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The Reorganization and New Training Objective of the Coast Artillery Corps

THE World War brought many changes to all branches of the Army and to the Coast Artillery Corps in particular. Once we were concerned only with fixed guns and mines. The war introduced numerous innovations which changed our conception of warfare. The Coast Artillery was affected by some of them.

While railway artillery was used long before the World War it was during its progress that the feasibility of giving large caliber guns mobility by mounting them on rails was practically demonstrated. Large caliber guns meant long ranges and difficulties of ammunition supply. These considerations required a careful preparation of fire and the use of firing maps with accurately computed corrections. Had the Coast Artillery remained with its harbor defense guns and mines during the war the War Department would have failed to utilize effectively a highly trained branch of artillery since the situation at the time we became involved did not offer an opportunity to attack hostile naval vessels. It was only natural, then, that the newly developed railway artillery should be turned over to us. We had the fundamental knowledge and experience. The methods used in firing large cannon are much the same whether mounted on concrete or on rails. Railway artillery then became the concern of the Coast Artillery and has remained so.

If it was not difficult to transfer our activities to railway artillery the contrary was the case when the need for antiaircraft artillery arose and we were also given this mission. At first thought the handling of the light antiaircraft guns might appear to be more properly a function of the Field Artillery. But again the Coast Artillery by its previous training was qualified to handle this job. The moving target, which brings to mind at once a prediction system of fire control, was familiar to us. It was true that our new target had a speed five or six times greater than the naval target with which we were familiar. It was also true that this new target could maneuver in three dimensions whereas our previous experience had included only two. But this same speed and maneuverability again called for the most accurate preparation and delivery of fire. So the Coast Artillery was given another mission which has been its principal interest during the past ten years.

Along with railway and antiaircraft artillery came the development of the motor and tractor for artillery and the decline of the horse as a motive power. Whether the horse will pass out of the picture altogether is a

subject for another discussion. It must be admitted, however, that the motor, only, can move the larger field guns. The Coast Artillery, during the war, as well as the Field Artillery manned tractor-drawn guns and since has continued to have tractor-drawn guns as a secondary armament for harbor (including mine) defense.

Trench mortars and sound ranging were also our concern during the war but, since then, these activities have been transferred to other branches and departments with the exception of certain developments in sound ranging.

These new functions of the Coast Artillery brought about a gradual reorganization. Coast Artillery troops for the past ten years have been trained and are efficient in handling fixed guns, railway guns, antiaircraft guns, tractor-drawn field guns, and mines. Our original organization, with troops scattered along our seacoast in the various harbor defenses, did not lend itself to the most efficient training. Many harbor defenses had only the skeleton of the personnel required. In addition the drain of the new railway, tractor, and antiaircraft regiments reduced the harbor defenses much below their prewar personnel strength. Many officers serving with troops have been cognizant of this unfavorable situation and have repeatedly called attention to the need for an increase in the strength of the Corps which was impossible to obtain. Some have even gone so far as to urge the concentration of the Coast Artillery in a few stations so that the personnel available would be sufficient to conduct training without numerous makeshifts, improvisations, and excessive overhead for administration.

The reorganization of the Coast Artillery has been the subject of much study in the office of the Chief of Coast Artillery for the past several years. The abandonment of certain Coast Artillery posts produces a political situation which will not be discussed but which, nevertheless, is real. The materiel at these posts is important and requires a careful consideration of the means required to prevent its deterioration. Unlike the personnel, it cannot be concentrated. Tactical and strategic considerations prevent this even if the nature of the materiel would permit.

In any organization scheme one of the most important subjects to be considered is the training of the civilian components of the Army of the United States. These include the National Guard and Organized Reserve. The C. M. T. C. and R. O. T. C., while not exactly a part of the Army, are closely connected with it and must be considered. At least two months each year is devoted by the regular Coast Artillery personnel to the important duty of training the civilian components. For reasons of economy the places designated for the training of these components should be conveniently located. Coast Artillery Organized Reserve units, National Guard units, and Reserve Officers' Training units are located throughout the entire continental United States—their location intended to facilitate pro-

curement of personnel rather than for tactical or strategic reasons. Unlike the other branches, the Coast Artillery, as its name indicates, has a principal sphere of action which renders the location of Regular units in the interior impracticable. This and many other subjects were deeply studied before the present reorganization scheme evolved and was approved.

The reorganization for the Coast Artillery will be placed in effect during the early months of the present year. The approved plan does not affect, to any great extent, Coast Artillery units beyond the continental limits of the United States. For various reasons little reference will be made to overseas units in this article.

Briefly, the scheme consists in reducing certain harbor defenses to a caretaking status. Those selected for retention as training centers, together with the units manning them and their strength in officers and men are shown in the table following:

HARBOR DEFENSES IN CONTINENTAL UNITED STATES RETAINED ON
ACTIVE STATUS

<i>Name</i>	<i>Unit</i>	<i>Off.</i>	<i>E. M.</i>
Long Island Sound	11th Coast Artillery (H. D.)	23	438
	18th S. R. B.	4	86
Sandy Hook	52nd Coast Artillery (Ry.) (less 2 bns.)	14	266
Chesapeake Bay	12th Coast Artillery (H. D.)	19	336
	3d Bn., 52nd Coast Artillery (Ry.)	9	228
	51st Coast Artillery (T. D.)	9	318
Pensacola	13th Coast Artillery (H. D.)	22	336
San Francisco	6th Coast Artillery (H. D.)	27	407
Puget Sound	14th Coast Artillery (H. D.)	25	410

Those reduced to a caretaking status are:

Portland	¹ Sandy Hook	Mobile
Portsmouth	Delaware	Galveston
Boston	Potomac	San Diego
New Bedford	Charleston	Los Angeles
Narragansett	Savannah	Columbia
Eastern N. Y.	Key West	
Southern N. Y.	Tampa	

¹ Manned by 52d in addition to manning railway.

Fort Eustis, Virginia, will be abandoned as a Coast Artillery station and with it passes the 1st Sound Ranging Battery. The duties of this battery will be taken over by the Field Artillery, the present personnel remaining Coast Artillery and available for general assignment.

There will be four anti-aircraft regiments in the States located at Fort Totten, Fort Oglethorpe (Georgia), Fort MacArthur (California) and

Fort Sheridan (Chicago, Illinois). The 62d will remain at Fort Totten at strength about the same as at present. The 61st will move to Fort Sheridan via Camp Knox for station. It will remain at about its present strength. The 63d will move from San Francisco to Fort MacArthur (Los Angeles) for station and will remain at about its present strength. A new antiaircraft regiment, the 69th, will be rendered active and organized at Aberdeen Proving Ground and will eventually move to Fort Oglethorpe, Georgia, for station. Its final station will be Fort Crockett, Texas. One battalion, only, will be active. Its strength will be the same as that of the 63d.

It can be seen that the location of the six harbor defense training centers and the four antiaircraft training centers depends, in large part, upon the geographic distribution of population and is a compromise with tactical and strategic considerations.

The 51st Coast Artillery and the 52d Coast Artillery, the only tractor-drawn and railway regiments in the States will be moved from Fort Eustis. The 51st will take station at Fort Monroe as will one battalion (the 3d) of the 52d. The headquarters and 1st Battalion of the 52d will take station at Fort Hancock where it will man fixed armament as well as railway guns. The organization of the two battalions of this regiment will be such that each contains a mortar and eight-inch gun battery.

The table which follows shows all units manning armament with locations and strengths. It does not include mine planter personnel.

REGIMENTS MANNING ARMAMENT IN U. S.

<i>Name</i>	<i>Location</i>	<i>Off.</i>	<i>E. M.</i>
6th C. A. (H. D.)	San Francisco	27	407
11th C. A. (H. D.)	Long Island Sound	23	438
12th C. A. (H. D.)	Chesapeake Bay	19	336
13th C. A. (H. D.)	Pensacola	22	336 ²
14th C. A. (H. D.)	Puget Sound	25	410
51st C. A. (T. D.)	Fort Monroe	9	318
52nd C. A. (Ry.)	Fort Hancock	14	266
(less 2 bns.)			
52nd C. A. (Ry.)	Fort Monroe	9	228
(3d Bn.)			
61st C. A. (A. A.)	Fort Sheridan, Ill.	16	305
62nd C. A. (A. A.)	Fort Totten	29	544
63rd C. A. (A. A.)	Los Angeles	16	328
69th C. A. (A. A.)	Aberdeen	16	328
18th S. R. B.	Fort H. G. Wright	4	86
C. A. S. Detach	Fort Monroe	29	198

² Not including caretaker detachments.

The units shown in the table below man no armament, consist solely of caretaker detachments, but are retained on the active list.

REGIMENTS ACTIVE BUT CONSISTING OF CARETAKER DETACHMENTS ONLY

<i>Unit</i>	<i>Location</i>	<i>Off.</i>	<i>E. M.</i>
3d C. A. (H. D.)	San Diego	2	22
	Los Angeles	2	23
	Columbia	2	39
5th C. A. (H. D.)	Eastern N. Y.	1	20
	Southern N. Y.	2	36
7th C. A. (H. D.)	Sandy Hook	5	49
	Delaware	2	38
8th C. A. (H. D.)	Portland	2	47
	Portsmouth	1	12
9th C. A. (H. D.)	Boston	3	71
10th C. A. (H. D.)	New Bedford	1	13
	Narragansett	2	45
*13th C. A. (H. D.)	Charleston	2	20
	Savannah	1	12
	Key West	2	15
	Galveston	2	36

* In addition to manning harbor defenses of Pensacola.

For convenience the next table is inserted showing, by location, all units manning armament as distinct from those on caretaking duty.

STATIONS OF REGIMENTS IN U. S. ON ACTIVE STATUS EXCEPT CARETAKING

<i>Name</i>	<i>Unit</i>	<i>Off.</i>	<i>Men</i>
Long Island Sound	11th C. A. (H. D.)	23	438
	18th S. R. B.	4	86
	M. P. Baird	*	21
Fort Totten	62nd C. A. (A. A.)	29	544
Fort Hancock	52nd C. A. (Ry.)	14	266
	(less 2 bns.)		
	M. P. Henry	*	24
Aberdeen (Fort Oglethorpe)	M. P. Ord.	*	24
	69th C. A. (A. A.)	16	328
Chesapeake Bay	12th C. A. (H. D.)	19	336
	51st C. A. (T. D.)	9	318
	3d Bn., 52nd C. A. (Ry.)	9	228
	M. P. Schofield	*	24
Pensacola	Coast Artillery School	29	198
	13th C. A. (H. D.)	22	336
Los Angeles	63rd C. A. (A. A.)	16	328
San Francisco	6th C. A. (H. D.)	27	407
	M. P. Armistead	*	21
Puget Sound	14th C. A. (H. D.)	25	410
	M. P. Bell	*	21
Fort Sheridan, Ill.	61st C. A. (A. A.)	16	305

* Commanding officer from harbor defense regiment.

The tabulation below shows certain units which have been reduced to caretaker strength with their previous strength indicated for comparison.

UNITS REDUCED TO CARETAKER STRENGTH

<i>Name</i>	<i>Station</i>	<i>Present Strength (enlisted)</i>	<i>Future Authorized (enlisted)</i>
8th C. A. (H. D.)	Portland	127	47
	Portsmouth	8	12
9th C. A. (H. D.)	Boston	226	71
10th C. A. (H. D.)	New Bedford	6	13
	Narragansett	156	44
5th C. A. (H. D.)	E. New York	0	20
	S. New York	31	36
7th C. A. (H. D.)	Sandy Hook	382	97
	Delaware	31	38
3d C. A. (H. D.)	San Diego	30	22
	Los Angeles	202	23

Units rendered entirely inactive are the following:

UNITS RENDERED INACTIVE

7th C. A. Band (Sandy Hook)—Personnel transferred to A. C., Langley Field, Va.

3d C. A. Band (Los Angeles)—Personnel transferred to 63rd C. A. (A. A.)

9th C. A. Band (Boston)—Personnel transferred to A. C., Mitchel Field, N. Y.

10th C. A. Band (Narragansett)—Personnel transferred to 69th C. A. (A. A.)

1st S. R. Battery (Fort Eustis)—Personnel available for general assignment, Coast Artillery.

Hq. and Hq. Battery, 30th Brigade (Fort Eustis)—Personnel available for general assignment.

Since many will be interested in how the new strengths of these organization are to be obtained as well as other details pertinent to a particular unit the following notes, by regiment, are given:

NOTES ON INDIVIDUAL UNITS

9th Coast Artillery Band (Boston)—This band will be rendered inactive about February 28, 1930, and the personnel transferred to the 9th Observation Group, Mitchel Field, N. Y.

9th Coast Artillery (H. D.) (Boston)—Will transfer one hundred and twenty-four enlisted men to the 69th C. A. (A. A.) at Aberdeen, February 5, 1930.

10th Coast Artillery Band (Narragansett)—This band will be rendered inactive about January 31, 1930, and the personnel transferred to the 69th C. A. (A. A.) at Aberdeen Proving Ground, February 5, 1930.

10th Coast Artillery (H. D.) (Narragansett)—Will transfer twelve enlisted men to the 69th C. A. (A. A.) at Aberdeen, February 5, 1930.

8th Coast Artillery (H. D.) (Portland)—Will transfer sixty-seven enlisted men to 11th C. A. (H. D.) (Long Island Sound).

10th C. A. (H. D.) (Narragansett)—Will transfer fifty-eight enlisted men to the 11th C. A. (H. D.) (Long Island Sound).

7th C. A. Band (Sandy Hook)—Will be rendered inactive January 31, 1930, and all personnel transferred to 2d Bombardment Group, Langley Field, Va.

7th C. A. (H. D.)—Will transfer ninety-seven enlisted men to the 69th C. A. (A. A.) (Aberdeen) February 5, 1930. Sixteen enlisted men will be transferred to the 13th C. A. (H. D.) (Pensacola) about the same date.

1st Sound Ranging Battery—The personnel will be transferred to the 69th C. A. (A. A.) at Aberdeen about January 31, 1930, where the battery will be demobilized and personnel assigned. Technical equipment will be stored.

52d C. A. (Ry.)—The regiment, less Service Battery, Batteries "D" and "F," and Headquarters Battery, 3d Battalion, will move to Fort Hancock, N. J., by rail and motor transportation so as to arrive about April 1, 1930. Railway equipment to be taken: two 12-inch mortars; two 8-inch guns; four fire control cars; four ammunition cars; one signal communication car; two kitchen cars; one locomotive. All other equipment to be stored. The Service Battery will be rendered inactive at Fort Eustis. The 3d Battalion will move to Fort Monroe, Va., for station on a date selected by the Corps Area Commander. Railway equipment to be taken to Fort Monroe: two 12-inch mortars; two 8-inch guns; three fire control cars; four ammunition cars; one signal communication car, and one kitchen car.

61st C. A. (A. A.) (Fort Monroe)—The permanent station of this regiment will be Fort Sheridan, Ill. Part of it will move to Camp Knox, Ky., to arrive on such date as the Corps Area Commanders may select and will be utilized for summer training at Camp Knox.

51st C. A. (T. D.)—All units of this regiment except the 1st Battalion will be rendered inactive. It will move to Fort Monroe for station on a date selected by the Corps Area Commander.

12th Coast Artillery (H. D.)—Will transfer nineteen enlisted men to the 3d Battalion, 52d C. A. (Ry.); two to the 61st C. A. (A. A.); six to the C. A. School Detachment. Batteries "B" and "E" will be rendered inactive.

3d C. A. (H. D.) (Los Angeles)—Will transfer its band and twenty-three other enlisted men to the 63d C. A. (A. A.); one hundred and three enlisted men to the 6th C. A. (H. D.) San Francisco; sixteen enlisted men to the 14th C. A. (H. D.) (Puget Sound).

63d C. A. (A. A.) (San Francisco)—Will move to Los Angeles by marching to arrive on a date selected by the Corps Area Commander.

30th Brigade Headquarters and Headquarters Battery (Fort Eustis)—Will be rendered inactive on a date selected by the Corps Area Commander.

69th C. A. (A. A.)—Consisting of a Headquarters, Headquarters and Combat Train, 1st Battalion, Battery "A," Battery "B," and Battery "E" will be made active by the Commanding Officer, Aberdeen Proving Ground upon the arrival of the personnel for its organization. A band will be organized by transfer of personnel from the 10th C. A. Band, Narragansett. The final station of this organization is Fort Crockett, Texas. Details of its transfer will be arranged at a later date and after vacation of Fort

Crockett by Air Corps troops. In the meantime its station will be Fort Oglethorpe, Georgia.

The Junior M. P. "General Robert Anderson" (Boston)—Will be placed in commission and stationed in the harbor defenses of Pensacola.

The "Major Evan Thomas" (Los Angeles)—Will be sent to the harbor defenses of Puget Sound for station.

The figures and dates given above for the transfer of enlisted men are approximate only. Minor transfers were ignored in these notes.

ORGANIZATION OF COAST ARTILLERY TROOPS AT FORT MONROE

Due to the location of the Coast Artillery School at Fort Monroe the organization of the troops at this station differs somewhat from the normal organization, with particular reference to the 12th Coast Artillery (H. D.). It was desired that as many types of Coast Artillery armament as possible be represented at this station. The troops at Fort Monroe not only are required to be thoroughly trained as units, but in addition, are utilized for demonstrations of the various types of armament and their use before Coast Artillery School students.

Units designated for station at Monroe are the 12th, the 51st, and the 52d. The presence of the 51st furnishes an opportunity to observe and study tractor-drawn artillery. The 52d serves the same purpose for railway artillery. The 12th will consist of a headquarters battery, the 12th Band, a battery (reduced strength) to be stationed at Fort Story, an antiaircraft battery, and a mine battery. The antiaircraft battery will handle both guns and machine guns as well as searchlights and will take no part in seacoast artillery training. The 51st Coast Artillery (T. D.) in addition to handling tractor-drawn artillery will be trained and proficient in the handling of fixed secondary armament. In like manner the 3d Battalion, 52d Coast Artillery (Ry.), will be trained and proficient in the handling of fixed primary armament. By "handling" is meant all operations connected with the guns and fire control system including the firing of target practices for demonstration purposes as scheduled by the Coast Artillery School.

If the duties of these units stationed at Fort Monroe are considered rather heavy it can also be seen that the officers serving with troops at that station will have an exceptional opportunity to obtain first-hand knowledge of the use and operation of nearly every type of cannon which the Coast Artillery mans.

THE NEW TRAINING OBJECTIVE FOR THE COAST ARTILLERY CORPS

During the study and preparation of the reorganization plans for the Coast Artillery, the War Department added to the duties and mission of Coast Artillery troops in the following words:

"It must be a *normal* mission for all Coast Artillery troops to serve antiaircraft guns. While the fixed defenses constitute the first line of

defense for the harbors on the Coast against enemy naval guns, the anti-aircraft armament must constitute the first line of ground defense against enemy aircraft at sensitive points and vital areas. This principle will be recognized and taught. In accordance therewith, *all Coast Artillery* will be trained to serve skillfully and effectively anti-aircraft instruments, equipment, listening devices, searchlights, fire control, etc., *in addition to the permanent assignments that units may have to fixed defenses, railway, or tractor-drawn artillery.*"

This means that each battery of seacoast artillery (which includes railway and tractor) will be assigned, in addition, to an anti-aircraft searchlight, gun, or machine gun battery. Assignments of seacoast artillery batteries to A. A. gun, machine gun and searchlight batteries will be approximately equal in each Corps Area and department and in each harbor defense. "The seacoast artillery units assigned to receive training in anti-aircraft artillery will devote sufficient time to this training to enable them to serve this armament with the same skill that they have developed in serving seacoast armament. All seacoast artillery units will conduct target practice with both anti-aircraft artillery and seacoast artillery in accordance with the rules and regulations prescribed in TR. 435-55, Coast Artillery Target Practice."

Officers on staff duties or with headquarters and service batteries will be trained on anti-aircraft artillery and officers on duty with organized reserve units will be ordered once each year, when practicable, to the nearest station of an anti-aircraft unit for observation of anti-aircraft firings and participation in joint Anti-aircraft-Air Corps exercises.

As a result of these instructions, Corps Area and Department training directives issued for the year beginning July 1, 1930, will contain some important changes from those issued in previous years. The following is quoted from the Artillery paragraph in a directive prepared in the War Department:

"Each battery of railway, tractor-drawn, anti-aircraft, and fixed artillery must be proficient, under the battery commander in drill, subcaliber, and service practice including an analysis of each where applicable; in adjustment of fire, camouflage, and when appropriate, in movement, concealment, emplacement, employment, operation, and maintenance of the materiel to which assigned. These units will also be required to be proficient in the tactical employment of anti-aircraft artillery only to such an extent as is applicable to the materiel available. The work of the various sections of the battery must be thoroughly coordinated so as to constitute a training team capable of operating at highest efficiency. * * * The desirable percentage of available training to be devoted thereto should be, when practicable, not less than 85 per cent. If necessary to attain this standard of proficiency other training will be curtailed."

A list of the subjects in which training will be given (not more than 15 per cent of the total time available) is shown:

Infantry drill.

Small arms instruction—(Course D for rifle and Table I and Table II, Instruction Course for pistol. To be fired once each enlistment, except by those entitled to additional compensation.)

Signalling—(A detail to be maintained, qualified in the blinker apparatus).

Physical Training and Athletics.

Chemical Warfare Defense.

Camouflage.

First Aid and Hygiene.

Interior Guard Duty.

In preparation for the antiaircraft training for seacoast units which becomes effective July 1, 1930, troop schools will be conducted for all officers covering the tactics and technique of antiaircraft artillery.

To prevent exceeding the allotment and appropriation for seacoast ammunition it has been necessary to curtail some of the firings authorized in order that seacoast artillery units may be permitted to fire antiaircraft artillery in addition to the seacoast armament to which they are assigned. These units will be allowed only half the amount authorized for antiaircraft units. For those assigned to antiaircraft machine guns the firing of four guns only will be required. Those assigned to guns will fire not more than three guns.

A few organizations will be given a special allowance to effect a further saving. The 51st Coast Artillery (T. D.) will be authorized only half the allowance designated for other G. P. F. regiments. The mine battery, 12th Coast Artillery (H. D.) will be attached to the antiaircraft battery for firing. The antiaircraft battery, 12th, will receive half the allowance of regularly assigned antiaircraft and machine gun batteries.

Antiaircraft batteries will receive the same allowances as at present.

There will be no allowance for the firing of secondary assignment seacoast armament.

Officers adjustment firings will be eliminated.

A considerable reduction will be made in the allowances for the Coast Artillery School and for firing conducted under the office, Chief of Coast Artillery.

The increasing importance of antiaircraft artillery is emphasized in the reorganization and training objective outlined above. This importance is due to the rapid development of aircraft in recent years and the possibilities for its further development and future use as a weapon of warfare. Those who have the vision and the imagination, see in the huge commercial transport planes of today nothing more than bombardment aviation which can carry bombs as easily as they now carry passengers and merchandise. These commercial planes can be provided with bomb racks and machine guns with much less difficulty than the transformation of a com-

mercial vessel into a troop transport. It may be possible to limit battleships and armaments of all nations, preserving the parity to which their resources and importance entitle them. But this procedure will not be possible in the case of aircraft due to its commercial use and the ease with which it may be diverted from its peaceful pursuits to those of war. Due to its great mobility it will be the first weapon with which our aggressive enemy will strike. Under these conditions our Air Corps and antiaircraft artillery will meet this menace, side by side, each in its own sphere of action. Antiaircraft guns, equipment, and trained personnel must be ready at all times for instant action. It is the appreciation of this condition which has crystallized the decision to train all Coast Artillery as antiaircraft artillery. This addition to the mission of the Coast Artillery Corps brings an increased responsibility and necessitates more highly intensive training. The entire personnel will be called upon to put forth greater effort. The Chief of Coast Artillery believes that this will be done enthusiastically and with pride in the fact that the Coast Artillery Corps is one of the most versatile of the combat arms and has become our principal means of positive defense against the greatest development of modern warfare.

Having had recent experience with reserve training it is only natural that the last duty and station should be uppermost in our mind, for a short time at least. Reserves, C. M. T. C. and R. O. T. C. are closely connected. Most of the commissioned personnel of the Reserve comes from the R. O. T. C. The few who are commissioned from the C. M. T. C. are carefully selected and earn their commission by considerable effort. Almost without exception the C. M. T. C. Reserve officer is active in the Reserve. We are sorry to report this is not true with the R. O. T. C. officer. It is understood that only one out of six R. O. T. C. officers are receiving active re-appointments after the expiration of the first five-year period of appointment. To the casual observer this seems like a terrific amount of lost motion. Perhaps it isn't. Perhaps the training received during a four year R. O. T. C. course will pay dividends in an emergency even if no further training is obtained after being commissioned. Nevertheless there seems to be something wrong with this picture. We know there could be closer cooperation between P. M. S. & T.'s and Unit Instructors of organized reserves. We hope that someone who has ideas on this subject will spread them upon the pages of the Journal.

March of the 62nd Coast Artillery (AA)

From Fort Totten, N. Y. to Fort Story, Va. and return

By LIEUT. COL. JOHN M. DUNN, 62nd C. A. (A. A.)

PRELIMINARY PLANS

WHILE earlier in the winter of 1928-1929 correspondence had been conducted with the War Department regarding the concentration of the 61st and 62nd Coast Artillery Regiments at Fort Story, Va., for target practice and joint training with the Air Corps, actual orders directing the movement did not reach the 62nd until February 21, 1929.

