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GUNS ON THE MOUNTAIN

BY "PINATUBO"

"Mountain artillery is more than a branch of the service; it is a religion."—Proposed Drill Regulations.

THE battery halted in the bottom of the pass. The head of the column had reached the divide where a scarlet guidon snapped and cracked in a fresh breeze. The wise and experienced mules closed up, nose to croup, and assumed attitudes of resignation under their loads. They wore expressions as though each were a patient Atlas supporting an earth. The soldiers with them felt of the packs and gave tentative tugs at the cinchas. Then each sat down in the trail alongside his mule. Both animals and men were veterans, quick to avail themselves of any chance of rest. They seemed equally ready to move on or to stay there indefinitely.

The recruit chafes and frets; he demands reasons for the delay; he desires to press on. He worries himself and others. When he grows wiser, he learns to sit down, to save himself and be patient. He cultivates repose. Halts are an evil to be endured—inexplicable but inevitable.

Men and animals contemplated the jungle which hemmed them in. An occasional mule nipped indifferently at the cogon grass, stiff and sharp-edged, like tin. The haze of dust about them slowly cleared and the silence was relieved only by the creaking of leather, as some animal shifted his weight. There was one white mule and the soldiers rested their eyes on him. It is said that when a veteran mountain artilleryman dies, his soul goes into a white mule. "Es el viejo soldado," murmured one man, and the others replied, "Verdad," while they regarded the mule with respect. They lighted cigarettes and gradually began conversing in low tones, while they watched the midges suspended in the air.

On either side of the pass loomed mountains, their slopes running sharply up toward heaven and disappearing among clouds. The head of the column looked down upon an extensive and fertile plain. Silver threads winding at random across it, marked the course of rivers making a languid progress towards a sea, which shone in the distance like a pool of quicksilver. The rear of the column, looking eastward, viewed a tumbled mass of green mountains,

heaped up without apparent plan or design. Almost at the further edge of sight, these irregularities ravelled out into a great plain. Little spirals of gray smoke arose from this plain at intervals and added to the light haze which hung over it. Two or three of the men began to point toward various places on the plain.

When they halted, the officer at the head of the column rode off among the immense boulders which lay scattered about the divide. These made him and his horse look like manikins. He might have been Gulliver wandering among the pebbles of Brobdingnag. Soon he returned and made a brief gesture. The column followed him, slowly unwinding from the jungle into the open. As it approached the foot of the mountain, the leading animals stopped and the column began to collect in little groups of men and mules. When the last group had formed, there was an instant of immobility followed by intense action. During a minute of orderly confusion one heard the grunts of straining men, the gentle sighs of animals relieved of burdens and the muffled clank of metal. Then the animals and men moved back and disclosed six guns at the foot of the slope. They were like a line of dwarfs, squatting on their haunches, steadfastly regarding the mountain top.

Men and animals stood looking with satisfaction for a moment. Then, shredding out into column again, the mass moved briskly on down the pass. They had lightened themselves of three tons of steel and camp was in sight. Soldiers may stay but one night in a place, yet there is a magic in the thought of reaching camp. It lifts up the heart and lightens the load. The column flowed rapidly and quietly downhill.

There were left behind the six guns. They stared unwinkingly at the mountain top, resembling six small and determined Cyclops. The mountain, its head wreathed in mist, ignored them. But the guns were unmoved by such treatment.

They had come to conquer the mountain.

The battery had come from the army post which, fifteen miles away, lay quietly among the claws which the mountains stretched forth toward the plain. Like all old army stations it was peopled with guns, men and animals. There were also ghosts—the ghosts of fresh young lieutenants who once spent hours on the drill field and at the picket lines and who are now war-worn colonels. There were ghosts of hearty soldiers who once sweated through battery drill and thereafter cleaned harness and breech blocks. These stout soldiers are long since gone and, were their names called, there would answer certain grizzled veterans, if indeed, any answer were made at all. And there are the ghosts of the animals who labored with them and who have long since perished.

There is a certain melancholy in such a spot. There is, as well, a certain inspiration.

Only the guns and the mountains remained the same. To the guns came new servitors, young men and young mules, to serve them with the same devotion. For guns are like monarchs who speak with the loud voice of authority. In all things must they be served and waited upon. They must be handled delicately and fully fed and escorted to the throne whence they are to utter words of thunder.

The mules served the guns faithfully and patiently. They were affectionately called "jugheads" by the men, who groomed them and cursed them and swore by them. No one knows why mules breed profanity among the men who live with them. It may be because the mule is a realist while the men are swayed by emotions which, to the mule, are of little account. Nature has so made him that he can have no pride of ancestry and no hope of posterity. He can afford, therefore, to ignore most of the vanities of this world. He occupies a position of extreme independence. This grates upon the temperament of man, who abhors independence in any but himself. When one reflects that, in addition, the mule enjoys extreme sagacity together with a healthy sense of his own dignity, it is easy to realize the degree to which he exasperates a master who often possesses neither.

The mule has followed the frontier. More, he has carried the frontier on his back. In the company of white men, yellow, brown and black, he has cocked his ears at unknown trails and virgin wilderness in every corner of the globe. His invariable reward has been profanity and scorn. To this he remains indifferent. He continues the march.

The men were brown and earnest. There was an habitual gravity and dignity about them. They came of a race which for generations had been forbidden to bear arms. Therefore, they said to themselves, there is the more reason that we prove ourselves fit soldiers. They had become more than soldiers. They were men at arms, devotees of the profession of arms, a profession which retains all of its ancient nobility wherever it is honestly pursued. The simplicity of their thoughts was untouched by the clever babble of cynical paragraphers. They focussed their attention upon the facts of life, indifferent to the tinsel and baubles of a gaudy civilization. Some had fought under Aguinaldo, a few had served under the scarlet and gold of Spain. All were soldiers.

These guns and mules and men, put together, made what is called pack artillery. One may search in vain for something like it. Other people, going from one place to another, follow the roads. The pack artillery goes direct. Mountains, declivities, rivers are

obstacles to others; to the pack artillery they are merely inconveniences. It does not march so much as it flows across the country, and it is a matter of pride that wherever an infantryman can go, there likewise can the mountain guns follow. There were those who questioned the matter. They demanded to be shown and that is what this is all about.

People who have been at the post recall the mountains which stretched along the western horizon and those who regarded them with any attention, remember one whose steep green flanks run up to rugged peaks, peaks which look down on neighboring heights as a cathedral spire looks down upon the city roofs. One cannot lift one's eyes from work or play without resting them upon it in one of its varied aspects. For this mountain, like many inanimate things, has a personality. Today its peaks are clearcut, distinct and appear to lean almost over the post; tomorrow it has withdrawn into the far distance and there, cool, remote and untroubled, it meditates. There is about it some of the grace and dignity of a lady as well as a most feminine changefulness.

And it is possessed of a gorgeously feminine wardrobe. In the morning, its shoulders glitter in the level rays of the rising sun, as though hung with emeralds. By mid-afternoon, it has changed its garb to mourning black and wreathed its head in far-flying streamers of gauzy vapor. And when one again turns the eyes to the west, it stands superbly decked in the magnificent shifting colors of the tropical sunset. The wet season comes to relieve a parched and thirsty earth and for days the mountain hides itself behind a silver veil of rushing rain only to emerge, finally, garbed in a fresh and more vivid green.

There was once a time when men worshipped such things and held them sacred. But we have long since turned from them to set up other deities, each man for himself, changing with the fashions, so that the air is full of clamor and disputation, unhappiness and uncertainty. But the small black native who, with bow and arrow, hunts the country about the foot of the mountain, is in no such uncertainty. He has given it a name which signifies "The Growing God" and among its peaks live, not only the spirits of his fathers, but more evil things. There are asuans—flyers by night by virtue of a magic oil poured into a hole under the left armpit. There are malaligaos—evil genuises who lure the jungle traveler to a miserable end by opening a false and magic trail for his careless footsteps. And there are trees of gorgeous flowers whose limbs embrace the unwary and suck his life blood. One may amicably discuss dogmas with a Christian, but so much as mention Pinatubo to the wild Negrito and he is vanished into the bosque, like a quail. As for going upon it, he would as soon take a header into Tophet.

Some years before this time, three officers of the regiment determined to scale the mountain. They offered up all their holidays to the project and, with a detachment of soldiers, cut through the jungle to its foot. They spent days clambering about through the tropical verdure; they dangled from long ropes against the face of cliffs; they crept through treetops and along the ragged edges of the crater and they achieved its summit. When they did so, they unconsciously decreed that the guns should follow them in due course.

After this, time passed. Guns, mules and men went about their daily business. But there was an uneasy feeling that there existed an account which required settlement.

When at length the project was put in hand, the prophets of evil came forth en masse and commenced making medicine. They foretold landslides which would overwhelm, falling trees which would mangle. They painted lurid panoramas of mules slipping headlong into the gulf, guns irretrievably lost over cliffs, flying boulders. Some diviners of the future went further and produced supernatural perils. Among them, these soothsayers predicted all calamities but rain and that was the only one which came to pass. Rain in the middle of the dry season. The military maxim was proved. "One must always expect the unexpected."

The guns set out, carried and attended by the mules and men. When they left the post, they traversed a series of old craters. Then they plunged into the jungle. Huge trunks of ancient trees soared upward to support a leafy ceiling through which an intense sunlight shone but faintly. The dim light and the hush made it resemble the interior of a cathedral. From the limbs of the trees, far aloft, long creepers depended, hanging motionless. Perched along the boughs of the trees and in their clefts were giant airplants, great orchids and a myriad other parasites.

Where the jungle ended was a precipice down which the mules zigzagged. They felt cautiously for a footing at each step, their ears pricked forward, while the men steadied them, head and tail. When they had descended four hundred feet they found at the bottom a river, into which they walked. Some of the men tried to leap from rock to rock. One of them slipped and fell headlong. This was a source of great satisfaction to his comrades, who were waistdeep in the stream.

When they had gone along the river for some distance in the shadow of beetling cliffs, they started to climb another precipice. This they found extremely difficult. Round, waterworn stones rolled about underfoot and there was no level place to rest. This the men named "The Soldier's Road to Success." When they had reached

the top they rested. From there the column wound its way around the shoulders of the mountains, up and down, finally emerging in the pass. It was late in the afternoon and turning cold. They had marched fifteen miles and climbed four thousand feet. Miles have shrunk for the passengers of car and plane, but wherever men travel on their own feet, they are still distances to be reckoned with.

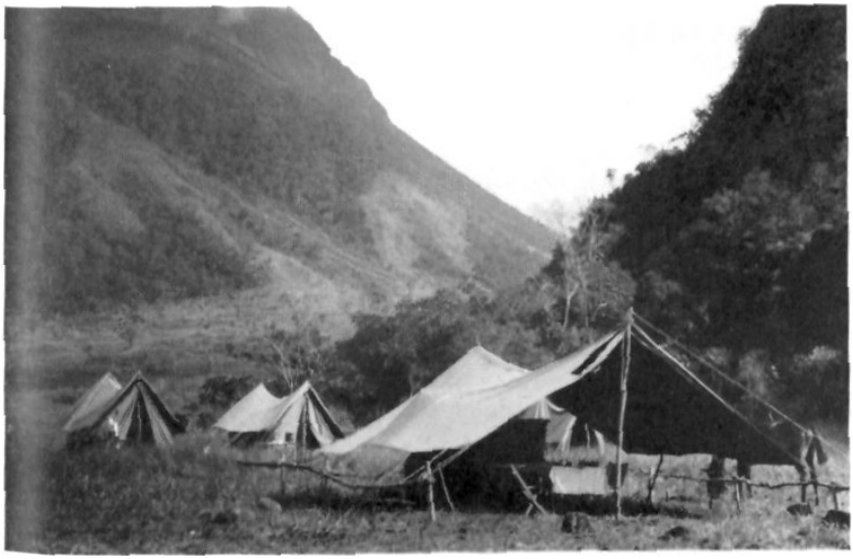
There were two officers and some men awaiting them in camp. They had been upon the mountain the day before to view its defences, which appeared to them formidable. After surmounting the long slope to the crater, they were forced to follow its edge for some distance. They soon found a ledge of rock barring further progress, but by throwing a rope over a projecting root, they managed to surmount the ledge. When they climbed up the rope, their legs dangled over the abyss of the crater. One of the officers, as he climbed up the root, noticed that it was loose in its socket like an old tooth. The sight was not reassuring and he had dark forbodings when he reflected that they would return that way. Later, other things drove this from his mind.

As they scrambled up the side of the mountain they encountered another cliff, sixty feet high. This appeared to be the mountain's main line of resistance. One walked along the face of the cliff on projecting tree roots, hoping that they were sound and tough. Above this cliff lay others and beyond them the top of the mountain, a jungle of peaks separated by yawning canyons, strewn with boulders as large as houses. The officers avoided floundering through these by walking through the tree tops, like monkeys. The boughs, draped with heavy green moss which was the growth of centuries, offered themselves as an aerial sidewalk. Sitting down to rest, one of the officers looked between his legs and discovered that there was nothing but space beneath him for two hundred feet. He moved on hurriedly.

They finally emerged on the highest peak but one and perceived the summit. The two peaks were connected by a saddle—a sharp and serrated edge. On the left lay the crater; on the right an equally precipitous mountain side. They rolled rocks either way and listened to them thunder down the thousand-foot slopes. When the reverberations died away they decided it would profit them to be careful. Either side would make a magnificent tomb, but they were not looking for tombs. They sallied forth along the knife-edge, clinging to shrubs and rocks. It was slow progress. Once in a while it was necessary to bestride it as one does a gymnasium horse, inching forward on the hands. Thus they reached the summit.

It was now with some foreboding that they now awaited the arrival of the battery.

THE COLUMN ON THE CHINA SEA TRAIL



CAMP SANCHEZ, FORMERLY CAMP SEVEN, IN ZAMBALES PASS
THE SLOPES OF PINATUBO ARE IN THE BACKGROUND.

PINATURO FROM ZAMBALES PASS

THE SCALE OF THE PICTURE IN SHOWN BY THE MOUNTED OFFICER IN THE RIGHT FOREGROUND. THE ROUTE OF THE EXPEDITION WAS UP THE SLOPE IN THE CENTRE OF THE PICTURE. THE DIFFERENCE IN ELEVATION BETWEEN THE OFFICER AND THE UPPER EDGE OF THE SLOPE IS ELEVEN HUNDRED FEET.

LAQUINDANUM SLOPE. A MASS OF VOLCANIC MATERIAL OFFERED MANY OBSTACLES IN THE FORM OF DEEP ARROYOS

The sun was shooting lances of light through the notch of the pass when the men fell in. Like the guns, they stood with their eyes fixed on the mountain top which stood forth in the blaze of the sunrise. One point they desired reassurance upon. They were not anxious to stay on the mountain at night when goblins, asuans, devils and ghosts were at large. Satisfied upon this head, they proceeded to the guns.

The guns suffered themselves to be loaded on the mules and the assault commenced. The long lava slope, from the pass, had seemed deceptively smooth. In fact, it was like the skin of an elephant, full of fissures. To the mountains they may have seemed mere cracks; to the men they were chasms, deep enough to swallow both men and mules. The men hastened to get tools and cut notches in the vertical sides. Then they inveigled the mules into the chasm and, pushing and pulling, got them up the further side. After doing this, they came to another chasm and did it again.

After a while, the mules could go no higher. The guns were taken off and the mules departed for the post. The soldiers looked at the mountain. Then they looked after the mules with envy.

The guns lay prone on the mountainside. When they were separated into four pieces, their character was less apparent and they lost some of the pugnacity of their appearance. They became reduced to resembling mere billets of steel.

The men approached them with a resigned air, carrying long spars of bamboo. The guns suffered themselves to be lashed to these spars, whereupon the men raised them to their shoulders. The guns resembled mandarins, riding with composure in sedan chairs. The caravan started cheerfully up the slope. After a few steps the soldiers discovered that they had been deceived in the smoothness of the mountainside. Jagged lava fragments tripped them up. The dry sparse grass was as slippery as ice. They no sooner moved than they stumbled and slid about, weaving uncertainly in the effort to retain their equilibrium.

They continued to oppose their strength to the placid resistance of the mountain and were quickly strung out in a long line like ants returning from a foray.

The sun, from his seat in the brass bowl of heaven, scorched their bent backs. As the day wore on, he increased the fervor with which he grilled them. The men struggled in the glare.

When they had achieved a few yards, their hearts began to flutter behind their ribs. With a few more steps, the fluttering changed to a thumping. Each felt as though he carried a wild animal confined in his chest and that this animal was bent upon tearing its way out. "Susmariejosep!", they gasped, and, setting

their loads down, stood bathed in sweat and struggling for breath. At long intervals, when breath was available, they swore composedly at the guns, employing epithets from a dozen dialects. One noticed, however, that they continued to handle their charges tenderly, almost reverentially. So are the mighty served.

Occasionally the head of the toiling line uttered a loud cry of "Bato, bato!" The cry was repeated down the mountainside. When they heard this the men, suddenly transformed from weary plodders, became alert and poised. Close upon the cry came a boulder, dislodged by some incautious foot. Rolling slowly at first, it was a mere stone. As its speed increased it became animate, like Victor Hugo's cannon. It gathered speed like a jack rabbit, bounding in great arcs. When it touched the mountainside, it changed direction with a devilish agility. The men watched its progress keenly and with apprehension. Now and then, one made a sudden leap to evade the onset. When it had thundered past, each man gave a sigh of relief and resumed the struggle.

Occasionally as some hidden reservoir of strength became available a man would make a short rush. After several quick, desperate steps, the little surge of energy went out of him and he was forced back into a snail's pace.

After some hours, vitality wilted. It had poured out as prodigally as the streams of perspiration. The storage batteries of energy were exhausted. The officers cried "Pundo!" and the men prepared to go down. When they went they looked back at the guns. The latter lay scattered up the slope like the litter of bodies which marks an assault. Their muzzles still grinned, indomitable and threatening, at the mountain-top.

The next morning the men returned. They had lain on the earth and like Antaeus, found their strength renewed. They resumed the assault. They raged and sweated at their task. They poured out their strength like water and at the end of the day were spent. But at the end of the day the guns rested at the top of the slope.

The men wore expressions of satisfaction. They crept up to the edge of the crater and peered over. There was only an immense void, containing silence. In a final convulsion one side of the mountain had blown cleanly out. It looked as though some mighty knife had removed a segment, much as one cuts a cheese. The sides of the crater stood naked and vertical for hundreds of feet. Even tropical verdure had failed to secure a foothold. From time to time, a pebble became dislodged and the eye instinctively followed its dreadful descent. The pebble was followed by a trickle of sand and gravel. The men reflected that the earth under their feet might suddenly give way and that with it they might go roaring into

eternity on the back of an avalanche. They began to feel a peculiar tingling sensation in the soles of their feet. When they encountered this sensation they drew back to a respectful distance from the edge and looked elsewhere.

Their eyes were drawn to the mountain across the pass and they remembered three comrades, slain on its slopes the year before. They began to trace routes with index fingers. Far to the west the sea gleamed under the afternoon sun. A liner was hastening along the coast making for the great bay to the south. Such was the distance that it appeared to be but a chip, lying motionless on the water.

When they had come thus far, the men were encouraged. They had risen eleven hundred feet above the pass. The mountain had tried to trap them in its fissures, had bombarded them with its boulders and had appealed to its ally, the sun. Nevertheless, they were here. They considered that they had passed the first line of defense and began to move the guns around the lip of the crater.

The mountain now opposed an entanglement of gnarled, tough trees, enlaced with wiry creepers. As an example of the elastic defense, it could not be surpassed. One penetrated a few steps and was stopped, involved by a hundred clinging vines, too strong to break, too nonresistant to suffer from an axe. To counter this defense, the men produced bolos. They were not the ponderous bolos issued by a ponderous bureatt. These the men used cheerfully to split firewood, open cans or dig holes in the ground. For the jungle, they preferred their own slim, light blades, beautifully balanced and whetted like a razor. These implements are the open sesame to the jungle. The boloman flourishes his weapon once, twice, thrice, and the way falls open before him. To one who has thrashed about unavailingly, it comes as a sort of wizardry.

Presently they approached the first cliff. The men spread along the foot of it seeking a breach but found none. They scattered and there was heard the swish of falling saplings. Leaning these against the cliff they lashed them with ropes and, with dexterous strokes of their bolos, notched them. In the notches were laid other saplings which were made fast in their turn. They worked deftly and when they were finished the wide ladder stood as solidly as if made of steel. It was amazing to see what they did with bits of hemp.

When the ladder was finished the guns surmounted the cliff. At this point the mountain seemed to feel that there existed an emergency and it called upon the raingod who dwelt among the peaks. Clouds began to play about the buttresses of the mountain.

As soon as they obscured the sun, there came a chill. Following this, the heavens wept. The sides of the mountain streamed with water and became slippery as if soaped. Uncertain footing became precarious. The men could stand up only by clinging to some support. When they moved about, their feet slipped from under them and they sat down heavily in the slime. Resentment showed in their expressions. This was the dry season. The mountain was violating the rules of warfare. They had the outraged attitude of troops who have been subjected to poisoned gas.

After a while they went down the mountain in search of shelter. They marched sulkily into camp in the rain and changed drenched clothes for merely damp ones. At this moment the heavens opened. Rain fell in sheets and all landmarks were blotted out.

The officers were trying to eat under a tent fly by the light of two candles. In a few moments they were aware of steady trickles of water on the table, down their necks, into the food. These trickles came through little holes which mildew had eaten in the canvas. They asked the sergeant, who was hastily covering up his supplies, why he had brought such a worthless fly. The sergeant informed them that the inspector had declared the tent fit for field service and had declined to condemn it. The officers wished to God that the inspector was under it now. They vied with one another in casting aspersions upon him. They then concluded to extend their aspersions to all inspectors. In the meantime they grew wetter and more dismal.

The rain beat down so that they had to shout to be heard. Soon they noticed that the level, sandy soil underfoot was unable to carry off the deluge. They began to be apprehensive about their own tents. They hung about under the fly until finally their apprehensions overcame their dislike of a drenching and they dashed out in the rain, to find most of their possessions sitting in pools of water. One of them lived in an abode which his comrades dubbed "The Boar's Nest." This was because he kept his possessions chiefly on the ground. They were now all afloat. This delighted the others. They intimated that, if it took a typhoon to teach him neatness, they were glad the typhoon had come.

Some typhoons last a week but this blew itself out in the night. The men resumed their labors on the mountain where the rain continued. A cold gale, whipping around the shoulder of the mountain, caused them to shiver in their thin cotton clothes. The long hempen ropes with which they hoisted the guns, lost their flexibility; became stiff, harsh and unfriendly. As the men slipped and slid, the guns became treacherous masters. They displayed a fiendish desire to crush the limbs of their servants. The men

THE THIRD LADDER WAS EIGHTY FEET HIGH. BUILT IN THE FORM OF A DOUBLE SPIRAL IN ORDER TO FOLLOW A CREVICE IN THE ROCK LEDGE

LOOKING DOWN FROM PEAK SIX TOWARD CAMP. WHICH CAN BE SEEN ON THE FLOOR OF THE VALLEY

THE EDGE OF THE CRATER WILL BE NOTICED IN THE CENTRE OF THE PICTURE. THE MOUNTAIN ACROSS THE CALLEY IS MOUNT ABU, ON THE SLOPES OF WHICH SGT. SANCHEZAND HIS TWO COMPANIONS WERE KILLED BY NEGRITO OUTLAWS

NEAR THE TOP OF THE SLOPE

THE PERSONNEL OF THE EXPEDITION

IN THE CENTRE OF THE FRONT ROW, KING PINATUBO, WHO WAS BROUGHT DOWN CAPTIVE FROM THE SUMMIT.

watched them warily and threw their weight about with care. Bones are brittle and two hundredweight of steel not to be trifled with.

In time they came to a place where the luxuriant vegetation surged like a green sea against a grim face of rock, which rose sheer for sixty feet. The men contemplated it with respect. Here was the mountain's main line of defense. They began to go to and fro, busily searching for a weak spot in the ramparts. But the mountain had built well. The cliff was a majestic girdle encircling its waist. It frowned like the implacable battlements of a fortress. But the men persevered in looking for an Achilles' heel. Finally one of them crept up a crevice like a chimney flue, choked with boulders and detritus. When the boulders had been levered out, they set about the construction of another ladder. This fitted tightly in the crevice, conforming precisely to it. When it was finished, it lay as if it had grown in place, curving to the right and then to the left, running upward for eighty feet as high as a five-story building.

When they had finished this, the men commenced to escort the guns. These hung helplessly like giant fish at the end of a rope, two men ascending with them. Now and then a gun seemed to resent its undignified position. It swung quickly in an endeavor to knock the men off the ladder. The men watched keenly and evaded these attacks. When the gun had swung back they patiently renewed their task of guiding it, calmly humoring the caprices of their charges.

It continued to rain.

Why were these men there?

It is a strange paradox that the fighting man is encouraged and repressed at the same time. He sometimes feels bewildered just as a small boy who, confronted with a fracas, reflects that he will be spanked equally for getting into a fight or for running away. It is not seldom the case that one may find the best fighters in the guardhouse for fighting.

The recruit joins the army for adventure and to see the world. In the morning on the parade ground, he thrusts his bayonet fiercely through a sack of straw. This is adventure. In the afternoon, he is handed a shovel, put on fatigue and is afforded the opportunity to see the world, a shovelful at a time.

The subaltern is carefully schooled in combat formations and concealment. He is then made to keep his platoon on a naked parade ground within earshot of the orderly room. He ultimately inclines to do his campaigning with a typewriter in numbered indorsements. He learns to remain quietly on the picket line at all times.

What is remarkable is that the combative instinct survives, but

it is often the case that soldiers outlast the treatment and hunger for combat. This does not mean that they crave war. But they desire to pit themselves against some adversary; to measure their strength against mud, rain and heat; hunger, thirst and fatigue. They struggle for prizes which are intrinsically as valueless as a wreath of olive. No one supposes that men join the Foreign Legion for its paltry five centimes a day.

