that a given quantity of ammunition is made available for a given unit at a given supply point to cover a given period of time. For example, the III Army Corps may be informed that it has a credit of 5 units of fire of all classes at First Army Ammunition Supply Point No. 3 for the period 6:00 PM 1 Jan. to 6:00 PM 4 Jan. Undrawn portions of credits revert to the command which allocated them. It is important to note that the time element enters into a credit. Very frequently ammunition instructions in map problems and maneuvers indicate that a certain unit has a credit of a given amount but fail to show a time limit. It should be obvious that an artilleryman who knows he has a credit of say 2 units of fire but does not know whether that credit is to cover one day or one week, is in no position to make an intelligent plan of artillery support.

Third, *the ammunition supply of an artillery unit must be so arranged that the unit may displace with its normal loads intact*. Analysis shows that the amount of ammunition which it is estimated will be expended from a position must be brought to that position prior to displacement. If the ideal is attained, the unit can displace with its normal load intact and leave no unexpended ammunition in its old position. Incidentally, when an artillery element is forced to abandon ammunition, it should inform the next higher artillery commander of the location, quantities, and types of ammunition abandoned.

A fourth fundamental is that *artillery normally hauls its own ammunition from an army supply point to battalion positions*. It should be noted in this connection that this does not mean that battalion ammunition trains must always go to an army depot, as the army may establish railheads or truck heads in front of its depots. Under certain circumstances, corps and even divisions may establish dumps or distributing points; and supply of the battalions may be effected from them. Thus, a division or corps operating on the side of a river away from army supply points would often set up dumps and DP's on the near side of the river. It is believed, however, that under average conditions the artillery will be able to supply itself from points relatively far to the rear. It should be noted that there is an increasing tendency both in foreign armies and in our own maneuvers to use truck trains and truckheads in ammunition supply, as opposed to rail movements terminating in depots or railheads. When truckheads are used it is important that they be located where hard standings are available. British reports indicate that this matter was sometimes neglected to their sorrow in the campaign in France.

A corrollary of the above is that *only ammunition transport is used in ammunition supply*. It is not contemplated that prime movers and wire trucks, for example, be used in ammunition supply—only the battery 5th sections and the battalion train vehicles are available for this purpose. Of course we all realize that in case of necessity we will use our prime movers, the battalion or battery commander's car, or anything else we can get our hands on, under the principle that "when you've got to go, you've got to go." However, as motor vehicles which are used excessively break down very quickly, and since an artillery piece with its prime mover miles away is exceedingly immobile, the use of prime movers in ammunition supply (as for any other stray purpose), should in the light of common sense be limited to actual emergencies.

A further corrollary is that *within artillery units ammunition transport is pooled when such action will facilitate supply*. For example, within the battalion, it is frequently advisable to pool the battery 5th sections with the ammunition train rather than to have those battery trucks remain idle or operate independently in supplying ammunition. Sometimes it will even be desirable to pool the transport within the division artillery or within a brigade. It is quite likely that in most cases division artillery commanders and brigade commanders will regulate the resupply operation of their subordinate battalions very closely.

A seventh principle is that *commanders and artillery*

officers are responsible for the ammunition supply of elements under their command or control. Specifically, the features involved in this responsibility are:

1. To estimate ammunition requirements for forthcoming operations.
2. To recommend sites for ammunition supply installations.
3. To allocate such ammunition credits as are allotted to the unit.
4. To disseminate information to the subordinate units covering such items as:
   a. Quantities available.
   b. Periods covered by the allocations.
   c. Places from which the ammunition is to be drawn, and any restrictions as to time during which the ammunition may be drawn.
   d. The times at which ammunition reports are to be made.
5. To supervise operations. This includes specifying quantities to be dumped at gun positions and giving special instructions concerning the care of ammunition at gun positions. It also entails responsibility for estimating the transportation requirements for executing supply and making requests to higher authority for additional transport when the need thereof is indicated. It likewise includes regulating the operation of the ammunition trains, organic or attached.
6. To render reports of expenditures. The supply services base the restockage of depots and other ammunition supply installations on the reports of quantities expended and on hand as reported by artillery units. These reports are initiated by batteries, consolidated in the respective artillery echelons, and copies are furnished to the appropriate ordnance officers and G-4's.

THE PRINCIPLES APPLIED:

Field Army

With these general principles in mind, let us see how they apply specifically to the various echelons of artillery command.

It should be clear that an army artillery officer finds the first four of chief concern to him. Even if his army is not the echelon which is to execute the operation, it will nevertheless be definitely concerned and hence he will have information of the plans as they are formulated and developed. Therefore, his task will be to make the estimate for his army in the light of these plans. This estimate must go hand in hand with one covering the requirements in weapons. The artillery officer must analyze both the tactical and logistical situation as it *can* develop and then recommend requests for the necessary ammunition credits to cover all or one phase of the operation. Such an estimate must be more than a simple statement that five units of fire are needed to cover the period dark 1 June to dark 3 June; that will be sufficient for a general picture of transportation requirements but it will have to be supplemented by data giving the various calibers and kinds required and information as to how much should be furnished as a mobile reserve, how much should be stocked at depots or railheads, and the rate of flow of the ammunition to the army ammunition supply points.

As the army is the basic supply echelon of our field forces and is charged with establishing ammunition supply points, including depots, and since it is believed that battalion ammunition trains will generally haul directly from army installations to the battalion position area, it follows that the army artillery officer can materially facilitate ammunition supply by making timely recommendations for the location and movement of ammunition supply points and designating the units to be served by each of them.

The army artillery officer must apportion between the army artillery and the army corps the ammunition allotted to the army. This allocation must reflect their relative needs as determined by the tactical situation, and should be made as far in advance as practicable to facilitate the preparation of plans of fire by subordinate artillery commanders.

Artillery officers frequently may place in the hands of their commanders a powerful tool for influencing the course of an action if, initially, a proportion of the ammunition credits is not allocated but retained as a reserve to be allocated later as the situation develops. While this appears to be a sound principle, in echelons as high as the army the picture of prospective actions should be sufficiently clear to make the retention of an ammunition reserve unnecessary.

So far as the duty of disseminating information is concerned, the army artillery officer's chief concern is informing subordinates of the allocations made to them, the places and times at which the ammunition may be drawn, and giving instructions as to ammunition reports.

An army artillery officer supervises ammunition distribution only in a general way. He may be able to anticipate calls for additional ammunition transport and facilitate its assignment when and if it can be made available.

His interest in ammunition reports is on the receiving end. A careful check of the status in the various units will enable him to shift credits, ask for changes therein, and influence the rate of flow. Tactically, this knowledge will facilitate decisions as to the assignment and changing of missions of the subordinate elements.

Army Corps

The army corps artillery officer will have all the specific duties involved in the previous discussion when his corps is operating independently; otherwise his responsibilities, although covering the same general field, will be considerably restricted. For instance, he may usually be expected to make estimates only as a matter of assistance to the army artillery officer. He will less frequently be called upon to recommend sites for ammunition installations, except when dumps or distributing points are set up for the corps artillery.

His activities regarding allocation of ammunition are exactly the same as those of the army artillery officer. Not only will he be called upon to apportion the ammunition between the divisions and the corps artillery, of which there may be considerable, but generally he will

also retain an initial reserve, as discussed above. Any reserve retained must be reallocated judiciously and in ample time to permit hauling it so that the primary purpose—placing it in the hands of the units which can make the best use of it—can be accomplished.

His duties in the dissemination of information and supervision of supply operations are similar to those of the army artillery officer.

His headquarters is in the chain of reports. Like the army artillery officer, he can gain considerable information of logistical and tactical value from these reports. Our current doctrine calls for the consolidation of ammunition reports in the corps prior to their transmission to the army. Since this is bound to take some time and serves no vital purpose, some observers suggest that consolidation should cease above the division (brigade) and that the army corps should simply pass on the division reports together with a consolidated report for the corps artillery. The merit in this proposal lies in not only that it saves time, but also that it gives the army a picture of the ammunition status by division. This should be of greater tactical and logistical value to both army corps and army artillery officers than one based on reports consolidated by corps.

The corps artillery staffs provided in our current tables of organization are inadequate for any coordinated corps operation. A study of this meager staff indicates that the corps artillery officer has only an S-4 to assist him in the performance of duties concerned with ammunition supply; presumably there are no other assistants, clerical or otherwise, earmarked for this important duty.

Division

In the division (brigade), the artillery commander's most important responsibilities concerning ammunition are those of making allocations and supervising supply operations. Questions of sites for installations will ordinarily arise only when division dumps or distributing points must be employed.

Estimation of requirements will be incidental except when the division is on an independent or semi-independent mission.

T. C. 42, previously referred to, indicates that the ordnance officer makes allocations within the division, but it seems both unfair and unwise to burden him with this added task. He will ordinarily not be informed of the tactical situation in sufficient detail nor have the requisite artillery training to perform this duty to the best advantage, and he is already charged with many other responsibilities of a highly technical nature.

Although the division artillery officer has no organic transport to effect supply operations, it is visualized that in most cases the tactical situation and limitations on traffic will force him to exercise very close control over supply operations, even to the extent of scheduling the movements of trains.

The insertion of the division ammunition office in artillery ammunition supply procedure has thrown a monkey wrench of annoying proportions into the conception that the artillery, being responsible for hauling ammunition from supply points to positions, should be free to do so as it deems best, subject only to necessary restrictions as to where and when it can get the ammunition. The "how" is an artillery problem. Under all cases so far examined the division ammunition offices simply turned into a bottle-neck.

Dissemination of information in the division is like that in the corps, but is more concerned with details of haulage.

The division artillery officer (brigade commander) has an S-4 and an ammunition sergeant to assist him in fulfilling his ammunition responsibilities.

It should be noted that the artillery officers of all the echelons so far discussed may request and receive reinforcing artillery from time to time. Any such request should include a request for ammunition for the weapons desired. All the details of haulage and resupply should be furnished to the commanders of incoming units, and frequently some ammunition will be stocked at the prospective position areas for such artillery before it arrives.

Regiment

In the regiment, ammunition supply deals primarily with passing on information, making allocations, and the general supervision of supply operations. The regimental commander should not hold out an ammunition reserve. He can help battalion commanders by securing information as to the availability of ammunition, and getting that information to the battalions promptly. Furthermore, he can direct the pooling of transport and coordinate any requests for additional transportation when the need therefor arises.

The omission of a regimental S-4 from our current T/O is considered proper since most of the matters respecting ammunition that arise in the regiment are so closely tied in with matters normally handled by S-3 or the executive that either one of them can readily give the regimental commander any necessary assistance on this subject.

In a groupment, the commander has ammunition supply responsibilities analogous to those of a regimental commander. Normally, the artillery officer of the echelon under which the groupment is formed should handle most problems regarding supply operations and thus leave the dissemination of information and making of allocations as the chief ammunition responsibilities of the groupment commander.

Battalion

Under our present tables of organization, the battalion is the basic echelon in actual ammunition supply. The battalion commander allocates ammunition by controlling the assignment of fire missions, by requiring a report of expenditures after each mission is completed, and frequently

by prescribing the expenditure for each mission.

He is particularly concerned with securing and disseminating information concerning ammunition supply operations, i.e., times when haulage is authorized, routes available, and the location of the supply point (or of the division ammunition office).

If higher authority does not issue instructions concerning dumping ammunition at gun positions, he must do so. He must also indicate whether and how the battery 5th sections are to be used in resupply operations and any unusual precautions to be taken in the care and storage of ammunition.

He must select or approve the bivouac of the ammunition train and the site of any battalion dumps or distributing points that may be established.

The consolidation of ammunition reports is an important job in the battalion because it involves at least four units, the maximum that will ordinarily be involved in any artillery echelon.

Although the division (brigade) artillery commander will often control resupply operations very closely, the battalion commander will frequently be responsible for the planning as well as the execution of the haulage.

To assist him in all these duties, the battalion commander has an S-4 and an ammunition train. The train is an element of the service battery which the S-4 commands; it is composed of three sections so that one or more sections may be sent with batteries having detached missions. Our current tables designate the train commander as munitions officer; he must conduct supply operations and has a full-time job keeping his train in operation, selecting routes, and planning the required haulage. There is considerable doubt whether he can find time to keep track of the status at each battery, make appropriate recommendations to the battalion commander concerning dumping and haulage, receive and consolidate battery ammunition reports, and at the same time operate his train most effectively. There appears to be no good reason why the S-4 should not be charged with ammunition supply. He should and could perform the purely staff duties and could use his subordinate, the train commander, in tasks of execution. A plan of this sort worked in one organization when tables prescribed S-4 as the munitions officer and the train as part of the headquarters battery. Likewise, when the artillery brigade had an ammunition train there was a separate munitions officer to perform the necessary staff duties; the train commander was charged only with the operation of the train and such distributing points as might be set up.

The S-4 of our present battalion has many trying tasks indeed. However, the staff aspects of ammunition supply as distinguished from the haulage jobs are not so weighty but that he could perform them as well as his general supply duties. Furthermore, staff matters concerning ammunition supply will come up at times and places which will cause no interference with duties affecting supply in general; on the other hand, haulage activities are sure to do so. If S-4 is the munitions officer there is one less staff officer with whom the commander must deal.

Battery

The battery commander has the following specific responsibilities in respect to ammunition supply: first, unload at his position such quantities as the battalion commander specifies; second, store and protect this ammunition as prescribed in standing or special instructions; third, submit reports of expenditures on the completion of each firing mission; fourth, submit the ammunition report at the specified time. In the usual case he will not conduct resupply operations; his 5th section can be used for that purpose but when so employed it will normally operate under battalion control. It is always the duty of the battery commander to inform his battalion commander when stocks of ammunition are running low. When battalion distributing points are established he may be required to execute part or all of his necessary haulage.

In light batteries the battery commander has the executive and a fifth section specifically earmarked for ammunition supply duties. Most duties affecting the care and storage of ammunition have in the past fallen to the assistant executive. However, since he is frequently used as a forward observer and for such reconnaissance as the battery commander and reconnaissance officer cannot make, this is leaning on a frail reed for an important task.

Many battery commanders charge the fifth section only with supply operations and have the recorder at the guns keep account of the ammunition status. The battery gun mechanic should be trained to be the technical expert in the care and handling of ammunition at the guns. Since there are two noncommissioned officers in the fifth section, one of them can perform these duties, i.e., keep track of the ammunition status and supervise the care and storage thereof, under the battery executive. Our current manuals suggest that the chief of the fifth section be charged with these duties and that the artillery mechanic assist him. Since the other duties (camouflage and defense against chemicals) of the corporal in the fifth section make it desirable that he be near the gun position as much as practicable, it might be better to charge him with duties pertaining to ammunition records and storage and leave the sergeant free to handle haulage.

In medium and heavy batteries there is an ammunition corporal (he also has other duties) in each gun section. He is presumably needed because the care and handling of separate loading ammunition is more difficult than is the case with fixed or semi-fixed ammunition. In other respects the organization for ammunition supply is like that in the light batteries and a similar assignment of duties is practicable.

In the medium batteries there is a peculiar situation brought about by the fact that the only spare prime mover is in the fifth section. In many cases, therefore, it will be advisable to use some other vehicle, such as the executive's truck, in resupply, especially when there is any unusual danger of losing trucks in this operation.

SUMMARY

In this discussion the ammunition supply *responsibilities* have been listed as pertaining to the commanders. In various places in our field manuals certain *duties* flowing from these responsibilities are listed as appropriate for various staff officers and other individuals. No such suggested distribution will fit all cases. Personal factors play a large part in deciding the best distribution of duties in any particular case. The important thing is to insure that a competent man who is properly trained is charged with them.

This paper is intended to indicate the particular ammunition supply tasks which confront artillery commanders in each of the echelons. Plans for meeting these tasks must be made with the utmost care. They must be prepared far enough in advance to facilitate efficient execution. Planning is a function of command. Those who execute the plans must be men of good judgment and courage. Successful commanders in all wars, including the present one, have attested to this fact. The artillery fire that has made history in Bataan is possible because wise plans were laid for ammunition supply and because intestinal fortitude is making them work.

MILITARY STUDY AS A SCIENCE

By LIEUTENANT JOHN Y. S. CHEN, FA, Chinese Army

Often the question of whether military study is a science or an art has been raised, yet not many times has the answer been satisfactory. Even Sun-Tze, the ancient Chinese military genius, contradicted himself in saying: "The art of war is of vital importance to the State." And: "Now the general who wins makes many calculations in his temple before the battle is fought."

Maybe Sun-Tze did not realize the contradiction of these statements. However, a compromise may be arrived at by saying: "The study of military principles is a science. The application of military principles is an art." I will let the readers be my judge.

In military study as a science I have found three problems confronting me:

A. There is too much to learn.
B. There are too many references required.
C. It is difficult to find the specific information required at the particular time it is needed.

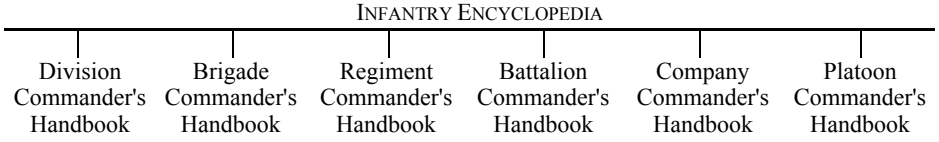
During my short stay in a Service School, I often heard instructors saying, "Military affairs are only common sense." Immediately, I reflected: "How can I acquire this common sense without having certain known facts and principles as my basis of judgment? After all, my sense cannot be *born* right."

Then, if I tried to refer all my doubts to the "books," I would find too many books to carry around—a task not possible even in peacetime. Sometimes, after long search, I would come to the right book and still it took me quite awhile to come to the right page. When everything was found, the specific time value was lost.

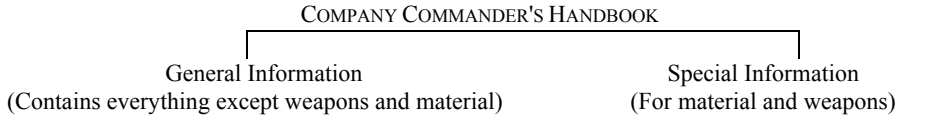
In view of the above difficulties, I would suggest the following features for future military text books:

A. They should be in loose-leaf encyclopedia form, so that changes can be made without difficulty.
B. There should be an encyclopedia for every branch of the service.
C. Every encyclopedia should contain many handbooks; one for each type of unit commander, covering all the information he should have.
D. Every handbook should contain two parts—General Information and Special Information.
E. The encyclopedia should be kept up to date, with changes mailed to the owner at definite periods.

Example:



And, to break this down in more detail, we would have, for example:



To make military books really scientific seems to be a huge job. But if this dream can come true, it would solve lots of officers' problems.

What About the Service Battery?

Our Service and Ammunition batteries, particularly those which serve in the horse battalions* of the Field Artillery, cannot operate satisfactorily with their present organization and strength under wartime conditions. Having just recently completed a tour of duty as an officer in such a battery, I speak from first-hand knowledge. The maneuvers in Arkansas, Louisiana, and Texas were eye-openers to me. Previous to those war games, minor problems around the Fort Riley Reservation had made me doubt the ability of the present set-up to function adequately. Service and Ammunition Batteries of some foreign armies have a strength a few more than twice that allowed our horse battalions and considerably more than that allotted our heavier motorized units.

In this article, I will deal only with personnel strength and vehicles. Armament, communication, and ratings are important, certainly; but there is room here for only the basic organization, men and machines. I write of the maneuvers because they most closely approximate the wartime conditions that must finally determine the wisdom of our planning.

Some problems facing me when preparing for operations in the maneuvers were those that confront every commander of troops whatever the size of his unit. I had a certain number of men. There were certain essential tasks. These tasks required vehicles. I had a limited number. My first and greatest problem was, "How best to apportion my men and vehicles to meet all the requirements?"

On paper I had a total strength of 59 men. Of these, two were in the hospital, 3 had to remain in garrison with the battalion detachment, 17 were on special duty or away in service schools. When the final gong sounded, I left for the maneuver area with 37 men (including NCO's) and 3 officers.

One of these officers was Battalion Munitions Officer, the other Battalion Motor Officer. That left me as Battery Commander (no small chore) and Battalion Supply Officer (which is more than any mere chore). Luckily my NCO's were superlative, mostly short timers. First Sergeant, 28 years' service; Battalion Motor Sergeant, 27 years; Battalion Supply Sergeant, 22 years. Any officer knows that means splendid cooperation, absolute and completely willing compliance with orders. There was no growling. Fifteen of my 37 men were regulars, the remainder Selective Service.

What to do with my vehicles? In the battalion I had twenty 2½-ton 6 × 6 trucks, one of which was a wrecker. Two trucks were assigned to each firing battery and two to Headquarters and Headquarters Battery. Four more went to Battery A for antitank missions on permanent assignment. One of those trucks to each battery was to be the kitchen truck, the other battery supply. Each truck (wrecker and the four to A Battery expected) pulled a 1-ton trailer. Headquarters Battery had nine weapons carriers, two command cars and a radio car.

That left eight trucks. One was counted out for wrecker, another for carrying gasoline, grease, and oil, another to battalion headquarters personnel, one more for Service Battery's kitchen, still another for Service Battery and Battalion supply sections, one for Battalion Medical and Veterinary detachment, combined, one for hauling water.

That left me one truck with which to provide a 6-truck and trailer ammunition train and to haul supplies for approximately 500 men and 450 horses.

Two command cars were left to me (the others went on umpire duty). One of those was assigned permanently to the battalion commander. The other was usually called for by battalion staff officers or was gone on missions with the Battalion Motor or Munitions Officers.

Just prior to leaving for maneuvers, two worn-out motorcycles and one new one were given us. The two old ones had side-car attachments. Both immediately gave trouble. No spare parts were available. The new one was run down and wrecked by a brakeless log truck. On a dusty road about midnight, driving with blackouts and after about 36 continuous hours at the wheel, one driver left the road, wrecked a truck. No repairs could be made, no spare parts were available. Two months later, repair work was begun on the truck at the home station, 1,000 miles from the scene of the accident.

We pulled one of the four gun-trucks from Battery A and sent them a weapons carrier from Headquarters Battery.

From the beginning, I was determined that kitchens would remain unmolested on the trucks. They had been fastened securely and the bows had been raised 14 inches to provide standing clearance for the cooks. Each kitchen truck carried an ice box and pulled a trailer which hauled supplies. We improvised a safety belt—placing it about 18 inches in front of the stoves and

*While this article is written from the viewpoint of the commander of a Service and Ammunition battery of a horse battalion, the ideas advanced are applicable (with obvious modifications) to any similar unit.

By Lieutenant Angus Rutledge, FA

about a foot above them. This gave security to the cook on duty when cooking while on the road or bumping cross country. With that arrangement, the last truck under my command left the bivouac area in no more than 30 minutes after an order to move.

But almost invariably we had to "shuttle." Hence, when we reached a bivouac site, we immediately unloaded all trucks except kitchen; sent whatever trucks that were needed back to the old bivouac for the remainder of the personnel and equipment, and the rest of our trucks out on ammunition details and to haul supplies.

Several things were drastically wrong with this system. In the first place, some personnel and equipment were always without transportation. Second, our drivers stayed at the wheel almost constantly, day and night. Third, our mechanics had little or no time for minor repairs and adjustments.

When *March Order* came I was faced with this dilemma: Leave some equipment and personnel, and send back for them later, or take them along and leave all the grain and forage. I could not take everything.

I saw another unit with several sacks of oats and considerable hay piled indiscriminately into a kitchen vehicle with rations and kitchen equipment.

My immaculate mess sergeant would have fainted with horror at my mere suggestion of such action. I wouldn't do it. First, because his vehicle was already so crowded with equipment and supplies that he could just barely operate and, second, because I wanted a hot meal for the men when we reached camp. Or if we were halted on the road for as long as 20 minutes near meal time, a full meal would be served to every man in the column right at the rear of Service Battery's kitchen truck. We did it time after time without a hitch. On the road at a halt, when an officer gave the command to feed out (it wasn't done without command) the trailer was dropped, rolled back, and a table set up. In not more than 10 minutes, men would be going through for sandwiches or hot food, whichever they preferred. Whenever the firing batteries reached a camp, the combat train was ready to feed out nearly every time. That's why I never unloaded those kitchens; I wanted them to be worthwhile.

Now for some supply functions. Our most essential items were: (1) forage and grain, (2) ammunition, (3) gasoline, and (4) rations. Let's take them as they're enumerated. (1) The battalion had about 450 horses. Each day each horse needed roughly 15 lbs. of grain and 20 lbs. of forage. These horses had no means of transporting more than two feeds of grain and no forage. Service Battery had to do the job. Approximately 9,000 lbs. of hay and 6,500 lbs. of grain was what we could normally expect to haul daily. Actually, because the horses didn't have time to do their full quota of eating, we used only about 7,000 lbs. of forage (90 bales) and about 5,500 lbs. of grain each day.

Usually we could expect to make a round trip of not less than 50 miles to the railhead. Much of this driving was under wartime conditions, with blackouts.

The transportation for forage and grain involved 3 trucks with trailers or 4 trucks without trailers. You can readily see that the requirements for those vehicles, with the loading crews, cut deeply into Service Battery's 37 men and available transports (other batteries helped with details). Just the same, those vehicles were of first importance. The horse must be fed—first.

On rare occasions the Quartermaster delivered essentials. But we could not and did not depend on them.

Ammunition supply was a nightmare from three weeks before maneuvers started until during the last week of the war when one of the ammunition corporals stacked our well-worn pile of sticks under some brush and forgot to pick them up.

Although we badly needed the space for other things, we had to make room for nearly 1,000 rounds of simulated ammunition. To get this simulated stuff, I had a detail of 1 officer and 4 or 5 men scouring the woods on the reservation with axes and a crosscut saw for several days. We filled one truck and trailer with the produce and hauled it 1,100 miles to "war"; then unloaded and stacked it, reloaded and moved it once or twice daily for almost 6 weeks. All that while I had only 2 men above permanent assignment to do all the KP and handle all the forage, rations, gasoline and ammunition. Noncoms, drivers, mechanics and officers did the rest. That was one battery in which the officers cleaned their own boots—if they found time. I saw my First Sergeant helping the Battalion Supply Sergeant and the Battalion Motor Sergeant (the three had a total service of 77 years) load and unload hay and grain like a trio of buck privates. They did it without orders, and willingly; but I didn't like it. There was no one else to do the job. By the end of the third week we had only one motorcycle with side-car attachments. Minor breakdowns, with no spare parts available, had finished the second. The one remaining had a bad clutch. Sometimes it worked. That left us (Battery Commander, Battalion Supply Officer, Battalion Munitions Officer, and Battalion Motor Officer) with a single command car and a wreck of a motorcycle for our dozens of needs. When the BC of Headquarters Battery offered to lend me a horse or two, I was just about in the mood to accept; but we could not have covered the necessary distances on horseback.

About that time a check-up revealed that we were down to a total enlisted strength of 33 men: one had gone to the hospital, one was over the hill and two on emergency leaves. I now had most of the NCO's taking a regular turn at whatever fatigue detail came up. All the corporals and some of the sergeants drove trucks.

By this time the other batteries were regularly furnishing details to help with forage and grain. A brake-less log truck ran down and seriously injured my solo

motorcyclist, wrecking the machine. I then was without a messenger.

My fellow officers laughed at our situation and worked like hell; the men shook their heads sadly, grinned and stuck to their jobs. It didn't get worse and we could see ahead to the time when the maneuvers would be over. Had it been actual war, we eventually would have ceased to function.

A story concerning gasoline and rations supply is mostly repetition of what has been said. Gasoline supply required one truck and trailer with two men doing 24 hours duty daily. We never ran out of gasoline. Rations were plentiful but very hard to get. At the Railhead they repeated in chorus, "It's not our fault if the daily train is late." It wasn't, perhaps; but that didn't make us feel better when our orders said "9:15 PM" and about 2:30 AM we'd ask, with a little glaze in the voice, about our chances for supplies. Those same men who spent the night (many nights) getting rations were very fortunate to get a couple of hours rest next day before there was more "shuttling" to do.

You may say that this is supposed to be an argument for reorganization of Service Batteries. It is a true and fairly accurate account of what happened to one such battery. You can well see what was wrong with it. Then you might say that with its total enlisted strength taken from schools and the like, the battery would have been able to operate easily. I contend that it would still be too small and that under wartime conditions the battery can't be expected to complete its necessary functions.

In the next few paragraphs and in the table I want to show you what experience and study has made me believe will be a better vehicular organization than we now have.

Proposed Changes in Vehicles of Service and Ammunition Batteries

Vehicles and Assignment

1—Motorcycle, solo (messenger)

2—Motorcycles, side cars attached.
(Btry agent, chief mech.)

5—Trucks, command.
(BC, Bn Supply, Mot Off, Mun Off, Amm Sgt.)

15—Trucks 6 × 6, 2½-ton, cargo with winch.
- 6—Ammunition
- 1—Kitchen
- 1—Btry and Bn Supply.
  (Not for rations, grain, etc.)
- 1—Bn Personnel section
- 1—Medical and Vets combined

- 1—Rations (Bn)
- 1—Wrecker
- 1—Battery Hq and personnel
- 1—Grain (Bn)
- 1—Spare (personnel, labor squad)

1—Trailer truck (portee Cav type) (for forage)

1—Gasoline tanker, with trailer (1,000 gallons capacity)

1—Water tanker (Bn) For kitchens and drinking water
(All cargo trucks should pull 1-ton trailers)
(Two trucks for each firing battery not included)

My knowledge of these vehicles has been gained through using them. They are more than satisfactory, they are excellent.

For forage I included the large trailer-truck because the 2½-ton cargo trucks were wastefully employed when used for that purpose. No less than three trucks were required to haul 1 day's supply of forage. We could not load more than about 2,400 lbs. on them even after raising the bows 14 inches. One of the large trucks will handle that part of the supply.

A Service and Ammunition Battery needs that spare truck in many cases. It should travel near the rear of the column, when on the march, to pick up important loads from vehicles that might have to drop out for repairs. In camp it will be used regularly for replacement of vehicles which are tied up by order of the Motor Officer for check-up and minor adjustments.

Every truck, cargo, in the battery should be equipped with the winch. I know it increases the cost some $300 per vehicle, but that is not so much as a single valuable cargo, plus truck, that will be lost because of the inability of a driver to extricate his vehicle without the aid of the cable.

I remember numerous instances wherein the winch saved the day. If it is impossible to obtain all-winch jobs, then, certainly, enough such vehicles should be included and distributed in each organization, so that each detail can have one winch truck in its convoy.

Those units which had water tankers on maneuvers were very fortunate, indeed. The 10-gal. milk cans we used were all right around the kitchen, but we should have been able to fill them there from a tanker, rather than having to haul them many miles in a truck badly needed elsewhere.

Now as to personnel:

For instance, Service Battery, Third Field Artillery Battalion, has a present war strength of 50 men.

Here is what they will normally be expected to perform in the field.

1. Furnish forage and grain for approximately 700 horses.
2. Furnish rations for approximately 625 men.
3. Haul gasoline, grease, oil for all vehicles.
4. Supply ammunition for twelve 75-mm. howitzers, likely to be used in antitank work with direct laying. Also, ammunition for .45 cal. pistols, light rifles, machine guns, and 37-mm. guns.

5. In addition there are the cooks, battery headquarters, battalion supply, clerks, and mechanics.

It is useless for me to go into the assignment of these 50 men. I believe it is obvious that they cannot do the job.