The greater part of the regiment had spent from September to November, 1928, at Aberdeen Proving Grounds, Md., and thus the personnel were familiar, as far as Aberdeen, with the only practical route of march to the south from Fort Totten. In addition, many officers of the regiment had motored between New York and Washington and between Washington and Fort Monroe. Thus it will be seen that the selection of the route of march was a comparatively simple task.

Between New York and Philadelphia the Lincoln Highway is the most usually traveled route. From Philadelphia to Baltimore there is a choice of two routes. The eastern route crosses the Susquehanna River at Havre de Grace, Md., while the more westerly route crosses the same river at Conowingo, Md. The eastern route was chosen because the grades were easier and for the additional reason that, as it happened, better facilities for billeting could be had along that road.

All things considered, including hours of departure from billets and arrival at the end of a day's march, driving hours for chauffeurs, and age and condition of transportation in the hands of the 62nd Coast Artillery, sixty miles per day is considered a good normal day's movement. It might not be out of place at this time to state that out of a total of fifty-eight F. W. D. trucks on hand in the regiment, thirty-four were, at the time the march was begun, on mechanical inspection report but replacements could not be obtained prior to the date of departure. These trucks were worn out, dilapidated and generally worthless, but had to be taken in order to carry the loads of the regiment.

War Department instructions required the regiment to be in position at Fort Story and ready to begin firing not later than April 1, 1929. This indicated a departure from our home station about the middle of March.

Weather conditions had to be considered. It was well known that spring weather could not be expected to break earlier than the latter part of April and that a considerable amount of bad weather might be expected in the New York-Washington area during late March and early April. For this reason it was desirable to avoid bivouacking in tents as far as possible, and plans were made to stay overnight in billets at military posts or in National Guard armories where such shelter could be obtained.

Having in mind the daily distances to be marched, a study of the route was made, with the results that the following points, with corresponding distances to be marched, were tentatively selected as billets:

Night of the	1st Day—	Raritan Arsenal, N. J.....	60 miles
“ “ “	2nd “ —	Frankford Arsenal, Pa.	59 “
“ “ “	3rd “ —	State Armory, Wilmington, Del.....	42 “
“ “ “	4th “ —	Aberdeen Proving Grounds, Md.....	48 “
“ “ “	5th “ —	Fort Meade, Md.	58 “
“ “ “	6th “ —	Fort Humphreys, Va.	52 “
“ “ “	7th “ —	N. G. Armory, Fredericksburg, Va....	41 “
“ “ “	8th “ —	N. G. Armory, Richmond, Va.....	52 “
“ “ “	9th “ —	Fort Eustis, Va.	69 “
“ “ “	10th “ —	Fort Story, Va.	54 “

A careful map study was made and the total marching distance, including turn-offs from main highways into billeting locations, was determined to be five hundred thirty-one and two-tenths miles. It is interesting to state at this point that the total distance logged on the outward trip proved to be five hundred thirty-four and seven-tenths miles.

FUNDS

Having determined this much of our problem, the next step taken was that of forwarding a requisition for funds. This was prepared and forwarded on February 25, 1929, four days after receipt of our orders.

The table in paragraph 19 AR 30-1075 gives a fair basis for an estimate for funds to cover movements by motor transport. Our vehicles, however, were old and were well known to have a greater gasoline consumption per mile than is shown in that table. For example, the table shows four (4) miles per gallon to be the gasoline mileage for a three-ton F. W. D. truck. It was known that our trucks could not make more than two (2) miles to the gallon, and in the cases of the twelve (12) trucks pulling the heavy loads in the gun batteries (eight guns and four tractors), no more than one mile per gallon could be expected.

The cost of gas was estimated on the basis of current contract rates to Army establishments. A twenty-five per cent addition to this cost was included to cover the cost of the necessary oil.

Our estimate finally included funds under the following items:

Army Transportation

- P1731 Gas and oil, tactical
- P3992 Repairs to motor vehicles and filling acetylene tanks on motor vehicles
- P3993 Repairs to passenger vehicles
- P5088 Tolls and ferriages

Barracks and Quarters

P3115 Hire of camp sites

P4375 Purchase of water

Communications (Signal Service of the Army)

P930 Telephone and telegraph tolls

Regular Supplies

P1707 Wood for cooking

P1906 Ice for preservation of supplies

P4720 Candles and matches

P4759 Kerosene for illumination

P4821 Straw for bedding

In general, it will be found that funds to cover all of the above items will be required for any extended field operations of a motorized organization. As we had no assurance at the time the estimate was prepared that we would find available shelter for billeting at the places tentatively selected, the necessary funds for the hire of camp sites and straw for bedding were included in our estimate.

DETAILED PLANS

The estimate having been cleared away, the decision was made to march in two columns twenty-four (24) hours apart. This seemed necessary and advisable on account of the lengths of our columns and the probability that housing accommodations at the billeting points might not be sufficient for the whole regiment. Parking accommodations for our vehicles were also an important consideration. Approximately eighty thousand square feet are required in which to park all of our vehicles in close order. There is always the possibility of rain overnight and experience has taught the personnel of this regiment that heavily-loaded vehicles must be kept on hard roads. Ease of supply, gassing of trucks, and the fact that a considerable portion of the route of march passed through the congested industrial area of the Middle Atlantic States with its large cities and heavy volume of motor traffic over the roads at all times, were other considerations involved in the decision to move in two columns.

Looking at the operation in retrospect, it may be said that the decision was well made and fully justified. On February 5th a warning memorandum was issued to all unit commanders in order that they might have early information on certain questions affecting their preparations for the march. In this memorandum unit commanders were informed that Equipment "A" and "B" would be taken with the following exceptions: no mosquito bars or headnets; one barrack bag per man; three additional blankets per man; one trunk locker for each four men, in which the best uniforms of the men were to be packed.

(1)	(1½)	(2)	(3)	1st B'n Column			2d B'n Column			(10)	(11)
				(4)	(5)	(6)	(7)	(8)	(9)		
New York City Jersey City, N. J.	Lincoln Highway " "	New York Jersey City	Jersey City Newark	Queensboro Plaza, L. I. City Jersey City exit, Holland Tube	6:30 A. M. 8:00 A. M.	18 18	Queensboro Plaza, L. I. City Jersey City exit, Holland Tube	6:30 A. M. 8:00 A. M.	19 19	Queensboro Plaza, L. I. City Jersey City exit, Holland Tube	New York entrance, Holland Tube Jersey City-Newark City Line on Newark Turnpike
Newark, N. J.	" "	Newark	Elizabeth	Jersey City-Newark City Line on Newark Turnpike	9:30 A. M.	18	Jersey City-Newark City Line on Newark Turnpike	9:30 A. M.	19	Jersey City-Newark City Line on Newark Turnpike	City Line South on Freylinghausen Av.
Elizabeth, N. J.	" "	Elizabeth	New Brunswick	Elizabeth City Line North on Freylinghausen Av.	12:15 P. M.	18	Elizabeth City Line North on Freylinghausen Av.	12:15 P. M.	19	Elizabeth City Line North on Freylinghausen Av.	City Line South on Rahway St.
New Brunswick, N. J. Trenton, N. J. Philadelphia, Pa.	" " " " " "	New Brunswick Trenton Philadelphia	Princeton Philadelphia, Pa. Frankfort Arsenal	Raritan River Bridge City Line North on Princeton Av. City Line on Roosevelt Blvd. Frankford Arsenal	8:15 A. M. 11:30 A. M. 4:00 P. M. 7:00 A. M.	19 19 19 20	Raritan River Bridge City Line North on Princeton Av. City Line on Roosevelt Blvd. Frankford Arsenal	8:15 A. M. 11:30 A. M. 4:00 P. M. 5:00 A. M.	20 20 20 21	Point of pickup on Middlesex Av. City Line North on Princeton Av. City Line on Roosevelt Blvd. Frankford Arsenal	City Line South on French St. N. J. entrance Del. River Free Bridge Frankford Arsenal, Wallach St. Gate Darby
Chester, Pa. Wilmington, Del. " "	Route 13 " 13 & 40 " " " "	Chester Wilmington	Wilmington, Del. Elkton	City Line North on Darby Turnpike Riverview Cemetery National Guard Armory	10:00 A. M. 1:30 P. M. 7:00 P. M.	20 20 21	City Line North on Darby Turnpike	7:45 A. M.	21	City Line North on Darby Turnpike Riverview Cemetery National Guard Armory	City Line South National Guard Armory Christiana River Bridge, Market St. " " " "
State of Maryland Washington, D. C. Fredericksburg, Va.	Routes 40, 3 & 1 Route 1 " "	Del.-Md. State Line Washington Fredericksburg	Dist. of Columbia Line Alexandria, Va. Richmond	Del.-Md. State Line District Line & Bladensburg Rd. Rappahannock River Bridge Armory, Btry "F", 111th F. A. Va. N. G.	10:45 A. M. 10:35 A. M. 5:30 P. M. 7:00 A. M.	22 23 25 26	Del.-Md. State Line District Line & Bladensburg Rd. Rappahannock River Bridge Armory, Btry "F", 111th F. A., Va. N. G.	9:30 A. M. 1:30 P. M. 9:20 A. M.	21 22 23	Del.-Md. State Line District Line & Bladensburg Rd. Rappahannock River Bridge Armory, Btry "F", 111th F. A., Va. N. G. Rappahannock River Bridge Armory, Btry "F", 111th F. A., Va. N. G. City Line North & Chamberlaine Ave.	District of Columbia Line Highway Bridge Armory, Btry "F", 111th F. A., Va. N. G. National Cemetery Armory, Btry "F", 111th F. A., Va. N. G. National Cemetery Howitzer's Armory, Va. N. G.
Richmond, Va.	Routes 1 & 60	Richmond	Williamsburg	Junction City Line North & Chamberlaine Av. Howitzer's Armory, Va. N. G.	5:30 P. M. 7:00 A. M.	26 27	Junction City Line North & Chamberlaine Av. Howitzer's Armory, Va. N. G.	3:15 P. M. 7:00 A. M.	26 27	Howitzer's Armory, Va. N. G. City Line North & Chamberlaine Av.	National Cemetery on Williamsburg Rd. Howitzer's Armory, Va. N. G.
Newport News, Va. Norfolk, Va.	Routes 60 & 117 Route 117	Newport News Norfolk	Norfolk Fort Story, Va.	Junction of Virginia Av. & City Line Ferry slip from Newport News (Colley Av.)	10:30 A. M. 2:00 P. M.	28 28	Junction of Virginia Av. & City Line Ferry slip from Newport News (Colley Av.)	7:00 A. M. 9:30 A. M. 2:00 P. M.	28 29 29	Howitzer's Armory, Va. N. G. Junction of Virginia Av. & City Line Ferry slip from Newport News (Colley Av.)	National Cemetery on Williamsburg Rd. Ferry foot of Jefferson Av. City Line East on Princess Anne Rd.

Later, on February 25th, after plans had developed further, unit commanders were informed in an office memorandum of the proposed march schedule and some of the features of various proposed supply plans. In this memorandum it was specified that each man, including what he wore on the journey, would take the following articles of uniform clothing: two O. D. shirts (wool), two suits of woolen underwear, two suits of cotton underwear, two pairs of shoes, two suits of fatigue clothing and such other smaller articles of uniform clothing as might be necessary. No caps were taken. Uniform clothing other than what was carried in the packs, was to be packed in barrack bags except the number one uniforms which were to be packed in trunk lockers. Two pillow slips, one pillow, four sheets and two bed sacks or mattress covers were also to be taken by each man.

Immediately after the tentative march schedule had been decided upon, we communicated with the Commanding Officer of each Regular Army station at which it was proposed to billet. In these letters the object of the march was explained, the number of the troops and vehicles in the columns were stated, and permission was requested to halt the columns and to use such shelter as might be available. The letters further carried the information that the Regimental Supply Officer would precede the troops to make all necessary arrangements for their reception and that certain supplies—rations, fuel, gas, oil and wood—would be purchased. Similar letters were sent to the Adjutants General of States in which we desired to use the facilities of National Guard Armories for shelter.

It is a pleasure to state at this point that we received favorable replies to all our communications and every assistance was rendered us at our billeting points.

POLICE ESCORTS

As these arrangements progressed, a very careful study was made of the route of march and the time schedule to be maintained. As a basis for our marching time, it was estimated that in the open country the gun battalion could make seven miles per hour, and the machine gun battalion, with Headquarters and Service Batteries attached, eight miles per hour, and that both battalions could make six miles per hour through cities or areas of congested traffic. As we planned to obtain police escorts along the entire route of march, it was necessary to determine with considerable accuracy exactly when and where we wanted the police escorts of city and state police to meet our columns. This study led to the construction of a table of police escorts (see table insert) which in effect became somewhat of a proposed march table.

Referring to the table the following is an explanation of the data contained in the various columns:

- (1)—City in which police escort was desired.
- (1½)—Route to be followed.
- (2)—Name of city through which column was to pass.

- (3)—Name of next point beyond on the route of march.
 (4)—Pick up point desired for police escort, 1st Bn.
 (5)—Hour of pick up, 1st Bn.
 (6)—Day of pick up for 1st Bn.
 (7) }
 (8) } Data similar to (4) (5) and (6) for 2nd Bn.
 (9) }
 (10)—Pick up point of escort (repeated).
 (11)—Dropping point of escort.

From this table it was also an easy matter to determine the hour of pick-up for state police at state boundaries.

This table was used in the preparation of letters to police authorities indicated in column (1) thereof of which the following is an example:

HEADQUARTERS SIXTY-SECOND COAST ARTILLERY JMD/g
 Office of the Regimental Commander
 Fort Totten, N. Y.
 March 11, 1929.

Subject: Movement of the 62nd Coast Artillery (A. A.), from Fort Totten, N. Y., to Fort Story, Va.
 To: Commissioner of Police, Trenton, N. J.

1. Orders have been received from the War Department directing the movement, by marching, of the 62nd Coast Artillery (A. A.), (a motorized regiment), from Fort Totten, N. Y., to Fort Story, Va. The route of movement along Lincoln Highway passes through the city of Trenton, the next point en route being Philadelphia, Pennsylvania.

2. *a.* The 1st Battalion Column, under the command of Maj. L. B. Magruder, 62nd C. A., consisting of approximately eight officers and two hundred and eighty enlisted men and seventy-five heavily loaded Army trucks, with guns and trailers, will arrive at City Line North on Princeton Avenue at approximately 11:30 a. m., March 19th.

b. The 2d Battalion Column, under the command of Maj. Gooding Packard, 62nd C. A., consisting of approximately twelve officers and two hundred and seventy enlisted men and seventy-five heavily loaded Army trucks, with trailers, will arrive at City Line North on Princeton Avenue at approximately 11:30 a. m., March 20th.

3. A police escort is requested through your city from City Line on Princeton Avenue to N. J. entrance Delaware River free bridge.

4. An advance agent will precede each column to meet your police escort at the designated point.

5. Please advise me of the point on the route at which I may expect your escort to pick up the columns, and the telephone number by which my column commanders will be able to get in communication with your police representatives.

6. Thanking you in advance for any assistance you may render us and assuring you of our desire to cooperate with you in the functioning of your traffic arrangement, I remain,

Yours very truly,

H. C. BARNES,
*Colonel, 62nd C. A.,
Commanding.*

Similar arrangements were made for state police escorts through the states of New Jersey, Pennsylvania, Delaware, Maryland and Virginia. At all places police officials were interested in our problem; uniformly courteous and exceedingly helpful.

BY-ROUTES TO BILLETS

All of our billeting areas were located from one to five miles off the main highway routes which we had planned to follow. From automobile



C. T. TRUCK IN DITCH OUTSIDE CAMP MEADE, MARYLAND

route maps or from knowledge available in the regiment, a careful study was made of the short by-routes leading to these areas. This study disclosed the fact that in all, except one case, the routes were city streets or concrete roads. The one exceptional case was the road leading into Fort Meade, Md., from the Baltimore-Washington main highway. A further study of this particular situation disclosed a concrete road leading directly south from Baltimore to Fort Meade, and that road was followed.

By careful reconnaissance a route of exit was found over a dirt road three miles long leading from Fort Meade to the Baltimore-Washington highway. The decision was made to use this road because the shortest distance out to the main highway by a hard concrete road was eleven miles.

On the morning upon which our 1st Battalion departed from Fort Meade the column moved at 7:00 a. m. The weather was clear. The two-gun batteries and the Headquarters 1st Battalion and Combat Train were committed to the road within a few minutes after 7:00 o'clock. Suddenly a sharp rain squall came up lasting about twenty minutes. The result was that a short piece of road easily negotiated under ordinary conditions in half an hour delayed the movement of these three batteries until 2:00 in the afternoon. This occurrence is mentioned here to bring out several principles:

That on a scheduled march a motorized column should be very careful about going into a place for billet or bivouac over a road which it would be difficult to get out over in the event of rain or other changing weather conditions during the night.

That vehicles should not be parked on other than hard ground except in very dry weather.

That before a motorized column is permitted to move over a piece of unknown road, a careful road reconnaissance should be made.

That short unknown stretches of secondary dirt roads should be finally reconnoitered not more than half an hour before the column moves over them.

BRIDGES

A word about bridges and their load capacities would not be out of place at this time. At least in the eastern section of the United States all of the bridges on the main highways have been constructed with sufficient load capacities to permit the passage of the heaviest loads of an anti-aircraft artillery regiment. Such, however, is not true in the cases of the secondary and tertiary road net.

Prior to our departure from Fort Totten we sent our heaviest loads to the post scales and had them weighed. Our limiting weights were found to be approximately as follows:

Old guns (Model 1918).....	14,000 lbs.
New guns (M1)	15,000 "
10-ton tractor and trailer.....	20,000 "
20-H. P. tractor and trailer.....	16,000 "
Artillery repair truck.....	14,300 "

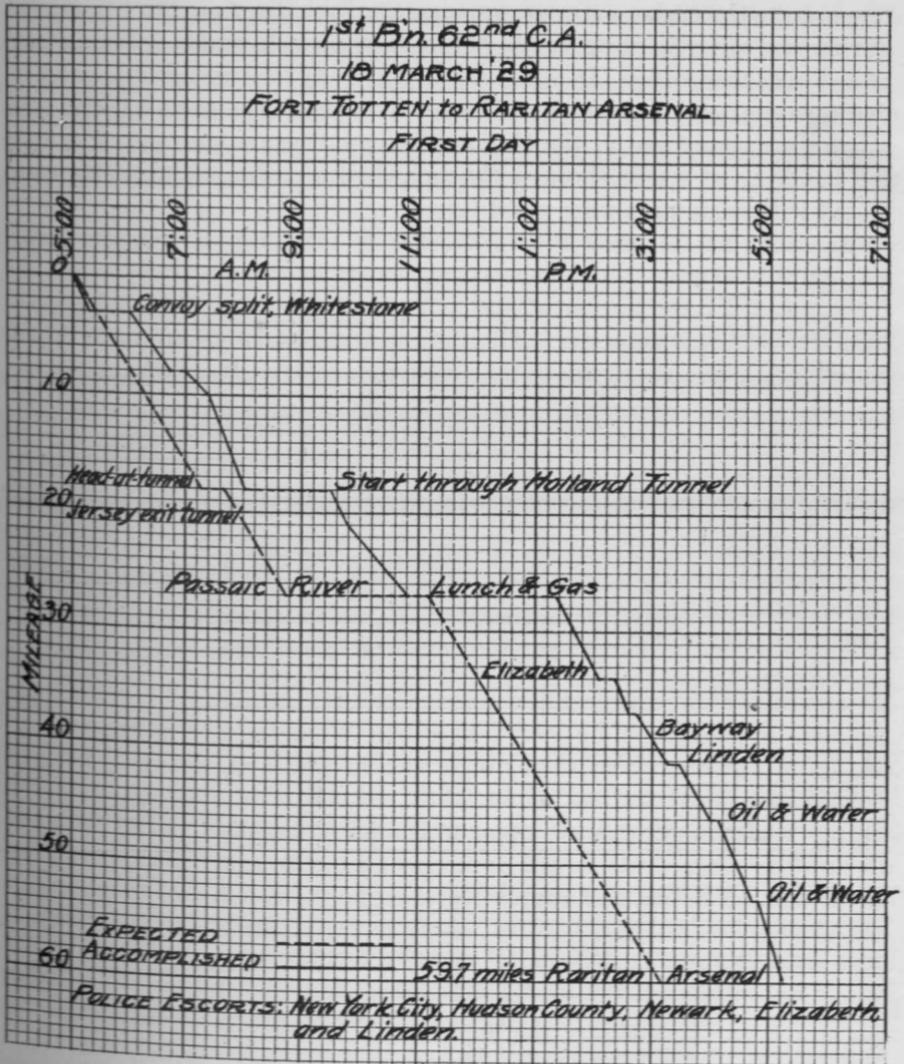
During the march when there was any doubt we examined the bridge carefully before permitting the vehicles to pass over it.

Generally there is sufficient clearance of overhead crossings to permit all vehicles and guns to pass under. However, sometimes there is not sufficient overhead clearance to permit a sound locator transported in a class "B" truck to pass under. In such cases the vehicles would have to be routed around the obstacle by some other road or sent ahead of the column so that the sound locator could be unloaded from the truck, taken

under the overhead crossing and loaded up again on the other side. At least in one instance on our march this latter alternative had to be done.

MARCH GRAPHS

In addition to studies of the route of march, detailed march graphs were made covering several of the day's marches through places where



traffic conditions were known to be very congested or where some special terrain feature had to be negotiated involving more than ordinary marching precautions. These march graphs included the first day's march from Fort Totten to Raritan Arsenal, through New York City and the Metropolitan area; the movements through Baltimore and District of Columbia,

and that part of the march involving the crossing of the ferry from Newport News to Portsmouth, Va.

The movement of such a column through New York City under the most favorable conditions is a difficult problem. In the instant case, it involved the passage through two bottle necks under rush hour conditions when the traffic is most congested. The first bottle neck was to be encountered at the Queensboro Bridge, crossing the East River at 59th St. Except during the early morning hours, before 6:00 o'clock, traffic is always congested over this bridge. It is estimated that sixty-five thousand to seventy-five thousand cars pass over the bridge each day. The second bottle neck was to be encountered at the Holland Tunnel. Regulations are rigid as to the handling of traffic through the tunnel. Its movement must be maintained without interruption at all times.

In order not to block the approaches to the ferry at Newport News, Va., or to interfere with the normal movement of civilian traffic across the ferry, careful coordination of the arrival of elements of the columns at the ferry slip was necessary. All of these arrangements were made in advance with representatives of the ferry company.

SUPPLY

In any march, the question of supply is an important one. In the instant case, we had a regiment leaving its home station for extended field service with approximately a fourteen days' march ahead of it before arrival at its destination. It is needless to state that great care was exercised in the study of this phase of the problem to insure that everything was considered and arranged for.

Normally, in field operations, a unit less than a division does not issue an administrative order. Such supply features as may be necessary are included in paragraph 4 of the field orders. Conditions in peace, however, are quite different from those to be met in war and, as our plans progressed, we found we had many items pertaining to administration and supply while on the march, upon which prior decisions should be made. In order to concentrate in one document all of the instructions pertaining to the administration and supply features for the march and to reduce the size of our field orders we issued the following administrative orders:

HEADQUARTERS SIXTY-SECOND COAST ARTILLERY JMD/g

Office of the Regimental Commander

ADMINISTRATIVE ORDERS }
No. 1 }

Fort Totten, N. Y.,
14 March, 1929, 11:00 a. m.

TO ACCOMPANY FIELD ORDERS NO. 1

I. SUPPLY

1. The 1st Battalion Section of the Service Battery under command of 1st Lieut. C. H. Crim, 62nd C. A., and attached to the Hq., Hq. Det.

and C. T., 1st Bn., for rations, will accompany and supply the 1st Battalion column. The Service Battery (less 1st Bn. Section), under the command of 1st Lieut. J. J. Johnson, 62nd C. A., will accompany and supply the 2nd Battalion column.

2. Sgt. Joseph R. LaChance, Service Battery, will take orders for rations from organizations of the 1st Battalion column, Corp. Alex L. Brummett, Service Battery, will take orders for rations from organizations of the 2nd Battalion column.

3. Staff Sgt. Nathaniel Willoughby, with the artillery repair truck, tools and a stock of spare parts, will accompany the 1st Battalion Section. Staff Sgt. Bureh M. Perry, with the artillery supply truck, tools and spare parts, will accompany the 2nd Battalion Section.

4. The duties of the Service Battery will be limited solely to supply



"B" BATTERY SETS UP OUTSIDE OF LANGLEY FIELD, VIRGINIA

and repair functions during the march. Trucks pertaining to these sections will not be used for towing.

II. RATIONS

1. Battery Commanders will submit ration returns prior to departure from Fort Totten for the period March 1st to 31st. They will turn over to Battalion Supply officers sufficient funds with which to make necessary purchases while en route.

2. Organization Commanders will carry sufficient staple rations for the entire march period when leaving Fort Totten and sufficient meat, bread and vegetables for two (2) days.

Battery Commanders should arrive at Fort Story with not less than two (2) days' staple ration components in their organizations. Fort Eustis is the last point at which rations may be drawn before arrival at destination. Advance information should be furnished the Regimental Supply

officer of staple ration components desired to be drawn at that point.