There are those who aspire to live without hazards. These may question the wisdom of the men. But the men would not comprehend such a point of view. They embraced the opportunity of combat with enthusiasm. They demanded a certain salt upon their bread of life, which otherwise would be without savour.

It must not be supposed, however, that these soldiers suffered from the habit of dissecting their own motives. They were earnest but not morose. They snatched moments for amusements. Some of them contrived disguises. They decked themselves with vast beards of black moss and wigs made of creepers. They then pretended that they were old men of the mountain and, with fearsome cries, leaped out at their fellows unexpectedly. If they could surprise one of the officers their delight was unbounded. When a man slipped on the edge of a declivity, his comrades first dragged him back to a foothold and, when he was safe, accused him hotly of intentional acrobatics. They made many small and simple jokes. But it is the small and simple joke which shortens the hike and lightens the pack. Campaigns may be planned by erudite staffs but they are won by such simple things as tobacco, rations and jokes.

Ultimately, they emerged from a deep canyon, lying between two peaks. The canyon was a memorial of the last throes of the mountain before it had subsided into peace. The men felt that they were the first to set foot in it and looked about them with curiosity. They were surrounded by gnarled and ancient trees, twisted and stunted by the gales of centuries. These trees wore long, green beards of moss and when cut, exuded a crimson sap, like blood. They wore the air of venerable Druids and one expected to encounter among them trolls, kobolds and goblins. Moisture dripped from everything and the place was pervaded by a funereal air.

But when the men emerged from it, they forgot the mournful canyon as they perceived the highest peak before them, rising grandly from a bank of clouds. The sight of their goal exhilarated them. A scarlet flag on the summit seemed to beckon to them and they made haste towards it. But the mountain here interposed its last line of defense—the crumbling edge of the crater. This

was all that connected the two peaks. The men essayed to cross it. It offered a hazardous passage to individuals; to the passage of guns it was impregnable.

The men stood among the guns and cast about for means to traverse it. The serrated edge defied them. It was as if the mountain, driven to its lair, were showing its teeth—grinning evilly at their discomfiture.

After a while a few shrubs were discovered, growing hardily inside the crater. Some men descended, gingerly using the roots of these shrubs as precarious footholds. Working delicately, they managed to connect these roots with bits of rope so that in time a sort of trough was formed across the inside of the crater. One side of the trough was a network of hemp; the other, the inside of the mountain.

As they worked, an eagle soared in diminishing circles about the mountain top, regarding their activity with a fierce, bright eye. The men called the eagle "The Guard of the Mountain" and shouted at him with derision.

When the trough was finished they hastened to throw into it the limbs of trees to form a footing. They ran to and fro like flies on a wall. Some of them scrambled to the top of the mountain and began to cut it off. They were preparing a throne for the guns.

In the meantime the drizzle ceased. The mountain lost its ally in the hour of its defeat. It drew about it a curtain of clouds, hiding its head in its shame.

It was clear to the men that their tribulations were almost done. They strove feverishly to complete their work. When they had done so, they dropped their tools and went back for the guns. They bore these across the abyss and up to the peak. There they set them on their throne. The curtain of vapor lifted and dispersed and the world was disclosed, spread out below like some vast tapestry.

The men were, however, oblivious to this sight. They centred their gaze on the guns which, in turn, attentively regarded the horizon.

Suddenly the guns spoke. The mountain top was enveloped by white thunderheads of smoke. The sound rolled, reverberating, among the mountain peaks.

It was then that the men looked shyly at each other and permitted themselves slow smiles of satisfaction.

The guns had conquered the mountain.

Editor's Note.—The Pinatubo Expeditionary Force left Camp Stotsenburg, Pampanga, on March 18th of this year. There were three officers and sixty men of the 24th Field Artillery, accompanied by Major White, M. C., and medical

detachment. One gun and eight men were furnished by each battery in order that the entire regiment might participate. The first gun to reach the summit was a composite one.

The following elevations may interest those who have recently served at Stotsenburg:

	Feet above sea level
Parade ground	600
Edge of Plateau above Camp 3	2400
Ford at Camp 3	1990
Foot of Soldiers Road to Success	2360
Sulit Circle	2752
Foot of Slide	3025
Top of Slide	3385
Camp Sanchez	3525
Zambales Pass	3820
Top of Laquindanum Slide	5050
Peak Six, Pinatubo	6030

These telegrams may also be of interest:

"April 6, 1926: To Snow, Chief F. A. Washington. Lee Toy Loef and sixty men this regiment fired six guns topmost peak Pinatubo, altitude six thousand feet, April first, eleven days hazardous work. No men or guns injured.* * *—Butner."

"April 6, 1926: To C. O. 24th F. A. Warmest congratulations to the regiment on remarkable exploit firing guns from Pinatubo.—Snow."

The editor also has the pleasure of acknowledging, on behalf of the members of the expedition, the hearty sympathy and backing of Brigadier General C. J. Symmonds, the Post Commander, and of Colonel H. W. Butner, the regimental commander, without which the project would have been impossible.

A FABLE

BY LIEUTENANT J. L. CHAMBERLAIN, JR. F.A.

Now this is just as fabulous as fabulous can be,
But perhaps the thought's occurred to you just as it has to me.
So I'm putting down the idea in a sort of fairy tale
Bringing out a general moral on a very minor scale.

There once were two lieutenants just as raw as raw could be,
One of infantry, the other field artillery,
And continually they argued with disdainful, sneering voice
On the total unimportance of the other fellow's choice.

The infantryman's name was Day, or maybe it was Knight,
But let us call him Day because it's easier to write,
The artilleryman possessed a name of very great renown
For its most surprising frequency—the fellow's name was Brown.

First Day would say, "Dear fellow, any yokel on a farm
Would say without a moment's thought that we're the basic arm."
Then Brown would say, "Dear, laddie, any cowboy on a ranch
Would say sans hesitation that *we're* the basic branch."

So through their peacetime soldiering, they carried on, each man
Believing that the other's branch was just an "also ran,"
And both of them got generalcies, and then—war was declared,
But neither was afraid because they both were well prepared.

Now finally they happened through sheer coincidence
To be in the same division to take up the offense,
And they still retained their theories of the proper way to fight,
They didn't *think* they were correct—they *knew* that they were right.

The enemy, the orders said, was stretched along the line
Of C. R. 10 (dash) Fiddlesburg (dash) R. J. Umpty-nine,
The orders said to go ahead until Clam Creek was crossed
And hold the ground which had been gained—to hold at any cost.

The major-general telephoned to every brigadier,
And bade him come without delay the general plan to hear.
So Day and Brown came rushing with the others of their kind
To hear the plans for battle that the general had in mind.

Now at this point I'll interrupt with just a word or two.
Remember it's a fable—not a word of it is true.
So if in view of logic it seems slightly out of joint,
Don't criticize my ignorance, just try to see the point.

So there they were, the brigadiers; each had a different view
Of what would be the best and most effective thing to do.
And Day and Brown were still, of course, in absolute dissent.
The general listened calmly to every argument.

Said Brown, "Just let me take my guns and load them up and fire,
And I'll guarantee that I can make the enemy retire."
While Day with equal confidence said, "Use the bayonet.
Artillery isn't worth a damn; I've never used it yet."

The general smiled a knowing smile and pondered on the case.
While the others talked and shouted he sat quiet for a space.
At last he spoke. "The both of you," he said, "are right, no doubt,
So I'll let you fight the way you want and see how you come out."

* * * * * *

The push began at daybreak and caught the foeman sleeping,
And Brown tried every kind of fire: concentrations, sweeping,
H. E., gas, and shrapnel; barrages, box and rolling,
And the fire situation he was certainly controlling.

Now in another sector was a different situation,
For Day had started his advance without a preparation
And the enemy's machine guns were a source of much distress.
In fact, the situation was a pretty awful mess.

The enemy was holding firm as well indeed he might,
He had no fear of H. E. that would blow him out of sight.
So inevitably Day's infantry was driven back in rout,
He'd fought just as he wanted to and seen how he'd come out.

He grasped the situation and he grabbed the telephone,
He called the major-general—his voice was like a groan,
"For Gawd's sake send artillery, send all of it you can,
And wipe out these machine-gun nests—we're losing every man."

Now in the meantime Brown had also called the general,
And said to him, "Er, general, we're doing mighty well.
We've smashed the foe to smitherines, they haven't got a dugout.
Nor even got a can of oil we haven't knocked the plug out."

A FABLE

"Now, where are you located? Just where is your position?
You've sent no message, do you think we work on intuition?
How many miles ahead are you? The time when you departed?"
And Brown's voice came most awfully meek, "We're now just where we started."

It is not necessary to carry on this tale,
For already I have told it in considerable detail,
But let me quote in closing what the general said to each
For it really was a very interesting little speech.

He spoke in words as follows, "You thought you knew your stuff,
But now I've let you try it and you've both had quite enough.
And I think you've learned that you can save yourselves a lot of harm
By a slight consideration of the other fellow's arm.

I think you've learned, in short, the value of coördination,
But you've learned, too late—you'll have to find some other occupation.

SIX MONTHS WITH A JAPANESE ARTILLERY REGIMENT

BY MAJOR WILLIAM C. CRANE, JR., F.A.

THE first detail of United States Army officers as students of Japanese was in 1908, and since then various officers have been on duty in Japan as language officers for tours of from three to four years each. Officers of the Japanese Army have similarly been in this country studying English. As an extension of the language courses, an agreement was made with the Japanese War Office early in 1925 to allow the mutual exchange and attachment of language officers to regiments of infantry, cavalry and field artillery for six months. In accordance with this agreement two Japanese officers served last year with the 2nd Division at Fort Sam Houston, and 1st Lt. Warren J. Clear, Inf., and I were attached to infantry and field artillery regiments in Japan.

There seems to be in our service little general knowledge of the Japanese Army, its life, customs and more strictly military aspects. With the idea of promoting a more intelligent understanding of the Army of our neighbor beyond the Pacific, the following observations of, and experiences in, the Japanese Army, and more particularly the field artillery, are contributed.

The 22nd Field Artillery of the 16th Division, stationed in the outskirts of Kyoto, was designated as the regiment to which I should report for six months' attachment beginning August 1, 1925. A telephone inquiry at regimental headquarters regarding the regimental commander's name was sufficient announcement of my arrival in Kyoto to bring a very prompt call from Major Sawata, commanding the 2nd Battalion. He very kindly volunteered to come for me on the morning of the 1st with the Division Commander's car, which had been placed at his disposal, and escort me on my first round of calls.

We went first to the regiment where Colonel Fugino, the regimental commander, welcomed me with a cordial and lengthy greeting, to which my halting, brief reply must have seemed entirely inadequate to one accustomed to the formal and flowery response expected of a Japanese on such an occasion. However, it seemed to be understood that I was delighted to be present, and from then until the end of my attachment the Colonel was most kind and did everything in his power to make my detail the pleasant and instructive one that it turned out to be.

On account of the absence of Lt.-Genl. Ryonosuke Yamada, the Division Commander, the call on him was postponed and the remainder of the morning was spent calling on the commanders of units of the garrison. These calls were very brief as a rule, and consisted of mutual introductions by the officer called upon and myself. Such self-introductions are usual in the Japanese Army, even when there is a third person present who could make the introduction. A few calls lengthened when it was insisted that we have tea which was always brought in promptly by the orderly on duty. Morning, noon and night, tea is produced immediately on demand by the orderly from his constantly boiling water kettle and ever-ready tea caddy.

The custom of introducing oneself has no great terror when the introduction is to an individual, but when the same method is applied to introductions to a crowd, such as the officers of a regiment, it becomes a little difficult. At noon, Major Sawata took me to the officer's mess where we sat in a reading room adjoining the mess room until all the officers of the regiment had passed by, without apparently being aware of our existence, and seated themselves at the huge "E"-shaped table in the mess room. Then, following the usual custom, I stepped into the doorway, bowed to the colonel at the far end of the room, and explained that I desired to greet the officers of the mess. The colonel rose at his place, followed by the others, who remained standing at attention facing the doorway. I bowed (a stiff inclination from the hips of about fifteen degrees), the bow was returned, and then I announced my nationality, branch, rank, name and duty and expressed the hope that we would all be friends. Another bow, returned as before, and the introduction was over, much to my relief. My short speech seemed next to nothing when compared to those I heard later on, as various officers joined the regiment for duty. On one occasion a lieutenant-colonel made quite a lengthy address, during the course of which, with true Japanese self-depreciation, he spoke of his lack of experience and ability and asked that his shortcomings be overlooked!

There are no government quarters furnished regimental officers stationed in Japan. It is usual for a district surrounding barracks to be designated as the area within which officers must dwell. The warrant officers and noncommissioned officers who receive special permission to live out of barracks are required to have houses within the same specified area. The result is that when duty ends all officers, except a very few bachelors who have quarters in barracks and several officers who, similar to our officer of the day, remain constantly on duty, return home and usually see nothing of each

other until they come to barracks the next day. There are no hops, horse-shows or polo games to bring members of the garrison together, nor are there meeting places such as our officers' clubs. There is, to be sure, an officers' club in each regiment where officers are required to lunch, where farewell and other special dinners are given, and which may have billiard and reading rooms, but it is not used as are our clubs as a general meeting place for officers and their families. Very occasionally the families of officers get together for a picnic (there was only one during my attachment), but otherwise there are practically no regimental social gatherings.

Probably the most outstanding feature of the life of Japanese officers and their families is the simplicity and frugality of their existence. Even for Japan where salaries are generally much lower than in America, and where the cost of living is also comparatively low, the pay of the army officer is hardly more than enough to house, feed and clothe his family in the simplest way, with practically nothing left over for many of the things which we long ago ceased to consider luxuries. For example, not an officer in the regiment owned his own mount, not an officer in the regiment, nor in the division so far as I know, owned an automobile or even a motorcycle.

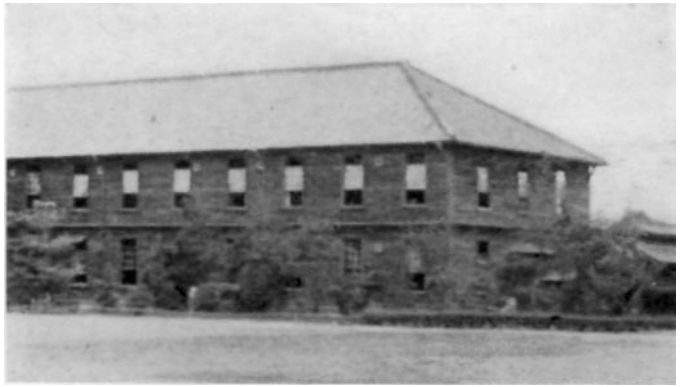
It is usually difficult to obtain correct information about social customs in the Japanese service. This for the reason that Japanese are very anxious to spare a foreigner all possible inconvenience and are very apt to answer an inquiry in the manner which they think most agreeable and convenient to the questioner. Although the matter of social calls by and on an officer joining a regiment is not settled by official regulations as in our service and the custom in this connection probably varies in different garrisons, still the general rule followed is for the new arrival to make the first call on his superiors, while his juniors call on him first. The time of calling is always arranged beforehand, as it is the habitual custom in Japan to offer callers tea and cakes at least, regardless of the time of day, so that a call without giving previous notice might place the host in the embarrassing position of having nothing on hand to offer his guest. Dinner calls are considered to be in a somewhat different category and in the case of those made by superiors, are frequently paid by merely sending a calling card with "thank you" written on it. The innate pride and independence of Japanese is well illustrated by the promptness with which they repay obligations and their insistence on the equality of the repayment. The giving of presents on any and all occasions, and the prompt cancellation of obligation by return presents of approximately the same value, is an old custom of great force that cannot be ignored.

RECRUITS REPORTING

NONCOMMISSIONED OFFICERS AND 2ND YEAR MEN

RECRUIT FOOT-DRILL

A BATTALION BARRACKS



HEADQUARTERS BUILDING

WASH SHED

RELIC OF SINO-JAPANESE WAR USED IN TRAINING REMOUNTS

OFFICERS TESTING THEIR CUTTING STRENGTH WITH OLD SWORDS AND BUNDLES OF WET RICE STRAW

The majority of officers are very sociably inclined and enjoy themselves tremendously on parties. Like most Japanese men they prefer stag parties which usually include geisha, who add immensely to the enjoyment of all with their playing, singing, dancing and games. However, geisha are not indispensable, and whether they are present or not, officers are more than willing to add to the joy of the occasion by doing whatever they can to amuse the crowd. Every officer has some stunt, which, with the aid of a little sake, he is delighted to perform. Generals seem to be particularly talented and it is a great sight to see one of them burlesquing a geisha dance, while the other guests, squatting in a circle around the room, shout their approval and appreciation. The whole-hearted, unrestrained manner in which all officers, who are otherwise so extremely serious and punctilious, enter into the spirit and fun of their entertainments, is a delightful, and for them, very fortunate characteristic.

In Kyoto the field artillery occupied a roughly rectangular area about 500 yards from east to west by 300 yards from north to south. A bare central parade was faced on the north by three battalion barracks in line, with wash sheds, regimental kitchen and bath, noncommissioned officers' club and regimental gun mechanics' shop in rear; on the east by the administration building and the guard house flanking the main gate; on the south by a line of three battalion gun sheds with battery stables, regimental shoeing shop, veterinary hospital and three riding rings in rear; and on the west by a small gun shed with three riding rings in rear. The officers' club with a small Shinto shrine for the regiment nearby occupied a small enclosure in the northeast corner of the regimental area. The dispensary, clothing storehouse, and clothing and shoe repair shop were in the southeast corner. Regimental and battalion headquarters and the intendance officers (Intendence Corps—pay and supply except as relates to arms and ammunition) were all housed in the administration building.

The central parade, bare except for a lone tree in the centre and a few trees along the edges, and about 100 × 400 yards in size, was sufficiently large for the formation of the regiment mounted and for foot and standing-gun drills. Mounted drills were held on a large division drill ground adjoining the regimental area on the north, while typical Japanese terrain (wooded hills bordering plains terraced and divided into small rice fields with occasional narrow roads and numerous irrigation canals) was within easy reach. Altogether it was a very compact, convenient arrangement with the sole drawback that a two days' march had to be made to reach the firing range.

All buildings were of frame construction with slate-colored roofs, and as they had never been painted, the general grayish tone

of weathered boards and tile roofs was cold and sombre. The two-storied battalion barracks were subdivided into battery orderly rooms and squad rooms much as are our own. Squad rooms held about half again as many men as we would ordinarily place in rooms of the same size. Two shelves around the walls and pegs under the bottom shelf were provided for the clothing and equipment of men and these articles were carefully and neatly disposed in a uniform manner throughout the regiment. The springless iron bedstead looked far from comfortable with its thin straw-filled bed-tick placed on a lattice of steel straps, but it seemed perfectly satisfactory to the men who in their homes are accustomed to sleep on the rather hard straw mat flooring habitually used in Japanese houses. An open shed with a waist high concrete trough and individual tin basins was in rear of each barrack building for the use of the men for toilet and laundry purposes. At each end of a battalion barracks was a battery latrine,—a privy cleaned out daily but nevertheless noisome.

Meals for the entire regiment were prepared in the kitchen in rear of the centre of the line of barracks and from there carried in buckets in detail from the batteries to squad rooms where the men ate. The usual meal was of boiled rice and barley mixed, a beef or fish stew, pickles and tea—all prepared in large steam-heated caldrons. Warrant officers and noncommissioned officers had their meals in the noncommissioned officers' club.

In the same building with the kitchen were the three battalion bathrooms, each with its large concrete tub about six or seven feet square and three feet deep filled every evening with steaming water for the popular daily bath. The batteries in a battalion alternate daily in taking the first bath. The idea of a common bath tub for two hundred men is surprising and uninviting until one understands the Japanese method of bathing which briefly is as follows: With hot water taken from the tub in a tin basin and with the aid of plenty of soap and a wash cloth the size of a face towel, the bather scrubs himself very thoroughly. He then rinses himself carefully and gets into the tub for a five- or ten-minute soak, along with whomever else has reached that stage of the bath. The water is unbearably hot for those unaccustomed to the Japanese bath, but delightful to Japanese and others who have hardened themselves. After soaking and chatting, the bather climbs out of the tub and either soaps, rinses and soaks again, or finishes his bath by rubbing down with his towel soaked in cold water and then drying with the same towel wrung as nearly dry as possible. The little remaining moisture evaporates rapidly and the bather is ready to dress and leave. Such a bath is naturally very cleansing and when taken daily and enthusiastically, as it is in the Japanese Army, it keeps one

remarkably clean all the time. The fact that one of the punishments for minor offenses is to deprive a man of some of his baths shows the genuine popularity of bathing. From private to general, undoubtedly the Japanese Army is personally the cleanest army in existence.

As noted above, there were four gun sheds facing on the central parade. The three battalion gun sheds on the south of the parade were each divided into three sections, of which the two batteries in each battalion occupied the end sections, while the central sections which would be occupied by Batteries Nos. 3, 6, and 9 (not organized in peace-time) were used as storage space for extra equipment and matériel. The gun shed on the west was similarly used as a storehouse.

The battery stables in rear of the gun sheds were conventional single-aisle, concrete-floored, frame stables with exits at the ends and on both sides at the middle. Harness and horse equipment of individually mounted men were disposed, respectively, on heel post pegs and racks in battery saddle rooms.

All horseshoeing in the regiment was done in an open shoeing shed, with attached forge room, under the supervision of the regimental veterinarian, whose hospital was conveniently located in rear of the shoeing shop. The treatment of practically all sick and injured horses was performed at the veterinary hospital; only the simplest cases were treated in the batteries.

In a manner similar to the above, all repair work or alterations of matériel, and the repair of shoes and clothing, were performed in regimental shops under the supervision of officers belonging to regimental headquarters.

(To be continued in our next issue.)

DRUMBEATS

BY MARTIN GALE

IT WAS in Germany, at Nockbad, that Headquarters Company of the —th Field Artillery picked up Chum. He was foraging vainly in the road when the soldiers entered the town. Overcome with fright at the sight of the troops, he laid shivering in their path. The Captain, a kindly man, diverted the column, and as they went by the Supply Sergeant gathered him into the fourgon wagon. He was black and scrawney, a poor uncared-for puppy, and he was horribly afraid. At first he feared even the Supply Sergeant and tried to steal away on every occasion; later when he had learned to trust that one man, he was unhappy away and dreaded the approach of another. It was pitiful to see him cringe. Only months of petting overcame his fear, but when that was accomplished what a change it was. His little tummy swelled like a ball on the good food they gave him, his fur became glossy and his eye bright and merry. He resembled a black teddy-bear with tiny pointed nose, short legs and furry body. He walked with a rollicking roll, and if you called him, came confidently for a tid-bit or a caress.

The Colonel was a dignified man, but he had a weakness for horses and dogs. In common with the regiment, he succumbed to Chum and they became good friends. Every morning Chum waited at Headquarter's stables for the Colonel to appear, then they made the daily inspection walking together through the regimental area. Chum slept in a box in the Headquarter's billet and each morning was the first on line for reveille. They taught him to answer to his name and at formations the First Sergeant called him and received an answering bark. Daily he made the rounds of the regiment visiting each battery where he was petted and made much of. But although he had many friends he had just one master. It was to the Supply Sergeant that he brought his puppy woes and from him received the comforting that made life bright again. When he had his unfortunate adventure with the bee-hive the Sergeant was the man to whom he ran; cats and large dogs drove him to his port of safety. Let the skies darken over him and you would find him dashing to his protector.

When orders came to entrain for Brest and home there was much speculation as to Chum's fate. Then the Supply Sergeant who was a broker in civil life announced that he would be taken

to America as a playmate for his own little girls. This was a great relief for the regiment did not cherish the idea of leaving him to the care of the German civilians. On the way to the seaport Chum and the Colonel were the only two who had plenty of room and comfort. The officers rode six to a small compartment, the men were crowded into box cars but Chum had his blankets spread wide and not a man dreamed of encroaching on his place. He caused great worry on the trip, for at one of the roadside stops for meals he was reported missing and the Colonel held the train until he was found. In Brest, as the Supply Sergeant had a heavy pack to carry, Chum rode up the hill to Pontanezen in the arms of a lieutenant of the battery, and was given the comfortable corner of a tent until it should be time to leave.

There were disquieting rumors in camp about pets and animals bound for home but the Supply Sergeant refused to believe them, and when the transport came in Chum again rode down to the docks in his lieutenant's arms. On the pier he was handed over to his proper master, who prepared to march aboard a lighter. All went well until a sharp-nosed navy lieutenant spied Chum under the sergeant's arm.

"No dogs on this ship," he shouted. "Take him back."

The lieutenant who had carried Chum intervened. "Can't we take him with us? He's the pet of the regiment and we've carried him all the way from Germany. We can't leave him now."

"Oh, yes you can," returned the Naval officer. Then to the Supply Sergeant, "Take that damn dog out of here."

The Sergeant climbed wearily back on the dock still holding his dog. The band which had played the regiment on board the lighters was in its turn preparing to embark. As the Sergeant dragged toward them the men saw Chum under his arm and guessed the truth. Immediately he was surrounded by a sympathetic audience.

"Won't they let you take him on board?" asked the Sergeant bugler.

"No, there's a Navy officer down there told me to take him off. Guess I'll have to leave him. 'Wonder if any of these M.Ps. would take care of him."

"Wait. You don't have to leave him. I can get him on board if you can fix it afterwards."

"Can you do it? It'll be alright if I can get him on. He's small, easily hidden, and the sailors'll help us. Or any of our officers will hide him, once he's on. But how will you smuggle him on?"