Taking the new list of vehicles and their assignments and working on that basis, I believe we need this:

ORGANIZATION OF PERSONNEL

Battery Headquarters	*Off.*	*E. Men*	*Total*
BC (Bn S-4), 1st Sgt., Orderly, clerk, agent	1	4	5
Battalion Supply			
1 Off (asst to S-4), 2 Sgts, 4 Cpls, 1 clerk, 1 mail clerk	1	8	9
Battalion Motors			
1 Off, 1 Sgt, 3 mechanics	1	4	5
Ammunition			
1 Off, 1 Sgt, 4 Cpls, 12 servers	1	17	18
Battery Supply			
1 Sgt, 1 Cpl, 1 clerk	--	3	3
Battery Mess			
1 Sgt, 3 cooks, 1 cook's helper	--	5	5
Battery Motor Shop			
Battalion M. O. supervises shop, 1 Sgt, 3 mechanics, 37 drivers (includes motorcyclists)	--	41	41
Miscellaneous			
2 machine gunners, 2 assistant m. g., 1 general mechanic	--	5	5
Basics			
Dig latrines, garbage pits, pioneer work; handle forage, rations, etc. Use as replacement for injured, sick	--	13	13
TOTAL	4	100	104

Only a few of these sections need explanation. From the Basics, I would take two men for orderlies, 1 for each 2 officers. This would not be a 24-hour per day duty. When not so employed, their duties would be the same as that of the other men.

One man would be detailed daily for KP. The 10 remaining would furnish labor squads for whatever details were to be done.

I would never have such permanent assignments that I could not put any man on fatigue details when necessary; but would attempt to keep all men such as drivers on their particular assignments, with no other duty to perform.

In the Battery Motor Shop, the Motor Sergeant is in charge of all drivers, makes driver assignments (subject to BC's and MO's approval); and runs the repair shop. I would like to have available a 50 per cent surplus in drivers. A driver needs rest badly after 10 or 12 hours at the wheel under difficult circumstances. I've known them to go for 3 days without rest and with only short cat naps for sleep; then catch hell from some other officer of the battalion, fresh from his air mattress and sponge bath, for dropping off to sleep when the column halted "only an hour after sun-up." In my opinion 50 per cent extra drivers is not too many.

I put the mail clerk in Service Battery because often there will be vehicles going to brigade, and division. Too, vehicles will go to the battery areas, at least daily. That gives the best chance for efficient distribution that I can see in the battalion.

I believe that the Service Battery CO should also be the Battalion S-4, but I'm sure that he should have an officer assistant in the battalion supply. Service Battery's commander should be the ranking battery commander in the battalion. He should have final authority in supply functions, subject to the orders of the Battalion CO. His job should be that of organizing a service unit, supervising the work of his principal assistants, the Mot O, SO and Mun O; and insuring its functioning by being able to visit freely the several scenes of activity, with the assurance that his men and equipment are sufficient for the assigned task.

ROAD TO DUNKIRK

By Henri de la Falaise

Leaves from my diary in Flanders

Chapter I

FRIDAY, MAY 10TH, 5 AM—PARIS

The air-raid alarm arouses me out of bed. Through the open window I see German bombers cruising leisurely at six thousand feet over southwest Paris. A few shells burst harmlessly far away from them. No fighters rise to meet them. There is a peculiar feeling in the atmosphere. I can't go back to sleep. On the radio at 7 AM I learn the most important news of the war to date: The German armies have hurled their might against the Belgian and Dutch defenses in a mass frontal attack. Most of the Allied airfields have already been raided by thousands of planes; hundreds of our aircraft have been destroyed before they could rise.

Good-bye leave!

Twelve hours later I am at the Gare du Nord, fighting my way with Bob S. through a crowd of Belgians. Dutch and others, who are answering the call to colors issued by their governments this morning. We succeed in squeezing into a compartment. Bob is liaison officer with a squadron of the 4/7th Dragoons (light tanks), and he, too, has been on leave.

Our train reaches Albert just after it has been raided. We see some wounded being carried away on stretchers. At Arras I leave Bob, who is going to Douai. Arras has had seven air attacks today. The streets and suburbs have been mercilessly machine-gunned by low flying Heinkels. As I walk out on the Place de la Gare carrying my kit the sirens sound again and everyone scurries for shelter. I hurry through the deserted streets toward the headquarters of the French Military Mission. Here I find Captain L., who gives me the latest news: My regiment, the 12th Royal Lancers, passed through Brussels today at noon and was wildly cheered by the population. The Twelfth's armored squadrons are speeding eastward to meet the oncoming enemy.

SATURDAY, MAY 11TH

Commandant M. arrives at 21:00 hrs., and takes me with him to the British GHQ, where in a huge cellar the brains of the B.E.F. are feverishly at work. Large maps, hung on the walls, show accurately the locations of the advancing British units. As new reports come in these positions are changed and moved forward. I am told that the 12th Lancers are heading for Tongres, thirty miles east of the river Dyle. The general impression seems to be that the German troops that have crossed the Belgian border are pushing northwestward toward the south of Holland. The British infantry will reach the Dyle tomorrow and will "dig-in" behind it, according to the prearranged plan. The French will be doing the same behind the Meuse on the right.

Henri, Marquis de la Falaise

EDITOR'S NOTE: *Henri, Marquis de la Falaise, is a member of a distinguished French family having a military background, and several of his close maternal relatives are officers in the British army. Educated at Sorbonne University in Paris, he enlisted in the French cavalry (in 1915), at the age of 17. After active service at the front during 1915-18 he was wounded severely, but later volunteered for the tank corps and saw action at St. Mihiel. For his war service he was awarded the Croix de Guerre, and received a second citation.*

After the war he worked for various motion picture companies in Hollywood, and made films in Bali and French Indo-China. During 1939-40 Marquis de la Falaise was a liaison officer with the British. For his services in Flanders he was twice decorated, and after Dunkirk he returned to France. He was sent to a tank regiment in Brittany: this unit was cut off and captured. Marquis de la Falaise escaped and made his way to the United States, where he is now living.

Some of the names mentioned in "Road to Dunkirk" are real, others fictitious in order to protect individuals, some of whom are now prisoners in German hands. All events described are, of course, actual history.

I leave Arras at 8:00 hours with Commandant M. by car. He is taking me to Tournai, in Belgium, about ten miles from the French border. We reach the lovely town and halt on the main square near the fine old cathedral with its seven spires. Our car is immediately surrounded by cheering citizens who gape at us as if we were the advance guard of an incoming circus. I bid farewell to M., and change some francs into Belgas; I also buy a Michelin map of the country east and west of Brussels. Then I take a train leaving for the Belgian capital.

At 14:00 hours I am in Brussels. I take a taxi and go to the French Embassy, hoping that the military attaché might help me to find my regiment. I waste thirty minutes in that office where nobody seems to know anything, and where the sight of a Frenchman in uniform trying to locate a British armored car regiment in the front lines seems to fill everyone with surprise and suspicion; there is some talk of sending me to a concentration camp. I tell them that I have a taxi waiting outside and that I wish to be allowed to go and pay the driver. Walking out, I hop in my taxi and rush off to the British military attaché's office at the other end of the town. There I find a very charming Brigadier standing in the street. He thinks that the 12th Lancers is on the immediate left of the French armored cavalry division—the 3d "Division Légère Mécanique, somewhere around St. Trond, east of Tirlemont." So I go to the railway station, only to find that there are no more trains leaving for the east. Sitting sadly in the buffet, I meet a fat gentleman who insists on paying for my beer. I am the first French soldier he has seen. He turns out to be the burgomaster of Wavre, which is the town I had decided to head for. He is driving home in his car!

16:30 hrs. Wavre. Am at the burgomaster's home, drinking his best bottle with his nice, plump wife. We drink to France. We drink to Belgium. We drink to England. Thank God, there are no other Allies or I will never reach my squadron!

Wandering through Wavre, I find a Highland regiment which has just arrived and is preparing to dig in behind the Dyle. A young officer is searching for a place to establish the men's cookhouse. We make a bargain: if I find a place for the cookhouse, he will let we have a car and a driver to go 10 miles east of the river, but no further. I get the cook all settled and happy within fifteen minutes, and the Scot orders his driver to transport me ten miles across the river but not an inch further. Forty minutes later I find the 4/7th Dragoons regimental headquarters at Grez Doidceau. Trucks pass, carrying the 8ème Dragons portes. I climb in the officers' car, as they are going to Jodoigne. They belong to the 3ème D.L.M.

18:30 hrs. Sight a British armored car of my squadron! I jump out in the road and stop it. It is Lieut. Phil S. Sergeant Ditton's car drives up shortly after. They are all very badly shaken, as they have just been severely bombed. Their wireless receivers have been put out of action but they can still send messages to the squadron command post.

I am assigned to Sergeant Ditton's car, and go forward to make contact with the French armored car squadron, the 12ème Cuirassiers, operating with us on our right. The colonel of this unit asks me to tell Phil to keep watch south of the Tirlemont-St. Trond road tonight. Phil is sheltering in a small wood at the side of the road. He sends me to the railroad crossing at Hoegarden. The Germans are pushing their motorized units toward Tirlemont from the southeast. I leave with Sergeant Ditton. The roads are filled with refugees; we can hardly move forward. The skies are red with the flaming villages in the east. We have to stop; the bombers are overhead.

Two hours later the refugees have passed, and we are in Hoegarden. Silence and the crackling of burning timber. Smoke and flames, under a pure, starlit sky. My car is facing west, toward the railroad tracks; Phil's car is 500 yards away, but our Bren and Boys guns are trained eastward on the crossroads forty yards distant.

By midnight Ditton is asleep. Parachute flares are dropping all over the countryside. From my left, in the far distance and ahead, comes the intermittent rattling of machine guns. Now and then a loud explosion occurs in Tirlemont.

SUNDAY, MAY 12TH

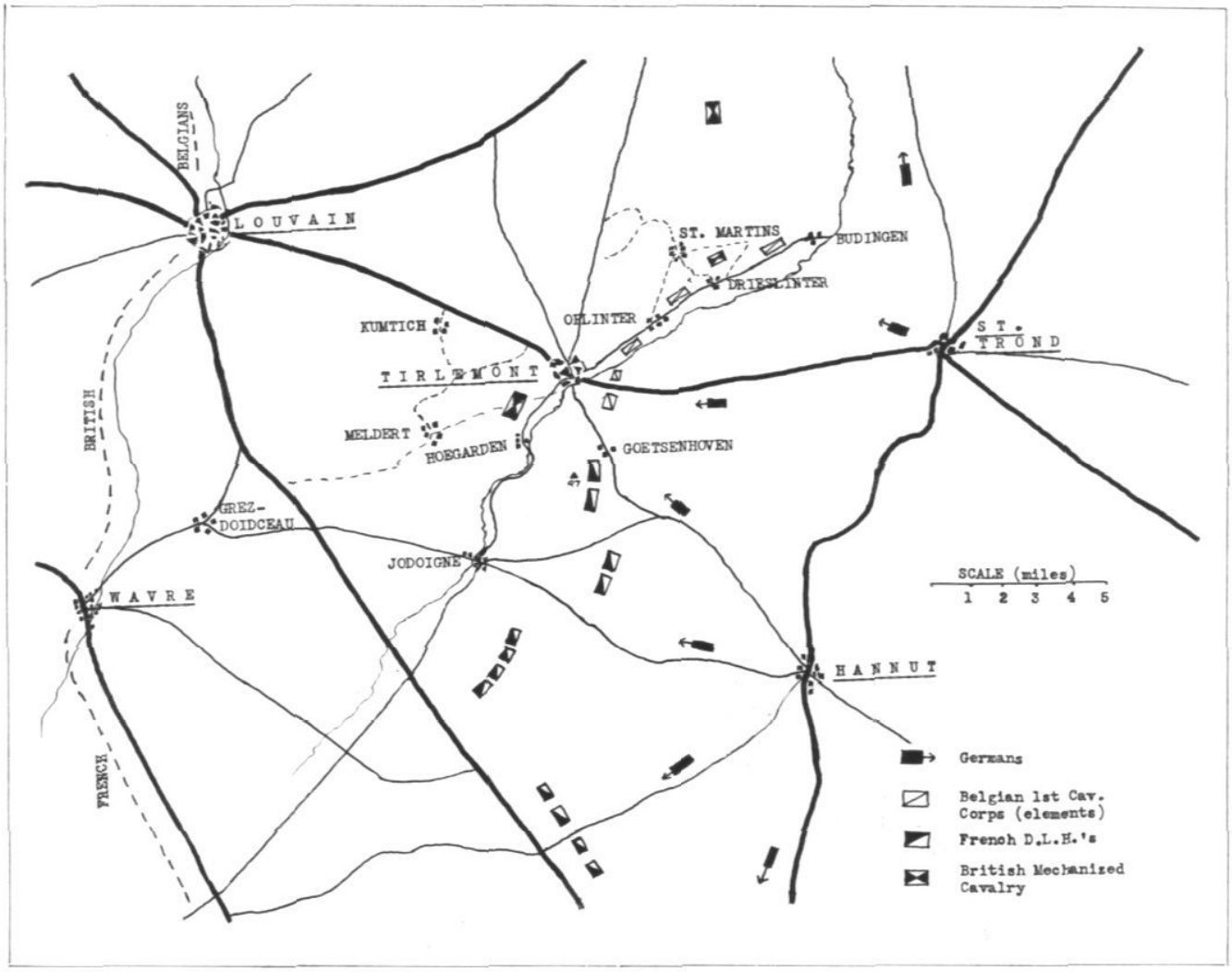
1:30 hrs. Silence everywhere. I get out of the car and walk to the crossroads with a D. R.[1] The Gette River is about 300 yards on the other side of the railroad crossing, between Phil and me. I sleep for thirty minutes, then awake and eat some biscuit and chocolate. Burns has spent most of the night fixing his wireless. A message comes through for me from Major Elliot P. at squadron headquarters: "Congratulations, and do I think I can find the Panhard[2] squadron of the D.L.M., as nobody seems to know the exact position of the French left wing." It is feared at headquarters that the Germans are coming up to Tirlemont from Hannut which, it seems, they have captured. I am to find out and report. Also, tell the Cuirassiers that the 4/7th are coming up and will be available at noon. I send a D.R. to Phil with the message. Phil sends back his D.R. with mine, asking me to take both of them with me for safety.

Daylight breaks slowly through mist as we set off eastward. We find Goetsenhoven to be almost completely destroyed. A Panhard comes along! I wave the Union-Jack. The car commander opens his turret, and tells me that he has just reported to his commander, who is in a wrecked and burned farm half a mile away. I immediately proceed there, but get out of the armored car 300 yards from the house and walk the rest of the distance.

Here I find Cdt. Halbessart. It is really quite pleasant

[1] Despatch rider.

[2] A Panhard is a French heavy armored car.



to see him again, after a month's interval, and show him that an "interpreter," as he called me previously, was also used for other jobs! He doesn't know very much more than we do about the situation around Hannut, but at least he is optimistic, though he thinks the Germans have already gone through Hannut. But, if they have, they should soon be on this road on which we are now standing, as this is the road from Hannut to Tirlemont! Hannut is about 15 km. from where we are now. He shows me his map. I copy and mark on mine the points where German units have been contacted by the Panhards of his group. His *ordonnance* brings us each a steaming cup of hot coffee. It tastes like heaven! "En principe" some elements of the Belgian cavalry division are holding the Tirlemont-St. Trond road. I decide to return to Hoegarden after I have located "les braves Belges," as Major P. always says. Leaving the Cdt., we take a track to Meer, then turn northwest to Wukmersen. Both places are badly damaged and completely devoid of any sign of life.

4:30 hrs. Wukmersen. The cool blue sky is filling up with the big grey bombers. They fly over us at a height of not more than a thousand feet, their black and white crosses showing very plainly. They are heading for the Dyle.

At the northern extremity of the village, I stumble on some Belgian cavalrymen of the "Guides" regiment. They are placing anti-tank guns, and seem quite exhausted as they have been retreating slowly and suffering severe losses. Their major shows me on the map the position of the cavalry corps is now taking up, and adds that he thinks they will be able to hold it.

At 5:30 hrs. I rejoin Phil in Hoegarden. I am to report to Major Elliot P. at Meldert. As I leave the village, I meet Cdt. Halbessart and his Panhards. He tells me the Germans are pouring up the Tirlemont road, and he is removing his headquarters to the rear of Hoegarden.

At Meldert I find Elliot and Major John Erne sitting on some straw in the village street. I am given a fine welcome and the information I have is immediately transmitted

to regimental headquarters. Our colonel sends me greetings and thanks.

Soon the enemy bombers return from the Dyle. Others are over Hoegarden, where black smoke is rising. Phil phones that he is all right. His Bren guns are firing madly at the "black birds"; so are the heavy machine guns of the French Cuirassiers.

By mid-morning Phil needs some information and asks me to reach Cdt. Halbessart again; he is on the eastern entrance of Hoegarden. The colonel phones just as I am leaving; headquarters is worried. The report is that German tanks are swarming over the countryside between Hannut, Jodoigne, and Tirlemont. I must discover if this is true, and, if so, find out from the Cuirassiers what line of retreat they wish us to take; also tell them that the 4/7th is being rushed up in support.

I find Hoegarden to be a heap of smoking ruins. The colonel of the Cuirassiers is with Cdt. Halbessart. As I stand with him in a wrecked house, reports of the battle keep coming in. The Panhards are fighting like mad. They

A "Panhard" armored car advancing toward front lines.

have destroyed at least fifteen German tanks during the last hour.

Lt. de St. E. arrives, covered with blood. He stands smartly at attention before the colonel, in his right hand a German helmet which is also dripping with blood. Two German "Tommy-guns" are slung over his shoulder. He presents these trophies to the colonel. His three Panhards have been put out of action but he has managed to escape with the remainder of his *peloton* on motorcycles. He asks to be given another car immediately. He has destroyed five German light tanks near Opheilissen.

The colonel offers me a sandwich. On his map he shows me the latest positions of the enemy tanks. When I talk about the possible line of retreat, he begs me to tell my colonel not to even think of such a move. We will fight on this line, he adds, *and die here,* if necessary. We must gain time in order to enable the troops on the Dyle to build up a strong position. *Nous ne reculerons pas, dites le à nos amis* are his last words when he shakes hands with me. As I leave the village I pass the first tanks of the 4/7th entering a farmyard. I tell the officer where he will find the Cuirassiers, and ask him to report there at once. He says he will, as soon as his French liaison officer arrives. Lt. B. of the mission rides up in a carrier. I tell him the situation briefly, and leave for Meldert.

At noon I report to Elliot, who reports to his colonel. The sun is very hot. We sit in the shade of a hedge watching the German planes. The colonel arrives. I repeat the message from the French. He seems worried that we might be turned from the south. In his staff car we go to the Cuirassiers. The French colonel does not feel quite so sure now. The heavy 17-ton Somuas[3]—pride of the D.L.M.—have been thrown into the battle. We go to an OP at point 97 near Outgaarden and watch the fight. Large German tanks are destroying the opposing Somuas one by one, and advancing. Their cannon seem to spurt a flame several yards long each time they shoot. They must be thirty tonners, at least, and they are firing 37-mm. armor-piercing shells.

14:30 hrs. Twenty Somuas have been destroyed. Fifteen Panhards are out of action. Phil has lost a car. Lieut. B's troop, which was surrounded, has managed to slip away. Peter Arkwright's troop has killed fifteen motorcycle scouts and destroyed a German armored car at point-blank range.

15:00 hrs. A report comes in that German tanks have entered Tirlemont; the Belgian cavalry is resisting. The French are withdrawing slightly and we are to move up to the east of Tirlemont to support the Belgians on the line of the Gette River.

I move out in the first car. Elliot follows at three hun-yards. I must find a way around Tirlemont. As I reach Kumtich, heavy machine-gun fire comes from the first house. I speed onward, waving my Union-Jack, as I can't believe that the enemy has already reached here. I am right, it is only a troop of the 4/7th that mistook me for a Jerry! I send a D.R. back to Elliot to tell him all is well. I cross the main Tirlemont-Louvain road. Elliot sends message to wait for him at St. Martin's, as he wishes to go to Tirlemont himself and see if there are any German tanks there!

Two hours later Peter and his troop pass by. He tells me he is going to hold a small bridge on the Gette, north of Tirlemont. Phil and his troop follow shortly after, then come Andrew Roddick and his troop. They all disappear in clouds of dust down the road to Bunsbeek.

Elliot returns from Tirlemont, saying that he has actually been in the town and has seen no trace of the enemy. The streets are strewn with wreckage and he has seen some Belgian soldiers on the road to St. Trond.

At 10:30 hrs. we establish squadron HQ in a small inn at St. Martin's. The artillery of the Belgian Cavalry Corps is placed on the hills at the end of the village. It consists of four troops of French long 75's. They are very well hidden and fire continually on the road to St. Trond. Two German Henschel observation planes are

[3]A Somua is the heaviest French cavalry tank, with armor plate 2 inches thick.

hovering above, trying to locate them. If they do, things might get pretty hot for us. Elliot does not seem to care!

19:00 hrs. I am off with Elliot in the staff car, headed for the small road stretching along the Gette, northeast of Tirlemont. We stop first at Oplinter and examine Andrew Roddick's position guarding the small bridge across the Gette. Then we go to Drieslinter where we find Phil. He looks very tired. There is a heavy machine-gun fire coming from the small woods across the river. At Budingen, near the end of the village, is Phil's last car, and when we get to the place where the road turns we stumble on some Belgian soldiers and an officer. They are firing like mad with rifles, machine guns, and even with an anti-tank gun which they have placed at the crossroads at the entrance of the village. We are placed between their fire and that of the enemy. We crawl out of the car which returns to where we left Phil. Elliot takes a rifle and so do I. We crawl on the paved road toward the middle of the village and the place where we should normally find Phil's third armored car. The Belgians are waving at us to get out of the way, and are firing over our heads. They seem very excited. Elliot is as calm as if he were on Piccadilly. After a few moments, during which we lie still on our bellies, he decides to go forward and find the armored car which, for all we know, might be out of action or captured. He tells me to stay where I am and if he is not back in five minutes, to return to Phil. Before I can voice an opinion he has left, clutching his rifle and crouching low.

A Belgian sergeant comes to beg me to fall back behind their line of fire. I tell him I have to stay until my major (Elliot) returns. The bullets are ricochetting on the stone paving of the small road, and the minutes seem terribly long, as I keep my eyes on my wrist watch. Five minutes have elapsed. I decide to go for Elliot and get up to dash in the direction he took. I have not gone fifty yards when I sight him. He is running toward me. I don't remember ever having seen a more pleasant sight! We get back to the car. He has found the armored car in a very good position and completely in control of the small bridge. He say that quite a few German advance scouts have found that out too, for the half-destroyed bridge is strewn with their corpses.

We go to Oplinter, make contact with the Belgian regimental HQ just established there. They think they can hold the Germans in front of Tirlemont and on the Gette, with our help, if the Germans are also checked in the south between here and Jodoigne. As we leave, the Belgian colonel receives a message. He tells us that one of his companies has just had an encounter with the enemy at Budingen. We smile and tell him that we have just come from there and have seen the fun. We compliment him on his troops, and part very good friends.

20:45 hrs. Back in St. Martin's. Everyone is very tired. I set out to find a place where we can cook a meal and eat in peace.

Elliot wakes me up an hour before midnight. The colonel has talked to him on the wireless. He wants me to go to the Belgian battery commander for information. I walk to the battery HQ. On the hill outside the village they are letting loose a heavy barrage. The noise is terrific. I am stopped by a sentry and have some trouble getting to the commanding officer, who is very busy on the telephone, receiving the sensings from his OP.

He is very young and smart looking and he and his staff seem to know their business. He reports that the positions on the road to St. Trond are holding but that the enemy is in Goetsenhoven. The D.L.M. and the 4/7th seem to be holding the Tirlemont-Jodoigne road. The night is cool and bright with stars, as I walk back to squadron HQ. The guns have ceased firing and all is silent, save for an occasional burst of machine-gun fire down by the banks of the Gette.

MONDAY, MAY 13TH

Dawn is hardly breaking, when Machin wakes Elliot and me with a bowl of hot tea and some eggs. John Erne joins us. He is bleary-eyed and worn out, has been on watch since 2 AM. We wash and shave. Phil and Peter have just sent a message asking for petrol and ammunition. Elliot asks if I will take the fighting lorry and do the job, as I am the only one, beside himself, who knows the exact position of the squadron's armored cars. He tells me that I shall be the judge as to how far I can go, as my lorry will be in full view of the enemy once I get on the small road by the Gette. He and John bid me farewell, as I leave with my carload of petrol and ammunition.

6:00 hrs. I am in Oplinter. So far so good. Andrew Roddick's troop files up. As we enter Drieslinter we get a few bullets from across the small river. In the village we jump out of the lorry to see if there is any harm done, and find that they have only punctured one petrol can. I go to where I had seen Peter's troop yesterday. See no sign of him. Belgian soldiers can give me no information either. Fifteen minutes are wasted searching for him and the armored cars. I decide to go on toward Budingen and Phil. There we hide the lorry in a small farmyard, and unload petrol and ammunition.

As we are about to leave, three Junkers roaring overhead at about six hundred feet machine-gun us. We hide in a deserted pig sty. My driver is getting rather "windy," but I succeed in getting him in his seat, and off to Drieslinter, before the Junkers change their minds and come back. We get to the village in record time. I tell the lorry driver to hide the car under a tree and to camouflage it with branches. Then I start on foot looking for Peter. Finally I locate him in a small shack behind a tiny bridge at the narrowest part of the stream. There is a small wood about a hundred and fifty yards away on the other side, and a small house which is occupied by the enemy.

Three wrecked motorcycles and six dead bodies sprawled on the narrow road, barely thirty yards ahead

Water color by Fedor Rimsky

Lieut, Peter Arkwright's troop rescuing two wounded soldiers near Drieslinter

of Peter's advanced car, prove the effectiveness of his troop's fire. Peter welcomes me, smiling and gay as always. He is puffing away at the little pipe I gave him one day in Arras, a month, no, ages ago. His No. 1 car is guarding the bridge, No. 2 is behind the wall of the shack, and No. 3 is about a hundred yards away to the left watching the railroad tracks and the railway bridge, which have not been blown up. Chicken feathers are all over the ground, and an appetizing smell of broth emanates from a large iron pot which is sitting on some bricks over burning embers. Peter has also found some mineral water which he insists I must take back with me. When I tell him I am running short of "John Cotton," he dives inside his armored car and emerges triumphantly with a half-pound tin, which I must also take! I wonder if some German observer is watching all these touching scenes through his Zeiss!

9:00 hrs. Elliot calls Peter. He wants to know if I have been seen. I answer myself and tell him that the lorry is safely hidden in the village, and that the supplies are being brought here by hand. An hour later I am on my way back to squadron HQ. The Belgians are firing their anti-tank guns, placed on the south side of the road. But the Germans seem to have brought up some field guns; three shrapnel burst high and north of the road. These give wings to our lorry, so we finally get safely home to our starting base by 11:00 hours.

At 13:00 hrs. Elliot and I go to visit the Belgian battery commander. His guns are firing at Goetsenhoven and on a concentration of lorries on the road leading to it. A squadron of Junkers flies over us and bombs the Tirlemont-Louvain highway. We can see smoke and dust rising from it for more than two miles. The bombers then wheel around and circle twice over the batteries, dropping no bombs.

News from the south is bad. Elliot says we may have to withdraw lest we be cut off from Louvain. We take the staff car and go down to see what is happening on the bank of the Gette. All is quiet. The Belgian commander is optimistic. He probably does not yet know what we know.

At Drieslinter we walk to Peter's outpost, only to find that he and a Belgian patrol are heavily engaged with the opposing force in the house across the river. Two wounded men are lying in the field across the stream. A German machine-gun is making it very difficult to rescue

them. Peter, rifle in hand, is shooting at the spot from which the enemy fire is coming. Elliot and I grab two rifles to add our efforts. A Belgian officer is blasting away at the small house with an anti-tank gun. Another group, squatting behind a heavy machine gun, fires short bursts in the direction of the railroad tracks. Four men—two Belgians and two volunteers from Peter's troop—succeed in crossing the deep gully, under the blown-up bridge, and worm their way up to the wounded men. Moving cautiously along the hedge which hides them from the enemy, they dart across the field and drag the wounded soldiers to the safety of a ditch. Then, inch by inch, yard by yard, they crawl back to us, dragging the two unconscious bodies, while bullets whistle overhead and toss up tufts of grass around them. Twenty minutes after they have left we help them up the gully and carry the victims to a field ambulance which has driven up behind Peter's armored car. Both men are hit in the belly and look as if they were dead.

15:30 hrs. Off to Budingen and Phil. We find him in the same position as yesterday, worn out and haggard; he has had no sleep for sixty-four hours. He has not been as lucky as Peter, as he has no house in which he can rest and eat. His armored car is very exposed and he has to be on the alert constantly. The two other cars of his troop are no better off than he is. Elliot, after seeing them all, does not think he can leave the troop there much longer. After making Phil drink some good wine out of my special reserve in the staff car, and forcing him to eat some biscuits and chocolate, we leave them to their lonely and dangerous task and turn the car back toward Tirlemont.

As we reach Drieslinter, a motorbike lying in the middle of the narrow road forces us to stop. As we get out to drag it out of the way, we see its driver, a Belgian cavalryman, lying on his belly in a field of clover on the side of the road. As he sees us, he points upward and back of us. Turning around, we see why he abandoned his bike in such haste. Five Stukas are diving on the road. Three leaps carry me to the middle of the field and I flatten down, my heart thumping like a base drum. . . . One, two, three, four, five, six, the bombs come screaming through the air. A deafening noise, smoke, blinding flashes, the earth rocks under me. The roar of the engines passes us, and I sit up.

Fifty yards away to my left, Elliot is waving to me. Fred, our driver, scrambles to his feet also, and the Belgian soldier walks slowly back to his motorbike. The Germans have missed the road; all the bombs have fallen on the other side of it. The smoking craters are in a straight line, about fifty yards apart. The left door of the staff car is damaged. As it won't shut, we fix it somehow. Elliot, after taking one look at Fred, who is too shaky to be of any use, gets in the driver's seat. We hurry to Oplinter, where we pay a visit to the Belgian colonel and the Chief of Staff of the Belgian 1st Cavalry Corps. He tells us that the French D.L.M. has been forced to abandon the position it held this morning, south of Tirlemont. This looks bad, as it means that the Germans might gain access to the Tirlemont-Louvain

Getting under cover of the big trees lining this Belgian highway did not save these horses, trucks and their drivers from the destructive force of the Luftwaffe's bombs. (*Black Star*)

road and cut us off. We hurry back to St. Martin's to report by wireless to our colonel.

Elliot sends Andrew Roddick on patrol through Tirlemont to find out if the enemy is anywhere near the Louvain road. Machin and I try to buy some bread and eggs, but these commodities are getting very hard to obtain. Every house is full of people, packing and ready to leave. I try to comfort some of the tearful women. One young woman with three small children clings to my tunic and wants me to advise her what to do and to tell her if it is true that the Germans are already in St. Trond! If I tell them the truth, that the enemy is only about three miles away, the whole village will be thrown into a panic. So I just smile at them all and say that as long as the 12th Lancers are in the village, they have nothing to worry about. I get two dozen eggs and three loaves of delicious bread!

Andrew Roddick arrives in his armored car from Tirlemont. He reports that the Belgian troops seem to be withdrawing toward Louvain. He has been heavily shelled on the St. Trond road, just outside of Tirlemont. This means that German field artillery has been brought up. I am sent to the Belgian battery commander to learn what he knows about this. Major Erne comes with me. As we enter the small room in the farm on the hill outside the village, which is the battery CP, we find the officers at work and too busy even to talk. We stand quietly in a corner of the room while orders are transmitted to the gun positions.