3. The Regimental Supply officer, leaving Fort Totten on March 15th, will precede the regiment. He will notify Battalion Supply officers where rations and supplies may be purchased. Arrangements will be made, as far as possible, to purchase from post commissaries along the route.

III. GAS AND OIL

1. Each battalion section will include a seven hundred and fifty-gallon gas tank truck. Battalion Commanders will issue instructions directing all drivers of motor vehicles to stand by their trucks upon arrival in camp each evening until their vehicles have been filled for the following day's run. Normally all gassing of trucks will be done in the evening upon arrival in camp, but, opportunity will also be taken during the noonday halts to fill trucks with gas. Gas trucks will not be used for towing.

IV. TOLLS AND FERRIAGES

1. Battalion Commanders will inform Battalion Supply officers of the numbers and types of vehicles and personnel in their columns. Battalion Supply officers should precede the columns to points where tolls and ferriages must be paid and upon arrival make cash purchases of tickets from funds allocated to them by the Regimental Supply officer for the purpose.

V. FUEL

1. Upon departure from Fort Totten each battery will carry sufficient wood for rolling kitchens for three days. Each battalion section of the Service Battery will carry sufficient fuel for the organizations of that battalion for three days additional. Each Battalion Supply officer will be furnished with funds by the Regimental Supply officer for the purchase of additional fuel for each battalion.

VI. CAMP SITES

1. The Regimental Supply officer will arrange for such camp sites as may be necessary and will make payment for same.

VII. STRAW FOR BEDDING

1. The Regimental Supply officer will arrange for the purchase, delivery and payment, of straw for bedding at each camp site where straw is authorized by the Regimental Commander.

VIII. ICE

1. The Regimental Supply officer will furnish to each Battalion Supply officer the necessary funds for the purchase of ice. Battalion Supply officers will make purchase and arrange for deliveries at the same time as prescribed above for rations.

IX. REPAIRS TO MOTOR VEHICLES

1. Each Battalion Supply officer will be furnished with fifty dollars; funds for emergency repairs to motor vehicles. Battalion Commanders will be furnished vouchers upon which they may make emergency payments for repairs. Upon presentation of such vouchers, duly prepared, to the Battalion Supply officers, they will receive reimbursement up to and including fifty dollars for the trip.

X. DISTRIBUTION OF FUNDS

1. For the trip from Fort Totten to Fort Story funds will be furnished the Battalion Supply officers by the Regimental Supply officer and will not be exceeded.

XI. PAYMENTS AND HANDLING OF VOUCHERS

1. Payments will be made in cash. Receipted itemized bills will be taken for payments for rations. All other payments will be receipted for on Comptroller Form No. 1034; signature to be in ink or indelible pencil by firm from whom purchase is made.

XII. EQUIPMENT

1. For equipment to be taken see par. 9, Memorandum No. 10, this headquarters, c. s., dated February 25, 1929, and unnumbered memorandum, this headquarters, dated March 5, 1929.

2. The Chevrolet (U. S. No. 115554), with its present chauffeur, is attached to the Hq. 1st Bn., effective 4:45 a. m., March 18, 1929, and the Dodge (U. S. No. 115483), with its present chauffeur is attached to the Hq. 2nd Bn., effective 4:45 a. m., March 19, 1929. Upon completion of the march and arrival at Fort Story, Va., these two cars with their chauffeurs, will revert to Hq. Battery. Chauffeurs will not be changed except by authority of Regimental Headquarters.

XIII. ADMINISTRATION

1. Maj. L. B. Magruder, 62nd C. A., and Gooding Packard, 62nd C. A., are hereby appointed Investigating officers for motor accidents occurring to vehicles comprising their columns.

2. Battery or detachment lists will be prepared for organizations comprising each column. Battalion Commanders will cause these lists to be used for mustering their columns on the morning they leave Fort Totten. Lists will be checked showing men in the columns, those left behind at the post, and those absent from the post. Two copies of such lists will be furnished S-1 immediately prior to departure from Fort Totten.

3. *Logs.* For the purpose of securing data for the return journey and for future operations, Battalion Commanders will cause to be kept accurate logs of the journey. In these logs will be kept—hours of departure from and arrival in camps; times, places, and durations of halts; road dis-

tances between important places along the route; times of arrival at points designated for meeting police escorts; routes used by police escorts through cities; and such other data as may be necessary and pertinent.

Battery Commanders will keep an account of gasoline and oil consumed per type of vehicle, with type of trailer hauled, and at the end of the journey will submit report to Regimental Headquarters.

XIV. QUARTERING

1. When troops occupy National Guard armories, Battalion Commanders will take necessary steps to insure that all members of their command strictly conform to the armory regulations in force. The necessary guards, latrine and bath orderlies, will be posted. Battalion Commanders are hereby appointed investigating officers to investigate complaints before leaving and to assess damages against organizations or individuals before leaving.

XV. USE OF BAND

1. The band will not be used for playing music, for concert work, for guard or general fatigue, except by direction of the Regimental Adjutant.

XVI. POSTAL SERVICE

1. The following schedule of postal service is announced; mail will be received and delivered at:

- a. Fort Totten up to 6:00 p. m., 18 March, 1929,
- b. Aberdeen Proving Ground up to 4:00 p. m., 21 March, 1929.
- c. Fort Humphreys, Va., up to 12:00 noon, 25 March, 1929,
- d. Richmond, Va., up to 5:00 p. m., 27 March, 1929,
- e. Thereafter to Fort Story, Cape Henry, Va., until 30 April, 1929.

The Regimental Adjutant will make arrangements with the Post Office Department to carry out the above schedule for the handling of the mail and for securing and delivering the mail en route.

XVII. HOSPITALIZATION AND EVACUATION

1. *Medical Service*—Such Medical officers and Medical Department enlisted personnel as may be assigned will accompany battalion sections of the Service Battery in each column.

2. *Evacuation*—Normally ambulance to nearest Army Post, emergency cases to nearest hospital.

XVIII. GUARD DUTY

1. Camp and motor park guards will be established at each night halt and an officer of the day detailed by each Battalion Commander for his battalion. At halts where both battalions are together one officer of the day will be detailed by S-1. The Regimental Staff and Battalion Supply officers will not be available for detail as officer of the day.

XIX. CALLS

1. Such calls as may be necessary will be prescribed by Battalion Commanders when alone, and by Regimental Headquarters when they are together. The calls sounded will be limited to those necessary for the day's operations.

XX. CHECK ROLL CALL

1. On nights when marches are to be made on the day following, tattoo will be sounded at 10:00 p. m., at which time a check roll call will be taken in each organization and all enlisted men will be required to be in bed. Lights will be put out at this time. Report of the roll call will be made to the officer of the day.

By order of Colonel BARNES:

JOHN M. DUNN,
Lieut. Col., 62nd C. A.,
Executive.

Official:

NELSON DINGLEY, III,
Captain, 62nd C. A.,
S-3

Under the above orders, supply matters worked very smoothly and no difficulties were met at any time.

It will be noted that our supply arrangements were based on the utilization of the Service Battery to perform those functions for which it exists as a unit of the regiment. Tables of Organization divide the Service Battery into four parts—a Regimental Section, a 1st Battalion Section, a 2nd Battalion Section and a Maintenance Section.

Throughout the gunners instruction period of the winter and in accordance with the requirements of Changes No. 2, TR 435-210, care had been taken to thoroughly instruct the personnel of the Service Battery in supply duties. As a result of this instruction, the battalion supply sections were well organized and all of the personnel thoroughly understood their respective duties. Each battalion section was commanded by a lieutenant of the Service Battery. Each section accompanied its own battalion and performed all supply functions. The officers in command of the sections acted as Battalion Supply officers and made all expenditures of funds for the columns while on the march.

The Regimental Supply officer, with a detachment of the regimental section of the Service Battery, in a White reconnaissance car, preceded the leading column by several days. Each day the Regimental Supply officer kept in touch with Battalion Supply officers by telephone and obtained from them their needs and requirements. Contracts were made in advance and supplies were arranged for. No difficulties whatever were encountered and the system worked perfectly. Supplies of all kinds were delivered on time whenever and in what quantities needed.

FIELD ORDERS

On March 14th, the following Field Orders were issued :

FIELD ORDERS } NO. 1 }	62nd C. A. (A. A.) FORT TOTTEN, N. Y. 14 March, 29, 11 :00 a. m.
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MAPS: Socony Road Maps of New York, New Jersey and Middle Atlantic States; Official State Roads Commission Maps, Maryland, Delaware and Virginia.

1. The annual target practice of this regiment will be conducted at FORT STORY, VA., commencing 1 April, 1929.

2. This regiment, less detachment ordered to remain at FORT TOTTEN, N. Y., by S. O. 31, H. D. E. N. Y., dated 11 March, 1929, marches on FORT STORY, VA.

3. *a.* The head of the 1st Bn., with 1st Bn. Section of the Service Battery attached, will pass the MAIN GATE at FORT TOTTEN at 5:00 a. m., 18 March, 1929.

b. The head of the 2nd Bn., with Headquarters Battery and Service Battery (less 1st Bn. Section), will pass the MAIN GATE at FORT TOTTEN at 5:00 a. m., 19 March, 1929.

x. (1) Battalion columns will halt for billeting or bivouac as follows:

	<i>1st Bn.</i>	<i>2nd Bn.</i>
	<i>Night of March</i>	
RARITAN ARSENAL	18/19	19/20
FRANKFORD ARSENAL	19/20	20/21
WILMINGTON, DEL.	20/21	
ABERDEEN PROV. GROUNDS, MD.	21/22	21/22
FORT GEORGE G. MEADE, MD.....	22/23	22/23
FORT HUMPHREYS, VA.....	22/23 and 24/25	23/24 24/25 25/26
FREDERICKSBURG, VA.	25/26	26/27
RICHMOND, VA.	26/27	27/28
FORT EUSTIS, VA.	27/28	28/29

(2) On 22 March, 1929, the 2d Bn. precedes the 1st Bn. out of ABERDEEN PROVING GROUNDS, its head marching at 6:00 a. m. The head of the 1st Bn. following will march at 7:00 a. m. The 1st Bn. head will not pass the BALTIMORE CITY LINE on PHILADELPHIA AVENUE prior to 12:00 noon.

- (3) On 23 March, 1929, the 2d Bn., precedes the 1st Bn. out of FORT GEORGE G. MEADE, MD. The head of the column will march at 7:00 a. m. The head of the 1st Bn. following will march at 8:00 a. m.
- (4) Speeds of marching to be maintained—1st Bn., 7 mph.; 2d Bn., 8 mph.; both columns at 6 mph. through cities or areas of congested traffic.
- (5) The HOLLAND TUNNEL will be used in leaving NEW YORK CITY, and the NEWPORT NEWS-PINE BEACH FERRY between those two points.
- (6) Police escorts have been arranged for through the following localities: NEW YORK CITY, JERSEY CITY, NEWARK, ELIZABETH, NEW BRUNSWICK, TRENTON, PHILADELPHIA, CHESTER, WILMINGTON, STATE OF MARYLAND, WASHINGTON, D. C., FREDERICKSBURG, RICHMOND, NEWPORT NEWS and NORFOLK. Bn. Commanders will send agents forward in advance of columns to make contacts before arrival.

4. See Administrative Orders No. 1.

5. (a) Plan of Signal Communication:

- (1) Commercial telephone systems in emergencies and when radio is not available. Prior approval required by Regt. Commander, Ex., S-4 or Bn. Commanders.
- (2) Radio between Bns. and Regt. Hdqs. will be established at 12:00 noon and 6:00 p. m. daily.
- (3) Sets will operate on a wave length of eight hundred (800) meters.
- (5) Call letters:

Regt. _____ AB 4
 1st Bn. _____ CT 1
 2nd Bn. _____ CW 2

(b) Axes Signal Communication:

See Par. 3 X (1).

(c) C Ps:

Regiment:

<i>Closes</i>	<i>Opens</i>
FORT TOTTEN, 7:30 a. m. 19 March, 29	RARITAN ARSENAL, 6:00 p. m., 19 March, 29
RARITAN ARSENAL, 7:00 a. m., 20 March, 29	FRANKFORD ARSENAL, 6:00 p. m., 20 March, 29
FRANKFORD ARSENAL, 7:00 a. m., 21 March, 29	AB'DN PROVING GDS., 6:00 p. m., 21 March, 29
AB'DN PROVING GDS., 7:00 a. m., 22 March, 29	FORT GEORGE G. MEADE, 6:00 p. m., 22 March, 29

FORT GEORGE G. MEADE, 8:00 a. m., 23 March, 29	FORT HUMPHREYS, 3:00 p. m., 23 March, 29
FORT HUMPHREYS, 7:00 a. m., 26 March, 29	FREDERICKSBURG, 6:00 p. m., 26 March, 29
FREDERICKSBURG, 7:00 a. m., 27 March, 29	FORT EUSTIS, 6:00 p. m., 27 March, 29
FORT EUSTIS, 7:00 a. m., 29 March, 29	FORT STORY, 6:00 p. m., 29 March, 29

1st Bn.: FORT TOTTEN, N. Y., until 5:00 a. m. 18 March, 1929, thereafter en route.

2d Bn.: FORT TOTTEN, N. Y., until 5:00 a. m., 19 March, 1929, thereafter en route.

By order of Colonel BARNES:

JOHN M. DUNN,
Lieut. Col., 62nd C. A., (A. A.)
Executive.

Official:

NELSON DINGLEY, III,
Captain, 62nd C. A. (A. A.)
S-3.

It is always a questionable procedure to issue orders covering movements so many days in advance. Many conditions may change. In this case, however, it was anticipated that only unusual or very adverse weather conditions would be likely to force a change in our schedule. In its preparation, however, we had provided a day or two leeway on the date of arrival at our destination in order to provide for unforeseen delays. No change was made necessary and the schedule was adhered to as issued.

DEPARTURE OF THE REGIMENT

On Friday, March 15th, 1929, at 4:00 p. m., the Regimental Supply officer, with the regimental section of the Service Battery, departed, and our first element was on its way to the south.

The trucks of the first column were placed in position Sunday evening, March 17th. Monday morning was cold and raw with the temperature down to freezing during Sunday night. Considerable difficulty was experienced in getting engines started, but at 5:00 a. m., in darkness, the column got under way. The second column departed at 5:00 a. m. the following (Tuesday) morning.

A 5:00 o'clock departure was fixed for the first morning in order to insure, as far as practicable, the crossing of the Queensboro Bridge, with subsequent passage through New York and the Holland Tunnel, with as fair an edge on traffic conditions in the Metropolitan Area as it was possible to obtain. Subsequent marches began at 7:00 a. m. each day. By allowing half an hour for breakfast and an hour to load up, get in posi-

tion and under way, the time for breakfast was fixed at about 5:30 a. m. It was necessary for cooks to get up to prepare breakfast from an hour to an hour and a half before that time. Consideration must be given to the hours that cooks are required to get up because convoy marches are tiresome at the best and men need their rest and sleep during the night. This precludes, as a rule, an earlier start than 7:00 a. m.

MESSING

It is customary to halt convoys for ten minutes every hour. At one of the morning halts fires were started in the rolling kitchens and part of the noon meal was prepared while the convoy was moving. A halt was made for an hour at noon and hot cooked noon meals were served each day. Similarly, cooking began again in the rolling kitchens during the late afternoon so that, by the time the convoys had arrived at their billeting areas and had unloaded for the night, supper was soon served. The cooking was excellent and a high standard of messing maintained throughout the march.

GASSING

The gassing of the trucks of a long convoy is no small matter. The principal gassing is done at night but, with many trucks in a column, it can readily be seen that it is likely to become a late operation. At some places where night halts were made, established gassing facilities were used and this simplified the problem to some extent. At other places only the seven hundred and fifty-gallon gas tank trucks were available, one of which accompanied each column as a part of the battalion section of the Service Battery. At times, under these conditions, the gas tank truck had to go several miles to refill before gassing was completed.

In general, the thirty-gallon gas tanks of the larger vehicles had just about enough gas to make a sixty-mile march, except in the cases of F. W. D.'s pulling the heavy loads (guns and tractors) of the gun battalion. These towing vehicles consumed per mile about twice as much gas as vehicles without heavy tows. It was therefore necessary to gas some of the trucks at the noon halt. In order to reduce the time of gassing at night, we found it advisable to partially gas the whole column during the noon halt. In this way a considerable part of the night gassing was eliminated.

ROAD AND CONVOY DISCIPLINE

Very strict road and convoy discipline was maintained throughout the entire march. This was very necessary on account of the immense volume of civilian motor traffic passing over the New York-Philadelphia-Washington-Richmond highway (U. S. Route No. 1) at all times. During halts, markers with red flags were placed at the head and tail of the truck columns. Trucks were always halted close to the right side of the road and turn-out intervals were left between every three or four trucks so as

to permit civilian traffic to turn in and pass both ways along the column. Enlisted men were required to dismount on the right side of the column and were not permitted on the road on the left side. As civilian traffic of all kinds, including large motor busses, run from forty to fifty miles per hour in the open country, no difficulty was had in enforcing these rules. Personal safety precautions dictated to the men that they be observed.

When railroad grade crossings were encountered while marching, two men from a leading vehicle in each battery, were posted as watchmen. They took posts on the tracks, one a look-out in one direction, the other, in the



CONVOY CLOSED UP AT A HALT ON THE ROAD BETWEEN RICHMOND AND FORT EUSTIS

opposite direction. They halted the column whenever a train came in sight from either direction and did not permit the movement to be resumed until they were sure that tracks were observed to be clear in both directions. These men were picked up by the last vehicle of the battery to pass. When the route passed through cities in which many turns had to be made, markers were placed at turning corners to guide the columns. •

Experiments were made during the march with various types of convoy formations, in order to determine which might better suit the marching and road conditions encountered. There resulted, in general, two types of marching formations—a battalion column of batteries at close intervals and a battalion column of batteries at open intervals. In either case the normal interval of twenty-one (21) yards between trucks was maintained. This permitted civilian traffic going in the same direction to cut into the column while passing it and avoided interference with the normal flow of

traffic in the other direction along the road. In the close formation battalion column, the rule is prescribed in this regiment that forty (40) yards shall be maintained between batteries. This is, however, more of a type formation than anything else. Actually on the road there is a decided objection to the close formation battalion column. It constitutes too long a column of trucks, it slows up movement, it makes driving more difficult for the chauffeurs and it very materially interferes with the movement of civilian traffic in both directions.

By a battalion column at open intervals is meant the maintenance of a distance of from a half to three-quarters of a mile between batteries. This type of column while permitting sufficient control by a column or battalion commander, obviates all of the undesirable features enumerated as objectionable in the close type of formation. It was customary, when marching at open intervals, for batteries to close up at the noon halts. Columns were also halted and closed up before passing through large cities to enable police traffic escorts to maintain better control. Generally this was requested by police authorities themselves.

REPAIR OF VEHICLES

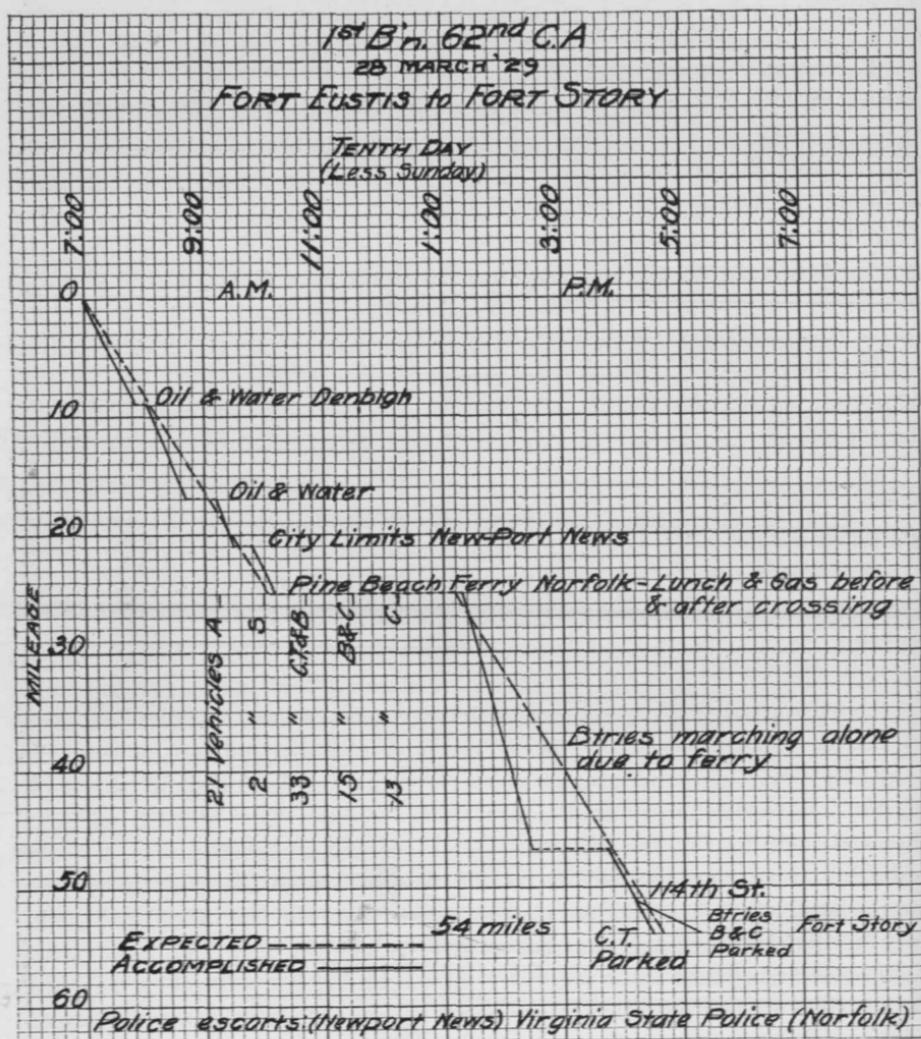
As has been stated before, much of our transportation was old and some of it on mechanical inspection report at the time the march was begun. On the outward trip, we had many difficulties due to breakdowns. An experienced motor mechanic, with a supply of spare parts and tools, accompanied each battalion as a part of the battalion section of the Service Battery. In the beginning attempts made to repair breakdowns caused many delays in the column movement through the halting of the columns. To secure the uninterrupted forward movement of the columns, we soon organized pick-up sections. These sections consisted of an officer, the necessary personnel and two or three trucks organized around the regimental motor mechanics and spare parts trucks. The pick-up sections operated some four to five miles behind the columns. When a vehicle broke down in the column it was left by the roadside until the pick-up section came along, whereupon repairs were made. In this way the lame-ducks were herded together and sent forward to rejoin the main columns at the noon halts or brought in to the billets at the end of the afternoon marches. This system worked admirably, speeding up and smoothing out the movements of the columns.

Careful records were kept of column movements and march graphs were prepared for each day's march. Two are shown here as typical of interesting days' marches.

REPAIR DAYS

Referring to the march schedule contained in Field Orders No. 1, it will be seen that no lay-over days were provided in billeting areas during which to overhaul our transportation. Profiting by our experiences on the

outward march, we provided such lay-over days about every third day on the homeward march. The final lay-over days were scheduled for the billet at Raritan Arsenal, the last stop before our movement through the Metropolitan Area to our home station.



RADIO COMMUNICATION

The regiment is equipped with Signal Corps Radio Sets Nos. SCR 136, designed to communicate between planes and the ground. Tests made prior to the march demonstrated the ability of these sets to operate easily up to sixty miles. Accordingly, Field Orders No. 1 required radio set-ups between battalions and regimental headquarters at noon and at 6:00 p. m. daily. The noon set-up was soon abandoned, however, as impracticable and

unnecessary. The columns were not always halted exactly at noon, coordination was difficult and frequently, when halted, a place could not be found where the antenna could be set up. In addition, the time consumed in setting up and taking down the antenna left very little time for radio operation.

MOVEMENTS OF REGIMENTAL COMMAND POST

The regimental command post functioned at all times during the march and moved as a separate unit. It consisted of the regimental commander and executive in one car, the adjutant and plans and training officer in another car, the regimental headquarters and command post personnel in a White reconnaissance car, and a GMC truck with the officers' baggage.

All of these vehicles except the Regimental Commander's car, moved as one small convoy, quickly making the jumps from billets to billets. This permitted an early establishment of the command post at each new billet and a considerable amount of current business to be transacted each day.

The Regimental Commander's car operated alone. Each column was inspected by the Regimental Commander at least once each day while on the march.

HOMeward MARCH

The homeward march after the target practice at Fort Story and the joint Air Corps-Antiaircraft exercises at Langley Field, Va., was largely a repetition of the outward journey, except that things went much more smoothly, as a result of the experience gained by all ranks on the outward march.

CONCLUSIONS

An effort has been made in this paper to set forth the things we did, as we did them, in the planning and conduct of this march. This may not have been the only or the best way of doing it but the interesting feature of it all is that it worked. It moved the 62nd Coast Artillery on a one thousand eighty-mile journey through the thickly populated centers of the industrial east, where traffic conditions are always highly congested. There was little friction and the march was made with as great a degree of comfort to all concerned as was possible under the circumstances.

The secret of it all is to think out and plan the problem ahead of time. After all, this is the essence of good staff work. In submitting this to the readers of the JOURNAL, the 62nd Coast Artillery (A. A.) trusts that this description of how we did it will be helpful to anyone else faced with a similar problem.

Passive Metal Linings for Internal Combustion Engines

By LIEUT. COL. JAMES PRENTICE, U. S. A.