"Hey, Jonsey, come here. Bring your drum." The bugler led the two to a corner hidden by stacks of equipment, where after a short explanation the drummer loosened the drum and with a final pat the Supply Sergeant put Chum inside and the drum was tightened up. Chum was perfectly quiet. He was in the hands of his friends, if they chose to put him in this queer resting place he would not object. When the lighter came up to the pier and they marched on he still held his peace, although three men held their breaths as the drum passed the sharp-nosed lieutenant. Not a sound came from the dog, and the officer merely nodded as he checked the men aboard.

This was the last barge off and the Colonel and the Brigade Commander were on it. They stood up in the bow watching the men filing on.

"Well, Colonel," said the Brigadier, "now that they are all off the soil of France I feel that the war is over. By the way, my aide tells me that your little black dog was sent ashore. They're very strict on this ship."

"What, Chum? Oh, I wish I'd known. I might have been able to do something. He was the pet of the regiment. I wonder who has him." Then spying the Supply Sergeant he called, "Sergeant, what happened to Chum?"

The Sergeant came forward and saluted. "A Navy officer made me take him off," he said, trying to look dejected.

"To whom did you give him?"

"I gave him to a soldier who will take good care of him," answered the Sergeant truthfully.

"I wish I'd known. They might have let me bring him on board." He turned to the Brigadier and the Supply Sergeant, tactfully slipped away, lest he divulge his secret too soon.

As the barge neared the ship the Brigade Commander made a suggestion to the Colonel. "They tell me that as soon as this last load is on, our ship is going out. I think it would be a good thing to have your band play us out of the harbor. Send them up on the upper deck as soon as they get on board, and they can start playing at once."

The Colonel agreed—he was proud of his band—and gave the necessary orders, greatly to the consternation of the three conspirators who had planned to quietly withdraw Chum from his hiding place. To no avail, for under the watchful eye of the leader the band was formed and marched direct to the upper deck. The troops turned out on the lower decks as the musicians tuned up and a circle of officers formed around the music. With a clanking the

anchor chain rose out of the water. As the leader raised his baton the drummer looked around appealing for support. It was not forthcoming. The leader glanced at him and nodded. Helplessly he swung his sticks and as the baton fell, smote a resounding stroke.

On the boom of the drum followed a chorus of yelping. It was, as the harassed Supply Sergeant said, more like a flock of coyotes at drill than one frightened puppy. The Colonel was in the front rank and for an instant he was puzzled. Then he guessed. He looked around and saw that the Brigadier and the ship Captain were too far away to hear. Then to the band he commanded in stertorian tones, "Without the drum! Play louder!"

THE USE OF SIGNAL CORPS TRAINING MANUALS

BY CAPTAIN CHARLES B. THOMAS, F.A.

Reports of inspectors, the Knox Trophy tests and information variously obtained, indicate that thorough instruction in Communication lags behind that in other essentials of Field Artillery. Officers will profit from a careful reading of Captain Thomas' article. His position as liaison officer at the Signal School brings him in close connection with the preparation and review of the manuals about which he writes.—GENERAL SNOW.

IT WAS recently the writer's good fortune to be able to visit two large artillery posts and to see something of the communication systems installed by the troops there-at on manœuvres and during ordinary garrison training. The results obtained appeared little short of miraculous in view of the shortage of men available for this work, particularly when the exercises extended over a period of time during which relief operators, etc., ordinarily would be employed. It was necessary during one manœuvre, in particular, for personnel to remain on duty for as long as eighteen hours without relief. Naturally, when such is the case, the main idea of everyone is to get in the essential lines and not worry about the tidying up of the system. However, with all due respect to communications officers throughout the Field Artillery, it is still believed that there are quite a few things which can be improved in their line of work. A high ranking signal officer recently remarked, "Communications throughout the Army are rotten. The Infantry admit this, the Field Artillery deny it, while the Cavalry brag about it."

Why is it that this impression is given when we actually know that our communications are pretty good? For exactly the same reason that the battery with shiny hubcaps and white halter shanks creates (in some minds, at least) a more favorable impression than the one which doesn't bother with such trimmin's. Human nature is very much the same wherever we go and any organization which is a bit spruced up can get away with a little more murder than one which is not.

It is the purpose of this article to point out how and where the information on tidying up the systems now in use can be obtained, as well as to indicate several places where a little extra work will be repaid many times in the impression given, and in the additional comfort afforded the operating personnel.

There is a general lack of familiarity in the Field Artillery at large with the Signal Corps Training Manuals. These are really very excellent books which will be of great assistance if their purpose is understood and they are correctly used. It is admitted that

appearances are against them. The officer, used entirely to text or reference books, comes across, let us say, a manual purporting to be the last word on Message Centres. "Ah," says he, "now I have it. I will immediately find out what the composition of a regimental message centre is and how it works." Accordingly he digs through the index, reads a few true-false questions, wanders around for a while in a maze of blue and yellow pages, and then hurls the offending manual into the corner with deep curses upon the author of any such unintelligible gibberish. I don't blame him. My first experience with these books, had several years ago, was of this nature. They do not appeal readily to a person accustomed to the ordinary text or reference book. An organization commander has so much in the way of reading matter coming to him in the ordinary course of events that he doesn't hanker to go out looking for more. Nevertheless these manuals are excellently gotten up and can be used to advantage if they are approached in the right way.

The Training Manuals were devised by the Signal Corps as a means to be employed in teaching their specialists; in other words, they are not so much text-books as they are a method of instruction. The idea underlying their preparation was that in an emergency, qualified instructors would be few and far between. This, everyone admits, is a revolutionary idea in an army which evidently believes that all that it is necessary to do in order to have an instructor is for competent authority so to designate an officer. Of course in civilian practice, embryo instructors (or teachers) go through a complicated course of normal schools and instructor training, but, as above noted, the army evidently doesn't believe in this. The Signal Corps was sceptical and so, for each subject, prepared an "Instructor's Guide" by use of which a green instructor could keep at least one jump ahead of his class. Every manual will eventually be divided into a student's manual and an instructor's guide, the former being the even numbered manual and the latter the odd. The Instructor's Guide contains exactly the same material as the student's manual with the addition of certain white pages containing "Instructions for the Instructor," "Instruction," "Progress," and "Proficiency" tests. Since it is unlikely that the student's manual will ever be issued in quantity (and this is not particularly necessary) this article will discuss only the instructor's guide. In other words, the difference between the two manuals is in the "get-rich-quick" course in instructional methods for that particular subject contained in the instructor's guide.

An analysis of any manual shows it to be composed of several divisions as follows:

An Introduction.

Unit Operations. (This term as used in these training manuals means an applicatory problem complete in itself, the performance of which serves to illustrate in a concrete manner some one specific point or theory.)

Suggestions for the Instructor.

Instruction Tests.

Progress Tests.

Proficiency Tests.

Information Topics.

Not a very cheering line-up for anyone attempting to find a specific bit of information, it is granted, but quite logical if the purpose of the manual is borne in mind.

In general, in order to use these manuals it will be necessary to proceed as follows:

First: Read the preface and introduction to the manual in question.

Second: Pick out those Unit Operations in which instruction appears desirable. In each manual will be found Unit Operations of small value to the Field Artillery. There will also be found some of no value. The instructor should exercise his judgment in selecting those operations necessary for the complete instruction of his unit. He should also fit the total number of Unit Operations to be taken up in any one drill period to the time at his disposal.

Third: Before attempting to teach a Unit Operation, read carefully the "Suggestions to the Instructor" for that Unit Operation. These will appear in the white pages immediately following the operation in question. The chances are that reference will be made here to the Information Topics which apply to that particular subject. However, it is recommended that the instructor read all Information Topics before the second step, that is, before picking out the desirable Unit Operations.

Fourth: Teach the Unit Operations as laid down. Much of the equipment asked for in the equipment list will not be obtainable, but a great deal of it may be substituted or improvised.

Fifth: Give as many of the various tests as time and opportunity permit. Whether you believe that the qualifications obtained thereby mean anything or not, you must admit that a drill is a drill, whether in the day room or on the field. Another use may also be made of these tests. They will save the instructor mental labor when it becomes necessary to devise drills or exercises for the older members of the detail who are not undergoing the individual training through absence because of sickness, special duty or the like.

Let us take a concrete example. Let us say that Lieutenant Dumbjohn reports for duty and is assigned as reconnaissance officer. His battery commander wishes him to bear down a bit on the

signal detail who are mostly recruits. Lieutenant Dumbjohn has probably seen an EE-5 telephone and most likely has talked over a commercial line, but what he doesn't know about telephones and switchboards would fill many books. He digs through the battery storeroom and there finds the following manuals, covered with dust:

Training Manual No. 21—Basic Signal Communication, Instructor's Guide.

Training Manual No. 23—Telephone Switchboard Operator, Instructor's Guide.

Training Manual No. 43—The Field Lineman, Instructor's Guide.

(The only reason they have not been relegated to limbo is because the battery commander had at some previous time signed for them—they are like the thermometer—a fine thing to keep in the storeroom.) Let us assume though, that Mr. Dumbjohn has seen the light with regard to Training Manuals and knows something about their use. He opens Training Manual No. 21 at page III and reads the preface, which among other information of more or less value, gives the minimum specifications of the Basic Private in a Signal unit. He then turns to page 1 where the method of instruction used in the manual is briefly outlined. Here, it is believed, is the difficulty. The idea is to put across the applicatory method with which all of us are familiar, but the description given in this introduction would lead very few of us to recognize it. Briefly, the introduction attempts to explain that the course will be conducted as follows:

First: By a short demonstration or description of the phase of instruction, covered by that particular "Unit Operation." This information is drawn from the paragraphs under "Information" in the Unit Operation to be taught and from one or more "Information Topics" in the back of the book (the yellow pages).

Second: By having the student actually perform the operations laid down under "Directions" in that Unit Operation.

Third: After having done those things ordered, by testing the student as to his knowledge thereon.

The introduction then explains the various kinds of tests used. There are three—Instruction, Progress, and Proficiency tests. The Instruction test is only a kind of drill. Records may be kept if it is desired, the main idea being to drill the student in the Unit Operation just completed. The Progress test is a check for the benefit of the instructor, by it he is enabled to pick out the backward students and, if he wishes, to take special pains with them. This test comes generally after the completion of a connected group of unit operations. Records may be kept of these if desirable. Finally, the Proficiency test is used at the end of the course (or several

may be used during the course) to determine whether or not the student has qualified. (This is in general the gist of the introduction to each manual. A short explanation of the new type questions which are used in the tests and some hints on devising tests, complete the introduction.) A discussion of the value of tests or the use of tests is out of place here, the matter having beeen touched on in a previous article in the FIELD ARTILLERY JOURNAL (March-April, 1926, page 169).

Let us now go back to Mr. Dumbjohn whom we left struggling through the introduction to the Training Manual. We will hope that he has assimilated most of it and finally turns to page 13, Unit Operation No. 1. He looks this over and decides that if his detail is quite green, it might be a good plan to teach them something about their tools. Accordingly, he turns to page 17, "Suggestions to Instructors," and gleans certain information about how the class should be conducted. Then, after reading Unit Operation No. 1, he feels more or less competent to meet his detail the next morning and to conduct the instruction as laid down in Unit Operation No. 1. He sees what equipment is desirable for each man. He sees certain information which ought to be given, and he sees how this class should go about sharpening a knife—by the members thereof actually doing the sharpening and not standing around watching him do it. Certain questions are asked from time to time, the answers to which do not appear anywhere in so many words, but are indicated in the lesson. Their main object is to make the student do a little thinking.

Having completed Unit Operation No. 1, an Instruction Test is given. This, be it remembered, is a drill, although it may also be made of record.

That night, Lieutenant Dumbjohn gets ready for his next day's instruction. He turns to Unit Operation No. 2, and finds listed in the equipment BA-4 cells and a voltammeter. The chances are he has neither, and since one primary battery is very like another, he doesn't bother a great deal but turns to Unit Operation No. 3, page 29, which has to do with BA-10 batteries. He should be able to get these, and it is quite likely he can borrow a voltameter from battalion headquarters. Having decided to teach this Unit Operation, he turns to page 33, "Suggestions for the Instructor," gets what information he can, and is ready to teach Unit Operation No. 3 the next morning. Similarly he continues, using only those Unit Operations which apply to the job in hand.

He realizes that the study of Army Organization in this manual is somewhat obsolete, due to changes in Tables of Organization and in the conventional signs used. It will be necessary, in order to teach this subject, to completely revise the course as laid down.

For the same reason Information Topic No. 2 is of no value to him. Information Topic No. 1 is, however, of value because of the definitions contained therein.

While not posing as an authority on communications, the writer of this article has taken the liberty to append his choice of those Unit Operations and Information Topics in the manuals, knowledge of which appears desirable for Field Artillery communication personnel. He has also indicated, under each manual, weaknesses observed in our communications which may be corrected by that Manual. It is hoped that this translation of Signal Corps Manuals will be of some benefit.

TRAINING MANUAL NUMBER 21

Basic Signal Communication—Instructor's Guide

This manual contains instructional matter for basic signal communication training. Every soldier in a signal unit should be versed in it. Certain of the unit operations, as, for instance Unit Operation No. 2, may very well be omitted, at the discretion of the instructor. The instructor should read the preface and introduction and obtain thereby an idea of the minimum specifications of the basic signal private, as well as an insight into the methods of training to be used in applying the manual. While Information Topic No. 2, Army Organization, is omitted in the following list because the symbols and certain of the data are obsolete, some instruction should be given in this subject, particularly in the organization of the soldier's own arm and of the supported infantry. Many of the unit operations can be combined in one period as, for instance, Unit Operations Nos. 1, 3, 4, and 5. It is quite possible for the instructor to substitute for BA-4 batteries those issued, as BA-9, BA-11, etc. Unit Operation No. 7 on the camp telephone should be omitted, but Unit Operation No. 8 should be retained, using the EE-5 telephone in the place of the EE-4 or Camp Telephone. It is apparent that Unit Operation No. 9 should therefor precede Unit Operation No. 8. Much of the data on wire lines given in Unit Operation No. 8 receives further discussion in Training Manual No. 43. It must be remembered that the set-ups shown on page 71, for instance, are *ideal* and would represent the *ideal* installation of a test station when the short stake type of construction of wire lines is in use. In other words, the instructor must bear in mind that any system of instruction should cover all phases of installation of communications from the most simple and earliest installation to the more complicated and final installation. A signal system once installed should be continually improved. Great stress should be laid on Unit Operation No. 6, Field Wire, Types and Splices.

List of Unit Operations which may be omitted:

Unit Operation No. 2—Primary Batteries, type BA-4. (See remarks above. Some instruction should be given on the batteries issued, using this operation as a model.)

Unit Operation No. 7—Camp Telephone, Nomenclature and Testing.

Tests in Army Organization, pages 98–109, inclusive. (It will do the instructor no harm to read this.)

Information Topic No. 2—Army Organization. (See remarks above relative to instruction in this subject.)

TRAINING MANUAL NUMBER 43

The Field Lineman—Instructor's Guide

The training of linemen should be pyramided on that of the basic private. It is for this reason that this manual is next discussed. In the preface will be found minimum specifications for Linemen, Field Artillery, and Telephone Corporals of that arm. The Introduction gives the usual information as to the use of the manual. The following unit operations may be omitted for Field Artillery:

Unit Operation No. 6—The Pack Reel Cart (Type RL-16).

Unit Operation No. 7—Laying and Recovering Wire with a Type RL-16 Reel Cart.

Unit Operation No. 8—Wire Cart, Two-horse, Infantry, Signal Corps and Cavalry.

Unit Operation No. 12—Laying and Recovering Wire with a Two-horse Wire Cart.

Unit Operation No. 17—The Universal Test Set, Type EE-65.

Unit Operation No. 19—The Buzzerphone Type EE-1.

Unit Operation No. 20—Ground Return and Simplex Circuits.

(Only that part of this operation relating to Simplex Circuits should be omitted.)

Unit Operation No. 21—The Service Buzzer, Type EE-63.

(This operation can be used to advantage in those units [battalion and higher] to which these buzzers are issued. While issued primarily for code practice, it is believed that many communications officers will find a use for them in the liaison detail.)

Attention should be given the proficiency test on pages 221–236, whether it is actually used in instruction or not. It will be noted that Unit Operation No. 15, Test Stations and Test Points, and Unit Operation No. 16, Line Route Maps and Circuit Diagrams were not omitted. While generally the Field Artillery does not need or install such elaborate Test Stations as contemplated in the text, the time might come when such an installation would be extremely

desirable. In general, we use test points in their place, largely because we do not have sufficient long circuits or personnel to warrant the installation of the test station. Information on the subject, however, would not be amiss. The use of Line Route Maps and Circuit Diagrams is for the same reason (few long trunks) of doubtful value to the average lineman. But certainly officers and noncommissioned officers should be more or less familiar with them and able to construct them if necessary.

TRAINING MANUAL NUMBER 23

Telephone Switchboard Operator—Instructor's Guide

This manual contains much excellent information on installing, testing and operating switchboards. Lack of familiarity with the advantages of cable and terminal strips is responsible, it is believed, for the general failure to use them with the switchboard. While they do add weight and at first glance it would appear that their use unnecessarily complicates matters, a little reflection will prove the opposite. Any officers who have used the new type boards, made experimentally by the Signal Corps, will agree that the weight gained by the addition of cable and strip is more than compensated for by the ease of installation, operation and inspection. Its use also adds greatly to the appearance of the installation. Since the switchboard will in most cases be carried on a vehicle, there is really no reason why it cannot be permanently installed in an improvised case containing operators' phone, board, cable and terminal strip. The new switchboards will be so arranged, and will have, in addition, a night alarm. Of course the idea of the cable is to remove to some little distance, the point where linemen connect in to the board and where they can test without annoying the operator. The terminal strip, so far as we are concerned, is to facilitate connecting in the lines—it is much easier to connect to a terminal having wing nuts than to the terminal on the board which requires the use of a screwdriver. While terminal strips, type TM-84, are issued, it is perfectly possible to improvise more effective ones by using the wing nuts which come with pistol ammunition boxes. For the above reasons, Unit Operation Nos. 1 and 2, should receive attention. In many of the unit operations, it will be noted that the operators set type EE-64 is mentioned. This set is not at present issued to the Field Artillery and there are no indications that it will be. However, by substituting for it and the camp telephone wherever mentioned, the EE-5 telephone, and making appropriate minor changes in the text where necesssary, it will be found that the manual answers very well for us. Attention should be given Unit Operation No. 8, Routing Calls and Use of the Traffic Diagram. A

switchboard operator should certainly understand this unit operation. A number of excellent drills for details will be found among the instruction, progress, and proficiency tests, whether or not any importance is attached to the proficiency of operators determined by them.

The following may be omitted:

Unit Operation No. 3—Installation of Monocord Switchboard, Using an Operator's Set, Type EE-64.

Unit Operation No. 14—Installation of the Camp Switchboard.

Unit Operation No. 15—Operation of the Camp Switchboard.

Army Organization Tests, pages 187 to 197 inclusive.

It is assumed that the student has been instructed in as much of his own unit's organization as is necessary, while training in Basic Signal Communication was in progress. This manual (No. 23) is pyramided on Training Manual No. 21. While omitted, largely because of the obsolete symbols, the tests on Army Organization contain some features well worth an instructor's attention.

Information Topic No. 2—Army Organization.

Information Topic No. 9—Installation and Operation of the Camp Switchboard.

Paragraphs 12–16 of Information Topic No. 4. These paragraphs have to do with the EE-64 operator's set.

The instructor should read all information topics before attempting to conduct his class, as the arrangement of this manual in this respect differs slightly from those previously discussed. There is a great deal of meat in these Information Topics, sufficient to keep the wideawake instructor well up on the subject at hand.

TRAINING MANUAL NUMBER 25

Message Centre Specialist—Instructor's Guide

Probably no one subject having to do with communications has given rise to more discussion than that of Message Centres. If everyone will remember that the Message Centre is an agency to expedite traffic and not to alibi it, it is likely that a great many arguments can be eliminated. In the smaller units, the Message Centre will be principally a chief of messengers. There has been a great amount of discussion as to whether officers can or should use the telephone, and as to whether all telephone calls should go through the Message Centre. Attention is invited to Information Topic No. 4, page 260, in this manual, where under "General Principles" we find that the following do *not* go through the message centre:

Mail.

Direct telephone conversation.

Messages carried by personal agents.

Messages passing directly between offices, or officers of the same headquarters, when they are near enough together not to require the service of the message centre to effect prompt delivery or to insure receipt or acknowledgment.

With this in mind, it may then be assumed, at least for the Field Artillery, that when a message is of such importance that direct telephone communication between officers (or officer's telephone operators) is necessary, the telephone is taken out from under the message centre's control. Generally, however, most messages can be written and sent through the message centre if everyone realizes that the main idea of the message centre is to get the message through. It can be recorded hours later if necessary—the first thing to do is to send it.

A great deal of misapprehension was caused, it is believed, by the advent of the Message Centre Manual. It must be remembered that the Signal Corps was faced with the necessity of preparing a manual which would work for anything from an army down to a battalion. But the fault lies with the services using the Manual. If one goes into a restaurant to order a dinner and the waiter brings a bill of fare, does he order the whole thing or does he pick out what he wants? If he is wise and has regard to the state of his stomach, he does a little choosing. The same applies to this manual. What is fine for a corps would be superfluous for a battalion. The only thing the Manual prescribes is that when messages are put through the Message Centre, they will be handled and recorded in a certain manner. The thing is really very flexible. The following may be omitted:

Unit Operation No. 8—Use of the Pigeon Message Blank.

Unit Operation No. 9—Releasing Pigeons.

Unit Operation No. 11—Transmitting Telephone Messages, Use of the Telephone Code, and the Phonetic Alphabet. (It is assumed that this subject has been covered in the instruction in Training Manual No. 23—Telephone Switchboard Operator. If not, then this Unit Operation should be included.)

Information Topic No. 2—Army Organization. (The remarks as previously made on this subject apply.)

Information Topic No. 12—Pigeons.

Attention should be given Part II, Training Message Centre Specialists in Team Work, page 289, and Part III, Training Message Centre Specialists in Handling Traffic Records, page 305, as many valuable hints on training may be picked up therein. Unit Operations dealing with Enciphering and Deciphering, Encoding and Decoding obviously should be omitted in those units to which Field Codes and Cipher Devices are not issued.

TRAINING MANUAL NUMBER 27

Radio Operator—Instructor's Guide

Part I—Radio Sets

This manual consists of three books as follows:

Part I—Radio Sets.

Part II—Volume I—Code Practice.

Part II—Volume II—Tactical Radio Procedure.

Part I contains the usual preface and introduction and deals entirely with the operation of various Radio Sets. The following may be omitted:

Unit Operation No. 1—Primary Batteries used in Radio Communication.

Unit Operation No. 2—Series and parallel connections of dry cells and batteries.

(Note: Unit Operation Nos. 1 and 2, may only be omitted if the student has had previous instruction in Training Manual No. 21 where these subjects were covered.)

Unit Operation No. 6—The S.C.R.-61 Wave Metre.

Unit Operation No. 7—The S.C.R.-74A Transmitting Set.

Unit Operation No. 8—The S.C.R.-74A Transmitter.

Unit Operation No. 9—The S.C.R.-54A Receiver.

(Note: The S.C.R.-125A wave metre is covered in Unit Operation No. 10. It will be necessary for the instructor to go over this entire Unit Operation which also includes the S.C.R.-95 and S.C.R.-125 wave metres.)

Unit Operation No. 11—The S.C.R.-105 Set.

Unit Operation No. 12—The Vacuum Tube Detector, D.T.-3A.

Unit Operation No. 13—The S.C.R.-72 Amplifier.

Unit Operation No. 14—The S.C.R.-121 Amplifier.

Unit Operation No. 16—The S.C.R.-67A Radio Set.

Unit Operation No. 17—The S.C.R.-130 Set.

Unit Operation No. 18—The S.C.R.-127 Set.

Unit Operation No. 21—The Inverted "L" Antenna.

Unit Operation No. 23—The 40-foot Umbrella Antenna.

Information Topic No. 3—The S.C.R.-67A Radio Telephone Set.

Information Topic No. 5—Hand Generator Type G.N.-29A. The Information Topics will be found to include lists of equipment issued with each radio set. It should be remembered that the 77-B set is a modification of the 77-A.

TRAINING MANUAL NUMBER 27

Radio Operator—Instructor's Guide

Part II—Code Practice—Volume I

This manual can be made of use to the Field Artillery, although generally the Code Practice Equipment and the Ediphone will not be obtainable. Sometimes suitable equipment can be improvised at a small expenditure of private funds. Where this is undesirable, the two service buzzers issued to battalions and higher units will have to be used. In general the system of instruction laid down should be followed, omitting those portions of the text which are obviously inapplicable. Information Topic No. 4, containing the various tables of characters, will probably be found of most assistance. These tables are carefully calculated on a speed basis and should be used in the instruction at the various stages in the training of a radio operator. They are applicable to whatever type of equipment is available and are numbered according to the Unit Operation to which they apply—Tables No 7 A, B, C, D, and E, for instance, being for use with Unit Operation No. 7, which has for its object training the operator in two-character code groups sent at the rate of five to seven words per minute. The instructor should read carefully the Introduction and "Suggestions for the Instructor" which follow immediately after each unit operation.

Because of the dissimilarity of Code Practice Equipment available at posts, it is impracticable to indicate which Operations should be omitted. The officer concerned with training radio operators will be obliged to exercise his own judgment in this matter, adapting the manual to the type of equipment at his disposal.

TRAINING MANUAL NUMBER 27

Radio Operator—Instructor's Guide for All Arms

Part II—Tactical Radio Procedure—Volume II

This manual is under revision but lack of funds will probably preclude its printing for some time. The revision will simplify the present procedure as laid down in this manual so that if an operator is trained in the old procedure, he will have no difficulty in learning the new. It will be only a question of omitting certain of the procedure which he has learned.