Then, of a sudden, the house shakes, the windows are blown open. The twelve 75's have opened fire and are barking like a pack of wild dogs, belching fire and sending red-hot steel hurtling and whistling through the air. The noise is deafening. The Belgian officer scribbles something on a scrap of paper and hands it to me. I read "4 × 12." A few seconds later, the guns stop. The forty-eight shots have been fired. Soon after, the telephone rings, reporting direct hits on the enemy. This is transmitted to the gun emplacements with an order to resume firing.

"Now we can talk," says the battery commander. Screaming into his ears, we tell him the object of our visit. He tells us that he has just been told to cover the retreat of the troops defending Tirlemont by laying a heavy barrage ahead of them. The evacuation will start at dusk and should go on very rapidly. He and his battery will try to withdraw later. John Erne tells him that we will protect him with a troop of armored cars.

Andrew Roddick's troop takes up its position a few hundred yards ahead of the different gun emplacements. Phil and Peter call up to say that the Belgians with them are withdrawing. They are told by Elliot to stick it out until further orders.

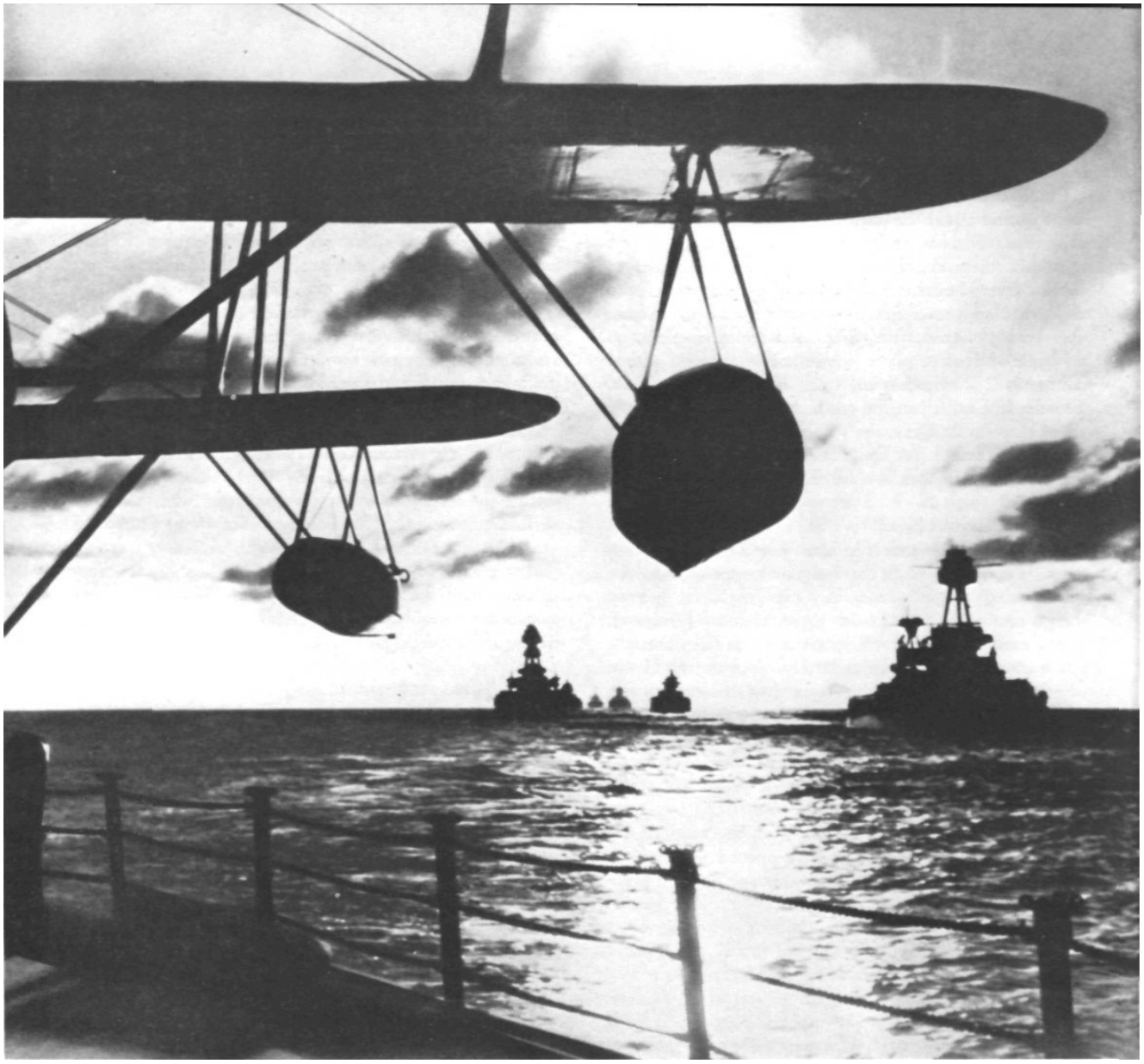
20:00 hrs. Hot soup, bread and butter, and three soft boiled eggs each! After this frugal supper Elliot advises me to snatch a few minutes sleep if I can. So John Erne and I find an old mattress. We both lie down on it and promptly pass out.

Two and a half hours later Elliot walks into the room and wakes us. Orders from headquarters are that we are to start withdrawing at 23:00 hours. Beyond the village the seventy-fives are firing at top speed, using up their ammunition. The sky over Tirlemont is red. I am told that while I was sleeping peacefully, German planes set the town on fire. Even now there are loud explosions, and thick smoke is rising as Belgian ammunition dumps are blown up. I climb the hill and hear the rattle of machine guns down on the Gette. Budingen appears to be on fire too. Phil and Peter are still down there. Silhouetted against the scarlet horizon, I can see one of Andrew Roddick's cars, watching.

Back in the village. Elliot tells me that Phil and Peter are on their way back. All is well. The rendezvous is at Lovenjoel, on the Louvain road. I am to ride in the staff car, just ahead of the fighting lorry, with John Erne's armored car back of us. My orders are to move off at once. In pitch darkness, without lights, we move on through small country roads and tracks toward the Louvain road, which we reach about midnight, three miles back of Tirlemont. A terrible sight greets us there. The bombers have reduced this lovely road, lined with tall trees, to a state of havoc and desolation. Trucks, busses, cars, some still on fire, are strewn all over it. One huge holiday bus has been blown up alongside a wrecked house, its front wheels resting on what remains of the roof. Pools of blood and mutilated bodies are lying around it. We make slow headway, avoiding the bomb holes and obstacles lying in our path. To the right of the road, on the railroad tracks, a train is ablaze. Finally, we reach Lovenjoel, which consists of about a dozen houses on both sides of the road.

(*To be continued*)

The FIELD ARTILLERY JOURNAL takes pride in again presenting to its readers first-hand source material dealing with the present war. Authentic material of this nature is practically unobtainable other than in our pages, and in thus recording serials and shorter articles the JOURNAL feels it is performing a definite service for the historians of the future.



NAVAL GUNFIRE SUPPORT of LANDING TROOPS

By Lieut. R. C. D. Hunt, Jr., U. S. Navy

EDITOR'S NOTE: *The following article by Lieut. Hunt, U.S.N., is one of the most thought-provoking studies we have been privileged to publish. Field artillerymen will readily visualize the difficulties involved in providing proper observation, communications, fire control, and fire* DIRECTION *in a landing operation. One is struck immediately with the vital necessity for close and continuous liaison between the field artillery component of the landing force and the naval gunnery personnel. Naval support will be the sole support* (*other than air attacks*) *at the outset. Then as a beachhead is secured and enlarged, there will be a transition period when field artillery will assume some of the missions. Finally the naval support must cease and the land forces take over. The problems arising may be similar to those of arranging cooperation between corps and divisional artillery, but they will be vastly more difficult. The importance of this subject should warrant its receiving further study. The* JOURNAL *invites readers to send in their ideas.*

Naval gunfire support has been studied and discussed by officers of all arms and servies. Its limitations, advantages, and capabilities have been considered from numerous angles, and the practical application of naval gunfire support has been undertaken by units of the Fleet in past years in order that we may have certain definite principles to "work on." Fortunately, present day practical efforts of our Navy to solve the very important problem of naval gunfire support are enabling us to form some positive conclusions with regard to the best use that can be made of the various types of naval guns and ammunition, against land targets.

The modern fire control system is designed for naval combat involving battle at sea, and it is the problem of the fire control officer to adapt his tools to the job which confronts him when called upon to support a landing on shore with effective fire from his ship's guns. The fire control instruments contribute to the effectiveness of the naval gunfire, and their efficient operation plays a part in solving our problem. It is essential that for surface ships the entire armament of the ship be capable of being brought into action simultaneously. The armament should be under the general control of the chief fire control officer who must occupy a control station in immediate touch with the commanding officer. Provision must be made for control of the armament at night. Provision must be made for taking observations for the control of gunfire, including the taking of ranges, observation of fall-of-shot (spotting), and the proper application of these observations to hit the target.

Spotting fall-of-shot presents an outstanding difficulty in proper naval gunfire support. Aircraft spot, direct spotting, and fire control parties landed ashore will be employed to observe fall-of-shot, but variation in patterns and nature of the terrain will tend to make the control officer wary of applying spots of questionable accuracy. Whereas direct spotting on visible targets may be possible to the vessels close inshore, those ships in the offshore supporting group will of necesity be dependent upon aircraft spotting, and when it is possible to put fire control parties on the hostile shore, these groups must keep the ship informed and make accurate observations of fall-of-shot. Here the problem of communication further complicates the problem of efficient fire control. Fire control parties from each support group must be landed as soon as practicable, in sectors occupied by the landing force, for the purpose of providing liaison between the supporting ships and the troops supported, and for spotting ships' gunfire from observation stations on shore. It is apparent that the value of these control parties will be impaired if communications are faulty. Spots must be transmitted to the firing ship immediately or they are worse than useless. When troops to be supported call for fires on definite areas, the fire control officer aboard ship must be notified without delay. A few seconds may mean a changed situation with resulting casualties to our own forces, and wasted ammunition. It is absolutely essential that, where fire control parties are employed ashore, their communication with the firing ship be rapid, reliable, and efficient. The landing force must provide these fire control parties with every facility for observation and communication, with that spirit of cooperation without which no landing operation can succeed. Boats should be furnished with pyrotechnic signals for indicating that the fire is falling short or should be lifted. The firing ships must be familiar with the pyrotechnic code to be employed.

The spotter who is accustomed to spotting the splashes, as shells fall near waterborne targets, may find himself unable to spot the salvos falling on land. In the delivery of supporting fires every effort should be made to identify suitable aiming points within the target area. However, aiming points will often be obscured by debris, dust, and smoke. The fire control officer must therefore make provision to continue the fire by indirect methods. In order to assist in the identification of targets and the preparation of fire data, important landmarks must be accurately located on maps and charts and described in sufficient detail to render their identification positive. All maps, charts, mosaics, and photographs to be used in fire control should be provided with a uniform grid system based on a common point of origin. Once landed, the observation party can assist in solving our fire control problem. The spotter has to be trusted. He is in a position to visualize the line of fire and ground forms, and when making his spot he can consider same with regard to flat trajectories. After all, he will have the same map or mosaic as the firing ship. If the slope or ground is not too erratic he, the spotter, is certainly in a better position to make a study of the ground and judge the necessary correction than if he were aboard ship. The control officer should give his spotter the correction he asks for, unless there is good reason for not applying a particular spot.

Well defined sectors of responsibility tend to prevent confusion among various ships' gunnery observation planes. The air spotter assigned to a particular sector is concerned only with targets within his sector. Therefore he knows immediately his responsibility in regard to a newly discovered target, depending upon its sector position. Naval gunfire against shore objectives can be efficiently controlled and shifted provided that spotting from the air or ground is effective. Proper choice of the firing ship's position will aid the ship's spotter and simplify the problem of the fire control officer. It is not my purpose in this discussion to outline the effect of such fire using the different kinds of ammunition.

The control officer in the supporting ship will probably build the fire control procedure around a recommended schedule of fires for that particular vessel. Important consideration may warrant a departure from this schedule, although the control officer must use every means available to deliver the required fire power at the times specified, and in the impact areas selected. The

Commander of the Landing Force, desiring naval gunfire to support the landing, provides a schedule of gunfire support. If this schedule is not materially affected by other considerations, the Commander, Naval Attack Force and his Fire Control Officers may be able to use it in the form recommended. The formulation of an adequate schedule of fire is a task which is not to be treated lightly. That officer of the staff of the Landing Force Commander who is assigned the preparation of the schedule of naval gunfire support is performing a task of paramount importance to the fire control officer in the supporting ship. Imagine the consequences which might result when the control officer opens fire in accordance with the schedule only to find this schedule impossible of execution. Carelessness in making up the schedule of fires may nullify all efforts of the control officer to deliver effective fire from his batteries. Consider, for example, the difficulty of a ship recognizing its own projectile impacts when targets close together are assigned to different ships during the same period of fire. It will not suffice that the plan for naval gunfire support with its schedule of fire be theoretically perfect. It must be practical, and when placed in the hands of the fire control officer, be capable of execution.

The control officer aboard ship will find his problem so "tied in" with the preconceived schedule of gunfire support that I intend to dwell on that subject still further. This recommended schedule of fire would be prepared by an officer on the staff of the Commander of the Landing Force who would probably and properly be an officer experienced in the handling of land artillery. If he also understands the principles of naval fire control and the capabilities of naval ordnance, so much the better. In selecting the impact areas to receive naval gunfire it must be remembered that the ships' guns are not field artillery. In firing on land targets naval gunfire support has certain limitations, particularly in close support of troops advancing inland over irregular terrain. The fire-control instruments are not designed primarily for use against land targets. Only by understanding our limitations can they be overcome and the fire control problem be solved by the supporting ship. If targets are indiscriminately assigned, and schedules of fire carelessly prepared, we are merely fooling ourselves, to the confusion of the control officer and the disappointment of the troops. There are missions performed by field artillery which by its very nature naval gunfire cannot accomplish. The achievements of American naval gunners firing on water-borne targets are likely to blind us to certain limitations of naval armament when employed against land targets. No one would consider arming a first-rate ship with field pieces, and no line-of-battle-ship can take the place of field artillery in close support of troops. If targets are assigned and impact areas selected with due regard to the capabilities of the ships' guns, then the fire control officer will find the prepared schedule of supporting fires to be not only a guide but an aid in using his tremendous fire power to the best advantage.

When the control officer sets up his problem, conditions may render it necessary to use the navigational range to the shore target, as derived from a chart. Such an arrangement leaves much to be desired from the standpoint of the fire control officer, but should be accurate enough to allow spotting on the target. Enemy artillery may be located anywhere within a very large area. The most effective counterbattery requires fire on specific targets rather than on a general area. This necessitates that the enemy batteries be accurately located and fire delivered thereon by means of aerial or surface observation. However, when enemy batteries cannot be definitely located, the control officer will place fires on any limited areas known or estimated to contain such batteries. Where a ship's target area is several hundred yards in extent, the control officer may cover the assigned area by offsetting the necessary range and deflection on the indicators at each gun so that the whole area may be covered simultaneously, or the battery may "walk through" the target area by correcting range and deflection for each salvo.

With variations in terrain giving irregular patterns, gunfire support is difficult of delivery inland. On flat surfaces of landing beaches, however, the control officer can lay gunfire with deadly effect. The mean point of impact can be moved sufficiently close to the edge of the target area to insure that the whole area will be covered with the required density. To cover enemy defense close to the landing beach, some of the salvos can be spotted down until the shorts are in the water. This helps the control officer by facilitating the identification of salvos in the same manner as employed in firing on water-borne targets.

Putting ourselves in the place of the ships' fire control officer, we find him face to face with a problem possible of solution provided the capabilities of naval gunfire support are considered, its advantages exploited, and its limitations understood. His problem within the ship is comparatively simple, inasmuch as it consists of the supplying of correct data to the fire control "set-up" and the efficient operation of the fire control instruments. His problem without the ship is to receive the correct data. In the final analysis, receiving correct fire control data is dependent on observation and spotting. This spotting is useless unless communications are adequate. Study of naval gunfire support, and results of practices fired in the past, indicate that the fire control problem is mainly one of spotting and communications.

One might well say that the difficulties of delivering effective naval gunfire support leave much to be desired. Nevertheless, even as landing on a hostile shore in the face of the enemy is the most hazardous operation to be attempted by troops, so will the fire control officer in the supporting ship make every effort to deliver effective gunfire in support of this landing.

Light machine gun in action from the top of an armored railroad train.
(*Acme photo. All cuts by courtesy of "The Leatherneck."*)

JAPANESE TACTICS

PART II

ATTACK OF A POSITION

In a previous article it was noted that the Japanese always endeavor to keep their opponents from using an entrenched position, and that they feel that in the confused conditions of the encounter battle the strong points of the Japanese soldier show to best advantage. However, in the Philippines they were unable to keep General MacArthur "out in the open," and on the Bataan peninsula. as to an increasing extent before Singapore, the Japanese have been compelled to deliver repeated assaults upon prepared positions. Therefore, it is to the point to examine Japanese theory with regard to the attack of positions. As before, the tactics of the division will be the basis of discussion.

When the enemy has had time to occupy and organize a position, the Japanese commander tries to fight the decisive action outside of the organized area by turning the position. However, where the character of the terrain or the presence of other Japanese units on the flanks limits the maneuver area, the Japanese recognize that a direct attack on the position must be undertaken. The technique of such an attack resembles the coordinated meeting engagement in the approach march and the development of the situation by the use of advance guards; it differs in the amount of time necessary for reconnaissance and attack preparations. These latter, while carefully executed, should not in the judgment of Japanese commentators be made the excuse for allowing the enemy undue time to strengthen his position. When a commander encounters a position which has been strengthened during a period of several days, he ordinarily drives in the covering forces and reconnoiters during all or

part of one day, and launches his main attack the following morning. He is quite capable, however, of doing all of this in one day, if it appears to him that time is pressing.

As the Japanese advance guards approach contact with the security forces of the enemy, and before the main body comes under long range artillery fire, the division commander orders his columns into assembly areas. Where the division is marching in two columns three assembly areas are designated: one for the brigade making the main effort, one for the regiment making the secondary effort, and one for the regiment held in division reserve. When the enemy covering forces are weak and do not form a continuous front, the advance guard commander drives them in on his own initiative; otherwise, the division commander organizes the operation under cover of strong artillery support. In a typical example, the covering forces of the enemy might be driven in on the afternoon of one day, and his main body attacked at dawn the next morning.

This procedure of successive attacks is approved in the Japanese Combat Regulations, but in practice it is often replaced by a continuous attack on both the outpost and main position. Apparently the determining factor is whether or not the artillery can support the attack through both positions without displacement, and whether time is pressing. When a continuous attack is made, the attack of the outpost line becomes a phase of the main attack, and the infantry usually pauses to reform on the captured outpost position.

The division commander completes his plan of attack based on reconnaissance reports while the advance guard is driving in the enemy outposts, and while the bulk of the Japanese infantry is going into assembly areas. He then issues a complete, formal field order. As a rule the commander will divide his infantry into two wings: one wing of two regiments makes the main effort, while the other wing has one regiment, and makes a holding attack. These infantry regiments advance from the assembly areas to their assigned positions along the line of departure, which is chosen so as to be protected from effective small arms fire. The Japanese prefer to make this march to the line of departure under cover of darkness, and the attacks are often delivered an hour or two after daylight. The frontage of an infantry regiment is about 1,100 yards, two battalions being in line, and one held in reserve. Attack objectives and directions are given to front line infantry units according to the detail with which the enemy position is known. Normally the line to be reached is deep within the zone of the hostile artillery.

The division artillery (three battalions of 75-mm. guns and one battalion of 105-mm. howitzers)* is frequently not reinforced. If reinforcement is made, it is by the addition of a 155-mm. howitzer or mountain artillery battalion. The organization usually provides for a direct support group for each wing without any artillery being held in general support. If an extra battalion is attached, it may be reserved for counterbattery work. All the division artillery deploys for the attack of the enemy outpost line. The artillery positions are pushed up close to the infantry line of departure so as to be able to support the attack of the principal position without displacement. Fire missions vary according to the phases of the action.

During the attack on the outpost line, counterbattery is fired by one battalion, and direct support by the remainder. Between the occupation of the enemy outpost position and the opening of the artillery preparation the artillery missions are counterbattery, harassing, and interdiction fires. The artillery preparation itself lasts from one to two hours. One-half hour to an hour is taken up with fire for adjustment, another half hour for wire cutting, and a final half hour for fire on the infantry position. During the main attack the artillery furnishes direct support, and one or two batteries are often detached and assigned to the infantry as accompanying artillery. The ammunition allowance for light artillery in the attack of a position is three to three and one-half days of fire, a day of fire equalling 300 rounds. Two or three airplanes are usually attached to the artillery for observation purposes. Provisions are never made for firing unobserved fires. Gunnery methods apparently are elementary, main reliance being placed on axial, ground observation, with observation posts close to the guns.

In the assault the infantry pushes boldly ahead, bayonets fixed, without regard to alinement. Superiority in numbers of one-third to one-half of the enemy is considered sufficient to attack a position. The division reserve is used by the division commander to meet a counterattack, to exploit a success, or to cover the flank of a penetrating unit. The division reaches its objective prepared to pass to the pursuit in accordance with previously made plans.

A general criticism of the Japanese tactics for the attack of a position is that the means are inadequate. Particularly is this true of the artillery. Another defect is the willingness of Japanese commanders to order a simultaneous attack of an outpost and a main position, which unduly shortens the time for reconnaissance and preparation. The plan of maneuver does not seem to be particularly attractive. It is usually a simple parallel, frontal push executed by the two wings of the division, and there does not appear to be a sufficient massing of strength on the decisive wing. However, it is not to be assumed that the Japanese will long persist in using any system which does not produce the best results. The Japanese gift for adaptation and improvisation can be counted upon to remedy quickly many of the faults in their peacetime doctrine.

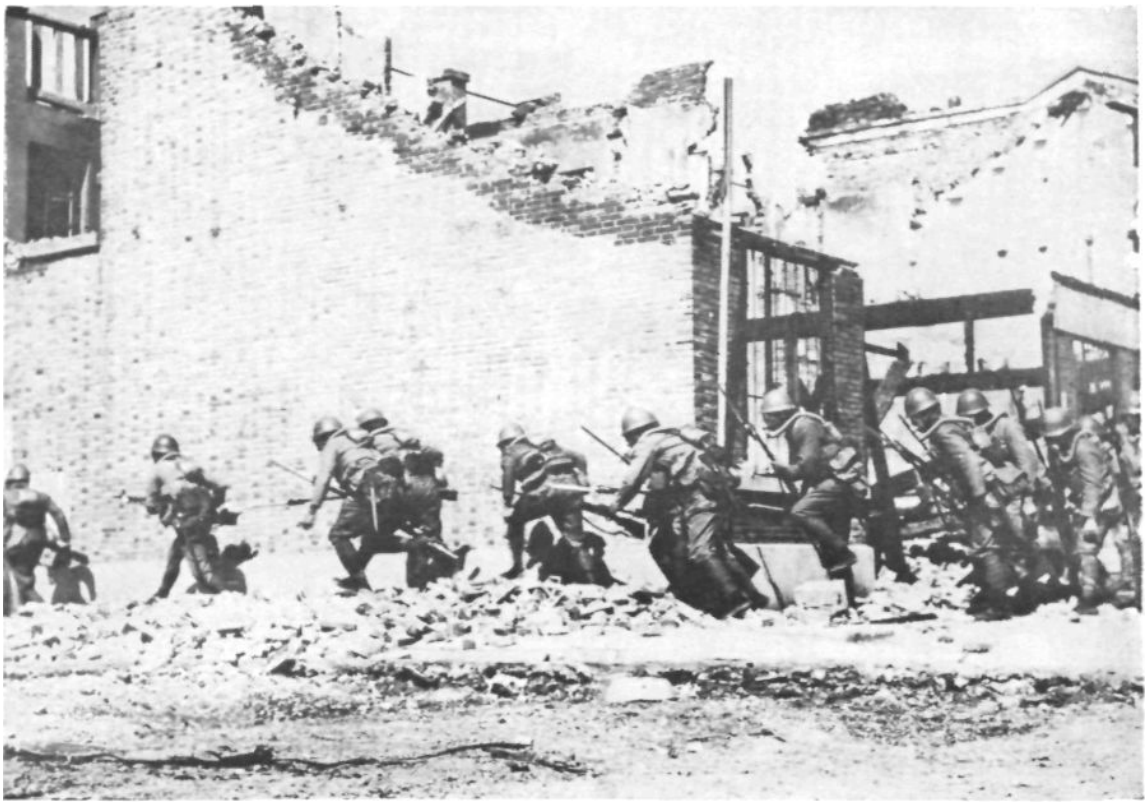
*The meager press dispatches from Luzon indicate that the Japanese recently have increased the proportion of 105's, and perhaps are using some German materiel.

PURSUIT

Japanese regulations emphasize the need for pursuit to reap the full fruits of victory. They also recognize the existence of many deterring elements, such as fatigue of the troops, disorganization, and depletion of supplies. In spite of this, the Japanese commander is urged to pursue relentlessly, and thus avoid the need of another battle with a reorganized and reinforced enemy. The Japanese commander throughout an engagement plans constantly for the pursuit. The enemy is observed carefully, especially at night, for signs of an intention to withdraw. To determine this intention, the Japanese commander has at his disposal aviation, ground reconnaissance patrols, and spies. When these are inadequate, he does not hesitate to stage local attacks to gain the required information. While he is pushing this reconnaissance, he makes plans for a possible pursuit.

The Japanese recognize that there are two principal types of pursuit, depending upon the outcome of the preceding action. The first type of pursuit is exemplified by the daylight withdrawal of a hard pressed enemy. In this case the withdrawal would be observed by the Japanese commander, who would immediately redouble pressure on the enemy's front while at the same time forming reserves into pursuit detachments with which to turn the enemy's flank and fall upon his rear. The destruction of the enemy is thus accomplished on or near the original field of battle.

Normally, however, the Japanese expect that the enemy will succeed in wholly or partially disengaging himself, and in beginning a displacement to the rear. This withdrawal will usually be protected by darkness, and will not be at once discovered. When the Japanese front line commanders find out what is occurring, they renew the attack individually and upon their own initiative in an effort to push through or around the hostile covering forces. As these Japanese units slowly push through the enemy position, reserve units are started around the flanks with objectives deep in the enemy rear. When the Japanese front line units have passed through the zone of resistance of the hostile covering forces, the division commander halts them, organizes and sends forward additional pursuit detachments, and causes the remainder to form in march columns and follow. The artillery endeavors to disrupt the enemy's retreat by interdiction fire on the road net. The artillery displaces close behind the infantry, and some batteries are attached to pursuit detachments. The absence of sufficient organic motor transport in the division is an added difficulty in the way of rapid Japanese pursuit.



Japanese forces in pursuit of opponents hug a shattered wall for shelter. (*Acme photo*)

RIVER CROSSINGS

Japanese river crossing methods are essentially those of other modern armies. Success is sought through surprising the defense by concealment of preparations and rapidity of action after the crossing starts. The advance

to the river is made on a broad front and is preceded by advance detachments who drive back enemy patrols from the near bank, and seize existing bridges and boats. The weakness of the divisional artillery makes especially awkward the support of an operation on a wide front, such as a river crossing. It becomes difficult to allot any artillery to the distant feint, without which there cannot be much deception.

NIGHT ATTACK

The Japanese Army has a strong partiality for the night attack, which their tactical commentators refer to as "a traditional Japanese method," largely because of their successful night attacks in the Russo-Japanese War and in the present war in China.* This form of combat favors the bayonet fighting stressed in the training of the infantry, and tends to cover the weakness in artillery and the lack of cooperation of the combined arms. The Japanese see in the night attack an opportunity to avoid loss, conceal movement, and close rapidly with the enemy. They are prepared to accept the consequent loss of cooperation between units, loss of unified direction, and increased chance for mistakes and confusion. The Japanese feel that trained troops may overcome some of these difficulties, and that if the enemy is too strongly organized or too numerous to defeat in daylight, the only chance that remains is to attack him at night.

Specifically, the Japanese use the night attack to extend a success gained during a daylight engagement; to seize by surprise points needed to assist the attack the next day; to distract and mislead the enemy, and thus conceal one's own activity; to prevent a hostile withdrawal; and to reach objectives which the enemy's superior fire power has protected in daylight. Just after dark or just before daylight are held to be desirable hours for attack. Regulations insist on the importance of a thorough knowledge of the terrain on the part of all commanders involved in a night attack; but in practice the time allotted for reconnaissance is often quite short. Objectives assigned are often quite ambitious.

Japanese landing party at Bias Bay, South China. (*Acme photo*)

The infantry of a night attack is usually disposed in two assault echelons and a reserve. In the normal situation a first wave rushes forward and seizes the line which constitutes the first objective; the second wave passes through the first and moves on to the second objective. This second wave also has the mission of repulsing counterattacks and destroying enemy searchlights. The relative strength of the first and second waves depends upon the relative strength of the first and second positions. In a battalion attack, the sector would be 450 to 550 yards wide, and the battalion would be expected to reach and occupy two objectives, the most distant of

*An attempt to launch a large-scale night attack driving on the U. S. positions on the Bataan Peninsula was broken up by our field artillery, with heavy losses to the Japs.

which would be about 1,100 yards from the jump-off line. A relatively dense formation is used, and while this is very vulnerable to fire, the Japanese justify its use on the grounds of ease of control and effectiveness in shock action. The infantry assault with the bayonet, and without firing. Battalion guns may be used against searchlights and obstacles, and machine guns participate in protective fires. Engineers are attached to cut wire.

The Japanese divide night attacks into two classifications. The first, attack by surprise, is characterized by an infantry rush with the bayonet unsupported by artillery, and is usually employed to capture the first objective. The second, attack by force, implies artillery support, and is used to take the second objective. Artillery support is arranged by conference between the infantry and artillery commanders. The artillery holds itself available throughout the attack, and the signal for fire support is usually a rocket. In preparing fires, special consideration is given to possible enemy counterattacks.

An opponent facing the Japanese Army may expect to receive frequent attacks at night. Against a vigilant enemy strong in automatic weapons it is likely to prove a costly operation. Defects which, it is believed, will tend to operate against the success of a Japanese night attack are: an over-readiness to attack at night in the hope of retrieving a check received in daylight; insufficient time allowed for reconnaissance and planning; overambitious objectives; vulnerable mass attack formations; inadequate artillery support; and the commander's difficulty in keeping control of the operation.

Japanese soldier dashes across a bridge of poles and planks supported on the shoulders of other Japanese troops during the China War. (*Acme photo*)

THE DEFENSIVE

The Japanese will admit with the greatest reluctance that their troops will ever be compelled to assume the defensive, and in consequence Japanese theory does not deal with the subject in great detail. The Japanese feel that the defensive need not be considered, unless the enemy has concentrated overwhelmingly superior forces against them. The object of the defensive is to inflict on the superior enemy such losses, by fire power disposed appropriately on the terrain and behind man-made defensive works, that the initial disparity of forces becomes equalized to the point of authorizing a passage to the offensive. The defense is based upon a single position, which is held to the last extremity. The desirability of locating a defensive position behind natural antitank obstacles is emphasized. All units from the company upward hold out reserves for the purpose of executing counterattacks. The division reserve varies from one to three battalions; it is not made stronger because front line units deployed on the defensive are considered capable of making a strong offensive return.

As the hostile infantry forms up for the attack the defensive artillery puts down its counterpreparation fires.

The Japanese do not depend upon elaborate field works, and, as the attacking infantry approaches, the unit commanders defend their sectors by fire at first, and then by the bayonet in front of their trenches. Unit commanders counterattack unhesitatingly as the security of their positions is threatened by hostile attack. The defensive artillery assists the close-in defense by standing barrages and concentrations within the defensive position. The division commander is constantly on the alert to determine the proper time for the division counteroffensive, plans for which are made well in advance.