EDITOR'S NOTE: *Some years ago while in camp at Virginia Beach with the 51st Coast Artillery (Tractor Drawn) we made inquiries of the natives as to the possibility of driving a light car (Dodge) down the beach to Kitty Hawk where the Wright brothers conducted their first experiments with the airplane. Aside from the natural interest in this now historic spot, it was believed that it would be useful to determine for military purposes whether the trip could be made on the hard beach sand at low tide. Lateral roads, close to the beach, are extremely rare in this section making the rapid establishment of communication lines and observation posts rather a difficult job. The beach, if passable, would furnish an excellent direct route and solve the problem. The natives with whom we talked were very discouraging. They said there were quicksands and various little streams emptying into the ocean which were impassable. Finally we said, "But Colonel Prentice goes up and down the beach, doesn't he?" (There was no concrete road into Fort Story then). Then one said, "Colonel Prentice? Oh, well. He can go any place. He runs up and over them dunes over at the Cape just like a rabbit. Did you ever see that car of his?" No, we never had. And we didn't believe any Ford ever ran all over the famous Cape Henry dunes. We had had Fords stuck in the sand before. So we called on Colonel Prentice and oozed the talk around to riding over sand dunes in a Ford. Very quickly he offered to give us a demonstration and led us out to a rather dilapidated Ford of unprepossessing appearance. It had oversize balloon tires but nothing else unusual was noticed until Colonel Prentice pointed out a gear shift with three shifts forward and one in reverse—an addition to the standard Ford installation. Coupled with the original installation, six speeds forward and two in reverse were possible. The cylinder walls and head, he told us, were plated with chromium. We climbed in and Colonel Prentice must have been in a playful humor because he ran over those dunes like nobody's business. We went up dunes of forty-five-degree slope and down the other side with a sixty-degree slope. Imagine the most thrilling roller coaster you have ever ridden. It would be nothing. Sand flew like waves in front of a speed boat. The car seemed to float on a sea of loose sand. We mentioned the possibility of turning over and having to have somebody pick this thing out of our back. The Colonel said it was possible but we would probably be thrown clear of it and the sand was loose and would make the landing soft. We couldn't say any more because he had started another series of loops. We finally made a two-point landing and hurriedly climbed out—Pulse, one hundred and fifty-two; respiration, forty-nine.*

Colonel Prentice says he bought this Ford in 1920 and drove it one hundred and twenty thousand miles. Then he turned it over to a farmer who drove it one hundred thousand miles more. A year ago the farmer decided to visit Colonel Prentice in Miami. He drove the Ford down. He drove it to California and back over the Rockies and deserts. He can't drive it so far we wouldn't recognize it because it has our finger prints in the body on the right hand side. Colonel Prentice says, "The engine, having little carbon, lasts quite well." He hopes to examine it next summer and will probably turn it over to the Coast Artillery School. In the following article he explains why it runs so well.

IN 1901 when I first joined the Artillery Corps as a Second Lieutenant we were obliged to study Hypology (Horse) in order to properly understand the then available power unit for moving artillery. We went into the study of the equine anatomy, his diseases, and his food. Some officers took this matter very seriously, so seriously that they almost forgot the subjects of ballistics and gunnery. Whether it is more important to get to a place to fire from or to fire properly when we got there was a matter of acrimonious debate at the club.

Anyhow, we have to do both and since chemical warfare has made it highly probable that there may be whole campaigns when the horse and the mule will be absent, artillerymen must give more thought to the subject of the horse's substitute, the internal combustion engine.

A few years ago I wrote several articles for certain artillery and air journals in which I stressed the need of care in selecting fuels and in lining engines so as to eliminate knock (detonation) since this quickly impaired an engine's usefulness. I was cognizant of the fact that higher compression engines were in immediate prospect not only on account of their greater efficiency but because we must be more careful about our hydrocarbon supply. There was danger of a gasoline shortage and scientists were at their wits ends to provide substitutes for gasoline distilled from petroleum.

During the World War the Germans made war on Roumania to seize their oil supply and were greatly chagrined when they got the oil fields and found them devastated and the personnel all out of the country. The oil industry gave as great a boost to the Allied cause as any other body of men when they deprived the Central Powers of their source of power for trucks and aircraft and when they so depleted the German stock of lubricants that German industry was almost at a standstill.

Germany made great efforts to make gasoline out of coal and developed a process, but it was available too late to do much good. Since the war they have commercialized this process of hydrogenation and the great Standard Oil Co. of New Jersey has the patent rights for the process in this country. Briefly, it is to grind up coal, mix the powder with petroleum or some heavy oil, and subject the mixture to great heat and pressure in a retort in the presence of catalysts while a stream of hot hydrogen gas is introduced so as to form saturated (full of hydrogen) molecules. This gasoline and the lubricants that are formed simultaneously are of excellent quality and when we get short on petroleum we can resort to our coal measures, especially the brown coal, for a substitute.

The defense of our oil reserves is an important new duty, devolving on the Coast Artillery, because most of the reserves are stored near the great harbors and close to our fortifications. A fair knowledge of the whole petroleum and engine problem is, therefore, appropriate for artillery officers and should be a part of the school courses.

The knock in engines is due to two causes, mostly. One is the molecular structure of the fuel itself. If we use a gasoline of the paraffine series, i. e., one in which the molecules are saturated, or in which the whole valency of the carbon is balanced by hydrogen atoms, we will be certain to have detonations when the temperature and pressure reach certain figures. The hydrogen wave sets in and the molecules crack or break up; then there is a resurgence and a terrific pressure and heat result. This is knock.

The other great cause of knock is a carbon lining in the combustion chamber. Carbon is a powerful catalyst when involved in a carbon-

hydrate reaction. When Dr. Otto first made the gasoline engine he didn't have a spark plug or a flame or a hot rod or extreme compression to set off the explosion. He had a cerium oxide or some such lining in a part of the chamber. When the mixture was compressed against this cerium spot the engine was supposed to fire. Carbon spoiled all this. Carbon poisoned the oxide catalyst and the doctor was obliged to look further into the matter. Carbon has great powers of absorption and if it would only remain constant in its powers and tendencies it would be an ideal lining for engines. But it will not and we, therefore, must eliminate it or so modify the character of the fuels that it cannot make irregular and premature explosions. From many years of research the author comes to the conclusion that there is little hope of finding a catalyst that will defeat carbon in internal combustion engines.

The treatment of fuels with such chemicals as tetra-ethyl lead, iodine, iron carbonel, etc., is an expensive and uncertain cure for knock.

Since we cannot hope to have a catalytic lining that will defeat carbon by its own powers why not have a lining to which carbon will not adhere or from which it can be removed with little difficulty at frequent intervals? Why not make it practicable to clean out the explosion chamber frequently with an air blast, anyhow? I know of few substances that will repel the wax in gasoline. Distill it and refine it as we may, just the minute a gasoline vapor gets into an engine chamber it begins depositing wax. This quickly carbonizes and leaves a coke that soon penetrates the pores of an iron lining and thereafter the engine carbons up quicker than ever before. Lubricants also contain this wax, a sort of polymer, and as the engine gets older its troubles recur at shorter intervals of use.

Gold, platinum, and certain ceramics (porcelains or glasses) make very good non-adhesive linings but the metals cost too much and the ceramics cannot stand the constant quick changes in temperature.

Next to these noble metals, and really their peer in service, comes chromium which can now be applied to metal surfaces by electrolysis. I have driven a high compression engine lined with electrically deposited chromium over ninety thousand miles in the past three years and have had little or no trouble from carbon, and the detonation problem is the least of my worries. I do not resort to the use of treated gasolines. I do use the benzine series of gasoline (the aromatic series) when obtainable. These benzine gases are the principal product of certain cracking processes. They often smell bad and are unsightly, but the smell can now be removed and the bad appearance modified by the use of dyes, as for a familiar example, the blue gas issued by the Sun Oil Co. Some firms use red or orange dyes. Aromatic gasoline is liable to change color several times a day and is especially sensitive to light.

The application of chromium to the tops of pistons and the head of an engine is a very difficult matter. There is a large factor of chance in the

way the chromium will be deposited. The electrodes must be just right and the solution and temperature can vary only a little or trees are formed. An electrolytic deposit is really a sort of laying on of scales. A perfectly sealed surface cannot be obtained.

Plating is inclined to scale and at the best gases and acids penetrate and are followed by carbon tentacles. A defective plated surface is hard to clean and is not as uniform in its behavior as a surface of rolled alloy of iron, copper, and chromium. Stainless iron is an ideal lining for an engine or a retort in which hydrocarbons are being distilled. Resort was, therefore, made to this alloy which, with a small percentage of copper, is really a passive metal. A passive metal will not catalyze chemical reactions that are taking place against it, and detonations of gasoline mixtures that are reasonably free from saturated molecules will not take place in an engine lined with cupro-chrome-nickel iron alloy. Stainless steel is not good. The carbon in the steel asserts itself as a catalyst and we must resort to the more malleable and less strong chrome iron for linings.

Chrome iron, with the qualities added to it by the admixture of copper and nickel, will supply a surface that is passive and very free from capillary holes that carbon can penetrate. It will stand great temperatures and will not oxidize at even abnormal engine temperatures. It can be crimped onto piston heads and engine heads and can be caused to adhere by spot welding so as to transfer heat readily. An application of sheeting of this alloy will last indefinitely and can be cleaned with abrasives or even chemicals without becoming pitted.

Chrome iron applications can be made to old as well as new engines. Old engines that have their compression increased, as a result, will not knock, and will become more efficient. The pepping up of an old engine by this application does not result from catalysis but from the very lack of it and from increased compression. I treated an old Ford Model T engine several years ago and was able to drive over very steep hills of sand and through very heavy muddy roads without any over-heating or knocking. I was even able to drive at will over the great sand dunes at Cape Henry and down the coast of Virginia and North Carolina with no engine troubles. I even drove over the famed Kill Devil Hill where the Wright brothers learned to fly.

Chromium has a peculiar quality with reference to friction. A surface of chromium alloy has less friction than a much smoother surface of iron. Witness the chrome nickel bullet jackets of the Krag Jorgensen rifle. These, without lubricants, far outclassed the lead projectiles so far as friction was concerned and had much to do with the rise in muzzle velocity of small arms. We can, therefore, think of a cylinder lining of chrome iron that will reduce piston friction and at the same time eliminate the creeping effect of carbon down from the explosion chamber.

Chromium is no longer a rare metal. Its ores can be found in many

places and it occurs in some very common earths and rocks. At present the cheapest and best ore comes from South Africa. Many of the great steel companies have elaborate installations for making chrome steels and irons. The electric furnace is used to reduce chrome steels and irons.

Most of the petroleum stills are now made of chrome iron. Some stills are of ordinary steel lined with liquid glass as an adherent for asbestos powder and other heat resisting materials. The liquid glass lining for engines is a known failure unless the engine is first lined with a substance that will resist corrosion. There are certain cases where resort to catalytic linings is justifiable but these are generally in the stationary engine field where frequent changes in fuel are not to be expected. This should be of interest in fortification power plants.

Chrome iron and its alloys is not as good a conductor of heat as cast iron or aluminum. Heat does not penetrate a chrome iron surface as quickly as it will cast iron or aluminum alloys. This is really a distinct advantage in an engine combustion chamber, for less heat units can be dissipated through the walls. The chrome iron lining carries off heat as fast as is needed in view of the high grades of lubricants we now can procure. We are on the way to much higher compressions than we now use and greater temperatures. As a matter of fact the author is on the verge of eliminating oil from the top part of the cylinder and, by the use of certain grades of highly conductive flocculent graphite for the piston lubricant and seal, cease to worry about oil on the spark plugs, if there *are* any spark plugs, for it begins to look as though we would be able to go back to Dr. Otto's first method of ignition. This flocculent graphite will not poison a cerium dioxide catalyst. We can, therefore, have an anvil and hammer in the explosion chamber that starts the explosive wave by trapping a limited amount of the mixture between two impacting catalysed surfaces.

Now I have referred to catalysts. They are simply substances which promote or retard chemical processes without being changed themselves. For instance, we make artificial butter from cottonseed oil because we can make it take up hydrogen and saturate its molecules by stirring the hot oil under pressure at high temperatures in a retort into which hydrogen is injected in the presence of nickel oxide. The nickel oxide will last indefinitely if certain precautions are observed; it simply catalyses batch after batch of oil.

Among the most potent of the catalysts are the rare earth metals such as cerium and strontium. These are extracted from certain Monozite sands that are widely distributed over the earth. Strontium is the radiant metal that makes an electric light filament emit light so efficiently; while cerium, when it adulterates a filament, ever so slightly, will cause the emission of great quantities of heat at the expense of the light emission. A lamp filament that is always too hot probably has too much cerium in it. Thus we

see that cerium is the ideal igniter in a high compression engine. It probably will eliminate the need of spark plugs and other means of ignition.

With reference to the compression ratios of some engines now in existence and those highly probable for future use, it is safe to say that while we have been content with a 1:3 or 1:4 ratio in the past and we now use from 1:5 to 1:8, we will in a few years be using from 1:12 to 1:16 compressions.

With these high compressions we must be on our guard against crystallization in bearings and piston tops. The use of a padded top piston is probable. Chrome iron is self hardening and we can make the whole piston top and the engine head resilient so that when an unusual stroke occurs there will be give and not too great strain. In the early days of my experiments I was so unwary as to run up the compression abnormally and to use a super fuel containing certain nitrates in solution. I ran the car over a pretty stiff course near Fort Eustis and, noting something unusual afterward, opened it up. The pistons were beautifully crystallized and the bearings about ready to fly to pieces. In those days chrome iron was not easily obtained so that resilient heads for cylinder and piston were not obtainable. The give in the head needs be very little, only a hundredth of an inch may do—just this little temporary absorption of energy will save the engine.

In the modern engine the shape of the engine head is a vital matter. A man named Ricardo, who was employed by the British government during the World War to improve their aircraft engines, developed the Ricardo head. This is simply an engine head that has part of its surface very close to the uppermost position of the piston top. With it we super-compress a film of mixture over a part of the piston top and start a brisker explosion than we would by having the entire head further away from the piston, the compression ratio remaining the same. Ricardo claimed that the turbulence not only makes a more efficient explosion but also scavenged (cleaned out) the chamber better.

The new Model A Ford engine probably can credit most of its increased efficiency to the fact that it has a modified Ricardo head. Ford uses a crescent shaped surface on the head, while Ricardo uses a semi-circle.

Of course our engines nowadays run faster than heretofore. This cuts down the amount of heat that can be absorbed by the walls. The modern engine has a shorter life than the old ones because the walls of the cylinder and the piston are rubbed more for a given mileage. This drives us again to a lower friction requirement in the cylinder walls and so this fact, too, favors lining our engines with chrome iron. Aluminum on chrome iron will last about four times as long as aluminum on cast iron. Some manufacturers are adding chrome to their cast iron. This makes for lower friction and supplies a very efficient valve seat while cutting down corrosion in the water tract of the cooling system.

While on active duty I often heard it said that I used a great deal of time in these experiments. Such was not the case. The first chrome-plated head cost me seventy dollars and I spent about two hours making up a drawing of the method of plating and conferred with a plating expert about half an hour. The tests, of course, ran over several years but since the cars acted very well I lost less time keeping them in commission than I would if they had not been altered.

The applications of chrome iron alloy sheetings to a small single cylinder pumping engine cost about forty dollars and this engine ran several years without making trouble. I drafted the idea in fifteen minutes and spent about two hours with a die cutter who designed the crimping plate. The electric spot welder did the work in half an hour while I stood by and answered his questions.

There is no profession that needs good engines as badly as the military. In no other profession will men be more impressed with this need than military men will. We have come to a pass where officers must understand engines as they used to understand their mounts. Suggestions for improvements are bound to come from all grades in the Army and the time is coming when officers will no longer feel compelled to be inconspicuous or even secret in their efforts to see the light clearer and to impart their discoveries to others. My own efforts were born of necessity. I sought to break down the isolation of our posts and to make it possible to come and go from places many miles away without being tied to impossible boat and train schedules. With over-heated and knocking engines I could see no hope of travelling the bad roads of those early days and I, therefore, devoted some of the time I ordinarily would use for profitless recreation to solving this problem which is still with us even though it has been partly solved.

I hope the time is not far distant when we will see articles in the Coast Artillery and Field Artillery Journals about engine improvements just as we used to see articles about draft for horses and mules, forage arguments, and the loads of beasts of burden.

Hawaii Thrilled by Night Bombing

By CAPT. J. T. DE CAMP, C. A. C.

SUCH was the headline of June 30, 1929, in the *New York Times*, under which it had a very interesting account of one of the night phases of the June maneuvers of 1929 in the Hawaiian Department. A secondary headline was "Searchlights Etch Skies." It is about the searchlights which underwent such a strenuous and such a realistic test, far different from any target practice condition, that this article is written.

These maneuvers started on paper late in May and by the 10th of June actual troop movements were under way. The situation at this time can be briefly summarized by saying that our fleet was held up on the Atlantic side and that strong "Red" forces had already established bases on the adjoining islands nearest to Oahu and had cut our forces off from aid from the mainland. Further than this they had succeeded in establishing aerial supremacy. Their next move was to overcome the "Blue" defending forces on Oahu.

Actually the Navy was not participating while our air forces were all designated as "Red" with the exception of an occasional observation plane. Each actual plane, in theory, was to represent three planes. The movements of the "Red" naval and ground troops were indicated to certain observers and unit commanders by sealed envelopes which were opened at stated times. Red aerial movements were actual. The action was continuous; so were our activities.

The 64th Coast Artillery (Antiaircraft) was disposed according to previous plans, with a mission of furnishing aerial protection to certain vital areas. From the beginning it was evident that the regiment was to be given a real test because of the disposition of the Air Corps. In addition, as the operations progressed, our units along the coast found themselves seriously involved with the naval bombardment and landing activities of the enemy.

To avoid interference with civilian activities, the efforts of the "Reds" were concentrated largely between dusk and early morning. This made it a real two-sided maneuver, nearly every night, between antiaircraft searchlight batteries and the Air Corps. Naturally the ability of our searchlights in action against a modern aggressive air force was closely watched by all higher commanders.

To enable the reader to gain some conception of this phase of the activity, the diary of Battery "E," 64th Coast Artillery (A. A.) is given verbatim with explanatory remarks following to make the picture clear. While all three searchlight batteries of the regiment were equally successful, the writer has more intimate knowledge of the war in the Battery "E" Sector, and has therefore limited the account of action accordingly.

DIARY OF BATTERY "E," 64TH C. A. (A. A.)

June 12, 1929

"1st Platoon Light column passed Quartermaster entrance of Fort Shafter at 6:11 a. m.; and arrived in camp at Fort Weaver at 8:15 a. m.; 2nd Platoon Light column passed Quartermaster entrance of Fort Shafter at 6:12 a. m. and arrived in camp at Pearl City at 6:50 a. m.; heavy transportation marched with Batteries 'F' and 'G' respectively. 2nd Platoon of one officer and twenty-eight enlisted men attached to 'G' Battery at Pearl City. 1st Platoon and Battery Headquarters camped at Fort Weaver (one officer and forty-four enlisted men). 1st Platoon was attached to Battery 'F' tactically. Camps were established and communications installed by 4:30 p. m."

All equipment, including heavy tentage, was taken in the field. Fort Weaver is about twenty-one miles from Fort Shafter on the west side of the entrance to Pearl Harbor. Pearl City Peninsula runs out into Pearl Harbor from the north. Besides making this move and establishing camps, including kitchens, latrines, etc., about eighteen miles of wire were laid and all routes to light positions reconnoitered so that positions could be occupied that evening (see next diary). The accompanying map gives roughly the various locations mentioned from time to time.

June 13, 1929

"Light positions were occupied at dusk June 12th and all installations were tested. Usual camp duties during the day. Scheme of local defense and routes of withdrawal, including covering detachments, were tried out. Inspection of camp at Fort Weaver by the Regimental Commander."

In this department each searchlight truck carries one machine gun and each driver one automatic rifle. Battery Headquarters has two automatic rifles. During the day, when the searchlights are withdrawn for cover, these weapons are disposed for local defense. At night they are taken into position. Due to the exposed position on the beach at Fort Weaver, much time and thought was devoted to a plan for a possible defense or withdrawal. The roads in this section were unmapped and were very bad. Thorough reconnaissance had to be made at this time.

June 14, 1929

"Searchlight positions occupied at dusk. No enemy activity. Camp inspected by Department Commander at 10:30 a. m., Department Ordnance officer at 11:00 a. m., Department Signal officer and assistant G-4 at 2:30 p. m.

June 15, 1929

"Searchlight positions occupied during air raids over Pearl Harbor between 7:30 p. m. and 10:00 p. m., 14th. Visibility poor, cloudy sky. Illuminations considered successful. Three bombing raids were made from above the clouds with motors cut off. Four attack planes brought down by machine gun fire from lights. (Bombs dropped by bombers appeared to be considerably off objective.) Attack tactics against searchlights highly un-

successful. Eighteen pursuit planes made low flying attack over Fort Weaver at 8:40 a. m., fired on by all machine guns of 1st Platoon, one thousand rounds fired, one plane brought down. Inspected by Department G-3 at 10:00 a. m., 15th."

From the viewpoint of everyone, except the actual participants, this bombing attack was undoubtedly the most spectacular phase of the maneuvers. It occurred in the early evening, so there were many spectators. The bombers, taking advantage of low cloud banks, were able to approach closely without danger from three different directions. From the cloud banks they then attempted to glide down on Luke Field and the Naval Station. At the same time pursuit planes were flying low over the light positions. While the cloud banks enabled the bombers to get in close, it also made it extremely difficult for the pilots to locate their objective and all flares apparently dropped far away from any vital areas. By following the probable location of the bombers in the clouds the searchlights were very successful in illuminating the planes as they broke from cover.

Being subject to attack from any direction, "Light Commanders Action" was usually employed. Instructions were to go into action against any plane within range, bombers having preference unless actually attacked by other planes. Immediate report was then made to the Platoon Commander who coordinated the action of his platoon. Thus the difficulties of identification were simplified and the danger of planes slipping in was minimized. After any searchlight was in action, identification of targets and control of the lights were relatively easy. Several times it was possible to illuminate and carry three bombers in different locations at one time by the two platoons of the battery. Naturally much reliance had to be placed on the judgment of the non-commissioned officers not to needlessly expose their positions. Usually, however, the Light Commander had time to get in touch with his Platoon Commander before going into action.

The tactics employed against low flying pursuit planes is worthy of extended treatment. In fact—to my mind—it was one of the outstanding phases of these maneuvers. Light Commanders, when subject to direct attack, occulted their lamps, the driver manned his automatic rifle and one man (either the Light Commander or telephone man) manned the machine gun. As the pursuit plane came within close range the light was flashed on the pilot. These tactics on this night proved highly successful as will be noted in the report of the number of planes shot down. (Remember, however, that the planes kept going and then came back.)

The experience of Sergeant Hodges, Light Commander at Number 1 position of the 1st Platoon, is worthy of re-telling. His light was close to the beach at Fort Weaver. At his own position he had climbed up a small tower for better observation as the surrounding country is heavily wooded. He carried his machine gun. About 9:30 p. m. he spotted a pursuit plane coming rapidly up the beach just above the trees. His light was not in ac-

tion at the time. Warning everyone, he followed the tactics outlined above. The result was that the pilot was blinded, and had great difficulty in controlling his machine. Continuing tracking the plane down the beach, it was brought under continuous fire by every machine gun in the vicinity. His report was "I shot him down three times (each plane represents three), fired all my ammunition and then threw my hardtack at him."

With the lights widely dispersed, it is thought that low-flying planes can not materially interfere with the proper functioning of searchlights, unless planes are in large numbers.

June 16, 1929

"Bombers" were heard in clouds northeast of 2nd Platoon positions at 7:30 to 9:30 p. m., June 15th. Could not be illuminated. No activity in area of 1st Platoon except one plane illuminated just before running lights were shown. Four flares seen over Honolulu between 9:30 and 9:45 p. m., 15th."

Orders were that no planes with running lights were to be illuminated. Due to the difficulties of maneuvering at night the pilots often kept their lights on. This made it somewhat difficult to detect other planes in the vicinity without lights. People in Honolulu often heard such planes overhead and wondered what the searchlights in that sector were doing.

June 17, 1929

"Aerial activity between 8:00 and 10:15 p. m., 17th, and between 2:20 a. m. and dawn, 18th. Visibility poor, low clouds, moon bright when visible. One plane illuminated over Ewa (Square 64) at 9:53 p. m., for four minutes. Three bombers illuminated by Light No. 1, 1st Platoon, over square 64 at 10:03 p. m., one plane brought down by machine guns, one hundred and fifty rounds fired; three observation planes, one illuminated over square 65 at 2:50 a. m. Lights on by 1st Platoon at 3:04 a. m., planes above clouds over square 66—no illumination. Three flights of three pursuit planes each over squares 55 and 65 at 4:50 a. m. Leading plane in each flight illuminated, one for two minutes, one for five minutes and one for three minutes. Lights withdrawn from positions at dawn. Much difficulty was experienced by planes maneuvering with running lights on when illuminated. One flight of bombers cruised around for about an hour and a half with running lights on and was apparently lost. Another plane, when illuminated, turned on its running lights. Searchlights were then turned off, when the plane turned off its own lights, it was illuminated again immediately. Camp visited by Department Signal officer and G-4 at 12:15 p. m., 18th, and by Department Sanitary Inspector at 2:30 p. m."