In using this manual, the ordinary procedure should be gone through with, that is, the introduction should first be studied and then the "Suggestions for the Instructor" for each unit operation before attempting to instruct in that unit operation.

No omissions are recommended. Probably there is no other branch of communications in which teamwork and similarity of training between the various arms is so essential as in radio. For this reason, the use of this manual as it is, is recommended.

In summing up, it may be said that probably the greatest fault in our communications lies in the lack of what may be called, for want of a better term, "Communications Discipline." As has been pointed out, in some cases this is due to shortage of operating personnel, but in many, it is through the lack of information of many officers as to what is possible or desirable. For instance, a stock expression is—"Get the wire off the ground." This does not mean much—yet we see wires laid on bushes—very taut—and a menace to anyone who comes stumbling along. Information Topic No. 2 in the Field Lineman is very explicit on this point; it says "wires are kept off the ground *whenever possible* and placed *high enough* to *clear traffic*." There is a great difference in the two demands. Also when wire is laid on the ground, it should have plenty of slack. We seldom see this. Another point: Very few officers attempt to cable all the lines leading into a Command Post and stake them down. This should be done after things are in order elsewhere. Not only does it improve greatly the general appearance of the installation, but also it prevents people blundering around among the wires particularly after dark. It is believed that a little attention to the Training Manuals will be repaid in raised standards for our communications, particularly in their installation.

There is a very excellent pamphlet published by the Signal School called "Training of Signal Communications Personnel." It goes into the training of signal personnel quite deeply and has been favorably commented on by the Field Artillery School. Used in conjunction with the Training Manuals it is believed that it would be of great use to officers of Field Artillery interested in the betterment of their communication details. Copies may be had upon application to the Field Artillery Liaison Officer, the Signal School, Fort Monmouth, New Jersey.

The Training Manuals were issued to organizations down to and including batteries, it is believed. How many of these are now available is problematical. They can be obtained at the prices shown, from the Superintendent of Documents, Government Printing Office, Washington, D. C.

NAME OF MANUAL	PRICE
Training Manual No. 21—Basic Signal Communication	$ .30
Training Manual No. 23—Telephone Switchboard Operator	.45
Training Manual No. 25—Message Centre Specialist	.55
Training Manual No. 27—Radio Operator, Part I—Radio Sets	1.00
Training Manual No. 27—Radio Operator, Part II—Code Practice	.30
Training Manual No. 27—Radio Operator, Part II—Tactical Radio Procedure	.45

REPLACEMENT OF ANIMALS IN CAMPAIGN

BY CAPTAIN, C. C. ALEXANDER, F. A.

THERE is a growing tendency to minimize the value of animals in modern warfare. To a certain extent this is natural, since we are living in a motor age, and in the great centres of population the horse is indeed becoming a rarity. Nevertheless, we must base our plans for future operations on those of the past and no one who has read, even superficially, the history of the last war will question the vastly important work of animals in carrying the war to a successful conclusion. It might be of interest to note here that our Expeditionary Forces in France required, in round numbers, 250,000 animals and a force of 500 officers and 15,000 enlisted men to care for them; also that the average monthly loss was 1.25 per cent.

If we may assume, then, that large numbers of animals will be used in future warfare, it becomes a matter of interest to know the sources from which the initial supply and the replacements will come; and it is the purpose of this article to briefly set forth some of the essential facts.

THE REMOUNT SERVICE

ORGANIZATION

The Remount Service as now organized is comparatively new, having come into existence as a separate branch of the Quartermaster Corps in April, 1919. In time of peace it consists of a Headquarters in Washington, a Remount Board, a Purchasing and Breeding Headquarters, Quartermaster Intermediate Remount Depots, and Corps Area Depots. In time of war its expansion will include Remount Troops, Concentration Depots in the Zone of the Interior, Base and Advance Depots in the Theatre of Operations, Mobile Army Depots in the Combat Zone, Port Remount Officers, Chief Remount Officer in the Theatre of Operations, Army Remount Officers, Corps Remount Officers, and Division Remount Officers.

GENERAL FUNCTIONS

The Remount Service is, in general, charged with the purchase of all animals; the control of remount depots and stations, including the breeding, care, feeding and training; and with the control of funds covering such activities.

The Headquarters Office consists of four officers and fifteen civilian employees.

The Remount Board makes recommendations to the Chief of Staff upon all matters pertaining to the supervision and regulation of breeding operations of public animals. The board consists of representatives from the Army, the Marine Corps, the Department of Agriculture, and twelve civilians who are appointed by the Secretary of War to serve for such periods as he may determine. The board is given authority, subject to the approval of the Secretary of War, to accept donations of animals for breeding purposes and donations of money or other property to be used as prizes at agricultural fairs and horse shows for the purpose of encouraging the breeding of animals suitable for army purposes.

Remount Purchasing and Breeding Headquarters will be established at such points as may be necessary to conduct the purchasing and breeding operations of the Army. Such headquarters are now located at Colorado Springs, Kansas City, Fort Reno, Lexington, and Fort Douglas.

Quartermaster Intermediate Remount Depots are located at Front Royal, Virginia (5062 acres); Fort Reno, Oklahoma (9493 acres); and Fort Robinson, Nebraska (23,040 acres). The average personnel at these depots consists of four officers and about one hundred and twenty enlisted men or civilians.

The only Corps Area Depot now in operation is at Fort Sam Houston.

The Remount Troop is the basic organization of the Remount Service. It consists of four officers and one hundred and fifty men and is an emergency unit only, there being no provision for such an organization in peace tables.

Concentration Depots will be organized in the animal-producing sections of the Zone of the Interior; at or near the Ports of Embarkation if the war is to be overseas; and in the Communications Zone of the Theatre of Operations if the nature and extent of operations justify such organization. Concentration Depots normally will consist of twelve troops with a Headquarters Detachment and attached Medical and Veterinary personnel. The primary function of the Concentration Depot is to receive animals from Purchasing Boards, condition them and then deliver them to the divisional units or to forward them to depots within the Theatre of Operations as replacements. It also operates schools for training Remount Officers, stable sergeants, farriers, teamsters, packers, horseshoers, and saddlers.

The Army Depot is a mobile unit charged with the care of 1200 animals and is composed of a Headquarters Detachment and three Remount Troops. It serves with the army in the field, receiving animal replacements from Concentration Depots and issuing them

through the Corps Depots or directly to organizations in the Combat Zone.

The Corps Depot, composed of one Remount Troop, like the Army Depot, is a mobile unit serving with the Corps in the field, but receives replacements from the Army Depots and issues them to units within the Corps.

The Port Remount Officer operates his office as a division of the Port Quartermaster.

The Transport Remount Officer, under the direction of the Port Remount Officer, has direct charge of the loading of animals.

The Chief Remount Officer in the Theatre of Operations is an assistant to the Chief Quartermaster. He directs the work of the concentration Depots in the Theatre of Operations and the Army and Corps Depots and also the flow of replacements to tactical units.

The Quartermaster Intermediate Remount Depots provide places where newly purchased animals can be sent and economically cared for while being trained and conditioned and until required as replacements.

Remount Officers are assigned to the Army, Corps and Division to take charge of remount matters such as the animal status of the unit, replacements, supervision of issues, inspections, and remount schools within the unit.

BREEDING OPERATIONS

On July 1, 1920, Congress granted $250,000 for the purpose of inaugurating a comprehensive breeding program. During the following year 183 stallions were obtained by purchase or donation and by transfer to the War Department of a number of stallions by the Department of Agriculture. In the next two years the number had grown to 285. During the 1921 breeding season 4129 mares were bred to 159 stallions, resulting in the production of 1777 foals or a crop of 43 per cent. During the 1922 breeding season 6799 mares were bred to 219 stallions with a foal crop of 2701, or 49 per cent. Each year shows an improvement and the results thus far are exceedingly encouraging. The Remount Service has now distributed throughout the country 361 stallions and every effort is being made to stimulate the interest of the farmer in the production of better animals.

ISSUE OF ANIMALS IN THE THEATRE OF OPERATIONS

The issue of animals in the Theatre of Operations is the issue of replacements, since all organizations will enter fully equipped. Therefore, the reservoirs of these replacements are arranged to meet the demand with the lowest factor of delay. Concentration Depots are well back in the Communications Zone holding the larger numbers

of animals while the smaller capacity depots are placed well up to the line of the Combat Zone to facilitate rapid replacements to the Army and Corps Depots.

Assuming operations to be beyond the seas the flow of replacements would be as follows: From Concentration Depots in the Zone of the Interior where the animals, after purchase, are conditioned until fit for shipment; then to the Embarkation Depots where they will be given the most careful tests to prevent any sick or injured animal from being shipped overseas; to the Concentration Depot at the Port of Debarkation which will accommodate 7200 animals; to the Concentration Depot in the Communications Zone which also accommodates 7200; to the Army Depot with a capacity of 1200; to the Corps Depots, each caring for 400; and finally to the Division where the Division Remount Officer will issue them to the units within the Division.

This scheme of replacement is not rigid, for example, animals may come direct to the Concentration Depot in the Communications Zone from purchases in neighboring countries or by requisition in the Theatre of Operations. Also, when possible, animals should be issued direct—by shipment overland or by rail—from the Concentration Depot in the Communications Zone to the units in the Combat Zone. The reason for this is apparent when it is recalled that a Field Army has a total of 90,177 animals, while its Remount Depots capacity is only 2400, or less than three per cent., replacements on hand. Thus it will be seen that the issue of animals from the Communications Zone is necessary in order to keep the Army's small replacement reservoir intact for possible emergencies.

Direction and Control.—As in the Zone of the Interior the Remount Service is charged with the care, conditioning, training and issue of animals in the Theatre of Operations. Within the Communications Zone this Service operates Concentration Depots to supply animals in the various sections of the Zone. G-4 of the Corps consolidates the requisitions of Corps troops; G-4 of the Army consolidates the requisitions of the Corps with those of Divisions and Army troops and the finally consolidated requisitions go to the Communications Zone where they are filled from Concentration Depots, when possible, so that the animals in the Corps and Army Depots may be reserved for emergencies.

Animals are delivered through an Army distributing point for animals, often to the Division at its railroad. A representative of the depot in the Communications Zone is sent with them and remains with them until final delivery has been accomplished.

Methods of Issue.—The Depot Commander may issue the animals directly from the depot to the receiving organization; or by an overland convoy; or by shipping them by rail or water.

Conclusion.—With the farmer and the sportsman interested and taking pride in the breeding of fine horses; with the splendid work now being carried on by the American Remount Association together with the various departments of the Government; and with the Army carrying the gospel to the youth of the land by way of the R.O.T.C. units, there is every reason for the lover of fine horses to be optimistic and to feel that in spite of all the mechanical geniuses the next war will see the horse playing a very important part.

Note.—The writer gratefully acknowledges the following sources of information: Army Regulations; "Report on Remount Service, A.E.F. France"; and especially a series of lectures by Captain D. M. Speed, Quartermaster Corps, from which extracts were freely taken.

METHODS OF FIRE DIRECTION

BY MAJOR JAMES A. LESTER, F.A.

Definition.—"Fire direction is the tactical command of one or more fire units with a view to bringing their fire to bear from a suitable position upon the proper targets at the appropriate time."

Scope.—The particular phase of fire direction which this paper proposes to discuss is the designation of targets by the battalion commander to battery commanders at distances of from several hundred yards to twelve hundred yards from the battalion observation post. The tactical reasons for the selection of particular targets and the tactical reason for distances, occasionally as great as twelve hundred yards between a battalion observation post and battery observation posts, will not be treated.

Whenever a battalion of field artillery goes into action, the battalion commander is confronted with the problem of designating targets to his battery commanders, some of whom are often at considerable distances from his observation post. His problem is not solved by merely giving half of the normal zone of his battalion to one battery and half to another and holding the third battery at his immediate disposal for fire over the entire normal zone of the battalion. This is the normal initial procedure and in general is a good "starter."

Liaison with the supported infantry unit is normally with the artillery battalion. The artillery battalion commander is therefore the normal person to whom the infantry commander comes for fires on particular localities. Hence the necessity for his ability to quickly pass these localities on to his battery commanders in order that fire may be delivered promptly.

The following methods have been successfully employed in solving this problem:

REFERENCE POINT METHOD

The principle involved in this method is that used in the computation of firing data by the parallel method.

A reference point is designated by the battalion commander. He sets the zero of his own angle measuring instrument on this point, reads the azimuth of targets upon which he wishes fire placed, and after having corrected same for the displacement of his battery observation posts, transmits this data in a message of the following general form:

1. Reference point St. Luke's Church steeple.
2. Two hundred mils left and 15 mils below
3. A road intersection at about 3600 yards.
4. Machine guns in southern edge of orchard just beyond this road intersection.

The battery commander concerned places the zero of his instrument on the reference point indicated and sets off 200 mils left of same and 15 mils below. He should by a study of the terrain within his field of view be able to identify the locality described.

Several refinements may be used to insure a high degree of accuracy in the transmission of this deflection:

(a) The battalion commander may use the range finder to find ranges to targets and ranges to battery observation posts in order to more carefully compute the offsets.

(b) Several reference points may be selected in the normal zone of the battalion in order that the target may be chosen as close to a reference point as possible.

(c) The battalion commander may compute the offset, from the reference point, of some object which can be easily identified, and determine from the battery observation post the exact error which he has made in his offset. This error may then be taken into consideration in subsequent computations of offsets, as it may be considered constant for targets in the same general locality.

A slight variation from the above may be employed when the battalion commander is alone at his observation post. He may read the deflection of the target as seen from his observation post and send it to the battery commander uncorrected for displacement. The battery commander then computes the offset himself and identifies the target as above.

In general the battalion commander should compute or have computed the offsets at his station for the obvious reason that the battery commander needs all available time for the computation of his firing data on the target.

In all cases the battery commander should report all target identifications when made.

The characteristics of a good reference point are:

1. Prominent, easily indicated and identified.
2. At a considerable distance.
3. Near the centre of the normal zone of the battalion.
4. Unvarying in shape or appearance with the observer's displacement.

In addition to the angular measurements (both vertical and horizontal) discussed in the use of a reference point, the horizontal and vertical clock methods may be used.

In the horizontal clock method the observer is at the centre of the clock, and the reference point is at 12 o'clock. In the vertical clock method the reference point is at the centre of the clock and 12 o'clock is vertically above it.

The clock methods are not very satisfactory unless the person to whom designations are made is close to the director.

COMPASS METHOD

In many cases it will be found that no suitable reference points can be identified. In actual practice this case has arisen so frequently and the compass method has given such unvarying success that many officers have come to the conclusion that the compass method should be employed as the normal procedure in the identification of targets.

The principle employed is the parallel method with the added advantage over the reference point method of having only one offset to compute, *viz.*, the offset on the target. (Magnetic north is considered at an infinite distance.)

The battalion commander sends to his battery commanders a compass bearing corrected for their displacement. He also sends the site of the target, the range, and a description of the locality. Good results have been obtained with a hand prismatic compass of the type which was part of the equipment in 1917 (Keuffel and Esser). The aiming circle, however, is much superior and is sufficiently portable to be carried by the parties of the battalion and battery commanders on their initial reconnaissances.

The following detailed procedure usually obtains good results.

All stations set the scales of their aiming circles at zero, release the needle, and centre the needle by means of the lower motion. When the needle is at rest and centred, the line of sight of the aiming circle is pointing to magnetic north and the bearing to any target may be easily read by merely turning the upper scale of the instrument on the target whose bearing is desired.

Just at this point the battery commander's telescope may be used to great advantage. Its zero should be placed on magnetic north and then it will read magnetic bearings. This may be accomplished by using the aiming circle to select a distant point which is in line with magnetic north.

The battery commander who receives a bearing from the battalion commander (corrected for displacement) only has to turn his telescope to the reading received and he should find the target within his field of view.

If the declination constants of the various aiming circles within the battalion vary considerably, a correction for these variations must be made.

If Y azimuths are used this correction is unnecessary. For this reason the Y azimuth method is recommended.

A nice refinement to this method may be made by designating several points at various ranges in the normal zone of the battalion and requiring the batteries to give their actual readings on same. The difference in these readings from those taken at the battalion

commander's station will prove an extremely useful guide in computing offsets.

It must be remembered that when offsets are greater than three hundred mils, the parallel method of computing same does not give satisfactory results. In such cases, graphical methods may be used.

GRAPHICAL METHODS

Where the element of time is not so important various graphical means are valuable in the designation of targets. In all cases it is believed that concurrently with the reference point and compass methods, topographical work on a battle chart should be commenced.

The first case discussed will be encountered when no map of any type is available.

The Battalion Reconnaissance Officer establishes an orienting line and gives arbitrary coördinates to the Battalion Observation Post. With these data the battery reconnaissance officers are able to locate their observation posts on their charts and give the coördinates of same to the Battalion Reconnaissance Officer. With these points plotted the Battalion Commander can determine the location of targets by polar coördinates; a well-adjusted range finder is essential for this work. The rectangular coördinates of these targets with a full description of same will then be transmitted to the battery commanders. After having plotted the targets, the battery commander can determine their azimuths and then by a proper setting on the battery commander's telescope find them in the field of view of his instrument.

Very often time may be available before opening fire to determine the location of visible targets by intersections.

In this case, the line between the battalion observation post and a distant battery observation post is a suitable base line for an intersection.

The distant observation post reads the azimuths to various targets. These lines when plotted will make intersections with the azimuths plotted at the battalion observation post.

If the intersections make an angle greater than 300 mils the target will be more accurately located than by means of one azimuth and a range-finder range.

USE OF GRIDDED MAPS

During the World War the artillery received the bulk of its firing missions by merely having coördinates designated by higher authority. Unfortunately due to the then common error of straying from the fundamentals always insisted upon in the American Field Artillery, the fire was generally delivered by map methods without any effort to get observation.

This brings up the question of "How may a target be located

whose coördinates are known?" Perhaps the simplicity of the problem does not warrant its discussion, yet its importance forces a short description of a method.

(1) Locate accurately the observation post and determine its elevation.

(2) Locate some base point in the normal zone which can be identified on the map.

(3) Next plot on the map the target whose coördinates have been given. Determine the elevation of the target.

(4) Draw a line on the map from the observation post to the base point and another line to the target.

(5) Measure the angle between these two lines with a protractor and compute the site of the target from the observation post.

(6) Set these data on the battery commander's telescope and the target should be near the intersection of the cross-hairs. The range finder is valuable to check measured ranges.

This or some similar methods should always be employed when firing with map data (wherever targets are visible) in order that it may be determined whether or not the fire is effective. Both battalion and battery commanders should perform these operations.

BY EMPLOYMENT OF BATTALION STAFF

Often a battalion commander may have ample opportunity to study the terrain during his reconnaissance prior to the arrival of the battery commanders.

In such cases it may prove more expeditious to point out various tactical localities to battalion staff officers and have them personally go to the observation posts of the battery commanders and make the designations in person.

The staff officer should carefully observe the changing view of the terrain as he moves from the battalion observation post in order that he may not be "lost" when he reaches the battery observation posts.

DESIGNATION BY DELIVERY OF FIRE BY ONE BATTERY

In general at least one battery commander will be close to the battalion commander. The designation of targets to this battery is verbal and is comparatively simple.

The fire of this battery may be placed on a target and the other batteries told to concentrate on the point where they see this fire falling. A description of the target should be given as in other cases.

DESCRIPTION OF TERRAIN FEATURES

The description of terrain in the vicinity of the target was referred to above. The importance of this description has been demonstrated in practice.

As the displacement between observation posts increases, the errors computed in offsets will increase, hence the necessity for full description.

A target well described with a considerable error made in deflection will often be more quickly identified than one poorly described whose direction is more exactly given.

Often in cases of moving targets of high mobility a general direction is given and a clearly visible landmark is located. In such cases azimuths, bearings, and coördinates are dispensed with.

OBSERVATION OF EFFECT

In all cases it must be remembered that the Battalion Commander has not completed his work when his designations have been made and identification by batteries reported.

He and some members of his staff must observe effect and take corrective action when same is not being obtained. A few pertinent remarks as "Your fire is all over," "Your fire is thirty mils right" will often be all that is necessary to bring the fire of the batteries to the proper places.

Batteries have been known to report identification on the wrong target. When this is discovered, designations must be made anew.

CONDUCT OF FIRE AT BATTALION OBSERVATION POST

In cases where targets are not visible from battery observation posts, the direction and range of the target may be sent to the battery and fire adjusted from the battalion observation post by lateral methods.

This should be employed only in rare cases as conduct of fire is the normal function of the battery commander.

CONCLUSION

The principles of fire direction discussed are simple—their execution is difficult. The highest degree of coöperation is essential if fire is to be placed quickly on the targets chosen by the battalion commander.

The solution is obtainable by constant practice in peace-time. By this practice the battery commanders and the telephone operators will master the language and methods of the battalion commander and the battalion should be able to function efficiently in new terrain without maps.

It is believed that the subject of fire direction has not received for some years the attention which its importance warrants. The impetus for efficiency in this art must come from the field officers of the Field Artillery.

RECOIL SYSTEMS

BY MAJOR C. A. SELLECK, F.A.

THE World War revealed the preponderating rôle of machines, it characterized modern war as a war of mechanics, emphasized the influence of armament upon operations and proved quite conclusively that superior armament determined success. So much of the armament was developed during the war that it is increasingly apparent and important that we must become intimately acquainted with the machines of our profession and the principles of the mechanics involved in their design and operation.

Many of these machines are articles of commercial use and the problem of development is that of the engineers of civilian life; guns and gun carriages, however, are essentially our machines and the specialists in their design and use are in the military service.

My subject deals with the gun carriage, and the functions it performs in providing a fixed firing platform, to dissipate the energy given to the recoiling parts in reaction to the energy imparted to the projectile and powder gases, and in returning the recoiling parts to their initial position for further firing. These recoiling parts consist of the gun, together with the various parts attached to it and recoiling with it, arranged in either of two ways—first, the piston rods with their pistons attached to the gun lug and recoiling with the gun; second, the pistons and their rods held stationary.

The effect of allowing the gun and a part of the carriage to recoil is to reduce many times the stresses in the carriage and to maintain its equilibrium. A properly designed recoil system will give reactions consistent with the strength and stability of the carriage and a smoothness of action which is essential for long service and accuracy.

In order to better understand the stresses put upon the carriage in service firing the following discussion may be of interest.

When a 15-pound shell is fired from the 75-mm. gun (Model 1921) with a muzzle velocity of 2175 feet per second, the potential energy of the powder is converted into about 1,000,000 foot pounds of kinetic energy, and as this energy is developed in about .006 of a second, it means that in terms of power the cannon develops about 342,000 horsepower during the brief time it is in action. In the same way a six-inch gun firing a projectile weighing 108 pounds, with a muzzle velocity of 2600 feet per second, develops 1,375,000

horsepower, and in the case of 16-inch gun it may be shown that it will exceed the entire horsepower of Niagara Falls.

This energy is developed by the burning of the propelling charge and it becomes the function of the recoil mechanism and the carriage to control and dissipate this energy. It is done by converting the impulsive force or pressure of the powder gases against the breech into an incessant force. The intensity of the impulsion is measured by the momentum of the mass acted upon by F. The gun and certain attached parts are allowed to recoil through a fixed distance. The momentum of the recoiling mass MV is constant for a given intensity of impulsion regardless of its mass, but it is quite desirable to keep the mass M as large as practicable, since this causes a corresponding reduction in the value of V; since the energy to be dissipated is equal to $\frac{MV^2}{2}$, it is most advantageous to keep V as small as practicable. In the case of the 75-mm. gun it is found that by the provision of a suitable recoiling mass and a suitable length of recoil the energy recoil can be checked by an average force of about 5000 pounds, which is within the capacity of the light structure provided. Gun carriages are now constructed to limit the recoil to a certain length, and it is necessary to determine all the circumstances of recoil in order that the force acting at each instance may be known and the parts of the carriage designed to withstand this force and to absorb the recoil in the desired length.

In determining all the circumstances of recoil, there are considered the velocity of the projectile in the bore; velocity of free recoil; stability; total pull or the total resistance tending to retard the recoiling parts and bring them to rest; velocity of retarded recoil; jump of the carriage; counter-recoil stability; the external forces acting, and the stresses produced.

With the introduction of longer guns and the use of high elevations the problem arose of getting sufficient ground clearance so that upon recoiling at high elevations the breech of the gun would clear the ground without digging a pit. This has been solved in two ways: first, by variable recoil systems which give shorter recoil as the elevation increases; second, by placing the trunnions of the carriage for movement in elevation, as close to the breech as possible, with the result that the breech always remains well above the ground.

Attention might be given for a moment in connection with recoil, to the trail, spade and float which communicate the firing thrust to the ground. The length, strength, question of box or split trail, bearing surfaces, etc., are highly important.

All modern guns have hydraulic recoil systems, the recuperator

systems differ and may be divided into three classes with characteristics as follows:

1—Hydro-pneumatic recuperator systems.

2—Pneumatic recuperator systems.

3—Spring return recuperator systems.

With hydro-pneumatic systems there are two fundamental arrangements.

(*a*) The hydraulic brake separate from the hydro-pneumatic recuperator. This requires two or more rods, a brake rod and a recuperator rod, with a brake cylinder and a recuperator cylinder which may have connection or passageway to an air cylinder. The recuperator and part of the air cylinder is filled with oil. The oil may be in direct contact with the air in the air cylinder as in the Schneider matériel or it may be separated from the air by means of a floating piston in the cylinder.

(*b*) The hydraulic brake cylinder connecting directly with the recuperator system. The oil must be throttled between the recoil and recuperator cylinder and thus the oil at lower pressure reacts usually on a floating piston, separating the oil and air in the recuperator cylinder.

With pneumatic recoil systems there are usually one or more pneumatic cylinders; the piston compresses the air directly, no oil or other liquid being used for transmitting the pressure.

With a spring return system there may be various arrangements:

(*a*) One or more spring cylinders separate from the recoil brake cylinder.