In general the Japanese show an apparent tendency to concentrate a disproportionate strength in the front lines. Their troops are always ready to abandon their prearranged system of infantry fires to meet the attacker with the bayonet in front of their trenches. Japanese officers have the return to the offensive uppermost in their minds, and are quick to launch counterattacks, large and small, coordinated and uncoordinated, on the slightest provocation.

LANDING OPERATIONS

Before beginning a landing operation the Japanese reconnoiter the proposed landing sites very carefully. For this they rely principally upon air observation, supplemented by the reports of secret agents. Troops earmarked for landing operations receive strenuous practice training. Transports and motor landing craft carriers rendezvous at some convenient anchorage the night before the landing; where no anchorage is available the transports arrive off the landing site about midnight. Landings usually take place just before dawn on a day when high tide is just after dawn. *Periods of rainy or story weather are preferred*, so as to facilitate surprise. The usual Japanese landing force is made up of two divisions with all equipment, including some light tanks. Men are transferred from transports and motor landing craft carriers to landing craft just off shore. The motor landing craft make for the shore at full speed, and if in formation all craft shut off their engines and drop their stern anchors together when a short distance off the beach; for the rest of the way the boats are eased in until they ground. The boats usually ground at fifty-yard intervals, and the initial force consists of some infantry, field artillery, engineers, and light tanks. Military patrol craft armed with small cannon and machine guns give close support to the landings, and air and naval support is provided as required. Once a beach head is established the main forces proceed inland as fast as possible.

JUNGLE WARFARE

In Malaya the Japanese appear to have modified their tactics to some extent to conform to the jungle terrain. It has been noted that upon occasion the Japanese show a tendency to use rather dense infantry formations, and to rely upon a simple frontal attack. This was abandoned in the campaign against Singapore, and replaced by an advanced form of infiltration.

Japanese patrols in Malaya pushed forward steadily, avoiding all strong points of resistance. Apparently the whole theater of operations was closely studied and mapped by the Japanese before the outbreak of war. General objectives were assigned, and to the patrol commanders was left the choice of means to achieve them. The widest freedom was left to the patrols; they roamed at will over the whole front. A standard method is: Several patrols are sent out to reach the same objective, so that if some of them are intercepted there is a reasonable chance that at least one will get through. When the Japanese main body comes up, the strong points which the patrols have left behind are reduced by troops equipped with heavy weapons.

The willingness with which Japanese commanders relinquish direct control of operations to subordinates, and the ruggedness of the individual Japanese soldier, facilitates this type of fighting. In order to meet this form of attack the British resorted to counter-infiltration by patrols, so that the end result is not unlike the Indian fighting of previous centuries—hostile patrols stalking and ambushing each other along the paths of a dense jungle.

CONCLUSION

Summing up, such weaknesses as appear in Japanese tactical theory seem to center around their underestimation of the fire power of modern weapons. Partly this stems from their rather naive and almost mystical faith in the bayonet, and partly from their experience the past few years in fighting the indifferently armed Chinese. At the present writing they are learning the value of artillery the hard way on the Bataan peninsula. But of all people the Japanese have shown the most capability in adopting another's ideas: once a lesson is learned they are quick to turn it to advantage. Therefore, it would be an error to suppose that they will repeat the same mistake.

If you have not been receiving your *Journal* lately, please consider whether or not you signed your notice of change of address. Every mail brings in several unsigned change of address cards. Incidentally, a *printed* change of address is usually more legible.

TOBRUK DIARY

(Conclusion)

By Lieutenant Colonel
David Larr, GSC

British 4.5 inch gun defending the Tobruk sector (*Acme photo*)

TOBRUK, 15 AUGUST (*continued*)

Having arrived at the headquarters of the Artillery Group of the Eastern Sector just after a heavy shell had demolished a portion thereof, we were decidedly superfluous at the moment. So we mounted our wheezing rattletrap and headed through the short desert twilight back to the counterbattery office.

The evening's dive-bombing raid was in progress over the harbor, and the air was shaking with detonations of the anti-aircraft barrage. Looking up at a sky literally speckled with bursts, one understood the grim necessity of keeping uninterrupted the flow of supplies into Tobruk. As we approached the turn off the main road to our billet, Captain F— yelled, "Out!" It required no second look to send us flying to the shelter of some of the numerous wrecked vehicles nearby. Three yellow-nosed Me 109's were roaring down the road after their dive over the harbor, machine-gunning everything on the pavement. They were at a height not exceeding 150 feet, with the entire surrounding world blazing away at them. Our ancient jalopy acquired three or four new perforations, which seemed to make little difference in its life.

Remounting, we were soon back at the office in the quiet of a peaceful evening. The Libyan wind usually dies late in the afternoon, and as the dust settles out of the air the sunset throws its reds and golds in a silently changing riot of color, and the purple shadows of twilight mount swiftly from the east. The air was so still you could plainly hear soldier chatter from an organization billeted in a wadi at least a quarter of a mile away. Soon ambulances jolted by bearing wounded from the raid at the harbor.

EDITOR'S NOTE: *In a preceding installment, Colonel Larr recounted his trip by destroyer from Alexandria to Tobruk. He described the arrival of the supply vessels in the harbor and the enemy action which took place nightly in an attempt to prevent landing of supplies. He gave a general outline of the terrain in the British-occupied area and something of the counterbattery organization.*

I sat on the porch with the three young officers of the counterbattery office. We sipped mugs of brackish whisky water and reminisced of the far-off days when one had real soda and ice. The batman announced dinner and we retired to the "dining room" for a sumptuous repast in which the hard bread and bully had actually been stewed up into slum with a treasured can of tomatoes conjured from some mysterious source. After dinner more reminiscing and swapping of yarns from far-off and sunnier climes was brought to an abrupt close by angry telephone buzzers as the evening hate came down around the eastern end of the perimeter. Rockets began to go up; somewhere to the south a battery of 25-pounders suddenly broke into its coverage of a raid somewhere. It was really not unlike a movie, sitting and watching the display half around the horizon.

Being dead for sleep, I turned in early. It seemed but a moment until I was awakened by a blaze of light and bits of plaster falling from the ceiling, shaken by the detonations of the anti-aircraft barrage. An occasional soft plunk on the ground outside denoted the fall of

some bit of the "fluff" from the shelling. It was a flare raid, with a low cloud ceiling—one of the more spectacular shows. The flare dropper cruised around in the lower fringe of the cloud and maintained an illumination below in which it was quite possible to read fine print. A distinct object came floating down over in the direction of the harbor. Field glasses showed plainly that it was a parachute mine; several Breda 20-mm. machine guns were firing madly at it. It must have been not more than 200 feet up when one finally made a hit. There ensued the most devastating bang I have ever heard. The marksmanship of that particular gunner was commendable. But I must say his judgment left something to be desired. The height was well-nigh ideal for maximum effect.

The raid died away shortly, and the night quieted down to the habitual bickering around the perimeter.

16 AUGUST

Off early this morning to visit the flash-spotting installation—first to one of the tower OP's where the following verse penciled on the rail in front was rather expressive of one's feelings therein:

> Here I sit 'twixt earth and sky, Awatchin' Wops wit' eagle eye,
> I twist and squirm and wiggle me bum, And ducks me neck when I hears a hum.

Two observers with a very expensive azimuth instrument were at the time acting as one end of a bi-lateral adjustment of a medium gun on an installation across the way. It must have begun to hurt because our friends the Wops came down with a very respectable counterbattery concentration, and the observers were having a field day recording bearings and times on the various flashes. Coordination of the flash spotter stations on individual locations was almost impossible; individual Italian guns were firing rapidly from all over the sector, apparently with a view to extreme dispersion so that intersections obtained on our side of the line would be of dubious authenticity. It was customary for both side to conduct counterbattery fires from sniping positions by single pieces and immediately thereafter the guns were hastily sneaked back to their battle positions before retaliation could arrive.

As soon as the storm passed, the adjustment continued. It must have hurt again, because two medium rounds suddenly landed very close to the foot of our tower. This was a gentle hint that enough was enough—that our observer had better desist or else. Major K—, who was showing me around, approved a bit of retaliatory fire on the Italian OP opposite: a troop of 25-pounders promptly gave the enemy something to think about. This did not work out so well, as it immediately developed that the Italians had shrapnel and we didn't. So everyone in the tower did a fireman's slide to the bottom and dived into slit trenches to fight flies and watch the ceaseless circles of the kites (buzzards) lazily in the sky while shrapnel snapped viciously at the tower.

The flash spotting command post had been dug into the sides of a narrow wadi. The billets of the personnel, the usual litter of wrecked vehicles scattered about, etc., gave this wadi an appearance identical with that of dozens of others throughout the occupied area. The command post proper was a deep dug-out entered by a tiny door camouflaged under a rocky outcrop in the precipitous side. The interior was brightly lighted by the efforts of a small American farm-lighting set which had been chugging away practically without interruption since the siege started early in April. There were the plotting boards, communication facilities, and command post of the heavy battery located in a nearby wadi to which was specifically assigned the mission of immediate reply to critical enemy fires in that portion of the perimeter. This arrangement worked very well.

In the flash spotting installation, survey had been made by unit personnel to an accuracy of one meter. A local grid had been established, using one Italian trig point and an astronomical bearing. Thereon were plotted the flash spotting OP's, place marks for the artillery in the area, the exact gun locations for the heavy batteries, and 18 prominent points (houses and towers) for use in gridding aerial photos. The only difficulty with the latter was that no aerial photos had been furnished for many weeks.

More than one base had been laid out and facilities installed except for the actual azimuth instruments. Since all could not be manned at once, observers were moved from base to base throughout the defended area depending upon current activity.

An interesting subsidiary occupation had been the preparation of range tables for captured Italian materiel, using ammunition from dumps found lying about in the area. This seems to have been something of a dizzy procedure, as the ammunition had not deteriorated at anything like a standard rate. The results were weird.

All flash spotting bases could carry out high-burst adjustments. However, up to this time no requests for such had been made by the artillery units concerned. It had been found that each base must have four stations operating in order to function successfully and that five, as a rule, had to be manned to keep four functioning very long. This was particularly true if the sector concerned was at all active. Telephone lines were difficult to maintain. This was especially the case with those from the more forward OPs, as Australian front-line units seemed to have a habit of cutting out sections of single conductors for use as rope, pinning the ends to the ground with iron stakes and establishing an earth return. Frequent patrols by linesmen were necessary to repair ravages from this nefarious practice.

A visit to the heavy troop which was on call for counterbattery missions was a lesson in what could be done, with determination and unlimited blasting equipment, in

the emplacement of artillery pieces. The equipment of this battery was very old but perfectly serviceable. In order to get maximum range not only had gun pits been blasted bodily out of the solid limestone sides of the wadi, but in addition trail holes had been excavated which practically had the guns standing on their tails. Maximum theoretical elevation could be obtained within very modest limits from the carriages as originally designed. Traverse was a problem which had been solved by an ingenious combination of blocks and tackle by which some members of the gun crew rolled the gun forward slightly, which lifted the end of the trail above the bottom of the hole. Then the remainder heaved mightily on a second tackle and pulled the trail towards the desired side. Wheels were, of course, on platforms. All was covered by a huge but simple camouflage which at a very short distance made the side of the wadi appear unaltered. The locations of these guns were, of course, approximately known by the enemy flash spotters; hence the personnel were sheltered in dugouts blasted from the sides of another wadi nearby. The sides of this particular gulch were practically vertical to a considerable depth and it was quite narrow. It behooved one to be acquainted with the local terrain or stay put after dark! The fact that casualties had been unusually light was a tribute to the ingenuity with which the installation had been constructed.

17 AUGUST

This morning I bade goodbye to my friends of the counterbattery office and moved down to the command post of a 25-pounder regiment. This was a territorial unit which had been mobilized upon declaration of war. Its headquarters functioned as the Group Headquarters of the West Sector. Under the set-up used, the headquarters of the reinforcing unit was side-tracked for everything except administration and supply. Regimental headquarters consisted of a regimental commander; an adjutant who in combat handled fire missions; a second in command charged with reconnaissance, administration, and relief of the commanding officer; an assistant adjutant who functioned in combat as munitions officer; a quartermaster (lieutenant) charged with general supply and command of the regimental rear echelon; an intelligence officer who functioned as counterbattery officer in addition to his other duties; an ordnance mechanical engineer (OME) charged with motor maintenance and upkeep of the armament of the regiment; a signal officer; and a regimental surgeon. Regimental headquarters were staffed by 26 "Other Ranks" (enlisted men) and in addition there were 17 ORs in the Signal Detachment and 12 in the Ordnance Detachment. It was a standard field regiment with 24 guns divided into two batteries of two troops each. Being somewhat low in personnel at the time, the usual 4-gun troop, 3-troop battery organization could not be maintained.

The reinforcing unit was another field regiment of Australian artillerymen with a similar organization except that batteries were organized into the standard three troops of four guns each.

The headquarters installation was scattered along one of the wadis in the second escarpment just out of light artillery range from the German positions around Ras Maduuar (the hill overlooking the southwest portion of the perimeter defenses). The command post enjoyed quite a secure location under a cliff in the floor of the wadi. In wet weather it must have become a sort of "Cave of the Winds" under a miniature Niagara of quite some proportions. (It does rain in the winter in this country, sometimes!) The officers' mess was a sandbag cubicle about 150 yards up the wadi and the sector counterbattery office occupied a bell tent a similar distance below the command post. Individual bivouacs of commissioned and enlisted personnel were scattered about the sides of the wadi and the top of the nearby plateau. The headquarters vehicles, such as there were, were parked in the area of the mouth of the wadi on the open plain.

In contrast to units operating along the Frontier Area, one found a central headquarters mess here for enlisted men—quite an unusual luxury, but the menu imposed by the prevailing ration scale quite levelled out any advantage derived from bulk cooking. All water in Tobruk was very, very salty and all rations as unimaginative as they were dry and battered upon arrival. The time-honored question, "How will you have your bully and biscuit?" was an all-too-stark reality here.

The gun positions of both the field regiment and the reinforcing Australian unit were generally along the flat below the second escarpment in a limited area defiladed from Ras Maduuar. Being R. A. Regiments (as distinct from the Royal Horse Artillery), the wire net in existence was unusually complete.

This group was in support of one dismounted cavalry and three infantry battalions. It consisted of 10 active gun troops. Sixteen OP's were organized with communications installed. Ten of these (one per troop) were always manned; six being designated as primary and manned at all times. The interlocking wire net provided in general three lines of communication per OP, of which one was installed by the supported infantry. Four of these "primary" OP's (one per battalion area) had a standby radio in addition to wire. OP's were used for all direct support as well as for local flash spotting. However, no oriented azimuth instruments were available, and attempts to secure flash spotting locations by prismatic compasses gave results from which fires were executed, but in my opinion the ammunition was largely wasted. Primary OP's were manned 24 hours per day and the secondary ones only during daylight. Practically all OP's had to be occupied by night although many could be evacuated during midday by personnel who walked out singly. Those opposite the German-held sector were the most perilous and any movement or light reflections

from optical instruments would bring down a precision adjustment by trench mortar which too often resulted in "liquidation" of the observer. The Germans were using a mortar of about 150-mm. caliber which had the nasty characteristic of arriving unannounced. Its tremendous bang was only heralded by a sharp hiss which one remembered after the dust and the smoke cleared away.

All gun positions were dug in, of course, as they were everywhere in the desert. Gun pits were about two and one-half feet deep and of sufficient diameter (about 27 feet) to permit all-round traverse of the pieces. Troop positions were generally on an irregular arc with the bulge toward the normal zone of fire. No diamond-shaped troop positions were seen. Spoil from the excavation was usually scattered over the surrounding terrain and not made into a parapet which would immediately reveal the position to attacking tanks. Very low over-all camouflage nets were used. This camouflage was constructed so as to resemble the limestone slabs which covered the ground throughout the area. The "Gun Position Officer" (Executive) had his combined bivouac and CP in the rear of the gun position. It contained the usual British command post equipment; i.e., plotting board with "arm and arc," firing chart, records, target lists, etc. It was invariably well dug-in and had overhead cover. The GPO normally gave fire commands from just outside the door, the telephone functioning from inside the dugout. No loudspeaker equipment was used here although oftentimes the troop position was of such extent that men were used to relay fire commands to the more distant guns.

I was told that during the early part of the siege, troop positions had normally been set up in the upper ends of the wadis. These had proved to be definitely unhealthy, as their location was much easier to spot than that of troops scattered about in the open plain. Personnel generally lived in the gun pits or in small dugouts cut into the rear portions thereof. In addition to nets, camouflage was largely supplied by the debris common to the entire area. It is difficult to estimate the number of wrecked vehicles lying about inside the Tobruk perimeter. Airplanes, cars, trucks, ammunition dumps, shelters, bivouacs, junk of every description and every stage of decrepitude covered the ground and was of very real assistance in concealing the installations in use. In fact, the ideal troop position, from the camouflage point of view (considering lessons obvious in Tobruk), would be one installed in the midst of a large city dump. The more nearly the vicinity approached that description the more immune the troops seemed to be to enemy fire.

Local antiaircraft protection was provided by issue Bren guns on AA tripods, which were few and not highly regarded; by all sorts of Italian machine guns on improvised pedestals which were many and also not highly regarded; and by a number of Breda 20-mm. machine guns manned by personnel of the light antiaircraft regiment. These latter were efficiently served and quite highly esteemed by the troops. Light antiaircraft pieces were credited with shooting down approximately 80 per cent of Axis aircraft known to have been destroyed in attacks over the occupied area since the beginning of the siege.

However, the delivery of small-arms fire on planes at close range was universally advocated by all concerned. Small arms would at least put them in the repair shop. And besides, many bullets are better than few bullets.

Delivery of artillery fire during the everlasting dust storms presented something of a problem, as even close aiming stakes were often obscured. A visit to one troop during a routine mid-morning "look around" by the regimental commander found visibility at about 25 yards. This was unfortunately normal for four or five hours per day about five days a week all summer in this particular spot. The G.P.O. (Executive) had an ingenious scheme worked with mirrors whereby he got an effective distance to his furthest aiming stake of about 100 yards, although no element of the installation was more than 15 yards from the gun when laid upon its normal firing task. The difficulty was that the mirrors had to be continually wiped off during firing; but the unit could shoot.

This regiment habitually used alternate and sniping positions, as did all the others in the defenses and also the enemy. With best World War I techniques, each troop had a battle position from which it never fired except in emergency, and an alternate position in which it habitually laid upon its normal defensive fire. In addition, there were as many sniping positions as the area permitted, from which all shoots in support of patrols, registrations to check the meteorological message (which emanated from the R.A.F.) and other special tasks were always fired. Guns seldom bedded down and remained very long in one set of holes.

Local counterbattery during ordinary times was fired by troops left in their sniping positions during the day. It was delivered from alternate positions in case of necessity. Each battery (two or three troops) was given full latitude for its ingenuity in what was known as the "flash and bang" department. False flashes and reports were widely used by both sides.

OP personnel and small-unit commanders in the forward area were convinced that the Axis used radio intercept to determine which command posts and OP's were in use. The forward area, particularly around the salient in front of Ras Maduuar, was pock-marked with a profusion of holes which were occupied from time to time by various installations. Establishment of the standby radio net was frequently followed by an enemy artillery concentration about 30 minutes after a forward area set would open up in a new location.

18 AUGUST

Moved over this morning to one of the "battery" headquarters. The commanding officer, having recently arrived after an extended tour of subordinate staff duty, was fairly glowing with pride in his first real command. His enthusiasm was somewhat dampened by the universal rule—10 rounds per gun per day for 25-pounders, which prevailed during this period of the siege. As a result, he was engaged in an intensive training program of a character rather unusual among the troops in Africa. Having but a few rounds, he was determined to make every one count. This spirit could well have been extended throughout the artillery of the garrison. His command post was located in a sandbag dugout about 10 feet square. One aspect which seemed to please him most was the utter absence of a typewriter. The one allowed had been blitzed some time before and he assured me that there would be no requisition for another while he was there. It was amazing how simple things could become under such conditions and still function with precision and dispatch. The equipment of this command post consisted of one telephone, one firing chart, two tables, two whiskey cases which doubled as chairs as well as fulfilling their original function. One Shannon file contained the hostile battery list and a list of prepared fire with data for all battle, alternate and sniping positions neatly tabulated. A piece of transparent plastic had inscribed upon it in pencil the graph for meteorological corrections for the day. Prepared data included deflection, site and range only. This battery was fortunately equipped with only one type of materiel. They solved the ammunition complications by firing everything with charge three (maximum), and used the same fuze for everything. Upon call, stripped data were corrected from the graph for weather; and away they went. They streamlined fire commands by depending upon the probable error of the gun to cover the target for range, laid the pieces parallel, and would condescend to sweep if the target was too wide. In spite of this primitive method of handling firing data, care in locating and laying pieces resulted in as high a degree of performance as I had seen anywhere in the Middle East. Ammunition niches were dug into gun pit walls and covered by curtains of burlap. It was maintained that this simple article would keep the temperature variations of charges to less than 10 degrees per 24 hours where the outside weather varied as much as 60 degrees.

19 AUGUST

Out well before daylight to go up with the battery commander and two lieutenants for gunnery instruction. These lieutenants had just come out from England. The battery commander wanted to check them over, as both were reasonably senior and would fall heir to troops before long. The fog and darkness kept visibility practically to arm's length as we crept along dubious tracks towards the perimeter in the darkness just before dawn. All mine fields were marked with trip wire, but one could never be sure that the trip wire had not been knocked down during the night. Besides, nightly air raiders were not above scattering thermite bombs over the area as they returned to the El Adem airdrome after the midnight hate. We finally dismounted about 2,000 yards from our objective just after the mist began to pale. We walked along the perimeter to an OP east of Ras Maduuar which offered an abundance of targets for our fledgling gunners. There were Italians on the southeast, south, and southwest, Germans on the west and northwest. This was a post in the old Italian perimeter, garrisoned by a platoon of Australian infantry. It had a central sub-surface concrete work characterized by small holes flush with the surface connected by underground tunnels. There were dugouts for sleeping, etc., reasonably secure from medium artillery. There were no parapets or other works visible at a distance of more than a few yards. The Australian lieutenant in command had 37 men, one Vickers and two Bren machine guns, and a 40-mm. antitank gun attached. From hard experience, he had moved his personnel out of the concrete hole to a series of organized shell holes connected by narrow trenches in and near the barbed wire perimeter around the post. It was a typical area, minedin all around and provided with 4-spoked mine fields radiating outward, as well as the old Italian tank ditch to the south. The wire was disposed in a belt at about 100 yards radius from the center of the position. There were several double-apron fences in the belt which was tangent to a main belt in a series covering the perimeter in the south. The central concrete hole was assigned with best wishes to the artillery observer normally stationed here. It was well plotted on all Italian maps.

We arrived and found the F.O.O. sipping the inevitable tea from the inevitable dirty enamel mug. There were now six of us in a cylindrical hole about eight feet in diameter, five feet deep, with a covered passageway leading off to the remainder of the underground work. As the sun began to gild the crest of the escarpment to our south we could see individual Italians walking about stretching themselves and evidently taking their morning exercise before settling down to the day's work. They were about 2,500 yards away and the escarpment was possibly 300 feet higher than our own level. Fortunately for gunnery purposes, most of the Italian positions seemed to be marked by "sangers" or piles of small stones ("nigger heads") which had been gathered up from the surrounding desert. My friend quickly assigned two groups of perambulating Italians to his lieutenants as targets. We all offered advice as to which groups contained officers, as they were preferred targets. The Italians did not seem perturbed until the adjustment became fairly close. The process was apparently quite obvious as only shorts could be sensed, overs being beyond the crest. One of the students was quite good

and on his second problem flattened his target out in handsome fashion.

Shortly thereafter we saw one man walking about halfway up the face of the escarpment. This was assigned as a target of opportunity to both officers, who indulged in a race to see who could get him first. He must have been reasonably influential, as the fourth or fifth volley brought a warning 105-mm. just outside the belt of wire near our post. The chase was getting keen by this time and our target, a tiny speck racing up the hill, must have been fairly bursting a blood vessel. The gentlemanly hint having been disregarded, a beautiful four-gun volley came howling in to our barbed wire enclosure, all four bursts neatly centered. We came up sputtering as the cloud of dust and rocks drifted away, to be greeted with howls of rage from the Australians who hitherto had been enjoying the show.

Our target made good his escape before the dust cleared and the battery commander decided to change over to Germans for a while. These latter must have been watching, as the first round for precision on a broken-down German tank short of Ras Maduuar brought an immediate reply. As the Australians did not like this either, one of the lieutenants was given a smoke mission on a suspected OP to the northwest. This went off smoothly. In looking around for an additional target, the regular F.O.O. saw (or thought he saw) movement in the German mine field west of us. It went to the better of the two students who apparently dropped one right down the chimney, and his first shot was attended by a terrific bang which blew smoke and debris high in the air. As the next commands were going down, we were fairly knocked from our perches by a fearful burst right beside our hole. I remember, as I was seeking to disentangle myself in the pile of arms and legs, hearing the regular F.O.O. saying under his breath, "Those ---------- trench mortars." The Australian lieutenant called across, threatening hand grenades from his personnel if there was any more of this. So the major called off instruction for the morning and after about one and one-half hours wait, during which the F.O.O. turned out a breakfast of tea (more!) and bully, we crawled out at five-minute intervals. Two hundred yards on one's tummy to the head of a practically invisible valley leading towards Tobruk left one with a torn shirt, an intimate inventory of burrs and briars, and a worm's eye recollection of all sorts of spent hardware lying about the ground. Speculation as to imminence of arrival of more just would keep popping into one's head. After about 200 yards, it was possible to go on all fours for a while, then walk slowly back to where the car was waiting in a wadi some distance to the north.

25 AUGUST

After many days of living with units throughout the area, I was really going back to the outside world! I could hardly believe it. And as the sun slanted towards the west on that last afternoon, I fear there was more than an occasional crossing of fingers and half-worded prayer. Providence was kind, the boats came in on schedule, and the return trip to Alexandria was only marred by several hectic minutes of high level bombing as we were off Sidi Barrani in the early hours of the morning,

COMMENTS

The conditions under which troops were living in Tobruk at this time were difficult, even for the best of personnel. The constant dust storms, monotonous if ample diet, restricted allowance of salty water, and atmosphere of continual mental and physical strain all combined to make service in Tobruk less pleasant than a vacation at the seashore. At this time (August, 1941) Tobruk had been under siege for approximately four months. In spite of all the hardships not much soldier "griping" was encountered, and on every hand one met a rather grim attitude of "This is a ---------- of a long pull but the ---------- 's won't get in."

In an effort to ameliorate the difficult conditions, "N.A.A.F.I. stores" (post exchange supplies) were placed on a ration basis. Shipping space was given such so-called "luxury" items as canned fruit, candy, cigarettes, whiskey and fresh fruit in order to keep troops in some kind of fighting trim. The extra trouble taken to provide these items was well repaid by the resulting lift in morale.

Speed Up Your Surveys

By Captain T. N. Dupuy, 35th FA

VERYONE who has maneuvered in the wooded southland will admit that much of the value of Field Artillery is dependent upon accurate traverse surveying. In these days of speed, rapidity as well as accuracy is essential. Running an accurate traverse is an easy affair; really it needs only great care in measurement followed by simple arithmetic to find the coordinates of place mark or gun position. A knowledge of trigonometry is of no importance since anyone capable of mastering the mil relationship can understand and use the simple sine and cosine formulas. Furthermore, survey procedure is amply discussed in TM 6-200, TM 5-235 and, to a lesser extent, in FM 6-40. Why is it, then, that most of us have difficulty in figuring survey data? Why is it that, though we can perform the mechanics of surveying rapidly, it takes us a long time to arrive at the results we are seeking?

We puzzle over the tables of trigonometric functions and eventually we usually, but not always, solve the X and Y values of the first leg of our traverse. In order to accomplish this we draw sketches, play with formulas, doodle a bit, then just guess; an educated guess, perhaps, but still a guess. Then we wonder whether these values are positive or negative. Again recourse to a sketch, a glance at the sky to try to discover north, plus considerable more guessing, will give us the signs.

There is needed some method or system of figuring survey data without recourse to theory, waste of time, or fear of signs or sines. After all, when we fire a precision adjustment we do not worry about how the laws of probability apply to the individual problem. Someone has given us rules which automatically give us the result we are seeking. All we have to do is sense the bursts and apply the rules properly. The worth of our precision adjustment is frequently dependent on the accuracy of our survey. Why not, then, use a similar set of rules which automatically apply the laws of trigonometry to all our traverses?

Let's analyze our difficulties: We have little trouble in measuring angles properly with the transit or aiming circle, and it is not difficult to get accurate taping; troubles in those essentials can be solved by getting good, though not necessarily previously trained, men in our survey personnel. What bothers us is what to do with the angles we get. Should we obtain the directions of all our lines in terms of *Y*-azimuths, or should we get the angles between successive legs of our traverse? In order to keep the problem one of solving right triangles with the X and Y differences as the sides of the right triangle, I believe we should always get the *Y*-azimuth of every leg of the traverse. Remembering that the sine of an angle is equal to the side opposite the angle divided by the hypoteneuse, we can get the length of the side opposite the angle by transposition and use of our tables in TM 5-236:

dX = AB Sin ø dY = AB Cos ø (Calling the X and Y differences dX and dY respectively. See Fig. 1.)

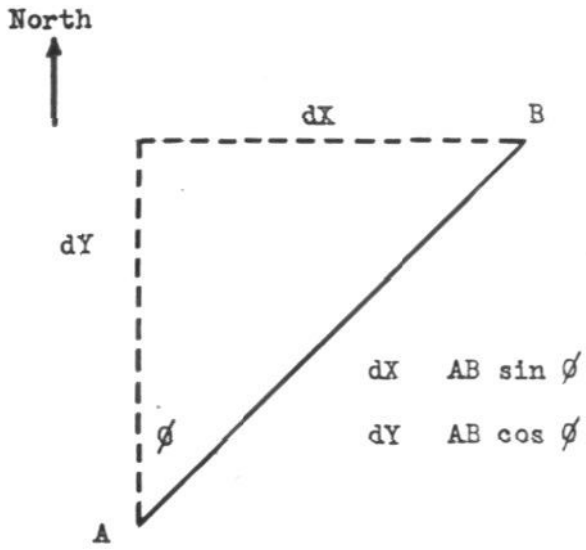


Figure 1

"That's a cinch," you say, "But what if the angle is greater than 1600 mils? The cosine of an angle is equal to the sine of 1600 mils minus the angle, somebody told me once. They also said that the sine of an angle greater than 1600 mils is equal to the cosine of the angle minus 1600 mils, and that the cosine of an angle equals the cosine of 3200 mils plus or minus the angle. Where does that leave me? Should I use the sine or the cosine to get dX for angles between 1600 and 3200 mils? Then

what about angles between 3200 and 4800, and between 4800 and 6400 mils?"

Since this is not a course in trigonometry, let's just take the word of trigonometry books that the basic formulas, as given above, remain valid no matter what value ø may assume between 0 and 6400 mils. The only difficulty is that the tables of TM 5-236, and most other tables of natural functions and log-functions of angles, only go up to 90°. So, using them as they are, we still must cope with the mysteries of sines and cosines above 90 or 1600 mils. For the mathematical mind this holds no terrors, but for the rest of us the above-mentioned confusion is in no wise abated. A little doctoring of the tables will, however, clarify the problem. Most tables are made up like the table in Fig. 2*a*. Half an hour's work will fix up an entire set of tables as shown in Fig. 2*b*. Then, no matter what the azimuth may be, from 0 to 359° 59′ 59″, the sine or cosine may be read directly. Since we sometimes need more accuracy than the slide-rule ensures, it is a good idea to similarly complete the tables of log-functions also.