The diary again indicates that fast, low-flying, pursuit planes can be illuminated. The three bombers mentioned as lost were flying for the first time at an early morning hour. At this time most of the lights of Honolulu and other localities, which are on in the early evening, were off. Between clouds, rain and lack of these familiar land-marks, the pilots could apparently only follow the shore line. Finally one plane came into Luke Field and signalled. The ground lights at the field were then turned on

which enabled the flight to orient itself. Likewise on this same morning it was learned by us that one very important duty of a Platoon Commander is to watch his light crews carefully as at early hours of the morning and after long periods of watching, his men are very liable to get the "jumps" and to be hearing planes in all directions.

June 18, 1929

"Aerial activity between 3:00 and 5:00 a. m., 19th. Bombing planes were noticed off Barber's Point at 3:30 and 3:35 a. m., 19th. At 3:50 a. m. three planes were heard over square 64, coming east. This formation, when lights were ordered in action, turned on running lights and turned south to sea. At 3:58 a. m. a flight of three planes were illuminated over square 55 by the 2nd Platoon and carried across square 64 by 1st Platoon for three minutes. At 4:10 a. m. three bombers were illuminated as they dropped flares at sea between squares 64 and 65. This formation was illuminated for three minutes as it went toward the northwest. At 4:19 a. m. No. 1 and No. 4 searchlights of the 1st Platoon were ordered to withdraw from the beach on account of landing parties on their immediate front who were firing on them. At this moment a flare was dropped by three bombers directly over Fort Weaver. One bomber was illuminated just before this flare was dropped but not in time to allow gun fire to be effective. This flight was carried by Lights No. 2 and No. 3 for five minutes toward the northwest. At 4:23 a. m. a second flare was dropped over Fort Weaver by a flight of three bombers. With only two lights available, this flight was not illuminated until 4:25 a. m., when the lights were shifted from the 4:19 a. m. flight. At 4:25 a. m. Light No. 4, 2nd Platoon, picked up a flight of three bombers well to the northwest in square 65 at an altitude reported as thirteen thousand feet. This plane was carried by 2nd Platoon as it glided rapidly downward until 4:30 a. m., when it released flares, which fell in square 64. It was carried for some minutes thereafter. At 4:45 a. m. the 1st Platoon was ordered to assemble at the rendezvous point. The Platoon Commander ordered Lights No. 2 and No. 3 to stay in position five minutes longer as it was not yet daylight and they were not exposed to the landing attack at Fort Weaver. At 4:48 a. m. a flight of three pursuits was illuminated over square 64 by Light No. 1 of the 2nd Platoon, but out of range of machine gun fire. At 4:49 a. m. Light No. 2 of the 1st Platoon was attacked successively by two flights of nine pursuit planes each. Both flights were successively illuminated and brought under machine gun fire. At about the same instant a flight of nine pursuit planes, flying low south towards Fort Weaver, was brought under surprise fire by machine guns and two automatic rifles of Light No. 3 and the Sound Locator Detachment which were in well-concealed positions. At 5:30 a. m. the 1st Platoon was assembled under cover prepared for local defense, when orders were received to report to the Battalion Commander for local defense. Leaving a small guard with the Cadillaacs, all available men of the 1st Platoon and Battery Headquarters were moved by trucks, arriving at Fort Weaver at 6:10 a. m.

"*Note:* The 4:19 flare at Fort Weaver would undoubtedly have resulted in heavy casualties, demolishing the position occupied by the 1st Platoon Command Post. This position is also occupied as Battalion Command Post, however, only the Searchlight Battery Commander was there at this time."

The diary is quite complete in regard to aerial activity but only mentions the enemy forces which were making a landing on the beach. In this engagement, Battery "F," 64th C. A. (guns) was actively engaged as was the personnel of a fixed battery, an infantry strong point and a battery of field artillery. Sufficient for this article to note that it was necessary for the Commanding Officer of Battery "E" to direct the withdrawal of the two exposed searchlights on the beach at 4:20 a. m. By 4:30 a. m. the enemy had landed on the beach in the vicinity of Light No. 1. This light had actually left its position about two minutes before. At 4:45 a. m. our Field Artillery laid down a barrage in this sector. However, after destroying the two seacoast searchlights in the vicinity, the enemy force—which proved to be a raiding party—was driven off.

The Battalion Commander and other officers had been aware for several days that if bombers were to come in from the south towards Pearl Harbor entrance, the searchlights would be at a distinct disadvantage. The location of the batteries at Fort Weaver was such that the searchlight could not be advanced seaward and resulted in the line of lights being behind the guns in this direction. Because of lack of telephone cables, no lights could be put on the Fort Kamehameha side of the channel entrance which would have helped the situation. In addition two dredgers were industriously engaged off shore twenty-four hours a day in deepening the channel at Pearl Harbor, making sound locating exceedingly difficult.

As stated in the diary, two flares dropped that night would have been disastrous, particularly to the 16-inch battery. While the first plane was instantly illuminated and carried across the path of two gun batteries, the second plane was not illuminated until almost out of range. This, however, was entirely due to the fact that when it dropped its flares, Lights No. 1 and No. 4 were retiring from the beach. While our tactics are based on the assumption that our anti-aircraft defense is usually placed far enough behind the front lines to be safe from small arm fire and ground troops, this situation illustrates what must be expected when anti-aircraft is established on an exposed front as will often be the case in seacoast work.

Further, it also illustrates the employment of the latest development of bombing tactics, namely, successive attacks by light bombers not in formation. To successfully combat such tactics, it would appear that our anti-aircraft defense must be not only continuous around the objective but disposed in great depth. Otherwise it is a physical impossibility for a limited number of searchlights to illuminate all targets at night. In the Weaver sector, the one-gun battery with four lights was plainly inadequate. Of course, the above conclusion assumes we have no available air forces of our own, the condition throughout these maneuvers.

June 19, 1929

"Bombers were heard in Schofield area at 3:22 a. m., 20th (square 44) going north. Although the 2nd Platoon had its advance lights on, no planes were illuminated. Bombing plane was heard over square 33 between

3:35 and 4:00 a. m. At 4:10 a. m. a bomber was "flicked" in square 54 in clouds when it turned southwest. From this time to dawn bombers were circling just out of searchlight range, apparently attempting to reach Luke Field without being illuminated. When lights were turned on these planes would immediately turn and go out of range. Bombers finally came in with landing lights at dawn."

On this night the activities were concentrated on the north shore. However, on returning from this mission the bombers kept trying to reach Luke Field without being picked up. For an hour the lights were busily engaged in driving the planes back into the clouds as they would attempt to come in.

June 20, 1929

"Night aerial activities were limited to a period between 3:00 and 4:00 a. m., 21st, in this sector. Sky clear but visibility not good due to bright moonlight. Lights at No. 1 and No. 4 positions along beach were as usual interfered with by dredgers working close to shore. At 3:04 a. m. lights went in action over square 64. However, planes were not illuminated until flare was dropped, which was apparently intended for Sector Headquarters, a location out of gun range. Plane illuminated for a minute and a half when its landing lights were turned on. (It is reported that Lieutenant McDaniels, the pilot of this bomber, glided in for twenty miles from an altitude of thirteen thousand five hundred feet.) At 3:21 a. m. a flare was seen over Barber's Point. This bomber was illuminated as it came east up the shore line at a low altitude. Lights withdrawn at 4:50 a. m."

The plane which dropped the flare over square 64 had been tracked for some distance. Sector Headquarters itself is beyond the range of the gun batteries and the lights had just been ordered in action when the flare was dropped. Barber's Point, like the north shore, is an unprotected area. It was on the west coast some distance north of here that the "Reds" finally made one of their two landing attacks in force on this morning.

June 21, 1929

"Maneuvers over at midnight, June 21st. Light column cleared Fort Weaver at 7:45 a. m., 22nd. Combined light columns cleared Pearl City Junction at 9:00 a. m., 22nd. Heavy column cleared Fort Weaver at 9:00 a. m. and arrived at Fort Shafter at 11:55 a. m. No troubles. Columns only stopped for regular halts."

Thus ended a period of activity closely approaching war-time conditions. The diary only indicates the work that was done. The problems of supply, transportation, communication, liaison, and anti-aircraft intelligence are not touched upon, nor is mention made of the day work of gun batteries to which the searchlight platoons were attached. For one forty-eight-hour period the officers grabbed sleep in snatches or had none. Between night operations there was always something to do or an inspector in camp. For our active opponents, the Air Corps, who flew day and night, we have nothing but respect and admiration but we came back with confidence in our abilities to at least curtail their activities.

What I Mean, We Gotta Keep Advancin'

By OozLEFINCH

EDITOR'S NOTE: The Oozlefinch is that strange bird known to the Coast Artillery for his peculiar appearance and habits. One of his most peculiar habits is flying backwards to keep the dust out of his eyes. We don't know whether this is due to the prominence of his eyes or the absence of feathers. While he flies faced to the rear, the direction of his movement is always to the front. Where he picked up this rough language we can't imagine. Probably it came from association with some rough Coast Artillerymen who came back from overseas after the war and gathered at the Club hoping for something that was not there. These days, the Oozlefinch mostly maintains a morose silence. No longer are the affairs of the Coast Artillery discussed in his presence. The tinkle of feminine laughter, has replaced other kinds of tinkle. The rattle of the dice box is gone. The Oozlefinch can't talk in this atmosphere. But he did loosen up not long ago to the author of this article who has written down what was said and sent it to us.

"NO, they ain't," remarked the Oozlefinch, reflectively.

"What ain't?" I inquired.

"Things ain't," he answered shortly. "Next you'll ask me, things ain't what?"

I knew the answer to that. But certainly things were getting nowhere with rapidly increasing acceleration. However, it was the first time he had been interviewed for publication.

The Oozlefinch has been bemoaning the loss of Keeney's mint juleps for so many years that he is actually beginning to take an interest in serious matters. His chief concern, however, seems to be that his name is no longer abroad in the land.

"You take these here inks," he explained. "Do they come to the club? I'll tell the world they don't! Here I am, a featherless bird who has to fly backward to keep the dust out of my eyes, the tutelary deity of the Coast Artillery and all that kinda bull—I really am unique; absolutely. But will the Editor publish my picture! Well, mebbe he will, at that.

"Trouble is, I can't fly fast enough no more. I need scientific aid; an' what's more, kid, I'm gettin' it. Yeh. Went to see General Williams about it the other day, and he's havin' the Ordnance design a false ogive for my stern and a stream-lined fuselage for my head and neck; boy, you watch my dust!"

In my ignorance, even that hardly appealed to me as being technical enough for the JOURNAL; but at last he came to the point.

"What I wanta tell you is, I've gone Antiaircraft! Yeh; absolutely. Went up to Aberdeen last fall; yeh, sure the 61st was there—and other rated prognosticators. Well, what I mean, the boys knocked 'em for a row of brass loops—positively.

"But I got ideas. This here antiaircraft game is just startin', to my mind. What I wanta tell you is, not what they have done, but what they had oughtta do. That's easy, tellin' what oughtta be done. It ain't so easy to do it, though. What's the use of talkin' about it? Well, say, how they gonna know what to do unless some guy like me tells 'em?"

“Now, don’t get me wrong, buddy. All you fellas know what a one hundred per cent job them Ordnance guys done; yeh, they’re oke, kid; I couldn’t a done better myself. What I mean, they’s gotta be some guy plannin’ in a big, broad way; not botherin’ too much with details. Some broad-minded guy; you get me, Jack.

“What I’m talkin’ about is ideals, if you know what I mean—what we oughtta try to do next, now we done what we done. Lots a these things I’m spielin’ about never can be done, mebbe; but we gotta dope out what we oughtta try. We’ll never get nowheres if we don’t. Anyways, they tell me the JOURNAL will publish anythin’ nowadays just so it ain’t serious.

“But looka here, now, buddy, you take weights. Just like all these wimmen been tryin’ to reduce; that’s our game. What good is a gun if she busts right through a bridge on you? I ask you! Make ’em lighter an’ we can go lotsa places we can’t go now. Look at all-metal airplanes! Alloys, light alloys, them’s what we need. An’ lighter guns, they mean lighter trucks.

“Then we gotta keep on boostin’ the muzzle velocity. We don’t wanna stop with what we got; it ain’t enough yet; absolutely not.

“You get me, Jack? What I mean, we ain’t started yet. We’re just gettin’ set an’ the starter is fixin’ to load his pistol.

“Now you take our flash messages—warnin’ of approach of planes. Best we can do now, but it’s all wet; too slow; yeh, absolutely. We need some gadgets on switchboards to send them signals right through like a mechanical rabbit runnin’ on a dog race track. Step ’em up! Put ’em through! Cut out the conversational effects!

“Then, machine gun searchlights. I gotta admit that sounds kinda wild-eyed. But who says low-flyin’ planes won’t operate at night? I ask you. Mebbe they will; mebbe they won’t. But if they do, how you gonna hit ’em without you can see ’em? Ask me another. They’ll have flares; what’ll we have? Anyways, somebody oughtta think about it. Very simple, quick actin’ short-range lights with a beam that widens out fast like a hoop skirt.

“Don’t you forget they’re gonna camouflage planes, too. Mebbe some kinda light-filters might help us pick ’em up better.

“An, these here data computers. So many men around ’em, it looks like the Navy football team in a huddle. Some day we oughtta do better’n that.

“An, all of ’em made on the bet that the aviator ain’t gonna change his course, altitude, nor speed durin’ the prediction interval. Well, of course, we ain’t able to guess what he will do; but why not build ’em so that if any of them three factors are changin’ the machine will assume that they’ll continue to change at the same rate durin’ the prediction interval? That’s one easy one to dope out; I’ll let you invent that gadget. But she’s comin’, buddy, some day.

“Then, there’s men. Who are the real key men in an antiaircraft regiment? I’ll let you in on that, fella; they’re the listeners and the stereoscopic height-finder operators. You won’t see nothin’ at night, an’ you won’t hit nothin’ no time, if them guys ain’t good, I’ll tell the cock-eyed world. They gotta be hand-picked, buddy, an’ they had oughtta be trained at the Coast Artillery School; you bet. An’ on topa all that, you can’t hold ’em unless you give ’em more pay. Them are the most important men in the regiment. They ain’t nobody else got to be so high skilled, fella. An’ that ain’t no joke. An’ what are they now? Corporals, privates, sergeants—if they’re lucky. Boy, let this sink in: them lads oughtta get about as much as any soldier in the regiment, an’ I don’t mean mebbe.

“But what we need right now, more than anythin’ else, is somethin’ that is practically on hand; all you gotta do is apply it. In antiaircraft you gotta act, what I mean, quick. There’re gonna be lotsa planes all in the air at onct, and when they ain’t you gotta pick up one fast anyways; when there’s lots, then you gotta change target quick, buddy. Them guys chafferin’ planes around ain’t parking in no lanes for no neckin’; what I mean, they’re steppin’. Nobody ain’t thinkin’ in terms of minutes; there’s gold in them seconds, kid.

“First thing you do, equip the data computer, height-finder, and BC telescope with inter-connected data transmission and follow-the-pointer dials for azimuth and angular height, so whichever one picks up the target first, the others just match pointers and they’re on, quicker’n a night club hostess can spot a big butter an’ egg man.

“Now about changin’ targets. The best way is to have two complete range sections—two data computers, two height-finders, two BC telescopes; then you get both data computers wired to the follow-the-pointer dials on the guns. Whichever range section picks up the target first, you throw a switch an’ cut him in on the dials. Then while the battery is shootin’ the other range section picks up another target; to change target, throw a switch an’ the guns get the new data. Mebbe it can’t be so simple as that; mebbe you’ll hafta have two sets of dials on each gun. Would it be worth it? You said a mouthful! That kinda battery would shoot down just about twict as many planes as the outfits we got now. Because nowadays, Jack, planes ain’t lingerin’ none; not so you could notice it; they ain’t in range of one battery long enough for a stick-up man to grab your watch.

“But s’pose that costs too much. Well, the height-finder usually takes longest to get on target an’ then a few seconds to get a altitude. So by eliminatin’ the extra data computer an’ keepin’ the extra BC telescope an’ height-finder you’d have a cheaper system that’d be almost as fast.

“Mebbe they can’t spend even that much money. Well, then cut out the extra height-finder, too; the extra BC telescope with data transmission would put the height-finder and data-computer on a new target mighty

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quick, but you'd lose some seconds waitin' for an altitude an' waitin' to get it in the data; yeh, you'd lose lotsa them golden seconds.

"One of them outfits would be worth nearly two of what we got, an' I don't mean mebbe."

The Oozlefinch retired abruptly to his glass case on the club mantel. Sticking out his bald head, he said:

"Well, that's off my chest. Goo'night, fella. An' say, when you write this dope up, don't make me talk like a bum; put it in good English, willya?"

Anyways, he can't say I ain't done it like he said to.

**FROM AN INSTRUCTION CIRCULAR ISSUED
AT THE COMMAND AND GENERAL
STAFF SCHOOL**

In the solution of problems the following policy pertaining to the attachment of antiaircraft artillery units to divisions and corps will be observed:

When an infantry or cavalry division is to operate beyond the support of army or corps antiaircraft artillery it will be reinforced by

*2nd Battalion (Machine Gun) less
Batteries G and H
Battery A (Searchlight)
1st Section Combat Train*

When a corps is to operate beyond the support of army antiaircraft artillery an antiaircraft artillery regiment will be attached to the corps antiaircraft regiment.

When a cavalry corps is to operate beyond the support of army or corps antiaircraft artillery an antiaircraft regiment will be attached thereto.

Tank Reorganization

By MAJ. SERENO E. BRETT, Infantry

EDITOR'S NOTE: *By special arrangement between the editors and the author, this article appears in the January issue of service publications other than the COAST ARTILLERY JOURNAL.*

REORGANIZATION seems to be the order of the day. It is submitted that any reorganization should be accepted solely for the purpose of increasing battle mobility. Battle mobility is the only logical objective for any organizational study. It is all-encompassing, and is the essence of successful combat. It embraces fire-power, movement, supply, security, mental processes, and all other phases of battle. Any attempt to set up numerous requirements for reorganization is certain to invite confusion, the introduction of useless equipment, formations and methods, and the adoption of complex and unwieldy organizations. In the last analysis, it is simply the question: Will or will not this gun, this type of transportation, this method of supply, reconnaissance or security, this formation, this system of cooperation or coordination, etc., increase our battle mobility?

The present day possibilities of increasing battle mobility are demanding reorganization and reequipping. This reorganization must not again produce static units, but in the future must be a continuing process if we are to make full use of the developments in the prolific scientific field in our scheme of national defense.

The reorganization of rifle units of the infantry is now undergoing serious and practical study. It is also important that we analyze our tank organizations. Tremendous possibilities for offensive and defensive power have been developed with kaleidoscopic speed in the automotive field within the past few years. Antitank methods have received the most serious consideration in foreign armies since the World War, and in most of those armies powerful armament is provided for security against armored vehicles. In face of all these developments and the ever increasing number of tank enemies, our tank organization remains practically the same as in 1918. Even the lessons we learned in combat have not been applied to our post war tank organization.

There is little question but that the present tank organization, confronted by modern antitank means, will produce little but grief for Tank Commanders, and probably considerable embarrassment to the tactical plan of the higher commander who is depending on tank support. The tank is a most powerful weapon, but we must give it a chance to live by giving it a usable, well-balanced organization. At least it must keep pace with its enemies if it is to remain on the battlefield. Here again, it is important that the reorganization should be a continuing process, but there are certain drastic changes which should be made now to modernize the tank service.

In any organization study of tank units, it is necessary first to determine the basic characteristics of the individual unit—the tank. When these basic characteristics, good or bad, have been determined, it is then necessary to determine how the good ones can be exploited and the effect of those which are bad minimized through intelligent and progressive organization. The outstanding characteristics of the tank are: protected mobility, protected fire-power, shock action, poor combat vision, dependence on supplies, relatively poor power of concealment, vulnerability to antitank weapons, and the limitation of its powers by antitank terrain. It readily can be seen that the good characteristics are most desirable on the battlefield, but when the poor characteristics are critically analyzed the uninitiated are apt to ask embarrassing questions about the sum total result of the balance between the good and bad. Based on our present organization, the tank officer of today must do considerable squirming before he can produce a satisfactory answer. He has for years been juggling with abstract thoughts on cooperation, teamwork, and so on, which may or may not have developed in him a sense of false security. If he has been analytical to the smallest degree he will have come to the realization that he has not in his own command those elements, normal to every battle, which will give him a powerful, well-balanced weapon. He must ask outside agencies for his normal needs—his smoke, his artillery protecting fires, his engineer support, and his communications. Also he realizes that his supply and maintenance echelons have not the mobility of his combat echelon.

With this makeshift team he has the ball snapped to him and he attempts to “carry on.” Vital members of his team he has never seen before and are working with him only on a supporting basis. The team has never practiced a single normal play together, and the mobility, training and equipment of his supporting members are not suited to his needs.

The progressive tank officer has a vision of a powerful, well-balanced team; a team sufficient within itself to meet the normal events of a good tank fight, and a unit which is able to give intelligent and powerful support to the rifle units it is supporting. Such a dream will only become a reality by a reorganization which will exploit fully the powers of the tank and provide those elements which are normal and necessary to every tank fight. Again, the objective of such a reorganization should be to increase the battle mobility of the tank unit; thus making it a much more flexible and powerful aid to the supported rifle troops.

Study any tank action and it readily can be seen that there are certain elements which, had they been provided in tank organizations, would have greatly increased the battle mobility and, incidentally, the battle life of the tanks. A relatively small number of tanks with properly balanced supporting services unquestionably will accomplish more than a large mass without such support or a larger number depending on the very uncertain support from outside agencies which must be secured through a complex system of

liaison or communications. When certain classes of support are needed by tanks that support must "click" or the action is over and the battlefield becomes a tank graveyard. Witness the frightful execution done at Flesquieres by one German officer manning a 77 mm. gun. Purely a case of a gun against a mass of unsupported tanks. The immediate result, sixteen tanks knocked out in a few minutes; the real result, the failure of the infantry division to reach its objective due to the loss of tank support.

Specifically, those elements or services which are needed to make up a properly balanced and more effective tank organization are smoke, antitank gun destroyers (self-propelled artillery), pioneers, antiaircraft protection, reliable and fast communication, and suitable and sufficient reconnaissance, command, maintenance and supply vehicles. Just how to fit these services into the scheme of organization to give tank units proper balance must be determined by practical and extensive field tests. They are, however, as necessary to tank organizations as are the various auxiliary weapons the rifle units were forced to adopt when confronted with modern battle conditions.

It is inconceivable in modern war that tanks should not make use of smoke as fully as is practicable. Aside from the smoke produced on general areas by supporting artillery or aircraft, tanks should have smoke immediately available to them for neutralizing hostile antitank guns and OP's and for covering their withdrawal, their maneuver against hostile armored vehicles and for many other purposes. This requirement for smoke within the tank organization immediately brings up the question as to how it should be produced. Obviously, the simplest way would be to provide smoke shell for the tank cannon. However, the small caliber of the cannon and the limited amount of available ammunition precludes the possibility of developing an adequate volume of smoke by this means. Another method, which has received considerable attention experimentally, is to provide the tank with a smoke producing apparatus which can be turned on and off at will. The release of smoke clouds by the tank itself is not favorably considered in many tactical situations. However, in many situations, such as screening a maneuver of the tanks, it should prove to be very efficacious. Inasmuch as this method of smoke delivery cannot be employed in all situations requiring the immediate development of smoke, it must be supplemented by other means. The remaining possibility is to produce smoke by guns or mortars which accompany the combat tank unit. It is believed that tank units should be equipped to employ both methods for producing smoke.

Artillery support is a constant need of assaulting tanks. Divisional artillery, by its preparation fires and concentrations or barrages, assists, of course, in breaking down the general resistance. During the actual assault, however, tanks must have immediate artillery support to engage antitank weapons and to assist in the destruction of hostile tanks if en-

countered. Hostile antitank weapons will remain concealed until our tanks offer a favorable target. Due to their poor vision, it is almost a hopeless task for a tank definitely to locate an antitank gun in the excitement of battle. Under our present organization, if a hostile antitank gun be located, the tanks have two alternatives open to them: First, to call for support from the divisional artillery or infantry auxiliary weapons, and second, to rush the gun themselves. The time necessary to secure support from outside agencies, even with the most perfect communications now employed, is so long that it permits hostile antitank guns to exact frightful toll of our assaulting tanks. During the World War tanks almost invariably chose the second alternative; rushed the gun and took their losses. This method of overcoming antitank defense was most costly then—now, with a highly developed system of antitank defense, and without effective supporting fires, it would be rank suicide. What is needed is a gun of sufficient mobility to operate directly with the tank combat echelon; this gun to take position behind the assault waves and cover the advance of the tanks from one local objective to another. The gun, or guns, should be an organic part of the tank unit, as training in the recognition of antitank targets and in tank tactics is of paramount importance. During the last war such a gun would have been invaluable—in future war, on account of the vast increase of tank enemies and the necessity for decentralizing support due to the increased mobility of the tank, this type of weapon will be indispensable.

