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Harris and Ewing

MAJOR GENERAL HARRY G. BISHOP
Chief of Field Artillery

THE FIELD ARTILLERY JOURNAL

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NO. 2

MAJOR GENERAL HARRY G. BISHOP

OUR third Chief of Field Artillery, Major General Harry G. Bishop, was born in Grand Rapids, Michigan, November 22, 1874, and appointed to the Military Academy from Indiana. Upon graduation in 1897 he was commissioned Second Lieutenant of Infantry. Less than a year later he was transferred to the 6th Artillery and served at Fort McHenry, Maryland, Washington, D. C., and Fort Caswell, North Carolina. In April of 1899 he sailed for the Philippines, and in the same year he was promoted First Lieutenant, serving with the 13th Battery at Iloilo and later commanding the detachment at Cebu.

General Bishop was made Captain in 1901, after which he served at Fort Adams, Fort Totten, Fort Stevens and Fort Sam Houston. In 1911 he graduated from the School of the Line at Fort Leavenworth and the next year he graduated from the Army Staff College.

From 1912 to 1916 he served as Major, mostly at Fort Sill with the old Fifth, during the days when the School of Fire was started. Upon being promoted Lieutenant Colonel in 1916 he was ordered to the 8th Field Artillery at Fort Bliss, and in November of that year he went to the Signal Corps Aviation School at San Diego, nearly losing his life as the result of a forced landing in a remote desert region of Mexico.

In 1917 he received his colonelcy, and on June 26, 1918, became Brigadier General, National Army, with command of the 159th Field Artillery Brigade at Camp Taylor. In August 1918, he went to France and retained his Brigade until transferred to the 3rd Field Artillery Brigade which he commanded until his return to the United States in 1919.

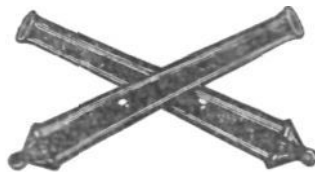
Upon reverting to his regular rank of Colonel he was assigned to the Army War College as instructor, and in September 1921 he became Chief of the Training and Instruction Branch, War Department General Staff, later going to the Fourth Corps Area as Chief of Staff. In August 1922 he again sailed for the

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Philippines and became Chief of Staff of that department. Upon his return to the United States in the Spring of 1925 he was put in command of the 15th Field Artillery at Fort Sam Houston and in 1927 he took over the 6th Field Artillery at Fort Hoyle. Due for foreign service again, General Bishop was transferred to Hawaii, where he commanded the 8th Field Artillery until he was selected Chief of Field Artillery for a term of four years beginning March 10, 1930.

As an author, General Bishop has attained considerable success. His book "Operations Orders" has been for a long time an important Field Artillery text, and he has also contributed valuable professional articles to the Field Artillery Journal.

General Bishop has ever been an ardent student of all Field Artillery activities. He is an extremely progressive, vigorous and resourceful man with a cheerful and genial disposition and throughout his long career in the Army he has held many positions of high importance and responsibility. Nobody knows the Field Artillery better than he, nor is better qualified to direct the destinies of our arm.



SOME THOUGHTS ON REORGANIZATION OF TRACTOR-DRAWN ARTILLERY

BY CAPTAIN M. R. COX, F.A.

INSTRUCTOR, MATERIEL DEPARTMENT, THE FIELD ARTILLERY SCHOOL

THE time is fast approaching when the vehicles of War vintage must be replaced in our tractor-drawn and other motorized units. In fact, from an economical standpoint, the time for replacement has passed some few years ago. It may be a sound policy to keep twelve-year-old vehicles in war reserve for a sudden emergency; they have only so many useful miles in them as they stand, so let those miles serve the country when it needs them most. But even reasonably cheap transportation is not to be had by attempting to operate such vehicles continuously. Why this is true, and what is the retiring age for motor vehicles under various circumstances are questions involving too many pages for discussion here. It is sufficient to state that these questions can be answered, and that experience in the armies of the world, as well as in large commercial fleets, places the average life of motor vehicles well under twelve years. In some instances it is set at three years; in others at six years; in none but exceptional cases, not analagous to military usage, is the limit placed as high as twelve years.

For example, the Quartermaster General, in figuring depreciation, estimates the useful life of the various classes of motor vehicles to be as follows:

Motorcycles	3 years
Light passenger cars	6 years
Medium and Heavy passenger	7 years
Trucks	10 years

If the present scheme of organization for motorized artillery units can be improved by the addition, reduction or rearrangement of personnel, by a reduction in the number or types of motor vehicles and other equipment, or in any other manner, the time to effect these changes is now—when a replacement of worn-out, obsolete vehicles is imminent.

The ever present, and at times dominant urge for economy,

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is an added reason for studying tables of organization. If an arrangement of men and matériel can be discovered that offers reasonable assurance of an increase both in efficiency and economy, it should be of sufficient general interest to warrant consideration in some detail.

The following "thoughts" are therefore presented, not with the hope of absolute agreement on the part of all readers—that would be too much—but with the belief that they may induce others to enter the discussion, and that the consequent exchange of ideas will be beneficial to our arm.

The 155 mm. howitzer organizations have been selected for discussion at this clinic; first, because more of them are now operating in all components of the Army than any other motorized type; second, because they are to be a part of the Infantry Division, our basic large tactical unit; third, because whenever formed and wherever employed, they will, in the main, be motorized in some manner.

The recent War Department order adding a regiment of 155 mm. howitzers (motorized) to the Field Artillery Brigade, Infantry Division, revives interest in the 155 mm. howitzer organizations, and restores the Artillery Brigade to its war-time situation. Most of our experience with these weapons during the War dealt with them as horse-drawn units. We do not know exactly how they will perform as an element of divisional artillery when they are motorized. It is evident that they will complicate the problem of marching the division, and that these complications are serious enough to warrant considerable study. Our experiences with these guns as corps artillery leads to the conclusion that the motor vehicle equipment as now specified is not suitable, in all cases, to negotiate the kinds of terrain that divisional artillery must be expected to encounter. The equipment would not be entirely satisfactory even if replaced, type for type, with modern vehicles.

Existing tables of organization for the 155 mm. howitzer units were made eight or ten years ago. In the light of what was then available in equipment, the organizations were efficient and economical to a high degree when employed as corps artillery. In recent years, however, improvements have been made in the

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design and construction of motor vehicles; the batteries are to be employed under circumstances requiring increased mobility, and over more difficult terrain; defensive measures against gas and aircraft must be given greater consideration; a somewhat different tactical employment is now contemplated—closer liaison between the members of the Infantry-Artillery team; reconnaissance and communications demand more space in the picture. In short, the 155 mm. howitzer organizations, as outlined in the 1921 tables, do not provide adequately for the 1930 conception of their employment.

The ideal in mechanical transport for Field Artillery is an all-purpose chassis capable of high road speeds with good cross-country ability, yet able to travel for long periods at the marching rate of Infantry on foot; one that can pull guns and trailers, or support a variety of special bodies, for cargo, personnel, command-posts, kitchens, communication centers and machine shops; one that can lay wire, ford streams and live in the field.

This vehicle should be simple in design, rugged in construction, easy to operate and maintain and able to be produced in quantity for other than purely military purposes. It should be obtainable in various weights and power sizes, all containing high percentage of interchangeable parts and units.

Attainment of this ideal is not impossible. Realization is being rapidly approached in the modern six-wheeled trucks, with detachable crawler treads. These vehicles are now capable of 45 miles per hour on good roads, without the crawler attachments. They will transport better than 20 tons cross-country, using the crawler attachments, which can be put on in a few minutes.

Present commercial use of six-wheelers, and four-wheel-drive vehicles in general, is confined to the heavier models. They find employment in logging operations, hauling construction material, in the oil fields, and for like service in localities where good roads have not yet been built. They are employed also on good roads for the rapid transit of freight. The weight on each axle of a six-wheeler permits total vehicle loads that most state laws would otherwise rule off the road as being destructive to costly pavement. Here, then, is a commercial type that is doing at least

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a part of our job—transport of heavy loads cross-country, and rapid travel on good roads.

Six-wheel modifications, as extras, are beginning to appear on some standard light trucks. These, when perfected, could well serve the Field Artillery in its problem of transportation for command, reconnaissance and communication purposes.

While it is not possible to fulfill our ideal of an all-purpose chassis from present commercial models, we can, however, go into the open market for items of motor vehicle equipment as immediate replacements that will insure a much higher degree of mobility than our motorized organizations have ever had.

To block out in general terms the major changes that appear desirable, with the reasons therefor in each case, is not difficult; they are:

(a) Dispense with all motorcycles with side-cars, especially in units below the regiment. Solo motorcycles for messenger service between regimental and higher headquarters might be useful—a Ford would do the job more economically. The motorcycle has not lived up to expectations, particularly when handicapped by a side-car and required to do cross-country work. They cost as much as a light car; are more difficult to maintain; have no fording ability, and cannot run at the usual marching speed of the column. They were the first vehicles to disappear from organizations via the salvage route. Replace them with Ford, Chevrolet or similar light cross-country cars.

(b) Replace the White Reconnaissance Cars with Ford station wagons, or similar light buses. The old Whites were wonders—no one can deny that! They still are in spite of abuses, lack of parts, old age, and an abomination for a body. Their only serious faults are: too much weight and too top-heavy for cross-country work. But they are no longer available, there are none in reserve, and they are out of production.

(c) Eliminate all caissons. The 155 mm. caisson weighs 2390 pounds, with space for only fourteen rounds. The caisson is actually 60 per cent of the total load. The twelve caissons in each battery thus provide it with 168 rounds. Light guns firing fixed ammunition, much of it shrapnel, require caissons to protect the fixed ammunition during transport. They also facilitate

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fuze-setting, loading, and rapid fire. The 155 mm. howitzer, using unfixed ammunition, utilizes the caisson as a means of transport only. The shells are unloaded from the caissons and placed on the ground at the gun positions before they are used in the howitzers. It is too difficult, and too expensive in time, to remove them individually from the caissons when firing. The cleaning, fuzing, and other operations that must be performed on each round almost demand that several shells and powder charges be out at the same time, all undergoing the process of preparation. So why not furnish a means of transport only? There are no caissons in the combat trains; the ammunition there is carried in trucks.

(d) Replace the caissons in the battery, and the cargo trucks in the combat train, by commercial four-wheel cargo trailers drawn by the same type of tractor that draws the guns. This will mean more ammunition at the gun position at no increase in motive power. One tractor now hauls two caisson bodies that weigh close to 5000 pounds and carry twenty-eight rounds; it can as easily haul a cargo trailer that carries 100 rounds. The cargo trailer, with its load of 100 rounds, does not exert as high unit ground pressures as do the caisson bodies with their load of twenty-eight rounds. Unit ground pressures under the wheels are important determining factors in cross-country travel. Also, resupply from the combat train would be improved by simply trading loaded trailers for empties; no more laborious transfer of 100-pound projectiles to the battery caissons from the combat train trucks, because the trucks could not get to the battery positions.

If we can do away with the four-wheel-drive trucks in the combat train, they can just as well be eliminated from the battery maintenance sections, by substituting for them the same type of cargo trailer that replaces the caissons. The 3-ton cargo trucks now in use are what limit the mobility of 155 mm. howitzer organizations. The tractors will, and do, take the guns almost anywhere, and the present light trucks and reconnaissance cars have fair success, even when the going is not particularly good. But the trucks—Wow! and again, Wow! If it rains, you do not expect to see them until the tractors can go back and bring

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them up. They are helpless in even moderately difficult cross-country going, particularly when carrying capacity loads. They do have some advantage over the ordinary truck in travel over fair to poor roads, because of the four-wheel-drive. But the hard, narrow tires cut through soft surfaces, quickly losing traction and grinding down until the vehicle is hopelessly mired. Modern four-wheel-drive, or six-wheeled trucks, mounted on heavy-duty pneumatic tires would be a huge improvement. However, no wheeled vehicle can equal a track-laying type when it comes to getting over soft, torn-up ground, such as the batteries and the combat trains may be expected to negotiate.

In eliminating heavy cargo trucks from the batteries and from certain other units, the present necessity of splitting a Division into two or more columns, when marching motorized artillery, is no longer a paramount requirement. It may be done at times, of course, but not because of inherent speed and cross-country differences between types of vehicles incorporated in the same organization. Last, and by no means least, is the advantage of eliminating one distinct type of motor vehicle. The spare-parts list is thus reduced by some 2000 items, and additional spare tractors are made readily available for use with the guns, and elsewhere.

(e) Replace the $\frac{3}{4}$ -ton cargo trucks and the light repair trucks with Ford six-wheelers and light delivery trucks. Here again it is possible to reduce the number of types by one.

(f) The Dodge 5-passenger cars are becoming so scarce that most organizations know them nowadays only as an item in the tables of equipment. Something must be issued as a substitute. Why not a Ford sedan?

(g) The Caterpillar "30" Tractor, having been adopted as standard for the type of artillery under consideration is therefore the draft vehicle recommended here. It is an improvement over the 5-Ton Artillery Tractor. The principal factors favoring its adoption are:

1. The 5-Ton is not in production.
2. The "30" is a standard commercial job, costing about half as much as the 5-Ton.

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3. Mechanically, the "30" is an improvement because of:
 - a. Greater track life—about three times that of the 5-Ton.
 - b. Twice as much fording depth.
 - c. Twice the draw-bar pull.
 - d. Better fuel economy.
 - e. Easier to lubricate and to maintain.
 - f. It is twelve years younger, which means it is the last word in metals, mechanisms, protection from dirt and weather, reduction of parts, and all else that tractor makers have learned in twelve years.
4. It is the most satisfactory American tractor in quantity production.

The T. 1. E. 1. track-laying chassis, developed by the Ordnance Department for general draft and cargo carrying purposes, would doubtless be a better prime mover than the "30." But as long as it remains a special military vehicle, not finding employment and consequent quantity production commercially, we cannot consider it for immediate replacement purposes.

In summary, the above amounts to this: All heavy loads in the batteries and combat trains would be hauled in commercial trailers behind a common type of commercial tractor; all other loads, including command and reconnaissance parties would be transported in vehicles of a common type—a light, fast, sturdy, simple, inexpensive vehicle that can be obtained in quantity. Is it unsafe to predict that our next draft army, as well as our future recruits, will have a better knowledge of these two vehicles than of any others, or of almost anything else in the Army?

No argument is needed in proof of the advantages to be gained by reducing from six to two the number of types of vehicles in a single organization. The simplification in training, repair, supply of parts, interchangeability, and reduction in marching complications recommend it to all who have sweated and sworn in operating and maintaining the present organizations.

So much for the howitzer batteries. What can be done to simplify organization of the regimental headquarters batteries and service batteries and the battalion headquarters batteries and combat trains?

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The suggestion to eliminate trucks from the combat train has already been advanced. This is based on the principle that the chief job of the combat train is to act as a rolling reserve of ammunition for the guns. This, more often than not, involves the transport of ammunition to the gun positions by combat train vehicles. Wheeled vehicles do not have such success in this service as do crawlers. It may be contended that the combat trains will, also, under not unusual circumstances, be required to go as far back as the railhead or the refilling point to resupply, in which case the tractors and trailers would be too slow. The retort courteous obviously is that they will be as fast as the horse-drawn caissons, upon which we depend for similar service in the light regiments which fire more ammunition per gun per day. Besides, it will be shown that the proposed ammunition carriers will more than double the number of rounds with the batteries and dispense with the fifth section at the same time.

The passenger cars and light cargo trucks in the headquarters batteries and service battery can and should conform to the types recommended for like service in the howitzer batteries. Cargo transport in the service battery should probably remain by truck. Modern 3-ton, four-wheel-drive trucks or six-wheelers, six-cylindered, with total gear reductions of around 150 to 1, on heavy duty pneumatic or cushion tires, will perform in a manner simply astounding to those who are accustomed to the limitations of our present cargo trucks. If these trucks can be equipped with crawler attachments, they will go almost anywhere with the guns. This applies to the brigade ammunition train too, with the difference that 5-ton, or 7-ton, six-wheelers would prove to be even more advantageous. With capacity loads, these big fellows do not exert appreciably higher unit-ground-pressures than 3-ton four-wheelers; however, they can afford higher pressures because of the expected difference in road conditions to be encountered by them. And they most certainly do cut down the road space required to transport any given tonnage over the highways. A few minutes with pad and pencil will prove that four 7-ton six-wheelers will transport 1000 rounds of 155 mm. ammunition at the same unit-ground-pressures under the tires that are given by ten modern 5-ton four-wheelers, or twenty-five of the

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present issue ammunition trucks. A saving of twenty trucks, forty men and upward of 500 yards in road space. Can we afford to laugh that off?

So much for efficiency. What about economy? Perhaps that can best be indicated by comparing a type organization manned and equipped according to the 1921 tables, with one in accordance with the proposals made here. Table I, column "A" under each heading gives the allowances in men and vehicles now authorized for a war-strength battery; column "B" gives similar items in the proposed battery. The new battery does not need a fifth section, as will be shown later, but an anti-aircraft section has been added.

TABLE I

1	2	3		4		5		6		7	
		Battery Hdqrs. and Detail		Firing Battery		Maintenance Section		Anti-Aircraft Section		Total Battery	
		A	B	A	B	A	B	A	B	A	B
1	Captain	1	1							1	1
2	1st Lieuts.			1	1					1	1
3	2nd Lieuts.	1	1	1			1(a)			2	2
4	Total Commissioned	2	2	2	1		1			4	4
5	1st Sergeant	1	1							1	1
6	Staff Sergeants		1(b)			1	1			1	2
7	Sergeants	2	1	5	4	2	2		1	9	9
8	Corporals	8	7	10	8		2(c)		2	18	19
9	Pvts. and Pvts. 1st Cl.	23	23	74	47	18	26(d)		6	115	102
10	Total Enlisted	34	33	89	59	21	31		9	144	133
11											
12	Car, Motor, 5-Pass.	1	1							1	1
13	Car, Reconnaissance	1								1	0
14	Motorcycles	3		3						6	0
15	Cars, Cross-Country		2		1		3			0	6
16	Caissons			12						12	0
17	Tractors	1	1	11	8	2	6		1	14	16
18	Trailers, Cargo				4	1	3		1	0	8
19	Trucks, 3/4-Ton	1	1							1	1
20	Trucks, 3-Ton					4				4	0
21	Trucks, Repair					1	1			1	1
22	Trucks, Station Wagon		3							0	3
23	Instrument Cart	1								1	0
24	Trailers, Howitzers, etc., common to both (e)									8	8
25	Total Vehicles									49	44

(a)—Motor Officer; (b)—Chief of Detail; (c)—1, Anti-Gas; 1, Motor; (d)—Includes 4 Mechanics (e)—1-AA Trailer; 1-Reel; 1-Water Trailer; 1-Kitchen Trailer; 4 Howitzers; A—Present war-strength organization; B—Proposed organization.

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The proposed arrangement indicates a reduction in men from 144 to 133, a reduction of vehicles from 49 to 44. The decrease in the number of men is effected largely through the elimination of the fifth section. However, it will be noted that some liberties have been taken with the allotment and assignment of personnel in other departments of the battery. The details of the alterations are not shown, for as Kipling says, "that is another story." One of the most remarkable features of the present tables of organization is that whoever makes a critical study of them almost invariably believes that he can set up a better arrangement of the personnel. After setting up his ideal arrangement he generally finds that practical considerations force him back to just about what the tables now contain. The arrangement presented here is not radical, nor ideal. It is merely an attempt to readjust the present allotment of men to a 1930 conception of the requirements of a motorized battery.

A detailed comparison between the ammunition-carrying characteristics of caissons and trailers is presented in Table II. It will be evident that more than twice as many rounds can accompany the guns when four trailers are used than are now provided by twelve caissons. Also, that a fifth section is not required.

TABLE II

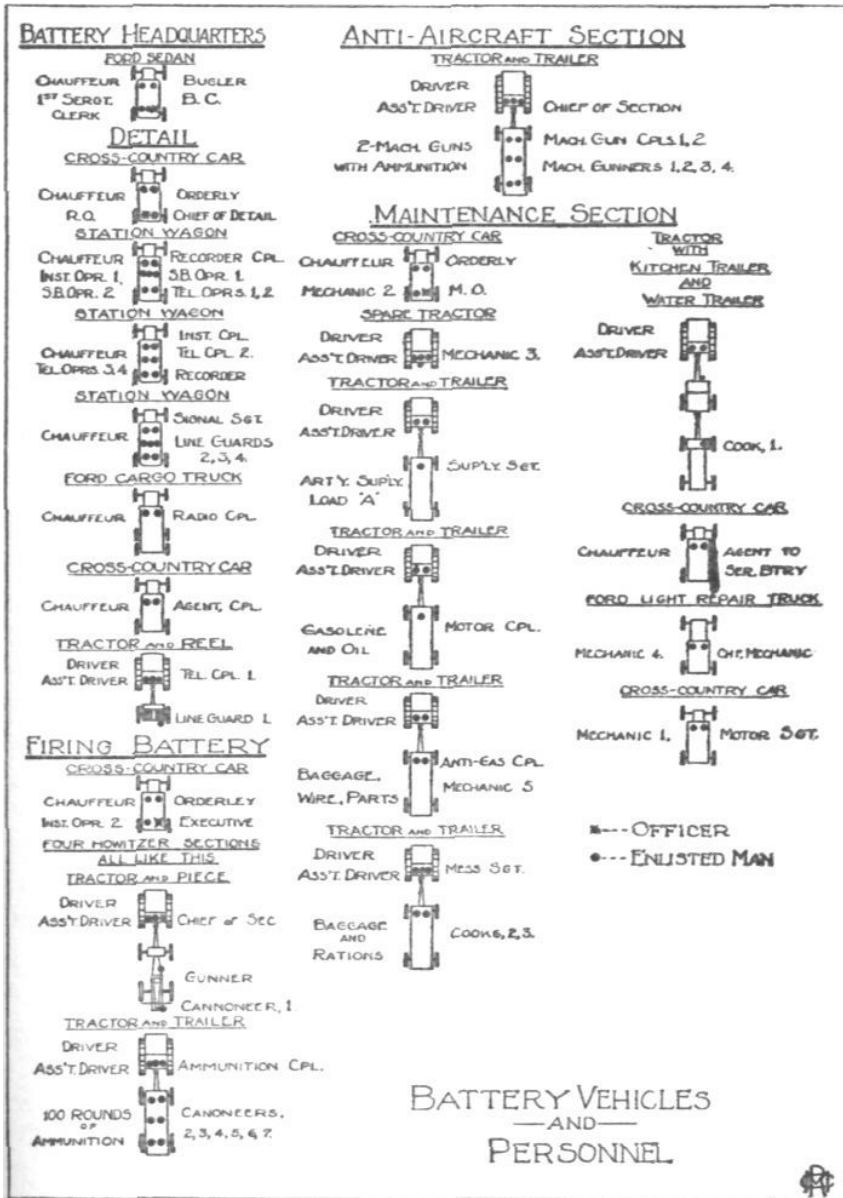
	Two 155 mm Caisson Bodies	6-Ton Trailer Type "K"	5½-Ton Trailer Type "F"
Number of rounds carried	28	*100	95
Weight without equipment, unloaded	4690	2800	5200
Weight of equipment and six men	1164	1064	1064
Weight of ammunition	2940	10500	9880
Total weight behind the tractor	8794	14767	16144
Weight on the ground under a wheel	†2251	3590	4036
Weight per inch of tire width	563	513	504
Total number of rounds with the battery	168	400	380

*63 shells, with 2 inches of space for separators all around each shell, will cover the floor of the body. Shells need not be more than two tiers high for the maximum load.

†Weight on the wheels of the front body is slightly greater than on the wheels of the rear body.

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TABLE III



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TABLE IV
BATTERY

No.	VEHICLES Type	COST OF VEHICLES		
		Present	Proposed	Difference
1	Dodge Car @ \$899.00	899.00		
6	Motorcycles @ \$428.00	2,568.00		
1	White Recon. Car @ \$3,042.00	3,042.00		
1	Dodge Repair Truck @ \$1,648.00	1,648.00		
1	¾-Ton Truck, G.M.C. @ \$1,460.00	1,460.00		
4	3-Ton Trucks, F.W.D. @ \$3,503.00	14,012.00		
12	Caisson Bodies @ \$1,500.00	18,000.00		
14	5-Ton Tractors @ \$6,751.00	94,514.00		
		\$136,143.00		
1	Ford Sedan @ \$720		720.00	
6	Ford Cross-Country Cars @ \$550.00		3,300.00	
1	Ford Truck (Repair) @ \$568		568.00	
1	Ford Truck (Cargo) @ \$1,300		1,300.00	
16	"30" Tractors @ \$3,662.00		58,592.00	
8	6-Ton Cargo Trailers @ \$975.00		7,800.00	
3	Ford Station Wagons @ \$765.00		2,295.00	
		\$136,143.00	\$74,575.00	\$61,568.00

Table III shows an arrangement of the vehicles, with a distribution of the personnel, in the proposed battery. An instrument cart has not been included. This vehicle is a relic of horse-drawn artillery with no place in a motorized unit. It can be most advantageously replaced by fitting up the vehicles in the battery headquarters and the detail, to carry instruments. The personnel using the instruments will then always have them at hand.