These tables are, of course, of maximum value when used in transit surveys with the angles measured in degrees, minutes and seconds. If the aiming circle (or BC Scope) is used, and there are no tables of log-functions or natural functions in mils available, the angle may be converted to degrees by means of the tables in the back of TM 5-236.

Having applied the sine and cosine relationship properly, the only problem left in figuring the coordinates of Station B is in determining the signs of dX and dY. This is now very easy because the sign is determined by the quadrant in which the *Y*-azimuth of the line lies. (See Fig. 3.) Having the coordinates of the initial point, simple addition (or subtraction) gives us the coordinates of each

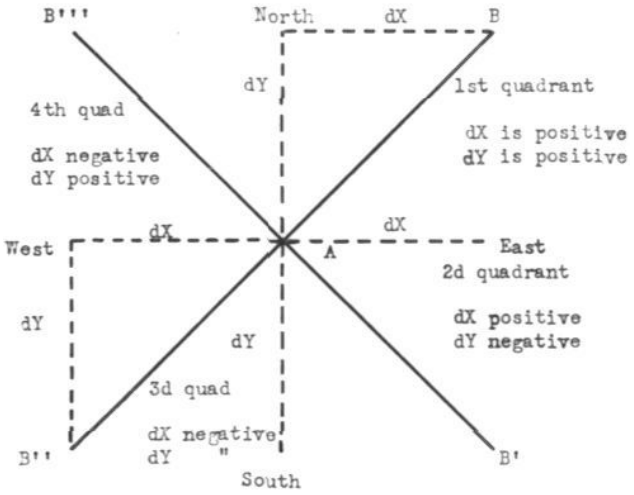


Figure 3

station over which we set our instrument.

The survey problem is simplified in every way if we can find the *Y*-azimuth of each line of our traverse without great effort. How do we find the *Y*-azimuth of

Figure 2a

	0°		1°		2°		3°		4°		
M	Sin	Cos	Sin	Cos	Cos	Sin	Cos	Sin	Sin	Cos	
0	0.00000	1.00000	0.01745	0.99985	0.3490	0.99939	0.05234	0.99863	0.06976	0.99756	60
1	029	000	774	984	519	938	263	861	.07005	754	59
2	058	000	803	984	548	937	292	860	034	752	58
3	087	000	832	983	577	936	321	858	063	750	57
58	687	986	432	941	175	866	918	760	658	625	2
59	716	985	461	940	205	864	947	758	687	622	1
60	0.01745	.99985	.03490	.99939	.05234	.99863	.06976	.99756	.08716	.99619	0
	Cos	Sin	Cos	Sin	Cos	Sin	Cos	Sin	Cos	Sin	
											M
	89°		88°		87°		86°		85°		

Figure 2b

	90°, 270°		*91°, 271°*		*92°, 272°*		*93°, 273°*		*94°, 274°*		
	Cos	*Sin*	*Cos*	*Sin*			*Cos*	*Sin*	*Cos*	*Sin*	
	0°, 180°		*1°, 181°*		*2°, 182°*		*3°, 183°*		*4°, 184°*		
M	Sin	Cos	Sin	Cos	Sin	Cos	Sin	Cos	Sin	Cos	
0	0.00000	1.00000	0.01745	0.99985	0.03490	0.99939	0.05234	0.99863	0.06976	0.99756	60
1	029	000	774	984	519	938	263	861	.07005	754	59
2	058	000	803	984	548	937	292	860	034	752	58
3	087	000	832	983	577	936	321	858	063	750	57
58	687	986	432	941	175	866	918	760	658	625	2
59	716	985	461	940	205	864	947	758	687	622	1
60	0.01745	.99985	.03490	.99939	.05234	.99863	.06976	.99756	.08716	.99619	0
	Cos	Sin	Cos	Sin	Cos	Sin	Cos	Sin	Cos	Sin	
											M
	89°, 269°		*88°, 268°*		*87°, 267°*		*86°, 266°*		*85°, 265°*		
	Sin	*Cos*	*Sin*	*Cos*	*Sin*	*Cos*	*Sin*	*Cos*	*Sin*	*Cos*	
	179°, 359°		*178°, 358°*		*177°, 357°*		*176°, 356°*		*175°, 355°*		

a line? There are two very apparent ways. First, use the compass on our transit (or aiming circle) every time we set up over a station. Second, measure the angular difference between a line of known azimuth and the line whose azimuth we are seeking.* There is less chance of error if, whenever possible, we use the second of these two methods. It is as easy as it sounds, yet it can be a little tricky. If you stick to the following procedure you can't go wrong. Set up over your initial point, the coordinates of which you must know, or to which arbitrary coordinates have been assigned. Next set the 180°-0° line (3200-0 line on the aiming circle) exactly along the orienting line, sighting back along the line towards its origin. Swing the upper motion of the instrument around so as to sight on the next station. There are two angles which can be read, the clockwise and the counterclockwise. Choose the smaller of these two as the angular difference between the two lines. If this is the clockwise it should be added to the azimuth of the preceding line; if the counterclockwise it should be subtracted. The result will be the azimuth of the line to the next station. With the transit it is easier to visualize what you are doing if the telescope is plunged and the upper motion then swung to the right or left, whichever is the angle less than 180°, to sight at the next station. (See Fig. 4.) This is repeated from station to station, giving you the

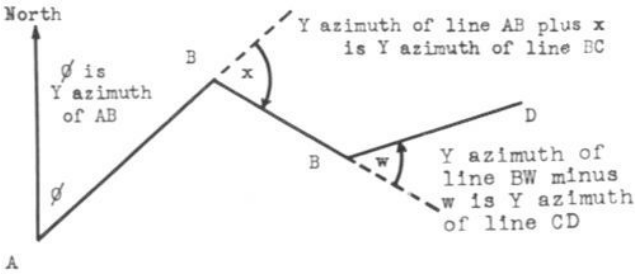


Figure 4

azimuth of each leg of the traverse. This is, essentially, the deflection angle method mentioned in TM 6-200. If your initial point was not on an orienting line or line of known azimuth, use the compass to give you the azimuth of the first leg, then follow the procedure outlined above from then on.

The next step is to compute dX and dY. For the most accurate work logarithms should be used because a slide-rule is somewhat less accurate and direct longhand multiplication is too tedious and productive of errors. Look up the log-sine and log-cosine of the azimuth directly in your doctored tables. To find dX merely add the log-sine to the log of the length of the leg. The same procedure, substituting the log-cosine for the log-sine, will give the dY value of the leg.

*Still another method is the back-azimuth method which doesn't, however, lend itself as readily to use on a form (such as in Figure 5) as does the deflection angle method.

SURVEY SHEET

BATTERY "C," 35TH FA

Place: *Vic. Camp Blanding. Fla.* Date: *July 20th*, 19*41*

(Whenever making a backsight with a transit always sight along the 180° - 0° line.)

Y AZIMUTH OF ORIENTING LINE OR TO A REFERENCE POINT		*0.0*
STATION *B.M.* Coordinates		*846.725.0-187.334.3*
Distance to next station in yards		*895.7*
Reading to next station in degrees		*+75° 26*
(After plunging. Right plus, left minus)		
Reading to next station in mils		*+1341.0*
STATION NO. *1* Compass (ø) from preceding station		*1341.0*
(Sin ø, for use with slide rule		——)
X	Log distance	*2.95216*
(Plus if ø is 0-	Log sin ø	*9.98581*
32, Minus if 32-	Log X difference	*2.93797*
64)	X difference	*+866.9*
(Cos ø, for use with slide rule		——)
Y	Log distance	*2.95216*
(Plus if ø is 0-16	Log cos ø	*9.40061*
or 48-64, Minus	Log Y difference	*2.35277*
if ø is 16-48)	Y difference	*+225.3*
STATION NO. *1* Coordinates		*7.591.9-7.559.6*
Distance to next station in yards		*1306.1*
Reading to next station in degrees		*+152° 08′*
(After plunging. Right plus, left minus)		
Reading to next station in mils		*+2704.6*
STATION NO. *2* Compass (ø) from preceding station		*4045.6*
(Sin ø, for use with slide rule		——)
X	Log distance	*3.11597*
(Plus if ø is 0-	Log sin ø	*9.86824*
32, Minus if 32-	Log X difference	*2.98421*
64)	X difference	*—964.3*
(Cos ø, for use with slide rule		——)
Y	Log distance	*3.11597*
(Plus if ø is 0-16	Log cos ø	*9.82896*
or 48-64, Minus	Log Y difference	*2.94493*
if ø is 16-48)	Y difference	*—880.9*
STATION NO. *2* Coordinates		*6.627.6-6.678.7*
Distance to next station in yards		*538.3*
Reading to next station in degrees		*—57° 44′*
(After plunging. Right plus, left minus)		
Reading to next station in mils		*—1026.3*
STATION NO. *3* Compass (ø) from preceding station		*3019.3*
(Sin ø, for use with slide rule		——)
X	Log distance	*2.73102*
(Plus if ø is 0-	Log sin ø	*9.24739*
32, Minus if 32-	Log X difference	*1.97841*
64)	X difference	*+95.2*
(Cos ø, for use with slide rule		——)
Y	Log distance	*2.73102*
(Plus if ø is 0-16	Log cos ø	*9.99311*
or 48-64, Minus	Log Y difference	*2.72413*
if ø is 16-48)	Y difference	*—529.8*
STATION NO. *3* Coordinates		*6.722.8-6.148.9*

①

Figure 5

SURVEY SHEET

BATTERY "C," 35TH FA

Place: *Vic. Camp Blanding, Fla.* Date: *July 20th,* 1941

(Whenever making a backsight with a transit always sight along the 180° - 0° line.)

Y AZIMUTH OF ORIENTING LINE OR TO A REFERENCE POINT *0.0*

STATION *B.M.* Coordinates *846.725.0-187.334.3*
Distance to next station in yards *895.7*
Reading to next station in degrees ..... *+75° 26*
(After plunging. Right plus, left minus)
Reading to next station in mills ..... ——

STATION NO. *1* Compass (ø) from preceding station ..... *75° 26′*
(Sin ø, for use with slide rule ..... *96778*)
X — Log distance ..... ——
(Plus if ø is 0-32, Minus if 32-64) — Log sin ø ..... ——
Log X difference ..... ——
X difference ..... *+867*
(Cos ø, for use with slide rule ..... *25179*)
Y — Log distance ..... ——
(Plus if ø is 0-16 or 48-64, Minus if ø is 16-48) — Log cos ø ..... ——
Log Y difference ..... ——
Y difference ..... *+225*

STATION NO. *1* Coordinates *7.592-7.559*
Distance to next station in yards *1306.1*
Reading to next station in degrees ..... *+152° 08′*
(After plunging. Right plus, left minus)
Reading to next station in mils ..... ——

STATION NO. *2* Compass (ø) from preceding station ..... *227° 34′*
(Sin ø, for use with slide rule ..... *73806*)
X — Log distance ..... ——
(Plus if ø is 0-32, Minus if 32-64) — Log sin ø ..... ——
Log X difference ..... ——
X difference ..... *—964*
(Cos ø, for use with slide rule ..... *67473*)
Y — Log distance ..... ——
(Plus if ø is 0-16 or 48-64, Minus if ø is 16-48) — Log cos ø ..... ——
Log Y difference ..... ——
Y difference ..... *—880*

STATION NO. *2* Coordinates *6.628-6.679*
Distance to next station in yards *538.3*
Reading to next station in degrees ..... *—57° 44′*
(After plunging. Right plus, left minus)
Reading to next station in mils ..... ——

STATION NO. *3* Compass (ø) from preceding station ..... *169° 50′*
(Sin ø, for use with slide rule ..... *17651*)
X — Log distance ..... ——
(Plus if ø is 0-32, Minus if 32-64) — Log sin ø ..... ——
Log X difference ..... ——
X difference ..... *+95*
(Cos ø, for use with slide rule ..... *98430*)
Y — Log distance ..... ——
(Plus if ø is 0-16 or 48-64, Minus if ø is 16-48) — Log cos ø ..... ——
Log Y difference ..... ——
Y difference ..... *—529*

STATION NO. *3* Coordinates *6.723-6.150*

②

Figure 6

The form shown in Figs. 5 and 6 makes the procedure outlined above practically automatic. The form can be used for mils or degrees; log tables or slide-rule. If the measurements of angles and distances are recorded as soon as found, necessary logarithms looked up in the table and the indicated operations performed immediately, you can have the azimuth of the leg before the chainmen have finished taping; you can have the coordinates of the station recorded within a minute after the taping is completed.* This means that, even when using logarithms, there is no computation necessary after the mechanical survey operations have been completed, resulting in a great saving of time. It will be noted that there is a remark on the survey sheet indicating the sign of the angular difference between the initial compass and the compass to the next station. (See Fig. 4.) The compass values on the form are, in fact, a running total of the angular differences from the initial azimuth. It may be found necessary, of course, to add or subtract 6400 mils, or 360° from time to time. The signs of dX and dY may be found by applying the notes on the form to the azimuth of the leg regardless of whether slide-rule or logarithms have been used to get the dX and dY values. These notes are in mils, but the conversion to degrees is obvious. Merely substitute 90 for 16, 180 for 32, 270 for 48 and 360 for 64. Application of dX and dY to the coordinates of the preceding station gives the coordinates of the station. This, like the figuring of the azimuths, is continued from station to station with the coordinate values being running totals of the X and Y differences from the initial point.

The survey of Fig. 7 has been worked out on the

*It is strongly recommended that all computations be performed by two computers working independently. This provides a worthwhile check on accuracy.—Editor.

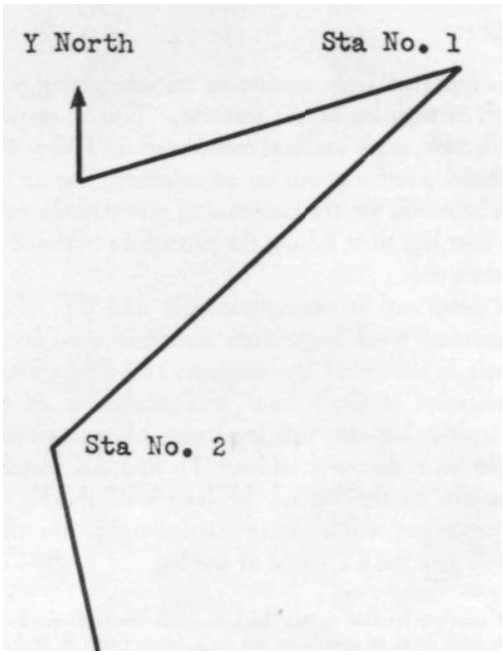


Figure 7 (not to scale)

form of Fig. 5 by the use of logarithms and in Fig. 6 by use of slide-rule. In each case the survey instrument was a transit, though in Fig. 5 the appropriate mil values have been entered to show how an aiming circle or BC scope can be used with the sheet. The survey was made from a bench mark and it was necessary to use the compass in order to find the azimuth of the first leg from the bench mark. A comparison of the two sheets shows very little disagreement in the coordinates of the third station. For ordinary work, therefore, it is apparent that the slide-rule may be used for computations without fear that the resultant inaccuracies will cause the limit of error specified in TM 6-200 to be exceeded. For extreme accuracy, however, it must be evident that the use of logarithms is essential. Note that since the operation is multiplication, the logs are always added, never subtracted. If the traverse were to be continued to more stations, the value of the compass to Station No. 3 and the coordinates of the station would be carried forward to the top of the next sheet, which is exactly the same as the first, and entered on the first two lines as indicated. The pages should be numbered at the bottom (as shown in the figures) when more than one page is used to record a traverse.

The Instrument Section of Battery C, 35th FA, consists of one Regular Army sergeant, who has never previously served in an instrument section, and five Selective Service Trainees. No member of this section has ever studied or had anything to do with surveying in civil life. After they had received instruction in use of the transit and in taping, the survey sheet was explained to them. One sheet, similar to Fig. 5, was worked out for them in the classroom. They then proceeded to run a four-station traverse of about 2500 yards. The error of closure was 2.8 yards. That was not perfection, but it was well within the allowable limits for a closed traverse. It proved that the use of the survey sheet and rigid adherence to the instructions which it contains will allow men previously unfamiliar with survey procedure and theory to run rapid traverses which are quite accurate. That, after all, is the objective we all seek to attain in our surveying. It also reduces the number of embarrassing questions asked by smart as well as dumb recruits; an attainment perhaps more selfish, but equally satisfying.

Life

Our Balkans--

By Lieutenant Edward A. Raymond, FA

The six small republics of Central America are remarkably analogous to the six Balkan states of Europe. Each group lies to the south of its continent, and each is considered a buffer between neighboring continents. The Balkans contain the Berlin-to-Bagdad railway, command the Dardanelles, and threaten the Suez Canal. Central America contains the Pan-American Highway and its occupation by a hostile force would threaten the Panama Canal. Roughly seventy per cent of Central America is mountainous; as in the Balkans, poor communications have isolated small communities. This has led to a good deal of local independence, and made the suppression of revolts a difficult problem. In each group of states, political life has been stormy; the greater part of the male population has been accustomed to bearing arms. As a further and striking resemblance, both regions contain strategic raw materials of great importance. The rubber-growing possibilities of Central America, as will be shown, are as important to us as Rumania's oil is to the Germans.

The strategic significance of Central America to the United States lies (as has been pointed out many times) in protecting the Panama Canal.

The long-term significance of Central America, leaving aside the possibility of military action in the Caribbean next year or the year after, is vital to the United States. There are about fifty groups of commodities which we must import. Thirty-four of these come entirely or in part from Central America. Included are castor oil (important in machine tool industries), tannin materials, copra, hard fibers, quinine and crude drugs, and tropical beverages and foodstuffs. Most important of all, we import some rubber from Central America.

The average person thinks of Central America—on the very rare occasions when he thinks of it at all—as low, swampy, and covered with dense jungle. There are lowlands on the Atlantic coast, and two stretches along the Pacific. Characteristically, however, Central America is volcanic and mountainous. In some cases, notably in Honduras, the mountains rise from the edge of the sea itself. More commonly the peaks and table lands of the interior slope gently to the sea.

There are three layers of climate in Central America. The top and bottom layers are humid, the middle layer clear and bracing. In the mountains heavy clouds hang low nine months of the year, and frequently make good their constant threat of rain. From ten thousand to six thousand feet, the air is noticeably thin, and it is cold. There is a characteristic, cutting chill to wet tropical altitudes that is most depressing.

The whole set of ranges and stray peaks found in Central America is referred to as the Continental Divide. It is part of that "backbone of the hemisphere" which from Point Barrow down is known as the Rockies and as the Andes from Cape Horn up. Guatemala shares with Mexico the Sierra Madres, and has three lesser ranges of its own, the Sierras de Chame, de Santa Cruz and de Las Minas. Honduras ("the depths") was named by Columbus from the deep water off its coast. The name also pictures the deep valleys in which most of its people live. Really high mountains are found in the western half of the country; they join the mountains of Guatemala to ring the lower table land of Salvador. The Nicaraguan boundary of Honduras is formed by the Tompocente range. Nicaragua is given a peg-legged appearance by her two great lakes, with Lake Managua lying above Lake Nicaragua. The peg side is towards the Pacific and is low, with isolated volcanos scattered over it; the hips and Atlantic thigh have a skeleton of high, continuous sierras. As every schoolboy knows,

American officers and men should familiarize themselves with all theaters in which they conceivably might fight

CENTRAL AMERICA!

there is a break in the Divide between Nicaragua and its southern neighbor, Costa Rica. Through this break flows the San Juan River, the almost-famous San Juan, stepsister of the tamed and greatened Chagres.

Between six thousand and three thousand feet, Central America is delightful. Her air is fresh and invigorating. Much of the land is prairie; some is forest, with oaks bearing acorns like plums and pines with two-foot cones. Two of her countries live almost entirely in this zone. They are Salvador and Costa Rica. The great stretch containing Guatemala City, the Mesa de Yojoa in Honduras, and the large, upland plains of Nicaragua between Leon and Matagalpa are more temperate, more "white man's country," than much of the United States.

Of course there are jungles in Central America; that no one can deny, and least of all one who has lived in them. Central America lies entirely below twenty degrees of latitude north, and the sun rides high. Along the Atlantic coast, rainfall is commonly two hundred and fifty inches a year, several times that of the eastern United States. The resulting growth must be seen to be believed. In swampy land, vegetation does not grow more than twenty-five or thirty feet high, but mangroves, banyans and most of the other swamp trees grow on clusters of tall roots. On slightly higher ground the enormous ceibas have exposed roots also, but these are massed on the surface of the ground, with undergrowth rising through the roots. Black palm, pina, acacia and tania are all hostile, with a fierce arsenal of spikes and barbs, or strongly acid sap to be splashed by bolo or machete. Insects and, in many regions, the world's deadliest snakes, must also be reckoned with. It takes violent chopping to move, and in the steaming, walled-in stillness energy is at a premium. Heads ring from heavy dosages of quinine. At halts, rest is hard to get. Clothing is soaked, natural fuel is wet, and screw worms, skin fungi and vegetable poisons make night purgatory.

In some regions jungle covers rolling hills. This type of land generally has immense trees—cuipas, mahoganies, cocabolas and igos—which shoot up in places to two hundred feet and more. Less undergrowth is encountered, but passage must sometimes be cut through llanas or hanging vines. Those largely unexplored regions of British Honduras and northern Guatemala which protrude into the Yucatan have terrain of this sort. More is found back of Fonseca Bay, where Salvador, Honduras and Nicaragua meet about the best harbor in Central America. Again, in those regions of Panama where the Divide nears the Atlantic, mountains and jungle are one.

The Central American states possess no streams navigable at considerable portions of the year by any craft larger than the native balsas and cayucas which ply them. The Usumacinta, which is the largest stream in Central America, flows through Mexican territory, and only rises in Guatemala. Many streams which look as though they would be penetrable on the map have erosion deltas, bars or coral reefs across their mouths.

Streams in great profusion rush from the Continental Divide straight to the Pacific. The large number of bridges required for a Pan-American Highway is a considerable cost factor, and produces many critical points where bombing would be easy. From the Divide to the Atlantic an equal number of streams meander into a labyrinth of swamps and tangled water net, eventually drifting into the Atlantic. They are brisker and more direct in Honduras, and gain power all along the coast at the height of the rainy season.

Most of Central America is roadless; over much of it not even pack animals are used. In jungles, human beings bear the burdens. The underbred, ill-cared-for little native horses can not endure mountain conditions; mules are costly. Where trails skirt abrupt cliffs and run through deep clefts of rock, pack animals are inconvenient. For generations, cargadores have carried loads by tump line. For centuries there have been no roads, and their need has been felt but slowly.

From the Rio Grande all the way down to Chile, there is only one inter-oceanic highway. But that is too imposing

a term for the rough trail from Puerto Cortes in northern Honduras to Tegucigalpa, the capital, and Choluteca, near Fonseca Bay.

In Central Guatemala, in Salvador, and in western Costa Rica there are limited road nets. The Pan-American Highway, however, is almost the only road being built in Central America.

First espoused in 1924 by a group of Latin American engineers, this project has been heavily indorsed by the present Administration in Washington, and is now being pressed at a rate which should connect within several years Laredo, Texas, 3,250 miles away, with Panama City. Odds are strong that the Canal will be double-tracked before the Highway reaches it. The road is half done, but the easiest construction has been tackled first. From the Rio Grande, a paved road runs some 830 miles to a point some 80 miles south of Mexico City. Road of a sort, however, links Mexico, Guatemala and Salvador. Both the latter countries have completed their links of the chain without American aid. In Guatemala cuts and fills were made by Indians carrying boxes by tump lines swung from their heads; this was a cheaper method than using trucks.

About one-third of the Honduran section has been completed.

In Nicaragua the 150 miles still unfinished will probably not be completed for three years.

The Export-Import Bank lent Costa Rica $4,600,000 in September, 1939, to complete the section which runs only 115 miles from San Jose, the capital, to the Panamanian frontier. This work will occupy at least four years, according to present estimates, as the Talamanca Range must be crossed at sometimes 10,000 feet, and dozens of swift streams must be bridged.

The Republic of Panama has used American dollars to build westward from the Canal, and to reach Costa Rica only some 65 miles of 365 must still be built.

There are approximately 2,000 miles of railroad in Central America, and of this amount about 1,500 miles are used by the United Fruit Company to bring bananas from nowhere to rickety little ports. There are two interocean routes. One of these joins Puerto Barrios, main Atlantic port of Guatemala, with a Pacific Coast line running north to Mexico and south to the three ports of Salvador. This is the International Railway of Central America, completed in 1927.

The two main ports of Costa Rica, Puerto Laredo on the Atlantic and Puntarenas on the Pacific, are connected with San Jose by rail. The 104 miles of the Atlantic section were built by two American brothers named Keith in a twenty-year struggle against many difficulties.

Spread of banana-leaf wilt and the Panama sickness on Atlantic plantations has stimulated banana growing on the Pacific side, and is placing pressure on communications with Atlantic ports.

Mention has already been made of the ports linked by inter-ocean railroad and highway. Strategically, they are the most important.

Heavy mining machinery and the rolling stock and equipment of the banana plantations has been landed on the Atlantic coast, some of it at piers and some by lighters.

On the Pacific coast, our Navy is constructing a base, and certain Islands are also being utilized by Navy and Naval Air Service.

Central America has gone from the use of cargadores, most primitive transportation in the world, to the extensive use of airplanes, largely without intermediate stages. T.A.C.A. (Transportes Aereos Centro Americanos) and a number of small native companies specialize in freight hauling. They take the entire production of isolated gold and silver mines and haul in all supplies, including mining machinery. They carry perishable dairy products, nuts, fibers, and many an odd cargo.

In Central America, airports of a sort are about as common as in the continental United States. There are large sections in which there are none, to be sure, but in populous sections they are numerous. International fields, with good repair facilities, are at all the capitals, where Pan American Airlines planes stop daily on their United States run.

American bombing squadrons from the Canal Zone make protracted visits to airports in Costa Rica.

The number and importance of United States airfields in the Republic of Panama is, of course, a military secret.

Such, then, is the terrain, and such are the communications, in Central America. Those are the conditions under which we would have to fight in that part of the world. They indicate that the recent history of the German campaigns in the Balkans can not be repeated. War machinery for a blitzkrieg could be driven to the frontier of Jugoslavia, or deposited there by trains. Roads and railroads existed in the Balkans, on which the attack could roll. These conditions do not exist in Central America. In Central America, lightly armed mountain and jungle troops, with little impedimenta, will be required. Warfare will be primitive again, and man power, not fire power, will once more play the decisive role. Fields of fire in either mountains or jungles are at a minimum, and point blank combat is the rule. Special conditioning and training to minimize hardships will be needed. For jungle fighting, special equipment will be required, including machetes, hammocks, light, fabric ponchos, insect salves, individual sterno-stoves, medicines, and much else.

The important objectives in Central America, other than harbors, are on high ground, and light screening and holding forces only need be jungle troops. The main body should consist of men conditioned at high altitudes, and sent as directly as possible—perhaps by plane—to their theater of operation. They would feel

the oppressive, humid heat of the lowlands badly, if landed on the coast, but could readjust themselves rapidly to the altitudes of the interior.

One has only to try keeping up with cargadores carrying hunting and camping equipment at high altitudes, or walk behind natives with machetes in the jungle, to realize that on his own ground the South American is physically quite the equal of a norteamericano. Let us forget the lack of planes, tanks and artillery in Central American armies. Let us realize that in a Central American campaign their specialized military aid could be useful, either to an Axis invader or to ourselves.

Before passing to a consideration of each of the widely differing Central American countries one by one, certain common factors in their relations with us can be examined.

Totalitarians and Democrats are fighting the same paper war of propaganda, diplomacy and economic pressure throughout Latin America.

Overthrow of all who resist the Führer is inevitable, say the Germans. Whether the countries of South and Central America are to find unprecedented prosperity in the world markets of the New Order or are to be treated as enemies is being decided now, say German radios, handbills and agents.

The United States stands ready to replace the lost markets of Europe, and controls vitally necessary supplies of capital goods and manufactured articles. Our Export-Import Bank sits in the game with a stack of chips $500,000,000 high, and unlimited credit. The United Fruit Company has four million acres and fifteen hundred miles of railroad track, and controls the livelihood of much of Central America. We offer, if not prosperity, salvation from immediate ruin.

"Sign up with the New Order and prosper later," says the Axis.

"Prosper now," says the United States.

These are the chief slogans of the paper war. There are some others worth mentioning. The Germans maintain that the United States has no real stamina, no real determination to fight for anything.

The Democracies, on their part, dramatize the fate of each country which has fallen to the Germans.

Each side tries to convince Latin America that it is more "simpatico"—that it is more akin in customs and feeling. The Germans praise the authoritarian and dictatorial qualities of nations which are ruled by "strong men." They stress the ties of blood and language between Latin America and German appendages in Europe.

The personalities of President Roosevelt and Secretary Hull symbolize our Good Neighborliness. The old-established Pan American Union is widely respected. We have promoted motion pictures, radio programs, tours, and widely advertise our goods.

In the paper war we are sweeping all before us. On May 18, 1940, twenty republics of Latin America, one hundred per cent of them, made a joint declaration with the United States, condemning the German invasion of Belgium, the Netherlands and Luxembourg as "unjustified and cruel." In this connection it is interesting to recall that only Salvador of all six Central American republics failed to take sides in the World War. As soon as Germany appeared to be decisively beaten, the other five declared war upon her. Indeed, Costa Rica has never signed an armistice and is still technically at war with Germany.

By the end of 1941 there were no Axis consular or diplomatic representatives in Central America; all had been expelled.

The extent to which Central America would aid us in defensive fighting can not be seen properly by lumping its component states together. They are different socially, politically and economically, and must be viewed one by one.

BRITISH HONDURAS

This, the northernmost country of Central America, may be treated in a few words. No one can doubt the whole-hearted aid we will receive from other English-speaking inhabitants of this hemisphere in saving it from attack. Unfortunately, British Honduras is not much of a bulwark. It was not worth leasing. The port of Belize is poor, and the communications leading out of it lack destinations.

GUATEMALA

The nearest of the Central American republics is also the largest, with nearly twice the area of Greece and a greater population. It, too, has traditions. In pre-Spanish days there was a distinct Central American civilization, lying between the Aztecs of Mexico and the Incas of Peru. The seat of this empire was in Guatemala, and the Indian name was Quiché. Family jealousies in the ruling caste caused civil strife, opening the country to easy conquest by Alvarado. In the nineteenth century, when the other Latin American countries were warring with Spain, Central America, that is to say Guatemala, produced no Bolivar, San Martin or O'Higgins as did South America, no Hidalgo or Morelos as did Mexico. It may be said to have slid imperceptibly into independence. The last royalist governor was kept on as head of the free state. Within a month the territory was occupied by an army from Mexico, only to be liberated as rapidly by a small force from the province of Salvador. The restored federal union was utopian but weak, and soon fell apart.

Guatemala itself is seventy per cent Indian, with the ladinos, those of mixed blood, dominating the country. There are few negroes, and the Quiché stock is sturdy. The nation is governed by the strongest personality in Central America, General Jorge Ubico. He has a strong love of discipline, and plenty of energy in enforcing it. Guatemala City is as clean as any capital in the world. The national budget is balanced. German agitation is

viewed in the same light as any other threat to the regime. There are 2,200 registered Germans, and perhaps 3,000 more with some German blood. They are wealthy, and dominate much of the coffee business, which is the largest cash crop. Fifth columnists are considered numerous.