Before and during action engineer service is constantly required by tank units. Routes must be reconnoitered, marked and often prepared; obstacles must be removed; bridges strengthened and fords prepared through streams; mine fields destroyed or rendered harmless and so on. At present the tank commander must ask for engineers to be detailed from other important work to render this service. If he gets them, he finds they are not specially trained to his needs and they are not equipped with proper tools or transportation. And again the tail wags the dog! A small detachment of pioneers is needed—probably in the Battalion Headquarters Company—to meet engineer requirements of normal tank operations. The personnel, of course, should be specially trained and equipped with proper tools and adequate cross-country transportation.

At present our tank organizations are totally unprotected from air attack. They have no weapon which can be brought to bear against hostile aircraft. It is not recommended at this time that antiaircraft units should be included in tank organizations, but some thought should be directed toward the employment of present tank weapons against hostile aircraft, while on the march or in bivouac, or it may be found desirable to issue additional weapons, such as the caliber .50 machine gun, to provide additional protection.

Tanks operate on relatively wide fronts. Hence, to fully exploit the

mobility of the tank and to insure greater flexibility and ease of control, the most rapid applicable means of communication should be developed and provided for tank units. Slow means of communication seriously reduce the battle mobility of tanks and cause delays which may prove disastrous. Our present organization provides radio telegraph down to the company. From the company down, the only dependable means of communication provided for combat is the runner. True, the company is provided with a cross-country car and two motoreycles, but these are required for necessary reconnaissances, for communication with supply and maintenance echelons and in maintaining liaison with the unit supported. With the combat echelon of a company operating over an area roughly twelve hundred yards wide by fifteen hundred yards deep it readily can be seen that runner communication is so slow as to practically paralyze the unit. The British have been experimenting for several years, and have had considerable success, with radio telephony for tanks. At present some of the units of the Royal Tank Corps are equipped with radio telephone receiving sets to include the individual tank. It requires no particular intelligence to determine the relative value of tank units controlled by radio telephone and partially armored command vehicles and similar units controlled solely by runners. Our authorities, of course, are keenly alive to the possibilities of radio telephony for tank use and considerable attention is now being directed toward the development of suitable equipment.

Reconnaissance, before, during and after action, is of vital importance in tank operations. Suitable vehicles, in sufficient quantities, must be provided to insure rapid execution of reconnaissances, else the battle mobility of the tank again slows down to the pace of the reconnaissance service. Often reconnaissances must be carried out under small arms fire. Therefore, reconnaissance vehicles must be provided with some armor protection to allow them to negotiate fire-swept areas, secure desired information as rapidly as is possible, and stand some chance of returning with the information. A vehicle similar in size to the British Carden-Loyd, preferably a wheel-cum-track type, will probably answer the requirements of a tank reconnaissance vehicle.

Behind the combat echelons of tanks follow the vital services of supply and maintenance. There is nothing more useless or annoying on the battlefield than a tank out of gasoline or broken down due to the failure of some small part. At St. Mihiel an entire American Tank battalion was completely immobilized for nearly twenty-four hours because its supply train was jammed in a road block. Then, and now, supply and maintenance vehicles were of the heavy truck type which must confine their movements to roads. Fast cross-country cargo carriers, capable of negotiating the same type of terrain as the tanks, should be provided to insure adequate maintenance and supply service close behind the combat elements. A cross coun-

try combat unit which must depend solely on roads for vital supply is far from a well balanced, efficient organization.

Balancing of organizations, along the above lines is most desirable even in our present tank units equipped with slow-moving war-time tanks, if we wish fully to exploit the powers of this weapon and give it a chance to survive modern battle. With the adoption of modern fast tank this balancing will become more necessary if we are to derive full benefit from its increased mobility. It will immeasurably increase the flexibility and range of uses of tank units by eliminating the drag from the rear. Basic training will take the place of the present multitude of details connected with coordination on the eve of battle.

The Air Corps News letter contains an interesting analysis of aircraft accidents prepared by the National Advisory Committee for Aeronautics from the record of Air Corps, Reserve Corps, and National Guard accidents. While the general trend is downward and fewer accidents result from spins and stalls those resulting from collisions seem to remain fairly uniform during the past several years. Forty-four per cent of all accidents in 1928 were said to be due to pilots' errors. The causes of pilots' errors were given as: overconfidence, overzealousness, apprehension, distraction, and miscellaneous, with about half assigned to overconfidence. As was to be expected, about eighty-five per cent of pilot fatalities occurred among officers with less than two years' experience.

To quote, "The successful pilot of today is the one who eliminates unnecessary hazards, when the taking of such hazards is not mandatory in the proper performance of the military mission. He learns from the costly experience of his predecessors. With modern equipment, the well-trained and alert pilot of today, who always uses good common "horse sense" can expect to live a long time. Ask the old-time pilot with over two thousand hours to his credit."

Comments on Combined Maneuvers

EDITOR'S NOTE: *The following remarks were found in the informal report of one of the observers who was present last summer at a joint Army-Navy exercise. We know many of our readers will agree with his comments. There is much danger of becoming so involved or interested in the machinery by which we conduct some of our Coast Artillery activities that we forget or fail to recognize that our main objective is to fire the guns in the most effective manner. And yet a certain amount of machinery is necessary to enable us to review what was done and derive some benefit from it. What is the answer?*

THE surviving impression that I carried away from the maneuver seems to be of crowded stations where everyone was intent on writing messages to other stations and in getting even the most minute details down on paper with the time to the second. A very full and complete record of everything anybody said seemed to be the paramount object and no action was taken until everybody all along the line had gotten the details written down. A *command* was given, someone at a table wrote it out in a field message book with a carbon copy, the written message was sent by messenger to a telephone booth where an enlisted man telephoned it word by word to a man at the station of the next lower echelon who copied it down in another field message book with many delays and "repeats." It was then checked back word for word and finally delivered to the officer in command of the unit who repeated the process in passing it along until after many valuable minutes, it finally reached the battery. I know nothing like that was happening with our "enemy," the battleships. My idea of the cardinal mission of the Coast Artillery—*immediate effective fire*—seemed to have been entirely subordinated to the red tape of organized recording of messages. If this condition was purely local it would, of course, be easy to correct, but I believe the problem is a much bigger one than that. In so far as I can tell, no criticism of the organization is justified in that I believe they were making every effort to carry out the requirements of training regulations and I know of no specific violations.

I may be a little too reactionary in my aversion to all this recording but I know that from a broader viewpoint this can be discounted, a logical solution of the problem presented. In the old days when firing meant everything to us it is undoubtedly true that there was little or no organization of the higher echelons of command. Of course, they should be well organized but, I believe, only with a view to assisting in securing the most efficient fire action. It seems to me that in the effort to build up an effective organization of higher commands so much enthusiasm has been created that it is possible that relative values have become obscured. With our terribly small enlisted strength, officers can be found for a large overhead but I am not sure but that we could carry it with a normal complement.

It is not easy to make corrective suggestions as the problem is a big one with many sides and I probably have touched on only a small part of it. It appears to me, however, that there are possibly two aspects of the

situation and that a simplification will result if they are definitely separated.

The first is the general coordination of strategical considerations, intelligence pertaining to enemy movements outside the field of view from the fire-control stations, missions of supporting troops, and all administrative details. These will undoubtedly have to be handled by Harbor Defense headquarters, with such staff and message center equipment as may be absolutely necessary. Practically all information will be received in the form of written messages and important action will be taken through the medium of written orders or memoranda.

The second is the purely tactical aspect and for that I believe the Harbor Defense should be organized as simply as possible to secure efficient fire direction, with no records kept except those necessary for that purpose, such as an operations diagram or chart, in full view of the officer in command, showing the targets assigned to the next lower echelons and the fact as to whether or not they have opened fire, together with a graphical chart showing the status of ammunition expenditure. Normal communication should, I believe, be by telephone in the most direct manner practicable with the paramount object of securing immediate response from the guns. The whole tactical organization would have to operate as a unit along the same general principles as a battery now operates and the smooth working of the machine would have to be secured through constant drill, indoctrination, and training under the personal supervision of the officers in command of the various echelons. It would not be possible to assemble a lot of records at a desk, afterwards to cross check and discover who made small errors of transmission but, from what I have observed here, I don't believe that efficient results can be obtained that way. Superimposed on the regular fighting organization would have to be the minimum number of recorders, at the battery, that may be required to record the data necessary for analysis of target practice but, I believe, it should be understood that these men are additional men to meet target practice requirements and have no place in the war organization.

The above suggestions would do away with any thought of a bomb-proof Harbor Defense message center in the front line where, to my mind, strategical and administrative details are out of place. It would practically mean that the Harbor Defense Commander would have under him a Heavy Artillery Commander as well as Commanders of Beach Defense, Antiaircraft Artillery and other supporting troops, if any. There would be no law against his taking over the tactical command of the Harbor Defense when a naval action commenced but, I don't believe he should, as it would probably not improve the functioning of the machine to change the guiding authority at the last minute.

I have not had a chance to look up the point and I don't know if there is anything in regulations as they now stand that would prevent my sug-

gested organization being put into effect. I doubt it. However, the actual interpretation in the field, as I have seen it out here, is far from it, so I thought I would unburden my mind in the hope that something can be done to insure artillery action instead of written records.

Everybody certainly tried hard. As was probably to be expected there were some false alarms and batteries were alerted almost as soon as the enemy was reported in the dim distance. In a short maneuver this made no particular difference but the men would have been worn out if it had kept up.

Regular reports of ammunition expenditure were required by orders, but as far as I could find out, there was no satisfactory record kept in the various command stations and I very much doubt if any of the officers in command could have told, at any time, how much ammunition they had left. This is a pretty broad statement and my information is not exact but I do think it is important matter to which but little attention is paid. It seems to me that systematic reports of ammunition expenditure should be required and that some standard method developed for showing the results graphically, for subordinate units, in each command station, so that the situation can be seen at a glance.

There was no device in the command post for showing graphically just which battery was firing on what target and toward the end it was rather a strain to remember. I believe that some such graphical representation is necessary so that the commander can at any instant get a clear picture of his part of the action.

For Army officers, the limit of continuous service in Washington is four years.

Commencing July 1, 1930, officers who have been on duty in the District of Columbia for four consecutive years will not be eligible for detail as student officers to the Army War College, the Army Industrial College or any other duty in Washington. Officers who upon graduation from the Army War College or Army Industrial College, have been detailed to duty in the District of Columbia will be limited to three years on such detail.

Recruiting, and How

By CAPT. OTTA MARSHALL, C. A. C. (D. O. L.)

IN recent personal correspondence, a well-known Coast Artillery officer conceded that it was likely that I was somewhat out of touch with mathematics, ballistics and other technical matters in which the serious-minded artilleryman might be expected to take some interest, but was kind enough not to suggest that perhaps my familiarity with the aforementioned matters technical was never such as to cause my temporary separation from the branch to be noted as a loss to the Corps. However, he reminded me that even an artillery officer, particularly if he be one of those all-too-few who are honestly and truly serving with troops, might become interested in personnel and the procurement thereof.

Not so very long ago I was on the receiving end, taking such men as were sent by the recruiting service and trying to train them to give the right answers when the Colonel came around for his periodical inspections, occasionally finding temporary relief in heaping futile curses on the head of the recruiting officer who had enlisted the particular moron who was, for the moment, in mind. Being now on the producing end, I want to set forth how the recruiting service has, of late years, reformed and how and why New York City, where about five per cent of all enlistments are made, modestly claims to be in the van of the reformation.

Back in the days when the present recruiting era, (which dates from the fall of 1921) was young and when the slogan of the service was "Get the recruit, nothing else matters," they say the street canvassers would get up a pool to buy a supply of blank guardians' consents from a duly authorized notary down on the Bowery for about two dollars and fifty cents per hundred, laying them aside for use when it appeared that a visit to the parental roof might not prove satisfactory. The price seems high but, you see, the notary put on his seal and he had to furnish a signature for a guardian, being very careful not to mar the space provided for the name of the applicant and for his home address. Later, an address, which was likely to be found to be just off the end of some East River dock, was easy to write in.

The scheme worked fine for production (and those were the days of competitive recruiting when they gave prizes to the canvasser who secured the most enlistments with never a demerit for a flare-back), not more than seventy-five per cent, for a guess, being discharged for minority, dependency or inaptitude. After all, that was not so bad when we remember that about all a soldier had to do when he wanted to be discharged was to ask for it. Generally, it was easier to get a discharge than it was to get a furlough. If a man wanted to go home to see Mama, he asked for a discharge and, many times, got it, especially if he were not of a high type. Why not? The recruiting service would always send more. What the or-

ganization officers failed to take into account was that while the recruiters would always send "another and another one, the one before the other is a brother to this other one."

And so the cycle was repeated. Fill up a regiment and they would call for more in about three months—it took about that long to get them all discharged. It was a great game until along about 1926 somebody down in Washington, being aware that the war was over and thinking it was about time to settle down, devised or perpetrated, depending upon which way your sympathies lie, a letter which set forth the facts and concluded with a curt paragraph of instructions to "report by indorsement hereon" how the young man came to be enlisted. When a recruiting officer had read about three of those letters he would begin to have a feeling that perhaps the War Department was in earnest about being displeased with the enlistment of so many sixteen-year-olds who were given a free trip to Hawaii, then sent back for discharge before they had time to get a tailor-made uniform. The recruiters sighed for the good old days of the peace-time university but, perforce, reformed.

Selective recruiting is coming back to us after having been almost unknown in the Army for nearly thirteen years. I can only speak for the Second Corps Area. Minority discharges have almost disappeared—the kind that can be so discharged are not being enlisted any more. Section VIII is occasionally invoked, but the doctrine that failure to train a man reflects on the officer responsible for that training is having its effect. It must be obvious that we now have less turnover of personnel and that the recruiting service is reaping its reward in that it is enabled to exercise still further care in making its selection for enlistment. We call it raising the standard. It's a merry-go-round and the organization commander is riding very close to the recruiting officer.

The recruiting officer in London, England, enlists about fifteen per cent of all who apply. In the British Army, discharge, except for expiration term of enlistment, is rare. Despite this, the London office is frequently hard pressed to find a vacancy for an especially desirable man. It was like that with us before the war and, with the aid of the actual commanders of troops, I see no reason why, in the near future, our replacements should not be as carefully selected as are those for the Royal forces. To show that we are moving toward that goal, in 1925 New York enlisted nearly sixty per cent of all its applicants, while in 1929 it will enlist about forty per cent. Of course there are no prior service applicants in London, and to make the comparison fair, let us add, that at the present rate, in New York, twenty-seven per cent of all applicants for original enlistment will be sent to organizations this year.

When I was last where I could hear the bugles blow I regarded the recruiting service as something like the unwanted child at a family reunion: tolerated in the circle but the member about whom no one should say any-

thing nice. Being directly under the Adjutant General the service was supposed to be a bit high hat, to do its playing mostly up-stage. This feeling, on my part, was due to a lack of understanding of the fact that the recruiter only sent such men as he could get when called upon to furnish replacements to an organization, and that it was up to us to train such as we received. Seeing some light in my early days on recruiting, I wondered if it would not be well to give all Colonels a short practical tour in procurement of personnel—something like that refresher course that is administered to certain selected officers down at Monroe and Benning. Shortly thereafter a thing that was just as good came to pass. An officer, (I have no authority to use his name, but it is no secret here) for years on recruiting duty, was sent to a regiment in this area and became its commander. Recently the Corps Area Commander published the story of his doings with a view, as he expressed it, of reducing the avoidable enlisted turnover. He added that the measure described offered "the best practicable solution for the vexing turnover problem for which the troops have been accustomed to blame the recruiting service and the recruiting service to blame the troops."

The entire story is too long to be quoted here, but, in short, it was a determined effort to reduce the number of separations. There were no minority discharges—none were enlisted. Claims of dependency were really investigated, but, by far, the most important step was that no Board under Section VIII, AR 615-360, was convened until the Colonel had personally interviewed the man most concerned, the object being to attempt to find a niche into which he would fit more satisfactorily than that into which he had fallen. To be sure, this means a transfer, but it was successful in a surprisingly large number of cases. It is said that men were found who were feigning, having already ascertained, so they thought, that Section VIII was an easy route by which they might get out of the service. We all know that a great many recruits regret having enlisted during the first few months of their enlistment, due, primarily, to the fact that they feel so out of place. To obviate some of this, recruits were segregated. They had no disagreeable duty for the first few weeks, being gradually worked into the routine of post life rather than thrown into it, as is too often the case. The reaction was prompt. Very soon a feeling that things were being stabilized came over the regiment with the result that, in one year, reenlistments rose from twenty-eight per cent to fifty-seven per cent, while discharges per sentence of court decreased from over three per cent, to less than one per cent. Discharges by purchase were also decreased, and all because one energetic young Colonel, who knew the recruiting game, stopped what had, in some places, reached the stage where we can truthfully say that it was the abuse of Section VIII. First the Brigade Commander, and then the Division Commander, saw what had taken place, and now the Corps Area Commander has ordered: "In all cases where the con-

vening of a Board of Officers under the provisions of Section VIII, AR 615-360, has been requested, * * * the Commanding Officer responsible for appointing the Board will cause the soldier under investigation to be brought before him for a close personal inspection and interrogation," along with all the rest of the words and phrases necessary to give the instructions that formal, official sound to which we of the Army are accustomed.

The consequence is that, in a matter of months, it has become easier to keep the regiments of this Corps Area filled, despite the fact that we are only enlisting about two-thirds as many men as we enlisted a year ago. Those we enlist stay enlisted until the end of their contract. The Second Corps Area is leading the Army toward selective recruiting and you should have guessed by this time that New York City is very proud to be setting the pace in its own area. A further result worth mentioning is that with fewer courts and boards, the general clerical work has been reduced to such an extent that junior officers have been able to bring their golf scores down to a respectable figure and the senior officers, having more time for exercise, have been able to keep bringing their figures down to respectable proportions.

Since June, 1926, I have read the oath of enlistment to some ten thousand men while they held up their hands and said they would for the next three years, and it has been my good fortune to see the per cent of those who didn't constantly decrease, partly through our own efforts to play fair, by weeding out the unfit and ineligible, and partly through the efforts of the organizations to help us. When a man is enlisted every reasonable effort is made to make him feel that he is being welcomed into the service. Until he is thoroughly "acclimated" this effort should be continued in the organizations, keeping him with those of his own kind until he is trained. In this area there are evidences that Regimental Commanders have adopted the oft-repeated recruiting slogan "The day to start reenlisting a man is the day he takes the oath of enlistment."

We think that, especially, the Coast Artillery, a highly technical branch, needs intelligent men—men who can be trained into a sense of individual responsibility. When a battery starts to fire at target practice there may be a crew of one hundred or more on the team, but only a few of them are with the Captain. Other officers may be stationed where they can watch a dozen men, but they daren't speak to one of them at the time. If a man is taken suddenly ill, the shoot may be held up until the manning party can be reorganized. The Coast Artilleryman, then, should be the first to applaud steps to bring about improvements in personnel. The Binet-Simon Intelligence test, as modified by the "nut" specialists out at Leavenworth, has been a great help in raising the standard of the men accepted, but, locally, efforts to keep and train the men they get, thereby lessening the requirements for replacements, has been the cause of

the greatest boost. None of us will dispute that the recruiting service must enlist the number of men they are told to get from among the men who can be induced to present themselves. If required replacements are sixty per cent of the strength of the Army no one need expect the same quality as they would get with forty per cent replacement required. The latter figure, including reenlistments, is just about where it ought to be.

To get and keep good men in an organization, service with that organization must be made attractive, whether it be Battery Q, the white wings or the Standard Oil Co. With which unanswerable parting shot, I cease to annoy.

I cannot conceive of the members of the Officers' Reserve Corps merely standing by for emergency duty. They are organized and equipped, mentally and morally, for greater and more constant service and their leadership should be asserted at all times. It is each man's duty to assert his leadership in the community and to recognize his own opportunities for such leadership. He may, for example, be one of a minority fighting for the community's best interests. The smaller the minority he is identified with, the more bitter the attacks upon it, so much clearer should he hear the call to duty, so much the more valiantly should he defend his opinions.

And you are doubly armed. You not only bear your President's Commission to leadership but the success you have achieved in civil life testifies to your knowledge and capacity and many of you know from war-time experience how eager men are to follow capable leadership.

The concept of leadership that I would like to leave with you is that which I have tried to impress on officers of the Regular Army. It is that of a leadership that is not concerned with the welfare of this or that component of the Army alone. It is that of a leadership solicitous for the national welfare. For, after all, the object of the Army is to safeguard that welfare in all its aspects, to protect the bigger and broader life of our whole citizenship, and to maintain the principles upon which our Government was founded.—From an address by Gen. Charles P. Summerall, Chief of Staff, at Chicago, Ill.

COAST ARTILLERY ACTIVITIES

Office of Chief of Coast Artillery

Chief of Coast Artillery
MAJ. GEN. ANDREW HERO, JR.

Executive
COL. H. L. STEELE

Organization and Training Section

MAJ. S. JARMAN
MAJ. J. B. CRAWFORD
CAPT. J. H. WILSON

Personnel Section

LT. COL. H. T. BURGIN
CAPT. H. N. HERRICK

Plans, Finance, and Materiel Section

MAJ. J. H. COCHRAN
MAJ. C. H. TENNEY
CAPT. F. J. MCSHERRY

Intelligence Section

MAJ. S. S. GIFFIN
CAPT. H. N. HERRICK

Wanted: A Superior Second Lieutenant

A second lieutenant has a hard time. When he is very new we assume he knows nothing and treat him accordingly. He is the butt of all jokes and the recipient of undesirable details. He is the one selected for the doubtful honor of leading the badger forth to the fray. The fiendish glee with which the Adjutant details him as tug officer would lead us to believe that he is really Barnacle Bill, the sailor, in disguise. If he is a bachelor (and he can't very well be anything else) he is leaped upon by mature hostesses who have more or less attractive guests for dinner or the hop. If it is necessary to do some doubling-up in quarters we know who is going to do it. All of this is good clean fun, good for his soul, and removes the ego from his cosmos. He is impressed that R. H. I. P. He generally goes about his multiple duties in the proper spirit and keeps plugging away with a zeal which sometimes is missing in more senior officers.

But when we sit down with his blank efficiency report before us is there any reason why we should carry this hazing into its preparation? Can't a second lieutenant be good at the job of being a second lieutenant? Why isn't he treated just like an officer of more senior grade? Why isn't his rating based on what he should be as a second lieutenant rather than influenced by a subconscious comparison with officers higher in rank and of more knowledge and experience?

To make this point clearer classification tables of all officers of the Coast Artillery for the past four years are given below.

1926

<i>Rank</i>	<i>Superior</i>	<i>Excellent</i>	<i>Satis- factory</i>	<i>Unsatis- factory</i>	<i>Inferior</i>	<i>Totals</i>
Colonel	8	27	22	0	0	57
Lt. Colonel	4	27	24	0	0	55
Major	15	112	95	1	0	223
Captain	2	108	164	1	0	275
1st Lieutenant	0	61	164	0	0	225
2d Lieutenant	0	15	127	0	0	142
Totals	29	350	596	2	0	977

Not classified, 29 (less than one year's service).

1927

<i>Rank</i>	<i>Superior</i>	<i>Excellent</i>	<i>Satis- factory</i>	<i>Unsatis- factory</i>	<i>Inferior</i>	<i>Totals</i>
Colonel	9	25	22	0	0	56
Lt. Colonel	7	27	24	0	0	58
Major	11	123	89	1	0	224
Captain	2	118	140	1	0	261
1st Lieutenant	0	77	161	0	0	238
2d Lieutenant	0	23	125	0	0	148
Totals	29	393	561	2	0	985

Not classified, 31 (less than one year's service).

1928

<i>Rank</i>	<i>Superior</i>	<i>Excellent</i>	<i>Satis- factory</i>	<i>Unsatis- factory</i>	<i>Inferior</i>	<i>Totals</i>
Colonel	8	28	16	0	0	52
Lt. Colonel	7	32	20	0	0	59
Major	12	127	87	0	0	226
Captain	2	138	140	1	0	281
1st Lieutenant	0	81	138	0	0	219
2d Lieutenant	0	25	117	1	0	143
Totals	29	431	518	2	0	980

Not classified, 35 (less than one year's service).

1929

<i>Rank</i>	<i>Superior</i>	<i>Excellent</i>	<i>Satis- factory</i>	<i>Unsatis- factory</i>	<i>Inferior</i>	<i>Totals</i>
Colonel	9	24	15	0	0	48
Lt. Colonel	7	34	19	0	0	60
Major	16	134	71	0	0	221
Captain	5	139	122	0	0	266
1st Lieutenant	2	116	129	0	0	247
2d Lieutenant	0	20	102	1	0	123
Totals	39	467	458	1	0	965

Not classified, 36 (less than one year's service).

A casual examination (and we don't expect you to examine it more than casually) will disclose the fact that there are no superior second lieutenants and only in the past year have two first lieutenants risen to "superior" heights. Why is this? Even the number of captains rated

superior is nothing remarkable. There is nothing in these tables to give us a clue to the answer. We presume captains are rated by field officers and most of the lieutenants are rated by captains. In rating officers in the lower grades there appears to be an unusual severity which is not contemplated by the instructions printed on the efficiency report. If there are really no superior second lieutenants, only two first lieutenants who deserve the highest rating, and no more than five captains who are considered outstanding; then the outlook for the future of the Coast Artillery is very bad.