(*b*) With small guns, the spring concentric and around the recoil brake cylinder.

Each type has its advantages and disadvantages. The principal advantage of the hydro-pneumatic system is that it is possible to build a mechanism of considerably less weight due to its great compactness and to the capacity range of an air spring. Mechanisms with spring return can be manufactured more quickly, and can be knocked down and reassembled with new parts by field troops. It has been found, however, that the hydro-pneumatic type can be made with such care that it is more reliable than the spring return, is more durable and is smoother in its action. While it is impracticable to disassemble it completely in the field for repair, this repair work itself becomes unnecessary as the mechanisms when properly made may be expected to stand up for some 20,000 rounds on the average without any major difficulty, whereas experience has shown that a spring return mechanism will ordinarily not endure for more than 5000 rounds without replacement of springs and breakages of this kind may occur at very critical moments.

OUTLINE OF RECOIL MECHANISM TYPES FOR ARTILLERY

I. Recoil Brake	Recoil	Carriage
1. Separate from Recuperator.		
(*a*) Throttling groove type	Constant	75-mm. Gun British M. 1917
(*b*) Throttling bar type	Constant	3″ Gun M. 1902
(*c*) Butterfly valve type	Variable	8″ Howitzer (British) M. 1917
(*d*) Piano roll valve type	Variable	75-mm. Gun (U. S.) M. 1916
(*e*) Throttling rod type	Constant	155-mm. Howitzer (Sch.) M. 1918
	Variable	155-mm. Gun (Filloux) M. 1918
2. Combined with Recuperator.		
(*a*) Constant orifice type	Constant	75-mm. Gun (Fr.) MI
(*b*) Spring controlled valve	Variable	75-mm. Gun (U. S.) MI
II. Recuperator		
1. Separate from Recoil Brake		
(*a*) Spring not telescopic		3″ Gun M. 1902
(*b*) Spring telescopic		4.7″ Gun M. 1906
(*c*) Pneumatic with liquid seal		8″ Howitzer (British) Mk. VI and VII
(*d*) Pneumatic with floating piston		
(1) Plain piston type		155-mm. Gun (Felloux) M. 1918
(2) Differential piston type		9.2″ Howitzer (British) Mk. I and II
2. Combined with Recoil Brake		
See under (1, 2)		
III. Counter Recoil Buffer		
1. Spear type		4.7″ Gun
2. Filing in type		75-mm. Gun (U. S.) M. 1916
3. Combined constant orifice and short spear		
(*a*) Spear on floating piston and packing friction		75-mm. Gun (U. S.) MI
(*b*) Spear on piston rod on cylinder head		8″ Howitzer (British) Mk. VI and VII

From the above outline the standard types of field artillery matériel will be extracted and their recoil systems examined more in detail.

The 75-mm. Gun, Model 1897 M 1 French, is the best answer to the question as to whether hydro-pneumatic recoil systems are efficient. Note its classification in the outline.

This mechanism, which is known as the Puteaux recuperator, consists of two cylinders. The smaller one is the recoil cylinder, filled with oil and containing the recoil piston and piston rod. The larger cylinder contains nitrogen in the forward end and oil in the rear end. The nitrogen and oil are separated by a free piston which is packed with grease, thus a grease seal is obtained between the nitrogen and oil. The two cylinders are connected so that the oil passes from one to the other. To the rear of the floating piston there is a diaphragm with a long tapered buffer rod which passes through the regulator hole and whose end projects into the buffer

chamber, hence it serves the double purpose of providing throttling through the diaphragm in recoil and of controlling counter-recoil.

On recoil, the gun moves to the rear, carrying with it the recoil piston and piston rod. The oil in the recoil cylinder is forced into the recuperator cylinder through the opening at the rear of the cradle connecting them. The oil passes through the valves and throttling opening of the oil regulator, and moves the floating piston forward against the compressed nitrogen, compressing it further. As the floating piston moves forward, the tapered buffer or control rod gradually closes the opening in the oil regulator and checks the flow of oil until at the end of recoil, the oil flow is completely stopped.

In counter-recoil the nitrogen expands driving the floating piston to the rear. It in turn forces the oil through the oil regulator and out of the recuperator into the recoil cylinder, driving the recoil piston forward, thus bringing the gun into battery. The flow of oil in its return passage is regulated by openings in the oil regulator, the flow is gradually slowed down, returning the gun into battery position without shock. Shock is further prevented by the respirator.

Before firing, the recoil mechanism should be examined for leakage of oil, proper amount of oil reserve, that the front end of the recoil cylinder is clean, and that the slide and roller paths on the cradle are clean and properly lubricated.

During firing, the action of the mechanism should be watched to see that the gun returns to battery properly and without shock. Careful attention should be given to the detection of oil leakage, frequently examining the following places for leaks; front end of recoil cylinder, the filling and drain plug hole, the oil index recess, and the right trunnion connection.

Where oil is found to be leaking or seeping, the recuperator must not be used.

The amount of oil reserve is indicated by the position of the oil index with reference to the rear face of the recuperator cylinder rear sealing plate.

No Reserve—indicator at the bottom of the recess.

Full Reserve—end of index flush with rear face of sealing plate.

Excess Reserve—index projects beyond rear face of sealing plate.

It is not dangerous to fire the gun with no reserve of oil; however, it is highly dangerous to fire the gun when the oil index shows excess reserve.

This mechanism is designed for oil of a certain viscosity, therefore only the special recoil oil should be used.

The following chart gives a list of recoil mechanism troubles, together with the causes and remedies:

TROUBLE CHART, 75-MM. GUN, M. 1897

Trouble	Cause	Remedy
Oil leaking into front of recoil cylinder	Failure of piston packing or wear of cylinder wall	Return recoil mechanism to Ordnance Maintenance Company for repair
Oil leaking into filling and drain plug recess	Failure of filling valve	Return recoil mechanism to Ordnance Maintenance Company for repair
Oil leaking around oil index	Failure of packing	Return recoil mechanism to Ordnance Maintenance Company for repair
Oil leaking out of right trunnion connection	Failure of packing	Return recoil mechanism to Ordnance Maintenance Company for repair
Oil index not functioning	(*a*) Index stuck (*b*) Packing tight	Withdraw all the reserve oil and insert an amount of heavy recoil oil equal to the capacity of one and one-fourth screw fillers or 80 strokes of the oil pump. (Use either the oil pump or the screw filler.) Tap index lightly as the oil is being added.
Failure of gun to return into battery	Insufficient oil reserve	Withdraw all the reserve oil and insert an amount of heavy recoil oil equal to the capacity of one and one-fourth screw fillers or 80 strokes of the oil pump. See that oil indicator is functioning properly. (Use either the oil pump or screw filler.)
Failure of gun to return into battery (oil index showing sufficient reserve oil)	(*a*) Low nitrogen pressure (*b*) Excessive friction (*c*) Damaged slides, piston rod, or piston (*d*) Damaged floating piston	Return recoil mechanism to Ordnance Maintenance Company for repair
Return of gun into battery with a shock	(*a*) Too much reserve oil	(*a*) Withdraw all oil reserve and insert an amount of heavy recoil oil equal to the capacity of one and one-fourth screw fillers or 80 strokes of the oil pump. (Use either the oil pump or screw filler.)
	(*b*) Air from recoil cylinder escaping too fast through respirator. (When recoil mechanism is equipped with respirator.)	(*b*) Adjust respirator to use smaller air vent. If this fails to correct trouble, withdraw the oil reserve as indicated in (*a*)

The 155-mm. and 240-mm. Howitzers are equipped with the Schneider system of recoil, consisting of an independent recuperator system of the hydro-pneumatic type.

The cylinders are in one forging called the sleigh and are secured to the gun and recoil with the gun. The brake and recuperator rods are held stationary and attached at their ends to a yoke on the cradle. The recoil cylinder is full of liquid, except for a small void left for expansion. The hydraulic brake piston rod is hollow and contains a

filling-in buffer chamber. Attached to the sleigh and sliding within this buffer chamber is a counter-recoil buffer rod. The throttling during the recoil is effected through an orifice formed by the difference in areas of a circular hole in the piston and the area of the buffer rod. For varying the throttling, the areas of the buffer rod are tapered, *i.e.*, the diameter of the buffer rod varies along the recoil.

The recuperator cylinder consists of the stationary recuperator piston which moves relative to the forging on recoil. The recuperator cylinder communicates by a large passageway to the air cylinder partly filled with air. The air cylinder is placed forward and is made shorter than the recuperator and brake cylinder. This is necessary in order that at maximum elevation the oil in the air cylinder covers the passageway communicating with the recuperator and air cylinders.

In recoil the recuperator piston forces oil into the air cylinder compressing the air or nitrogen. At the end of recoil the compressed nitrogen exerting pressure through the oil on the recuperator piston head and on the recuperator cylinder head, causes the recoiling parts to return to battery. The liquid, a mixture of glycerin, water and caustic soda, and the nitrogen are in contact.

The return valves in the recoil piston control the action of the moving parts in counter-recoil. When the recoiling mass starts back into battery, the pressure of the oil in front of the valves causes them to seat and the liquid is forced to pass through the small annular openings between the return valves and the interior walls of the piston rod. The inside diameter of the piston rod is varied to produce the desired throttling.

In the Schneider system the recoil is designed constant at all elevations or practically so, a slight variation taking place with the elevation.

On the whole this recoil system has proved one of the most satisfactory recoil systems used during the World War, being simple to fabricate and thoroughly rugged due to its simplicity in design.

Like any other machine, correct functioning depends upon certain conditions.

The recoil system must be full of liquid and the proper quantity of liquid and pressure must be maintained in the counter-recoil system.

An insufficient quantity of liquid in the recoil cylinder has the effect of increasing the pressure at the beginning of recoil, causing excessive stress in the cylinder wall and may result in the breaking of the piston rods. Insufficient pressure or quantity of liquid in the counter-recoil system has the effect of not completely returning the howitzer to battery.

When the howitzer is in action the length of recoil should be constantly checked.

The normal recoils for the various powder charges at elevations of 10º, 20º, and 40º are tabulated and should be consulted. A correction pressure plate is located on the under side of the cradle-head cap.

The guide rails must be kept cleaned and oiled and lubricating oil should periodically be put into the rear of the recuperator cylinder through an oil hole provided for that purpose. The failure to note this oil hole has caused trouble.

The recoil system of the 155-mm. Gun, Filloux, combines features of both systems already described. It is of the hydro-pneumatic variable recoil type.

The recoil mechanism consists of a cylinder, a piston and a piston rod, and a control rod. The piston rod is connected to the breech lug and recoils with the gun. Grooves of variable depth are milled along the length of the control rod, controlling the flow of oil through the ports of the piston during recoil. The control rod assembles within the bore of the piston rod, and does not move longitudinally, but rotates. The amount of this rotating changes the area of the orifices through which the oil can pass. Its rotation is accomplished by means of an arm and gear sectors in such a manner as to shorten the recoil as the gun elevates. The capacity of the recoil cylinder is about 11 gallons of oil.

A replenisher device is connected to the recoil cylinder to assure that the latter is filled at all times with oil. It also serves as a reservoir to permit the escape from the recoil cylinder of the excess oil due to expansion caused by the heat developed in firing. Its capacity is about 1.7 quarts. It consists of a cylinder in communication with the forward end of the recoil cylinder and a piston prolonged to the rear by a rod. This rod forms a gauge for measuring the quantity of oil in the replenisher.

The recuperator mechanism consists of two connected cylinders, one containing the piston and piston rod which are attached to the breech lug, while the other contains a mushroom valve and a free piston. The free piston separates the oil contained in the first cylinder and part of the second cylinder from the high-pressure air, which compels the return of the gun into battery after recoil. The amount of oil in the recoil and recuperator mechanism is shown by indicators. The amount of oil required for the counter-recoil cylinder is about 4 gallons.

In recoil the gun moves to the rear on the cradle, carrying with it the recoil piston and piston rod and the counter-recoil piston and piston rod. The oil in the recoil cylinder is forced through ports in

the recoil piston and is throttled through grooves in the control rod. The oil behind the counter-recoil piston is forced into the recuperator cylinder, passing through the counter-recoil valve, and impinges on the free piston causing it to compress the nitrogen.

In the counter-recoil the compressed nitrogen forces the free piston to the rear. The counter-recoil valve closes and the oil behind the free piston is throttled through constant orifices in the counter-recoil valve. The counter-recoil piston is forced forward, pulling the gun back into battery. At the end of counter-recoil the spear buffer on the end of the control rod enters the buffer chamber in the rear end of the recoil piston rod. This acts as a dash pot to reduce the shock of the gun going into battery.

A trouble chart for this gun has been prepared based on the results of proof firing, as follows:

TROUBLE CHART, 155-MM. GUN, FILLOUX

Trouble	Cause	Remedy
1. Replenisher piston less than 100 mm. from rear face of cylinder	*A*. Expansion oil *B*. Accumulation of air	*A*. Drain reserve oil from recoil system and pump in reserve oil until guage reading is normal *B*. Accumulation of air indicates defective packing of replenisher piston and the replenisher must be disassembled by repair unit
2. Replenisher piston measures 200 mm. or more from rear face of cylinder	No reserve oil in recoil system	Drain reserve oil from recoil system, if any. Pump in reserve oil until guage reading is normal
3. Oil leaks from rear of replenisher	Accumulation of oil at rear of replenisher piston due to defective packing or scored cylinder walls	Drain oil from recoil system. Disassemble replenisher; replace packing or band lap cylinder. Repair unit
4. Recuperator guage out less than 5 mm.	*A*. Loss of reserve oil from recuperator system *B*. Loss of air pressure indicated by emulsified condition of oil	*A*.Drain recuperator system. Pump in oil 100 full strokes of the standard pump *B*.Arsenal repair
5. Oil guage indicator in recuperator oil guage head remains stationary during recoil and counter-recoil	Indicator packing too tight	Ease the indicator packing nut
6. Oil leaks from forward end of counter-recoil cylinder	*A*. Black oil is normal and due to lubrication. *B*. Clear oil indicates a leak	*B*. Arsenal repair
7. Oil drips from counter-recoil stuffing box	*A*. Broken springs *B*. More compression required on springs	Arsenal repair

TROUBLE CHART, 155-MM. GUN, FILLOUX—*Continued*

Trouble	Cause	Remedy
8. Oil drips from recoil rod and control rod stuffing box	Defective packing	Arsenal repair
9. Excessive leaks from recuperator and recoil filling and drain plugs	Sticking of valve. Defective valve seat	Arsenal repair
10. Gun will not return to battery	*A*. Too much oil in the recoil system *B*. Insufficient air pressure	*A*. Drain and refill recoil mechanism *B*. Arsenal repair
11. Gun returns to battery with too great a shock	*A*. Insufficient oil in recoil system *B*. Excessive amount of oil in recuperator	*A*. Refill recoil system *B*. Drain and refill recuperator system to normal
12. Gun does not recoil full distance	*A*. High viscosity of oil due to low temperature *B*. Scoring of bearing surfaces *C*. Increased friction on packings *D*. Malfunction of control rod	*A*. Warming of recoil mechanism by firing *B, C, D*. Arsenal repair
13. Too great recoil	*A*. Insufficient oil in recoil system *B*. Insufficient air pressure *C*. Insufficient friction of packings *D*. Malfunction of control rod	*A*. Refill system to normal *B, C. D*. Arsenal repair
14. Gun in counter-recoil has uneven jerky motion	*A*. Too close fit of bearing surfaces *B*. Scoring of bearings *C*. Foreign substance in oil	Arsenal repair
15. Gun in counter-recoil comes to dead stop then resumes motion.	Same as in 14	Arsenal repair
16. Gun returns to battery too fast	*A*. Low viscosity of oil *B*. Insufficient oil in recoil system *C*. Too much oil in recuperator *D*. Malfunction of oil valve *E*. Malfunction of buffer	*A*. Allow system to cool *B*. Increase reserve oil to normal *C*. Reduce reserve oil to normal *D* and *E*. Arsenal repair
17. Gun is too slow in returning to battery	*A*. Insufficient air pressure *B*. Too much friction on packing	Arsenal repair
18. Position of replenisher does not change during firing	*A*. Piston stuck *B*. No expansion of oil	*A*. Tap the piston *lightly*. Gymnasticate piston by pumping in reserve oil and draining replenisher *B*. Requires no correction.

This is the merest outline of this subject and is compiled from various hand-books, training regulations, ordnance field service bulletins, treatises on theory of recoil, design of recoil systems and gun carriages and from excellent information given me by Captain R. C. Montgomery, F. A.

An exhaustive study of the whole subject of theory and design of recoil mechanisms and gun carriages is recommended to those artillerymen who wish to understand the tools of their trade and take part in the developments of the future.

COMPARISONS, AGAIN

BY CAPTAIN GEORGE P. WINTON, F.A.

IT IS not unusual to encounter the assertion that soldiers suffer from a peculiar mental state known as the military mind. This condition or point of view is a favorite target for civilians writing on military subjects. Generally their arguments come to this: that officers steeped in the traditions of the Army and schooled in its thought are incapable of proper judgment in the very elements of the profession—arms and the use of weapons. Instances are given of the British Generals' insistence on the use of shrapnel against entrenched troops, of their reluctance in using tanks, of their repeated use of the same type of offensive which had time after time proved inadequate and cruelly costly in casualties.

Probably there is a certain amount of truth in the contention that there is stubborness in the mental attitude of some officers on the questions that vitally concern the Service. Tractor motor power for artillery is a case in point. Discussion of the question is difficult, and comparison of animal and mechanical motive power is not easy, for the reason that proponents and opponents of each type have different conceptions of the abilities and limitations of each kind. It is not necessarily the military mind at work; but a general desire to see the Army follow no unwise policy.

However, without forgetting the fine traditions and magnificent achievements of horse-drawn artillery in the past, many officers are convinced that the motor artillery will be responsible for the achievements in the future.

The "next war," that strange conflict, that dark time for which the army exists, is in the future. Its place and its nature are unknown and it is only in the light of experience in past wars and by observing the rate of invention in weapons that preparation can be made for it. Generalities are of little value in this preparation, yet many things can be stated only in general terms. One of these is the commonplace, "we live in a motor age." Though wholly agreeing in this, the writer must confess that he is no motor expert and that the ideas he has were forced on him by the pressure of events that he experienced with his battery in the late war.

This particular battery was organized after the outbreak of the war largely from recruits, yet with a considerable number of non-coms from the old Regular Army. After a short period of training the battery was sent to France as a unit of the Artillery of the 3rd Division, served throughout the campaigns in this division and went with it to Germany as part of the occupation forces, where it underwent

a change from horses to motors in its transport. The artillery brigade to which this battery belonged was unique in that the same officers and men had to learn to handle horses and later to handle motors. The motorization of the 3rd Field Artillery Brigade and its manœuvres under the inspection of various boards are matters of official record, but the tasks of the battery commanders are not so thoroughly recorded. Their experiences were not alike and some found things easy that were hard for others. Yet in general all had to follow the same training and from their experiences comparisons between tractor and horse power could be made along the following divisions:

(a) Training.
(b) Combat efficiency, which includes Mobility, concealment and maintenance and gas immunity.
(c) Limitations.

When the writer joined, in the autumn of 1917, the regiment was understrength and incompletely organized. Nearly all the batteries had the full allowance of horses with the result that the work in the care of animals was heavy. The routine was that of any horse regiment. Taken as a whole, the draft was poor and the care of horses was not the best. The maximum mobility was not attained, in spite of hard work on the part of officers and non-coms, because many of the men not only did not understand the care and management of horses, but did not care to learn, in short, there was little interest in the work. Later these same men developed into drivers of enough ability to follow the infantry in the rapidly changing situation between July 15 and August 15, 1918, but at an enormous sacrifice of horse flesh. With the writer, the impression remains that one of the most difficult tasks of training was the care and handling of horses. In spite of the rich tradition of animal management that the Army has, in spite of example by old non-coms and with careful selection of drivers, the work was harder and gave less return than any other part of training, not excepting discipline itself.

The motorization in Germany furnished a contrast. In place of veteran non-coms who knew horses and were able to supervise the care of animals, reliance had to be placed on a small group of men and three or four officers who had been given a short course of motor instruction at schools in the S.O.S. With this group and a few emergency officers who were garage men in civil life, the training of our regiment was undertaken. Fortunately the regimental commander had recently come from a motor regiment and it was largely due to his careful plans and use of motor instructors that training progressed so rapidly. However, men who had timidly and unwillingly worked with horses were eager to be tractor drivers.

Here was familiar ground. Here they could shine. The work of the battery commander was considerably lightened by this spontaneous interest. Troubles peculiar to motors came in swarms, and ranged from joy-riding to burned-out bearings. But in time these troubles were overcome, and the progress of training was such that after three months the regiment was ready to take the field with all its equipment, including the heavy repair-shop trucks. The men already knew more or had learned more about motors in three months than about horses in a year of garrison and campaign. The comparison may be partly unfair in that when the men took up their duties with the animal regiment, they were recruits of the rawest variety; and when they started in on motors they had the experience of a year and a half in the Army. They were trained in things common to both horse-drawn and motor-drawn artillery, such as road discipline, bivouac and billet.

Now, as concerns combat efficiency: The battery was drawn by horses throughout its combat service, and comparisons are possible only when like conditions are assumed. It was the writer's experience that even with careful planning and detailed reconnaissance, it was not feasible to occupy a battery position or to change position in daylight. (This would probably be the case in the face of an enemy with air service, in another war.) The heavy night work, the scanty rations and the presence of mustard gas around the rear echelons, all tended to weaken the animals. More than once, just when the battery commander would want the maximum motive strength from his horses, they would be weak and staggering in their traces. Several times it was critical in the campaign north of the Marne, and during the rainy nights of September and October, 1918, on the Meuse. The position might be near a hard road, say a hundred and fifty yards from it. The last hundred and fifty yards of the night's march were the important ones and the hardest. The desperate feeling of a battery commander with his carriages stalled in soft ground, the men and horses dead tired and the position littered with camouflage nets and ammunition—dawn streaking the sky and enemy planes droning overhead, all this is a very vivid memory, and an item, at least, in the comparison of horses and tractors. Tractors are not exhausted by standing for hours in a traffic jam on a narrow road at night, and after hauling the battery almost to the position, they will not all fail at once from a common fatigue and deliver the merest fraction of power that they are capable of under normal conditions. Often, little is gained by hitching spare teams of tired horses to a stalled carriage, for the conditions are such that they must be hitched in tandem and the tandem length is too great for united effort, but a unit as short as a tractor can be a real help even in a tight place to another stalled tractor.

The limitations of motors are many but simultaneous and general fatigue among the various units is not one of them.

All artillerymen agree that protection against enemy fire is best gained by concealment. The closer the contact with the enemy and the larger the forces, the more difficult is proper concealment. There is no real concealment in occupying those places that the enemy believes will be used. In the presence of the enemy, the woods may be a trap, while these same woods at a distance may be a real protection from casual reconnaissance by enemy planes. With horses, woods are the best concealment. Under most conditions the choice of position is limited, and when horses are present it is further limited by the necessity of being fairly close to water. The concealment of the battery rear echelon in the last war was a hard problem. Several times it was poorly done and drew enemy artillery fire and consequent casualties. With motors, the rear echelon could be camouflaged at almost any convenient place, and proper standing ground for the tractors would be no greater problem than picket lines for horses, with the very desirable addition that tractors are easily camouflaged and by their construction are relatively immune to all but direct hits. They are also considerable protection to the men who drive them. Casualties to tractors can be repaired or salvaged; horse casualties must be disposed of in a different manner. It is in the difficulty of concealment that horse-drawn artillery is at its worst disadvantage in comparison with motor-drawn artillery. The rear echelon with its picket lines or groups of horses tied here and there under trees is a glaring sign of artillery to enemy air observation. In column on the march a tractor column may be drawn off the road and hastily camouflaged with branches and brush. It can pass through gas concentrations. Any battery officer can testify to the inadequacy of the horse gas mask and to the terrible burns and sloughing off of flesh by horses from mustard gas alone.

Under "maintenance" could be placed a comparison between the shoeing and the general care of horses and the repair and upkeep of tractors and motor vehicles. Here, again the experience of the writer with horses was under war conditions and with tractors in peace-time. In addition to the natural reluctance of most of the drivers to take proper care of the animals, there was the constant shortage and uncertainty of feed, a very natural thing in campaign. The need for proper rations for the animals was just as pressing when they were standing idle at the rear echelon for a day or two at a time, as when they were working. The tractors with enough fuel to keep them in running shape would not present the same problem of supply for fuel. And oils are not as susceptible to weather

conditions as are horse rations. It was hard to impress upon the drivers, after motorization, the necessity for thorough "stables" for their vehicles, but it was easy to discover the guilty. An unwatered horse may work for a while apparently well, but a bearing burned out from lack of oil is a plain sign of neglect. The same driver, who, at night and in the general confusion did not let his horse drink as much as he wanted, knew that there must be oil in the crankcase, gas in the tank and water in the radiator if his motor was to run. When troops were billeted and the horses scattered through a town, it was very difficult for the officers to be sure that every horse was watered and fed, and supervised grooming was impossible. Before horse billets could be occupied, they had to be passed by the veterinarian. Tractors are easily billeted under shelter that would be quite unsuitable for horses; or parked without shelter of any kind. However, there was no less work in keeping tractors in proper shape than in keeping horses in good condition; good maintenance is as important to one as to the other. The task of the battery commander, close supervision, is not different, but the work is done with less effort for the men understand the general principles of mechanical maintenance, which seem reasonable to them, while the regulations on the care of horses seem to them like Army red tape. (Another point of importance in the training of an emergency Army.)