Table IV shows the cost of the present vehicle equipment in the battery, in comparison with that proposed as replacement.

Table V shows that a battalion, two additional batteries, and a battalion headquarters battery, can be supplied with proposed vehicles at the price of one battalion with present equipment.

In Table VI the same types of equipment are listed for the regimental headquarters battery and service battery; comparative costs are shown. Using the proposed vehicles, one regiment two separate battalions, two additional batteries, and one battalion headquarters battery can be supplied with motor vehicles at the cost of one of the present regiments.

From a purely military standpoint it would probably be better to employ 3-ton, or 5-ton cargo trucks in the service battery, in place of the 2-ton Ford six-wheelers. There are plenty of good

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TABLE V
BATTALION HDQRS. BATTERY AND COMBAT TRAIN

No.	Types	VEHICLES		
		Present	Proposed	Difference
HEADQUARTERS BATTERY				
2	Dodge Cars @ \$899.00	\$1,798.00		
2	White Recon. Cars @ \$3,042.00	6,084.00		
5	Motorcycles @ \$428.00	2,140.00		
2	¾-Ton Trucks, G.M.C. @ \$1,460.00	2,920.00		
2	3-Ton Trucks, F.W.D. @ \$3,503.00	7,006.00		
1	5-Ton Tractor @ \$6,751.00	6,751.00		
		\$26,699.00		
2	Ford Sedans @ \$720.00		\$1,440.00	
3	Ford Station Wagons @ \$765.00		2,295.00	
3	Ford Cross-Country Cars @ \$550.00		1,650.00	
5	Ford Trucks, Cargo @ \$1,300.00		6,500.00	
1	"30" Tractor @ \$3,662.00		3,662.00	
		\$26,699.00	\$15,547.00	\$11,152.00
COMBAT TRAIN				
1	Dodge Car	\$899.00		
5	Motorcycles	2,140.00		
1	Dodge Repair Truck	1,648.00		
28	3-Ton Trucks, F.W.D.	98,084.00		
		\$102,771.00		
1	Ford Sedan		\$720.00	
3	Ford Cross-Country Cars		1,650.00	
1	Ford Truck, Repair		568.00	
10	6-Ton Cargo Trailers @ \$975.00		9,750.00	
11	"30" Tractors		40,282.00	
		\$102,771.00	\$52,970.00	\$49,801.00
Total Battalion, including 2 Batteries		\$401,696.00	\$217,667.00	\$184,029.00

arguments either way, which finally hinge on this: road space versus cost. The following table indicates the comparative figures for the service battery:

Vehicle Type	Number	Total Cost	Total Road Space
2-Ton, Ford, sixwheelers	41	\$53,300.00	1107 yards
3-Ton, F.W.D's	27	94,581.00	729 "
5-Ton, Coleman, Walter, Freeman	19	115,000.00 (Approx.)	513 "

If some vehicle is placed in the service battery for cargo transport of a different type than those in the other units of the regiment, the spare parts and maintenance problems are complicated. The idea here has been to make a study of vehicle types that

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would be more economical and efficient than present types. In this respect economy of maintenance can not be forgotten; it is as important as economy of first cost. One sure way to decrease

TABLE VI
REGIMENTAL HDQRS. AND SERVICE BATTERIES

No.	VEHICLES	COST OF VEHICLES		
	Types	Present	Proposed	Difference
HEADQUARTERS BATTERY				
3	Dodge Cars	\$2,697.00		
3	White Recon. Cars	9,126.00		
6	Motorcycles	2,568.00		
1	Dodge Repair Truck.....	1,648.00		
2	¾-Ton Trucks, G.M.C.	2,920.00		
3	3-Ton Trucks, F.W.D	10,509.00		
1	5-Ton Tractor	6,751.00		
3	Ford Sedans		\$2,160.00	
4	Ford Cross-Country Cars		2,200.00	
5	Ford Station Wagons		3,825.00	
1	Ford Truck, Repair		568.00	
6	Ford Trucks, Cargo		7,800.00	
1	"30" Tractor		3,662.00	
		\$36,219.00	\$20,215.00	\$16,004.00
SERVICE BATTERY				
1	Dodge Car	\$899.00		
9	Motorcycles	3,852.00		
1	Dodge Repair Truck	1,648.00		
1	¾-Ton Truck, G.M.C.	1,460.00		
27	3-Ton Trucks, F.W.D.....	94,581.00		
1	Ford Sedan		\$720.00	
5	Ford Cross-Country Cars		2,750.00	
1	Ford Truck, Repair		568.00	
42	Ford Trucks, Cargo		54,600.00	
		\$102,440.00	\$58,638.00	\$43,802.00
Total, Regiment, including 3 Battalions.....		\$1,343,747.00	\$731,854.00	\$611,893.00

maintenance costs in any motor vehicle fleet is to reduce the number of vehicle types.

No authoritative data could be found from which comparisons might be drawn regarding the total operating and maintenance costs of the present and proposed vehicles when engaged in military service.

In the absence of concrete facts, reliance can be placed upon common knowledge for the statement that a regiment composed of Fords and "30" tractors will run a year at less cost than the present regiment, incorporating six distinct types, all of which

REORGANIZATION OF TRACTOR-DRAWN ARTILLERY

TABLE VII
BRIGADE AMMUNITION TRAIN
(Motorized Elements)

VEHICLES		COST OF VEHICLES			
		Present		Proposed	
No.	Types	Train Hdqrs.	Two-Ammn. Batteries	Train Hdqrs.	Two-Ammn. Batteries
3	Dodge Cars	(1) \$899.00	(2) \$1,798.00		
2	Dodge Repair Trucks		3,286.00		
13	Motorcycles	(5) 2,140.00	(8) 3,420.00		
61	3-Ton Trucks, F.W.D.	(3) 10,509.00	(58)203,174.00		
3	Ford Sedans			(1) \$720.00	(2) \$1,440.00
9	Ford Cross-Country Cars			(3) 1,650.00	(6) 3,300.00
2	Ford Trucks, Repair				1,136.00
3	Ford 6-Wheelers			3,900.00	
30	7½-Ton 6-Wheelers @ \$6800.00				204,000.00
		\$13,458.00	\$211,678.00	\$5,670.00	209,876.00
			13,548.00		5,670.00
	Totals		\$225,226.00		\$215,546.00
			215,546.00		
	Difference		\$9,680.00		

COMPARATIVE COSTS AND ROAD SPACE FOR AMMUNITION TRUCKS OF VARIOUS TYPES

No.	Type	Road Space	Cost
58	3-Ton F.W.D. @ \$3,503.00	1566 yds.	\$203,174.00
82	2-Ton Ford, Six-Wheelers @\$1,300.00	2214 "	106,600.00
40	5-Ton Coleman, Walter or Freeman @ \$6,000	1080 "	240,000.00
30	7½-Ton, Six-Wheelers @ \$6,800.00	810 "	204,000.00

individually are more expensive to operate and to maintain, than those replacing them.

As to road space: Allowing 27 yards for trucks, tractors and cars; 20 yards for motorcycles and cross-country cars; 5 yards for trailers; the following is obtained:

	Present Organization	Proposed Organization
Battery	820 yards	795 yards
Battalion headquarters battery	365 "	370 "
Battalion combat train	920 "	470 "
Total, Battalion	2,925 "	2,430 "
Regimental headquarters battery	490 "	525 "
Service battery	1,000 "	1,300 "
Total, Regiment, w/o attached units	10,265 "	10,115 "

Comparative costs and road spaces are tabulated in Table VII for the brigade ammunition train. Here the contention between dollars and road space is very much in evidence for all

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types, except the 7½-ton six-wheelers. These vehicles are almost the ideal for the ammunition train. The inclusion of another vehicle type in the ammunition train has no effect whatever upon the maintenance problems of the regiments, and still leaves the train composed of but two types.

From personal experience in criss-crossing the Fort Sill reservation after ducks in an old Model T Ford, and based upon considerable observation of the Model A in the none too gentle hands of farmers and traveling salesmen, the author is convinced that he would be content to command an organization with the inherent marching ability of those proposed here. He is most certain that he would rather pay for it (if possible) than for a similar organization with the present equipment.



CONFEDERATES DRAGGING GUN UP KENESAW MOUNTAIN TO OPPOSE
SHERMAN'S ADVANCE TO ATLANTA

RADIO COMMUNICATIONS TO AND FROM AIRPLANES

BY CAPT. FRED G. BORDEN, SIGNAL CORPS*

RADIO was used more or less successfully between airplanes in flight during the war, and the question as to why no apparent progress is being made in the development of communications along these lines is pertinent. The lack of progress is due to many causes, most of which are technical; therefore, it seems proper to discuss briefly some elementary characteristics and limitations of radio.

GENERAL CONSIDERATIONS

There are five elements necessary to transmit a radio signal from one point to another. These are (1) apparatus capable of creating an alternating current of electricity of high frequency; (2) apparatus to carry this current to the conducting medium; (3) a conducting medium; (4) apparatus capable of collecting the current from the conducting medium and carrying it to the receiving set; (5) apparatus to modify in some way this high-frequency current to bring it within audible range. Of the five elements mentioned, the first and last offer no difficulties. In other words, the radio transmitting set and the radio receiving set, unless unduly restricted as to size and weight, have now been perfected to such an extent as to give performance comparable to that of any other method of electrical signaling. The fourth element—the receiving antenna—offers no difficulty whatsoever. A readable signal from thousands of miles away can be received by an antenna 2 or 3 feet square, and it is therefore evident that failure to perfect radio communications from airplanes is due to two of our elements—the second and the third, *i. e.*, the transmitting antenna and the conducting medium, the latter an element of which we know little, over which we have no control, and which we call ether.

It has been brought out that radio is an alternating current of electricity of high frequency. By an alternating current we mean

[*THE FIELD ARTILLERY JOURNAL desires to express its thanks to the Signal Corps Bulletin, as well as to the author, for valuable assistance in the preparation of this article.—Editor].

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one which, starting at zero, attains maximum positive potential, falls through zero to maximum negative potential, and returns to zero. These changes are periodical and the value of the potentials from one fraction of a second to another form a sine wave and the entire change is known as a cycle. The distance between corresponding points of adjacent waves is the wave length and the number of times per second that the complete change occurs—or the cycles per second—is the frequency. There is, of course, a definite relation between wave length and frequency. Radio travels at the speed of light, which is 186,000 miles, or 300,000,000 meters, per second; therefore, frequency equals 300,000,000 divided by wave length in meters, or conversely wave length equals 300,000,000 divided by frequency. The frequencies used in radio are very high, from about 100,000 to 30,000,000 cycles per second. The human ear has a range of from 20 to 20,000 cycles per second. Radio sets using wave lengths of from 10 to about 100 meters are known as high-frequency sets; from about 100 to 1,000 or 2,000 meters, intermediate frequency; and above that as low-frequency sets. The high and intermediate frequencies only are used in airplane sets.

THE TRANSMITTING ANTENNA

Returning to the two principal sources of difficulty in perfecting radio transmission from airplanes, we noted that one was the transmitting antenna. Two types are in use—a weighted wire, which is unreeled to a length of 100 or 200 feet, is called a trailing antenna, and an antenna supported some 4 feet above the wing to a strut near the tail is called a fixed antenna. A transmitting antenna is fairly efficient when its length is about one-fourth of the wave length used, its efficiency dropping rapidly as this length is reduced. Due to the small size of the airplane, it is difficult to build a fixed antenna of more than about 20 feet, or between 6 and 7 meters, which is efficient for wave lengths up to about 30 meters; but due to certain characteristics of such high frequencies, which will be mentioned later, they are not practicable, and experiments indicate that an antenna of this length will not efficiently transmit a radio signal of a frequency which is practicable. The problem is similar to that which would be encountered

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if we tried to use a 12-inch propeller on a 400-horsepower engine.

The problem has been attacked from all angles by the Signal Corps aircraft radio laboratory at Wright Field and by many private concerns, but up to the present results have not been satisfactory. A comparison between a trailing antenna and a fixed antenna using the same transmitting set shows that the trailing antenna will transmit an 80-meter wave about 5 times as far as will a fixed antenna. Due to the difficulty in obtaining proper characteristics as to capacity and inductance of even a trailing antenna, a transmitting set will send readable signals from an airplane only about one-third as far as will the same set on the ground; therefore we can assume that, other things being equal, a set which will transmit a signal 75 miles when used as a ground set will transmit only something like 5 miles from a plane using a fixed antenna. Trailing antennæ can be used more or less satisfactorily on observation airplanes and on bombers. On pursuit airplanes, which dive at full throttle, loop and roll, a trailing antenna can not be used, nor can it be used on an attack plane, which not only maneuvers rapidly, but also flies just over the tree tops, fences, and other obstructions. On these two types fixed antennæ are necessary. That the problem of transmitting satisfactory radio signals by means of a small fixed antenna will eventually be solved goes without saying, but up to the present it has presented one of the most difficult problems in the art of radio.

THE CONDUCTING MEDIUM—ETHER

Let us now consider the third element necessary to the transmission of radio signals—the conducting medium, or ether. We know nothing about the ether, even that it exists, but since there must be something that conducts radio signals, we assume that it has certain characteristics and that it permeates all space and all substances, and we call it ether. The transmission of radio waves is but little understood. For example, a high-frequency wave of 40 meters will be heard distinctly at a distance of perhaps 10 miles, can not be picked up again within a distance of two or three hundred miles, and can be easily read at a distance of several thousand miles. This dead space varies from day to

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day and even from minute to minute and is called the skip distance. The tendency of high-frequency signals toward phenomena of this kind render them very difficult to properly control. Using waves of any frequencies within the high or intermediate bands, many phenomena which have not been satisfactorily explained will be noted. For example, the same transmitting set will send a readable signal about three times as far at night as it will in the daytime, and about three times as far in winter as in summer. Now let us compare the range of a transmitting set in an airplane under unfavorable conditions (and it will have to operate under unfavorable conditions at times) to the range of a similar set on the ground on a winter night. The set which will transmit signals only 5 miles from a fixed antenna in an airplane will transmit around 600 or 700 miles from a ground set on a winter night. This is the range of a pretty good broadcasting station, which will weigh in the neighborhood of half a ton and occupy a space about the size of a fuselage. To obtain a range of 15 miles from a pursuit plane, we must design a set about three times as powerful as our broadcasting station, and which will weigh complete around 75 to 100 pounds, while occupying a space of less than one cubic foot.

The problem seems difficult of solution, but we have progressed a long way and it is only a matter of intelligent experimentation and time until it will be completely solved. As an example of what is being done we will mention one phase, that of supplying current to a radio set by means of a new engine-driven, double-voltage generator developed by the Signal Corps aircraft radio laboratory. The set operates little or no differently than when using batteries and other equipment, and the saving in weight over airplane sets as at present installed is as follows: Bombardment, 190 pounds; observation, 41 pounds; pursuit, 30 pounds. The generator set in the pursuit plane also furnishes current for gun synchronization, for heating element in clothing, etc.

DELICACY

Radio is a laboratory product and has characteristics more closely allied to laboratory equipment than to a simple, portable piece of apparatus which can be used by anyone who can turn a

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dial. Its extreme delicacy is not generally realized. For example, the energy required to raise the temperature of a teaspoonful of water 1° is sufficient to maintain an audible note in an ordinary radio head set for several thousand years. The human voice—the only available means with which to modulate the wave used for radiotelegraphy—has a power equal to twenty-five millionths of a watt. A change in distance of one-thousandth of an inch between plates of fixed condensers, commonly used in radio sets, will change the frequency of the set by thousands of cycles. It is not surprising, therefore, that radio sets are complicated and require skillful operation, but it is almost a miracle that they operate at all.

CHARACTERISTICS AND USES

Before we can arbitrarily decide as to the kind of radio equipment best suited for various classes of aviation, it will be necessary to study the problem from two angles: First, characteristics of radiotelephone and radiotelegraph sets; second, the probable need for communications (*a*) within each class of aviation, (*b*) between various classes, (*c*) between plane and ground, and (*d*) between Army units—both air and ground—and Navy units of all types.

RADIOTELEPHONY VERSUS RADIOTELEGRAPHY

Comparing first, radiotelephony to radiotelegraphy, we can say that except for the single fact that radiotelegraphy requires two skilled operators for each message while telephony does not, that all factors favor telegraphy.

Under the same conditions, a radio set which will transmit a readable continuous wave (cw) telegraph signal for 60 miles using 50 watts, will require about 150 watts to transmit a telephone signal for the same distance. In a frequency band which allows only two radiotelephone sets to operate without interference, we can use 10 or more radiotelegraph sets, and when we consider that a field army has something like 1,200 radio sets, the need for conserving channels is evident. The microphone of the telephone set picks up noise caused by the engine, propeller blast,

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etc., which interferes with transmission of speech. The radiotelegraph is not affected by noise at the transmitting end. A telegraph set is much lighter, smaller, and simpler than a telephone set of the same range. Telegraph signals can be read through static and other interference that would render a telephone set useless. Except in the rare instance when the originator and the addressee are in direct communication, a telegraph message is faster than a telephone message and it is always more accurate. Telegraph is more suitable than is telephony for sending message in code.

In consideration of all of its obvious advantages, we must conclude that except in cases where its use is impossible, radiotelegraphy is far superior to radiotelephony.

In considering the cases where it is, to all intents and purposes, impossible to employ radiotelegraphy we find that in all instances where the pilot must operate the set, radiotelephony must be the agent: A pilot possesses certain faculties developed to a much higher degree than in the average man and other faculties that are not common. It is very probable that there never will be sufficient thoroughly trained pilots, and it is obviously shortsighted to insist that all be telegraph operators. The offensive power of aircraft and of antiaircraft weapons has developed far ahead of the defensive power of aircraft. In other words, we must expect losses of personnel to be much greater in proportion than in the last war, which means that the majority of war-time pilots will be hastily trained in essentials only and there will be no time to teach them codes. Telephony then will be used in communicating between airplanes in formations either of one class or of supported and supporting classes in which it is necessary or desirable for the pilot to operate the set. Any other use for radiotelephony probably will not be encountered because in multiplace ships an expert operator will form one of the crew and he may act as observer, gunner, and bomber as well.

MILITARY USES

Before we can visualize the kind of communication equipment desirable for airplane installation, we must first discuss from a tactical standpoint the probable use of these planes during war.

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It is difficult to conceive of any war against a first-class power that would not, especially at the beginning, require the close cooperation of the Air Service of the Army and of the Navy, and therefore require good communication between the various units of each—not only between those in the air, but also between air elements of each, and terrestrial elements of their own and of the other force. In other words, we must visualize rapid and reliable communication between Army planes and Navy planes; between Army planes and ships, and naval shore establishments; and between naval planes and the headquarters of Army units. These elements may be from a few miles to several hundreds of miles apart and as direct communication will ordinarily be impossible, the only practicable means of communication must be radio. Radio installations in either Army or Navy airplanes which do not take into consideration the necessity of sets being within the same wave-length range as that of the other service would not function, and in war this might be disastrous. All capital ships and the headquarters of the larger Army units are able to transmit and to receive both intermediate and high-frequency signals. Therefore, an airplane radio set which would transmit and receive either one of these frequency bands would be able to communicate with terrestrial units of both services. The high-frequency transmitter is more efficient than is the intermediate frequency transmitter when a short antenna is used; and, as a very short antenna is required for some types of airplanes, high-frequency or short-wave sets will be standard airplane equipment. As the term "short wave" includes all frequencies between, say, 15,000,000 and 3,000,000 cycles, it will be necessary for the two services to cooperate in choosing working frequencies in order to provide for intercommunication.

THE TYPE OF RADIO SET

In considering the type of radio set which would be proper for various kinds of airplanes from a standpoint of allowable size, weight, and simplicity, and which will function properly for the duty required of it, we must come to the following conclusions: (1) The set must be rugged enough to withstand rough take-offs and landings. (2) A radio set must be portable enough

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to permit removal from one plane and installation in another similar plane within the *alert* time—15 minutes. (3) It must have sufficient power to work up to its required range under ordinary atmospheric conditions. (4) Its operation must be as simple as possible and still permit it to fulfill the first three conditions. (5) Its size and weight must be as small as possible consistent with reliable operation.

It must be admitted that the first requirement for any piece of apparatus is that it will work; simplicity and size are secondary. It is therefore impracticable to make any arbitrary decision as to allowable weight of a radio set. It is also impracticable to decide that, since radiotelegraphy requires the employment of skilled operators while radiotelephony does not, the latter is the more desirable means of communication. The problem must be examined from all angles. It is impracticable also to take the position that, since radio communication is not at present entirely satisfactory, no considerable use will be made of it until it is perfected. The problems connected with the design of adequate radio equipment are varied and difficult, and can be solved only by close and willing cooperation between the designer and the user. The following quotation from an address by the Chief Signal Officer is pertinent:

"The trend of development in electric communications leads us to believe that we may look to the future to give us greater speed, greater accuracy, but not great simplicity. I can hold out no promise for foolproof signaling equipment. Each increase in service, each increase in speed and accuracy, and each decrease in weight and bulk brings with it an additional complication in parts and an additional delicacy of operation."

It is believed that radio equipment as at present perfected by the Signal Corps is equal if not superior to that designed by any other agency of any Government, and if properly operated will afford satisfactory communication under usual conditions. It is as impossible to properly operate a radio set with an untrained operator as it would be to operate an airplane by an untrained pilot, and it is a fallacy to expect that a radio set can be developed which will obviate the long and careful training of the operating and maintaining personnel.

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The following conclusions are reached as to the type and range of radio equipment desirable for the four types of aviation: Pursuit—all planes to be equipped with high-frequency receiving sets, capable of being tuned with one hand while wearing heavy gloves and without the necessity of the operator looking at the set while tuning or operating it. Its only controls must be a switch and one dial, the planes of the squadron and flight commanders to be equipped with high-frequency transmitting and receiving telephone sets for command. The receiver must have a wave-length range which will allow it to be tuned to the frequency of the transmitting set of bombardment, attack, and observation aviation for liaison. A fixed antenna must be used—required range under usual conditions, 15 miles. Bombardment—all airplanes to be equipped with intermediate frequency transmitting and receiving combination telegraph and telephone radio sets using trailing antenna; range to ground, 50 miles. Attack—similar to bombardment except range of only 25 miles, using a fixed antenna. Observation—similar to bombardment.

MISTAKEN IDEAS

In considering radio communication there are two ideas which seem to be generally accepted, but which are not true in fact: (1) Possibility of tuning radio sets before taking off and expecting them to communicate in the air. The characteristics of any type of antenna as regards its capacity and inductance—hence, its resonant frequency—is not the same on the ground as in the air; also characteristics of the set itself change with the temperature. Radio sets must be mutually adjusted in the air, which adjustment must be changed at frequent intervals. (2) Possibility of enemy jamming radio communication, especially radiotelegraphy. The amount of apparatus required to do this successfully would be too great to allow of its transportation or probably its use even at a fixed location. Since the strength of a radio signal varies approximately inversely as the square of the distance from the transmitter, the attempt to interfere with even a few of the frequencies available would be unsuccessful, and any attempt

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to cause interference would be much more detrimental to his own radio communication than to that of his opponent.

The average length of life of an airplane in the World War was from 10 to 15 hours. Since 1918 the offensive powers of airplanes have been greatly increased, particularly as regards a realization of correct principles of tactical employment and fire power. While the better performance and greatly increased speed of airplanes have increased their defensive powers, these two factors have added to their offensive powers equally and, since it appears to be impracticable to armor planes, we may state that the offensive has increased much more than the defensive. In addition to this unequal improvement of the defensive as compared to the offensive ability of airplanes, it must be realized that antiaircraft guns and locating and sighting devices have been greatly perfected since the World War.