The classification shown above is made in the War Department and is based on the efficiency reports prepared by the officers' immediate superiors and indorsed through channels to the Adjutant General. Classification is not difficult. The Classification Board has experienced some difficulty, however, because it is convinced that some efficiency reports reviewed indicate carelessness or indifference on the part of the rating officer. The Board does not believe that a rating of "satisfactory" on all items included in the report is probable any more than a rating of "excellent" would be. It is a human characteristic that if we are good at one thing we may not be so good at something else. Napoleon wouldn't have gotten a superior rating for neatness and personal appearance. The fact that an officer is rated "satisfactory" throughout causes the Board to believe that the officer rated has not been correctly represented for classification. If an officer is "Conscientious, hard-working, and capable," why shouldn't he draw something better than "satisfactory"? Maybe he shouldn't. But should an officer be rated "satisfactory" who is "not especially industrious and needs supervision"? These two are true cases and caused the Board to pull their (its) hair and do some deep thinking.

"Satisfactory" is the favorite rating. It causes least trouble. It is used much by superiors who rarely come in contact with the officer reported upon as would be the case where the junior is on detached service. Lack of contact may account for some of the (more or less) useless reports prepared but not for all.

But to come back to the lieutenants and junior officers. Why can't a lieutenant be rated "superior"? Most of them perform their duties well. Lack of experience or short length of service should not be considered. The officer should be compared to others in his grade and if he is outstanding and all that can be expected why not call him "superior"? A report on a lieutenant prepared by a colonel contained the remark, "If he were not a lieutenant I would rate him superior." This is a gyp. (He got it, anyway). Certainly there are superior lieutenants and more superior captains than the classification table indicates. A feeble start has been made. Two first lieutenants are now rated as superior. Keep trying, shave tails. Some day you may make the grade, too.

Battery "E," 63d C. A. (A. A.), Wins Knox Trophy

Battery "E," 63rd C. A. (A. A.), Fort Winfield Scott, California, has been awarded the Knox Trophy for practices fired during the calendar year 1928. This is the first time the trophy has been awarded to a machine gun battery of antiaircraft artillery. The award was based on five practices with hits per gun per minute of

1st practice	77.6
2nd practice	72.3
3rd practice	35.4
4th practice	51.2
5th practice	89.5

Can you tie that? Of course not. That's the reason they won the trophy.

Now to bring you up to date on the Knox Trophy. It is awarded annually by the Massachusetts Society of the Sons of the Revolution for excellence in target practice. (The Society also provides one for the Field Artillery.) It may be won by a searchlight or mine battery under the rules approved by the donors. The trophy will be presented to the Battery Commander at the annual dinner of the Society to be held in Boston on January 17. The President of the Society is Brig. Gen. Richard K. Hale of Boston.

Capt. William H. Sweet commanded Battery "E" when this trophy was won. The other officers were 1st Lieut. J. C. Kilbourne, 2nd Lieut. Grayson Schmidt, and 2nd Lieut. Paul Nelson. Captain Sweet, although offered the trip to Boston, declined the honor of personally receiving the trophy for the battery. Perhaps he doesn't like to make speeches. 1st Lieut. Howard H. Newman, Jr., the present Battery Commander, will attend the dinner and receive the trophy.

Captain Sweet has been asked to write an article for the JOURNAL describing the practices which won the trophy and the methods which he used to obtain such excellent results. We hope to publish his article in an early issue.

War Department Service School Policies

A revised War Department policy replacing the one announced in 1925 has been published (December 6). The important points are given, briefly, for the convenience of our readers.

All newly commissioned will serve three years with troops before attending a service school. Certain departures from this are anticipated.

As soon as possible after this period of basic training all junior officers may expect to be detailed as students at the Battery Officers' Course.

Students graduating from the Battery Officers' Course will not be detailed on further duty as students (of the Advanced Course, for instance) until they have had a period of three years on other duty. This require-

ment may not be enforced if the officer has had more than eleven years' service.

An officer who has never attended a service school has a priority over those who have attended one or more courses.

Officers of more than eleven years' service may be detailed to the Advanced Course without having taken the Battery Officers' Course.

Officers most "vulnerable" for selection to attend the Battery Officers' Course are:

Those stationed at the Coast Artillery School, Fort Monroe, Fort Eustis.

Those returning from foreign service if his return synchronizes with the opening of the course.

If his return does not synchronize he may request extension of foreign service to accomplish synchronization; or he may be assigned to duty at Fort Monroe (Fort Eustis) until the course opens.

Officers who are due for change of station under length of tour of duty policy may expect detail as students, if eligible.

The Advanced Course students are selected principally by seniority and availability. Those who have never attended the school have a priority over those who have. Officers over fifty years of age will not be detailed as students in the Advanced Course (exceptions possible).

Parallax Corrections for the T-5 (Sperry) Director

The question has arisen as to whether a parallax correction is desirable for the new T-5 Director now being developed by the Ordnance Department and the Sperry Gyroscope Company. There is no parallax correction provided on any of the directors in use at present. The approved method is to set up the director at the center, approximately, of the square formed by the four guns of the battery. The distances from the instrument to the four guns is not great and such slight parallax as exists is ignored.

One might say that if a parallax correction were possible the director could be removed from the center of the square and set up away from the guns where there would be less confusion, smoke, and dust. This would be an advantage. The height finder is now given this advantage. A more important consideration would be the great protection furnished in a position outside the gun square. If attack and pursuit planes perform as expected they will dive for the guns and attempt to put them out of action by machine gun fire or fragmentation bombs. In this case the director crew will catch their concentrated effort.

There are disadvantages to the inclusion of the means to make the parallax correction. The principal one is the complication in the mechanism and its operation which would be introduced. Naturally the weight would be increased and weight is one of the most important considerations with this instrument at the present time. A longer transmission line would be

required not only adding to the weight by additional cable but more power would be required to operate the system as the distance increased.

An additional disadvantage, although probably not of the first importance, is that the Battery Commander would not be able to exercise close supervision over the operators at the instrument.

The decision reached is: That the parallax correction feature is not desired for the T-5 director.

Joint Army-Navy Exercises, 1930

The Secretary of War and Secretary of Navy have recently issued instructions that five minor joint Army and Navy exercises be conducted according to the following schedule:

<i>Place</i>	<i>Time</i>	<i>Naval Forces Participate</i>
Panama	Feb. 25-Mar. 10, 1930	Battle Fleet
Philippines	To be arranged by Army and Navy commanders concerned.	Asiatic Fleet
Hawaii	To be arranged by Army and Navy commanders concerned.	Naval Forces based on Pearl Harbor.
H. D. of Long Island Sd.	May, 1930	Scouting Fleet
H. D. of San Francisco	July, 1930	Battle Fleet

The Commanding Generals of the Panama Canal, Philippine and Hawaiian Departments and the First and Ninth Corps Areas will arrange for these exercises with the Naval Commanders concerned. They will be drawn up with a view to testing existing defense projects and plans. Since in solving the problems presented, the air, antiaircraft, and harbor defense forces of the Army simulate action against the elements of an attacking fleet, there are afforded excellent opportunities for improving the tactics and technique of the different arms. The problem of successfully using forces at hand to defend against naval attacks necessitates efficient communication and team work between all the elements of the defending forces. They are of particular benefit as a means of developing efficient communication and cooperation between Harbor Defense forces and the naval patrols which are furnished by the Naval Districts.

Antiaircraft Artillery for the Infantry Division

It has been estimated that approximately two antiaircraft regiments are required to furnish a reasonable antiaircraft defense for the Corps. The practice (in the map problems solved at the service schools) has been to attach antiaircraft units of the corps to divisions for their close defense, no antiaircraft artillery being provided as an organic part of the division. Recently the Chief of Coast Artillery has recommended that antiaircraft artillery be provided as an organic part of each division. For each division

A Headquarters and Service Battery, including a Search Light Platoon
A Gun Battery of four guns
Two Machine Gun Batteries of three Platoons each—Each Platoon
manning a multiple mount .50 caliber machine gun

In certain situations it is very necessary for the Corps to coordinate the antiaircraft artillery for air defense. One instance is: where the Corps is concentrated in a comparatively small area preliminary to some anticipated operation. In most cases the Division Commander is most directly concerned and no more difficulty would be encountered in coordinating than exists at present with the organic artillery of the division.

Antiaircraft Artillery War Game

Do we want an Antiaircraft Artillery War Game similar to the Coast Artillery War Game so popular (?) fifteen years ago? This question was recently raised in the Chief's office by an officer who believed that it would be useful in the training of R. O. T. C., Organized Reserves, and National Guard units.

Opinions differ as to the value of the Seacoast Artillery War Game Boards furnished all Harbor Defenses. The boards were expensive and the realism introduced by their use was not sufficient to justify this expense. Many officers believe that they introduced an unnatural condition into the conception of Coast Artillery tactics which was pernicious. While it is believed that the war game had some admirable uses it is now generally conceded that it was not a suitable agency for the most efficient tactical training of officers or enlisted men.

It is believed (in the Chief's office) that an Antiaircraft War Game Board would have even less value than the Sea Coast Board. The antiaircraft artillery game is a fast-moving proposition. Sometimes one doesn't know whether to say "Here they come" or "There they go." And it is getting no better fast. We allow a bomber a speed of about one hundred miles per hour but it is certain that the speed of the bomber of the future will be near one hundred and fifty miles per hour. Any war game board designed would have to be much larger (cover more territory) in order to play out a phase lasting even a few minutes.

For indoor instruction conferences and map problems are considered the best agencies for training where no antiaircraft materiel is available. Correspondence courses may be used. Terrain exercises can be prepared for any locality to add local color even if the troops and materiel and hostile planes exist only in the imagination.

One of the outstanding peculiarities of antiaircraft artillery is the lack of fire direction and control which can be exercised by the higher commanders. Once the hostile bombers are within sight the majors and colonels might just as well call it a day until they clear out or are brought down. We won't say that the antiaircraft artillery can get along without

field officers. They do their part of the job before the batteries open fire. Selection of routes and positions is their worry. The preparation of rather detailed instructions visualizing and anticipating every possible condition of attack is the concern of the higher Commanders. The Regimental Commander may be compared to a football coach with his staff of assistants. He can't be on the field after the whistle blows but he is there before running the team through its plays, observing, planning, approving, perfecting, setting the scenery.

One of the good features of the old war game was that it exercised all officers, from the colonel down, in the giving of tactical commands to cover various phases or situations. There is not much chance for this in the anti-aircraft. If the Battery Commander or platoon leader doesn't use his head without being told it will be too bad.

Joint A. A.-A. C. exercises are the best possible training. There will be more and more of these. When the proper methods for their conduct are better understood, when better cooperation and coordination are obtained they will be of immense value. Active duty training periods for the Reserve and National Guard will be so designated as to coincide with the periods when joint exercises are held. Several of these are to occur next summer. More-real knowledge can be obtained by participating in these exercises than in an entire winter of Antiaircraft War Game instruction.

New Truck for Test

A new type of truck (the Walter Truck) has been delivered to the 61st C. A. (A. A.) at Fort Monroe by the Coast Artillery Board.

Test of Single Conductor Mine System

During January, February, and March a test of the newly-developed Single Conductor Mine System will be conducted in the Harbor Defenses of the Delaware.

High Speed Target for Seacoast Artillery

For years the Coast has needed a high speed target for seacoast artillery (in addition to other things). The usual target practice is fired on a target making about ten miles an hour. Sometimes if the tide is running against the tug (Fort Eustis) the speed is reduced to three miles per hour and the plotter punches and punches until the paper looks like it had been hit by a charge of seven and one-half shot fired at close range. We know that this is not a service condition and that the use of a high speed target is necessary to properly train the personnel for firing on the target we will encounter in time of war.

Recently the Navy took some of our money with the intention of de-

veloping a high speed target for us. This development was carried on at Norfolk with the Coast Artillery Board in touch with the Navy. The first test of the target was made in February, 1929, and a speed of from twenty-five knots run with the target in tow. The target performed satisfactorily at high speed, but promptly sank at low speeds. After some changes further tests were made in May—same result. A third test was made with the low speed Mine Planter Schofield towing. This target was loaded in the stern with a five hundred-pound mine anchor and showed some promise but was still unsatisfactory. The money allotted was turned back with the problem unsolved.

Additional effort in designing the target will be made in Washington, provided a small allotment is made available.

The difficulty with this type of target is that it acts like an airplane. It stays up when the forward speed is high but promptly sinks when the speed drops off.

What is going to tow this target? Why bring that up? The Navy could tow it and probably would on occasions. The first thing is to get the target and then we can look around for some one to tow it.

Officers Detailed for Duty With the Sperry Gyroscope Co., Brooklyn

War Department orders have been issued directing 1st Lieuts. Hobart Hewett and Gervais W. Trichel to proceed to Brooklyn for a course of instruction in the plant of the Sperry Gyroscope Co. Lieutenant Hewett is now stationed at Fort Monroe, Lieutenant Trichel at Fort Hancock.

Both officers have had considerable experience with anti-aircraft materiel and were specially selected for this duty for this reason. They will spend approximately seven months with the Sperry Company and will be present during the manufacture of the new T-5 director which that company is undertaking. While there is no schedule of instruction to be followed every opportunity will be offered to obtain a thorough knowledge of the instrument itself as well as the process of its manufacture. Upon the conclusion of this duty these officers will be experts on the instrument and will participate in its practical tests at Aberdeen Proving Ground next summer.

The JOURNAL congratulates them upon their selection.

Antiaircraft Plotter

A new type of xylonite plotter for determining position of bursts in anti-aircraft firing has received a preliminary test by the Coast Artillery Board and furnished to troops for service test. This plotter was described (page 214) in the March JOURNAL.

Plotters have been furnished the 60th, 61st, 62nd, 63rd, 64th, 65th, 11th, and 13th, and if found satisfactory will be adopted.

The Coast Artillery School

During November one of the courses conducted at the Coast Artillery School was completed. This was the special course for battery officers of the National Guard and Organized Reserve. Twenty-six officers attended this course which extended over a period of six weeks.

The difficulty of conducting a satisfactory course in such a short period is obvious when it is remembered that nine months is devoted to the corresponding course for Regular battery officers and that this time is considered none too long in which to impart the desired instruction. However, not many National Guard and Reserve officers can spare a longer period from their civilian occupations so the course provided is naturally rather intensive. More time, comparatively, is devoted to the practical, including demonstrations, than to the theoretical.

The instruction given in the Department of Artillery covered a rather wide variety of subjects and classes of artillery. For instruction in orientation the class was divided into two sections—harbor defense and anti-aircraft—the officer's assignment depending upon his National Guard or Reserve assignment. The courses in materiel and gunnery, in addition to theoretical instruction, included considerable practical instruction at target practice the student officer actually performing the duties as a member of the battery personnel.

The anti-aircraft section visited Aberdeen Proving Ground and witnessed the tests then being conducted. They also received instruction on the newest types of materiel and were permitted to fire both guns and machine guns at towed sleeve targets. Returning to Fort Monroe, practice in firing trial shot and burst problems was given on the torque amplifier (fixed) anti-aircraft battery. Additional target practices were fired against towed targets.

The harbor defense section visited Eustis to become familiar with railway and tractor-drawn materiel and methods. They witnessed demonstration shoots of the 155 GPFs by the 51st Coast Artillery (T. D.) as well as practices fired by the 52nd Coast Artillery (Ry.) on the 8-inch railway gun and the 12-inch railway mortar. At Fort Monroe this section manned the 75 mm. field gun and fired over six hundred rounds at moving targets. They became familiar with the duties of the gun pointer, gun commander, fire adjustment officer, etc., by performing them. They also filled the individual positions during the firing of a practice on a 12-inch mortar battery in conjunction with the 12th Coast Artillery (H. D.).

From comments made by some of the students who have returned it is evident that much valuable instruction was covered in a short period of time and that the course given was considered well-worth while by those who attended.

Harbor Defenses of Cristobal

On November 5, Fort Randolph resounded with the roar of cannon when Battery "E," 1st Coast Artillery, fired the 14-inch guns of Battery Webb in their annual target practice. Capt. T. E. Jeffords conducted the firing by battery salvos which resulted satisfactorily.

On November 6, Fort Randolph was honored by a visit from the Secretary of War, Colonel Hurley. The Secretary made a general inspection of the post with special attention to the armament and the necessity for a sea wall at Fort Randolph.

Brig. Gen. William M. Cruickshank, Commanding the Panama Coast Artillery District, made his annual inspection of the 2d Battalion, 65th Coast Artillery, on November 16. After the battalion was presented by Maj. A. J. French, Commanding, the troops passed in review and were inspected in ranks. Then followed infantry drill by batteries and finally the inspection of barracks.

An inspecting party consisting of all artillery officers (except those exempted) of the Atlantic side made a thorough inspection of all inter-post and outlying stations on the Fort Sherman reservation, November 25, to acquaint themselves with the location and purpose of same.

Following calibration firing by Battery "H," 2d C. A., at Batteries Stanley and Mower (14-inch guns) this battery held record target practice on November 12, firing 12 rounds of ammunition and firing Stanley and Mower as a single battery with a distance of 250 yards between batteries. Three hits were scored—two bow-on and one broadside. Range, seventeen thousand five hundred yards. This firing completed all artillery service practices in these harbor defenses for the present season.

The 13th Coast Artillery (H. D.), Fort Barrancas

Congressman Tom Yon, of west Florida, visited Forts Barrancas and Pickens on the afternoon of November 12. He was particularly interested in seeing the old Forts Barrancas and San Carlos which were originally constructed in 1840 and 1728 respectively. He has introduced in Congress a bill for four thousand dollars to be used in restoring these forts.

Congressman Melvin R. Maas, representative from St. Paul, Minnesota, member of the Military Affairs Committee, accompanied by Lieut. Leland S. Stranathan (A. C.), arrived at Fort Barrancas November 15 by plane from Shreveport, La. Congressman Maas inspected both Forts Barrancas and Pickens. He stated that he wanted to see everything which needed improvement, repairs, or restoration.

Battery "B," 13th C. A., commanded by Capt. James D. Brown, turned in a perfect qualification record of one hundred per cent on the 1929-1930 rifle qualification course. There were three officers and twenty-seven enlisted men required to fire, and all qualified. Captain Brown himself made 244 on the "D" course.

Battery "A," commanded by Capt. J. J. Maher, has been conducting intensive drill on the 10-inch guns preparatory to firing its 1930 training year target practices. The preliminary practice of eight rounds was fired November 21 with satisfactory results. It is interesting to note that the time of the airplane spotting made by Lieut. Lambert S. Callaway and Lieut. H. F. Gregory (both A. C.) was less than the time of the terrestrial spotting by more than ten seconds per splash, the average time being about twelve seconds for an observation to be radioed to the Battery Commander. Method of adjustment used was the successive approximation. The 10-inch record practice of sixteen rounds will be held Monday, December 2, weather permitting. Maj. Richard Donovan from 4th C. A. D. Headquarters will witness the shoot.

The 15th Coast Artillery (H. D.), Fort Kamehameha, T. H.

During the month of July smoke tests were conducted in connection with the concealment of Battery Closson. A very interesting set of photographs of the test has been received which, unfortunately, can not be published due to the fact that they accurately disclose the position of this battery in the harbor defenses of Pearl Harbor. The entire test had a confidential status and is only mentioned to inform interested officers that such a test has been made and certain conclusions reached by those designated to observe it.

The subject of smoke screens has been a live one in the Coast Artillery for many years. We all know the Navy uses it with success. Why not the Coast Artillery? Meteorological conditions govern the use of smoke. Therefore it can not be used at all times (when wind is unfavorable). The condition for fixed guns is not the same as for the Navy because in the latter case there is mobility, in the former none. The Navy may use smoke to enable it to attain a favorable position from which to deliver fire. Smoke blinds the defense as well as the hostile forces. Perhaps fire could be delivered by Case III even if the battery were entirely screened. Perhaps the delivery of fire by the protected battery would not be necessary at the time the screen is laid as in the case of an aerial bombing attack not accompanied by naval activity. The greatest criticism, in the minds of some, is that it actually discloses the battery position by inviting attention to the fact that where there is smoke there is something to conceal. Certainly, the screen should be laid over an extensive area greatly exceeding and including the vital battery area if it is to reduce the accuracy of the bomber to any extent. It is generally conceded that smoke screens are ineffective for large areas, such as cities. They may have a use in drawing the bomber to an unimportant point and persuading him to drop his bombs there just as lights were arranged during the war to represent targets of importance.

An interesting article covering the subject of smoke screens could be written and would serve to direct thought towards this means of defense.

52nd Coast Artillery (Ry.), Fort Eustis, Va.

The District Commander, Maj. Gen. Henry D. Todd, accompanied by the Brigade Commander, 30th Coast Artillery Brigade (Ry.), Brig. Gen. C. D. Roberts, inspected the 52nd Coast Artillery (Ry.) artillery materiel on November 22. The armament train of thirty-five cars including four 8-inch guns and four 12-inch mortars passed in review. General Todd complimented the regiment on the appearance of its materiel and also its motor transportation.

For the enlisted men troop schools begin on December 2 and continue until February 28. In addition to Gunners' Instruction, special courses are given in (1) Clerical Instruction, (2) Telegraphy, (3) Radio, (4) Meteorology, (5) Cooking, (6) Railway Trainmen, (7) Marine Engineering, (8) Motor Transportation, and (9) Telephone Communications.

Troop schools for officers of the regiment for the three months period will include the following subjects: (1) Tactical Employment of Railway Artillery, (2) Train Inspection of Railway Artillery Materiel, (3) Air Brakes and Train Operation, (4) Orientation and Command Post Exercises, (5) Antiaircraft Machine Gunnery, (6) Gunnery for Heavy Artillery, and (7) Analysis of Drill and Target Practice.

The 61st Coast Artillery (A. A.), Fort Monroe

Since the return of the regiment from Aberdeen Proving Ground on November 10, the 61st has been occupied with the usual winter routine duties. Troop schools and Gunners Instruction are being conducted.

As an aftermath of the several months spent at Aberdeen and the marches to and from that post the motor equipment was found to need a general overhaul. This work is being carried on as well as the scheduled instruction. Once each week all motor transportation takes the road for purposes of inspection.

Officers' schools have been made more interesting by taking advantage of the close proximity of the Coast Artillery School and the Air Corps Tactical School. Instructors from these schools have been giving very instructive talks before the 61st officers, adding greatly to the interest in the officers' classes as well as greatly increasing the range of instruction possible.

211th C. A. (A. A.), Mass. N. G., Summer Camp

The 211th C. A. (A. A.), Mass. N. G., or as it better known, the First Corps of Cadets of Boston, camped during its annual tour of Federal service at Peters Pond, South Sandwich, Mass., conducting its firing at Town Neck, Sandwich, over Massachusetts Bay.

The regiment consists of the Headquarters, Headquarters Battery and Combat Train, Medical Detachment, and four lettered batteries, "A," "B," "F" and "H," each armed with its appropriate weapon. The strength of the regiment is sixteen officers and two hundred and seventy-nine enlisted men. There were actually present at camp twenty-three offi-

cers, including seven attached Reserve officers, and over three hundred enlisted men.

The regiment left Boston on the morning of July 20, by train, arriving at Sandwich some two hours later. The guns, searchlights and transportation assigned the regiment, together with truckage loaned by the 26th Division, left early the same morning, arriving late in the afternoon. The camp, a tent camp, had been partially prepared by the advance party so that by retreat the entire camp was well under way. The 21st, Sunday, was spent in getting shaken down. Monday, the 22nd, all batteries occupied positions on the beach and prepared for preliminary practice which was carried on throughout the first week. A plane from the 101st Observation Squadron (Mass. N. G.) flew tracking missions the last three days of the week.

The first part of the second week was devoted to record practice, the machine guns firing mornings, the guns afternoons. On August 1 through the cooperation of the Hyannis Airport a plane was obtained for a searchlight mission, the first night mission the regiment ever had. The lights did extremely well in spite of the fact that adverse weather conditions, the lack of a sound locator, and the presence of some fifteen hundred automobiles rendered picking up a plane by sound a very difficult undertaking. However, the experience obtained was very valuable.

Camp closed on August 3, the regiment proceeding on that date to Boston by train.

The high points of the camp were: presence of Reserve officers, the excellent results with machine guns, the searchlights practice, and the absolutely smooth functioning of the camp, so smooth, in fact, that some of us were constantly worried wondering what was wrong.

All machine gun firing was by sight, no tracers were used. All guns were thoroughly serviced before practice. Last year's rate of fire was stepped up over half and scores somewhat more.

The other experiment, the attendance of Reserve officers, was a great success. There were in camp one captain and six lieutenants. All were attached to organizations in which they functioned as Platoon Commanders, each officer having a definite assignment and working as a member of the unit to which attached. It is believed that each party greatly profited, the Reserve officers by the practical experience obtained and the regiment through the painstaking and efficient service it received, not to mention the good relations and understanding promoted by the working together of officers of the Guard and the Reserve.

One of the valuable features of the cadets' camp site, in addition to the splendid field conditions and bathing facilities, is the presence of a four-way aviation field on the parade ground. This was used by seventeen different planes this year, both military and commercial, ranging from Moths to Falcons, as well as the pursuit ship flown from Selfridge Field for special tracking missions.

PROFESSIONAL NOTES

Notes on the Computation of Drift Effects on Projectiles Due to Range Wind

By MR. H. P. HITCHCOCK

As an illustrative example, it was decided to compute the effect of a 50 f/s rear wind on the drift of the 12" Mortar Model 1890 firing a 700-lb. Common Steel Shell, Mk. VI, at 65° elevation.