Surely no one would believe that we have in the present motor equipment the ideal. We have yet to find the ideal gun. The limitations of tractor artillery are many: poor mobility in mud because of the present accompanying vehicles—trucks; necessity for a high degree of skill in the drivers; great weight, which would bar its use in districts where road culverts and bridges are weak; considerable noise and the showering of sparks which handicap it as a surprise weapon. But most of the above, which are only a few of the limitations, can be resolved into a problem of basic design. The solution may or may not be at hand in the present commercial tractor and the truck with removable caterpillar tread, indeed the whole problem is a big one. The fact remains, however, that the number of men, who by training and environment are horse handlers is constantly on the decline and specialists in this work, such as horseshoers, are getting scarcer and scarcer. The number of men with a fundamental knowledge of motors is increasing and the number of expert specialists, such as garage mechanics who would be drafted for a war army, is daily increasing.

More recently the writer was fortunate in his assignment to the 83rd Field Artillery at Fort Benning, Ga., and though the limitations of motor artillery are still obvious and many, it is his firm

belief that in the light high-speeed T-35 tractor with which two batteries are now equipped, there is a solution, though not necessarily *the* solution. Accompanying vehicles, particularly motorcycles, still hamper the mobility of the battalion. Wheel vehicles have no place in a tractor column unless present as light trailers, towed by tractors.

For the rapid movement of the battery detail and headquarters groups, the light Ford reconnaissance car seems to be fairly suitable. But in motor artillery, as in any other great task, "There is no excellence without great labor," and a day will come when the motor artillery will go on any mission that calls for wheel vehicles, the pack artillery on missions in rough terrain where no wheel vehicles can travel.

COMMAND AND GENERAL STAFF SCHOOL

(Reprinted from the January-February and the March-April, 1926, issues of the *Military Engineer*, The Mills Building, Washington, D. C.)

THESE are the first two of a series of four letters on the Command and General Staff School, which are appearing in the *Military Engineer*. The author, a student in the class last graduated, will remain anonymous until the last letter has been published.—EDITOR.

FORT LEAVENWORTH, KANSAS.
October 25, 1925.

MY DEAR B:

I haven't forgotten my promise to write you my impressions of this school—and while we have a breathing space here goes for a start.

The usual joys of getting settled were intensified by the sweltering weather during the first part of September. I got here on the last permissible day—better take a week and do it leisurely when you come next year. But, things soon got ironed out under the systematic procedure prescribed in great detail for all newcomers.

Fort Leavenworth appears to most newcomers a surprisingly beautiful post. It is on a plateau a hundred feet above the Missouri River, surrounded by rolling, more or less wooded country, with good bridle paths for riding, though not many good auto roads. Kansas City is thirty miles distant and readily reached by train, trolley, or *via* a concrete automobile road. The reservation is fairly extensive, comprising some ten square miles in area, and includes the U. S. Disciplinary Barracks, while adjoining one far corner is the federal penitentiary. Gone are the days of the old 2nd and 3rd Engineer Battalions, when Fort Leavenworth was a good deal of an engineer post. The former engineer barracks have been cut up and made over into several score of officers' apartments, popularly known as the "Beehive." The same thing has happened to other old buildings. Most of these apartments are roomy and comfortable, but we preferred, and were able to obtain, a house on account of giving more elbow-room to the children.

There is a good post school, supported in part by contributions from parents who take advantage of it. As for the ladies, there are so many activities that they apparently have trouble in deciding what to leave out.

Post athletics are concentrated under the management of the Officers' Club, and a single moderate fee confers the privileges of the excellent 18-hole golf course, the dozen tennis courts, the swimming pool, *et cetera*.

The opening days of the school were characterized by talks of welcome and advice from the commandant, director, and instructors. We were assured that there were in the course no catch problems, no "niggers in the wood-pile,"—that we would do well not to play hunches, or bone the personal equation of individual instructors, not to follow previous problems blindly, but to tackle each problem with an open mind, giving it our own honest best, as if an actual situation existed. Above all, we were warned not to "straddle" in solving a problem. I am convinced that this is excellent advice. It was also emphasized that the purpose of the school is not simply to turn out staff officers, as some have supposed it to be, but equally to train every officer taking the course for *high command*.

Our program started in rather lightly, with plenty of free afternoon periods. There was no question from the start, however, but that our evenings would be full ones. The amount of reading matter to be covered demanded all available time after supper. In general, the morning is divided into three periods of one hour each, from 8:30 until noon, with 15-minute intervals between. These are either "lectures" or more generally "conferences" on an assigned subject. Student officers are called on at random by instructors, but are not marked on their recitations. An engineer in our class was asked by an infantry instructor, "How do the Engineers fight?" Answer: "They fight like infantry, and they fight like h—!"

The "applicatory system" is early in evidence, for very often the lesson is accompanied by an "illustrative problem," driving home concretely the application of the principles involved. Instructors spend an average of eighty hours each in preparation for these conferences which, on the whole, are very well handled.

So far, all problems and practical exercises have been given in the afternoon, lasting from 1:00 until 5:00, or later. On days when an afternoon problem is scheduled, the last morning period is left free. Saturday is always entirely free, and we are not only permitted, but encouraged, to play hard from Friday evening until Sunday afternoon. It is not difficult to slip back into a schoolboy's attitude toward these week-end holidays.

PRELIMINARY PROBLEMS

All problems for the entire first month are illustrative in nature, and do not count on our standing. Thus, the class is given a course in solving map problems, ending with a "trial shot" at a problem involving an "estimate of the situation," and each solution is criticized, but not marked. Another introductory course covers the technique of writing combat orders. The principal subject-matter for the first six weeks, however, is the "tactics and technique" of

the various branches, which is covered as thoroughly as time permits, and as the knowledge required of staff officers demands. At the conclusion of this period, one has a fair idea not only of the tasks and capabilities of each branch, but of the way the different arms coöperate. An instructor may be an enthusiast on the Air Service, for instance, but his treatment of the subject can do no more than give this branch its generally accepted place in the picture of the whole *team*.

A welcome change from the indoor instruction is the "tactical ride." At 1:00 P.M., each student falls in with his section and mounts his assigned horse, recognized by a large number painted on the croup, and the class of 250 rides off into the country, to what destination no student knows. The instructors halt the column at "Cross-roads 576," perhaps, and each student receives a copy of the "situation" and "requirement," the answer to which must be turned in at a designated hour. Before writing our solutions, we are allowed to "reconnoitre," on foot or horseback, though usually not beyond the limit of the "line held by the Blue advance guard," for instance. The solution of this first requirement may be followed by a second and even a third new situation and requirement for "Colonel A" to solve before the afternoon is over. The only map that can be used in these problems is a one-inch map showing the roads, streams, and principal features, but *without contours;* the ground forms, cover, and so on must be determined by observation in the field.

The first problems that count in our year's record are given early in October—and after that they come along at an average rate of two or three a week. The first series do not score heavily—five units each out of a total 1000, so, although we have had eight problems, the total value is only 4 per cent. of the year's work. They are, in fact, referred to as "jitney" problems. Five of them have been "terrain exercises," solved outdoors like the illustrative tactical rides, but these are now over for the fall, not to be resumed until the "general terrain exercises" of next spring. All problems now are indoor map problems, solved as a rule on the Gettysburg and Leavenworth 3-inch maps.

You can readily see that no great amount of preparation before coming here is essential. Of course, the officers who have spent a past year at a special service school of instruction have a certain advantage therefrom, particularly at the start. But the course, as I have indicated, gives you plenty of time to get into your stride, and no engineer officer need hesitate to come here from a district or office job. Correspondence Course "D" is the best course of preparation available for you. It parallels the course here, though in a less thorough manner, and you should cover at least the first

few sub-courses, in order to get in advance a little of the feel of the thing.

With the advent of the first "pay" problems, there are heard also in the daily gossip of the section room all sorts of adages about how to solve them—hunches about what the next problem will be, rules of thumb about how to hit upon the proper solution. But, there are no short cuts to success. The school wants you to master the principles and apply them with your own honest opinion to the problem at hand.

THE SYSTEM OF MARKING

Our first marked problems have come back, and the perusal of the comments is bound to have a chastening effect (as did our experience in giving a verbal order to a dictaphone, and listening to the halting phrases that came back at us from the instrument). It is well, perhaps, that this year the problems are not to be graded A, B, C, *et cetra,* but are to be simply marked either S (satisfactory) or U (unsatisfactory). Less time will be given to trying to figure out just where one stands. As you probably know, the marking is entirely impersonal. Our papers bear no names, simply identification numbers, and the instructors are ignorant as to whose papers they grade. They work in committees, under a system designed to insure uniformity in marking. If you believe that the marking committee has missed your point and failed to do you full justice, you may submit your paper for further consideration by means of a "reclama." My impression is that such resubmissions are seldom necessary or advisable.

Among the most helpful aids to study, are the old problems used in former years, if used wisely. The comment sheets issued with the problems are particularly valuable in throwing light upon the concrete application of principles. The wrong use of a problem is, of course, to memorize a solution, and to apply it blindly to a new situation which is bound to have essential differences of detail.

TEAMWORK AND COÖPERATION ENCOURAGED

Another agency to assist in study has been set up this year by the commandant, Brigadier-General Edward L. King, who conceives the ideal spirit of the school to be that of a football team, with the instructors as coaches. The class is divided into sections, to each one of which are assigned two instructors. At least once a week, each section meets with its instructors for the purpose of an informal and frank discussion as to difficulties, doubtful points, and the like. This is an experiment the value of which is not yet fully tested. There are also committees formed voluntarily by various groups of students that meet usually once a week, to exchange views and mutually helpful data. In reviewing a number

of subjects preparatory to a problem which may cover a wide range of instruction, it is helpful to have available carefully digested review notes—the preparation of such notes is a task which may well be split up among the members of a committee. I think that such groups can serve a useful purpose if they are thoughtfully planned and organized, and include officers of various branches, representative of different viewpoints.

We have fairly finished what might be called the first phase, covering the separate arms, their tactics, and technique. We are well started on the course in "Command, Staff, and Logistics," which goes into administrative details of supply, and the like. To-day, we had our first conference in "Tactical Principals and Decisions," the basic and most important course of all. So far, there is little evidence of mental strain. This class is younger than any that have come before—the average age, I should judge, is well under forty. Instructors say they can detect a difference in the complexion of the various classes from year to year, and our class appears to be not less serious-minded and business-like about its work, but a bit more light-hearted.

I'm getting quite keen about the course. It dove-tails together so neatly—individual instructors may fall somewhat short of academic excellence, but the *tout ensemble*, the system, is surely admirable. We are getting the benefit of the work of a devoted succession of instructors who have put together, piece by piece, this impressive structure of applied knowledge. We have sloughed off all responsibility except that of the student—to take every advantage of this course. The opportunity for extending one's acquaintance among these many fellow-students and instructors, also, is an unusual and valuable one. Altogether, I count it a great privilege to be here. Do not waver in your own decision to come.

Faithfully yours,

A.

FORT LEAVENWORTH, KANSAS,
December 31, 1925.

MY DEAR B:

No schoolboy ever welcomed a holiday more joyously than we greeted the Christmas vacation which commenced on December 23rd, to last over New Year's. That day marked an exodus from the Post for many, especially those temporary bachelors whose families did not accompany them to Leavenworth this year. Those of us who were left have reveled in delightfully late breakfasts, in skating, in reading, in lazy hours of long postponed play with our families. Perhaps there has been some study, but—for the good

of our souls—I trust *not much*. For we needed a bit of relief after some four months of steady grind.

SUBJECTS OF INSTRUCTION

The principal subject-matter for study since my last letter in October has been the course in "Tactical Principles and Decisions." Successively, we have taken up the various lessons—marches, reconnaissance, security, meeting engagements, attack and defense of a position, attack and defense in zone warfare, retirements, delaying actions, counter-attacks, pursuits, river-crossings—a formidable array of tactical principles, brought down to earth by means of a host of illustrative examples. Sometimes, in fact, there are two or three of these applicatory problems to stake out, study, and inwardly digest in an evening—rather a rich diet tactically it seems at times.

Almost as important, perhaps, is our parallel course in "Command, Staff, and Logistics." The composition of a good administrative order is as difficult as, and certainly a more unaccustomed task for most of us than, a field order. We have worked out every detail of moving a division, both by truck and by rail, all over the Gettysburg map. We are taking up, along with each type of tactical situation, the corresponding logistics of supply—thus, supply in attack, supply in pursuit, supply in defense of a river line, and the like. Much emphasis is properly placed on this question of supply—an emphasis not always given in the past—in order that commanders and staffs may not fail to appreciate the vital part that such considerations play in campaigns.

Four other courses, which may be called minor subjects, on the basis of allotment of time, deserve mention here. A brief course in "Military Intelligence," with one test problem, emphasizes the importance of that subject and gives a picture of the technique of a G-2 section in action. The course in "Methods of Training," recognizing that every Army officer to-day must be a competent instructor, covers the principles of training and the preparation of all kinds of map and terrain problems, manœuvres, and field exercises; there are two test problems. "Military History" devotes nineteen lectures to the campaigns of the World War, and touches briefly upon methods of historical research. The course in "Leadership" consists also of a series of lectures, on such illuminating subjects as, for instance, "Failures in Leadership in the Commanders of the Army of the Potomac." One wonders, incidentally, to what extent these failures were inherent in the men themselves, or how far the record might have been differently shaped had better opportunities for previous experience and training been available. Would McClellan's career have been sensibly different if his notoriously

inadequate Pinkerton information service had been replaced by a modern G-2 organization?

Our test problems have been coming along at the rate of only one or two a week, but many afternoons of late have been devoted to map manœuvres, both of the "two-sided" variety, between groups of students, and "one-sided," with the instructors playing the enemy rôle. Starting with a reinforced regiment, we worked up through the brigade to the division, which involves quite an array of bits of cardboard to move around on the map. These map manœuvres have obvious limitations; they are surrounded at best by a somewhat artificial atmosphere; they need skilled direction in order not to lag, and most of the instructors do not claim real expertness in directing them. With all that, they seem to me very valuable in illustrating principles, in teaching certain details of technique, in compelling an officer to think on his feet, in affording much needed practice in giving verbal orders. After the purely tactical problems, come map manœuvres that simulate the functioning of a staff, with the parts of the various G's and also of the administrative staff played by the students. It all helps mightily to round out the picture the school is trying to paint for us.

SCHEME OF INSTRUCTION

The general scheme of our morning instruction continues unchanged. There is no denying that the conferences do at times get pretty deadly. There is a difference in the inherent interest of the various topics for discussion, and a good deal of difference, too, in the ability of the various instructors to "put it over." Some instructors, with no better knowledge of the subject, but perhaps a better understanding of the psychology of their audience, put just the right touch of unexpectedness, of allusion, of humor into the discussion. They use graphics wherever applicable. They seem to put their finger on just what difficulties the student has, and leave him with a concrete picture. It is interesting to try to analyze just wherein lies the difference! It has been a surprise to me, too, to note the rapid rotation in instructors; we have had to date about sixty different instructors for less than two hundred and forty conferences and lectures, or an average of less than four periods per instructor. Needless to say, we are not imbued with the personality of individual instructors, but rather are we left with the impression of a composite of the whole faculty; instruction by mass, rather than individual performers, so to speak. Of course, the personality of the directing heads makes itself felt, but there is this distinct impression of a *system* of instruction paramount to any individual.

The problems, though they come less frequently than the

"jitney" problems of mid-fall, are getting harder, and they count more. It is becoming more difficult, also, to make any estimate as to what the problem will be about (with exceptions in certain subjects). This calls for a good deal of reviewing, in order that all the various principles imbibed may be fresh in mind before putting to the test one's knowledge of any particular group of them. Two problems have called for "estimates of the situation." These involve a four-hour struggle to cover reams of paper with a discussion, and are popular neither with the students nor (I should guess) with the instructors who have to read them, but are held by the School to be valuable in teaching such logical approach to a decision as will thoughtfully weigh all factors before reaching a conclusion.

PRINCIPLES, NOT RULES, GIVEN

One problem, especially, has caused no end of discussion. A Blue division advancing to cover the frontier from invasion encounters, on its own soil, a Red reinforced brigade. Another hostile brigade is advancing some fifteen or twenty miles distant. Each Red force is about two-thirds the strength of the Blue division. The great majority of the class, some 75 per cent. in their solution, attacked the leading Red brigade vigorously, in order to defeat it before it could be reinforced by the other brigade. The School's solution, on the other hand, surprised many of us by taking up a defensive position to meet a probable attack from the combined Red forces, while awaiting Blue reinforcements, due the next day. The critical factor was, of course, the question of how soon the other brigade could come into effective supporting action, but it seemed rather a close decision, and the School happily did not consider that those who attacked had merited a mark of "U" (unsatisfactory) thereby, if their solutions were otherwise acceptable. It becomes increasingly clear that no instructor, no school, can give us *rules* that will always, or even generally, work—only *principles* that must be applied as a matter of individual judgment. Usually, the School solutions carry conviction, and seem so surprisingly simple and obvious that one wonders afterwards why it was not all as clear as that while being worked in the problem room!

You recall that I spoke of the official "committees" that meet weekly, each with its own two instructors. These meetings afford opportunity for a discussion of some of the principal errors noted in correcting our papers. In particular, they are the medium for preparing for the formal "discussions" held in respect to certain selected problems. Each group, meeting a day or two after the problem in question, and before the "School solution" has been published, instructs a spokesman to present its own composite judgment on some particular phase of the problem. These spokesmen

present their several views later at the joint discussion, and build up, aided by the instructor's comment, a solution, which may or may not conform to the School's dictum presented at this time. Thus, our sense of critical analysis is no doubt stimulated.

I think I have already spoken of the weekly hops that are held every Friday night at the Golf Club-house; make a note that tuxedos are generally worn on these occasions. Another great source of pleasure lies in the performances given each month by the Dramatic Club. The brunt of the acting must naturally be borne by the instructors and ladies of the post, but a few student-officers do appear able to find time to learn their lines as well as their tactical principles. In this matter of recreation, the propinquity of Kansas City has been mentioned. Perhaps the favorite resort there is the new Kansas City Athletic Club, to which all officers here have been sent complimentary guest-cards.

If my letters have made you less dubious about coming here, I shall be glad. Certainly, our morale as a class is still excellent. We are fairly in our stride, but not forgetting that there are some stiff hurdles ahead. Personally, I am more than glad to be here, as I have said before.

Faithfully,

A.

FOREIGN MILITARY JOURNALS A CURRENT RÉSUMÉ

ENGLAND

The Journal of the Royal Artillery, July-September, 1926.

"One Army Not Two," is the title of the first article in this issue of the *Journal of the Royal Artillery*. It is written by Major S. R. Wason of the British Artillery.

In any future war on a large scale, the English plan to expand their military forces through their Territorial Army,—meaning by this latter what corresponds to our National Guard. Major Wason, in this article, discusses the organization and training of the artillery, Regular and Territorial, to meet the requirements of such a system.

The author concludes that, in peace-time, officers and noncommissioned officers from the Regular Artillery should be detailed as instructors with the Territorial Artillery. This proposed method seems to resemble very closely our present policy in the United States. Then, when war breaks out, the author proposes to use still more members of the Regulars with the Territorials, in order to speed up the final preparation of the latter. This system makes for considerable mingling of the Regulars and Territorials and gives rise to the title of the article,—"One Army Not Two."

It is interesting to read the author's description of what happened in England in the World War, when practically all the Regulars were used at the front. He writes as follows:—

"The batteries of one of the New Army divisions were formed in September, 1914. Up to the beginning of the following January they were almost completely without Regular officers and noncommissioned officers. To give an illustration of the shortage of noncommissioned officers, the battery sergeant major of one battery was a gunner who had been left behind on mobilization as storeman. His late captain had classed him among his "broody hens"—those that never had laid (the gun) and never would lay; consequently he never qualified for proficiency pay and so could not be promoted. The quartermaster sergeants were usually incapable, sometimes worse. The noncommissioned officers were usually those who had asked for the job. Equipment was desperately short and so was uniform. But what there was, was wasted. In one battery, out of sixteen saddles and bridles given by Lady Roberts' Fund, none were serviceable after two months. The men lost, wore out, or sold, on the average one pair of boots each per month, and an even larger

number of blankets. There were four guns of an old pattern permanently in action on the barracks square, and each battery did one and a half hour's battery gun drill a day, the noncommissioned officers passing orders, and the men setting figures on improvised wooden dials without having an idea in either case what the orders or figures meant. The drivers went through interminable skelton driving drill, riding bare-back with halters and then repeated the process in the afternoon on foot on the barrack square, without any idea what they were doing.

"As a result of this soul-destroying process the men lost their keenness and their discipline. A steady proportion of two-thirds overstayed their Christmas leave. Lack of equipment was responsible for much, but the more gear they had the more they lost. Those first three months' training did more harm than good. There were simply not enough officers and noncommissioned officers to go round who had an idea of organization, administration and training * * *."

"Some Notes on Morocco," is an article by Major General Sir Webb Gillman. In it General Gillman sets forth his experiences and observations during a visit with the French forces in Morocco last fall.

"The Tactics of Penetration," by Colonel J. F. C. Fuller, is an excellent and interesting analysis of this form of attack in modern war. The author reaches his conclusion by theoretical consideration, and proves their practical soundness by examples from the World War. He shows by consideration of actual numbers, that single penetrations against a well-organized front are practically impossible, due to the supply problem of the number of troops required in the congested gap they can successfully create.

The author's solution is to make *two* penetrations, within supporting distance of each other. The enemy in the intermediate space between the two breaks must normally withdraw, and it is through this space that the successful penetrating force must strike. The withdrawal of the enemy in the intermediate space would be due to converging fire on them, and the exhaustion of their reserves in resisting the preliminary two breaks on both their flanks.

Among the author's conclusion we find the following:—"As I have pointed out, the triangle of country laying roughly between Namur, Arras and Reims was the only area in which penetration could be effected by offensive action with any hope of economy. Further, it was hopeless even in this area to attempt penetration at any one point or even at any two points unless they were sufficiently close together to influence detrimentally the area in between them.

It was never grasped, so far as I am aware, that the point of penetration was not to be sought at the point of attack, but between two converging points of attack. It was never understood that if a line 400 miles long was to be broken, the front of attack must be at least 100 miles, and that the decisive attack should only be launched after the enemy's reserves have been exhausted. It was not realized that troops did not exist in sufficient numbers for such an extended attack, and even if they had they could not have been supplied. Lastly, the obsession of method, of numbers and of brute force prohibited surprise, the true forerunner of victory.

"The possibility of carrying out an effective dual attack of penetration was, I maintain, a feasible operation in 1915, for though shell shortage existed, trench systems were still shallow. With armies as then organized it was, I maintain, more feasible to do so than with the armies which existed in 1916, and most of 1917. It was not lack of fighting force which created the stalemate, but the lack of knowing how to apply it correctly. Had this not been so there would have been no need to have carried the war to Gallipoli, to Mesopotani, to Palestine and Saloniki, all impossible decisive theatres. Lack of military imagination dispersed our fighting force, at a time when sanity demanded the concentration of every man and gun on the Arras-Reims front.

"Later we come to Riga and Cambai, true battles of penetration based on surprise. Do we find wisdom resulting from them? No, only another obsession, namely penetration itself—the tool is mistaken for the hand. If I am wrong, why then the gigantic single attacks of 1918? The German offensives were single, one following the other and each aimed at a weak point. The French and British attacks are single, the value of salients is not understood, neither is the problem of supplying a moving army understood. Yet lethal gas and the tank were weapons preëminently suited to the dual attack, since gas could create defensive flanks by rendering areas uncrossable, and tanks could form offensive flanks and strike at the rear of the enemy, the enemy between the two points attacked. Have we learnt this lesson yet? I much doubt it. Have we learnt, that the decisive point of the attack is the rear of the enemy's army and that to hit this rear we want two forces, just as a boxer wants two fists * * *."

"Observation," by Colonel A. G. Arbuthnot, is a plea for more stress on the provision and training of Terrestrial observers in the artillery. To quote the author:—"Instances of the moral and material value of a man who could see at a good observation post, I could give without number, but space forbids, and I have only said what I have because I am conscious of a tendency in the air to

belittle observed shooting, and to think that its day is past; because we are obsessed with our other very necessary methods of shooting; because there are too few of us left who know what 'value for shell' a battery with a good observer gave during all periods of the war."

This issue of the *Journal of the Royal Artillery* contains the sixth instalment of Major A. F. Brooks' **"Evolution of Artillery in the Great War."** This instalment is the second one on the evolution of the artillery tactics and treats on the years of 1916 and 1917. The author studies the tactics of the German offensive at Verdun (1916), the battle of the Somme (1916), the French attack at Verdun (1916), the British offensive at Arras (1917), French offensive on the Aisne (1917), Messines (1917), Ypres (1917), and the French offensive at Verdun and Malmaison (1917). During this period the artillery tactics are characterized by efforts at destruction, regardless of time or expenditure of ammunition. This tendency reached its maximum at the battle of Ypres (1917) and closes with the French offensive at Verdun and Malmaison (1917). Speaking of these latter battles the author points out:—"A general idea of the dimensions which the bombardment had assumed, may be gathered from the fact that at Verdun, between the 13th and 27th of August, the French expended a total of 120,000 tons of ammunition, the equivalent of 360 trainloads!"

In closing his discussion of this period (1916–1917) the author remarks:—"Although we had been floundering in the mud of our bombardment in vain efforts to destroy the obstacles protecting the hostile fire power, we had nevertheless gradually reached a state of greater efficiency and were in a better position to employ our artillery power in the future for its legitimate task of neutralization as opposed to destruction."

"The Reorganization of Road Transport," by Major W. G. Lindsell, is a discussion of the British system of transport in front of railheads, as prescribed in recent amendments to the British Field Service Regulations.

In the January number of the *Journal of the Royal Artillery* was an article by Major Cherry, in which the author advocated not only the conduct of fire from planes, but that command and staff officers should in certain cases pilot their own planes. In this issue of the *Journal,* Squadron Leader J. C. Slessor of the Royal Air Force presents an answering article entitled **"Royal Air Force and Army Coöperation, the Other Point of View."** In this article it is contended that, in general, officers, other than those in the Air Force, do not have time to learn "instinctive" flying, which is

necessary; further, an officer in the air will not have complete information on which to base decisions,—in other words, commanders must be on the ground and trained observers in the air.