OBSERVER PERSONNEL

Taking all of these factors into consideration, it is evident that airplanes and, hence, their personnel will have only a very limited expectancy of life in any future war. This affects the subject of communications in two ways: (1) Since the personnel will be frequently replaced, we must expect to see air units fortunate indeed if their squadron commanders and flight commanders are experienced pilots, while other pilots will have only the minimum training necessary. This will require that these commanders have rapid and reliable communication to members of their command. (2) Under many circumstances, it will be necessary to use experienced observers in the rear seat of the plane. These observers must be trained to do well all of the following: To properly operate a radio set, to see objects on the ground and to interpret what they see, to take photographs as required, to fire machine guns and to hit the object at which they fire, and to bomb. The proper instruction and training along these lines will require fully as much time as to train a pilot, but the qualifications of an observer and of a pilot are entirely different. It would appear, therefore, that a policy to train as observers none but qualified pilots should be carefully examined to ascertain whether or not it will furnish qualified

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personnel, in case of a sudden emergency, and also if it will furnish observer replacements as and when necessary.*

TELEPHOTOGRAPHY

Mention must also be made of telephotography. The value of a photograph transmitted by radio from an observation plane to Army headquarters, within a minute or two after exposure, can easily be realized. Telephotography is practical, and the apparatus can be made practicable for use from a military airplane. That the apparatus is complicated can not be denied, but military history shows that no matter how heavy a piece of apparatus may be and no matter how difficult its operation, if it can demonstrate its military value it will be used in war. Again quoting from the address of the Chief Signal Officer: "Not so many years ago a board of United States Army officers solemnly recommended against the adoption of the magazine rifle because it was too complicated and could shoot too fast."

[*The training of observers to spot artillery fire efficiently requires much care, time and coordination. Not only must there be excellent coordination between the observer and the ground as regards the purely technical part of transmitting and receiving radio messages, but much in the way of procedure must be established between observer and batteries. It requires perfect cooperation in order to synchronize the arrival of the projectiles at the target with the observer putting his plane and himself in a position to see the bursts to advantage. The observer must have considerable experience in estimating distances on the ground from various altitudes, and an understanding of the effects of ground slopes and irregularities on the points of burst. He must be able to keep himself oriented as regards the line gun-target no matter what gyrations are made by his plane. He must not lose his firing battery nor his target no matter how many batteries are firing or how many rounds are landing in the target area. He must have a good fundamental knowledge of artillery methods of fire, ammunition, the appearance of bursts, etc., so that, for example, he can distinguish low-order bursts from ricochets, or the fire of the battery he is observing from that of other batteries. There must be an excellent understanding between the artillery observer in the plane and the battery as to assignment of missions, identification of targets, requests for adjustment or for deliveries of fire and of matters regarding codes, coordinates, scales of maps, etc. Pre-arranged signals must be understood by both receiver and sender in order for the radio to give satisfactory results in artillery observation of fire from the air. Not only must the two sets work satisfactorily and together, but the radio air-ground procedure must be satisfactory.—Editor].

CHASING BUBBLES

BY BRIGADIER GENERAL H. M. BUSH, 62d F. A. BRIGADE

AS we glance sorrowfully over this reform-ridden old world and see the things that are being done under the threadbare guise of righteousness, we are convinced that there are persons so full of mistaken zeal that they don't have any room left for good horse sense."—CLYDE D. MOORE.

The above thought brings rather forcibly to mind the multitude of miscellaneous subjects which some more or less experienced, active-minded and usually intelligent officers are so often bringing up. They are frequently asking permission to try out something, or writing articles, fluently and often quite ingenuously advocating innovations or improvements involving everything from basic changes in Training Regulations to the adoption of contraptions and devices, some of merit and some quite doubtful, but all and several totally untried or still insufficiently proven as to practical use.

These individuals are prone to argue that the Infantry is busy adding this and that weapon, changing and rearranging their organization, and their active, mercuric minds get the idea that the Field Artillery is dead from the top down and is really going backward unless their pet revolution is at once given a trial. Most of these officers do not stop to consider that even if a change is adopted, it takes a long time before anything very radical can be accomplished, and that methods must remain *in situ* until the change is complete. They often are unaware that their brand new idea has been tried out and discarded long ago and they are hard to convince that time-tried basic methods change very slowly, and rather by development than by revolution. Germany knew years before the World War that their 77's were inferior to the French 75's, but they weighed the elements entering into any change, and went into the conflict ready to compensate for the handicap and eventually to overcome it. The American tendency (now in a considerable measure discredited) to immediately adopt an article or device because it is new or novel, or to start its manufacture in quantity, often selling an issue of nice looking stock first, before it has been given anything

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more than a good laboratory test, is well known. A few of our largest manufacturers had pages of red ink before they really knew whether their production would stand up under average usage and conditions. The writer has had the experience of seeing devices, sponsored by leading engineering concerns, put on the market and after a few months of field usage so modified that the product had few of the original "selling points." Even Henry Ford has had his difficulties after getting his Model "A" on the market.

New ideas and devices are being developed and either offered to leading manufacturers or granted patents in an unending stream. General Motors has a special committee of experts whose duty it is to examine everything that is offered them, but few of the inventions pass into the trial stage. A Federal patent does not mean that the article or device is commercially practical; it simply means that no one else has registered the device and that some one's brain-storm has evolved something that comes within the provision of the law. The truth of the matter is that, in very many branches of industry the results of careful, long continued experiment and research by numbers of real experts remain locked up in the vaults of great concerns until such time as they can be used successfully and economically in the replacement of worn-out apparatus or to meet some new phase of competition or demand.

Every war has produced some development in weapons and materials. But it is doubtful if the battle of Arbela would have been any more decisive if Alexander had had machine guns or that Cannae would have been any more disastrous to the Romans if Hannibal had had tanks.

Every period of peace has seen the manufacture, on paper or for test, of new engines of destruction; but when the basic requirements of the battlefield have to be met in earnest there is a stripping off of encumbrances and a getting down to basics that can be readily taught.

It might be answered that this is a mechanical age and practically all our possible soldier material is familiar with machinery, that all boys and most men can drive a car or rig a radio. But how many of them attempt to keep their machines in repair

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except for very minor difficulties? In time of war the mechanics are going to be needed in the factories and will be kept there despite your calling for them. (If you get them on requisition you will get the "gold bricks").

What warrant is there for the idea that basic conditions have been so changed that it is not worth while to study one's Training Regulations forwards and backwards and polish up on the technical and tactical handling of the basic units (battery, battalion).

One of the worst mistakes one of our best general officers made during the war training period was to assume at the very outset that what the old-time field artillerymen he had under him knew was out of date and useless, and to avoid, for a few weeks at least, the full utilization of their basic knowledge.

This is the mistake that appears to govern the ideas and expressions of some of these visionaries today. They are so obsessed with what is being done in the laboratories and on the proving grounds, that they forget that there is always a marked difference between proving-ground error and field error and that while the laboratory may determine, for instance, that an infinitesimal amount of a certain gas will kill an extraordinary number of persons, it takes literally tons of the same gas to produce the effects in the field. As the result of their star gazing they overlook the hard fact that whatever results are obtained experimentally, or even before the most exacting of boards, the apparatus being tested is in the hands of specially trained, handpicked men and the results they give are not the same as results obtained with the ordinary "run-of-mine" soldier.

A year ago there was quite a lot of interest and a great deal of prophecy in engineering circles concerning a new product from Germany, that land of research and laboratories, called Tungsten-Carbide. It was going to revolutionize machine tool practice and send high carbon steel into the limbo of forgotten things. In December, 1929, comes the report of the "Machine Shop Practice Division of The American Society of Mechanical Engineers which says: "It has not done so."

Follow if you will the usually gullible daily press and read their "near science" items or their small town columns and you

CHASING BUBBLES

can get some estimate of the number of revolutions that just don't revolute.

It will be argued that, unless we examine and explore all of the latest implements, devices, trends and hypothetical ideas; experiment, test, speculate and give each and every one that does well in the laboratory a field try-out; exhaustively discuss each and every speculation, even though more experienced men can recall doing the same thing before, that we are standing still and will surely retrograde. All such matters as give a reasonable show of containing something of value, which have not been investigated before, had best be referred to expert technicians. The officers of the line, no matter how far they may have pushed their technical and theoretical education, must qualify as practical experts in the fundamentals; then, with all their qualifications behind them, either transfer over to the technical staffs, or confine their activities and knowledge to the teaching of others in these same basic fundamentals, to the end that the human machines they control may be efficient in the handling of what they have, and not what they may receive in the distant future.

It has been noted that the attitude of mind of the commander insensibly transmits itself to his subordinates. It is therefore extremely dangerous to use one's command as a laboratory. Having tried it once or twice the writer speaks from experience.

Possibly the most common error that officers fall into once they have been well bitten by the "advanced thought" or "latest development" bug, is instantly to imagine that the particular matter which obsesses them is highly controversial, and they immediately proceed to discuss it at all times and places, write letters and even articles on it and then they develop tremendous peevishness if they meet with a cold reception. Diagnosis of the disease often reveals that it is very similar to that suffered by a certain type of inventor and some others of the "distant visioned intelligentsia" to wit:—An almost complete intellectual void as far as absolutely basic and practical realities are concerned.

To attempt to catalogue all of the numerous and sundry "bright ideas" that have been thrust upon the writer's attention in the past twenty-five years would take too much space. Roughly they divide themselves into two classes:—

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(a) The so-called "trends" and developments in the handling of the Field Artillery.

(b) "Revolutionary" changes due to one or more of the several mechanical devices which are being constantly urged or suggested for experiment and adoption.

It would be just as presumptuous for the writer to assume that all of the ideas which are now being actively experimented with are or will prove useless, as it is for the hair trigger visionaries to conclude that they will be adopted and will revolutionize everything.

Undoubtedly there may be occasions when the "Flying B. C." will be of considerable value; but until the numerous *ifs* and *ands* are satisfactorily answered these occasions will not be numerous. Suffice it to say that the battery commander whose mind is in the clouds (air) will never have his ground organization in the best shape. The same applies to battalion, regiment, and, for good measure, to the brigade.

We are living in an age of great mechanical development and our mechanical means of transportation are wonderfully developed; but the movement for and the building of heavy metalled highways has been a part of this development. The writer hesitates, therefore, when it is proposed to eliminate the horse from use in the field and substitute mechanical transportation, to agree.

If the various officers, line, field and staff are properly grounded in the basic principles of their arm, know their duties and are required to function in their proper and assigned places, the minor differences in dispositions to meet changing conditions will be accomplished without difficulty. If, on the other hand, all efforts have been concentrated in making mechanical or tactical experts of each and every officer, to the neglect of the basic requirements of his own arm and the building up of the human machine, then there will be disappointment and failure and no special courses of last-minute study will put the machine together and insure its proper working. It seems to the writer that there is a tendency to worry at the Tactical and Mechanical Gnats; while the basic Training, Organization and Coordination Elephants are forgotten.

HIGH BURST RANGING

BY 1st LIEUT. E. L. SIEBERT, F. A.

DRAWINGS BY 2d LIEUT. E. PARMLEY III, F. A.

[The author, who is an instructor in Gunnery at the Field Artillery School, here answers a request for an understandable explanation of a matter which has not been entirely clear in many minds. By means of a map problem he shows how high burst ranging can be used by employing only our regular Field Artillery instruments and the simple, practical methods now in use at the Field Artillery School.—EDITOR].

THE Reds have effected a surprise landing on the New Jersey Coast and have split into two groups of about equal strength. One group is investing New York City while the other is making a dash for Washington. Opposing this latter force (estimated as four infantry divisions) is a hastily assembled force consisting of the 28th Division, 29th Division and a provisional division of Regular Army troops from the 3rd Corps Area.

You are Major 1st Bn.—F.A. (75 HD). Your battalion has just been rushed by rail to Muirkirk, Md., to reenforce the artillery brigade supporting the provisional division.

The Regular Army Division, with the 28th Division on its right and the 29th on its left, is deployed for defense along the Patuxent River from about the 380 Y-grid line to the 385 Y-grid line, NW of Laurel. Your infantry has an outpost line holding the edge of the woods just north of the river.

While your Battalion Executive supervises the detraining and assembling of your battalion, you and your Captain S3 and Lt. S2 report to the CG 1st FA Brigade at a farmhouse near Contee for orders, arriving there at about noon. The Brigade S3 gives you your orders verbally, approximately as follows (handing you at the time a sheaf of USGS 1:62500 maps of the Laurel Quadrangle,* these being the only type available):

"The situation is as follows—etc.

"It is believed that the enemy will attack tomorrow at daylight in an attempt to penetrate our position with tanks along the Columbia Pike.

"This division will hold its present position with a view to counter-attacking strongly in the vicinity of RJ 408 (SE of Scaggsville) when the opportunity presents itself.

*See map on page 167

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"Your battalion will be in general support directly under orders of this brigade.

"Put your battalion in position in this area (draws an oval on the map) via this route (draws on map).

"You will be responsible for these normal and emergency barrages and these concentrations (gives you an overlay). Barrages and concentrations to be fired on call from this CP any time after 8 p. m. tonight. When not employed on these defensive fires, you will be prepared to fire harassing and interdiction missions to be assigned you from here, based on Air Corps reports and photographs. This means that when you get a mission that gives you—

"a. Coordinates of a target,

"b. Nature of target,

"c. Rounds to be fired.

"d. Time to be fired, probably, *at once*,

"you must be able to bring effective fire to bear within a few minutes after the call.

"Quite naturally most of these missions will be fairly long range, 4000-7000 yards, and will be unobserved.

"You may register before dark.

"Attract as little attention as possible."

Then follow data covering ammunition, signal communications, etc., and finally, he tells you where the brigade CP will be and tells you to report your OP and CP locations.

He then hands you, last but far from least, a list of the grid coordinates and elevations of a number of accurately located points on the USGS maps that you have. These coordinates have been converted from latitude and longitude by the Corps of Engineers and furnished to the troops along with the map. You note that your maps have little red lines along the margins showing where to draw in a 5000-yard grid and how to number it.

Being satisfied that you understand your instructions and that your two staff officers have made the necessary notes, you hurry back to your battalion and set it in motion on the proper road toward its position, under the command of your executive. You assemble your party and the BCs and their parties at the head of the column and "go forward on reconnaissance." Time about 1 p. m. You issue each BC a couple of copies of the USGS

HIGH BURST RANGING

map and give each a copy of the list of coordinates of control points.

Upon your arrival at the battalion area you select the RJ 359 ridge as a suitable area for OPs and the south slope of this ridge as suitable for battery positions (see map).

You allot each BC his gun position area and a general location for his OP. You pick your OP and have B Btry's OP with you. You designate the battalion reference point, the battery sectors, and the minimum range line and have the BCs go ahead with the process of getting their batteries into position. The limbers, combat train, kitchens, etc., to be on the unimproved road about 900 yards south of the line of batteries.

C Btry's OP is near the road bend 400 yards NE of RJ 400. The Bn and B Btry OPs are together 500 yards west of RJ 359. A Btry's OP is in a farmhouse attic, 200 yards east of RJ 359. The battery positions are in the order ABC from east to west from RJ 359 west about 800 yards (see sketch).

Your S3 gets to work dividing the defensive fires among the batteries. The normal barrages cover enemy approaches just south of Scaggsville, while the emergency barrages cover approaches near the church at RJ 408. The defensive concentrations are in the same general area.

The rest of your staff goes about their normal activities, making arrangements for communications, information, supplies, ammunition, care of casualties, etc.

The battalion is in position and ready to fire at 2:30 p. m.

Now to the strictly technical aspects of the problem.

You have from your OPs good observation along the Scaggsville—RJ 408 ridge. Your sector extends from RJ 438 at Scaggsville—SE to RJ 334. This ridge, however, with its patches of woods here and there obscures practically all the terrain to the north. This means that you can observe gun ranges up to about 3000-yards only. Your defensive fires will be visible. Your harassing and interdiction missions, however, will probably be on the stream crossings of the Hammond Branch and the Middle Patuxent River or at ranges from 4000-7000 yards. You are required to bring unobserved fire to bear on targets at any of these ranges.

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You decide that you cannot rely on getting a meteorological message.*

You *can* register near Scaggsville before dark, but a K for 3000 yards is only of use for your defensive fires at short ranges. This K is of little use for firing beyond 4000 yards. In fact a K must be for a range not differing by more than 25-30 per cent from the range to be used for later firing.

Now before you worry further about the long range fires you should clear up the question of the defensive fires. Throughout the night you must be prepared to deliver accurate fire on your barrage lines. A week or so ago in anticipation of active service you calibrated your whole battalion, so that a K found by one gun might be applied to the whole battalion. When you register you decide to compare the powder lots of your shrapnel and shell. After you have done that you can establish a K equally well with shell or shrapnel and fire for effect with either by applying the appropriate correction.

In order to get map data to which to apply your K corrections, you must locate your batteries and OPs and base points on a map or firing chart.

You order your Bn RO to start a 1/20,000 firing chart based on the map. He numbers this 1/20,000 grid sheet to correspond to the grid on the USGS 1/62,500 map. He plots on this grid (from the furnished list of coordinates) a number of control points and by a resection or traverse establishes his position on the firing chart. This can be done with surprising accuracy. A careful experienced man can on the average with issue equipment get his location to within 5 yards on the 1/20,000 sheet. Your RO computes the altitude of his position by reading the angle of site to one of the control points whose altitude is given and multiplying this by the range over a thousand. This gives him the amount he is above or below the known altitude.

*The proper furnishing of a meteorological message to artillery troops in a moving situation is, under the present organization, a doubtful proposition. The conditions that must be satisfied are: *a.* A meteorological station within ten miles (at the most). *b.* A weather ceiling of at least 600 feet. *c.* Good wire or radio communication for the prompt broadcasting of the message. *d.* A new message to be sent whenever weather conditions change materially.

If the artillery brigade is given a small meteorological section, as is hoped by many, this matter will be greatly cleared up.

Moreover, to keep a fresh K would be easier and *more accurate* if you could observe registration fire at appropriate ranges.

HIGH BURST RANGING

The Bn RO now assembles the Btry ROs and tells them that the position of his board is the origin point and gives them the coordinates and altitude thereof and the Y-azimuths to a number of control points so that they may declinate their aiming circles.

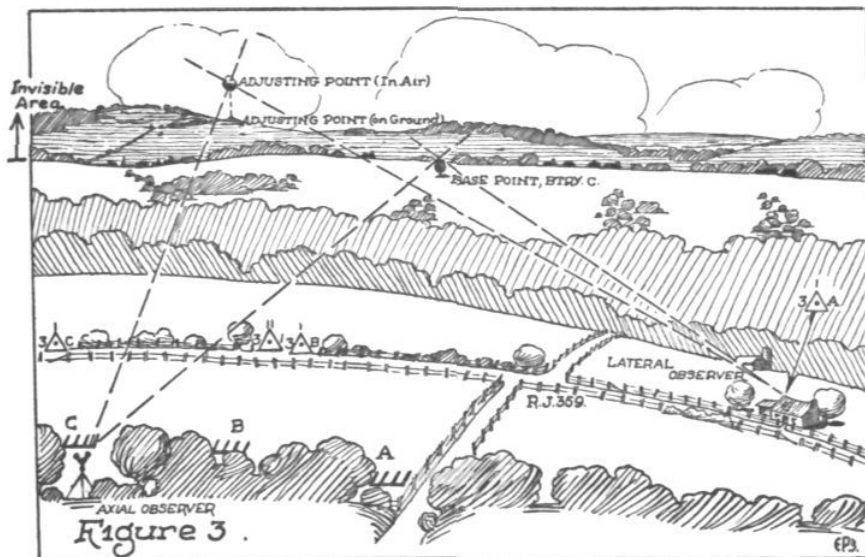
He next runs a traverse to the vicinity of each battery and establishes a place mark at each. He gives each Btry RO the coordinates and altitude of his respective place mark. He also stakes out the battalion orienting line. The Btry ROs, starting from their own place marks, locate their guns and OPs. The Bn RO locates the Bn OP. Base points for each battery are designated by the Bn CO and a Y-azimuth to each is read from all the OPS. The exchange of this information allows each RO to have his base point plotted with very satisfactory accuracy, and allows the Bn RO to have on his board the entire battalion layout, *i. e.*, all the batteries, the orienting line, the OPs and base points.* Time consumed about two hours. It is now 4:30 p. m. From now until dark (7 p.m.) you will be engaged in hauling up extra ammunition, perfecting camouflage, organizing antiaircraft defense, sentinel posts, digging shelters, etc., all with due precaution against enemy ground, airplane and balloon observation.

You authorize A and B batteries to fire 3 rounds each with one gun to get base deflections, and C battery is authorized to fire with one gun not more than 15 rounds of shell and 10 rounds of shrapnel to establish a K and a velocity (V) correction in foot seconds for shell and shrapnel. This K may be used by the entire battalion, because the battalion has been calibrated as mentioned above. Thus by the expenditure of not more than about 30 rounds the entire battalion has enough information to fire unobserved fires at short ranges (the base points are at about 3000) and the enemy's opportunity to locate your organizations has been reduced to a minimum. As time goes on, however, the weather will change so much that your K becomes of little value

*The National Guard and Reserve Battery Officers' Class (Fall 1929), at The Field Artillery School, composed almost entirely of officers without surveying experience determined gun data for a battalion in this manner, many of the group getting deflection and site to within a mil or two and the range to within ten or fifteen yards. A K was established by registration and transfers made to several other targets. In three out of four cases the transfers resulted in mixed or bracketing salvos.

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and it will be necessary to establish a new one. This will be true at least every three hours or oftener if the weather changes suddenly. This puts you in rather a hole as nightfall is not far off. You solve that difficulty by arranging for C Battery to register one gun on its base point at 8 p.m., 11 p.m., etc. This can be done after dark by using a lateral observer at another battery's OP to sense for range. See drawing. An observer at A Battery's OP (800 yards to right)



BATTALION AREA LOOKING NORTH (AS VIEWED FROM AIR)

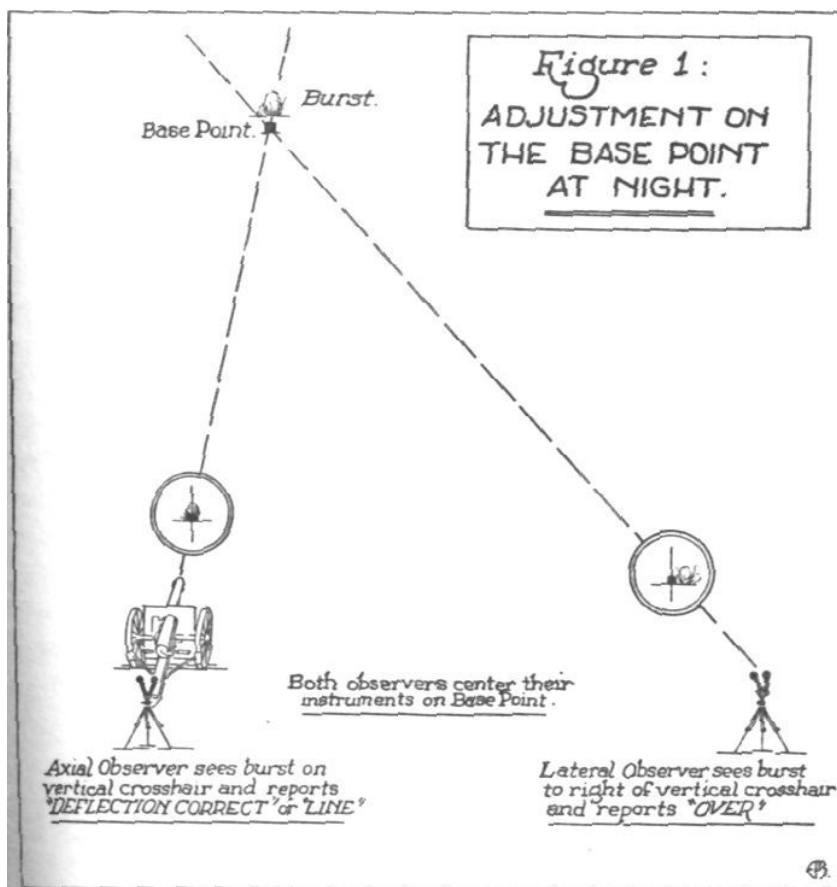
directs his instrument at C Battery's base point. The C Battery OP observer gives deflection sensings and the A Battery observer gives range sensings, rights are overs and lefts are short. As the initial data to check the K is very good, 8 rounds should be enough to fire each time. As shell is hard to see at night, shrapnel with low air-burst (zero corrector) is used.

Thus you keep on tap a fresh K throughout the night, for all your short range fires. Nevertheless your problems are not all solved, for early in the morning you must be prepared to fire long range unobserved fire at ranges from 4000-7000 yards. The limits of a K transfer of fire make it desirable to get a K at about 5000 yards. Such a K would be applicable to ranges from 3750-6700 yards.

HIGH BURST RANGING

You therefore select a map location at about 5000 yards and decide to register on it next morning before daylight. The RJ 600 yards east of CR 415 is considered suitable.