Relations with Washington are good, and the United States trains the officers of Guatemala's army. This numbers 5,000 regulars. In addition to 10,600 ex-servicemen, probably 75,000 armed irregulars could be raised to fight along commando lines. It will be remembered that the Boers had no standing army before defying England, and that warfare in mountains and jungles is still primitive.

HONDURAS

This is the poorest country per capita in Central America; it is virtually roadless, and both individually and collectively the Hondurans work for the United Fruit Company. There are about five hundred Germans in Honduras, but President Carias has said that he will follow, step for step, in our hemisphere defense policy. He once closed the mails in his capital to dry up the flood of Axis propaganda from the now-defunct Servicio Informativo, then headed by Dr. Otto Reinebeck in Guatemala City.

Honduras has United States instructors for her officers, and compulsory military training. This is responsible for a nominal total of 94,650 soldiers. The regular army has a strength of only 2,325 men. A large percentage of Hondurans has participated in revolutions at one time or another, and many citizens have personal Lee-Enfields.

EL SALVADOR

Salvador is the only Central American country with no Atlantic coast. It rather fancies itself as the industrial section of Central America, and, with three times the population density of the United States, it may progress along such lines. At present coffee fincas produce 90% of the national income. The present regime of General Maximiliano Martinez appears solidly intrenched. Disruptive influences, such as Axis propaganda, are dealt with severely. Colonel von Bohnstadt of the German Army, former head of the military school, has been replaced by an American. The regular army is the second largest in Central America, although Salvador is the smallest country. Salvadoreans are fierce fighters. In area, size of population, in broken terrain and in military tradition, Salvador resembles Serbia.

In May, 1927, Salvador, Guatemala and Honduras signed a three-power agreement to a common policy on matters of general concern in Central America.

NICARAGUA

Nicaragua is the most Americanized nation in Central America, not excepting Panama. She once had an American president, the filibusterer William Walker, who sought annexation to the United States in 1855. We ousted Zelaya, a bloodthirsty character who terrorized the country from 1903 to 1909. From then on United States Marines were in and out of Nicaragua until 1933.

Under General Samoza, present dictator, the Guardia Nacional fought shoulder to shoulder with the United States Marine Corps, and when the devildogs departed, carried through the fight to a successful end. Samoza was educated and worked in the United States. He went back north on an official visit in 1939, and enjoys remembering the glories of that trip. He declared a two-day national holiday when F.D.R. was last reelected. He is with us, one hundred per cent. We also have ninety-five per cent of the foreign business of the country. Furthermore, the people have participated in the benefits of American millions advanced for naval construction at Fonseca Bay and for an east coast highway. The Nicaraguans still hope for a trans-isthmian canal.

The United States organized the Guardia National originally and has always supervised its training. It has only 3,500 men, but is considered the best equipped army in Central America.

COSTA RICA

Costa Rica is next-door neighbor to Panama. It is proclaimed by the National Tourist Bureau "the most peaceful country in the world." Its population is white. Costa Rica was not a mining center, but was settled by Andalusian farmers who brought their families and who aspired to earn a good living on their land, not to become princes. They prospered. On the inland plateau where most of the population lives, there is a cool, invigorating climate. The land is ideal for coffee trees. There are no negroes on the plateau and the few Indians live on reservations. The government is democratic, and for two generations there have been no revolutions. Although Costa Rica did rouse up and drive Walker out of Nicaragua in the nineteenth century, relations with neighboring countries have generally been peaceful.

There has been important German influence in Costa Rica. A quarter of all exports were coffee shipments to Hamburg and other German ports, and twenty per cent of the best land, together with important handling facilities and financial establishments, were German. A great many prominent citizens had German business connections. Literacy is high in Costa Rica, proof of the fine school system. The people, though provincially minded in characteristic Latin fashion, do know and condemn the German course. Its president, Dr. Guardia, studied medicine in Brussels and has a Belgian wife.

Costa Rica is officially friendly to the United States. It has signed an agreement providing, in effect, American air and naval bases. The Costa Rican army is the smallest in Central America, but a much more formidable

Costa Rica is called "the most peaceful country in the world." It was settled by Andalusian farmers who use, not abuse, their land.

one could be raised, under the particular conditions, between the rising and the setting of the sun.

PANAMA

The Panama Canal runs through a strip ten miles wide across the independent republic of Panama. Obviously, defenses of the Canal can not be restricted to the strip. Obviously, we have a vital interest in the rest of Panama. We are anxious to awaken no echoes of the old cry, "Yankee Imperialism!" We treat the Republic of Panama with great ceremony; our diplomatic representative is a full ambassador. In canal rental, customs taxes, wages, and the expenditures of many tens of thousands of Americans from the Canal Zone, we make Panamanian politics distinctly solvent.

Few Panamanians follow politics. Of some 500,000 inhabitants, only about 75,000 are white; 75,000 are Jamaican negroes; 5,000 Orientals; and 50,000 are Indians, many of them living in the interior of the country under the conditions of 1492. The Cuñas of Darien are hostile. In general, then, the population is so constituted as to be apathetic to American largesse. The politicians have, in the past, been cynical. Arnulfo Arias, recently deposed president, was formerly ambassador in Rome. He became imbued with fascism. His intimates while he was in power included Dr. Isaza, Panamanian consul in Hamburg for some years. The 2,000 Germans, 750 Italians and 400 Japanese in Panama are said to have grown in numbers under his regime. The recent coup d'etat, installing President Guardia, was a step taken by the Panamanians and for the Panamanians.

On Panamanian territory there are also the Pan American Highway, numerous air bases, the Department Training Center at Rio Hato, and a partially-completed trans-Isthmian highway.

The Panamanian Police was built up under Arias, who hoped to use it as a political tool. He furnished new uniforms and bought submachine guns. Total strength is only 1,465, and there is no Panamanian Army.

* * * * *

The Balkan states, while too weak to resist powerful invaders alone, have shown themselves invaluable to larger allies. The resistance of Serbia under King Peter in the first World War won the same admiration as the recent feats of Greece. Historical analogies are frequently suggestive. From the tactics of the Third Reich in the Balkans we can foretell continued attempts to "soften up" the countries of Central America. Germany succeeded in winning over Hungary and Bulgaria. She weakened Jugoslavia and Roumania. But from the Jugoslav revolt, from the Greek campaigns, we know that political penetration will not always work, and that the efforts of a small nation to preserve itself can sometimes be surprisingly effective. We should be shortsighted indeed to neglect the potential small allies close to the Canal. We need friends in "Our Balkans."*

*As evidence of the friendliness of the Latin American countries to the cause of the United States, it may be noted that the six Central American nations and the three Caribbean republics—Nicaragua, Panama, Costa Rica, Guatemala, Honduras, El Salvador, Haiti, Cuba, and the Dominican Republic —are now at war with the Axis powers, and also are signatories of the 26 Power Pact.

Radio Support in Rapid Movements

By Commo

IT may be said that the fire support an artillery battalion can give to its supported Infantry, Cavalry, or Armored Force units, is going to be about as good as the communications within that battalion. These notes are written to indicate a method of solving certain problems in communication that arise in fast moving actions.

A naval officer remarked a few months ago, "Do the best you can with what you have." A good slogan, but not new to a CommO; he's been doing that for years. The plans outlined in this article may not fit all requirements in detail. Sets or frequencies may not be available; on the other hand, improvement in existing types of equipment will readily suggest corresponding improvements in communication plans. For example, if the 194 sets could be satisfactorily netted under all conditions, a much simpler plan for the use of these sets during displacement could be easily devised.*

Many are the diagrams that show normal radio and wire nets of the battalion; few show the handling of these nets during displacements. When artillery supports troops whose tactics comprise rapid movement and sudden change in the situation, matters of vital importance are: That contact with liaison sections be constantly maintained regardless of the movements or location of the supported unit; that at least one battery is always prepared to respond to a call for fire from liaison section regardless of what the battalion may be doing at the time; that the proper use of radio alone can maintain this necessary contact.

Hence the following are prerequisites: first, that the communication plan used be simple, very flexible, and yet complete; second, that *all* battery officers, battery detail sections, communications and operations platoons of headquarters battery, all staff officers (particularly S-3), *and* the battalion commander, MUST thoroughly understand whatever communication plan is to be used; third, a few simple prearranged messages must be used and understood by all concerned. Too many schemes look good on paper but fail miserably on the ground just because some officer or key NCO does not know what sections other than his own do when a displacement is ordered.

The artillery unit used as an example in this discussion is a light battalion in direct support of a cavalry brigade, but similar use of radio can be made, with obvious modifications, in other artillery units. Radios of antitank elements do not enter into this discussion. The antitank radio net is a separate net, whose control should rest with higher units. No antitank radios are shown on the accompanying diagrams.

*The SCR-194 eventually will be replaced by the SCR-608,-609,-610,-628 radio sets which are readily nettable and will permit of a more flexible use of sets during displacements.—EDITOR.

A knowledge of the radio equipment of the battalion, its disposition, and normal use is essential before reference is made to the diagrams. These SCR 245 sets are mounted in radio trucks. These are used by each liaison section and the fire-direction section. (Note that liaison sections are motorized—why not, since the cavalry regimental commander is going to have his CP in a scout car?) These three sets work in the same net. Normally voice transmission is used. No undue difficulties are encountered in handling two separate fire missions at the same time, provided that the FD set operator (preferably an NCO) does not confuse the sensings of each liaison officer. This is simply a matter of intelligence and training. To save needless repetition of messages, a small loud speaker is plugged into the FD set and by using an extension cord, this speaker is placed close to the firing charts. Sensings of observers can thus be received directly without the necessity of the radio operator repeating them. Obviously, the speaker volume is adjusted so that the surrounding countryside does not also receive these sensings. The 245 set is used for liaison because it can maintain contact between supported regiments and the battalion regardless of the movements of either, and at any distance likely to be encountered in working with cavalry; whereas the limited range of the 194 renders this set unsatisfactory until the situation has stabilized.

The SCR 178 is used to establish and maintain contact with Division Headquarters Battery until the wire circuit, if any, from division artillery is complete. Primarily an auxiliary command net, this net is also available for air-ground work in the event a plane is assigned to the artillery. If a plane is assigned to a designated battalion for an adjustment, no change of frequency is made by the adjusting battalion or plane. All stations

in the net with the exception of the adjusting battalion remain silent, but continue to listen to the adjustment. Thus the assignment to battalion is rapid, and all battalions keep constantly informed of the results of air observation, and targets observed, without the necessity of repeating this information through other sets or switchboards. Time is vital in actions of this nature. The 178 is usually operated from the normal ground set-up, but can be easily operated from a stationary vehicle. In this case, better results will be obtained if the generator is manually operated, as is normal, rather than attempting to rig up a dynamotor to do this work.

An SCR 203, a pack radio set which is rarely packed, is issued for communication with the supported cavalry brigade. Although highly desirable, it usually is not feasible to lay wire to the cavalry brigade CP, as its location is changed frequently and rapidly. Reliance is placed mainly on radio and messenger for this battalion-brigade contact. The 203 is mounted on a wood frame and placed in a command car. The generator can be manually operated as designed, or operated by a dynamotor running off a storage battery. A vehicular antenna is mounted on the car. When the battalion is in direct support of the brigade, the 203 set is primarily a tactical station; when the battalion is attached to the brigade, this set becomes both a tactical and a command station. For this reason, a command post section consisting of a sergeant-major, message center chief, and headquarters clerk, ride with the 203 set. Although operation is possible when in motion, best results are obtained when the vehicle is stationary. If it is essential that contact with the brigade be maintained while the battalion is moving, a better solution would be to use for this contact the 245 assigned to the FD section. As soon as the movement has been completed, the 203 should immediately check into the brigade net and resume normal operation.

Of the sixteen SCR 194 sets assigned to the battalion, three are assigned to each gun battery. For convenience in referring to these sets, they are designated as the A, B, and C sets. The A set is primarily used for battalion-battery contact and always remains in the vicinity of the gun position. Considerable flexibility is possible in the use of these latter sets. However, this use should be standardized into a very few logical systems. Which system should be used in a certain situation is determined primarily by the availability of observation to liaison sections, batteries, and battalion. Sets may be placed under battery or battalion control.

When terrain offers reasonably good observation, sets B and C should operate in the battery fire control net. Set B should be pushed forward as far as possible. The C set can remain at the gun position or move forward to the battery CP. Communication from forward observer to the battery is the important thing. This use might be designated as "battery sets under battery control."

When observation is poor, the fire support of the battalion can probably best be handled by the use of several forward observers. In situations of this kind, the use of the B and C sets can be separated into two phases. In the first phase, B and C sets are under battery control as above and the A sets are in contact with the battalion 1, 2, and 3 sets (see below). As soon as the battalion wire circuits to a battery are installed, the A set closes station and the B set is instructed (by prearranged message) to establish contact with the battalion base set which had previously been working with the battery A set. It is important that this B, or forward observer's set does not change frequency. It is far simpler for the battalion base set to change to the battery set's channel. This system might be designated as "battery sets under battalion control." Obviously, if distances between battery forward observers and the FDC exceed the effective range of the set (about five miles) communication will probably be unsatisfactory. However, if it can be maintained it gives the battalion three more observers reporting direct to the battalion CP.

What use is made of the other two sets of the battery? They can be used in a battery fire control net (using the channel habitually assigned to set A), provided that if any interruption of the battalion-battery wire circuit occurs, this net must be closed at once, and the A set immediately establish contact with a set at the FDC. (A spare, if the normal base set is working with the battery FO.) It should be standard procedure that whenever a wire circuit goes out, radios are *immediately* turned on without command and used until the wire circuit is again in operation.

When a battery is attached to another unit, as, for example, in an advance guard, its battalion base set (1, 2, or 3) should be attached to the battery. This will give to the battery commander two independent radio channels, which he can use for command and fire control and so maintain contact with his battery regardless of his location.

The remaining seven 194 sets are assigned to headquarters battery. Of these, three (designated as 1, 2, and 3 sets) are set up near the FDC for battalion-battery contact before wire circuits are complete, or to contact the forward observers, or as an emergency channel for fire commands. These three sets are carried in modified saddle bags, and the operators are of course mounted. Other sets may or may not be carried mounted, preferably not, as there is always the chance of a horse falling, or breaking loose, and so ruining a set. Sets 4 and 5 are really spares, but are often used for Bn CP-Bn OP contact if wire circuits are not complete or are not to be used. Also, these two sets are valuable to the battalion commander as a means of maintaining contact between himself and the battalion position area should he leave for reconnaissance, conference, or such. Mention will be made of this battalion commander's net later. Sets 4 and 5 are also useful for keeping direct contact between old and new position areas during displacements,

or are available to form another liaison section if required.

Sets 6 and 7 are assigned, one each, to each liaison section. An additional 194 per liaison section would be highly desirable, as it would give the liaison officer opportunity to establish contact between a point from which he could observe fires and the CP where his radio truck would normally be kept. CP's are rarely established in locations which are also good OP's. Unfortunately, there are not enough radio sets issued so that they may be placed everywhere they might be desired.

Exception may be taken by some regarding the number of radio operators required for this scheme and their allocation to sections. Naturally any plan requires certain disposition of personnel. If this disposition is slightly different from the normal, a bit of thought and reorganization is necessary. Such rearrangement can and has been done, simply, and without stripping any section of its necessary personnel. There is no reason why a soldier can not do more than one job, and some jobs do not have to be done by an NCO all the time. Again it's a matter of doing the very best you can with what you have.

Often so few 194 channels are assigned to an artillery battalion that efficient use of the 194 sets is hampered. Seven channels are the minimum that should be assigned to a battalion. If 194's are used for liaison work, the number of channels should be increased to nine. Now that the 10-meter amateur band is closed to amateurs, use can be made of the lowest numbered channels of the 194 set without fear of outside interference. Artillery units working with cavalry are singularly fortunate in that they are the only units in a cavalry division using frequencies lying within the 194 range.

Two channels are assigned to each gun battery. One is always used by the A set, the other always is used by the B set, regardless of the net in which they are working. Note that the A and B sets do not change channels. These channels should be widely separated, preferably one in the A coil and one in the B coil range, using the lower frequency channel (A coil) with the B set and the higher frequency with the A set. Slightly better results in working over long distances and broken ground forms can be expected when using the lower frequency. Normal working distances of the A set are much shorter and hence the higher frequency will be found sufficiently satisfactory.

Note that in all work with the A, B, and C sets of the gun batteries, that it is the sets contacting these battery sets which change to the battery channels, and not the opposite. Note also that only the C set ever has occasion to change channels. Several reasons suggest this system; battery radio operators are generally not as well trained as those of a headquarters battery, nor do they usually have the immediate and close supervision of several radio experts. Furthermore, information as to changes in radio nets is generally difficult to get to the gun batteries without lengthy explanations. Consequently, the simpler the radio scheme can be made for the gun batteries' radio operators, the better the entire plan will function. Any additional channels assigned to the battalion are kept for the use of battalion headquarters. These may be used as a battalion commander's channel, liaison channels, by survey parties, and so on.

Displacement of the battalion by echelon can be classed as: (1) one battery displacing forward initially followed by the remainder of the battalion; or, (which is the same thing) two batteries displacing to the rear initially followed by the remaining battery; (2) two batteries displacing forward initially, or one battery displacing to the rear initially; (3) battalion displacing forward or rear, by echelon, by battery.

Case 1: Figure 1 shows the radio sets of the battalion with battery sets under battalion control. Figure 2 shows by dashed lines the normal radio nets of the battalion (battery sets under battalion control), and by dotted lines, the radio nets after initial forward displacement. Only a forward movement is shown; the representation of a retrograde movement is obvious. The important step in this displacement is the attachment of radio set 1 and operator to the displacing battery. This set works with the 194 set of liaison section 2 (set 7); the A set of the battery works with set 6 of liaison section 1. Contact from battalion to displaced battery is maintained either through the 245 liaison net and thence by 194 to the battery, or by the use of sets 4 and 5 to maintain a direct net from the old to the new position area. During this initial displacement, the FDC continues to handle liaison fire missions as usual, using the remaining two batteries for their execution.

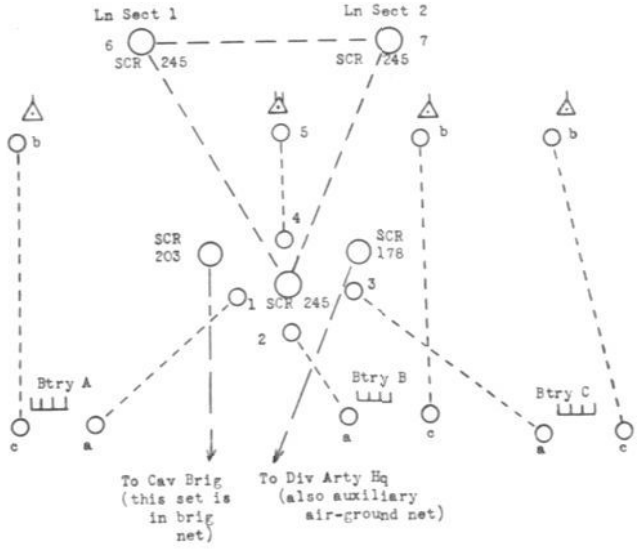


Figure 1.—Radio nets of the battalion; radios under battery control. Wire circuits not yet installed or not to be used. Battalion sets are numbered; battery SCR 194 sets are lettered with lower case letters.

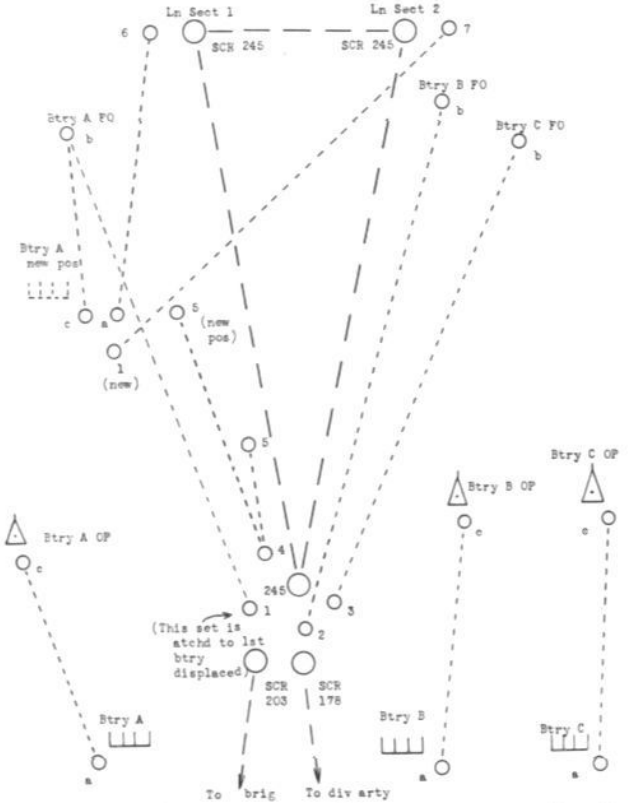


Figure 2.—Displacement, case 1. Wire circuits are used in this plan, although only radio nets are shown. Battery radios initially under battalion control are under battery control until displacement is completed.

FDC and CP installations displace to new positions (where wire, if needed, has already been laid) just ahead of the remaining two batteries. Displacement is ordered only after the displaced battery has reported that it is ready to take over fire missions from both liaison sections. This battery then executes all liaison fires until the FDC and one other battery is in position and ready to function again. Communication during this phase must be sure, prompt, and coordinated.

Some of the prearranged messages which could be used during this movement are:

a. From Bn to Ln sections, and from Bn to battery FO's: WORK WITH (*call name of set*) ON (*channel*). DISPLACING ACCORDING TO PLAN (*type of displacement being executed*).
b. From Ln section to Bn: COMMUNICATION ESTABLISHED AS DIRECTED.
c. From displaced battery to Bn: READY TO TAKE OVER ALL LIAISON FIRE MISSIONS.
d. From Bn to other batteries: EXECUTE DISPLACEMENT AS ORDERED.
e. From Bn to Ln sections (after displacement is complete): FIRE DIRECTION CENTER WILL TAKE OVER LIAISON FIRE MISSIONS. LIAISON 194 SETS CLOSE STATION.
f. From batteries to forward observers: BATTALION WILL CONTACT YOU DIRECT. I AM CLOSING STATION.
g. From Bn to FO's: CONTACT YOUR BATTERY BASE SET. I AM CLOSING STATION.

These messages are best expressed by one code word. For example, in one battalion, names of states are used for the messages, names of cities for frequencies, and names of colors for the type displacement that is to be executed. Batteries are normally informed of these matters by telephone, hence these code words are rarely used with the batteries.

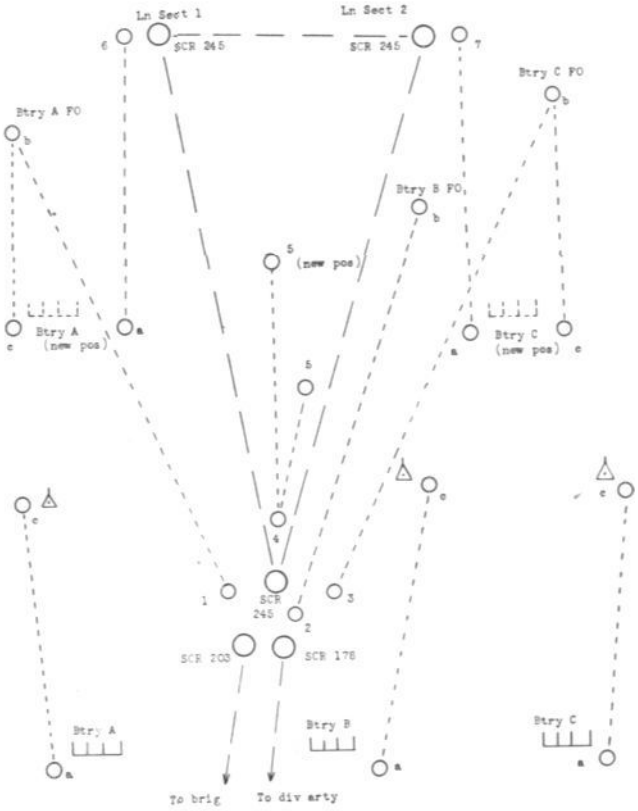


Figure 3.—Displacement, case 2. As in Fig. 1, wire circuits are in use but not shown hereon. Battery radios initially under battalion control are under battery control until displacement is completed.

Case 2: Figure 3 represents the disposition and use of radio sets in this type of displacement. The A sets of the gun batteries work with the 6 and 7 sets of the liaison sections. No set is attached from headquarters battery. Contact between old and new position areas can be maintained as in Case 1. Required prearranged messages are also similar. FDC and CP installations displace ahead of the remaining battery, but *after* the batteries initially displaced report that they are ready to handle liaison fire missions. During the displacement of these

two batteries the FDC handles liaison fire missions, but only one battery is available for the execution of these missions. During the displacement of the FDC, batteries execute the fire missions of the liaison sections with which they are in contact.

Case 3: This is merely a combination of the previous cases. No figure is shown for this type of movement. The displacement of the first battery is the same as Case 1, except that no radio is sent to this battery for contact with a liaison section. During the displacement of this battery, the FDC continues to handle liaison fire missions as usual. When the first battery to displace is ready to execute fire missions of *one* liaison section, the FDC and CP installations displace with the second battery, leaving the remaining battery to execute the fire missions of the other liaison section. When the FDC and the second battery are ready to function in their new positions, the FDC resumes the handling of liaison fires, using the batteries in the new position area for their execution. Contact between new and old position areas can be maintained as indicated before, through the liaison sets; or set 5 can be sent with the first battery, using set 4 as a base set at the CP. However, when the CP displaces, this base set must be sent to the battery remaining in the old position area in order to provide continuous communication with this battery. Prearranged messages are similar to previous cases.

Comments: When using such a communication plan as outlined above, note that: (a) all personnel concerned must be familiar with the plan and also the prearranged messages used; (b) since batteries act as their own FDC during displacement, each battery must keep its observed fire chart and/or firing chart up to date, and it is a primary responsibility of the FDC to see that batteries are informed of fires delivered as soon as possible; (c) continuous radio contact between liaison sections and the FDC or batteries is maintained; (d) at least one battery is always available to execute fires called for by liaison officers; (e) contact, either direct, or indirectly through liaison sections, can be maintained between the new and old position areas.

If sets 4 and 5 are not in use or can easily be spared, it is advisable that one of these sets be sent with the first echelon to displace and that the other remain with the last unit to displace. This provides more direct contact and does not bother the liaison section operators with the necessity of relaying messages. It is in situations such as this that another 245 set would be ideal. This set could accompany, and be assigned to, the battalion commander. With it he could keep in constant touch with his CP and yet also follow the action of supported units as reported by the liaison officers. He could be kept informed of the missions fired, and if necessary, could prohibit the firing of certain missions. He could accompany the brigade commander on reconnaissance and yet issue warning orders to his battalion while still several miles and minutes away from his CP. Wherever he went he would always be in touch with his battalion—a feat usually difficult to achieve, but which always gladdens the heart of a commander.

Other agencies of communication have not been mentioned in this discussion, for in fast moving actions, it is upon radio that the greatest reliance must be placed. Naturally, wire is used whenever possible. The wire net may be built up from a simple battalion circuits-to-gun-positions plan, to a complete installation using simplexed circuits to battery switchboards. Frequently useful is a hybrid type of wire net in which battalion circuits are laid to battery switchboards in the vicinity of gun positions, but no battalion switchboard is installed. Direct lines are used at the CP, there being no battalion locals. As batteries have few local lines, the time required for a battery to pick up its wire, using this system, is about the same as that required for headquarters battery to pick up all its lines. Installation and pick-up of locals is always time consuming. Time permitting, simple wire nets should always be laid in the new position area prior to displacement. As batteries are displaced, wire to these units can be picked up, thus constantly decreasing the number of circuits that are in use. In very rapid retrograde movements the last lines may have to be abandoned. Despite the promise of wire issue being continuous in combat, it still seems good judgment to pick up all the wire possible provided that in so doing, equipment and personnel are not needlessly exposed to loss or capture.

It is impractical to lay wire to liaison sections operating with cavalry. Seldom is wire laid to battery forward observers, unless the situation has stabilized to a considerable extent. Artillery operating with fast moving troops may occupy several positions during a day's action, and before resupply of wire can be accomplished. It is folly to lay so much wire that it is not available when needed for other positions. Consequently two circuits are seldom laid from gun position to battery OP. The battery radios are always available as an auxiliary channel.

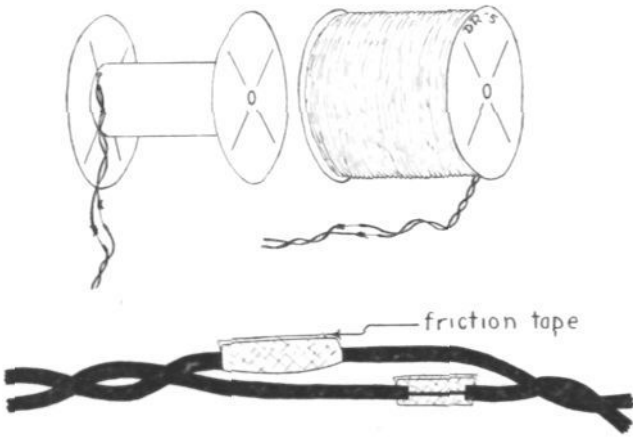
The use of visual signalling should be exploited to the maximum. Mocked by some, nevertheless a knowledge of visual signalling, particularly semaphore, is essential. It can be used not only for fire control but is quite helpful to liaison sections, survey sections, ammunition and ration parties, patrols, marching columns, and in numerous other situations.

As has been mentioned before, the 194 set is not suitable for liaison work, because of its limited range and undesirable characteristics which prevent netting. These sets could probably be used in three or more station nets if a stage of tuned radio frequency were placed ahead of the detector. This would largely eliminate interference caused by the super-regeneration of other 194 sets on the same frequency. However, much of the maligning of the 194 set is not justified. A very great deal depends on the training and intelligence of the operator, and his comprehension of the characteristics of short wave

transceivers. Ground forms, trees, rain, etc., need not prevent satisfactory communication with the 194. This statement is based on several years' experience with these sets in widely separated parts of the country under nearly all types of weather conditions. Invariably an experienced operator can make satisfactory contact with another station. This can be generally done by: relocating the set; replacing the battery at the proper time; very accurate calibration; knowledge of tuning; and proper use of the microphone. However the set will not work if it is allowed to become wet or if much moisture collects in the antenna mounting socket. Perhaps the best reason for getting the maximum performance out of the 194 is that until something better is issued it is the best obtainable at present; therefore it should be used as efficiently as possible.

The use of radios as described in this article is presented not as anything startlingly new or as a paper scheme. Portions of the plan have been used for years, and all have been used and found feasible during firing, RSOP's, exercises, and finally during the recent Louisiana maneuvers. Still not perfect, improvements are constantly suggesting themselves. Recent work with an experimental, battery operated, crystal controlled, transceiver, using acorn tubes, and working on about 4,000 kilocycles, indicates that replacements for the 194 set will not only be more satisfactory, but will considerably widen the possibilities of intra-battalion radio nets.

SPEEDING SPLICES



The principal source of delay in laying wire over considerable distances, or where a reel runs out, is the time required to make the necessary splices. A properly made splice is time consuming under the very best conditions, but any time saved through slighting the care in making the splice is false economy. However, the process may be shortened somewhat by preparing the drum for splicing, in advance. It is obvious that no portion of the procedure of splicing that comes after the tying of the knot can be accomplished before the actual time of splicing. On the other hand, the ends of the wire may be stripped of insulation at any time.