Squadron Leader Slessor's remarks about the desirability of a ground commander's sending his own staff officers up in the air to observe are interesting. He says:—"However, the important thing to consider is the point of view which gives rise to the statement quoted; it is a point of view very widely held, and at the bottom is based on a fallacy, namely, that it is possible to make reliable deductions in the air. *It is not only impossible, but it is excessively dangerous* (author's italics). This is not a point of view, but a statement of absolute fact. In a naval battle, and possibly in some parts of a few open, treeless, sandy countries like Palestine or Iraq, you do get the panoramic view from the air, and it may be possible to make accurate deductions from what you see, but under European—and most other—conditions, you absolutely definitely cannot. And for this reason the R. A. F. observer must be, and is, trained to report exactly what he sees; he must have a knowledge of army formations, and of how the army works, in order to help him identify what he sees. But the moment he tries to draw deductions, and to report tactical or strategical situations he, and any other observer, whatever his rank or service, becomes a public menace. Major Cherry quite rightly says that air information must be supplemented by, and compared with, information supplied by the older forms of reconnaissance; and to attempt to size up a situation, on however small a scale, without the aid of those other sources of information and without the close personal touch only possible on the ground, is to court trouble. Even in open moving war the air observer, however skilled he may be, fails to see so much that is important, and perhaps unconsciously he attaches such importance in his own mind to what he does see, from the mere fact that he has seen it with his own eyes, that his estimate of the general situation will probably more often than not be so distorted as to be almost unrecognizable when compared to a review of the actual situation. When finally it is considered how much reliance—from psychological reasons—a commander is bound to place on the report of one of his own staff who has seen with his own eyes, it will be realized how terribly dangerous such a proceeding may be."

FRANCE

Revue D'Artillerie

"High Burst Adjustment," by Major P. Maison, and **"Execution of the Reticule Tangent Method,"** by Major G. Pellion, in the May, 1926, issue, give divergent views on the matter of high

burst ranging, a subject which is apparently receiving much study in the French Army at the present time.

The first article discusses a system not unlike our own method of a false angle of site. A fictitious aerial target is selected at a point where it can be used by all three batteries of the battalion. Its exact horizontal coördinates and absolute altitude are sent to the batteries and observation posts. The directing piece of each battery is laid on the target with corrected data and the observing instrument at each observation post so oriented that the cross-hairs pass through the aerial target. From the range table can be obtained the fuze setting for the range used and the corresponding time change for 100 metres at the firing range. With these elements a precision adjustment is made on the aerial target. Assuming that an adjusted elevation (α) is obtained, it is now desired to find the point on the horizontal plane where a shot fired with elevation α would hit the ground. This is done by the formula $R = D + (Z - Z_0) \cot \omega$ where D is the distance from gun to projection on the map of the aerial target, Z the altitude of the aerial target, Z_0 the altitude of the piece, and ω the angle of fall corresponding to the adjusted angle of elevation α. The problem is finished by a transport of fire in the usual manner to any objective in the vicinity.

The reticule tangent method involves a special instrument and the use of numerous tables with accompanying trigonometric formulæ.

"Artillery in Morocco in 1925," in the June and July issues, is a most readable thesis on the lessons to be learned from the operations of last year as applied particularly to the artillery. The writer, Captain Courbis, does not attempt a history of the campaign, but he does clearly outline the conditions encountered and the best methods employed by the artillery. As these are applicable in any mountainous country, defended by a semi-civilized enemy, it has been thought worth while to cover at some length, the points brought out by Captain Courbis.

The native of that part of North Africa, known as the Riff, is essentially a mountaineer and preforce an infantryman. Due to long training, simple mode of life and a natural temperance, he is capable of great physical endurance, and has a mobility far superior to European troops. Against a strong force the Riffian has little inclination for offensive tactics. His preference is the defensive, where hidden among the rocks he can best utilize his supernormal vision and talent for rifle shooting. At the same time, he has an eye turned towards the rear, and whenever he feels that his flank is menaced or his line of retreat in danger he is likely to withdraw.

However, when cornered, he fights with the desperation of a wild animal.

The armament of these people is limited to the rifle, Mauser or Lebel, with an occasional grenade; machine guns and artillery are very rare. His tactics consist in holding a single irregular line with riflemen protected in short trenches or behind boulders. Ordinarily there are no reserves, but it is quite common to encounter isolated scouts in front of the defense line, who with a few shots slow up the march of the French and force a deployment.

The theatre of operations is mountainous, very rugged and broken. The climate is noted for its extremes. During the summer the country is a torrid desert without water, while in the winter heavy rains turn the dry stream beds into torrents, and the surface of the hills into slippery mud. Roads are nonexistent in the mountain and all transport must follow the mule paths and dry stream beds. The existing maps are poor, and even where accurate it is often impossible to identify points on the terrain due to its broken character.

Faced with these obstacles the French allotted for the offensive of September, 1925, seven divisions, which with the addition of corps troops, totalled 102 battalions, 56 batteries and 18 aviation squadrons. The artillery was of all types; pack, horse-drawn, portee and tractor-drawn and ranged in calibre from 65 to 155 mm.

The procurement of artillery information was facilitated by the wide choice of untroubled observation posts, available in the mountains, but at the same time, the necessity for complete and accurate information was correspondingly increased. The wide front to be covered, the few guns available and the colossal difficulties of ammunition supply made it essential that not a round be wasted. Mapfiring was out of the question, and accurate, economical adjustments were the rule of the day. It was important for battalion and higher artillery commanders to keep themselves accurately informed of the enemy and the terrain so that no fire be wasted on trifling objectives and that the very best available routes be used in an advance.

For the transmission of messages, the telephone, the heliograph, and the messenger were the most reliable. Visual signalling resumed a great importance whereas radio and aeroplane communications generally failed.

As in all other campaigns, the employment of the artillery rested largely on the tactics of the infantry. Here was an approach made during which there was no danger from enemy artillery, permitting the French to move all their own guns at the same time rather than by echelon. Slowed up by the shots from the Riffian scouts, the French would deploy at once and contact with the enemy position would quickly follow. The most successful type of manœuvre was

a flank movement which would generally dislodge the Riffians but a rapid pursuit was demanded if any material results were to be gained. Such tactics called on the artillery for a quick occupation of position, selection of targets and rapid adjustment of fire.

In meeting the above requirements, the first problem that presented itself to the commander of the divisional artillery was the distribution of his force. Several schemes were tried out but Captain Courbis is of the opinion that the most effective was the assignment of one battalion (two if available) of pack artillery to each infantry brigade and the retention of any horse-drawn or motorized units under the direct control of the commander of the divisional artillery. This plan seems to have been the happy mean between rigid control of all the artillery under the artillery commander and complete decentralization in which all the batteries were separated from each other and attached direct to infantry units.

The primary fire mission of the artillery was direct support of the infantry by concentrations of short, accurate bursts of fire. Such missions as counter-preparations, destructive and interdiction fires were negligible or nonexistent, and although harassing fire frequently had good moral and political effect on wavering tribes. Assignment of targets was made by the battalion commander to his battery commanders by verbal description over the telephone, by written message accompanied by a panoramic sketch, or by a personal visit to the captain's observation post. Panoramic sketches were often resorted to and were in general of more value than maps for artillery fire due to the difficulty of identifying the features of the ground with those on the map. Joint battery and battalion observation posts were not advocated, as tending to confusion.

Gun positions were of two classes: either on top of a crest beside the observation post, or in the valley directly behind. The latter was preferred as in a mountainous and roadless country, it is usually easier to lay a telephone line of a half mile, or even more to the top of a ridge, than it is to haul four guns to the top of said ridge and transport the ammunition which they may consume. In the conduct of fire it was necessary to obtain a rapid salvo adjustment with a deep bracket, followed by progressive volleys. Unless this was done, there was no chance of striking a mobile enemy who would quickly find shelter. Precision fire was in almost all cases futile. On the other hand, choice of targets could not be left indiscriminately to subordinate commanders, inclined to waste precious rounds on fleeting but unimportant targets, picturesquely described, as the desire to go rabbit shooting.

In the matter of ammunition, high-explosive shell was preferred. The difficulty of corrector adjustment when observation post is not in the plane of site; the constant corrector changes entailed in fire

on targets in the hills; and its increased weight were the chief objections to shrapnel. For searching behind crests, time shell was found very effective.

Forward displacements were generally made by a battalion as a whole. Every effort was made to spare the men and animals by a careful reconnaissance of the route prior to departure and the posting of engineers and labor troops at fords, declivities and mud holes. It was necessary to reiterate in orders the importance of feeding, watering and resting the animals by the removal of packs and harness whenever time permitted. In spite of everything the death and evacuation of animals was high.

The various guns used in this campaign were the 65-mm. mountain, the 75-mm. and 105-mm. mountain howitzers, the 75-mm. field gun, the 155-mm. howitzer and the 155-mm. St. Chamond, Model 1916. The trajectory of the old 65-mm. is too flat and the projectile too small unless howitzers are to be provided in the same expedition. The new 75-mm. and 105-mm. mountain howitzers were found to be excellent weapons. The 75-mm. howitzer has the advantage of firing the same projectile as the field gun. The 75-mm. field guns were drawn by eight-horse teams but the wear on the caisson teams was so great that it is suggested, that in future, the ammunition be carried in pack trains and only the guns drawn by teams. Portee artillery was of little use except in regions where the French had built roads. Tractors, though possessing the necessary power, could not stand the rough ground and the need of constant repair made them of little value. It was found that where all supply vehicles had to be drawn by tractors, the weight of fuel, oil and spare parts used in a day exceeded the forage of a horse-drawn battery.

In the July, 1926, issue is an unsigned article, **"A Gun and Howitzer for the Danish Army."** With a view to purchasing twenty howitzers and twelve heavy field guns, the Danish Government sent a commission to France in 1922 which negotiated a contract with Schneider and Co. to construct a pilot model of each of the above types.

As a result, plans were drawn up and a field gun of 10.5-cm. calibre has been built for motor traction along the following lines:

Muzzle velocity	840 m/s with maximum charge
Muzzle velocity	620 m/s with minimum charge
Maximum range	17,000 m.
Weight of tube	1,920 kg.
Weight limbered	5,076 kg.
Weight of projectile	16.4 kg.
Length of tube	5.055 metres
Length of recoil	1.00 metre

Unfixed ammunition is used, the powder being contained in bags and the breech mechanism of the usual Schneider type provided with obturator and separate primer. The carriage is of the split trail pattern. Elevation from 0 to 43º is obtained by means of a pinion on the chassis engaging with an arc rack under the recuperator. An independent line of site is not provided. The chassis pivots around a large pin set in the axle housing, permitting a considerable deflection shift. The recuperator has an oil brake having no connections with the counter-recoil system which has two air- and one oil-pressure cylinders. In all cases the cylinder is the moving part. At the muzzle is attached a device called the Schneider Muzzle Brake.

By a system of vents and passages the forward moving gases of discharge are brought to act on the tube in a manner, which it is claimed, greatly reduces the force of recoil, thus permitting a much lighter recuperator than is normally used. The tube is slid backward for travelling. No shield is used, but band brakes and rubber tires are provided. The gun was successfully tested at Harfleur in June, 1924, followed by a run of 2500 km. over the roads.

The howitzer differs little from the standard Schneider, model of 1917, with the addition of travelling springs and the above-mentioned muzzle brake. It was tested in October, 1925, with gratifying results.

"Revue Militaire Française," May, 1926.

"Chemical Warfare," by Chef d'escadron Paul Bloch, is continued in this number. The author believes that in spite of the almost universal condemnation of the use of gas in the last war, it will play an even greater part in future warfare. There was a time when even the use of the firearm was considered unsportsmanlike. We can understand the indignation expressed by the old soldiers in the days of Montluc, who remarked:

"Were it not for that cursed invention so many brave men would not be killed by cowards who fire from a distance and dare not look their victims in the face."

As an example of the effectiveness of gas at a moment when offensive and defensive means were well balanced, the author points to the gas casualties suffered by the American troops. Twenty-seven per cent. of their total losses was due to gas. Only twenty-five per cent. of the German artillery ammunition was of the gas type.

In 1920 the English under-secretary of war stated in an address to Parliament:

"No nation has renounced the use of gas * * * if we must

be prepared for defense it is equally essential to study the offensive side of chemical warfare * * *. The preparation of the offensive use of gas can be made secretly in time of peace and give results extremely important and even decisive at the very outbreak of war."

While it is difficult to manufacture with secrecy guns or tanks, the combat gases, whose chemical compositions are quite similar to many commercial gases, can be studied freely in the commercial laboratories. In the event of war industrial plants are immediately ready for the preparation of poison gases.

The author also notes that the latest German regulations devote considerable space to offensive and defensive gas warfare. In a recent German work on chemical warfare, Doctor Hauslian, the author, writes:

"Gas warfare offers to the nation most intelligent technically and scientifically, a superior arm, which will give a world supremacy to the nation best able to handle it."

The great value of gas during the offensive lies in its capacity to neutralize enemy troops by causing them to keep on their masks with a resulting loss in activity and morale. Moreover there are always masks in poor condition, causing a fair number of casualties. This neutralization can be accomplished by means of a short preparation and a small amount of ammunition. In firing on small areas such as battery positions, the necessary density can be obtained in two or three minutes by a concentration of several batteries. The best effect is obtained by a combination of high explosive and gas shells. In firing on infantry objectives, care should be taken to discontinue firing gas shells in time not to harm the friendly attacking troops. During the attack it is always helpful to resort to the old trick of firing shells filled with gas of a harmless nature which will nevertheless cause the enemy troops to keep on their masks.

Ludendorf states in his memoirs, that shortly before the armistice he was about to use a very effective type of incendiary bomb to burn Paris and London. These bombs, weighing about a kilo contained a composition of powdered magnesium and iron oxide. Heavy enough to penetrate the roof of a building, they would be detonated by a fuse. Combined with gas bombs to hinder the circulation of the fire department, a number of such fires widely scattered throughout Paris or London would be very difficult to extinguish.

"A Study of Mortars," by Commandant Schneider, shows that this weapon is quite adaptable to either stabilized or open warfare. He traces the history of the mortar and explains its usefulness during the first years of the war. Early in 1918 with the rapid development of artillery there was a tendency to increase the distance

between the front lines, a distance beyond the range of the old type of mortar. The new type matériel (150 Model 1917) not being yet ready, the mortar was used but infrequently for some months. The new matériel when used was found to be invaluable as an accompanying weapon for infantry during the last few months of the war.

It was frequently used under conditions unsuited to heavy artillery, particularly in destroying machine-gun emplacements within 100 or even 50 metres of our lines. The range probable error of the heavy artillery frequently leaves such zones close to the front line that can be reached only by the mortar. Neither can such a mission be accomplished always by the tank, which can frequently be stopped by anti-tank weapons and by natural or artificial obstacles.

The author believes that the mortars should belong to the artillery rather to the infantry, since the infantry battalion commander has already too many auxiliary weapons under his command. He will still have his light mortars (Stockes) which can be carried by the battalion personnel.

"The Question of the Limitation of Armaments," by Commandant "S," deals with the problems confronting the preparatory commission, designated by the Council of the League of Nations to meet May 18th. This preparatory commission was to prepare a questionnaire summing up the disarmament problems to be submitted eventually to an Arms Conference to be called by the League Council.

The English feel that the only problem to be solved is that of limiting the peace-time forces. From their point of view it is impossible to limit the potential force of a nation.

The French point of view is quite different. They maintain that disarmament should follow security, this security to be in the form of guarantees against aggression. Moreover, it is essential to consider the strength the various nations can muster in case of war. This potential strength can be equalized only by the organization of economic and financial assistance.

In this issue are contained the articles **"Verdun,"** by Lieutenant Colonel Grasset and, **"The Allied Debarkations at the Dardanelles,"** by Commandant Desmozes.

"Revue Militaire Française," June, 1926.

In this issue Commandant Schneider concludes **"The Study of the Trench Mortar."** A new type of matériel should have the following features:

(a) The range should vary from 500 to 4000 metres though the usual range employed will probably not exceed 1500 metres.
(b) A calibre of 120 mm. and a weight of 200 kgs. would be large enough for almost any mission and not too heavy for transportation by hand.
(c) The projectile should be powerful, weighing from 10 to 12 kgs., containing an explosive charge of 5 kgs.
(d) The traverse should be very wide, permitting rapid changes in deflection during close combat.
(e) The elevation should vary from 0º to 70º, permitting low-angle fire on tanks and vertical fire on dug-outs.
(f) The range error should not exceed ten metres and the deflection error five metres at the maximum range.
(g) The rate of fire should be as high as five or ten rounds per minute. The author recommends a type of motorized transportation which makes use of both tracks and wheels, the change from one to the other to require not more than ten minutes.

"The English Army and the Manœuvres of 1925," by Commandant "T," is begun in this issue. This was the first big manœuvre since the war and all the troops in the British Isles were used in an attempt to solve certain problems of doctrine and matériel.

The British staff is working for perfection in open warfare, a type of combat which best responds to the numerous situations confronting the Army throughout the Empire. Training in this type of warfare develops qualities of leadership; and officers so trained can easily adopt themselves, in case of necessity, to stabilized warfare.

Every effort has been made to increase mobility. The infantryman's pack now weighs only twenty pounds. The balance of his equipment is carried on battalion trucks. The division supply trains have been almost entirely motorized by means of requisitioned trucks. In the artillery a large part of the medium and heavy artillery has been motorized and the motorization of light artillery is being studied.

The General Staff has abandoned momentarily the heavy tanks and is experimenting with a new type of tank, in which the armor is sacrificed for speed (twelve to fifteen miles per hour). The Vickers tank is of this type and is armed with a six-pounded and three machine guns. It has a very large radius of action (150 miles) for attacks on the flanks or upon the rear. These tanks should be employed in a body for surprise effect and should be well supported by airplanes and artillery. The English Press speaks quite enthusiastically

of an "Individual Tank" carrying a machine gun. It should be valuable as a scout for the Vickers tank and should also solve the problem of changing machine-gun positions under fire.

To make place for the motorized arms, the infantry and cavalry have been reduced; the cavalry from thirty-one to twenty-two regiments, since 1920. The cavalry is still very much respected, however, because of its value in colonial warfare, and also because it fits into the General Staff's open warfare policy.

During the manœuvres considerable study was devoted to the coöperation of the air force with the land forces.

There is a large and important group of officers and journalists in England which finds the War Office too attached to conservative doctrines. The radical wing of this group wishes to abandon all existing tactical principles and wishes to apply naval tactics to land warfare. These radicals claim that the Infantry no longer exists as a predominant arm. The principle argument in favor of the predominant rôle of the Infantry is that it alone can occupy and hold ground. However, it is not necessary that ground be held and defended. Naval fleets have always defended lines of communications without holding them. The air force did likewise in Mesopotomia. Therefore why cannot armies of the future be cruising land fleets? As for the cavalry, admitting its usefulness in colonial warfare, it is out of place in any great modern war. The right tank, a real mechanical cavalry, combined with the airplane, should wholly replace the cavalry in reconnaissance as well as in combat. The march of infantry under fire is suicide and moreover too slow. Coöperation is impossible between infantry marching at 5 kms. per hour and motors at 30. Numbers will not count in the future; force rests with armament, movement and armor. Therefore prepare for mechanical warfare.

"Communication and Supply in Morocco," by Captain Juin, is a detailed description of the work of the French service of supply during the campaign of 1925. The author takes up in turn the rail, motor, and animal transportation problems.

Due to the difficulties encountered by the army trucks in carrying the large quantity of supplies over such difficult terrain, an entirely new scheme in motor transportation was adopted by the French Staff. It was found necessary to call in a commercial trucking "Masiéres" to transport a large part of the supplies. This firm was given the concession for all of Morocco. Naturally there was much complaint on the part of rival firms and Army Transport Officers, but this system produced satisfactory results.

Mules, camels and donkeys were used to supply the extreme front lines. At first requisition was made upon the native tribes

for animals and men for this service. This was very exhausting and at times dangerous work, and desertions were so numerous that an attempt was made to hire the native labor. This was also unsatisfactory. In September the system of requisition was again adopted with better results this time, often calling upon the aid of the civil authorities and the intelligence service.

"Chemical Warfare," by Chef d'Escadron Paul Bloch, is continued in the June number. The author deals with the various technical means of gas protection.

In this issue Lieutenant Colonel A. Grosset concludes his article **"Verdun"** and Commandant Desmozs continues **"The Allied Debarkations at the Dardanelles."**

CURRENT FIELD ARTILLERY NOTES

Objects and Value of Preston System of Branding

Many of the horse record cards coming in from organizations give as the cause for disposing of animals or separating them from the service, such notations as "died" or "condemned and sold." Such remarks are utterly useless in collecting data on why we lose animals.

The following notations on the Preston System of branding animals were prepared for the purpose of acquainting officers with what this system of branding is intended to accomplish.

The Preston system of branding horses and mules was adopted for two reasons, as follows: (1) As a means of positive and permanent identification; (2) as a means of collecting valuable data for the Remount Service, Quartermaster Corps, for the Veterinary Corps, and all mounted branches of the service.

When a horse or mule is purchased for the Army its record card, Q.M.C. Form 125, is made out in triplicate. The original accompanies the animal, duplicate copy is filled in the office where animal is purchased, and the triplicate sent to the Quartermaster General's Office for file in the Army horse and mule record file. If the card of any animal branded under the Preston system is lost in the service, a duplicate can be obtained from the Quartermaster General or from one of the five Remount Purchasing and Breeding Headquarters. As long as the brand is properly applied the horse is positively and permanently identified, and his record can be looked up at any one of three places—and the first object of the branding is definitely accomplished.

When a horse or mule is separated from the service, the *cause* for its separation should be noted on its record card under the heading "Final Separation from the service and reasons therefor," and the card mailed to the Office of the Quartermaster General, as prescribed in instructions thereon. The cause of separation should be stated in specific terms, such as "condemned and sold on account of ring-bone, spavin, periodic opthalmia, etc.," "died of colic, influenza, etc." A mere notation that the horse "died" or was "sold" provides no data as to the reason the animal died or was sold, and gives no information of value to anyone.

After the record card, with proper notation as to final separation from the service of any animal is received in the Office of the Quartermaster General, the triplicate card for this animal, which has been on file in that office all the time, is completed as to reasons

the animal was disposed of, and the card placed on the "Dead" file of animals for study and collection of data. The original card is then forwarded to the Surgeon General's Office for study and for collection of desired data of particular interest to the Veterinary Corps.

Anyone can readily see that if these cards are made out and sent in properly after the animal is disposed of, they can be studied and sorted out so as to accomplish the second object of the Preston brand and to show the following:

(a) Longevity of horses from various sections of the country, or of various breeds.
(b) Average useful life of horse in various branches of the service or sections of the country.
(c) What parts of the horse's anatomy go bad first, if any?
(d) What are the most prevalent diseases and injuries?
(e) What causes the greatest loss in animals?

In fact, many other important things of interest and value can be determined, which should benefit the Remount Service, Quartermaster Corps, in its purchasing and breeding work, the Veterinary Corps in its treatments of animals, and the service at large in its handling, care and use of animals. It is of interest to note that the Preston system of branding has already brought out the fact that 1½ per cent. of all animals purchased are lost from various causes before they are issued to organizations.

An article, "The Preston System of Identifying Horses and Mules," by Major C. L. Scott, Quartermaster Corps, appeared in the July-August, 1924, issue of the FIELD ARTILLERY JOURNAL.

Remount Training Contest, the Cavalry School

Among the important equestrian events held at the close of each school year at the Cavalry School, Ft. Riley, Kansas, is the Remount Training Contest for the Special Advanced Equitation Class. This class is composed of selected officers who have excelled in horsemanship while taking the Troop Officers' Course. The purpose of the special course is to give selected officers additional instruction in horse training and animal management, with a view to their subsequent use as instructors in equitation and horsemanship at our service schools.

The winner of the remount contest this year was Captain William H. Colbern, 82nd Field Artillery Battalion (Horse), who has recently completed a two years' course at the Cavalry School. Captain Colbern rode a five-year-old Virginia half-bred named Fred Harvey, by Harvey F (Tb), out of a half-bred Virginia mare. Although a little leggy, this bay remount is a fine type of horse, weighing 1175 pounds and scaling 16.3 hands high. He was

CAPTAIN WILLIAM H. COLBERN, 82ND F.A. BN. (HORSE), ON "FRED HARVEY"
WINNER OF THE REMOUNT TRAINING CONTEST FOR 1926 AT THE CAVALRY SCHOOL, FT. RILEY.

CAPTAIN JAMES C. SHORT, 9TH CAVALRY, ON "VERDICT."
2ND PLACE IN THE REMOUNT TRAINING CONTEST, 1926, AT THE CAVALRY SCHOOL, FT. RILEY.

SECOND DIVISION CHAMPIONS—11TH FIELD ARTILLERY

assigned to Captain Colbern last fall, and was trained and ridden by him up to the time of the contest.

The runner-up in the contest was Captain James C. Short, 9th Cavalry, who rode and trained Verdict, a roan half-bred, by Trial by Jury (Tb), out of a half-bred mare at the Ft. Reno Remount Depot. This remount is four years old, weighs 1150 pounds, and stands 16 hands high.

The contest covered three phases which were judged and marked on points, each phase being scored on a basis of 100. The most important phase was the Schooling Competition, counting 50 per cent. on the final score. In general, the schooling requirements included the following: Showing the remount at a walk, school and posting trot, canter and gallop; transition from one gait to another; counter-gallop on the circle; change of gallop lead on a straight line and on the circle; shoulder-in and ranging the haunches; two-track on the diagonal; halt from the gallop and vice versa. In the schooling phase Captain Colbern made a score of 96 while Captain Short, his nearest competitor, made 94. Both officers showed well and gave a fine exhibition of horsemanship. Their performance was far superior to that of the rest of the class.