You furnish an observer at C Btry's *guns* with the necessary information to direct his instrument toward this point and do the same for the lateral observer at A Btry OP. The ground at this point (RJ 600 yards E of CR 415) is not visible from any of your OPs. The lines of sight of the axial and lateral observers intersect



at this point. If you cannot see the adjusting point on the ground you can observe with respect to the cross hairs of both instruments just as you did in getting the short range K at night, except you must adjust on a point vertically above the road junction

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selected. To do this you decide that if the angle of site of the gun and the axial observer are raised to a point 30 mils above the crossroads, both the axial and lateral observers can lay their instruments on this point and see bursts that occur in that vicinity. To elevate the lateral observer's instrument to that point, it is first necessary to determine the actual altitude of this assumed adjusting point and then compute the angle of site of such a point as seen from the lateral OP.*

To see the bursts at the adjusting point (I refer to the one in the air 30m above the RJ) you must use shrapnel. In making a precision adjustment with air bursts it is perhaps simpler to use the range scale and assume a fork equals 100 yards.

You get from the map a gun range of 5100 yards, or a French 75 range setting to start with of about 5000. The angle of site to the RJ is about zero. The added site is 30 mils (to bring the bursts up to where you can see them). The BC of Btry C commands: "No. 1 Adjust BDL 25 Site plus 30 Corrector 40 No. 1, 1 round AMC Without Quadrant 5000."

The lateral observer is told to get ready to observe. When he is ready the BC gives "on the way" and sends to the guns "fire." The axial observer sees the burst as 10 mils right of his crosshairs and 6 mils above. The lateral observer sees it 12 mils right. Each one telephones his observation to the BC. The BC decides to come back 400 yards;† and to bring the burst down near the cross-hair intersection and commands: "Left 10 Down 5 No. 1, 1 rd 4600." This time the axial man reports it "2 left 1 below" and the lateral man reports it "4 left." This is interpreted by the BC to be a "short." He commands therefore "Right 2 4800." The sensings on this round are: The axial observer "Line, 2 above" (deflection correct). The lateral observer "2 left." This is also "short." Therefore the next command is "4900." This is sensed deflection correct, zero height, by the axial observer and 2 right by the lateral man, or 4900 is over. The range bracket is

*It has been found to be advisable also to furnish both observers with the true angle of site reading to some material point in order that they may check the angle of site mechanisms of their instruments.

†This may be computed as follows:

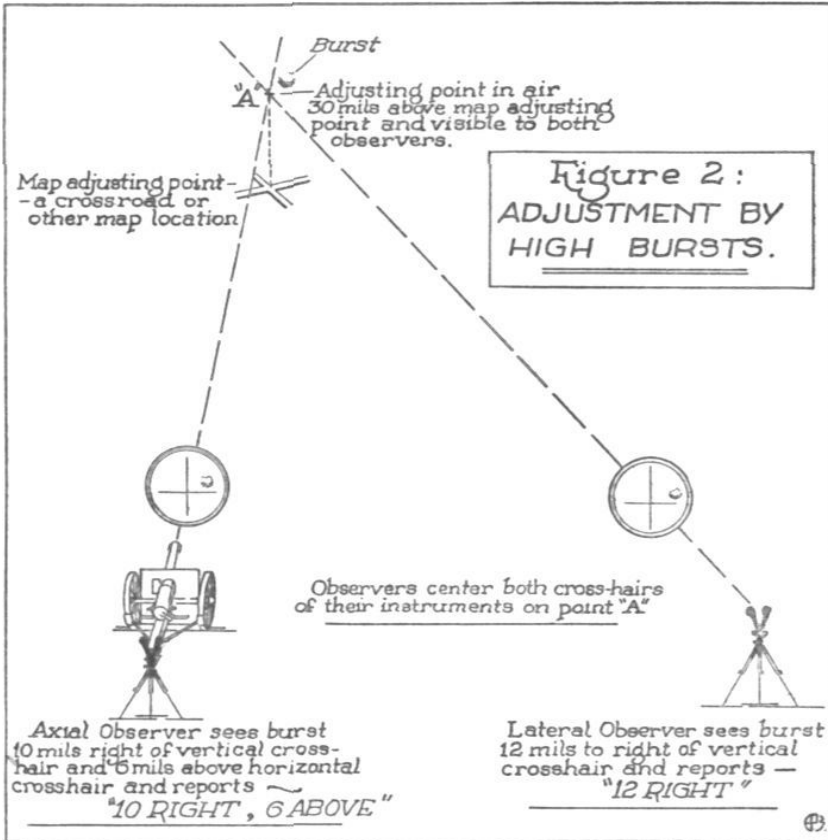
12 mils @ 5000=60 yds. (if the lateral observer were on the flank).

60÷ .2 (for obliquity) =300 yds.

Down 6 (on corrector) = about 100 yds.

The omega table could also be used.

HIGH BURST RANGING



now 4800-4900. The BC commands: "3 rds 4850." By the same system these are sensed by the BC—

Range	HB	
1. over	4 above	}
2. over	zero	
3. short	2 below	
		deflection about correct

Next command is "4850." There are sensed:

4. over	4 above
5. short	2 above
6. over	2 below

The adjustment is ended and you have all the necessary information to compute the K.* This is done as follows: Opening

*If time and ammunition permit, it is advisable to fire six more rounds for effect to get a more accurate indication of the location of the center of impact.

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your Firing Tables 75-B-1 to page 52-53 (shrapnel) and at a range setting of 4850, which equals a gun range of 5031, you see that (column 12) the probable error in range is 19 yards. $4 \times 19 = 76 = 1$ fork. The precision adjustment rule for the determination of the adjusted range is applied and by subtracting the 2 shorts from 4 overs you find that you must change your range $2/12$ or $1/6$ of a fork, $76 \div 6 = 13$ or the adjusted range would be $5031 - 13$ or 5018 (the overs predominate), if the average height of burst for the six rounds for effect had been zero. Average the heights and you get 10 above and 4 below or a net of 6 above $\div 6 =$ average of 1 mil above. Using the same tables (column 5) you find that for a one mil change in elevation you get a range change @ 5000 of about 18.5 or 19 yards. If your HB had been zero, your range would have been 19 yards shorter. Therefore your true adjusted range is $5018 - 19 = 4999$ yards. The map range is 5110 yards.

$$\text{Therefore the K} = \frac{4999}{5110} = .978 \text{ (Shrapnel).}$$

You know that with a gun range of 4999 yards and a properly computed site (zero in this case) you would hit the cross-roads. You had to go left 8 mils from your map deflection to get on. 5 mils of this was due to drift, (see tables) 3 mils to weather effects presumably. Therefore you have a deflection correction of +3.

To apply this information, assume that you are sent, shortly after you have done this "high burst ranging," an order that states:

"*Brig. 6** Large force enemy tanks being unloaded at unimproved road stream crossing over MIDDLE PATUXENT RIVER at (383.450—669.550).

"Fire 300 rds shell at once."

Smith S3."

You order each BC to fire on this mission sending to each these instructions:

"Bn 3 Enemy tanks unloading near unimproved road—stream crossing over MIDDLE PATUXENT RIVER at (383.450—669.550).

"Map K = .978 (Shrap) Deflection correction + 3 mils @ 5000.

*Brig. 6 or Brigade 6 is the designation given this mission so that it may be referred to again by either the sender or receiver with minimum explanation.

HIGH BURST RANGING

"Cover an area 200 yards wide, 400 yards along road.

"Fire 100 rds shell long fuze.

"At once."

Each BC: *a.* Plots the stream crossing on his firing chart (1 minute).

b. Draws in the area to be covered 200×400 yards (1 minute.)

c. Measures the base deflection shift to the near right hand corner of the area, corrects this for difference in drift and applies the deflection correction (1 minute).

d. Measures the map range to the near right hand corner and multiplies this by K and applies a velocity correction for shell. (This last is an unusual refinement) (2 minutes).

e. Computes the number of rounds sweeping and the turns necessary. Decides to fire at such and such ranges or elevations and sends the commands to the battery (2 minutes). Total time from receipt of message to opening of fire=about 8 minutes).

Needless to say your fire is effective, the tank thrust is thwarted, the enemy's attack fails and he withdraws and sails back to Karakhania.

The secret of your success has been the highly complicated and difficult *high burst ranging*. It is, as you can see, a simple registration exactly like an ordinary precision adjustment except (a) you adjust in the air at a known angle of site above a given map location (not usually a target). (b) You have used shrapnel instead of shell. (c) You have used the range scale instead of the quadrant. When you have fired six rounds "for effect" as the last step in the adjustment you have gone through these steps:

a. Computed the adjusted range (regular precision rule).

b. Computed the average height of burst above the cross-hairs during the six rounds for effect.

c. Corrected the adjusted range for the amount the average height of burst is above or below zero.

d. Divided this final adjusted range by the map range and found a K for shrapnel.

To use this K to fire upon a target you apply the regular transfer of fire rules (because it *is* a simple transfer) as shown below:

Having transferred the new target from an air photograph, or having its map location from any source, measure the map shift to

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the target and correct for any difference in drift. Measure the map range to the new target and multiply this by K, and apply any velocity correction known to exist between your shrapnel and shell. Compute the angle of site.

In the narrative example a deflection correction was found because the other two batteries beside the one that did the adjusting did not end up on the adjusting point as did the battery that fired the high bursts.

There are several other practical methods of doing a high burst adjustment—but none more simple in the opinion of the writer than the one described.* For one thing, the adjustment could be done with the quadrant using forks. This requires a cumbersome computation of a fuze range to accompany each elevation change. Again the quadrant may be used making range bounds of multiples of the number of mils necessary to move 100 yards. This makes the fuze range matter simpler, but has no advantage over the use of the range scale, except at the very end, in correcting for HB above or below the adjusting point.

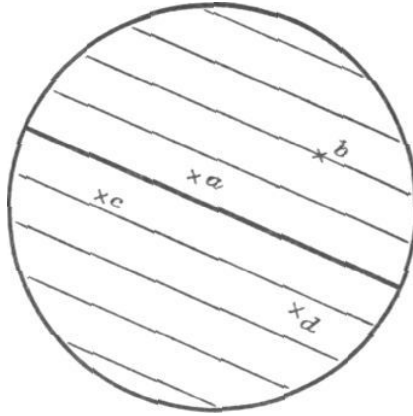
After the completion of an adjustment with the quadrant there are two methods other than the "site" method of the computation of the adjusted horizontal range, viz; the corrector method, wherein you compute the range effect of lowering the height of burst down to the horizontal. The other is the position correction method wherein instead of deducting the site, etc., you compute the range effect of the position of the adjusting point above gun. Where very accurate map locations of your battery, lateral observer, and adjusting point are available, probably the most accurate method is the "tangent reticule" method. The system used in that method is to provide the lateral observer with a special observing instrument which is equipped with a reticule that may be set at any angle. The instrument is directed at the adjusting point and the angle of fall of the trajectory at that point, corrected for the obliquity of the lateral observer's position, is computed. The reticule in the special instrument is set at this computed angle. See figure.

With the observer on the right, bursts appearing above the

*The advantage of this method is greatest when we use a gun whose range scale represents gun ranges, *i. e.* where a list of range settings is unnecessary.

HIGH BURST RANGING

tangent reticule are overs (ex. A and B) and bursts appearing below as C and D are shorts. The advantage of this method is that no record need be made of the height of burst.



The adjusted horizontal gun range may be computed by any of the methods stated above.

The disadvantages are (1) the correction that must be computed for the obliquity (tables may be prepared and used) and (2) the special instrument involved. The French have such an instrument. Several are on hand at our Field Artillery School. The site method using issue BC telescopes for observing is, however, the standard method taught at The School. All methods are discussed in classroom and fired later by committees. Each adjustment is followed by fire for effect. Adjustments are with shrapnel and fire for effect with shell Mk I and Mk IV long or short fuze.

A quick adjustment may be done with high bursts by firing a bracket adjustment with platoon salvos until you split a 100-yd. bracket. At a midpoint of 100-yd. bracket you fire the whole battery. "If a mixed or bracketing salvo is obtained, take this as the adjusted range. If all rounds are in the same sense, fire another salvo at the appropriate limit of the original bracket." (FASN II-VIII).

It is believed that as a general rule divisional artillery will not need any assistance from the corps observation battalion for high burst ranging. One might go farther and say with considerable assurance that seldom will a *battalion* of divisional artillery need

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outside assistance for HB ranging and if it does, it can practically always get in within its own regiment or brigade.

The observation battalion will be used to assist the GPFs and other long range weapons that will require accurately located OPs at considerable distance and lateral displacement from the guns.

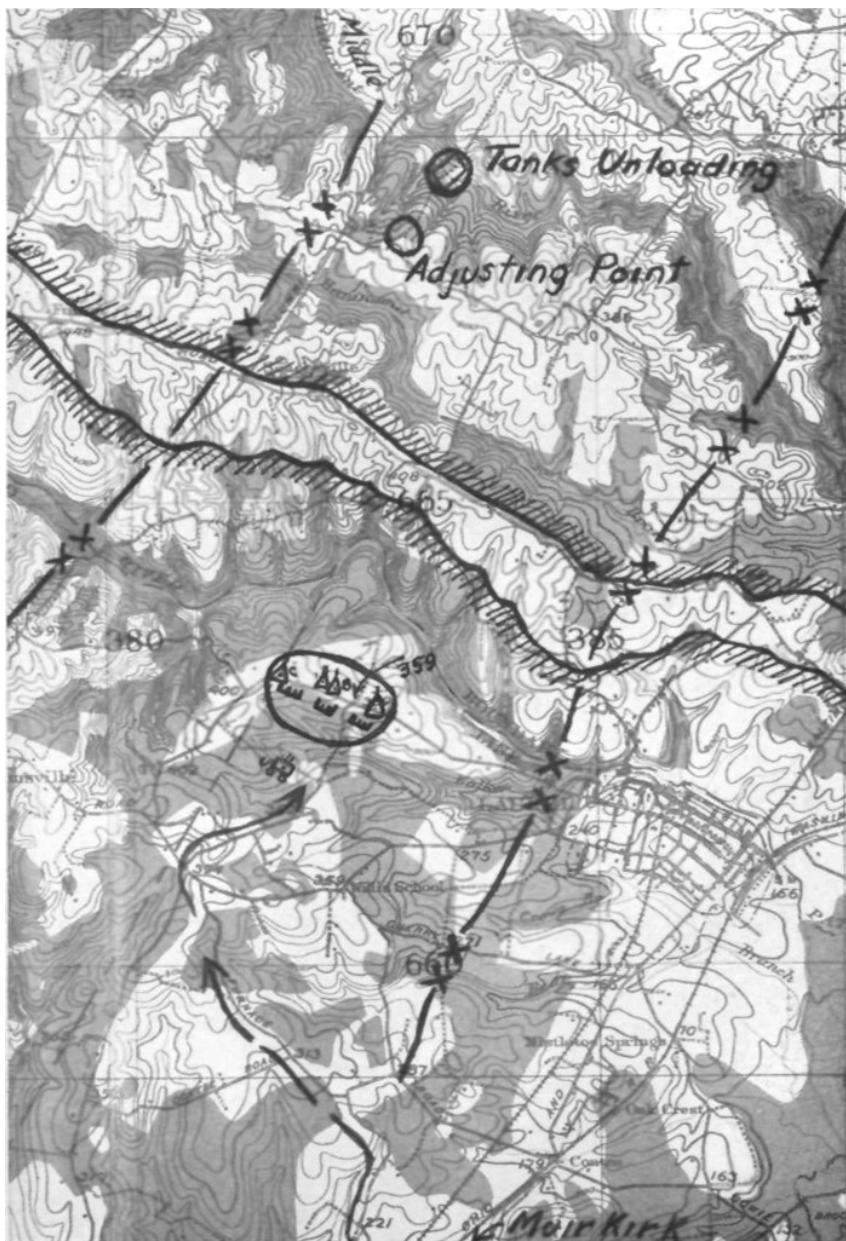
Though the statistical records of The School covering fire for effect after transfers of fire from high burst adjustments were lost in the recent fire, it is the impression of most of the officers here who have witnessed these firings that in over 50 per cent of the cases the fire for effect at the computed range was mixed or bracketing. It is estimated also that in practically every case by firing one fork over and one fork short we included the target. In none of these tests was any correction made of any difference in velocity between shrapnel and shell. All ranges were between 3000-5000 yards.

For a complete treatment of this subject for Light and Medium Artillery see Field Artillery School Notes, Book II, Chapter VIII.



UNION ARTILLERY AT PETERSBURG PROTECTED BY MANTELETS

HIGH BURST RANGING



LAUREL QUADRANGLE
USGS 1/62500; VI = 20 Ft.

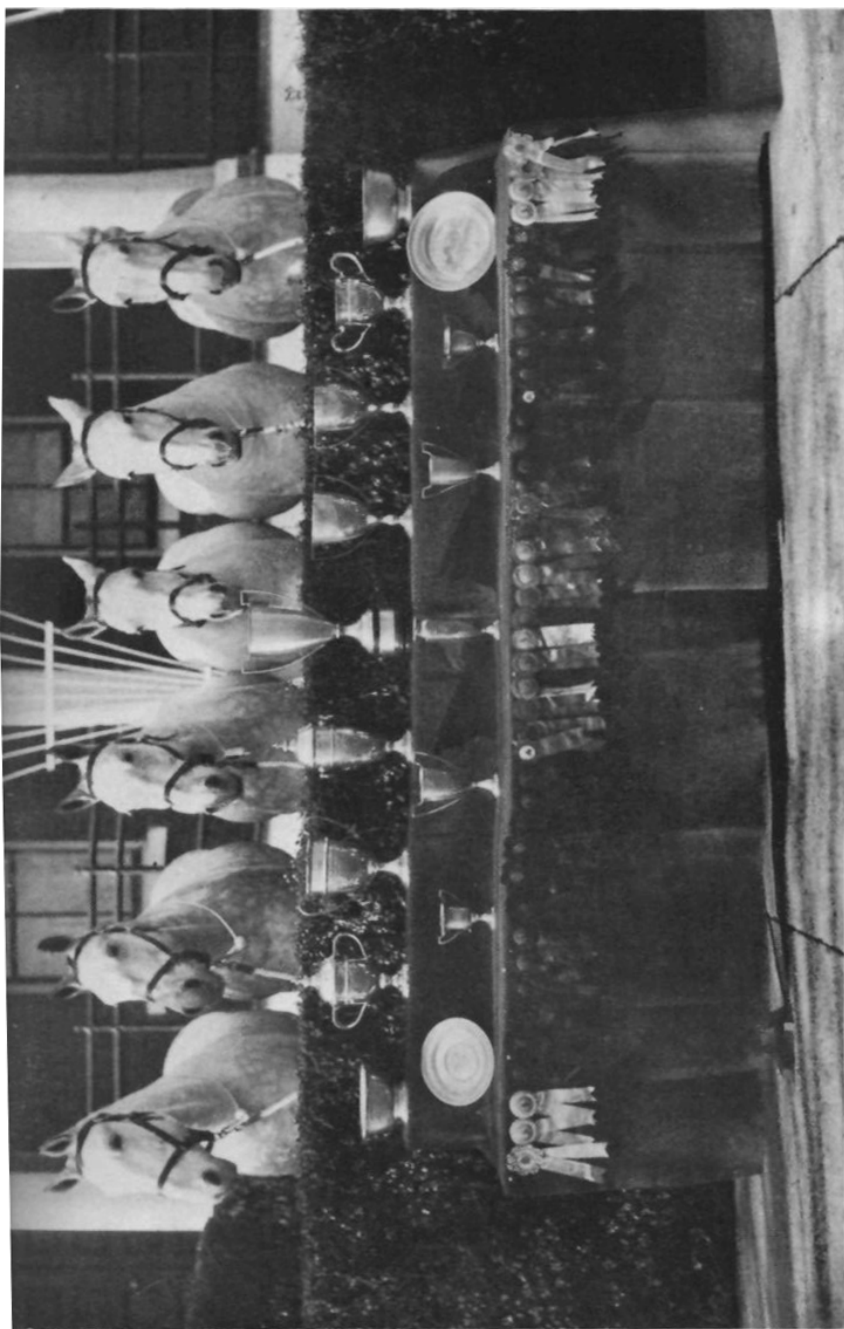
A GRAND ARTILLERY TEAM

IN this unique picture which was made for the Christmas menu of Battery "C," 16th Field Artillery, is seen the Fort Myer Artillery Show Team with the trophies and ribbons it has won. The horses from left to right are, Summerall, McClosky, Menoher, Snow, Berry and Rumbough. They are named after former commanders of the Fort Myer Artillery battalion.

The cups and ribbons were won by the horses individually and as a team in competition at the Army Horse Show, Washington, D. C., Southern Maryland Fair, Marlboro, Maryland, National Capital Horse Show, Washington, D. C., District of Washington Field Day, and the National Horse Show, New York City. Eight of the silver trophies on the top row were won at the National Horse Show at Madison Square Gardens in 1925, 1926, 1927 and 1929 when this team went to New York with the Gray Horse Battery to put on its exhibition torch light riding hall drill. In 1925 and 1929 these horses made a clean sweep of all ribbons in the Artillery horse in hand event. Summerall won the blue ribbon and cup twice. The Chief of Section is Sergeant Thomas M. Rudy and Captain W. H. Maris is Battery Commander.

Four months out of the year this team serves on the caisson for military funerals in Arlington National Cemetery, but during the summer it accompanies the battery on its 250-mile hike to Tobyhanna, Pennsylvania, for summer camp duty. It also marches in all parades with Battery "C." During the last year it has participated in the Innaugural Parade for President Hoover, guard of honor for Prime Minister Ramsey MacDonald of Great Britain, the funeral escort for Secretary of War Good, and Washington's Birthday celebration at Alexandria, Virginia.

A GRAND ARTILLERY TEAM



FIRST SECTION PIECE TEAM OF BATTERY C, 16TH FIELD ARTILLERY
Left to right: Summerall, McClosky, Menoher, Snow, Berry and Rumbough

THE FIELD ARTILLERY UNIT AT ALABAMA POLYTECHNIC INSTITUTE

BY MAJOR J. T. KENNEDY, F. A., P.M.S.&T.

THE Alabama Polytechnic Institute is located at Auburn, Alabama, in the central eastern part of the State, where the climate is mild, and outdoor work can be carried on throughout the entire year. The Institute is one of the Land-grant Colleges established under the Morrill Act of 1862. The State Legislature took advantage of this Federal Act, and in 1872 the college was established on its present basis.

Since its establishment in 1872, Alabama Polytechnic Institute has had military training as a part of its curriculum. In each of the wars in which our country has been involved since its establishment, Auburn has furnished a number of officers who served faithfully and efficiently. It has also furnished many officers to the Regular Army of the United States, of whom General Robert Lee Bullard is the most distinguished. General Robert E. Noble, U. S. Army, retired, is also an alumnus of Auburn and is the President of the Auburn Alumni Association.

ORGANIZATION

Auburn at present maintains R.O.T.C. Units of the Field Artillery and the Engineers. The Field Artillery unit includes about three-fourths of the students taking R.O.T.C., and the Engineers one-fourth. The selection of students for the two branches is more or less arbitrary and is fixed by the courses the students take. The quota of each branch is definitely held at the above ratio. This is found to be a distinct advantage since it avoids undignified propaganda and bickering between the units represented. The total strength of the R.O.T.C. Units, Field Artillery and Engineers, is around 1,150 at the beginning of each school year.

Military training is required of all physically fit students for the first two years, except those who are married or who are over twenty-one years old upon entering college. The advanced course is optional. During the past few years we have always

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SERVICE PRACTICE OF ALABAMA R.O.T.C. UNIT AT FORT BENNING, GA.

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had a good percentage of those eligible elect to take the advanced course work.

For the past ten years until the rating was discontinued, Auburn has received the Distinguished College rating. Since the discontinuance of this rating, it has received the highest rating given by the War Department.

The Field Artillery Unit has a strength at the beginning of each school year of about 850, organized as a Regiment of three battalions of three batteries each. All basic students are Cadet Privates, all first-year advanced course students are Cadet Non-commissioned officers, and all second-year advanced course students are Cadet Commissioned Officers.

At the beginning of the present school year the old issue uniform was discontinued and the unit now has an excellent uniform of good gray cloth. The coat is on the style of the Army Officers' coat, trousers are long, no leggins. Cadet cap is of gray cloth, Pershing style. The uniform is paid for in part by the student, and the remainder by the uniform commutation for basic students—\$7.15 per year, or \$14.30 for the two years. The total cost of the uniform for basic students is about \$35.00. After this year basic and advanced course students will wear the same uniform of cadet gray.