When filling an empty drum leave three feet on the end of the line untouched, for knotting and securing the line to the drum; crush and strip the insulation from the strands at this point. Care must be exercised to insure leaving the necessary plier-length between the two bare sections and stripping the insulation toward the end of the line. If the line were to be wound on the drum without further action it would be impossible to test the line on the drum, since it would short-out through the metal of the drum, and the bare portions would be susceptible to rust. Therefore, it is advisable to cover the bare wire with a strip of friction tape as shown in the sketch (notice that the tape is laid longitudinally rather than wrapped around the line as in splicing). When the drum has been completely filled, the process is repeated with the free end. This should be done when the line is picked up, since time is not then at a premium as it is when establishing communication. A wire crew using this system and coming to the end of a drum merely rips off the tape, cuts the wire on the side of the stripped portion nearest the end of the line, ties the knot, and continues the splicing.

LIEUT. WILLIAM P. FRANCISCO.

DRIVER'S TEST

By Lieut. Colonel O. F. Marston, FA

Rapid motorization and mechanization of our forces, plus the mass induction into the army of untested civilian drivers, has brought to the front, in importance, the development and use of a practical "driver's test." Such a test has been attempted and acclaimed successful by civilian authorities. But that test could handle only eight to ten drivers per hour. It was, therefore, much too slow when there were possibly millions to be tested.

At the Field Artillery Replacement Training Center, Camp Roberts, California, Lt. Carl H. Christensen was assigned the task of developing a usable, systematic series of tests. He believed that the field artillery driver should be able to see clearly to a reasonable distance under normal conditions, that a driver ought to be able to watch the road ahead and at the same time see traffic approaching from side roads to right or left.

A driver's judgment of depth or distance must be such that he could know when he has sufficient clearance for passing and when he has sufficient speed and time to cross intersections before traffic traveling perpendicular to him would reach that crossing.

The safe driver should have the "feel" of his vehicle. He must be able to tell when he is driving too fast for a curve, when his car slips on a turn, when his vehicle is reaching the danger point (or near tipping) on hillside driving.

Last, and very important, the military driver must react mentally and physically with such speed and coordination that only fractions of seconds should pass between his sighting a danger and his trained reaction to that danger.

Clearness of Vision—20%

20 - 20	20%
20 - 30	10%
20 - 40	5%
Over	*0

Field of Vision—20%

170 deg. & over	20%
169 to 160	10%
Under	0

Stability—20%

0 - 1	20%
1⅛ - 1¼	15%
1⅜ - 2	7%
Over	0

Depth Perception—20%

0 - ½″	20%
⅝ - ⅞″	15%
1 - 1¼″	7%
Over 1¼″	0

Reaction time—20%

Under .50 sec.	20%
.51 to .55 sec.	15%
.56 to .60 sec.	10%
.61 to .70 sec.	5%
Over .70 sec.	*0

*No driver's license authorized.

Figure 1: Percentage table for Drivers' Tests, used at the F.A.R.T.C., Camp Roberts, California. The total cost (excluding labor) to provide the testing devices used in these tests was $2.48.

Lt. Christensen divided the complete test into five (5) separate units. Each was given a possible score of 20%, all included on one score sheet to make a total possible of 100%.

The units are (1) *Clearness of Vision*, (2) *Field of Vision*, (3) *Depth Perception*, (4) *Stability*, and (5) *Reaction Time*.

Each candidate must score 70% or above to be qualified for a driver's license. A score of 0 in either (1) Clearness of Vision or (2) Reaction Time tests disqualifies a man for a military driver's license.

Following are explanations and pictures of the tests and test devices developed and designed by Lt. Christensen.

TEST 1, CLEARNESS OF VISION

A standard Snellen Chart was actually used, rather than accepting the results of physical examination records.

TEST 2, FIELD OF VISION

The testing device is secured to a wall and consists of a horizontal board with movable arms pivoted at the center and correlated with protractor markings for each arm. Each arm supports a pointer which is placed so close to the wall that the soldier when in position cannot see it. The testee stands under the horizontal board with the back of his head resting against the wall. He looks at an object straight ahead. The instructor then moves the right marker forward until the soldier can see the pointer vaguely, as one might say, "from the corner of his eye." An instructor checks to see that the soldier is looking straight ahead. A like procedure is then followed with the left pointer. The protractor is then read

for each side. (Note: Zero for each protractor is straight ahead, i.e., 90 degrees from the wall, and is marked around to 100 degrees, each toward the wall. Setting 90 degrees with both arms would put the arms parallel to the wall.) The sum of the two readings is the field of vision for the soldier. Repeat the test to catch cheaters. Non-cheaters set repeatedly in the same place and get the same field of vision.

This Field of Vision test is to determine whether the soldier has so-called "Tunnel Vision." It is imperative that the driver has a vision scope sufficiently wide to pick up traffic details to the side even though watching straight ahead on the road. A normal field of vision is about 170 degrees. In the tests that have already been concluded, a few prospective drivers have been found whose field is less than 80 degres. Such a man could not possibly notice dangers approaching from side streets without turning his eyes from the road where they belong.

TEST 3, STABILITY

The improvised testing device used is secured to a wall. It has a "T"-shaped arm which is suspended so that it stands approximately perpendicular to the wall and at about the height of an average man from the floor. The arm may be any desired length but should be long enough that the man being tested must stand clear of the wall. A pencil, point down, is attached firmly to the free end of the arm. It has no horizontal movement but can move vertically for testing purposes. On the wall there is an instant adjustment to accommodate the varying heights of men tested. The pencil rests lightly on top and near the center of a piece of plain paper which is attached to a clip-board, in turn fastened securely to a special cap worn by the subject. Those being tested stand at attention during the test. As they "wobble," or move even very slightly, the pencil, which remains fast, records those movements on the paper. Twenty seconds is sufficient time for the pencil to remain in contact with the paper. Then the paper is removed and, measuring the distance across the pencil marks, is graded according to the table (Figure 1).

TEST 4, DEPTH PERCEPTION

This test determines whether the soldier can ascertain that he has or has not "passing clearance" as regards vehicles approaching in the opposite lane. It also tests the soldier's ability to tell his comparative speed in reference to other vehicles in his immediate traffic which are traveling in either the same or opposite direction on the highway. While judgment enters into the picture in so far as actual highway driving is concerned, one who fails in this test will be lost on straight desert highway where there are no fences or telephone posts to assist him.

The testing device (Figure 2) consists of a box inside which two vertical rods of identical color, lustre, and texture are visible through a window, cut toward the soldier being tested. The soldier can see neither the tops nor the bottoms of the rods. One rod is stationary, the other travels forward and backward (remaining vertical) along a track in the floor of the box. The movable rod is actuated by means of a string "reins" which are pulled by the testee who stands 20 feet from and on an approximate level with the device. A light inside the box provides illumination.

Figure 2: The depth perception test, No. 4. Distance, box to man, 20 feet. The testee holds "reins" by which he controls the movable rod (nearer light).

Procedure: The soldier takes his place, light is turned on to give exactly equal illumination to the rods, soldier pulls the strings until he thinks the movable rod is exactly even with the fixed rod. If exactly correct, the pointer attached to the movable rod would read zero. Settings other than perfect are shown by the scales marked in inches and fractions of inches along the track. Three tries are given, the testee dropping the reins after each try. An average is taken for use on a scoring sheet.

TEST 5, TIME REACTION (KOLOMOMETER TEST)

This testing device, designed by Lt. Christensen, has been named the "Kolomometer." Built by artillerymen at Camp Roberts, it operates as follows:

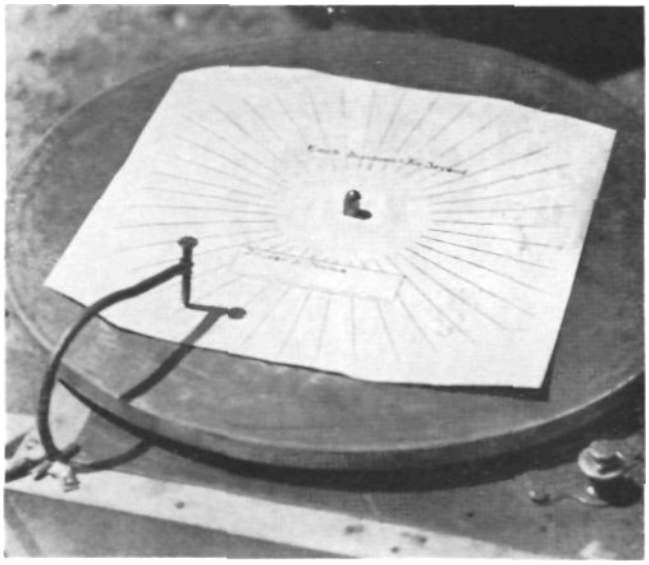


Figure 3: Kolomometer spark gap and record (reaction time test, No. 5. Screw carries spark which burns paper on revolving phonograph disc when testor closes a switch, driver breaks current by pressing on brake.

The primary circuit of six volts from the truck voltage regulator box is brought through a concealed switch, attached to the foot-brake lever arm, then through the testor's hand switch, through a door-bell buzzer in parallel with a Model "T" Ford spark coil, then grounded to the truck frame. The secondary circuit travels from the positive side of the spark coil through a screw point spark gap opposing the metal turntable of a spring-wound phonograph motor (Figure 3), then back to the negative side of the spark coil completing the sparking circuit. For testing, the front body seat is removed from a weapon carrier, and a plank, with the "Kolomometer" attached, is placed in the seat position. A mimeographed paper record (Figure 3) is placed on the turntable (an individual record is used for each driver tested) and under the screw spark point (Figure 3). A heavy disc is placed on the paper record to hold the record from blowing if the vehicle is traveling. If the test is given while the truck is moving, the brake switch is closed. The testor's hand switch is open. When the testor closes his switch, the primary circuit is fully closed, causing the buzzer to sound. At the same time, a spark burns through the paper record which is revolving at 15 revolutions per minute. When the buzzer rings, the driver brakes as quickly as possible. The first ¼th inch movement of the brake pedal opens the brake switch, stopping the buzzer and the spark. Then the paper record is removed. The spark paths cut in the record are read to 1/100th of a second. The entire device may be installed in or removed from a truck in about ten minutes, and is easily installed in any military truck or command car.

Using these devices in giving tests, the Camp Roberts Field Artillery Replacement Training Center has been able, with a trained test crew, to test men at the rate of sixty to eighty per hour. The "Kolomometer" test may be used either on the road or with the vehicle in park. Thousands of tests have shown that the reaction shows no marked difference in moving and stationary vehicles.

CAUSES FOR REJECTIONS

(Some Miscellaneous Rules)

No man whose total score on the series of tests is below 70 per cent shall be allowed to drive, nor shall he be issued a driver's license. No man failing either the Clearness of Vision test, Test 1, or the "Kolomometer" test, Test 5, shall be issued a driver's license. Any man now holding a driver's license who fails to pass the above tests shall have his driver's license cancelled. All men sent to the field forces from the Camp Roberts Artillery Replacement Training Center as drivers have passed this test.

If the figures and explanations shown are not sufficiently clear for practicable use by interested organizations, the Commanding General, Field Artillery Replacement Training Center, Camp Roberts, California, will furnish working drawings and detailed descriptions to the Commanding Officer of any organization upon application.

LEADERSHIP

A few years ago the Carnegie Foundation, by investigation and research, pretty well established that 85% of our success was due to ability to lead people and only 15% was due to technical knowledge, so we cannot be surprised that General Marshall tells the appropriations committee of our Congress that the candidates for officer candidate schools shall be selected on the one qualification "Leadership," "all other requirements shall be secondary," "even to education."

Someone has said that "education is the ability to meet life's situations." Not knowledge, but action. Knowledge alone will get you nowhere. It's the way you use it that counts.

—COL. WILLIAM N. DAY.

It is easy for a battery commander to enlist the intelligent support of his men in maneuvers or in combat if he will take the trouble to give them a brief, clear discussion of the Principles of War. This will stimulate and hold their interest. People always do well at those activities in which they are interested. Lieut. Addington's article furnishes excellent material for the BC.

RULES OF THE BIG GAME

By Lieutenant Jerry S. Addington, FA

SAVANTS claim that the art of making war is nothing more than an execution of the highest form of common sense. Consequently the rules by which war is made must be simple. The tools for making it may change, but the rules do not, for they are based on human character and actions.

Military textbooks list nine principles of war: the *offensive*, the *objective, mass, economy of force, movement, simplicity, security, surprise*, and *coordination*. They are quite often discussed in just that order, and so they shall be here.

First there is the offensive. Before going any further the reader should ask himself, "Has any football team ever won a game without carrying the ball?" Then it becomes apparent that the offensive is one of the main principles of war. The French used to say, "toujours l'attaque"; but of course it is not always possible to attack, in which case the defender can only hope to tie the score on his particular front while the main effort is made somewhere else on the battlefield. In order to attack, troops are moved up near their battle positions almost always at night so that they may seize the initiative as soon as possible when daylight comes. To be able to attack does not necessarily require a superiority in men or materiel, but it does require superior firepower or maneuverability. The attacker carries with him the advantage of choosing his own field of operation and of keeping the enemy guessing from where his main effort is coming. Germany has gained all her military victories through being able to attack violently, seizing the initiative and keeping her enemies guessing. Russia has been able to stop the Germans by being able to counterattack violently.

When it comes to the objective many people have the wrong conception of what the objective of a field force is. Is it cities, mountains, or the enemy army? Without a doubt it is the latter. The ultimate objective of a military force is the destruction of the opposing military force. Did Napoleon win when he had taken Moscow? Has Hitler won now that he has taken control of more than half the capitals of Europe? For various reasons, cities may become intermediate objectives. Mountains or other terrain features may become intermediate objectives if they afford favorable positions from which to destroy the enemy army. On our own maneuvers in the Carolinas and Louisiana we have attacked with the mission of taking certain positions from which it was possible to drive back or encircle the "Reds."

The third principle of war, mass, we can better understand because victories in modern war are won by great masses of artillery fire, tanks, motorized infantry, and other mechanized units, all thrown in at the decisive time and place. It is necessary to use a large number in order to effect the "breakthrough" or "close-in turning movement," and in order to execute a most devastating "mop-up" after these movements are accomplished. A more common analogy is in this: you wouldn't take a tack hammer to drive a rail spike. You would want a sledge. We have read how successful the Germans have been in the Low Countries and elsewhere in Europe through their use of an overwhelming number of troops and materiel. On our maneuvers and in war we mass our troops somewhere along the line or on either flank in order to effect a "breakthrough" or "turning movement."

There is some limitation, however, as to the number of troops that can be employed under the principle of mass, for the critical place, for all its importance, is not the only front on which the war is being fought. It is necessary to hold or "contain" the enemy on other fronts. The fewer the number that can do this job successfully the more force that can be put in action on the main front. There are also flanks and rear areas to be protected, which is more important now than ever before because of the advent of speedy tanks, air-borne and parachute troops, and long-range bombers.

In order to strike the effective balance between the number of men and the amount of materiel to be employed on the main front, or main effort, and the amount to hold the enemy on all other fronts the commander

must use the principle of economy of force. Economy of force was very markedly demonstrated in 1940 when the Germans held the Maginot Line busy in front, and made a holding attack in the Low Countries, while their tanks and motorized columns poured through the Sedan gap. We have seen or read about the economy of force used in the Louisiana maneuvers of 1941 wherein the cavalry made the encircling movement. That same economy of force played its part in the Carolina maneuvers, where several turning movements were accomplished.

It is hardly necessary to expose the merits of the principle of movement. It is easy to understand that wars cannot be won unless troops "get in there and hustle." The greater the mass and the faster the movement the more severe is the blow. Science as well as war proves it. The Germans have used this principle to great advantage in a method of war called "blitzkrieg." The mechanization and motorization of our own army is an effort to speed up the movement of our troops on the field of battle.

For many people the issuance of orders, the details of the action of every subordinate unit, the places they are each to be, and the times they are to be there, their missions, their objectives—all seems to be hopelessly complicated; and so it can become to even the wisest of military commanders if prudent use of simplicity is not made. So valuable is simplicity that it takes place as one of the most important principles of war. The plan as a whole must be simple; the orders to carry out the plan must be simple and written in simple words. Simplicity is the child of common sense. It is the grouping of these simple orders and missions of subordinate units that makes the whole picture often seem complicated. The American soldier demands simplicity. He can do anything if he is told what the situation is and what is required in simple one-syllable words. In many cases his failure to do what he is told is a failure on the part of his commander to use this principle of simplicity.

Movement under cover of darkness, camouflage, antitank and anti-aircraft artillery, air-raid warning systems, trenches, tank traps, mine fields, road blocks,—all these are methods of effecting and achieving the principle of security. Inattention to security means disclosure of the plan, for the enemy's eyes are glued on the actions of the opposing force. Security keeps the enemy guessing and the opposing force safe. It is the high regard for this principle of war that causes a soldier so many sleepless nights on his feet, on his horse, mule, vehicle, or caisson. It is this principle that causes the soldier to seek overhead cover, reverse slopes of hills, and ditches. There are no soldiers who went on the Louisiana or Carolina maneuvers in 1941 who did not come in close contact with this principle, and looking back on it can realize it now whether or not he did then.

To surprise the enemy not only affects his morale, but usually catches him with his defense in an improper place, or not quickly within call. It is possible therefore if surprise can be obtained to defeat the enemy quickly before he can set up a defense. There are two types of surprise, strategic and tactical. By reversing the Schlieffen Plan and coming through the center, Germany obtained strategic surprise of France in 1940. By the isolation of many small groups on the field of battle by small encircling movements German troops obtained tactical surprise. The Japs surprised the U. S. by their violent and sudden attack on Pearl Harbor. It is possible to surprise the enemy as to the numbers, position, and plan of the opposing force. A surprise on any one of these points is sure to make for success, but surprise on all three such as the Germans were able to obtain in the French campaign of 1940 makes success a certainty.

There remains only the principle of coordination. This is a word used a great deal by newspaper "experts" and sidewalk strategists, without their full understanding of what it means. Coordination means cooperation and teamwork; it can be obtained through unity of command and purpose. Each unit, *and each arm*, must play its part in the battle at the time and place needed and with the knowledge of the units around it. It is necessary for the commander of all these units to direct them all toward the common objective and keep them informed of the situation and progress made. Therein will lie intelligence which is so necessary for military success.

These are the principles of the art of war. They are few; they are simple. Each within itself is easy to understand, but the application of all of them to a situation without compromising one or more of them requires great military knowledge and experience. There is no end to the study of the application of the principles of war. The study is open to all.

In order to better understand battle news from abroad or of field maneuvers at home it is most enlightening to take the situation and apply the principles of war one at a time to either side and see just where they observed or failed to observe certain principles. Therein will lie the story of their success or defeat.

Sincerity and self confidence contain harmonies that will always move us and aid us in spite of resistance, and the only difference between success and failure is measured by action.

IS "TOUGH" INSTRUCTION ENOUGH?

By Lieutenant William Dobson Kilduff, FA

It's war, all right—there can be no doubt about that. It's war to the finish, war that will test not only our regular army and navy but our reserves as well, war that will call for all the manpower, trained and untrained, that we possess. Above all, it's war that will demand the very highest type of leadership, the very best sort of command from reserve as well as regular officers.

All that is obvious; it reads like an editorial from almost any U. S. newspaper *circa* December 8, 1941. But behind that paragraph lies at least one fact that is not obvious. Behind that paragraph lies a great question: how good are our reserve officers?

There are a variety of answers. As a recent R.O.T.C. graduate himself, this writer has been generally impressed with the ability of his fellow reserve officers. Moreover, he has several times heard veteran officers of the Regular Army express their approval of the manner in which reserves under their command handled themselves and their men. On the other hand, this writer has heard sharp criticisms of these same officers. He has also noted some who could never develop into unit commanders by any stretch of any imagination. Discouragingly, there are more than a few of this latter type.

With a tremendous number of "new" lieutenants—indeed, of "new" captains and even field officers—in the Army, it is inevitable that some should fail. But why so many? Even the non-professional observer must realize that there is something wrong with the way in which we select and activate our R.O.T.C. graduates. In fact, the disinterested critic must see that the entire system by which we now commission young college graduates is in need of careful examination. Even granting that many excellent men have come from the ranks of the "R.O.'s," we must admit that a number of relatively useless R.O.T.C. officers have turned up in the Army.

In a recent article in the FIELD ARTILLERY JOURNAL, Major Irwin A. Lex, FA, laid the blame on the method by which we activate our Reserve officers. In his essay, "Is It Too Late?" he declared that incoming officers—civilian soldiers, as it were—should be given a brief but intense refresher course before entering actual service. Major Lex wrote that instructors "of the hard-boiled type" could whip the newcomers into shape in a few brief weeks. Now, in general, Major Lex is quite right. Given the average commissioned reservist, a tough, experienced instructor can produce a good, working battery officer in an amazingly short space of time. That fact has been proven in the past and is now being proven again at Fort Bragg's F.A. Replacement Center, to name but one post. Indeed, recent press reports indicate that Lieut. Gen. Walter Krueger organized comparable schools for his officers—*after* these same officers returned from lengthy and instructive maneuvers.

But "tough" instruction is not enough. You cannot change a leopard's spots and you cannot make a dependable leader out of a perpetually embarrassed young R.O.T.C. lieutenant. Make him roll a shelter half a dozen times, teach him how to mount guard until he can do it in his sleep—you still cannot *create* a real officer, if the man in question lacks the presence and the personality which a commission demands. For source material let us look at Bragg once again. On that post all new arrivals at the Replacement Center are sent to school for a full and worthwhile month. Even Fort Sill men, the Artillery's aristocrats, attend lectures on such down-to-earth topics as personal hygiene and mess management. Better still, they actually do (as Major Lex urged) "disassemble a breech block" and service a 1½-ton 4×4. But what is the result? For the most part, graduates of that brush-up are excellent officers. They can handle men efficiently and they can run a battery competently. All of them, however, are not so useful. A small but persistent percentage simply cannot bear their fair share of the burden. Try as they may, study as they will, they cannot handle their responsibilities.

Why?

For the answer we must look far back—well past brush-up courses and "tough" instruction. Post-activation training such as that can do little more than put a quick shine on the product in any event. Instead we must look to the actual system by which these unfortunates got their commissions in the Army. By spending three class hours and two drill hours per week for four academic years and by attending a six-week summer training camp, these men were given lieutenancies in the Army of the United States. The courses which they took were never extremely difficult (on at least one campus, the R.O.T.C. courses have long been considered beneath the dignity of the true student); the drill periods were entirely too short to be effective; and the summer camp, for the men under consideration, was little more than a romp in the country. Except for the period under canvas there was little opportunity for students to exhibit their qualifications or their deficiencies. It was enough that they turned in passing grades when examination time rolled around, meanwhile turning up for drill once each week. Although high grades were rare, it was extremely difficult to fail one of those examinations. In short, a golden opportunity for men to drift into a commission with little interest in military science and no outstanding ability as troop leaders. Once a man was

accepted for the advanced course, he was almost a "sure thing" for a commission. Unless the medical examination cut him down, he was an officer in the Army of the United States.

Now, the officers of any army in the world live on a plane a cut above that of the ordinary citizen. In time of war they become exalted persons. Given life and death power over large numbers of men, they bear heavy responsibilities—a good officer must be a superior man in every sense of the word. The "average man," even the average college graduate is *not nearly* good enough. But at this writing, "average" and even below-average young men are being granted commissions.

It must be admitted, of course, that such is not the case with *all* R.O.T.C. units. At some schools (notably Auburn, V.M.I. and Louisiana State University) the cadet is only granted a commission if his instructors deem him a competent leader. Every effort is made to weed out those who would not come up to West Point standards. That is, where the military science faculty is of a superior order, the percentage of "useless" graduates is appreciably lower.

But at many other schools, alas, such is not the case. Even today, when almost every able-bodied college student is seeking a commission, inferior men are enrolled in R.O.T.C. units. The "gold rush" has given officer instructors a chance to pick and choose, but their selection is still imperfect. Some logical and, what is more, permanent system of selection must be installed. We cannot continue to permit the quality of R.O.T.C. units to vary with the competency of the military science faculty and with the international situation. We must institute a consistent system to insure a consistent product.

How? It is not a difficult question to answer. By extending the Army's efficiency rating system down to the R.O.T.C. cadets, obvious undesirables could be eliminated at any point in their military science courses. Semiannual reports would suffice. The employment of such efficiency reports would enable the P.M.S.&T. and his staff to remove men from the cadet corps without blasting their normal academic career. The large-*T* genius who cannot face a platoon of freshman on the drill field without stammering would, for example, be released from the R.O.T.C. unit and permitted to continue his engineering studies without scholastic embarrassment. That same young man, ill-fitted to become an Army officer, might be superbly fitted for any number of other valuable defense jobs.

Men on the order of that same "genius" are a lot more common than most R.O.T.C. instructors care to admit. They do not belong in line units. Until they are eliminated (and reclassification is *not* a suitable method) the Reserve Corps will never reach a state of maximum efficiency. For one thing, their training costs the Federal Government a considerable amount of money. For another, their presence in the armed forces destroys the confidence of the enlisted man in his superior officers. And finally, their inevitable removal from the Army will affect their personal lives, hampering their career for a considerable period of time.

There are, one hears, evils attached to the efficiency rating system. In actuality those evils are automatically eliminated if the system is organized and administered by competent senior officers. It goes without saying, of course, that an intensification of all training activities should accompany the change in practice and that all military science instructors should seek additional opportunities to "learn" their men: i.e., to become familiar with the progress of their career. By careful and judicious employment of efficiency ratings, R.O.T.C. instructors could quickly purge their units of men who for non-scholastic reasons were unfitted for commissions. The method is not ruthless and it works no unnecessary hardships. All it does is save the army the embarrassment of discharging unfit officers, and the officers the embarrassment of such a distasteful discharge.

As we have noted, the tremendous rush to enroll in R.O.T.C. units all over the collegiate map has forced military science instructors to choose the men for their courses. That is all very well, but remember that misfits still can slip by unnoticed even under the existing system of selection. Remember, too, that the "gold rush" will not continue indefinitely. When this war ends, the appeal of a commission will diminish, and—unless we watch out—the quality of the Reserve Corps will slump badly. We cannot let that happen. A commission in the Army of the United States should be a document given only to men of proven ability. Men who are "just good enough" will not do; they do not receive diplomas at West Point. Why reward them at other schools?

Every moment is a moment of decision. Form the habit of making them promptly. Procrastination kills even ambition.

SOME NOTES for FORWARD OBSERVERS

By
Captain Bernard Thielen, FA

THOSE excellent and timely articles on forward observation in the January FIELD ARTILLERY JOURNAL suggest certain details of technique, well known to experienced observers, that might profitably be brought to the attention of younger field artillerymen upon whom this important duty often falls.

Identification of points on the ground. — Although anyone who knows the most elementary principles of map-reading can orient his chart, the inexperienced observer often wastes a good deal of time by merely placing his chart in approximate orientation and attempting to locate various points by inspecting first the chart, then the terrain, then the chart again, and so forth—repeating the process for each point in which he is interested. A better method in many situations is to use large pins as a sort of alidade. One pin (call it the "eye-pin") is stuck firmly in the observer's charted position; another (the orienting pin) is stuck—also firmly—in any other readily recognizable charted point. Lining up the eye-pin and the orienting pin with the recognizable point as it appears on the ground (by actual eye-level sighting, *not* by bird's-eye inspection) will, of course, orient the chart. To locate the exact line to a third point on the ground the procedure is obvious: stick a "locator pin" temporarily in the chart position of the desired point, *check orientation*, and then sight from eye-pin to locator pin. Somewhere along this line is the desired point. Its location on the line can generally be determined by inspection or by range estimation.

This business seems so elementary as to be unworthy of mention, but the plain fact is that many junior officers and NCO's who know the theory of orientation get completely befuddled in practice simply because they do not come to grips with the mechanics of the job.

Recording uncharted fires.—As often as not, the forward observer is working without any chart—conducting fire merely by sensing range and deflection error. He is then faced with the problem of recording certain information which will serve to improve his subsequent initial data. Some experienced observers find that a crude panoramic sketch of the target area (Figure 1)

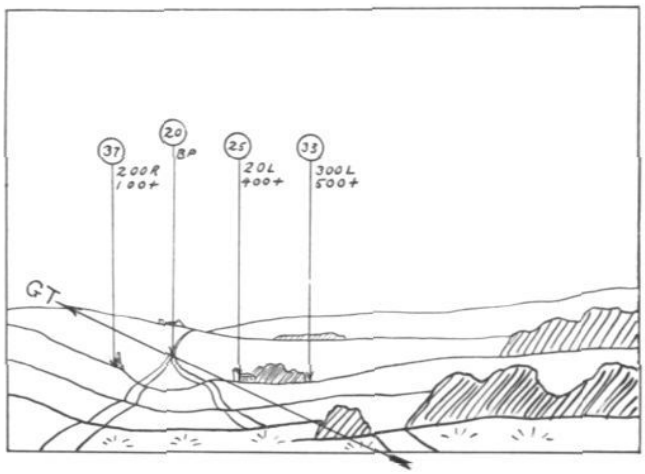


Figure 1

provides the most convenient record. This sketch need be neither accurate nor artistic; initially it will show only the principal ground forms, roads, wooded areas, and perhaps one or two conspicuous landmarks. As a target is fired on, a vertical line is drawn to the proper location on the sketch. At the upper extremity of this line is entered

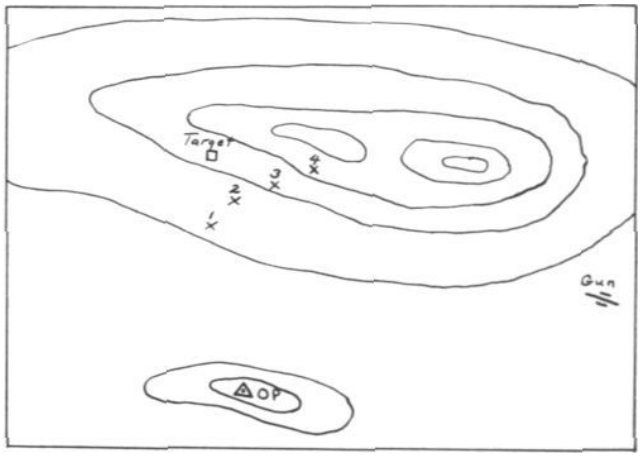


Figure 2.—Registration with one gun. Round No. 1 was sensed 200 Left, Range Correct. On the basis of this first round the observer was unwilling to change his range sensing throughout the problem, although the bursts, of course, moved steadily back as the deflection progressed up the hill. The students at the OP could not account for this phenomenon, except by accusing the battery of error, until the effect of terrain was explained to them.

the assigned number and, when the problem is over, the adjusted data in the form of a corrected sensing. Other information such as time, battery firing, nature of target, may be entered if desired. The general gun-target line may be sketched in as it becomes apparent. Such a record is particularly valuable in transmitting information to a relief observer.

Effect of terrain on trajectory. — In hilly or broken country the inexperienced lateral observer is often bewildered by the apparently erratic behavior of rounds fired at the same range and different deflections. Figure 2 illustrates an extreme example which was encountered in service practice. Although all four rounds were fired at the same quadrant elevation, the points of impact varied in range by more than 500 yards. Most observers can understand this effect of terrain when it is explained to them, but they need considerable practice before they learn to compensate in advance by intelligent "false" sensings. In fact, the principle involved cannot be overemphasized: the observer's sensing is not a literal statement of range and deflection error; it is merely a means to bring down the next rounds where the observer wants them.