The second phase of the contest was Jumping. The course was arranged in the riding hall and consisted of ten obstacles (brush, post and rail, stone wall, chicken coop, and gate). These jumps were all 3½ feet high. Each jump was scored on a basis of ten points. The usual penalties were exacted for tips, knock-downs, refusals and run-outs. In case of a third refusal or run-out, the contestant was eliminated from the jumping phase. Practically, this also meant elimination from the contest. The jumping phase counted 25 per cent. on the final score. Captain Short came out first in this phase with a score of 99½, with Captain Colbern as runner-up with a score of 98½.

The final phase of the contest was a cross-country ride over a three-mile course containing ten obstacles. This course had to be covered in not less than nine and not more than twelve minutes, necessitating an average gait of from 15 to 20 miles an hour. The only penalties exacted were for refusals, run-outs and falls. Failure to complete the course within the prescribed time limits was penalized by elimination. Fortunately, all contestants completed this phase in proper time and in good form. The splendid condition of all the remounts at the end of this phase, indicated that all the contestants had brought their mounts to a fine physical condition for the contest.

Covering all three phases, the final scores were as follows: First, Captain Colbern, score 94.5; second, Captain Short, score 93.5. There was little to choose between these two officers. Both gave a

fine exhibition of horsemanship and at no time were in any danger of being topped by any of the other contestants. Captain Colbern won the contest on the slight edge which he earned in the schooling phase. Captain Short, although suffering with a sprained ankle, put up a game ride in all the phases. He was compelled to ride with one foot out of the stirrup throughout the contest and it was quite evident that he was suffering severe pain.

The fine sportsmanship which permeates the Cavalry School was demonstrated at the end of the contest when Captain Colbern greeted Captain Short with the remark: "Jim, if you had had that other leg, you would have beaten me."

Baseball Championship Second Division

The 15th Field Artillery Baseball Team won the Division and Post Championship with a total of twenty games won and four lost. The percentage scores of the team composing the league follow. Fifteenth Field Artillery, 83.3 per cent.; 9th Infantry, 70.8 per cent.; 12th Field Artillery, 58.5 per cent.; 23rd Infantry, 50 per cent.; 1st Infantry, 41.6 per cent.; 20th Infantry, 41.6 per cent.; 2nd Engineers, 16.6 per cent.

In the entire schedule of twenty-four games, the 15th Field Artillery used two pitchers only. This team was also the winner in 1923 and 1924.

A Greeting to New Men

All men upon joining the 76th Field Artillery are given an attractive printed circular, the cover page of which reads "New Soldier! We welcome you to the 76th Field Artillery. You have joined a Regiment whose War Record, Ideals, and Esprit are Unimpeachable. We expect you to live up to these Ideals and Traditions. Read this and enter into 'The Spirit of '76.'"

It is understood that credit for the preparation of this circular is due 1st Lieutenant John P. Eckert, Field Artillery. The text of the circular is as follows:

"STRAIGHT GOODS FOR THE NEW MEN

"You have come to the most strenuous branch of the service, the horse-drawn Field Artillery. Before you start in, you should be made acquainted with a few facts; attention to them might save you much trouble later on.

"In the first place don't expect a soft snap. You will learn that the redleg with a light battery has something to do all of the time. Work is his middle name. He has got to be an animal tamer, a gun tamer, and a man tamer; he has got to know everything from horse flesh to ballistics, from harness to geometry, from telephone

to high explosives. He must know how to shoot a pistol, a machine-gun and a cannon; he has not only got to know how to ride a little cavalry horse; but also to man-handle a pair of big busters that weigh a ton and a half between them; and he must learn how to ride the trail and hold his seat on a pitching, roaring seventy-five. You can't be a coffee-cooler or a cake eater in the branch that wears spurs with a red hat-cord. As a certain member of the organization remarked on a famous 'After Dinner' occasion: 'You gotter be a Buller in the Field Artillery.'

"Why do they like it? The answer is two-fold. The first is the spirit. Artillerymen have always had it. They stick together in a remarkable manner. With but few exceptions you will find them a loyal lot; they will fight at the drop of the hat for their organization, and whatever growling is done within the family they seldom woof to outsiders. Traditions running back through the Revolutionary War have a lot to do with this condition; there are more songs, poems, stories and yarns about the Field Artillery than all the rest put together. Their loyalty is hereditary; their enthusiasm contagious.

"The second reason for the popularity of the Field Artillery is the joy of the life itself. Ask the driver. He will tell you that it is worth all his grooming and harness cleaning to experience the thrill of a snappy morning's battery drill at a brisk trot; the rhythmic pound of the hoof beats in his ears and the pungent smell of hide and leather in his nostrils; feeling the powerful muscles of a magnificent horse responding to his rein and spur, the stiff breeze crackling around the guidon, the musical, 'jingle-bumpety-clank,' as Kipling describes it, of the guns and caissons as they go rolling along; all filling the air with such an exhiliration of sound and moving life that his spinal column arches and his toes wiggle in his stirrups for joy. John D. Rockefeller with all his millions or Rudy Valentino with all his looks, cannot draw a bigger kick out of life than this.

"Ask the B. C. Detail or the Headquarters Specialists. They will tell you that the job at the observation post is the best of all jobs; that there is no better reward for work well done than the sight of the first salvo bursting around the target.

"Ask the cannoneer. He will tell you that no doughboy drill can equal the satisfaction of the trained gun crew's play; when, working silently and with the speed and smoothness of a machine, they feed their guns the shell and shrapnel, as it kicks and bucks and bellows, and with a 'crack-whistle-swish and roar' throws out its iron messengers of death. 'Them babies that raise such hell up the line.'

"This year the boom of the Soixante-quinze will reverberate

through the Sierras and over the plains of Wyoming as it did over the hills of France, and the caissons will go rolling along as merrily as they have done since 1776. New soldier, what you will get out of all this will depend upon what you put into it. Your mess-mate will give you the glad hand, and your superiors a square deal, but if you don't get into the Spirit of the Seventy-sixth you will see only the work and not the play, the grooming and not the thrill. To make good you will need willingness, muscle and guts, particularly guts!"

Award of Jeff Feigel Medal

On Friday morning, August 13, 1926, Major General C. P. Summerall, at Regimental Review, pinned the Jeff Feigel medal on the breast of First Sergeant William Casey, Battery "D"; the best Artilleryman in the Seventh Field Artillery.

Colonel Fred Feigel, of New York City, gives each year an individual medal in memory of his son, Lieutenant Jeff Feigel, to the best artilleryman in the Seventh. Lieutenant Feigel was a member of Battery "F" of this organization and the first artilleryman to meet his death in the American Expeditionary Forces.

Each year a candidate is selected from each unit in the regiment to compete for this medal. Candidates of over five years' service are chosen for their particularly soldierly qualities, their technical knowledge of artillery, length of service and character. Having attained this priceless reward a soldier is no longer eligible to compete, but the medal remains in his possession.

First Sergeant Casey, the winner of the 1926 Jeff Feigel medal, and First Sergeant of 1924 Knox Trophy Battery, has an enviable record of twenty-five years straight service. At the end of his first enlistment in 1904 he was discharged as a sergeant; the same grade was on his discharge for each succeeding enlistments until 1917 when he became first sergeant—the grade he holds at the present time. In his entire service Sergeant Casey has never had any form of disciplinary action—his whole career is characterized by outstanding loyalty, faithfulness to duty and love of honor and country.

In being recognized as the best artilleryman in the Seventh Field, Sergeant Casey receives a just reward for his long years of excellent service.

A Reserve Officer's Impressions of the Field Artillery School

Under the heading of "Impressions of Fort Sill," by Second Lieutenant N. F. Gill, Field Artillery Reserves, the following appears in the June, 1926, issue of the *Ohian*, Bulletin of the 83rd Division:

"Three months is entirely too short a time to learn much about the Field Artillery, but it does give a very clear idea of what it is all about, which every officer ought to have and in peace-times Fort Sill is probably the best place to get it. The location is fine, with plenty of places to hide and shoot most any kind of a weapon, the weather changes so rapidly you have to make up your mind at the last moment whether to use a temperature correction of 20 degrees or 80 degrees, and the instructors are the best and naturally expect the students to sense a shot by the sound of the gun. In other words, a person can come down here knowing a little and come away knowing how little he knows, even if he does have away above the average knowledge.

"Everything one does down here is graded, according to a standard, which is a mystery we've never been able to solve. Gunnery is brought before us so often and furious that it just naturally becomes second nature to dream about Direction, Distribution, Height of Burst and Range. The problems range from the type where accuracy is brought down to a point where a scratch on the gun bore is considered or the kind in which you fire the problem in a bathing suit as they say.

"By the time the last week comes around and train schedules are studied with enthusiasm, each kind of problem is fired without much vibration of the field glass, in fact it is pleasant to play with the corrector and certainly a joy to see those shrapnel balls rain down on a bunch of paper infantrymen. It takes an artist to fire a decent problem and they teach it so that most of us are would-be artists, at least.

"Everyone enjoys the tactical problems as usually it means a game to be played in which we have to outwit the enemy. To take a battalion out, put it in position where it can't be seen and yet shoot everything it sees, put in communication that can be used to talk over, how to arrange every man so one shell burst doesn't kill the whole army takes a lot of quick and accurate thinking that tests an officer and shows the enlisted man how and why he has a person to run the battle. It's surprising how much fundamental Field Artillery he has to know as second nature and then how much common sense is needed to effectively carry out the missions assigned to him. Well they bring that all out very nicely down here which is quite a job to put across in three months.

"In fact they teach everything, in a small way, that is of interest to the Field Artillery. The mechanism of the matériel, why a telephone is supposed to work, the use of an airplane in conduct of fire, even down to the internal workings of the motive power of horse-drawn artillery. They even teach it in a way that doesn't hurt, we even sat down to all meals after the instruction in sitting on a horse.

Every Reserve Officer or National Guardsman that likes the Artillery would delight in the course at Sill just as the colored race delights in owning a whole watermelon. They give the cream of it all there."

Courses at the Field Artillery School

The courses this year will be the same as those of last year. So far as relates to National Guard and Reserve Officers and the Enlisted Specialists, the scope as published last winter in Information Bulletin Number 79, is equally applicable to this year. The dates as at present scheduled are given below.

REGULAR OFFICERS

Battery Officers' Course, September 15, 1926, to June 10, 1927.
Advanced Course, September 15, 1926, to June 10, 1927.
Refresher Course, February 7 to May 7, 1927.

NATIONAL GUARD AND RESERVE OFFICERS

Battery Officers' Fall Course, September 15 to December 11, 1926.
Battery Officers' Spring Course, February 7 to April 30, 1927.

NATIONAL GUARD FIELD OFFICERS

Short course limited to field officers, January 3 to February 12, 1927.

ENLISTED SPECIALISTS' COURSES

Fall, September 15, 1926, to January 29, 1927.
Spring, February 7 to June 10, 1927.

Binders for War Department Publications

The value to an officer of the large number of War Department regulations published is, to a considerable extent, a function of his ability to find the particular publication when it is desired. Without binders in which to systematically file these publications, this is a difficult thing to do.

The size of current appropriations does not justify the hope that an adequate number of binders for War Department publications will be available to officers in the future. It is felt that a real service would be rendered Association members in the Regular Army, National Guard and Reserves by making it possible for them to obtain a thoroughly satisfactory binder for Training Regulations, Army Regulations, Range Tables, Field Artillery School publications, etc., at a cost materially less than that of the present War Department binder when purchased commercially.

After some investigation it has been decided to sell the binder

shown in our advertising pages. To avoid the annoyance of figuring postage costs these binders will be sold on a quantity cost basis plus estimated average transportation costs. In other words, these will be handled by the Association without profit, as a service to its members. Under this arrangement the cost, delivered to members, will be about half that of binders of the style used by the War Department when purchased at retail, or about 65 per cent. of the cost of the latter binders when purchased in quantities.

A Correction

An error was made in the name of the author of the article appearing in the July-August JOURNAL, entitled "Reflections of Camouflage." This article should have been credited to Lieutenant Burton Harrington, Spec.-Res. to whom apologies are extended.

Polo

The Twelve Goal Intra-Circuit Tournament.—The War Department Blues:—No. 1, C. S. Kilburn, Cavalry; No. 2, C. Parker, F. A.; No 3, W. V. Morris, Cavalry, and No. 4, N. E. Margetts, F. A., and the Sixteenth Field Artillery:—No. 1, G. C. Benson; No. 2, F. D. Sharp; No. 3, J. S. Tate, and No. 4, R. E. DeR. Hoyle, entered the Twelve Goal Intra-Circuit Tournament at Rumson, New Jersey, to pick a representative for the South-Eastern Circuit. Both teams totaled twelve (12) goals. The War Department "Blues" were eliminated in the semi-finals; the Sixteenth Field Artillery going into the finals against Rumson. At the end of the Eighth Period, the teams were tied 8-8, and in the extra period the Sixteenth lost 9-8.

In an exhibition match between Rumson and the Sixteenth Field Artillery, following the tournament, the Sixteenth Field Artillery defeated Rumson for a set of cups. The Sixteenth Field Artillery team is recruited from one Battalion of Field Artillery at Fort Myer, Virginia.

The Twelve Goal Inter-Circuit Championship.—On Saturday, August 21st, the Fort Leavenworth team won the finals of the Inter-Circuit Championship by defeating Rockaway 13-3. This is considered a great victory for the Army, as teams from every section of the counrty participated in this event.

The teams lined up as follows:

Fort Leavenworth	Rockaway
No. 1, C. A. Wilkinson, Cav.	No. 1, Eaton
No. 2, C. C. Smith, Cav.	No. 2, Beadleston
No. 3, I. P. Swift, Cav.	No. 3, Dempsey
No. 4, J. K. Brown, Cav.	No. 4, Hazard

The playing of the Leavenworth Team was excellent throughout, and this team should win the twelve goal championship. Little doubt is felt that some of the above Army players will be advanced to Junior Championship play next year.

Junior Championship 1926.—The Junior Championship for teams aggregating twenty goals was held at Rye, New York, this year. With the exception of Captain C. H. Gerhardt, Cavalry, an entirely new squad was picked by the Central Polo Committee of the Army this year. The Army economy program barred some players from consideration, and it was only through the generous coöperation of the Army at large that the team was able to participate. The task seemed almost hopeless at first, and the greatest credit is due the individual members of the team that assembled at Mitchell Field for organizing and perfecting a machine which carried them to victory over opposition that it did not seem possible to overcome. Much credit is also due Colonel Lewis Brown, Jr., Cavalry, for his selection of the individuals to compete.

About the middle of July, the team began to function with satisfying results as shown by the following scores: On July 17th the Army team won 5-4 against a Meadow Brook Team. They lined up as follows:

Army	Meadow Brook
No. 1, G. C. Benson, F. A.	No. 1, Ewing
No. 2, C. H. Gerhardt, Cav.	No. 2, Whitney
No. 3, H. D. Chamberlin, Cav.	No. 3, Peters
No. 4, K. C. Greenwald, F. A.	No. 4, Phipps

On July 20th, the Army won 11-5 against the Meadow Brook Whites as follows:

Army	Meadow Brook
No. 1, G. C. Benson, F. A.	No. 1, Grace
No. 2, C. H. Gerhardt, Cav.	No. 2, Cooley
No. 3, H. D. Chamberlin, Cav.	No. 3, Von Staade
No. 4, K. C. Greenwald, F. A.	No. 4, McFadden

On July 22nd, the Army won decisively by a score of 11-4 as follows:

Army	Meadow Brook
No. 1, G. C. Benson, F. A.	No. 1, Talbot
No. 2, C. H. Gerhardt, Cav.	No. 2, Hitchcock
No. 3, H. D. Chamberlin, Cav.	No. 3, Richards
No. 4, K. C. Greenwald, F. A.	No. 4, Phipps
J. K. Brown, Cav.	
4 periods each.	

Ponies were used only one period apiece in the three games (8 ponies per player) in order to save them for tournament play and condition them, as many of the ponies had been in pasture at Front Royal, Virginia, since last fall.

Four teams entered the Junior Championship—three Civilian teams and one Army team. The Civilian teams were composed of players seasoned by many years of championship polo, which makes the army victory all the more creditable.

On August 4th, the Army played its first tournament game against Meadow Brook. It was a hard fought match, and the Army nosed out victorious with a score of 8-7.

The line up was as follows:

Army	Meadow Brook
No. 1, G. C. Benson, F. A.	No. 1, R. P. Smith
No. 2, C. H. Gerhardt, Cav.	No. 2, H. E. Talbot, Jr.
No. 3, H. D. Chamberlin, Cav.	No. 3, Fred Roe
No. 4, K. C. Greenwald, F. A.	No. 4, R. Wanamaker

The Army showed its wonderful development of team work in this game. This victory put the army team in the finals.

On August 7th, the finals of the Junior Championship were played. The Army was opposed by Bryn Mawr with a line-up of veterans, who had eliminated the Greenwich team:

Army	Bryn Mawr
No. 1, G. C. Benson, F. A.	No. 1, Earle
No. 2, C. H. Gerhardt, Cav.	No. 2, Gatins
No. 3, H. D. Chamberlin, Cav.	No. 3, McFadden
No. 4, K. C. Greenwald, F. A.	No. 4, M. Belmont

The Army won 16-6, and retained the Junior Championship of the United States.

More and more Army players are reaching Junior Championship Calibre and it is hoped that before long more than one army team may enter the Juniors.

To further show the improved status of army players, the United States Polo Association has picked two army players to participate in the Open Championship of the United States, this fall. They are Captain P. P. Rhodes, F. A., and Captain C. H. Gerhardt, Cavalry. Both played on Major Louie Beard's fine team that defeated the British Army Officers in England last year.

It is to be hoped that hereafter army officers will always be chosen to not only represent us in Open Championships, but soon in Inter-national Competitions as well.

Funds for supporting the game are lacking, but those who have given can't help but feel that they have contributed to a most successful Army Polo Season. Let us keep up the good work.

Pacific Northwest Tournament.—The polo team of the 2nd Battalion, 76th Field Artillery, stationed at the Presidio of Monterey, California, won the Pacific Northwest Polo Tournament.

The Team, under the sponsorship of Major John R. Starkey, who commands the Battalion, traveled up to Vancouver Barracks, Washington, on June 22nd and returned on July 6th after winning four hard fought games. One June 26th the strong Portland Hunt Club Team was conquered by the close score of 9 to 7; on June 28th the Finley All Stars were overwhelmed by the score of 19 to 6; on July 2nd in an extra chukker game the strong 7th Infantry Team was defeated 6 to 5 and in the last and deciding game the Boise Polo Club of Boise, Idaho fell before the unerring assaults of the 76th F. A. by the score of 9 to 8.

The line-up of the 2nd Bn. 76th F. A. was as follows:

No. 1, Lieut. A. R. S. Barden, Team Captain.
No. 2, Capt. C. E. Boyle.
No. 3, Capt. G. L. Caldwell.
No. 4, Lieut. B. R. King.
Sub, Lieut. L. H. Slocum.

Field Artillery Board Notes

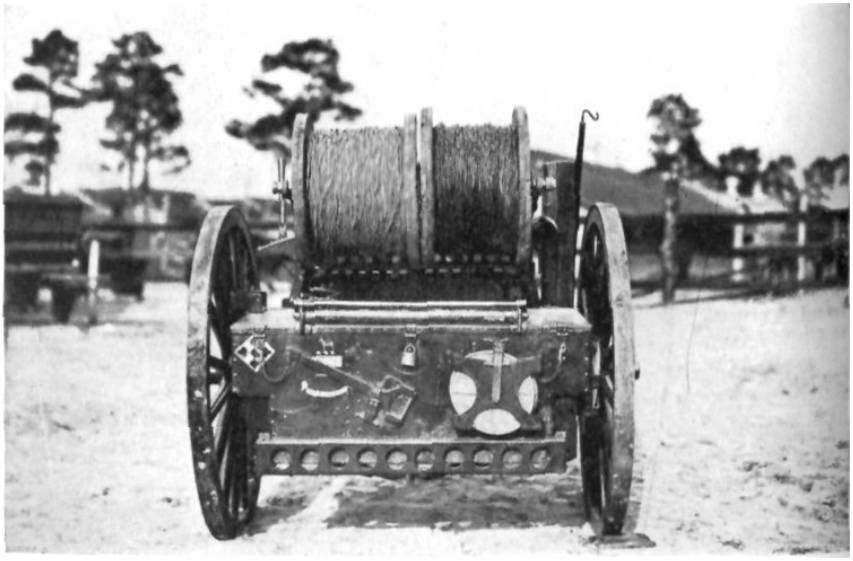
Equipment Tables.—Since the last Board notes were published, two equipment test marches of ten days each have been made; one with a 75-mm. gun battery, horse-drawn, and one with a 155-mm. howitzer battery, tractor-drawn. After the new equipment tables had been worked out, in order to determine how and where the equipment therein listed was to be carried, the above-mentioned batteries were fully equipped at war strength and given a ten-day field test in which many of the normal tactical situations were worked out.

One big feature brought out by the 75-mm. march was the necessity for overloading practically all vehicles in order that the *authorized equipment* might be carried. The weather was such that the men needed both overcoats and slickers. This will frequently occur in campaign. The gas and camouflage equipment is bulky and heavy. For instance, whereas 4800 pounds has been and still is considered to be the maximum load which should be put back of a caisson team, the caisson fully loaded weighed over 6000 pounds without the men on it. The light wagon is badly overloaded. An illustration of the ration cart at a creek crossing is shown. This illustration and that of the Fordson tractors show the type of roads covered during the equipment test. Cross-country marching over varied terrain, including sand and marsh, also comprised part of this test.

RATION CART

TWO-AXLE LOAD PROPOSED TO REPLACE THE TWO ONE-AXLE LOADS AUTHORIZED AS BATTERY EQUIPMENT

FORDSON TRACTORS WITH ADAPTERS—FULL-CRAWLER ON THE LEFT, HADFIELD-PENFIELD ON THE RIGHT



BATTERY REEL MODIFIED TO CARRY EXTRA REELS

The Board is still working on this equipment proposition and no report has as yet been forwarded.

Water and Ration Cart.—The Board has on hand a test to modify the present water and ration carts, making one two-axle vehicle take the place of the two one-axle vehicles now issued. It will be noted that the artillery hitch is used to draw the vehicle and that the water tank is placed crosswise on the carriage. In connection with this arrangement, the limber of the kitchen is to be used to take the cooked rations from the kitchen to the battery. This test is also incomplete, no report having been forwarded as yet.

Battery Reel.—A study of the vehicles now used to carry wire, signal and observation equipment indicates that the light wagon is very unsatisfactory. A modification of the battery reel which will enable it to carry more wire is shown in the illustration. The use of two of these reels in the battery in place of one reel and one light wagon is part of this test. Again the work is uncompleted and no report has as yet been forwarded.

Motorcycles.—Two Indian motorcycles have been under test for the past year. All the work done with these and other motorcycles indicate that while this type has its usefulness for messenger service, it is of little value for column supervision or reconnaissance. The test is uncompleted.

Fifty-gallon Gas Drum.—On one five-ton Holt tractor, the gas tank was removed and a fifty-gallon gas drum put in its place, the idea being, that, instead of refilling the gas tank when empty, the drum would be removed and a new one substituted. The idea proved to have several disabilities: the removal and replacement of the gas lines was difficult, especially at night, the weight of the filled drum made it an unwieldy and difficult load to handle. The amount of gas in the tank had to be carefully watched and the fuel line connections manipulated at just the right moment, due to the fact that first gravity then vacuum feed must be employed to empty the tank. This, while not a serious defect, was a great nuisance. The report is being written. It will be unfavorable.

Motor Equipment—General.—The test of Fordsons with the Full-Crawler and Hadfield-Penfield adapters has been re-commenced and they have been placed on a "continuous run" program. During the equipment hike of the light battery, these tractors pulled single-axle loads over the same ground as that covered by the horse-drawn battery with comparatively little difficulty.

A T-35, geared high and with self-contained reels driven from the drive sprocket, is being tried out as a wire-laying tractor. To date the mechanism driving the reels has not proven satisfactory. The test is incomplete.

A Chevrolet cross-country car of the same type as the Fords

has been received and is being tested in the same manner as the latter. It appears to have more power than the Fords, to be easier riding and easier to get out of ruts.

Trailers.—The question of the type of vehicles to be used for carrying ammunition and other matériel in the tractor-drawn gun and howitzer batteries has been under consideration for some time. There is a very strong feeling that all trucks should be eliminated from these organizations and tractor-drawn trailers substituted. Three different types of trailers are being purchased and will be tested for this purpose.

M-1920, 155-mm. Gun-8" Howitzer Matériel.—Due to difficulty experienced with the ammunition in the first firing, this matériel with the 155-mm. tube was re-fired this spring. No new model ammunition being available as yet, the standard shell with the long fuze was used. The results were satisfactory on the whole, but no definite conclusions can be reached until the new model shell is used. The pneumatic equilibrators have been under a temperature and adjustment test and have proved satisfactory. A progress report covering this feature is underway.

General.—The lanterns for aiming stakes have proved satisfactory except for mechanical difficulties in the construction of the masks. With either one or two aiming stakes, the lantern was superior to the electric light, giving a narrower spot of light, when properly adjusted.

The Elgin watches were satisfactory and the report has been forwarded.

The Otis King calculator was unsatisfactory in many ways. An unfavorable report has been forwarded.

The four-line switchboard with operator's unit has proved very satisfactory and a favorable report has been forwarded.

The test of airplane firing by means of aerial photos has been re-commenced and a new series of extensive tests will be made this coming winter.

Personnel.—The Board has been enlarged by the addition of three members, Majors T. D. Osborne, J. R. Brabson, and H. Eager. The addition of these officers was in pursuance of the provisions of A. R. 85-10.