EQUIPMENT

The equipment of the Field Artillery Unit consists primarily of eight 75 mm. guns with caissons, one reel cart, two 5-ton tractors, two F.W.D. trucks, one reconnaissance car, and considerable fire control equipment. We also have seventy public animals. These animals are used indiscriminately for equitation and for draft purposes; about twenty are of the strictly light draft type, while the others more nearly conform to the Cavalry type. The guns and caissons are kept in a wooden gun shed furnished by the college. This is a fairly substantial building, well painted and covered with galvanized iron. We have two stables of the single alley type, of the same construction as the gunsheds. The stables while not permanent, are of excellent design, and entirely suitable for our climate. Each stable has a concrete alley down the center with standings of mixed sand and clay. They are conveniently located to our two outdoor riding halls. These two

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MARCHING THROUGH GEORGIA-ALABAMA R.O.T.C. ON FOUR-DAY PRACTICE MARCH

halls are of approximately standard size, each being 100 feet wide by 270 feet long. The picket line is elevated slightly with a concrete curbing. A heavy chain is used instead of rope. Near the stables and riding halls is a corral.

We have also an outdoor pistol range of nine targets, and an indoor pistol range for five targets. For dismounted drill we use the athletic field in addition to the small drill field which pertains to the Military Department.

For indoor theoretical classroom work regular class rooms are assigned in the various buildings of the college just as they are to any other department.

CREDITS

This institution allows the R.O.T.C. equal credit hour for hour to that allowed for other courses. The total number of credits required for a degree from the institution ranges from 142 to 160 semester hours. This number is the same whether the student takes the R.O.T.C. course or not. The number of credits allowed for each year of the R.O.T.C. course is as follows:

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First year—4 credit hours.

Second year—4 credit hours.

Third year—6 2-3 credit hours.

Fourth year—6 2-3 credit hours.

This gives a total for the four years of 21 1-3 credit hours which is about 14 per cent of the total required toward graduation. One credit hour is allowed per semester for each recitation requiring outside preparation, and one-third credit hour per semester for each laboratory (or drill) hour requiring little or no outside preparation.

COURSES OF INSTRUCTION

The courses of instruction follow generally those prescribed by the War Department, although they are not necessarily given in the same year indicated in the War Department program.

Fundamentally we divide our work as follows:

First year basic—Duties of Cannoneers.

Second year basic—Duties of Drivers

First year advanced—Preparation and Conduct of Fire.

Second year advanced—Tactics, Law, Administration, and Military History.

A student taking the basic Field Artillery course will get in his first year the following subjects: Fundamentals of Military Science, Service of the Piece, Matériel, and a few hours work with the Pistol. The second year basic student will get one semester of Equitation, one half semester of Military Sketching and Map Reading, and one half semester of Signal Communications. The first year advanced course student will receive instruction in Reconnaissance and Occupation of Position, Driving and Draft (Review), and the Preparation and Conduct of Fire. (Artillery Firing). The second year advanced course student has a short course in Drill and Command, a course in Tactical Employment of Field Artillery, Law, Administration, Minor Tactics, and Military History.

It is believed that the above arrangement of courses is fundamentally sound and hard to improve upon. It can be seen that

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the work of the first year advanced course student is arranged with a view to having the student prepared for camp. After arriving at camp, with some review of the duties of cannoneers, use of the detail, driving and draft, the students are ready to go on the range.

CAMP

For the last three years, Field Artillery students from Auburn have attended the required R.O.T.C. camp at Fort Benning, Ga. This is the only Field Artillery Unit that has attended this camp, but there have also been units of Engineer, Ordnance and Signal Corps at the camp including students from Alabama Polytechnic Institute, University of Alabama, Georgia School of Technology, and University of Tennessee. After the 1930 Camp there will be Field Artillery students from the University of Florida in addition to the Field Artillery students from Auburn. It is believed that this will be an advantage to the Auburn students since the idea of competition can be developed.

The number of students taking the camp each year has varied from 90 to 128. This number just about makes a good battery



ARRIVING IN CAMP—FOUR-DAYS MARCH

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organization. The students are organized into a battery in camp, with the officers and non-commissioned officers rotating from day to day. However, the Battery Commanders and First Sergeants are detailed by the week.

The course in camp follows that prescribed by the War Department. The first two weeks after processing are devoted to a review of the duties of the cannoneers, drivers, and members of the battery commanders detail. The Battery is then taken on the range and proceeds with its service practice. Last year we used for the first time the 37 mm. gun, mounted on the regular 75 mm. gun. In view of the shortage of 75 mm. ammunition, this 37 mm. firing proved a real benefit, allowing all students to fire several problems each. Students perform all duties at the firing battery under the supervision of an officer. At the O.P. they are assigned problems in turn as Battery Commander. The students at the O. P. not actually conducting the fire are required to observe the fire and record their sensings and next commands. After the 37 mm. firing we take up firing with the 75 mm. ammunition. Nearly all the students show a keen interest in the service practice, and develop a fair amount of confidence and some skill. Of course the firing is by no means perfect, but for college students who spend only a limited amount of time on their military work in college, it is believed that they do fairly well.

PRACTICE MARCH

Upon the completion of Service Practice the Battery makes a practice march of four days. It is believed that of all military instruction a student receives while taking the R.O.T.C. course none can equal the benefit obtained from this four-day practice march. The students act as officers, non-commissioned officers, drivers, and cannoneers, and B. C. detail. They perform all of the duties incident to the march of a Battery of the Regular Army except cooking. In all of the work of the R.O.T.C. Battery in camp, we are indebted to the 83rd Field Artillery Battalion for their assistance and cooperation. One Battery of horses and equipment of the 83rd is turned over to the R.O.T.C. Battery for use throughout the camp.

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PISTOL

Upon the completion of the four-day practice march, a few days are devoted to firing the prescribed pistol course. A very good percentage of qualifications have been made in this firing.

ATHLETICS AND RECREATION

Throughout the duration of the camp every effort is made to conduct athletics on a fairly large scale. A baseball team is organized and competes with the regular teams of the garrison. In addition tennis and golf tournaments are arranged. We also have indoor baseball, volley ball, quoits, swimming, etc.

A small camp paper is published each year and an effort made to organize a camp orchestra.

A dance is held each week with the cooperation and assistance of the regular garrison, and with the girls of Columbus. These dances are closely supervised and are maintained on a very high plane. They are probably the most enjoyable form of entertainment that the students have in camp.



THE END OF A MARCH CANNONEERS CLEANING CARRIAGES, DRIVERS GROOMING

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A FINE CAMP SITE OF THE AUBURN R. O. T. C.

CAMP ROUTINE

An effort is made to conduct a camp somewhat along the lines of a summer camp at West Point. During working hours of the day bunks are required to be kept in perfect order, tents and streets properly policed and clothing properly arranged. Frequent and strict inspections are made and students given demerits for infractions of the regulations. When a man receives a certain number of demerits, he is deprived of some privileges as punishment.

CEREMONIES

In college as well as in camp frequent ceremonies are held. The R.O.T.C. Unit always has a ceremony at Auburn on Armistice Day, Washington's Birthday, Confederate Memorial Day, and on the occasion of presentation of Reserve commissions. These commissions are always presented by the Governor of Alabama in person on Alumni Day, when we hold what we call Governor's Review.

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SUMMARY

It is well known to the writer that much of the above is familiar to all those officers who have served on R.O.T.C. duty. It is thought, however, that some of them would be interested to know the routine of a unit other than their own, and that those officers who have not had the privilege of serving on R.O.T.C. duty might be glad to know what it is like at Alabama Polytechnic Institute. We have the whole-hearted cooperation of the president of the college and other college administrative officers, as well as members of the faculty in all of our work. This makes the duty very agreeable in addition to being a great help in the conduct of the work. While the discipline of the members of the R.O.T.C. Unit is not perfect by comparison with West Point and other strictly military schools, yet the response to right leadership is splendid, and it is believed that the reserve officers graduated are efficient and capable of performing the duties of a subaltern officer if they keep up their training by correspondence study and occasionally attending the reserve officers' camps.



UNION FORCES TAKING ELKHORN TAVERN, BATTLE OF PEA RIDGE, 1862

WAR BUGS

BEING A WORM'S-EYE VIEW OF THE WAR TO END WAR



BY CHARLES MacARTHUR

Formerly Private Second Class, Battery F, 149th F.A., 42nd (Rainbow) Division, A.E.F.
Pictures by RAYMOND SISLEY, Formerly of Battery C, 149th F. A.

By courtesy of Liberty Magazine

This is the eighth installment of a private's intimate history of his battery's experiences with the Rainbow Division. Their shellfire baptism, how they formed a link in the forty-mile wall of artillery at Champagne. Chateau-Thierry days, the drive on the Ourcq, St. Mihiel—have been told in the preceding installments. In this installment he tells what happened when his battery indulged in pointblank shooting at the Germans.

IT was a mistake to win the Battle of St. Mihiel. All it got us was a piece in the papers, three or four bum towns, and several thousand acres of marshy woods, worth five dollars an acre—with no takers. However, General Pershing got the idea that this duck pond was important and ought to be defended. Orders shortly came down to consolidate. Consolidate means dig. Dig means work. Work means you.

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A brand new trench system was ordered. We scooped it out. Roads were needed. We made them. Gun pits and abris were necessary. We dug, and dug some more. Our officers sought to speed work by pretending the Germans were sore about getting kicked out and intended coming right back with their gang. Applesauce.

Those Dutchmen knew when they were well off. They knew those woods, too. We couldn't have coaxed them back if we had opened a beer garden and admitted ladies free. So we dug away and remembered how happy we had been before the battle started.

Meanwhile rumor spread that the Rainbow was stuck in the bog for the winter. There was talk of fighting in the north; and the toughest aggregation of star-spangled bums in the A. E. F. was spading up a lousy front that could have been held by any good football team—all because we had been suckers enough to take St. Mihiel in the first place.

Awaiting the call—it came sooner than we expected—we prepared



"Where's that Chocolate?" Bawled the Loudest Voice in the Outfit.

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to make ourselves comfortable. Our woods stood several miles back of the original front line, in the enemy S. O. S.

Evidently the Heinies had been using it for a *Turnverein*. With real home-loving instinct, they had built a flock of rustic tables and benches, suitable for small dinners, etc. If we wanted to get strong, there were any number of horizontal bars about, and a trapeze or two. Also the woods were dotted with bungalows, where the officers ran to tell each other secrets and Play House.

Scouts beat the captain to several of these shanties, and returned with everything that made life worth while. We acquired a piano, several stoves, a few Bavarian pipes in fair condition, a collection of superb steins, a file of funny papers, and a stack of rude photographs.

Even an accordion was discovered, and George Savage



"What Outfit, Buddy?"—"Buffalo Bill, You Big Sap!"

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learned to manipulate it beautifully between hands of three card monte. Stores of lumber, tar paper, and tin roofing led up to little homes with shelves in them. Imagine shelves! After working hours we lived like millionaires.

The Y. M. C. A. arrived and converted one of the German log barracks into a get-together hut. When word went out that chocolate, cookies, cigarettes, and writing paper would be passed out on the opening night, there was a panic.

The doors were opened, finally; and everybody not on guard fought and bit and kicked to get in. The men at guns were represented by delegates, which was a bit optimistic on their part. The prospect of chocolate—free—was far and away the high moment of the war to date.

But instead of stacks of chocolate a benevolent secretary stood on the platform, waving his handkerchief and beaming benignly. He announced right off the bat that he was happy to see us and now wished to recite a little poem by Robert W. Service. With no further warning, he cleared his throat and commenced.

The poem had to do with a soldier who was very depressed about something and about to commit suicide. The secretary acted it out, with much shadow boxing and hands to the heart and brow. His voice sank to a hoarse whisper and rose triumphantly as the soldier decided not to die, after all, but to stick it out for the sake of the Little Woman and the Fifty-second Congress.

On reaching the moral, Mr. Secretary stepped on the gas and choked up. He began to weep.

"Where's that chocolate?" bawled Bush McGraw, who had the loudest voice in the outfit. It began to look as if the chocolate had been a ruse. There was talk of eating the secretary. He looked sweet.

Lieutenant Colonel Smith, who had been sobbing quietly in a corner, leaped to the platform and averted murder. The muttering died down. We were very fond of Smith. Yet he was no diplomat. Blind to the pulsing issue, he went on from where the secretary had left off. For no reason, he announced that we were not so badly off in comparison to the suffering of Washington at Valley Forge.

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"*Where's that chocolate?*" insisted Mr. McGraw and glee club.

The lieutenant colonel begged to be heard. Washington was a fine fellow, he said, and a credit to America. The demands for chocolate became deafening. Again Smith raised his hand. A sinister silence fell. If the Y. M. C. A. had been using chocolate as a bait for the Better Things of Life, some wise secretary was going to be marmalade.

"Comrades!" cried the lieutenant colonel. "And I am *proud* to call you comrades!"

This was an alarming statement. He might just as well have confessed that there wasn't a bar of chocolate within fifty miles. An ugly murmur ran through the room, rising in ominous crescendo. The French Revolution began just like that. (*Cf. Carlyle.*)

In the nick of time Lieutenant Colonel Smith grasped the situation. He was a lawyer and knew his stuff. He yelled suddenly that there was chocolate for all. Moreover, if anybody wanted to write home for forbidden boxes, he personally would sign all requests. Thirdly, as he had mentioned before, he was *proud* to call us comrades.

The resultant cheer revealed the fickleness of human nature. It was immediately decided that Smith was the greatest officer in the army and should be a general by rights. We unbelted with a few good opinions of the Y. M. C. A. as well.

This episode almost reconciled us to the tedium of digging—especially as a hot rumor indicated that we were destined for another front more worthy of our talents. We prepared for the move by trading our skinny, drooping nags for some fat and frisky ponies belonging to a French battery down the road. Those French were a little careless about the way they guarded their picket lines; although the boys who made the swap could have stolen their Frog eyes if we had wanted them.

Quite a scene took place the next day when the Frogs called and tried to get their horses back. We were amazed at their claims, and patiently pointed out—by certain markings—that our new horses were genuine American mustangs, fresh from the woolly West. When they remained unconvinced, we

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tweaked a couple of mustaches and asked them if they wanted to make anything out of it. Nobody could call *us* liars and get away with it.

There was no new front in stock, so the general thought up something just as good. He decided it would be a slick idea if the battery sneaked out into No Man's Land and fired a few shots at pointblank ranges. It certainly was an original idea. People have been put in the Nut House for less.

It is barely possible that men, women and children, not connected with Battery F, 149th Field Artillery, may glance over this record. For their benefit, a brief description of the general's plans, with comment on same:

It was proposed by the general, and seconded by his sycophantic admirers, that the battery should leave its safe little woods on the night of September 21, and mosey up to the front line trenches, crossing them as if they were roller skating rinks; after which, we were to line up the guns—at a neat right dress—in No Man's Land, and shoot such Germans as we saw fit. The theory was that such unprecedented procedure would scare the wits out of the enemy and teach them not to start any more wars.

From our point of view, there were several slight objections to the scheme. (a) We might get killed. (b) Very likely we would get killed. (c) We couldn't escape getting killed. And for no reason. We could hit whatever targets the general had in mind just as hard and twice as accurately from our regular positions.

Moreover, the general's plan assumed that the Germans were going to sit still while we sent several hundred shells into their little stomachs from a distance of a few hundred feet. We knew better. At that time the Germans had good machine guns, elegant cannon, and no sense of humor. It was fairly certain that they would put up with our tomfoolery for just so long and then get good and mad. They might even shoot back. When the order came, therefore, it looked as if the general had invented a contest for the goofiest idea of the war—and then had set out to win it himself. However—

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Theirs not to make reply.
Theirs not to reason why.
Theirs but to do and die.—PERSHING.

Another call for volunteers. Another touching rush to be killed. Captain Stone mournfully picked out a platoon. The woods shuddered with drama, and private opinions of all generals caused the sweet green leaves to curl up and die. Such handshaking as went on between the select few and their potential survivors! A thousand expressions of good luck fell flat in the mud. The little Greek said a prayer.

The practical side of the matter received some attention. Axles were greased to take out the squeak. The clank of the harness was deadened with rags. The guns sneaked out at set of sun. Why the general gave us the break of doing our stuff in the dark is a mystery. The Germans would have had much better pickings by daylight.

The parade crept through the inky woods, the men cursing in whispers when a horse snorted or a stick broke under the wheels. We reached the front line, indistinguishable from any other part of the line in the darkness, except for the click of a bayonet and an occasional doughboy humming a song.

Captain Stone and Fred Monast rode ahead and flitted back and forth with whispered directions. A steel wagon tire rang against a rock. Wild echoes woke the silent valley. Oh, oh. That was bum coffee. No back talk from the Krauts, however. We were playing in elegant luck. Even one star shell would have caused some handsome hash.

Midway in No Man's Land lay a little hollow. The horses were led—very gently over the rim. We unlimbered in five seconds flat and turned the guns toward Germany. Our target was Merin Bois Farm, supposedly impregnable. The brick farm buildings loomed in the dark blue night like Gibraltar.

Caissons were silently unloaded, shells piled in rows. Each accidental clash of iron brought a hiss of hardboiled reproach. The horses were led to a patch of pine back of the first line. The cannoners dug their flops—shovels burning. No digging ever was done so fast or so well.

Captain Stone crept over the rise of ground to direct fire. At

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once a fool full moon shot from a cloud on a bobsled. The farm lighted up like a Christmas tree. Three quick ranges came down, then:

"Fire!"

A murderous salvo, instantly repeated as the shells ripped into the building and tore it apart. We were loading on the recoil now. Dotted lines of death streamed from every gun to the farm. There were so many explosions that our target was obscured by smoke.

The Germans ran around like monkeys in a ninety-mile blizzard. A dozen rockets hissed out of their little hell, breaking red and white and green over our heads. That meant a few return packages at any minute.

We got ready to duck. Several machine guns began to rattle; our nerves were spared by all the noise we ourselves were making. Only when snip-snips filled the cracks of sound were we conscious of possibilities.

Wham! We were faded! Big guns, too. The Katzenjammer Kids didn't know where we were yet. The closest shells were 100 feet away. It's pretty tough, firing at flashes.

Bong! That one clipped the crest. Getting warmer, Germans. Some nosey *Oberleutnant* was giving them the right address. Big buckets of high explosive hammered the hollow. Some of them were bad news. We took to firing from our hands and knees as fragments whirred like pigeons past our ears.

Two or three honeys landed twenty feet from the second piece. We got on our faces, popping up like jacks-in-the-box at every battery right. A fragment sliced Wilbur Wood in the arm. He kept on serving the gun.

The Germans got real rough, slinging iron like confetti. Result: they began to have the same trouble we were having—they couldn't see us for shellbursts.

We laid off for a second and got a new line on the farm, passing the salt and pepper every time our Dutch cousins stuck their snouts out of the wreckage. Meanwhile, a smudge of dawn streaked the sky. We began to get nervous. This sort of thing couldn't go on forever.

Nevertheless, through many tough campaigns one natural law

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had revealed itself: *If* we got through the first fifteen minutes of fire without serious damage we were reasonably safe from harm thereafter. This law had operated beautifully for seven months. On the strength of its continued operation some of the boys got frisky. Walter Birkland, in particular, ran around the second gun during a regular cyclone of shell fragments. It was for luck, he explained.

Night began to fade—perceptibly. So did our ammunition. Between shots we discussed what we would do by the dawn's early light—when all those fun-loving Katzenjammers got a look at us. Jack Walsh suggested that we pretend we were waxworks. The rest thought of apologizing, and clung to Nick Richmond, who had studied German in college.

Worry vanished with the sudden appearance of the drivers, racing through the smoke drifts. Three cheers for the Red, White, and Blue! Hooray for Lloyd George! Bravo, Clemenceau! By some process of nerves, the guns were hooked to the limbers. We tore across the field, one side or a leg off. Considerable scrap iron pounded in our tracks. A good mile back of the first line we stopped running, feeling that we were still ten miles too near.

So there *was* a God.

A terrific reunion took place at the old position. Those who had been left behind were thoroughly ritzed by the death dodgers. The stunt was discussed from every angle. Among other things, we took it all back about the general. Shooting from No Man's Land was an elegant idea. The general was a genius. He knew his oats, that boy; and he knew who to pick for the tough jobs, too.

A little later the expedition was warmly commended through the colonel. Our opinions of the general went up another eight notches. There was a man who would amount to something in the war.

The captain did the handsome thing and cited all who took part in the mission for their conduct under fire. We reminded the captain that he had been very brave, too. It was all like Christmas in the Harem.

Further, the Intelligence Department reported that our fire

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had completely demolished the enemy positions, annihilating the defenders. A few of them, deprived of the Y. M. C. A.'s heartening counsel, had committed suicide. On the other hand, we were intact and apparently immune. No German could hurt us from now on. Several of the boys attempted to cut out their army insurance. Obviously, there was no sense in shelling out ten dollars every month when the war was all a big joke.

Then came the discovery of General Pershing that his best troops were playing kiss the pillow in the woods of Essey. This was three weeks after the Battle of St. Mihiel. Immediately orders came thick and fast. It was rumored that we were scheduled to crack the line north of Verdun. That was O. K. with us. There was glamour about Verdun, already the graveyard of a million brave men.

We rolled out of our beer garden on the double. The doughboys flashed past in motor-trucks, yelling, "See you later!" They were sitting pretty, riding from front to front like bank presidents, while we hiked on swollen feet.

The regiment became separated, due to some brainy work on the part of a major and a lieutenant. The latter's idea of being a great officer was to threaten stragglers with death, on the theory that any officer could shoot an enlisted man whenever he felt like it.

Of course, we never took the threat seriously. In spite of army regulations, there must be a law somewhere against shooting people.

All the way we were bothered by various pests, chiefly M. P.'s. One general, who thought he was a tough guy, amused himself by dressing up in a private's slicker and hammering our buzzing eardrums with "What *out*-fit, buddy?"

You can't fool a horsefly. *We* knew he was a general. The answer came back like rubber bands:

"Buffalo Bill, you big sap!"

"Nine Hunert and Eighty-eighth Dental Supply, Dismounted. Remounted on Horseback."

"Hunert and One Ranch! Y. M. C. A. Replacements! What's it *to* you?"

The general met this razz with words that are never used by

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generals or gentlemen. In a fine blaze of fury, he ripped off the slicker and stood revealed in all his silver stars. Now that he could prove he was a general, it was no fair insulting him. We shut up.

After twenty long hours—boots, boots, boots, going up and down again—we hit a collection of wooden barracks and paused for the afternoon.

Captain Stone went completely military and ordered us to wash the carriages and guns, which did away with any foolish notions of sleep. At night we hit the trail again, tired and sore as goats.

Morning brought us to the dust piles around Verdun. Once they were towns. We swung into the wide white roads called the Holy Way in remembrance of the thousands upon thousands of dead men who had tramped over the hill and on out of the world. Countless corpses. In the first cemetery were 20,000 tidy graves. The French are a neat people. Thirty thousand lay in the next. In all, we passed more than twenty graveyards. Well, there were still more than 1,500,000,000 people in the world, with approximately the same dreams and jobs and jokes.

We steamed up a long hill. Those monotonous crosses stuck out of the slope like cloves from a ham. The hill was burned and barren looking. We halted at the summit, in what passed as a woods. Barracks here, and mail. We hung out a "Not to Be Disturbed" sign for an hour and didn't start the crap game until late in the afternoon.

The little Greek thought he saw a woman and burned down the road with a set of tempting chops. His quarry turned out to be a priest. Mr. Papolis returned, a bitter Scotch Presbyterian.

Sunset and evening star; and one clear call for us. We dragged our badly swollen dogs down the hill and hit it out for the war.

A long and horrible hike on bleeding feet. Avocourt at last. This was a pile of dirty, flourlike dust at a crossroads. A broken milestone was the one remainder of the town. In the early morning light it began to look as if we were just poking our noses into a lot of trouble. We proceeded to the bloody Bois de Montfaucon, and had a chair.

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So this was the Argonne! A bunch of doughboys snored on the ground. They informed us that the American army had suffered overwhelming defeat; that the Allies were trapped; that the Germans were making ham sandwiches out of one and all. This was staggering news until we learned that the rumors had their origin in the plight of the now famous Lost Battalion, cut off directly ahead. We were there to help get them out.

The sun appeared and we gave our new surroundings the once-over. The woods were splintered into small bits, green with mustard gas. There wasn't a live leaf in twenty miles. Thousands of dead men sprawled in the ulcerated fields. Horses, their legs awkwardly pointing up, and a general litter of junk. Wagons, rifles, socks, rations, love letters. What bum soldiers those boys must have been, God rest their souls! Everything pointed to panic and massacre.

One of the kids lay on the ground dying, with a bullet in his guts. He had been yanked from a stenographer's job in New York, trained (as they say), and exposed to his first fire—all in thirty-seven days. He was slightly bewildered by it all.

The doughboys told of being marched in column of fours right down to the trenches—in full sight of the German gunners. More Sears-Roebuck officers. One gang of artillerymen told us of firing for thirty-six hours without effect. It turned out that they hadn't used fuses. Apparently, they thought shells went off by themselves, and had been pegging iron cucumbers through the entire battle.