Dead space.—Occasionally—not often, but occasionally—a target lies in dead space for a particular battery or battalion (or perhaps only for one particular propellant charge). Although this fact may not be apparent until a number of rounds have been fired, the observer must learn to recognize such a situation as soon as it becomes evident, *and report it promptly*. Often the mission can be taken over by another battery or by the infantry mortars. It will be helpful if the observer is accustomed to visualizing his trajectory—not only in the usual sense of a line on the ground but also with respect to its approximate curvature, its maximum ordinates, and its various angles of impact.

COOPERATION

A new civilization has been building for two thousand years. A civilization based on the words of that great teacher, the Man from Galilee. You recall the story—"I give unto you a new commandment"?

Today a mighty war is sweeping the world that has given unto us another "New Commandment." A commandment to cooperate. Cooperate or be destroyed, one by one. A commandment that challenges every forward step man has taken in these 2000 years of learning to live together.

As long as I can remember in my quest of the military arts, I have been constantly reminded that "Fire and Movement" dictated our every act, but now if we covet victory we must recognize a third powerful factor—Cooperation. Fire, Movement and Cooperation.

No longer is it possible for a handful of riflemen behind rocks to delay the march of a column through a pass, for progress has given to us much new material for combat and control of combat. All of these add to the intricacies of doing battle, demand close cooperation and the "will to win" thoroughly permeating every element.

Fire and movement are physical factors. The "Will to Win" is a mental factor. The higher command can contribute the maneuver that will give us full opportunity to exercise our skill in fire and movement, but upon you non-commissioned and junior officers, alone, rests the leadership that is going to produce the will to cooperate and win.

What, then, are the elements that tend toward cooperation? First on the list I would put "Poise," and volumes have been written on that subject. To me the position of a soldier at attention is a form of poise. The position correctly assumed is without strain, and the mental facilities are all alert and attentive as they must be for cooperation. Why, in military habit, do we request our men to come to attention when a superior approaches? Most certainly not as a disciplinary measure nor to impress them with his importance. Our food and comfort as well as our direction instructions come from a superior, and we assume the position of attention so that confusion and misunderstanding may be avoided.

He who goes forward armed with poise has a marked advantage. Poise is something more than a struggle against awkwardness. Physical exercise might give us suppleness of movement but the man who is endowed with poise enjoys a consciousness of his own worth without that adoration of self. Vanity transforms poise into egotism, while this consciousness of one's own worth kept aflame soon contributes that will to cooperate and win.

—COL. WILLIAM N. DAY.

Not in the BOOK

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

SHADOW-LINE LAYING

Major Marcos Lopez of the Chilean Army, recently a student at the Field Artillery School, outlined a method of laying a battery used in his army which is not contained in our "book" but might very well be. In principle it consists of using the shadow of a vertical stake as an aiming direction. Applied to our equipment it might be worked somewhat as follows:

The battery commander or RO has the shadow line of a vertical stake materialized on the ground at the guns and at the OP at or near the same time. With the OP instrument set up at one end of the line he lays the zero on the target and takes the reading to the other end of the line. He next applies the offset and converts the result into deflection as under any other method and sends the data to the guns. The Exec., having set up his instrument at one end of the shadow line at the guns, lays his instrument and then lays the pieces reciprocally.

It should, of course, be obvious that the system can be used only when there is a shadow and when the shadow line can be materialized at about the same time at the OP and at the guns. (The shadow of the tube supporting the head of an aiming circle comes in handy for this purpose.)

While the method is subject to some inaccuracies, it has advantages over laying by compass in that there can be no errors due to magnetic attraction or inaccuracies in the declination of instruments. It requires fewer computations than the aiming point method. Keeping all these limitations in mind, it certainly offers a "solution," thanks to our Good Neighbors. It should find its way into "the book."

LT. COL. H. D. KEHM.

EDITOR'S NOTE: In the January-February, 1934, issue of THE FIELD ARTILLERY JOURNAL, Lt. Col. (then Major) Erwin H. Falk, 185th FA, described a refinement of the "shadow line method." A wire "gallows" or inverted "L" is made of stiff wire about 3/16 inches thick; the base of the stem is bent U-shaped, and a small notch formed at the outer end of the arm. A plane table is set up; the thumb screw on the corner toward the sun is loosened, the U of the wire bracket slipped under, and the screw tightened; a plumb bob is suspended from the arm (the notch preventing its slipping off) so that it just clears the table; and a clean piece of paper is then placed on the plane-table. Identical apparatus is provided at the OP and at the gun position. At a given time or on signal (as by telephone), the shadow is marked simultaneously at both places, and is then materialized on the ground by placing one stake under the plumb bob and by sighting along the marked shadow-line to locate the second stake. It is usually desirable to refer to some distant aiming point (both at the OP and at the guns) so that the instruments can be set up in some convenient place nearby, less exposed than where the plane table was situated out in the sun.

CORRECTIONS FOR SIGHT DISPLACEMENT

In a defensive position where wide sectors of fire are required and trail arcs are provided, an aiming point must be visible to the pieces day or night. This compels the use of aiming stakes, which can be illuminated. When large shifts are made under these conditions, a deflection error is introduced which varies with the distances between the sight and the aiming point and the sight and the point of pivot.

In Figure 1, S represents the position of the sight with the

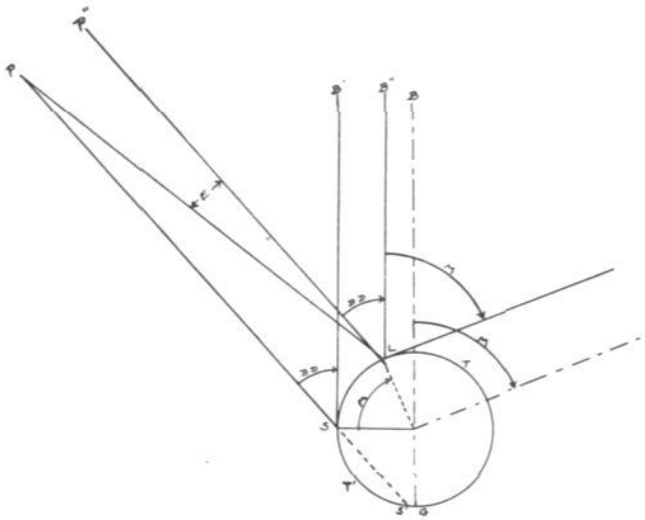


Figure 1

piece laid on the base line G-B; L is the sight location after a shift M has been made; E is the deflection error resulting from this sight displacement; and T, S', and T' are other sight positions as the gun is shifted further about its point of pivot. The deflection error (with aiming stakes in front of the piece when laid on base deflection) becomes increasingly right from S to T, decreasingly right from T to S', increasingly left from S' to T', and decreasingly left from T' to S; with aiming stakes to the rear, the direction of error is reversed.

The sight displacement error or offset can not ordinarily be computed accurately because the sight is seldom on the line perpendicular to the axis of the bore at the point of pivot. To measure the sense and size of the sight displacement error:

1. Set up an aiming circle in the vicinity of the piece to be checked. With the piece laid on base deflection, lay the instrument parallel to it by reciprocal laying.
2. Make shifts left and right on the instrument, in multiples of 200 mils; after each such shift, lay the piece reciprocally, have the gunner refer to the aiming point, and record his referred deflection.
3. Determine the sight displacement errors by computing the differences between the referred deflections and the deflections which the recorder would normally have computed by applying the announced shifts.

For example, with a recorded base deflection of 2857, the following results might be obtained:

Shift		*Referred Deflection*	*Computed Deflection*	*Error*	*Correction*
BDR	200	2656	2657	1 L	R 1
BDR	400	2455	2457	2 L	R 2
BDR	600	2254	2257	3 L	R 3
*	* *	* *	* *	* *	* *
BDR	1200	1648	1657	9 L	R 9
*	* *	* *	* *	* *	* *
BDR	2400	440	457	17 L	R 17
*	* *	* *	* *	* *	* *
BDR	3000	3043	3057	14 L	R 14
*	* *	* *	* *	* *	* *
BDL	3000	2646	2657	11 L	R 11
*	* *	* *	* *	* *	* *
BDL	1600	1253	1257	4 L	R 4
*	* *	* *	* *	* *	* *
BDL	800	457	457	0	0
BDL	600	258	257	1 R	L 1
BDL	400	59	57	2 R	L 2
BDL	200	3058	3057	1 R	L 1

From the data thus obtained, a chart or curve can be made and sight displacement corrections obtained by interpolation. They should be included on the work sheet for unobserved fires.

Sight displacement corrections can be obviated by using trail arcs centered about the sight rather than the middle of the axle. In any event, the necessity of using close-in aiming points for night firing makes some solution desirable, particularly when firing at long ranges.

CAPT. D. C. LITTLE.

A SURVEY SHORT-CUT

"A survey would take too long." How familiar! And how often has that sentence glossed over sloppy organization of position by a light or medium battalion. There are circumstances, of course, in which base pieces must be located by inspection or "shot in" by firing upon targets of known position. There will be rare occasions upon which there will be no time to locate gun positions on map or firing chart at all, and other occasions, almost as rare, when survey may be done at leisure. In general, though, anything which will serve to speed up survey without loss of accuracy is of real importance.

The writer wishes to speak, not as inventor, but as advocate of a method of measuring the distance between two occupied stations, a method picked up at Fort Sill some time ago.

At the far station a one-hundred yard perpendicular to the line sought is staked out on the ground; flags, lights, mirrors or aiming stakes may be used. At the near station this one-hundred-yard perpendicular is measured with an aiming circle. The distance is computed by the mil relation and then corrected for error in the artillery mil. Every redleg knows that there are 6280 true mils in a circle, not 6400. Use of the artillery mil, then, makes computations 120/6400 or roughly .02% too small. A desired distance, computed from an aiming circle measurement, must be increased by .02%.

This simple dodge is so much more fool-proof than conventional short-base and long-base intersections, and so greatly preferable to running a tape over rough ground or through underbrush, that the writer considers the man who first used it his warm, though anonymous, friend, and hopes to meet him in Berlin some day.

LIEUT. E. A. RAYMOND.

ORIENTATION BY SUN AND WATCH

Often a reconnaissance party will find itself in a position where the true azimuth to an object is desired in a hurry and there are no aiming circles handy. In such a case it is well to remember the method of woodsmen and Boy Scouts.

Hold a watch—preferably a pocket watch because of its larger dial—horizontally; point the hour hand at the sun; south lies exactly half-way between the hour-hand and noon; a bearing can now be taken. If the day is cloudy, hold a pencil or knife-blade vertically over the center of the dial, and the resulting shadow will indicate accurately the direction of the sun. The advantage of the knife is the narrowness of the shadow obtainable by rotating the blade. Note that allowance must be made for the effects of "daylight saving" or other large, arbitrary differences between local time and sun time.

This idea can be carried farther by pasting a large clock dial and hands on a rocket board, and drilling a hole in the center of the revolving arm in which to place the pencil. The arm must be allowed to swing free while the pencil is inserted in order to sight properly.

This method is probably more accurate than using an aiming circle which has not been declinated for some time, and is accurate enough to use in computing initial firing data.

C. G. RICHARDS.

HOW ABOUT A PICKET LINE FOR JEEPS?

Rightly acclaimed as one of this war's greatest contributions to the art of battle, the jeep (truck, ¼-ton, 4×4, to avoid misunderstanding) is proving a headache to headquarters battery commanders. With messengers, staff officers, visiting commanders, and agents using them, a myriad of the little things run in and out of every CP. Unfortunately any established track seems to present a challenge to the drivers of these highly mobile vehicles to find another and more difficult route. Moreover, many officers seem to consider it to be a crime to dismount and walk to the local installations. The result is a net of unnecessary tracks screaming to the aerial observer, "Here's the Xth Div Arty CP!" Also, it becomes dangerous to walk from the S-3 igloo to the kitchen in the dark, for tripping over one of them. In addition, S.O.P. in many instances requires fifty yards between vehicles. One solution is to declare the CP OFF LIMITS for jeeps. The installation nearest the main avenue of approach is, or should be, the message center. Therefore, in addition to his other duties, the message center chief can be placed in charge of the jeep park. It is his task to stop all jeeps (and other vehicles) attempting to enter the CP., dismount the occupants, direct them to the desired installation, and have the driver place the jeep in a previously selected spot. This is, in effect, making the message center chief the doorman, for anyone wanting a particular jeep merely calls the message center and asks for it. At the same time all the agents can be kept there, accessible but not cluttering up the operations section. Now where is that damn jeep? Call Confusion one-one; the sergeant has it camouflaged!

LIEUT. WILLIAM P. FRANCISCO.

Diary of War Events

EDITOR'S NOTE: The following diary provides a ready reference file for those who do not save newspaper clippings. For those who are unable to obtain adequate news coverage of the war, it gives briefly the essential day-to-day events. It will be continued as long as it seems to perform a useful function.

FEBRUARY, 1942

1st Navy Department announces destructive raid on Marshall and Gilbert Islands.
Manila Bay forts destroy flotilla of barges and launches assembled on south side of bay.
U. S. troops are getting settled in North Ireland.
British artillery on Singapore Island opens fire across Johore Strait.
Japanese bomb New Guinea and the Netherlands part of Timor.
Fighting continues on Borneo and at Amboina naval base between Celebes and New Guinea.
In Burma, British stabilize along west bank of Salween River.
Libyan British withdraw further to Maraua, 95 miles northeast of Bengasi, recently captured by Germans.
In Ukraine, Russians draw near Dniepropetrovsk on great bend of Dnieper River.

2nd MacArthur repulses attack by Jap shock troops
Japanese troopship is sunk at Singapore.
In Libya, Germans advance east of Barce, one unit reaching the Slonta district.

3rd Heavy air attacks on Singapore and Surabaya naval base.
Two landing attempts on west coast of Bataan are repulsed. On land front, three lines of Japanese trenches are over-run.
Japanese move nearer Australia, bombing Papua, only 320 miles away.
Libyan Germans reach Jebd-el-Achdar region, due south of Cirene.

4th Jap planes raid Rangoon, causing little damage. Two attempts to bridge Salween River fail.
Jap units infiltrating on Bataan are destroyed.
Chinese lose Poklo, 75 miles east of Canton, but capture 3 towns near Yochow.
Germans enter Derna, only 95 miles from Tobruk.

5th Heavy Jap troop movements to tip of Malaya.
In Burma, patrols cross Salween River above fallen Moulmein.
U. S. fighter planes in action in Netherlands Indies. Surabaya bombed again.
Japs try to take Waichow, 50 miles from Canton, to remove threat to supply lines; street fighting occurs.
Germany admits Russians penetrate 38 miles north of Kharkov.
In Libya, Rommel's forces approach Tobruk.

6th In Washington, Pacific War Council of the United Nations is set up. "Combined Chiefs of Staff" board is established; United States and Britain each represented by four high-ranking officers.

7th United Nations naval forces in Australia-New Zealand area are now under Vice Admiral Leary, USN.

8th Japs occupy Paulau Ubin, island in Johore Strait.

9th Japs get a bridgehead on Singapore Island.
Jap 2-day assaults on Bataan have all been repulsed. Manila Bay forts have silenced some Jap batteries.
In Burma, Japs still checked along Salween. American Volunteer Group claims its 101st aerial victory.
Alexandria suffers first bombing in five months. British bomb German naval base at Salamis, Greece.
Former French liner *Normandie*, being converted into naval auxiliary, burns and capsizes at New York pier.

10th Japs repair Johore Strait causeway, pour onto Singapore Island. They land on New Britain and Celebes, and continue Borneo advance.
Chiang Kai-shek visits Pandit Jawaharlal Nehru. Gandhi's successor as leader of All-Indian Congress party, in effort to arouse Indian masses to resist Japan.

11th Salween line breached; Japs capture Martaban.
Naval command of United Nations Far Eastern Forces shifts from Admiral Thomas C. Hart, USN, to Vice Admiral C. E. L. Helfrich, commander of Netherlands Indies Navy.
U. S. Troops are now on Curacao and Aruba islands off Netherlands Guiana.

12th German battleships *Gneisenau* and *Scharnhorst* and cruiser *Prinz Eugen* run the Strait of Dover, head for Heligoland.
Navy Department reports Jap losses in recent Marshall and Gilbert raid as sixteen ships destroyed, including aircraft carrier, cruiser, destroyer, 2 submarines, and 38 planes, plus havoc to shore installations.
Singapore defenders counter-attack 4 times.

13th U. S. reinforcements are in major Java cities; British and Australians are in Java and Sumatra.
Jap dive bombers in Bataan attack own troops by mistake.

14th Japs invade Sumatra, using parachute troops.
Second crossing of Salween is forced, near Paan.
Libyan Germans forced back west of El Gazala. British bomb Axis bases in eastern Mediterranean.

15th Singapore surrenders unconditionally; at least 60.000 men involved.
From Martaban and Paan, Japs head toward Thaton, on Martaban-Rangoon railway.

16th Japs take Palembang, chief city in south Sumatra, 269 miles from Batavia. Oil fields and installations destroyed. Practically no oil fields in Netherlands Indies are now producing.
Burmese British fall back to Bilin River line, 50 miles east of Rangoon-Lashio railway, supply route for the Burma Road.
Submarine shells Netherland island of Aruba, U. S.-garrisoned, 700 miles from Panama Canal; little damage to Standard oil refinery, but 3 tankers are torpedoed and a fourth off Curacao, nearby.

18th Japs cross Bilin River line, 115 miles from Rangoon.
Libyan Germans withdraw ot 90 miles west of Tobruk.

19th Axis Submarine activity continues; more sinkings in Caribbean and off our east coast.
Dutch are still fighting in Borneo, Celebes, and southern Sumatra.

20th Japs invade Bali, one mile off Java, and Timor.
Midget submarine sinks Brazilian steamer *Olinda*, the 17th recent loss off our Atlantic coast.

21st Naval and air battle raging over approaches to Java.
French battleship *Dunkerque* reaches Toulon, France, from Oran, in North Africa.

23rd Burmese British retreating toward Sittang River.
Australia puts Darwin area under martial law.
Submarine shells California oil refinery; damage negligible.

24th British north flank is driven across Sittang River.

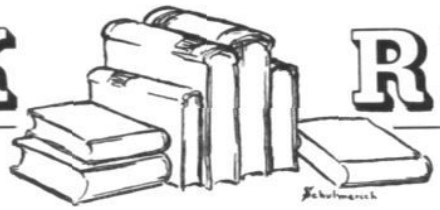
25th British reforming 60 miles east of Rangoon, burning that city, and evacuating region of Chittagong, India. 400 miles northwest of Rangoon.
Java now surrounded and cut off from Australia.

26th Bataan troops advance one to five miles, but do not penetrate main Jap positions.
British raid Kiel naval base, damaging *Scharnhorst* or *Gneisenau*.

27th Opposing fleets engage in Java Sea.
War Department reports army planes have sunk at least 19 enemy ships and destroyed 245 combat planes in Southwest Pacific, against loss of 48 planes.
Japs bomb and strafe Port Blair, capital of Andaman Islands in Bay of Gengal.
Vichy assures that Germany will not get its fleet.

28th Japs land at 3 points on Java, directly opposite Sumatra, 100 miles east of Batavia, and 90 miles west of Surabaya naval base.
Australians continue to bomb New Britain Island; the Japs, New Guinea.
Japs seem to have forced Burmese British west of lower Sittang River, and to have cut Rangoon-Lashio railway, supply line for China.
British successfully raid French coast near Havre, combining seaborne and parachute troops; destroy radio location station and suffer slight losses.
Pacific Fleet Headquarters announces submarine sinking of 44,900 tons of Japanese shipping.
At least 26 vessels have been sunk or damaged in United States Atlantic coastal waters since January 14th, when the U-boat campaign began.

BOOK REVIEWS



BRAZIL: LAND OF THE FUTURE. By Stefan Zweig. The Viking Press. New York. 1941. $3.00.

"There is no more excellent dessert than the ideal trilogy of coffee, sugar, and cigars," says Stefan Zweig when speaking of the economy of Brazil. That combination, however, is no more delightful and satisfying than this portrayal of our important neighbor of which we know too little. The book is delightful because it flows with the smoothness of sympathetic understanding and a discerning eye and mind; satisfying, because it answers so many of our mental questions without resorting to dry statistics or the technique of a Baedeker.

After fleeing Austria at the approach of the Nazis who later burned his finest works in the public square of Salzburg, Zweig visited England, the United States, and finally Brazil, which so charmed him that it became his home. The first years of his exile seemed to have no effect on him—he continued his writing and lecturing, and did everything in his power to help his fellow emigres. In some of his public statements in the last year or two, however, a note of despair could be found, though they still did not affect his literary work. His violent uprooting from Vienna, the only home he had known, and the tribulations of starting anew in his late fifties in a strange land with a new language, finally proved too much to bear, and on February 23rd he and his wife ended their lives at their home near Petropolis, the Brazilian summer capital.

Brazil has been blessed with good fortune from its earliest days. It was permitted to develop slowly, gradually, in its own way, It never was the pawn of European powers, since it had no spices of the Indies, no storied gold of Mexico or Peru, no spectacular riches promising quick profits for the impoverished courts. It offered only the products of labor, and has offered nothing else except during its half-century of "gold rush" two hundred years ago; those easy riches, however, were concealed from the world by as tight a censorship as the Chinese used to guard their secrets of silk, so the cupidity of foreign adventurers was not aroused.

Tolerance and understanding, with a long-range plan for the development of the country, were brought by Manoel de Nobrega and his Jesuit brothers with the first group of colonists. The motives of his Order have been suspected in Brazil from time to time, but its practical approach to the many problems and the solutions that looked beyond just the day, laid firm foundations that were never seriously challenged either from within or by foreigners. Even the miscegenation deliberately sponsored by the Church has had a steadily unifying effect, and has helped weld a cohesive nation, rather than encouraged a mere collection of provinces.

From the founding of the first Portuguese colony, some major product has developed just in time to save the economy of the country as another was failing for one reason or another. The original shipments of timber (used to make dyes) were followed by sugar, which with tobacco and chocolate were coveted by the European gourmands. When Manchester learned to spin cotton, the native bolls were exported. All of these were sent in the raw, the products of manual labor only, for Brazil lacked coal—the source of mechanical power had to be imported. So with the progress of the industrial revolution in Europe, Brazil began to lag further and further.

But "just as the seventeenth century produced its miracle of sudden prosperity with sugar, the eighteenth

with gold and diamonds, so did the nineteenth follow this up with coffee." And for a short time rubber also reigned. Coffee, though, is king as much as cotton ever was in our own South, despite the growing industrialization of São Paulo, where most of the immigrants have settled during the last fifty years.

Each product has in its turn drawn much of the population now here, now there, mixing it, keeping the language from degenerating into local dialects, and yet fixing a particular stamp on the cities arising one by one. Sugar raised Bahia, the first capital, to first position, with tobacco and chocolate doing their share. The marks of gold have nearly disappeared, but the new capital of Minas Geraes district, Bello Horizonte, like Washington and Canberra, is a magnificent example of the planned city. Rubber created the once-magnificent Manãos and Belém, the latter now one of the world's most important aerial crossroads: north to the Caribbean and the United States, west to Manáos, Peru, and Colombia, south to Rio, Santos, São Paulo, Montevideo, and Buenos Aires, and eastward to Europe. Coffee developed the port of Santos. And strangely enough, the site chosen by Nobrega as the finest in the country. São Paulo, is surging forward as the industrial center of the Brazil of the future.

THE OFFICERS' GUIDE, 7th Edition: $2.50.

COMPANY ADMINISTRATION AND PERSONNEL RECORDS, 11th Edition: $1.50 in stout plastic binder, $2.00 in boards.

This invaluable and inseparable pair of books have both just been revised to include new matter to February, 1942. Experienced officers find many an answer in them, and to new officers and new units they are indispensable.

The titles are briefly descriptive, but the contents offer a wealth of guidance. *The Officers' Guide* gives an excellent picture of the Army as a whole, and its educational system. It guides the new officer in his purchase of uniforms and equipment, on reporting to his first station, and on assuming his command. Highly practical help is offered on mess management, supply, courtesies and customs, privileges and restrictions of officers, and particularly the difficult questions of leadership that arise.

Company Administration is the Bible of the orderly room. Supply and property records, the company fund, morning and sick reports, duty rosters and service records, correspondence—all these and many more are *plainly* explained, with ample examples of properly accomplished forms.

The Military Service Publishing Company has been alert to keep these books up-to-the-minute, with all current instructions reflected. The result is a pair that are as much a "must" as the Firing Tables themselves.

DAKAR: OUTPOST OF TWO HEMISPHERES. By Emil Lengyel. Random House, New York, 1941. $2.00.

Dakar is so aptly described in this title that it is strange no earlier book on the subject has been published at any time, in any language. Lying at the point of Africa's bulge, it is closer to the Americas than is any other section of Europe or Africa; the distance to Natal is only 1,620 miles, or five hours by many planes. It lies athwart not only the European sea-lanes to South America, but also those to India and the Far East, since the Mediterranean has been practically closed and Suez is scarcely a ghost of its former self.

These events raised Dakar's importance practically overnight. But raised them from what? A mere cluster of mud huts near the mouth of a sluggish river? Not at all, is the surprising revelation. Dakar has long been the capital both of a country half the size of our own, French West Africa, and of Senegal, its most flourishing province. It has the finest harbor between Casablanca and Capetown. And from it, railways lead to the interior.

But what of the hinterland? We have been so accustomed to thinking of the French in connection with Paris, the Riviera, and perhaps *Beau Geste*, that we are prone to forget their ability as colonizers. The spirit of Pére Marquette and of the voyageurs of our West have not been lost, however; it has only been turned to face south instead of west, to exploit and develop this tropical colony.

Lengyel outlines the development of the country behind Dakar, both from the European point of view and with native history in mind. The relationship of events here to those elsewhere in the world, both currently and long ago, are brought out. He gives the story of Dakar itself, of the African empire stretching behind it, and—perhaps most important—of the islands which threaten to become bases in the very middle of the Atlantic. The Cape Verde Islands, the Canaries, Madeira, and the Azores all fit into the picture, not only of the book but of world events as well.

The author of *The Danube* and *Turkey* has given us another book of vital interest at this moment, and one whose material is not elsewhere available. It is definitely recommended reading.

THE JAPANESE ENEMY. By Hugh Byas. Alfred A. Knopf, New York, 1942. 107 pages. $1.25.

This little volume occupies a unique place among the flood of new books on the Orient and its people. It is timely, full of "meat" yet fascinating to read, and of much greater importance than its length or price would indicate, as compared with other recent publications. Mr. Byas, for many years the Tokyo representative of the *Times* of both London and New York, omits the customary geographical and statistical outlines in order to concentrate on the Japanese mind, on who rules the nation, what the war plan is, and finally what we must do to win.

He advances with good reasons the startling thesis that the Japanese attack was designed to benefit the island empire regardless of the outcome in Europe. In fact, it was planned with full realization of the possibility of Hitler's defeat rather than as a primary aid to the axis partner. With Japan, "charity begins at home" and rigid self-interest controls every action regardless of treaties with any other power.

The Japanese master plan and the vast reaches of the Pacific theater receive due attention, but perhaps most interesting is the exposition of the group dictatorship that rules Japan. The changing balance of power among the several groups explains the periodic shifts in foreign policy. In particular, the changed attitude of the navy and its moral degradation sometime after that of the army are of extreme importance.

After demolishing the thesis that Japan is a downtrodden nation of "have-nots," Mr. Byas closes with a forceful, cogent outline of the prerequisites to our victory.

APACHE DAYS AND AFTER. By Brigadier General Thomas Cruse. The Caxton Printers, Ltd., Caldwell, Idaho, 1941. $3.50.

General Cruse was born in Kentucky in 1857, and graduated from West Point in the Class of 1879. He was commissioned in the cavalry, and was immediately sent to Arizona. For years he served in the 6th Cavalry in Arizona and New Mexico, during which time he participated in many campaigns against Victorio, Geronimo, and other Apache leaders. The discussion of Geronimo's surrender to Gatewood is both interesting and valuable.

Although the largest part of the book deals with the Indian campaigns in the Southwest, General Cruse tells the full story of his career. In 1896 he transferred to the Quartermaster Corps, and served in that branch in Puerto Rico and the Philippines. In January, 1917, he was promoted brigadier general, and at the outbreak of war was serving in the Office of the Quartermaster General in Washington. He retired in January, 1918. General Cruse's book is one of the extremely useful "little" histories which serve to fill the gaps left in the general narratives.

CURT AILMENT OF NON-DEFENSE EXPENDITURES. By Henry P. Seidemann. The Brookings Institution. Washington, 1941. 25 cents.

Any publication of the Brookings Institution is worthy of notice, and this one is particularly timely, in that it outlines a program whereby well over two billions of dollars annually could be saved on non-defense appropriations. The conclusion could hardly be improved: "A drastic curtailment of all non-essential expenditures is of the utmost importance from the standpoint of the war program, as well as from the fiscal point of view. Government expenditures for non-essential activities should not be allowed to compete with the government's war program any more than private expenditures for non-essential purposes should be allowed to compete with war requirements. The government can set an example for the people in this critical hour by practicing the rigid economies which the national situation imperatively requires."

THE ARMY OFFICER'S MANUAL. By Lieutenant Colonel A. C. M. Azoy. D. Appleton-Century Company, New York, 1942. $2.50.

Included herein is a vast amount of widely varying information, ranging from a table of pay and allowances to an outline history of the army, by a coast artillery officer of long experience. It constitutes a handy reference manual.

ELEMENTARY MATHEMATICS IN ARTILLERY FIRE. By Joseph Miller Thomas, with tables prepared by Vincent H. Haag, McGraw-Hill Book Company, Inc., New York, 1942. $2.50.

Dr. Thomas, Professor of Mathematics at Duke University, defines and explains angles, tables (and their use, including interpolations), the solution of triangles, and maps (including resections and contours). He also touches upon artillery fire. Primarily, however, this volume is an intermediate treatise on mathematics—too advanced for use as an elementary text, yet too elementary for the advanced cartographer or ballistician.

It is unfortunate that Dr. Thomas becomes so interested in the mathematical reasoning underlying the Lambert Conformal Conical Map that he devotes much space to it and quite ignores the polyconic type actually used in our military maps. He dismisses this more practical map with six and a half lines following twelve pages of Lambert explanation. In similar fashion he briefly outlines the grid system used on the French military maps and gives none of the details of our own system, merely stating that the principles remain the same in all instances. Those who are interested in the background of our military maps are referred to War Department Technical Manual 5-230, sold to the public by the Superintendent of Documents, Washington.

Some subjects which are not readily found in our training literature or which have been entirely omitted from the more recent manuals, are well set forth. The proof of the Bessel ("Italian") method of resection is given. So is the theory of probabilities, which of course is the foundation of the conduct-of-fire methods. The mathematical basis of the MIF MIF is outlined, too.

Tables include common logarithms, constants, and the trigonometric functions of the mil (both natural and logarithmic), but are abbreviated in some cases.

In the abstract, the mathematics which are set forth apply to any system of preparation of firing data, with any map system, and for any weapon. The work is evidently the result of much time and attention, and despite the title was not prepared solely to attract the public eye. It would be of much greater value, however, if it had been connected more definitely with the practical applications of the principles, and if the discussions had been based upon the tools with which we actually work instead of on (as in the case of the Lambert map) obsolete material, however fascinating the latter might be to the abstract mathematical mind.

Yes—and our day-room and our mess-hall, and our kitchen and our motor-shed and our stables and our . . . .

NOT a cure-all, NOT an infallible guide, but a fine, practical aid in getting the battery administrative details taken care of when, as, if, and how they should be.

BATTERY DUTIES: A PRACTICAL LIST

covers those administrative duties which are "not in the book." It does NOT replace official material, but it does augment and clarify it. YES, field duties are included too, 'tho of course most administrative work is done in garrison (either post or cantonment). AND the official text references are given for the TECHNICAL duties of the individuals, wherever appropriate.

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