It became clear why *we* had come on the run all the way from St. Mihiel.



SAVING A GUN—SHERMAN'S ATLANTA CAMPAIGN

THE CONDUCT OF WAR

BY MARSHAL FERDINAND FOCH, AUTHOR OF "THE PRINCIPLES OF WAR"

TRANSLATED BY CAPTAIN W. F. KERNAN, F. A. U. S. ARMY

PART II

EXECUTION OF THE PLAN OF WAR MANEUVRE

CHAPTER VII—LOGISTICS (*Continued*)

THE German concentration of troops, originally planned for the line Neunkirchen-Homburg, was first withdrawn to the Rhine (decision of July 22) in order to avoid the danger of a French offensive on the eighth day of mobilization, and was then advanced, in accordance with orders received between July 29 and 31, to the line Birkenfeld-Kaisers Lautern. This last change was made in order to speed up the German offensive, and it affected the elements already detrained as well as those whose transportation was still under way.

The close relation revealed here between the tactical operations in the Palatinate and the German railway system—the remarkable elasticity evident in the use of railways for military purposes, especially when we consider the primitive nature of the railways in 1870 and the fact that the railway stations had no military ramps whatsoever—gives us an indication of the results which can be accomplished by an efficient General Staff. We are able also in this connection to form some conception of military transportation of the future which will have at its disposal the superior organization of modern railways as well as numerous and specially constructed detraining points.

It is very possible that like Prussia in 1870, we may ourselves find it necessary to make changes in our concentration plans during the very time that these plans are being carried out.

A concentration must have time. If, for example, it requires eight days, this length of time must be guaranteed either by the distance factor alone as in 1870, or by distance together with a certain amount of "covering troops" capable of maneuvering or resisting for eight days. This latter consideration makes maneuver space necessary for the covering force (at least five or six

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marches). In both cases, whether it be considered desirable or not, if the concentration is to be completed without disturbance, it must be commenced at a safe distance from the frontier. However, as the concentration approaches completion the period during which it must be protected lessens. For example, if the transportation of troops had continued for six days, only two more days would be necessary to finish it, and thus the mission of the covering troops would then be to guarantee protection for these two days. If the covering troops had not been attacked it would be possible (on the sixth day) to advance the elements already detrained and to move up the detraining points of the remaining troops to within two days' march of the covering force.

There are other points which must be taken into consideration. First of all we must remember that troops in process of being detrained have little value for either combat or reconnaissance and they must, of necessity, be maintained at some distance from the enemy. Their value increases, however, as the concentration approaches its end; they may then be advanced without undue risk and in case of need they may be permitted to engage the enemy.

At the beginning of operations all information regarding the enemy is vague. This information becomes more definite as time goes on; either the covering force is attacked or it is not attacked. At any rate the condition of uncertainty vanishes.

From this we are able to draw the inference that in the future as in 1870, our concentration will commence at a considerable distance from the enemy and be advanced to within striking distance as it approaches completion. We must be able to change at will the course of a concentration during the time it is being carried out. This again, means that our system of transportation must be so organized as to permit the movement of units (Corps Divisions and Brigades), in their normal marching order, and unless this is done the detrained elements will be helpless and unable to maneuver for a considerable period of time. In order that such a scheme of transportation may be carried out successfully it is necessary that each railway line be assigned the transportation of one Corps scheduled for immediate entraining and of one Corps scheduled for entraining later.

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Furthermore, each Corps scheduled for immediate entraining should have one division as its leading element and retain one division in support; also, the scheme of mobilization must permit those Corps which are ready soonest to be entrained and transported in advance of the others.

In the Corps themselves priority of transportation should be assigned to the Divisions which are able soonest to complete their mobilization. Proper mobilization could not be effected by having all Corps governed by the same schedule. Such a procedure would amount to reducing the entire operation to an average of accomplishment of all the elements taking part in it. It would result in retarding those units which are able to concentrate quickly and accelerating the movements of the slower units without affording them the means of completing their concentration.

The German General Staff understood this thoroughly and the system employed by them for the transportation of their armies may be studied with profit.

Efficient mobilization means something more than merely raising troops, and we may add that an adequate system of military transportation involves something more than the transport of troops from one place to another like so much baggage.

Systems of mobilization and troop movement have as their objective the execution of a concentration on terrain previously selected; this concentration must always be capable of maneuver commencing at a point distant from the enemy and approaching him as it approaches completion; it must be capable, moreover, of being moved at will, of displacing forward or to the rear, and all plans of mobilization must be framed with this possibility in mind.

A concentration of this kind is what we must be able to expect from an efficient General Staff.

To sum up the proceeding, let us show the difference between the following two systems of mobilization.

(1) A system of mobilization and troop movements which is uniform throughout;

(2) A system of mobilization and troop movements which is successive and at the same time methodical.

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As an example, let us assume that we have twenty-one Corps to be transported on six double-track railway lines and that each railway line is capable of handling forty trains per day (each Corps using ninety-six trains). If we use the first system mentioned above, $\frac{21 \times 96}{6 \times 40}$ or 8 days will be required to complete the concentration. At any time prior to the eighth day only parts of the twenty-one Army Corps will have been detrained and consequently no maneuver will be possible before the eighth day. On the other hand if we use the second system we have the following results:

Six Army Corps will complete their concentration after $\frac{6 \times 96}{6 \times 40}$ or approximately two days and nine hours.

Twelve Army Corps will complete their concentration in four days and eighteen hours.

Eighteen Army Corps will complete their concentration in seven days and thirteen hours.

Twenty-one Army Corps will complete their concentration in eight days.

This means that on the third day six Army Corps will be ready to maneuver; on the fifth day twelve Army Corps will be ready to maneuver and on the eighth day twenty-one Army Corps will be ready to maneuver.

In this latter case it is evident that we are prepared for any eventuality which may arise, and most important of all, we are able to prepare a progressive system of attack, for in the last analysis, troops assembled around detraining points are not sufficiently united to attack with any hope of success. This is true for a variety of reasons, but principally because the concentration lasts for several days and it is impossible to maintain all of the troops in the same area during the whole period. The zone of concentration must inevitably be extended and the attack must be organized in a certain progression as the concentration advances.

The word *attack* means a succession of efforts; that is to say, succession in the employment of forces; echelonment of efforts

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in time; echelonment of efforts in space—in other words depth. If therefore we combine this necessarily successive arrival of troops in the zone of concentration with a system of attack, our attack can be made to develop out of our concentration like "lightning from a cloud" without violating the principle of continuity and without loss of time.

An example will perhaps make this point more clear. Let us look at the three railway lines leading to Remilly, Benestroff and Berthelming, connected at these terminals by one lateral line and farther back by a second lateral line running through Thionville, Teterchen, Bening and Sarreguemines.

Now if we assign two Army Corps to each one of these three

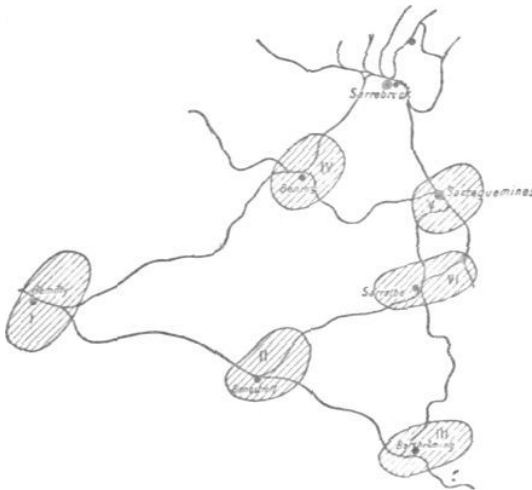


FIG. 1 SITUATION ON FOURTH DAY
(Each Ry. line moving two corps)

lines, and if all three lines transport their quota of troops during the same period of time, six Army Corps will be transported in four days and on the evening of the fourth day the concentration will be completed around six points namely, Remilly, Benestroff, Berthelming, Sarreguemines, Bening and Sarralbe and the system of attack has not yet been organized. (See figure 1).

On the other hand we can assign all three lines at first to the transportation of a single Corps. Three Corps will thus reach

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the zone of concentration in two days. They will be in echelon as follows:

I Corps from Remilly to Bening

II Corps from Benestroff to Sarralbe.

III Corps from Berthelming to Sarreguemines. (See figure 2).

On the third day the transportation of the other Corps (IV, V, VI) will be commenced under the same conditions; the advanced elements of these Corps will detrain along the first transversal, their rear elements along the second transversal. (See figure 3).

On the same day (third day of mobilization) the three Corps of the first line close up on their advanced elements and move forward away from their detraining points.

On the fourth day the IV and V and VI Corps continue detraining and close up on the heads of their columns while the Corps of the first line displace forward to arrange themselves in an attack formation. By the evening of the fourth day the entire system of attack is complete and all six Corps may be launched against the enemy with the "swiftness of lightning." (See figure 4).

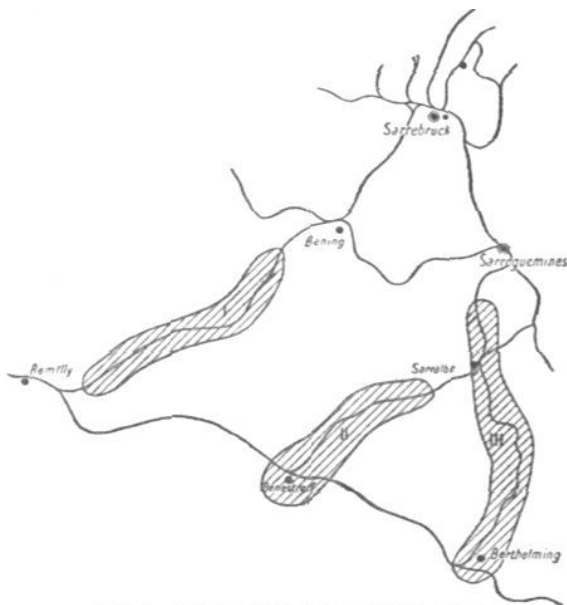


FIG. 2. SITUATION ON SECOND DAY
(Each Ry. line moving one corps)

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On July 30, 1870 the various Prussian Army Headquarters were located as follows:

Headquarters First Army at Treves.

Headquarters Second Army at Alzey.

Headquarters Third Army at Spire.

On August 3 Moltke located his headquarters at Mainz. We must note here that if the French had attacked before July 30, they would

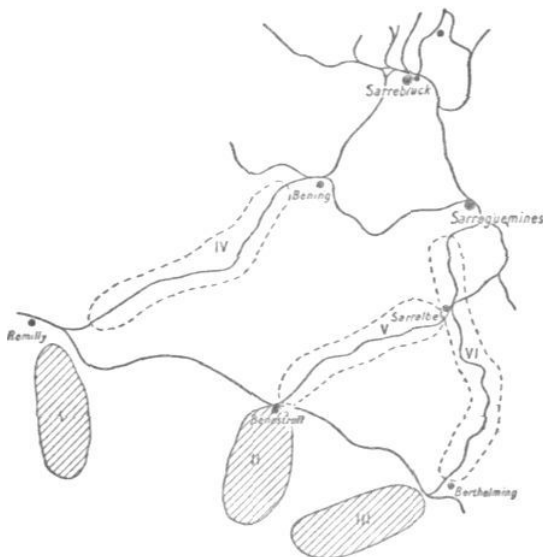


FIG. 3. SITUATION ON THIRD DAY
(Each Ry. line moving one corps)

have found the German Armies still in process of forming for the attack and without their commanders.

Even when the German High Command arrived it approached no closer to the theatre of operations than Mainz. Moltke's intention was to direct operations from this point in accordance with information received from the Saar (120 kilometers distant). This information was expected to be furnished by the Cavalry of the Second Army.

This simply meant that the German High Command would have been insufficiently informed as to the situation, even if we take into account the rapidity of telegraphic communications. Moreover, the operations of the Cavalry of the Second Army were to be directed by an Army Commander who was in complete

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ignorance of the intentions and desires of the Central Headquarters. Therefore, it is extremely doubtful whether the information furnished would be accurate. Also we can foresee that the German High Command at Mayence would not have information which was vitally necessary and such information as it received would be both incomplete and tardy, this from the fact that Moltke had no advance guard which was subject only to his own orders.

In a similar situation Napoleon would have hastened to join his advance guard, not only in order to receive information without delay, but also to form an estimate of the situation based on personal observation, to direct personally the efforts of the reconnoitering bodies and to control the operations of an advance guard whose progress in reconnaissance would serve as a basis for the maneuver which he would later formulate.

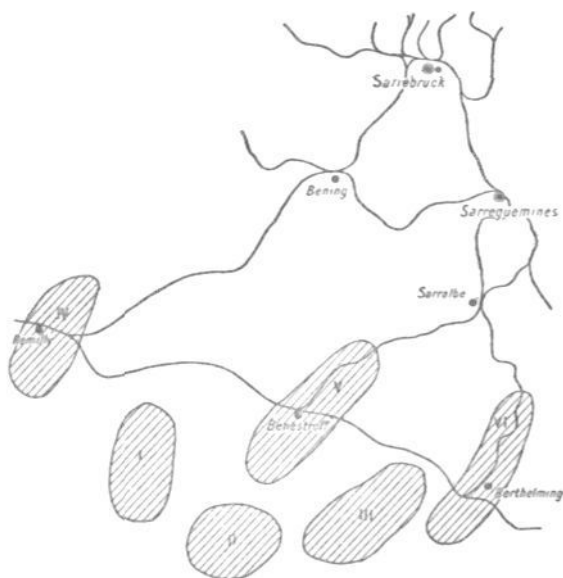


FIG. 4. SITUATION ON FOURTH DAY
(Each Ry. line moving one corps, compare with Fig. 1)

FOREIGN MILITARY JOURNALS: A CURRENT RESUME

France—Revue d' Artillerie, October, 1929

IN an article "**Divisional Artillery—The Role of the Battalion Commander in Combat**", Major E. Ricard follows the commander of a divisional artillery battalion through a complete cycle of operations. Rather than attempting to seek the solution for each of his numerous problems, a study is made of their nature, the solution being dependent upon the situation. Once the situation is well defined, the solution may be found in regulations. The important point is to foresee what problems will arise, and when they will arise, in order that timely preparation may be made to meet them.

The duties of the Battalion Commander as set forth in regulations, are treated in great detail in the following sequence: before the order for reconnaissance; during and after reconnaissance; immediately before opening fire; during action.

The tasks of the Battalion Commander, as covered in this study, constitute a maximum which he should exert every effort to perform, regardless of the fact that frequently the nature of the situation will be such as to preclude their full accomplishment.*

Captain N. Aizier in an article "**Artillery in the Offensive in Position Warfare**" analyzes in detail a recently published work of that title by Colonel Brüchmuller, a well known German Artilleryman frequently mentioned in recent years in French and foreign military journals, whose earlier work on the same subject was published in 1927 under the title: "German Artillery in the Break-through Efforts of the World War."

The work is a study of the principles which the Germans put into effect, beginning in 1915, for operations of this character, and the development of these principles during the course of the World War.

At the time of the most perfect application of the German doctrine for the employment of artillery in attack (Chemin des

*A translation of this valuable study will probably appear in an early number of the F. A. Journal.—EDITOR

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Dames Offensive), this method was based essentially upon the following principles:

- A. Above all, the benefit of surprise must be assured.
This result will be obtained by dispensing with fires for adjustment and by the short duration of the preparation.
- B. The artillery preparation, which must be brief in order to prevent the enemy alerting his reserves, must nevertheless, be of sufficient effectiveness to paralyze hostile reaction; Hence the necessity of employing an enormous mass of artillery and of firing at maximum rates.

Moreover, the reaction of the enemy artillery is to be feared no less than that of his infantry; therefore the preparation will be begun by heavy counter-battery, participated in not only by batteries especially assigned to this mission, but also by all the so-called artillery of general and direct support.

- C. The preparation fires and the accompanying fires during the attack must cover all hostile organized positions. Hence it is necessary to have a large amount of powerful long-range artillery, whose batteries should be pushed without hesitation far forward, if necessary to within a few hundred meters from the first lines.
- D. Command must be fully centralized, no initiative being left to lower units.

In addition to the orders proper, in extreme detail, these units should be instructed and drilled mechanically and guided by conferences, plans and suggestions.

The infantry-artillery liaison will be organized at the same time in complete detail.

In following the development of the German doctrine of artillery employment in the attack on stabilized fronts, the article gives numerous interesting historical examples, taken from operations on the Eastern as well as the Western Fronts. It also discusses the German organization and staff and command functions for such operations.

In the divisional artillery there existed no marked difference in organization between the French and the German, although

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generally the German groupments included a greater number of batteries than the French.

On the other hand, from the Corps up, the German artillery was under the direct orders of the Commanders of the larger units who employed as technical advisers artillery officers assigned to their General Staffs.

Soon the custom was established of superimposing upon this technical staff, whenever important operations were impending, certain specialists from General Headquarters who in fact directed the attack preparations and prepared the artillery orders, although in general they had no command function whatsoever.

One of the advantages of this organization was that it enabled the greatest benefit to be derived from experience in successive offensives carried out on different fronts.

These specialists, literally "traveling salesmen" in the matter of artillery employment, undoubtedly through constant practice in their duties, attained exceptional skill in the tactics of their arm, and, from one offensive to the next, were able to apply the benefits of their latest experiences.

This procedure also made possible the rapid preparation of an offensive on any given front, due to the training of these specialists in staging such operations.

Colonel Brüchmüller was one of the most renowned of these specialists and the concrete examples in his study are related to the various phases of his own career during the Great War.

"The 5th Battalion of the 23d Field Artillery in Morocco" by Captain F. Martegoutte, is a narrative of the operations of a 155 mm. Howitzer unit which, during the Riff War, accompanied the mobile columns through the valleys and over the passes of the hills north of the Ouergha and the Middle Atlas Mountains.

The battalion was sent from France to Morocco in June, 1925. Many authorities, among them a number of old African fighters, took a skeptical view of the proposed employment of Artillery of this caliber in such operations, considering it not only a hazardous venture, but expressing their opinion that the missions it would be called upon to perform could be accomplished equally well by the smaller calibers. However, in spite of the tremendous difficulties encountered, the author feels that the results accomplished

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fully justified its employment, as it furthered military as well as political action, and he points out the valuable lessons that have been derived as to the organization, equipment and employment of such units in future operations of a similar character.

During its seven months' active campaign, the battalion, or units thereof, marched 1400 kilometers, 1200 of which were over extremely difficult trails, to which may be added 600 kilometers covered by the teams of the batteries used in transporting supplies. The terrain of operations was extremely broken, the roads being merely trails made through the course of ages by the natives and their mules, no effort ever having been made to improve them. They were rocky, worn, often difficult for mountain artillery and seemingly impassible for wheeled vehicles.

On a march of 40 kilometers from Fez to Pont-el-Tnine, the battalion had to replace nine wagon wheels, one caisson wheel and a dozen wagon-poles. Owing to the efforts demanded of them and the poor condition of the horses, ultimately it became necessary to discard the caissons, replacing them with light 3-horse wagons, and to use five pairs for the pieces. For difficult going, this number was often increased to six or seven pairs, and on one occasion fourteen pairs and forty men were needed to draw each howitzer into position. Slopes of 30 per cent to 40 per cent, and even greater, were frequently negotiated. The greatest difficulties were encountered in preventing the howitzers from slipping off the trails, the edges of which often gave way under the three-ton weight of the howitzer, and in making the hairpin turns, which usually involved unhitching, unlimbering and manhandling the piece.

During the operations of July 11-14, 1925, two batteries of two howitzers each, in order to reach their position, climbed 1800 feet, covering in 22 hours, a distance of 3 to 4 kilometers. Ten pairs were used on each piece. The trail had a total of forty hairpin turns, at each of which manhandling was necessary. Individual howitzers negotiated on the average six turns per hour.

Preparation of fire was always simple: no coordinates, no

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calculations, objectives always visible from the pieces or from their immediate vicinity. The only maps available were 1:100,000.

Observation was axial and from the vicinity of the pieces, the objectives standing out boldly in the clear air. Communication was almost invariably by voice, although the heliograph was extensively used for distant communication, in instances up to eleven kilometers.

The tribesmen, operating over thoroughly familiar terrain and moving by routes permitting them to take cover with prodigious speed, were often able, with a few resolute men, to halt the march of an entire battalion.

Groups of such men were the usual targets of the 155 howitzer.

On the face of it, such employment of the Schneider howitzer seems absurd. However, the locations where the riflemen sought cover were known or could be rapidly determined. It became a matter of dislodging these groups, and here the well known psychological effect entered, namely, the demoralization of the Chleuh caused by the effects of a projectile with which he is not familiar. He knows the 75 and 65 of old; the Riff tribesman is very skillful in protecting himself against their effect. Also the appearance of the 155 shell at the very start produces a great effect on his morale. It is only necessary to sprinkle the rocks, the cover, the holes which shelter the enemy, to dislodge him without trouble.

The infantry was thus spared many losses.

Liaison presented no difficulties because the maneuver of the troops in action could readily be seen and followed from the observation posts.

Saving of ammunition was always an important consideration and fire was ever concentrated on a few sensitive points. Simple conventions permitted the designation of such objectives, usually by placing a few 65 mm. air bursts on the objectives, or by some similar method.

On one occasion, on the front of the 2d Division in May, 1926, the artillery was very instrumental in subjugating the Jaia and Beni Katchem tribesmen.

As the parleys with the rebellious villages threatened to drag

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on eternally, a decision was reached to impress the tribal chieftains by unexpectedly subjecting their villages to a violent bombardment. Immediate results were obtained. Two hours later the bulls, the symbol of submission, filed by in front of the batteries, frequently preceded by a rider at a full gallop dashing up to beg that fire be withheld.

In the later operations, the heavy artillery several times resorted to mechanical traction. Tanks were used to haul a 120 mm. cannon to a position inaccessible for the teams. The heavy battalion of the 9th Field Artillery had tanks at its disposal to occupy a position at Taza. Mazeres trucks towed a 155 howitzer over a stretch where seven or eight pairs would have been needed. Tractors of proper design should be provided to facilitate steep ascents and negotiate sharp turns.

Revue D'Artilerie, November, 1929

"An Artillery Instructor—General Dumezil", by General Picot, is a sketch of the life and work of that distinguished artilleryman who died at Vincennes on February 9, 1929.

During his four years at Neufchateau and Troyes, in addition to commanding the garrison, Colonel Dumezil served as President of the Board of Practical Studies and Director of the Practical Artillery Firing Course. By his personality he had a marked influence on the firing instruction of the entire French artillery. He had a full share in the 1910 revision and elaboration of the Field Artillery Regulations, which mark an epoch in the evolution of the French artillery doctrine. The Committee which prepared the revision defined its purpose as being to simplify instruction, because simplicity is the surest guarantee of good execution during the difficulties of combat." Its prime aim is to appeal to the officers' judgment. "Principles should serve as a basis for reflections rather than precise rules which a slip of memory may cause to be forgotten at a critical moment."

The war of 1914-18 confirmed the principles of these regulations in the spirit of French artillerymen and taught them to their adversaries; in fact, from 1917 on, it is noted that they hold a marked place in German regulations.

In 1907 the authorities recognized that the range at Poitiers,

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which had been used since 1898 by the Firing School, was too restricted and that the School was hampered in the study of the tactical employment of the new materiel. Accordingly, in 1907 the School was moved to Mailly where it has functioned since that year. Six batteries, and later twelve were assigned to the School.

Convinced that the studies of technique and tactics of the arm cannot logically be separated, instruction in them was combined. From 1907 to 1911 more than 400 Field Artillery officers were students at Mailly. There were the officers who in 1914 were found at the head of France's batteries and battalions, and that country has not yet forgotten the great services rendered by its artillery in those days.

At the very beginning of the War there befell to General Demezil, the modest toiler, the most glorious of rewards. In September, 1914, on the very terrain of the Camp de Mailly, scene of his peace-time lessons, he saw the German artillery checked in its victorious advance, turn about and fall back before the fire of the 75 mm. batteries (of the 21st Army Corps) under his command.

This is a memory, which, together with his years of instructing in firing courses, he used to recall with pleasure during his retirement.

England—The Journal of the Royal Artillery, January, 1930

"Lord Horne As An Army Commander", by Lt.-General Sir Hastings Anderson, K.C.B., is the leading article in this number of the Journal and it written with ability and sincerity. General Anderson was Lord Horne's Chief of Staff and knew him, therefore, through a most intimate relationship. Some of his remarks are worth quoting:

"It must always be difficult to appraise the military merits of Commanders of Armies in France; an Army Commander held no independent command, the fronts and flanks of Armies were rigidly tied down, the Army gains were won by hard frontal fighting, almost as mechanical as the movements of a parallel ruler: the art of strategy was almost completely denied to their

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operations, and these were of necessity methodical rather than brilliant."

"Lord Horne had the stern unbending sense of duty which marked men of the type of the Duke of Wellington, of Sir Patrick Grant or of Stonewall Jackson. He was impatient of indiscipline, of slackness, of eyewash, and especially of a lack of care in Commanders for the lives and the comfort of their men. He was essentially of the Royal Regiment. A slack trace, men lounging on their horses at a halt, or horses across the road, when he passed a battery on the march, would bring him bounding from his car, with quick sharp words to the officers, which taught many that the eye of the Horse Artillery Commander had not dulled with rank and age.

"Above all, he was a man of deep religious sentiment. To him, as to Stonewall Jackson, may be applied the words of Colonel Henderson: 'In whom shall we find a firmer faith, a mind more humble, a sincerity more absolute? He had his temptations like the rest of us. His passions were strong, his temper hot, forgiveness never came easily to him. Fearless, strong and self-dependent, he was the very model of a Christian gentleman.'

"Long may be British Army continue to breed such leaders."

"The Rocket Service And The Award of The Swedish Decorations For Leipzig", by Captain H. B. Latham, R.H.A., is quite a lengthy article which gives in considerable detail the history of what appears to be a rather unique organization in the British Artillery. The conception of a Rocket Service was apparently born in the mind of Colonel William Congreve and put into effect in the early days of the 1800's. The following description is offered as to the basis for the employment of rockets:

"Briefly his idea was to put a shell in the front end of a rocket, which was powerful enough on being fired to transport itself and the shell through space for any required distance, according to the elevation at which it was fired.

"He eventually evolved a rocket of sufficient power to carry a 42 lb. shell to a range of 2000 yards, but at the time with which this article deals, the most common types to be found in the land service were the 32 pr. and the 12 pr.

"If we remember that the Horse Artillery gun of the period

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only threw a 6-lb. shell, we shall be able to appreciate more fully Congreve's invention, which without any gun at all, carried a shell of double the weight the same distance, with only slightly less accuracy.

"And from the following history we shall find, that on nearly every occasion on which they were used in war, the noise and visibility of their approach, the heavy casualties and ghastly wounds that they inflicted, struck terror into troops who were not unaccustomed to endure without flinching the shell-fire of the period. But their effect was to a large extent neutralized by the very brief period of training which the "Rocketeers" had undergone previous to having to handle them in battle."

The idea of employing rockets for various useful purposes seems to have a peculiar fascination for a certain type of mind. In our own day we have heard of rocket-propelled automobiles and rocket ships, and every now and then some new genius who revives the idea of visiting the moon by means of rockets. If the employment of rockets in place of projectiles delivered from a tube had been entirely practicable, there is little doubt but that some system would have survived and remained in existence today. However, during the life of the Rocket Service it apparently performed useful work and distinguished itself in combat. During the year 1813, for instance, the British at times employed this weapon against the French with success as the following quotation indicates:

"Just as it was getting dusk, the French attacked this small force with two battalions. Lane posted his men in advance of the British line and as the French advanced full of confidence 'a few Rockets thrown into the midst of the dense columns, spread such consternation amongst their ranks that facing about they retreated in the greatest disorder. The men of the Rocket Brigade followed and now the extraordinary scene presented itself of a strong body of infantry flying before some dozen assailants. But the new and formidable weapon with which they were armed had struck terror into the enemy and they did not stop until they had reached the citadel, while 25 of their body, the greater part badly wounded, fell into the hands of the enemy.'

"'Altogether this was a great day for the Rocket Battery, and

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Hope was fain to admit that, when the range was short, rockets were effective on enclosed ground or on water, though very uncertain when used with any elevation."

Revue Militaire Francaise, November and December, 1929

"**The Italian Army in 1929**", by Commandant Conquet, is a discussion of Italy's problem of national defense and a description of her military organization.

Certain geographic and economic conditions create a problem of national defense for which Italy's military system appears to furnish an excellent solution. Italy is bounded on the north by a wide range of mountains. Therefore, Italian troops must be well organized for mountain warfare. This barrier, during six or seven months of the year, is impassable. The defense during this period does not require a considerable force. However, during good weather, a strong covering army is necessary to protect the border due to its convex shape which facilitates covering enemy attacks.

Concerning the economic conditions, Italy is rich in manpower. In a territory whose area is only three-fifths that of France, Italy has a population of 41,000,000. The yearly class of available recruits totals 400,000. On the other hand, Italy is poor in economic resources. As a consequence the national defense budget has a very limited sum at its disposal.

The armed forces of Italy include, in addition to its Navy, the Army, the Air Force, special organizations, and the militia.

Two fundamental regulations govern the army: (1) the compulsory service regulations and (2) the regulations concerning army organization.

The object of the compulsory service law is to fix the nature of the service and its duration. After some experimentation, the present law was adopted as a compromise between financial limitations and military necessities. Although a class of 400,000 is available each year for eighteen months' service, the enrollment of this number would cause an unsupportable financial burden. To reduce the number, the government resorts to: a rigorous physical selection; total exemption; and numerous partial exemptions. As a result, the usual number accepted is about 210,000.

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Each class is called at the age of 20, and enters in April. Therefore, each year from April to October the Army reaches a total of about 320,000 men (not including personnel in skeleton organizations). From October to April, during which period only one class is in the service, the Army strength drops to about 150,000 men. This last low figure is justified by the fact that from October to April the Alps are impassable.

The fundamental assumption which effects the present system is that the military power of Italy must be brought to a maximum, without delay, at the outbreak of hostilities. This led to a peace-time army which has the greatest possible number of large units (army corps, divisions, etc.), necessary to rapid mobilization in case of war. All army corps and divisions are provided with their staffs and troops, except that part of the smaller units (battalions, sections, etc.) are skeletonized to permit an effective minimum training strength for the other (active) troop organizations. Under this system the general staff is able to provide for 30 divisions in time of peace.

In case of mobilization the Italian army will increase in an elastic fashion. The first consignment of incoming reservists will fill up the skeleton organizations and increase the active peace-time organizations to war strength. In this manner the Italian Government expects to have both a strong standing army and an effective framework for rapid mobilization.

The organization of the artillery is as follows:

The divisional artillery:

30 regiments (1 for each division).

Each regiment has 4 groups:

Two groups of 75 mm. guns	}	horse
One group of 100 mm. howitzers		drawn
One group of 75 mm. mountain artillery—pack.		

This last group is for close accompaniment. Each group includes 2 active and 1 inactive battery.

Army Corps artillery:

12 regiments (1 for each corps).

Each regiment has 4 groups:

Two groups of 105 mm. guns	}	motor
Two groups of 149 mm. howitzers		traction

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This matériel has a relatively short range. However, in mountain warfare range must not be sought at the expense of mobility.

In addition there are the following artillery units:

Alpine artillery: 3 regiments 75 mm. pack.

Horse and Portée artillery: 1 regiment of 75 mm. guns.

Heavy and coast artillery: 5 regiments of heavy artillery, each having 4 groups of a varying number of batteries, with an incongruous and at times ancient type of matériel: 149 and 152 mm. howitzers and 210, 260 and 305 mm. mortars, all motor drawn.

3 regiments of coast artillery.

Anti-aircraft artillery: 13 groupments.

In general the Italian artillery has the following characteristics:

(1) Like the Infantry it is equipped for mountain warfare. There are pack units in each division.

(2) The proportion of howitzers is much higher in Italy than in France.

(3) All except divisional artillery is motorized, in an attempt to gain mobility.

(4) Anti-aircraft artillery has been developed considerably.

The officers of the active service are obtained from two sources: (1) by the advancement of non-commissioned officers (25 per cent. of total) and (2) by graduates of the infantry, cavalry, artillery, etc. schools. Promotion is regulated by strict selection and examination. Reserve-officer material is found in the university graduating classes. Part of the college man's period of service is spent in regional military schools and those who are qualified complete their 18 months' service as 2nd Lieutenants of reserve. In 1929 there were 200,000 officers, active and reserve.

The Italian Air Corps is independent of the Army and the Navy, and like them has its own Chief of Staff. In 1918, Italy possessed 2600 planes, of which number 1000 were at the front. In 1922, this number fell to 80 obsolete army planes and no commercial planes. In 1929, Italy had 1200 military planes and 15 commercial air companies.

In considering Italy's armed forces, we must also consider the

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special organizations: the colonial troops, the carabineers, and the border customs guards. These three groups total about 125,000 men and receive military training. In case of mobilization they are available as border guards and are useful in other similar types of service.

The militia (Voluntary Militia for National Security M. V. S. N.) is a complex, original, and powerful organization. It developed from the sporadic fascist associations which were organized in 1920 to combat communist excesses and they eventually carried their chief to power. Shortly after this, Mussolini legalized this organization of "black shirts." The militia was originally a political instrument charged with maintaining internal order for the dictatorship. It still remains the "Pretorian Guard" and the support of the Government.

The militia is now tending more and more toward a wider role of national utility and has virtually become a professional volunteer army capable of mobilizing rapidly a total of 250,000 men. Local units of the militia train weekly, usually on Sunday, and frequently participate in the army and air force maneuvers. The high command has recently decided that, in time of war, the militia units will retain their identity and that two battalions of militia will be assigned to each division. Probably the high command hopes that the militia, by its propinquity, will inspire the war-time army with that intense patriotism which, in the militia, has grown to a sort of religious ecstasy.

In his article, "**Permanent Fortifications of Belgium and France**", Commandant Tournoux answers those authors who contend that permanent fortifications were of no defensive value to the French during the World War. He cites several German authorities to show that various fortifications considerably annoyed and hindered the invading forces.

He concludes his study by pointing out the necessity of strong and modern fortifications as a means of preventing aggression on the part of any future enemy of France. It is especially necessary that France should prepare to defend herself against a sudden attack. By means of permanent fortifications France may ward off the first blow, giving time for an orderly military and industrial mobilization and the arrival of allied support. Therefore

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the fundamental purpose of national defense should be to resist the first shock. As the aggressive nation risks being without allies, and runs the chance of ruining itself as well as its victim, if the war is prolonged, it will seek an early victory. The existence of a powerful system of permanent fortifications in France will minimize the possibility of a quick decision and thereby lessen the probability of war.

"The Artillery of the 21st Army Corps, September 26, 1918", an article by Lieutenant-Colonel Aublet, is "a study whose purpose is to show how the French high command conceived the organization and employment of artillery in the preparation of an attack on a wide front."

From the study of this operation, the author evolves certain principles of artillery employment:

"In every attack on a wide front, with limited resources, surprise will always be the best aid to success: to realize it, a rapid employment of artillery remains indispensable.

"The only way to assure strength is to concentrate resources: concentration of fire, by the employment of artillery in large units, immediately followed by the concentrated efforts of the various arms.

"Intelligent cooperation of command will always be able to secure convergence of fire and be able to guard against the unforeseen, in giving necessary flexibility to a preconceived plan.

"The allotment of missions to each unit, according to its ability, will secure from each the maximum result."

"The Recovery of Bab-Hoceine", by General Vanbremeersch is a detailed description of an offensive north of Fez in September, 1925. A study of this campaign brings out, among other lessons, the importance of mobility in mountain warfare. A column which must advance into the heart of a mountainous region should be composed of infantry, cavalry, pack artillery, and should be supported by aviation.

Artillery in draft or tanks should not be used in such a campaign. The power of these weapons would not compensate for their lack of mobility. In the campaign, described in this article, the right column of the 256th brigade brought along its battery of 75 mm. horse-drawn, artillery. Everything went

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well until the column had to leave the trail and cross over ravines, rocks and shrubbery in a terrain which made draft transportation impossible. It was necessary to advance the battery along a trail which was far to the left of the column. A company of infantry was detached to support this battery, but this small detachment was in constant danger of destruction in a country where the enemy could attack from any direction.

The only condition under which artillery in draft may be profitably used, in such terrain, is to establish it, at the beginning of an attack, in a well selected and secure position from which it need not move until the capture of the objective assigned to the troops which the artillery is supporting.

Italy—Rivista di Artiglieria E Genio, January, 1930

In an article "**Notes on Fire Support**", by Claudio Trezzani, Colonel of Infantry, the author, aims to add a contribution towards solving this complex problem. An examination is made of the task of the Infantry commander in obtaining Artillery support by foreseeing the manner in which the combat will develop, in order that he may be enabled to determine objectives upon which the Artillery must execute its fire, the moment at which its fire must be executed and the effects to be attained therefrom. For this purpose he classifies the objectives as known, probable and possible, indicating for each class the task which the Infantry must perform in order to insure the timely and effective intervention of the Artillery.

"**A Graphic Table for the Ballistic Preparation of Fire**", by Romolo Zanobi, Captain of Artillery, describes a method for constructing and using a graphic table which permits a simple and rapid determination of the elements of firing data corrected for the conditions of the moment, as well as facilitating the application of correction data and the utilization of adjustment data.

LETTER OF APPRECIATION

February 17, 1930.

MAJOR GENERAL FRED T. AUSTIN, U. S. A., RETIRED,
2032 Belmont Road,
Washington D. C.

Dear General Austin:

It is with regret that I note your retirement from active service on account of physical disability and I wish to express to you the appreciation of the War Department of your long and valuable service.

In the many years that have elapsed since your entry in 1898 into the military service as first lieutenant, Adjutant of the 5th Massachusetts Infantry, you have progressed with distinction through the various grades to that of Major General, Chief of Field Artillery. A review of your record shows a wide variety of assignments including duty in the Philippine Islands, in the Hawaiian Islands, as Instructor at the Field Artillery School, and a detail in the Inspector General's Department. Promoted to the grade of Brigadier General of the National Army during the World War you commanded with credit the 167th and 156th Field Artillery Brigades, and subsequently the Field Artillery Replacement Depot at Camp Zachary Taylor. It was in recognition of your efficient services at Camp Zachary Taylor, particularly during the influenza epidemic at this camp, that you were awarded the Distinguished Service Medal.

From the date of your assignment to duty as a subaltern you have undertaken every assignment with characteristic loyalty and zeal. Your professional ability and good judgment have invariably won the approbation of those with whom you have served.

I extend to you my personal best wishes as well as those of your many friends and associates in the Army and I wish you many happy years following your relief from active duty.

Sincerely yours,

(SIGNED) PATRICK J. HURLEY.

Secretary of War.

NATIONAL GUARD NOTES

Classification of Mounted Organizations in the National Guard

The new National Guard Regulations 79 of July 1, 1929, issued to all states and put into effect by the Militia Bureau January 1, 1930, are expected to bring about good results in increasing training. These regulations have caused the allowance of funds for animal caretakers no longer to be fixed by the number of horses a unit has on hand. The funds for caretakers are now based on the classification of the unit.

Under the old N. G. R. 79, \$75.00 per month was the allowance of funds for each eight horses or major fraction thereof. If several horses died or were disposed of, it necessitated a reduction in funds for animal caretakers. As a result of this, practically all units of the National Guard retained many unserviceable horses in order not to suffer a reduction in funds for animal caretakers and also to enable them to employ suitable caretakers over a period of months, thereby retaining efficient help. This was uneconomical and placed an unnecessary burden on the National Guard.

In the new regulations the different classifications are as follows:

(Facilities for use, and percentage of maximum allowance of animals)

Class A. Large up-to-date armory, including stables with riding hall of sufficient size to drill whole troop or battery at once (total number of animals not to exceed 150 per branch): 100 per cent.

Class B. (1) Conditions as in Class A except only a small covered drill hall used by single troop or battery: 100 per cent. (2) Where more than one organization of a branch which is authorized to maintain animals are quartered in one armory: B(1) plus 50 per cent for each additional organization.

Class C. No covered drill hall; lighted field adjacent to stables of sufficient size to drill whole troop or battery; maximum use of all animals: same as Class B.

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Class D. No drill hall and only fair amount of use made of animals: 75 per cent.

Class E. Unsatisfactory facilities and not sufficient mounted drills ordered: 0.00 per cent.

Reclassification. An organization may be reclassified by the Chief, Militia Bureau, at any time that the facilities and conditions warrant such reclassification.

Maximum number of animals to a stable. No stable having less than fourteen animals may be maintained at Federal expense without special authority of the Chief, Militia Bureau, and then only under exceptional circumstances.

In making new N. G. R. 79 effective it was necessary for the Militia Bureau to make a classification of all mounted units in the National Guard as provided for in paragraph 16a therein, in order that the number of horses to be authorized and the allowance of funds for animal caretakers could be determined.

The total number of horses authorized by the Secretary of War for the training of the National Guard is not large enough to provide every unit with the maximum number allowed under N. G. R. 79. Neither is it deemed necessary for purposes of basic training to provide in all cases the maximum allowed. The distribution most desired is that which will assure the maximum degree and amount of training to the greatest number of the National Guardsmen. Considerations which govern the Militia Bureau in making the distribution are not only the facilities for holding mounted drills throughout the armory training period, but the actual amount of use which can be made of the horses for training purposes, due to every condition which affects the training. This amount of use is comparative. There are localities in which conditions permit and records show that horses are used daily throughout the armory training period by a large number of men. The returns received in training are large in these localities. On the contrary there are localities in which local conditions permit, and actual records show, that the horses are used for training purposes but once or twice a week or even less frequently. Single mounted units in isolated stations rarely meet the requirements which would justify the use of the maximum allowance of animals. Although the letter of the

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regulations may be complied with in both the above cases, still there is a difference in the maximum use of horses possible under the existing local conditions and it is not considered equitable to give to each an equal number of horses, although a sufficient number to permit basic training is always allowed.

The foregoing is the objective which the Militia Bureau had in mind in revising N. G. R. 79. From the large number of requests received in the Militia Bureau for reclassification of units under these regulations, it is felt that the regulations may not have made it clear that the facilities for the use of horses in mounted training, the actual use made of the animals, and the resultant degree and amount of training are all considerations in the economical distribution of animals for training purposes.

Transfer of National Guard Corps Artillery Regiments to Infantry Divisions

Under the new Tables of Organization National Guard regiments of 155 mm. Howitzers have been transferred from Corps Artillery to the Artillery Brigades of Infantry Divisions as follows:

CONNECTICUT—192d Field Artillery, headquarters at New London, assigned to 68th Field Artillery Brigade, 43d Division.

NEW YORK—106th Field Artillery, headquarters at Buffalo, assigned to 52d Field Artillery Brigade, 27th Division.

PENNSYLVANIA—108th Field Artillery, headquarters at Philadelphia, assigned to 53d Field Artillery Brigade, 28th Division.

MISSISSIPPI, SOUTH CAROLINA and TENNESSEE—178th Field Artillery, headquarters not as yet organized, assigned to 56th Field Artillery Brigade, 31st Division.

NORTH CAROLINA—113th Field Artillery, headquarters at Raleigh, assigned to 55th Field Artillery Brigade, 30th Division.

INDIANA—150th Field Artillery, headquarters at Kokomo, assigned to 63d Field Artillery Brigade, 38th Division.

OHIO—136th Field Artillery, headquarters not as yet organized, assigned to 62d Field Artillery Brigade, 37th Division.

ILLINOIS—123d Field Artillery, headquarters not as yet organized, assigned to 58th Field Artillery Brigade, 33d Division.

WISCONSIN—121st Field Artillery, headquarters Milwaukee, assigned to 57th Field Artillery Brigade, 32d Division.

IOWA—185th Field Artillery, headquarters at Davenport, assigned to 59th Field Artillery Brigade, 34th Division.

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TEXAS—133d Field Artillery, headquarters not as yet organized, assigned to 61st Field Artillery Brigade, 36th Division.

OREGON—218th Field Artillery, headquarters at Portland, assigned to 66th Field Artillery Brigade, 41st Division.

Assignments of Howitzer regiments to the Artillery Brigades of the 29th, 35th, 40th, 44th and 45th Infantry Divisions will be made later. The 29th Division is composed of National Guard troops of Maryland, Virginia and the District of Columbia; the 35th Division of troops of Nebraska, Kansas and Missouri; 40th Division of troops of California, Nevada and Utah; the 44th Division of troops from New Jersey, Delaware and New York; and the 45th Division of troops from Colorado, Oklahoma, New Mexico and Arizona.

The 172d Field Artillery regiment, New Hampshire and Maine National Guard, has been assigned to the 26th Division, Massachusetts National Guard, for mobilization purposes only, until a Howitzer regiment can be allotted to Massachusetts.

The 113th Field Artillery is completely organized in North Carolina while but two battalions of the 178th Field Artillery are at present organized, one each in Mississippi and Tennessee. The third battalion has been allotted to South Carolina but organization has not yet been authorized.

103rd Field Artillery, Rhode Island National Guard

Major General William G. Everson, Chief of the Militia Bureau, has authorized the Adjutant General of Rhode Island to organize the Headquarters Battery and Service Battery of the 103rd Field Artillery of that State. At present the 103rd Field Artillery, Rhode Island National Guard consists of one battalion commanded by Major Francis W. Rollins. When these two additional units are organized and federally recognized the State is authorized to present for federal recognition a lieutenant colonel and one staff officer. Organization of the 2nd Battalion will be authorized whenever the State of Rhode Island indicates its readiness to do so, after which the organization of regimental headquarters may be completed. It has been proposed to convert the Rhode Island Squadron of the 122nd Cavalry into the 2nd Battalion of the 103rd Field Artillery.

REORGANIZATION OF THE FIELD ARTILLERY IN THE UNITED STATES

AS a result of study by the War Department General Staff and the Office of the Chief of Field Artillery, in which every endeavor was made to increase the efficiency of the Field Artillery and to place units where they would be of most use in training the National Guard and the Organized Reserves, and at the same time utilize to the maximum all permanent quarters, the War Department recently announced the following sweeping changes which are considered the most drastic since the World War as regards organization of the Field Artillery in the United States:

a. The 1st Battalion, 9th Field Artillery, will be reconstituted at Fort Lewis, Wash., and armed with 155-mm. howitzers.

b. The 3d Battalion, 17th Field Artillery, will be reconstituted at Fort Leavenworth, Kans., and armed with 155-mm. howitzers.

c. The following units will be rendered inactive:

The 1st, 2d and 13th Ammunition Trains. (Now stationed at Fort Hoyle, Fort Sam Houston and Fort Bragg, respectively.)

The Headquarters and Headquarters Batteries and the Service Batteries of the 3d and 5th Field Artillery regiments.

All batteries now partially inactive in Field Artillery units in the continental United States except those in the 1st Battalion, 3d Field Artillery, the 2d Battalion, 7th Field Artillery, and the 2d Battalion, 18th Field Artillery.

d. The partially inactive batteries in the 1st Battalion, 3d Field Artillery, at Fort Benjamin Harrison, Ind.; the 2d Battalion, 7th Field Artillery, at Madison Barracks, N. Y., and the 2d Battalion, 18th Field Artillery, at Fort Des Moines, Iowa, will be rendered wholly active.

e. The Brigade Headquarters and Headquarters Battery of the 3d Field Artillery Brigade will be reduced to three officers and five enlisted men.

g. Provision is being made to give slightly higher grades and ratings to communications personnel, and for personnel for liaison detachments in battalions.

REORGANIZATION OF THE FIELD ARTILLERY

h. One battery of the 2d Battalion, 5th Field Artillery, at Fort Bragg, N. C., is to be rearmed with 155-mm. G.P.F. guns.

i. The 1st Battalion, 5th Field Artillery, is to be organized as a separate battalion, rearmed with 155-mm. howitzers and sent from Fort Bragg, N. C., to Fort Ethan Allen, Vt., for station.

j. The War Department has under consideration moving the 3d Battalion, 13th Infantry, from Fort Ethan Allen, Vt., to Fort Adams, R. I., to decrease crowding at the former post.

k. The partially inactive batteries that are to be made wholly active will be reconstituted almost entirely by the physical transfer of trained men. The new 155-mm. howitzer battalions will have trained men transferred to them in limited numbers only, and will be brought to strength by recruiting.

l. The personnel of the 5th Field Artillery Band will be transferred to the 17th Field Artillery and the 17th Field Artillery Band will be reconstituted.

m. One battery with attached battery section of battalion combat train of 83d Field Artillery Battalion, will move by marching to Camp Knox, Ky., and upon arrival the battery and battery section of the battalion combat train will be made inactive, and all personnel transferred in grade and specialist's rating to the 1st Battalion, 3d Field Artillery.

n. Dates of movements and of rendering units inactive and of reconstituting units will be announced later. It is contemplated that all movements except those of the battery from Fort Benning to Camp Knox and the 1st Battalion, 5th Field Artillery, to Fort Ethan Allen will be completed by approximately May 1, 1930.

In explanation of the reorganization of the Field Artillery in the United States it might be well to mention a few of the factors which led up to it:

We have all been conscious of the gradual loss of enlisted strength of the Field Artillery during the past few years, due mainly to supplying men to the various Air Corps increments. Last year this matter reached the point where regiments were so stripped of personnel that they were no longer able to function efficiently as regiments, and it was decided to retain as

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active units only such organizations as could be maintained at approximately table of organization strength. As a result of this decision some sixteen batteries of 75's were rendered partially inactive, with paper strengths ranging between twenty-four and fifty-one men, including most of the non-commissioned officers and specialists originally in the battery. These partially inactive batteries were supposed to carry on their rolls all "ineffectives" (men not present for duty for various reasons, on furlough, sick in hospital, on special duty, etc.) and such men, if any, as were in excess of the number needed to maintain the active batteries at tables of organization strength. This procedure, although it gave certain battalions more men than they would have had if the partially inactive battery had been made wholly inactive, met with objections on the part of some due to the paper work involved. It was also believed that the grades and ratings could be better used for other purposes.

The lessening of the numbers of active gun batteries available for training purposes was being severely felt in certain Corps Areas, particularly in those which had only one battalion of Field Artillery.

The inclusion of the 155-mm. howitzer regiment in the Infantry Division presented new training problems, since in the Field Artillery of the war strength Corps, there are more Field Artillery officers serving with 155-mm. howitzers than with 75-mm. guns. This demanded the immediate reconstitution of several battalions of howitzers for training purposes.

Another very important consideration, which brought about the decision to effect these many changes in organization, was the fact that many of the cantonments built during the War had become uninhabitable and the desire of the War Department to utilize to the maximum all available permanent shelter. One limiting factor of the reorganization was that the total strength could not be changed, although grades and ratings could be adjusted, providing the present annual cost was not exceeded.

For some time the Chief of Field Artillery has been deeply interested in increasing the efficiency of our signal and radio communications and in providing better liaison between Field

REORGANIZATION OF THE FIELD ARTILLERY

TABLE A

	Brig Hq		75-mm Gun		155-mm How		155-mmG		240-mmH		75-mm Pack		75-mm Horse	
	A*	B*	A	B	A	B	A	B	A	B	A	B	A	B
Tech Sgts Signal.....	1													
Sif Sgts Signal.....	4	1	1	1	1	1	1	1	1	1	1	1	1	1
Radio.....	1	1	1		1									
Sgts Signal.....			1	1			1	1	1	1	1	1	1	1
Radio.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Corps Signal.....	1	1	2	1	1	2	1	1	1	1	1	1	1	1
Radio.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pvts Incl & Pvts Incl.....	7	10	8	9	8	10	5	11	11	8	8	6	6	6
Lingeuards.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Operators Tel 5th cl.....	3	3	2	2	2	3	2	2	2	2	2	2	2	2
Operators Tel 6th cl.....	2	2	1	1	2	1	1	1	1	1	1	1	1	1
Operators Tel.....	3	4	4	1	3	1	5	4	1	4	2	4	2	3
Operators Radio 4th cl.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Operators Radio 5th cl.....	2	1	3	1	3	1	1	1	1	1	3	1	1	1
Operators Radio 6th cl.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Operators Radio.....														
Total.....	11	14	13	14	11	13	7	16	16	11	11	8	8	8
Ratings 4th cl.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5th cl.....	5	4	5	2	4	3	2	3	2	2	5	2	1	1
6th cl.....	2	2	2	2	1	2	2	2	1	2	1	1	1	2
Total.....	2	8	2	7	2	2	7	2	5	0	2	2	0	2

* A=Numbers according to present Tables of Organization (prior to changes made by Circular 6, WD 1930).

* B=Numbers according to Circular 6, WD 1930.

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Artillery battalions and supported Infantry. This reorganization of the Field Artillery affords an opportunity to improve the status of communications personnel.

With these considerations in mind, study was made in the endeavor to remedy these conditions and to place every man and rating of our limited personnel where he could be of most use.

The reorganization results in a net increase of two more 75-mm. gun batteries and six more of 155-mm. howitzer batteries, while the 155-mm. gun and 240-mm. howitzer batteries have been reduced to one of each caliber. In order to supply the personnel for these units, and to provide for slight increase in the grades and ratings allotted for communications personnel and mechanics in certain motorized organizations, it was necessary to render inactive three ammunition trains, two regimental headquarters and headquarters batteries, two service batteries, thirteen partially inactive batteries and one active battery of 75-mm. guns.

Table A shows a comparison of the grades and ratings for signal and radio personnel of the various types of active units. Column A shows numbers according to present tables of organization, while Column B indicates the strength authorized under Circular 6 WD 1930.

In addition to the increases in ratings shown in table A, one general mechanic fourth class and one general mechanic fifth class in lieu of two mechanics sixth class are provided for in the regimental section, Service Battery, 155-mm. howitzer regiment; three auto mechanics fourth class in lieu of fifth class for the 240-mm. howitzer battery; and one auto mechanic fourth class and one general mechanic fourth class in lieu of two sixth-class ratings in the Ammunition Train.

These increases in ratings are in accordance with studies now being made on the new tables of organization for various Field Artillery units, pending the publication of which five additional privates first class and privates are attached to each gun battery.

FIELD ARTILLERY NOTES

2nd Field Artillery to be Converted into Pack Artillery

On account of the character of the country, the Secretary of War has directed that the 2nd Field Artillery Battalion, stationed in the Panama Canal Zone, be converted from portée artillery to pack artillery and that the conversion be made as rapidly as the arrival of animals and equipment will permit. Portée artillery carries its equipment, guns, ammunition and personnel on trucks.

The animals for the battalion, 590 in number, will leave the United States on a schedule beginning with the March 29th transport from San Francisco. The second shipment will leave New York on May 9th, the third from San Francisco on July 5th and the 6th and last shipment will leave the United States in November.

The battalion will be equipped with twelve 75 mm. pack howitzers, including pack hangers and Phillips Pack Saddles, cargo type. However, the saddles will not be available until the fiscal year 1931. In the meantime the battalion will use 311 aparajos, which are now in storage in Panama.

The portée equipment now in use by the battalion, including guns and ammunition, will be stored in Panama.

The tractor and truck sheds now being used by the 2nd Field Artillery at Gatun will be converted into stables and 10 stable buildings will be erected at Fort Davis for the use of the animals of the battalion.

Allotment of West Point Graduates to Branches

The Secretary of War has allotted the Graduates of the 1930 Class, United States Military Academy, who will number, it is estimated, 247 to the six line branches and to the Quartermaster Corps as follows:

Infantry	100
Cavalry	18
Field Artillery	63
Coast Artillery Corps	31
Corps of Engineers	16
Signal Corps	9
Quartermaster Corps	10

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In making assignments to branches the time-honored policy of assigning graduates of the Academy in branches of their choice as expressed by them in writing will be followed so far as it is consistent with serving the best interests of the service.

In the event that no cadets, or a less number than the 10 choose assignment under this policy to the Quartermaster Corps, then the remaining unfilled allotted assignments will revert to the line branches as follows:

Field Artillery	2
Coast Artillery Corps	1
Corps of Engineers	1
Infantry	5
Cavalry	1
Total	<hr/> 10

No graduates of the 1930 Class will be assigned to the Air Corps immediately upon graduation, as officers of that Corps must be qualified flyers. It is, therefore, necessary for graduates of the Military Academy to pursue the courses of instruction at the Primary and Advanced Flying Schools before they can be assigned to the Air Corps. Details to the Air Corps for the purpose of this instruction will be made at the time of announcement of assignments to stations. These details will be made only from those individuals who request them and the number to be detailed will be limited only by the number who apply and who are found physically qualified for flying.

German Officer Attached to Field Artillery Brigade

The Secretary of War has authorized the attachment of Captain Walter Warlimont, German Army, to the 2nd Field Artillery Brigade, 2nd Division, at Fort Sam Houston, Texas.

Construction Work at Fort Bragg

The Constructing Quartermaster at Fort Bragg, North Carolina, has been instructed to advertise for bids for the construction of fifteen sets of non-commissioned officers' quarters at that post, the amount allotted for the purpose being \$102,000.

Allotment of Officers to Air Corps Tactical School

The Secretary of War has directed that ten officers of arms other than the Air Corps be detailed to the Air Corps Tactical

FIELD ARTILLERY NOTES

School, Langley Field, Virginia, as students for the 1930-31 school year. The allotment to the different arms is as follows:

Infantry	2
Field Artillery	2
Cavalry	2
Coast Artillery	2
Signal Corps	1
Corps of Engineers	1

The officers to be detailed must be of the grade of senior captain or above, graduates of the advanced courses in their respective service schools or the Command and General Staff School and must have signified their willingness to be placed on duty involving flying. They will not be required to pass the special examination for flying but only officers who are in good physical condition will be detailed, in view of the fact that they are required to participate as observers in flying missions.

While the number of officers detailed for the 1930-31 course is the same as for the 1929-30 course, the allotment to the various arms is different. In 1929 only the Infantry, Field Artillery and Cavalry field officers were detailed to the Air Corps Tactical School. This year the Coast Artillery, Signal Corps and Corps of Engineers have been added.

One Troop of Cavalry to go to Camp Knox, Kentucky, for Summer Camps

The Secretary of War has directed the Commanding General, Fourth Corps Area, Major General Frank R. McCoy, with Headquarters at Atlanta, Georgia, to issue the necessary instructions for the movement of one troop of Cavalry from Fort Oglethorpe, Georgia, to Camp Knox, Kentucky, by marching, for duty with the summer training camps at the latter station. The troop is to arrive at Camp Knox on or about June 20.

A Novel Riding Hall

According to the present plans the Fifteenth Field Artillery Riding Hall is in the row of buildings to be wrecked in the near future. This riding hall is one of the most useful and ingenious structures in Fort Sam Houston.

About four years ago Capt. C. F. Cox was the regimental veterinarian for the Fifteenth, and as training young mounts was

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his only real pleasure he felt the regiment should have a riding hall, but there were no facilities and no funds for such an enterprise. "Doc" gave the matter serious thought and finally hit on the solution.

There was a row of empty barrack buildings in the regimental area and fortunately two of them were just the right distance apart. So official sanction having been obtained, Captain Cox and a gang of artillerymen set to work. They tore the wall from the east side of one building and from the west side of the other. With the material thus acquired they built fences at the ends of the riding ring and seats inside the two buildings. When they got through they had a fine open air riding hall with two grandstands that were inside buildings and under roofs.

—SAN ANTONIO MILITARY REVIEW.

Artillery Train Gives Up Charter

The United Train of Artillery, one of the oldest and most colorful military organizations in the country, surrendered its charter to the Yankee Division Veterans' organization and brought to a close a continuous and notable existence since Revolutionary days.

The United Train of Artillery was formed under a charter granted under the National Defence Act on April 22, 1775, and during the struggle of the colonies for independence its members acquainted themselves on the field of battle with deeds of valor and were cited many times for the assistance they gave the Continental Army.

Their flag, pictured in many early histories with the insignia "Don't Tread on Me," was carried at the head of their column in many an exciting battle. The members today still point with pride to the citation of General Washington, issued after the Battle of Princeton, in which he commended the officers and men for their bravery.

In the Battle of Bunker Hill the United Train of Artillery was recognized as one of the strongest wings of the Revolutionary forces and while they suffered heavy losses in that engagement they succeeded in holding one of the strategic points in the struggle.

FIELD ARTILLERY NOTES

146th Field Artillery Planning \$25,000 Polo Field

Representing a layout of approximately \$25,000, the officers' polo team of the 146th F.A. is planning grounds to be opened in 1931 at Fort Lawton. The War Department has been petitioned for a revocable lease of a site at Fort Lawton and if it approves the plan, Seattle will be benefited by one of the best polo grounds in the Northwest.

If the site is approved by the Government, the Officers' Club plans to stage an invitational Northwest tournament in 1931.

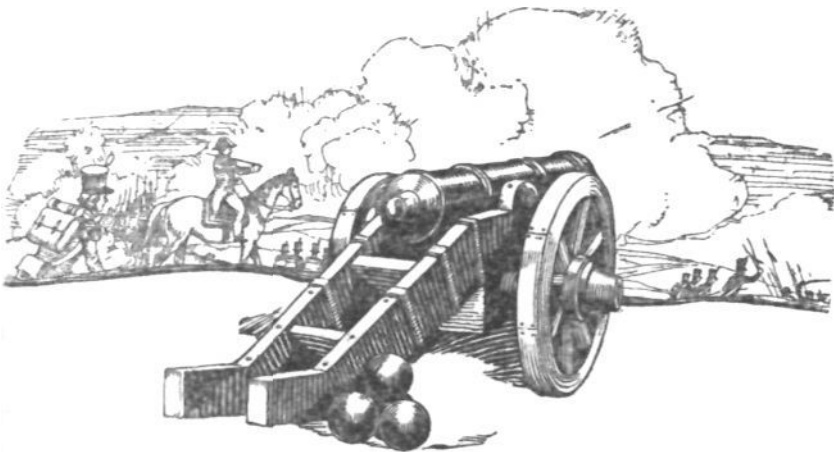
Pending the decision of the War Department the 146th F.A. team this summer will engage in a "good-will" tour to all of the tournaments in this section, which will probably include the events at Boise, Idaho, Vancouver, Washington, and Fort Lewis.

Colonel Albert H. Beebe of the 146th F.A. is enthusiastic about the program of the Officers' Club and has offered his co-operation.

Officers elected by the team for 1930 are Maj. Fred M. Fuecker, president; Capt. W. R. Carroll, vice-president; and Lieut. Dudley Eddy, secretary-treasurer. The executive board consists of the aforementioned officers and Lieut. George D. Hubbard and Capt. Virgil Anderson.

-SEATTLE TIMES.

Eight new polo ponies, to bring the number of mounts to twenty, have been added.



FAIR PLAY

BY E. I. SHACKLEFORD*

FAIR PLAY is dead. The illustrious scion of a mighty race and one of the greatest progenitors this country has ever known recently answered the final call in his paddock at Elmendorf. Fair Play died as he lived, game to the core. He carried his years, which were well passed the allotted span, gallantly, and we doubt if anyone not actually knowing his age could have come within a decade of what it really was. He suffered none of the breaking up and decadence so pitifully evident in man and beast when nearing the end. Turned into his paddock early in the morning, he appeared in his usual fine fettle, in fact men working nearby at eleven o'clock saw him gallop toward his barn, stop suddenly, raise his beautiful head, neigh two or three times and then topple over dead. And what a splendid way to die and how fitting it is that death should have come to him in this manner! How the picture fires the imagination and clutches the heartstrings!

Fair Play always seemed to us more than a horse, he was a symbol, an epitome, of all that is being so constantly striven for and so seldom achieved in the development of the thoroughbred. He was the pride of his breeder, the late Major August Belmont, and a never ending source of pleasure to him on his not infrequent visits to the Nursery Stud in the latter part of his life. Never shall we forget the day, a lovely one in May, during the dispersal sale of Major Belmont's horses held at Nursery Stud, when Fair Play was led into the ring, looking every inch the king he was. The sun's rays on his beautiful chestnut coat made it seem like burnished gold and one felt little wonder that anyone should hesitate to pay any price to own such a horse. In fact, his present owner, Mr. Joseph E. Widener, did pay the goodly sum of \$100,000 for the son of Hastings, then past his twentieth milestone. From the Nursery where he was bred and where he acquired most of his fame as a sire, he was transferred to Mr. Widener's beautiful estate, Elmendorf, where, in quarters specially built for him, he held court and received the

*By kind permission of The Thoroughbred Record.

FAIR PLAY



TOP: MAN O' WAR. CENTER: MAHUBAH, HIS DAM.
BELOW: FAIR PLAY

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tributes that both the high and the lowly ever accord true greatness.

And at Elmendorf he is buried. On a sloping eminence overlooking the training barn his grave was made and there space has been left for Mahubah, when her time comes, his mate in the production of the greatest of all horses, Man o' War. The graves will be appropriately marked and the plot shared by them alone.

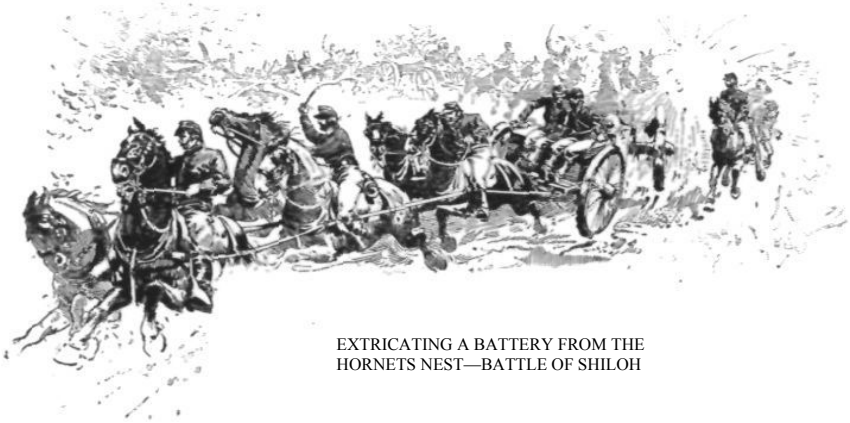
Fair Play, bred by Major August Belmont at the Nursery Stud, was foaled in 1905, being by Hastings out of the imported mare, Fairy Gold, a daughter of Bend Or. His career both on the turf and in the paddock is too well known to need more than a brief résumé at our hands. Fair play was a brilliant racehorse, but it is as a sire that he will always be best known. He won the Flash and Montauk Stakes at two, while his victories at three includes the Brooklyn Derby, the Coney Island Jockey Club Stakes, Lawrence Realization, First Special, Jerome and Municipal Handicaps. He was out the same season as Colin, who defeated him for the Belmont Stakes after a titanic struggle. In the autumn of 1908, when racing was under a cloud, Major Belmont sent Fair Play to England. He, however, did not do well there, and was brought back to this country in 1909, and entered the stud the following year. From the outset his success was pronounced. Stromboli being numbered among his first foals. Three times in the years that followed he was premier sire of America, in 1920, 1924 and again in 1927. When it is remembered that Fair Play has never been represented by any great number of horses in racing his success is all the more phenomenal. Had he sired nothing save Man o' War, he would have achieved undying fame, but his reputation does not rest on the achievements of his get in any one year. It is the high percentage of truly great horses that he has given to the turf year after year that makes him one of the greatest sires of all time. Besides Man O'War, his roster includes such famous campaigners, many of them now successful sires, as Mad Hatter, Stromboli, Mad Play, My Play, Ladkin, Dunlin, Messenger, Sporting Blood, How Fair, Blind Play, Chance Shot, Chatterton,

FAIR PLAY

Chance Play, Display, Catalan and others too numerous to mention.

Fair Play's greatest success was of course achieved with the daughters of Rock Sand, the blood of the "Triple Crown" winner, seemingly having an especial affinity for his. He comes of a line remarkable for its virility, the best evidence of which is the fact that several foals by him are due at Elmendorf in 1930.

Much of Fair Play's greatness has been attributed to his dam, imported Fairy Gold, by Bend Or, which was ever a tower of strength among the matrons at Nursery Stud, but Hastings, his sire, a good racehorse, twice premier, the first time when only nine years old and again in 1908, represented the Australian line at its best.



EXTRICATING A BATTERY FROM THE
HORNETS NEST—BATTLE OF SHILOH

POLO

WORLD WAR CHIEF OF STAFF BACKS ARMY POLO

AT a time when opponents of Army polo are indulging in considerable discussion concerning its value and benefit to the Service, the following statement, made recently at Great Neck, Long Island, by General Peyton C. March, World War Chief of Staff of the United States Army, is of interest:

"I have always been very much interested in the development of polo in the United States Army, and when Chief of Staff, encouraged it and supported it in every way possible. It not only develops in mounted officers the greatest possible skill in riding, training, and the care of horses, but it unquestionably increases the initiative and daring of men who would otherwise be only mediocre horsemen. I find that the country at large, wherever I have traveled, is personally interested in the success of the Army Polo teams, not only in their international matches, but against the great civilian teams of America. This interest, of course, is accentuated by the fact that the polo teams, like West Point itself, are manned by men taken from the whole country, and also, in almost every case, by men who have little money. They are successful because of their skill in riding, and in training and developing their mounts. I believe that those in authority should back the Army Polo teams to the limit."

PEYTON C. MARCH.





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PLEASE MENTION THE FIELD ARTILLERY JOURNAL IN WRITING TO ADVERTISERS

THE ARMY HORSE SHOW TEAM AT THE NATIONAL

W. M. GRIMES. MAJOR, CAVALRY

IT is believed that a study of the attached tables will give the readers of the FIELD ARTILLERY JOURNAL a very clear idea of the showing made by the U. S. Army Horse Show Team in the National Horse Show, Madison Square Garden, New York City, N. Y., November 7 to 14, 1929.

In so far as the Army Show Team is concerned the important classes are the international ones. A glance at Tables III, IV and V discloses the fact that our team won three of the five international classes.

Unfortunately the excellent performance of our Army team received little attention, this was due to the over emphasis placed by newswriters on the outcome of the International Military Trophy—the team-event—which the United States unfortunately did not win.

The personnel of the team exhibiting at Madison Square Garden follows:

Major Harry D. Chamberlin, Cavalry—Team Captain.

Major Charles P. George, Field Artillery.

Captain James G. Watkins, Field Artillery.

Captain William B. Bradford, Cavalry.

Captain Russell C. Winchester, Cavalry.

First Lieutenant John W. Wofford, Cavalry.

First Lieutenant Earl F. Thomson, Cavalry.

THE ARMY HORSE SHOW TEAM

TABLE II
U. S. ARMY HORSE SHOW TEAM
National Horse Show, Madison Square Garden, New York City, N. Y. November 7-14, 1929
INTERNATIONAL EVENTS

Class	Horse	Rider	1st	2nd	3rd	4th	Remarks
146	The International Military Event		1				U. S.—1st Place
	The Jan Ciechanoski Challenge Cup	Bradford		1			Poles—2nd Place
147	The International Military Stake	Chamberlin			1		Canadian Army's "Montreal" won this event. "Dick Waring" (U. S.) and "Muskoogee" (U. S.) tied with "Montreal" for 1st place; on jump-off "Dick Waring" and "Montreal" tied again. 2nd jump-off "Montreal" won.
							Canada1st Place U. S.2nd " U. S.3rd " Poland4th " Poland5th " U. S.6th "
148	Pair of International Officers' Jumpers	Proctor } George Williams } Nigra } Muskoogee }	1				U. S.—1st Place U. S.—2nd Place
		Bradford } Watkins } Winchester } Thomson }		1			Irish Free State—3rd Place Canada—4th Place
149	International Military Trophy	Thomson Bradford Chamberlin			1		Polish Team1st Place Italian Team2nd " U. S. Team3rd " Irish Team4th " Canada 5th "
150	International Individual Military Championship Trophy for officers	Tan Bark Thomson					U. S.—1st Place Italy—2nd Place
Receptulation:							
U. S. Army Horse Show Team won three (3) out of five (5) International Events. Winning in all—							
Three (3) Firsts							
Two (2) Seconds							
Two (2) Thirds							
Two (2) Places							
United States	3	2	2	1	1	8
Poland	1	1		1	1	4
Canada	1		1	1	1	3
Irish Free State			1	1		2
Italy		2				2

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TABLE I

U. S. ARMY HORSE SHOW TEAM

National Horse Show, Madison Square Garden, New York City, N. Y.

November 7-14, 1929

HUNTER AND JUMPING CLASSES

	Class	Horse	Rider	1st	2nd	3rd	4th	5th
110	Green Hunter	The Judge	King		1			
120	Hunt Teams	{ Saint Paul G. Williams Proctor }	{ Thomson Watkins Bradford }				1	
122	\$2,000 Championship Hunter Stakes	Dick Waring	Chamberlin				1	
125	Jumpers	Buckaroo	Bradford	1				
127	Three Hunters or Jumpers	St. Paul George Williams Triangle	Thomson Watkins George	1				
128	Jumpers, 5'	Buckaroo	Bradford			1		
129	Pen Jump	Buckaroo	Bradford				1	
131	The Commodore Cup	Babe Wharton	Winchester					1
133	Scurry Stake	Babe Wharton Nigra	Winchester Winchester		1		1	
134	Handy Hunter Stake	Buckaroo Tan Bark	Bradford Thomson	1	1			
136	\$2,000 Stake	Proctor Joe Aleshire Nigra	Bradford Bradford Winchester	1	1		1	

MILITARY CLASS

	Class	Horse	Rider	1st	2nd	3rd	4th
41	Officers' Chargers	George Williams Husmile Diplomat	Watkins Winchester Wofford	1			1
42	Officers' Mounts	George Williams The Madame Husmile	Watkins George Winchester		1	1	1
43	The Bowman Challenge Cup	George Williams The Madame Diplomat	Watkins George Wofford	1		1	1