For the purposes of the computation, a projectile fired at a non-tabular velocity of 715 f/s intermediate between the tabular velocities of 635 f/s and 750 f/s was chosen. Under the condition that the range wind is \bar{w} , we have the following relevant characteristics of the trajectory:

Elevation (Φ)	65°
Muzzle Velocity, V_0 ,	715 f/s
Time of Flight	38.63 sec. (from Trajectory computation)
Range	3527 yards (from Trajectory computation)
Drift	339 yards (Firing Table 12-I-1) by interpolation from the tabular velocities
n	20 cal. per turn of rifling

As a result of a 50 f/s rear wind, the characteristics of the trajectory are changed to the following:

Elevation (Φ')	68° 43.8' (Relative to air)
Muzzle Velocity, V_0	695.4 f/s (Relative to air)
Time of Flight	38.69 sec.
Range	2965 yards (Relative to air)
Range	3610 yards (Relative to Ground)
n'	19.45 cal. per turn of rifling (Relative to air)

To determine the effect of the 50 f/s range wind on the drift, we need to know what the drift is when the muzzle velocity is changed from 715 f/s to 695.4 f/s, when the elevation is changed from 65° to 68° 43.8', and when the twist of rifling is changed from one turn in 20 calibers to one turn in 19.45 calibers.

The drifts at 68° 44' at the tabular velocities of 750 f/s and 635 f/s may be obtained by a graphic extrapolation of the drift as a function of $\sec \Phi$ for these velocities. The drift at an angle of 68° 44' and a velocity of 715 f/s may be obtained by interpolation. By this procedure, it was found that the increase in elevation from 65° to 68° 44' increases the angular drift from 98 mils to 123 mils.

By comparing the drift at 65° elevation and the muzzle velocity of 750 f/s with that at the same elevation and a muzzle velocity of 635 f/s, it may be deduced that the effect of the reduction in muzzle velocity on the angular drift should be negligible.

Hence, the increase in elevation and the decrease in muzzle velocity combined augment the drift from 339 yards to 358 yards, in the system moving with the air.

In taking account of the effect of n on the drift, we shall assume that the drift is inversely proportional to the values of n and thus as n changes from 20 to 19.45, the drift will change from 358 yards to 368 yards. We thus find that the resultant drift is 368 yards. Relative to the stationary system, this is equivalent to a drift of 104 mils, that is to say, six mils greater than the drift under normal conditions. It thus follows that a 50 f/s rear wind causes approximately an increase of six mils in the drift under the given conditions.

The Drift Change Due to a Range Wind

By MR. R. H. KENT

Consider a projectile fired with a velocity V_o , at an angle of projection Φ , from a cannon having one turn of the rifling in n calibers, under normal atmospheric conditions. Then in general, if Z is the drift, we may write

$$Z = f(V_o, \Phi, n)$$

and, as is well known, if Φ is not too great we have

$$Z = \frac{1}{n} F(V_o, \Phi),$$

where $F(V_o, \Phi)$ does not involve n .

Consider the effect of a following wind W_x on Z . Following the usual procedure, we refer the trajectory to axes moving with the wind. In this system the horizontal component of the velocity becomes $V_o \cos \Phi - W_x$ instead of $V_o \cos \Phi$ and the vertical component remains unchanged. Hence, if V_o' and Φ' are the initial velocity and angle of projection referred to axes moving with the wind, we have

$$V_o' = V_o \sqrt{1 - \frac{2W_x \cos \Phi}{V_o} + \left(\frac{W_x}{V_o}\right)^2}$$

and

$$\Phi' = \tan^{-1} \left[\frac{\sin \Phi}{\cos \Phi \left(1 - \frac{W_x}{V_o \cos \Phi}\right)} \right]$$

Inasmuch as the spin is unchanged while the velocity changes from V_o to V_o' the effect is equivalent to a change in the value of n . If n' represents the effective value for the moving axes, we have

$$n' = \left(\frac{V_o}{V_o'}\right)n.$$

It follows that the drift Z' , when the range component of the wind is W_x and other atmospheric conditions are normal, is given by

$$Z' = f(V_o', \Phi', n')$$

and the drift change due to a range wind W_x , is $Z' - Z$.

Of course, if Φ is not too large, we may write

$$Z' = \frac{1}{n''} F(V_o', \Phi).$$

In most cases, $F(V_o, \Phi)$ may be determined from the range tables and the drift change $Z' - Z$ calculated with reasonable precision provided, of course, that the elevation is not too high.

Calculations made by Mr. H. P. Hitchcock for the 12" Mortar projectile fired with a velocity of 715 f/s at an elevation of 65° have shown that the drift change for a 50 f/s following wind would be about six mils. This deflection change is approximately one-fourth the deflection change produced by a 50 f/s cross wind.

Note: See Fowler, Gallop, Lock & Richmond, Phil. Transactions of the Royal Society, A, 221, page 358, "The Aerodynamics of a Spinning Shell" and also Moulton's "New Methods in Exterior Ballistics."

New Bomb-Aiming Apparatus

Experiments are being carried out at the Army Air Corps' experimental laboratory at Wright Field, Ohio, with a view to the development of a bomb-aiming apparatus which will greatly increase the accuracy in dropping bombs from air planes.

The device will be on the order of an aiming apparatus which will enable the pilot to determine more accurately the methods and time by which the projectile may be dropped.

The existing bomb-aiming apparatus is fairly accurate. It is built along the side of the fuselage of the plane and has adjustable parts which can be set for the desired ranges according to the elevation, speed and drift. It is possible with devices now in use to hit the outline of a battleship on the ground with a large percentage of accuracy from an elevation of from four thousand to five thousand feet. If the bomb lands within twenty feet of the target it is counted as a hit but greater accuracy is desired.

The Army Air Corps has also worked toward the perfection of bomb-releasing devices. The instantaneous release of the projectile on the instant the pilot touches the release button has been the main field for improvement, as such devices have much to do with the accuracy with which the bomb is sent toward the target.

The pilot has to fly straight and make proper allowances for speed, elevation, drift, and range when aiming the bomb and improvement in aiding this is the object of present experiments.—FROM ARMY ORDINANCE.

Spanish To Be Studied at Command and General Staff School

In order to increase the number of officers who are able to speak the Spanish language, the Secretary of War has directed that beginning with the school year 1930-31, the study of the Spanish language be included in the course of instruction at the Command and General Staff School at Fort Leavenworth, Kansas.

This action was taken because of the already close relations between the United States and the countries of Latin America, and the probability that these relations will greatly increase in future years. In addition, there has been a demand from these countries for officers with a knowledge of the Spanish language for detail on special missions. At the present time, the percentage of officers possessing qualifications in this language is comparatively small, two per cent speak it fluently, sixteen per cent fairly, while twenty per cent read and translate.

Recent announcement was made of the success met with in taking an aerial photograph of Mt. Ranier from a distance of two hundred and twenty-seven miles. The distance achieved in this long-distance photograph exceeds by fifty miles any previous record.

These remarkable photographs were obtained the past summer during a fourteen thousand-mile aerial photographic tour of the northwestern part of the United States. This project was authorized by the War Department because of the valuable contributions to military photography that were expected to result.

The mountains clearly shown are far beyond the distance the eye can see. Even on clear days the atmosphere contains sufficient haze to limit vision to much less than twenty-seven miles. But the long-distance photographs were made on film sensitive to the invisible infra-red rays that penetrate smoke and haze. The photograph was made from an altitude of seventeen thousand feet above a landmark which could be identified on a map.

The great value of high altitude or long-distance photography in time of war is obvious. It would mean the ability to secure layouts of enemy territory far beyond the reach of enemy antiaircraft guns.—From Air Corps News Letter.

COAST ARTILLERY BOARD NOTES

Project No. 738—A. C. Self-Synchronous Data Transmission System for Antiaircraft Artillery.—Electrical follow-the-pointer data transmission systems for antiaircraft artillery have been tested during the 1926, 1927 and 1928 firings at Aberdeen Proving Ground, Md., and the superiority of this system of data transmission over the Case 1½ has been very great. Of the system employed, the alternating current self-synchronous system has shown itself to be by far the most desirable. The specifications for such a system, prepared by the Ordnance Department, are satisfactory. The Coast Artillery Board has recommended that the alternating current self-synchronous data transmission system be adopted as standard data transmission for all antiaircraft 3-inch and 105 mm. guns, and that all M-1 Vickers data computers to be purchased be supplied with this system.

Project No. 739—Standardization of Signal Lamp Type EE-80.—The Signal Lamp Type EE-80 has been used during three tests at Aberdeen Proving Ground and has proved of considerable value in target practice. It will be of great value under service conditions, particularly in signaling pursuit aviation. The Coast Artillery Board has recommended that this lamp be adopted as standard for use in the antiaircraft artillery.

Project No. 740—Test of Sponge Rammer T-5 for 6-inch Gun M1900.—Two sponge-rammers T-5 have been received and will be tested by the 12th Coast Artillery.

Project No. 741—Terrestrial Sound Ranging Plotting Board (Straight Base Method).—The Coast Artillery Board has recommended that the plotting board under construction by the Ordnance Department for use by the First Sound Ranging Battery be designed for use with the straight standard base only.

Project No. 742—Program for Development Work in Long Range Firing Against Naval Targets.—Program is being prepared by the Board.

Project No. 743—Service Test of Ordnance Tractor, Caterpillar "20"—Two Ordnance Tractors, Caterpillar "20" have been furnished by the Ordnance Department for test by the 61st Coast Artillery under the supervision of the Coast Artillery Board to determine their suitability for maneuvering the 3-inch antiaircraft gun M3 on trailer mount M2.

Project No. 744—Incorporation of Antiaircraft Artillery in Infantry Division.

Project No. 746—Air Corps—Antiaircraft Artillery War Game.—A war game for Air Corps-Antiaircraft Artillery, similar to the present Coast Artillery War Game, has been suggested by an officer on duty as instructor, Organized Reserves, to be used in connection with the instruction of Reserve units of both branches.

YOU TELL EM

Sorry, But It Can't Be Done

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

In enclosing my check for renewal of my subscription permit me to heartily congratulate you on the JOURNAL. In talking with other officers of the Coast Artillery Corps here I find that they all feel as I do and I have yet to hear an adverse criticism. Perhaps the best criterion of my own reaction is that I now read the JOURNAL from cover to cover, a thing which speaks for itself as spare time at the general service schools is at a premium, as you well know.

While I would not go so far as some who have advocated total elimination of the highly technical and mathematical articles I do feel that their curtailment was a good thing. I especially enjoyed the article on Antiaircraft Gunnery (British) by Captain Krohn and the one on Mechanization in Europe by Major Benson. Personally I would like to see more along this line as I feel knowledge of what other countries are doing is most helpful if not vital to our own progress.

As you probably know, I am rather a "bug" on sound ranging. While I was on this duty at Fort H. G. Wright, the Chief's Office had a policy of rigid secrecy in regard to this work and no references to it were permitted in the JOURNAL. The appearance of a recent article by Major Colton perhaps indicated a modification of this policy. I wonder if the spreading of more information on this subject would not awaken interest in it and react to the benefit of the Corps?

With best wishes for the continued success of the JOURNAL under its new policy, I am,

Sincerely yours,

R. B. WEBB,
Major, C. A. C.

Likes To Hear How It Was Done

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

THE COAST ARTILLERY JOURNAL is one of the best means of training the Reserves. A correspondence school course is a help but at its best it can not carry the personal message to the reader that an article does. The inexperience of the average graduate is not due to his academic weakness but rather to a lack of training in human engineering. Few, if any, colleges give such instruction: they are not actively engaged in practical application of their knowledge and so take the academic viewpoint.

The Reserve is at a still greater handicap, for he is not in daily contact with the activities of the Regulars. If his training be confined to written lessons, he too will be an incubate. The something that tells a man how and

when is gained either by personal experience or from the advice of those who have been through the mill. Those articles that give personal experience are by far the most informative: They may be lacking in gunnery; they may be written about any part of the campaign; they may tell you only one little secret; but they do tell the way in which the writer used his head and tools to accomplish a definite result.

These are the articles that will be of permanent value to your readers. Changes of materiel or regulations do not alter facts or principles, which are the results of experience.

I have read several articles of this nature in the JOURNAL, and this is merely the expression of a personal opinion. I am confident that the JOURNAL will continue to improve.

Sincerely yours,

EVERY W. WALKER,
1st Lieut., 522nd C. A. (A. A.)

We have the *Journal of the United Service Institution of India* to thank for the following contribution to the You Tell Em Section. They were writing them then, too. Stanhope took the island of Minorca in 1708. The elderly lieutenant's letter was addressed to a minister. We presume he wanted to be promoted. He writes

Minorca, October, 1758.

My Lord:

I was a lieutenant when General Stanhope took Minorca; for which he was made a Lord. I was a lieutenant when General Blakeney lost Minorca; for which he was made a Lord. I am a lieutenant still.

Yours, etc.

This Should Please a Former Editor

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

* * * With reference to Lieutenant Gray's intimation that the Editor of the JOURNAL should have protected me when a storm arose following the publication of my article on "The New Artillery Grid Maps" I can see no reason why he should have assumed the responsibility of standing back of me in this connection. It was entirely my own hunt, and I was entirely in the right except for one technical slip. * * *

Very truly yours,

ROGER SHERMAN HOAR.

Photographs Don't Lie

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

I am enclosing check for renewal of my subscription. My permanent address will continue to be as listed.

The JOURNAL seems to be improving with each issue. I find especially interesting the wails of "Old Subscribers" and accompanying editorial comments, the articles on recent developments in materiel and methods, the notes on activities of various units, and the brilliant research work of the Junior Coast Artillery Board. If I hadn't seen a picture of it, I would have doubted the existence of such a remarkable instrument as the Snickers Gadget.

Very truly yours,

G. E. MILLER,
2nd Lieut., CA.-RES.

Can't Stop It

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

Herewith check for three dollars.

If you will examine your files you will find that in September, 1928, I subscribed for *one* year with instructions to discontinue at the expiration of a year.

Please note that I am *renewing* these instructions and if you do not discontinue my subscription next September I will not be responsible for payment thereof.

Very truly

L. C. BRINTON,
Lieut. Col., U. S. A.

It Not Only Interests Us, It Surprises Us

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

* * * It may interest you to know that altho a mere female, I enjoy reading your JOURNAL from "Kiver to Kiver."

Yours, etc.,

MRS. E. J. C.

We Hope We Can Keep Them Out of the Basement

The Editor, the COAST ARTILLERY JOURNAL

Dear Sir:

Herewith check for three dollars (\$3.00) in payment of my subscription.

I have been able to understand everything printed in the JOURNAL, in the last few editions, and enjoyed reading them through.

The custom in the battery has been to file them in the basement, now they stay in the reading room.

D. J. RUTHERFORD,
Captain 64th C. A. (A. A.)
Commanding Battery "B"

COAST ARTILLERY ORDERS

Col. Harry C. Barnes, from command 52nd, Fort Totten, to Org. Res., Chicago.
Col. John W. Gulick, from Militia Bureau, Washington, to 2d C. A. D., Fort Totten, March 15.

Col. Frank C. Jewell, appointed member Army Retiring Board, Fourth Corps Area.

Col. Harry T. Mathews, from R. O. T. C., Seattle, Washington, to retire November 3.

Col. J. B. Mitchell, from Panama, to Headquarters, Second Corps Area, December 5 (awaiting retirement).

Col. Robert E. Wyllie, detailed member class B Board, Panama Canal Dept.

Maj. Richard F. Cox, from student A. W. C., to G. S. C., Washington, June 30.

Maj. Edward B. Dennis, detailed member class B Board, Panama Canal Dept.

Maj. Stuart A. Hamilton, transferred to Chemical Warfare, October 19 and remain on present duties, Edgewood Arsenal.

Maj. William W. Hicks, from instructor, National Guard, New York, to 2d, Fort Totten.

Maj. Harry L. King, from Philippines, to Org. Res., Topeka, Kansas.

Maj. Edward W. Putney, from Philippines, to 9th, Fort Banks.

Capt. Coleman F. Driver, retired.

Capt. Leon C. Dennis, from 7th, Fort Hancock, to Philippines, sail New York, May 7.

Capt. Byron T. Ipock, from Philippines, to 9th, Fort Banks.

Capt. Albert M. Jackson, from Frankford Arsenal (temporary), to 62nd, Fort Totten, December 15.

Capt. Harry W. Lins, from 8th, Fort Preble, to 13th, Fort Barrancas.

Capt. Richard C. Lowry, from 9th, Fort Banks, to Philippines, sail New York, May 7.

Capt. Riley E. McGarraugh, from 12th, Fort Monroe, to Philippines, sail New York, May 7.

Capt. Douglas E. Morrison, from 62nd, Fort Totten, to Philippines, sail New York, May 7.

Capt. Everard F. Olsen, from 7th, Fort Hancock, to submarine mine depot, Fort Totten.

1st Lieut. James B. Carroll, from Philippines, to 12th, Fort Monroe.

1st Lieut. Edwin B. Fitzpatrick, to sail New York, February 28, for Panama.

1st Lieut. Eugene R. Guild, from 3d, Fort MacArthur, to 12th, Fort Monroe, sail San Francisco, January 29.

1st Lieut. Claud T. Gunn, 52nd, Fort Eustis, transferred to Finance, November 21, and to Finance School, Washington, for six weeks, thence to Chanute Field.

1st Lieut. Hobart Hewett, from 61st, Fort Monroe, to Sperry Gyroscope Co., Brooklyn, December 10.

1st Lieut. John J. Hincke, from Philippines, to 12th, Fort Monroe.

1st Lieut. James F. Howell, Jr., from Hawaii, to 12th, Fort Monroe, instead of 1st S. R. B., Fort Eustis.

1st Lieut. Joseph C. Kilbourne, from 63rd, Fort Winfield Scott, to Philippines, sail San Francisco, February 8.

1st Lieut. James E. McGraw, from Philippines, to 51st, Fort Eustis.

1st Lieut. Clarence M. Mendenhall, Jr., from 61st, Fort Monroe, to Hawaii, sail New York, February 21.

1st Lieut. Arthur B. Nicholson, from Philippines, to 12th, Fort Monroe.

1st Lieut. Roy D. Paterson, from Philippines, to 6th, Fort Winfield Scott.

1st Lieut. William F. Sadtler, 7th, Fort Hancock, transferred to Ord. Dept., and to Nansemond Ord. Depot, Virginia, November 8.

1st Lieut. Leland S. Smith, from 13th, Fort Moultrie, to Philippines, sail New York, May 7.

1st Lieut. Horace Speed, Jr., from 1st S. R. Battery, Fort Eustis, to Philippines, sail New York, May 7.

1st Lieut. Gervais W. Trichel, from 7th, Fort Hancock, to Sperry Gyroscope Co., Brooklyn, January 3.

1st Lieut. Carl B. Wahle, from 51st, Fort Eustis, to Hawaii, sailing New York, March 28.

1st Lieut. John A. Weeks, from 14th, Fort Worden, to Hawaii, sail San Francisco, January 4.

2nd Lieut. Clair M. Conzelman, from Philippines, to 11th, Fort H. G. Wright.

2nd Lieut. Matthew K. Deichelman, from 12th, Fort Monroe, to Philippines, sailing New York, May 7.

2nd Lieut. William G. Devens, from Philippines, to 52nd, Fort Eustis.

2nd Lieut. Olaf H. Kyser, Jr., placed on D. O. L., November 21.

2nd Lieut. Howard E. Pearson, from 7th, Fort Hancock, to Panama, sail New York, February 28.

2nd Lieut. Jacob G. Reynolds, from 3d, Fort MacArthur, to Philippines, sailing, San Francisco, May 29.

2nd Lieut. Guy E. Thrans, from 7th, Fort Hancock, to Philippines, sail New York, May 7.

2nd Lieut. Holger N. Tofton, from Hawaii, to 13th, Fort Barrancas.

2nd Lieut. Kenneth J. Woodbury, from 9th, Fort Banks, to Philippines, sailing New York, May 3.

W. O. Walter E. Jones, A. M. P. S., from Fort Worden, to Fort Monroe, sail San Francisco, November 27.

W. O. Patrick J. Keating, A. M. P. S., from Fort Hancock, to Philippines, sail New York, January 17.

W. O. William J. McCartney, A. M. P. S., from Philippines, to Fort Hancock.

W. O. Peter J. McGreevy, A. M. P. S., from H. D. Cristobal, to Fort Monroe.

W. O. James E. Murray, A. M. P. S., from Fort Monroe, to Cristobal, sail New York, February 28.

W. O. Nelson E. Smith, A. M. P. S., to Sandy Hook, instead of Long Island Sound.

W. O. George G. Trahey, A. M. P. S., to Long Island Sound, instead of Sandy Hook.

Master Sgt. Claud A. Sadler, 64th, Fort Shafter, retired.

Tech. Sgt. John L. Sullivan, 13th Band, Fort Barrancas, retired.

1st Sgt. Robert E. Cantrill, 14th, Fort Worden, retired.

1st Sgt. William Delahanty, 2d, Fort Sherman, retired.

1st Sgt. Frederick J. Kelly, 3d, Fort MacArthur, retired.

1st Sgt. John Morris, 14th, Fort Worden, retired.

1st Sgt. Thomas F. Spellman, 9th, Fort Banks, retired.

Pvt. Walter E. Jones, Fort Worden, appointed Warrant Officer, A. M. P. S., October 24.

BOOK REVIEWS

Radio Telegraphy and Telephony. By Rudolph L. Duncan and Charles E. Drew.
New York: John Wiley & Sons, Inc. 1929. 6¼" x 9¼". 950 p. Il. \$7.50.

This is a very complete treatise on radio communications and will prove to be a valuable help and reference to the novice as well as the radio engineer. The fundamentals, theory, operating procedure, and mathematics are given in their proper places and in a most satisfactory relation. The mathematics contained in this book is not very difficult, and only that part which is necessary to explain the principles involved is used.

As the book contains twenty-six chapters, only a brief outline of a few of the important parts can be considered.

There are chapters covering the theory of magnetism, Ohm's law, generators, and alternators, which is explained in an elementary manner, with excellent diagrams. When these principles are referred to in the later chapters, they are often reviewed to clear up the particular point under discussion.

The theory of alternating current is covered in a condensed manner, but sufficient information is given for the reader to become familiar with the manner in which alternating current functions.

The chapter on "Vacuum Tubes" is exceptionally good. It gives an elementary explanation of the electron theory with its applications in the development of the different types of vacuum tubes. The different vacuum tubes, including the later A. C. types are described, and in many instances the characteristic curves, and the methods of obtaining them are given.

Receiving circuits are covered, from the simple crystal set to the latest multi-tube receiver. The functions of the different apparatus used in these circuits are described, including the different methods of coupling.

There are also chapters describing telephone receivers, loudspeakers, commercial receivers, rectifying devices, high voltage condensers, resonance, commercial broadcast telephone transmitters, spark transmitters, arc transmitters, and direction finders.—C. L. W.

The Doctrine of Necessity in International Law. By Burleigh Cushing Rodick.
New York: Columbia University Press. 5¾" x 8¼". 158 p. \$4.00.

There are many rules of International Law which make provision for exceptions in cases of "urgent necessity." On such occasions, therefore, a departure from the rules is not contrary to law, but is strictly legal. However, it is a delicate matter to determine just what is an "urgent necessity" which would justify disregard of the ordinary rules; who is to be the judge of the necessity? How far and to what extent can action under this plea be carried? These are questions which Dr. Rodick studies and analyzes in this scholarly work.

The author treats the doctrine of necessity purely from a legal standpoint, although he acknowledges that under the inherent right of self-defense a state can do virtually anything which may be required for its preservation. That, however, is extra-legal and has its justification only in success. The state must be prepared to pay the legal penalty in the event of failure, as Germany is today paying for the rape of Belgium.

Dr. Rodick commences by citing the views of the early writers on International Law from Machiavelli, early in the sixteenth century, to the writers of a hundred years ago. They follow discussions on necessity as applied to national

jurisdiction, to the high seas, to intervention or reprisals short of war and finally to war itself, under the three heads of military, naval and neutral questions.

Probably the most interesting cases to the present generation are those of the World War and the best known example of the necessity plea in that struggle was Bethmann-Hollweg's frank statement regarding the invasion of neutral Belgium. "His statement is an excellent presentation of the idea of political necessity," but is not a legal justification.

However, it was not only the Central Powers that violated neutrality. The Allies seized a base in Greece, then neutral, in order to aid Serbia claiming that as there was no better way to reach that country, it was an "urgent necessity." Similarly Japan seized the Shantung Railway in neutral China in connection with its operations against the German port of Tsingtao. Dr. Rodick denies any legal justification in any of these cases.

Naval warfare in the World War raised many interesting points. Great Britain—and the United States after entry into the war—claimed that military necessity required an exceptional measure of mining in the North Sea, while Germany made a similar plea to excuse her war zone decrees of 1915 and 1917.

Germany's method of submarine warfare, involving a failure to make provision for the safety of the passengers and crews of merchant vessels before sinking, and frequently insufficient care in establishing the true character of the vessel, was a necessity, according to Germany, inasmuch as with that type of vessel it was impossible to observe the rules which had heretofore prevailed.

Under what circumstances is a general legally justified in refusing to grant a suspension of arms, truce or armistice? When can the bearer of a flag of truce be fired on? What conditions would justify the destruction of private homes, museums, churches, and other buildings usually exempted from bombardment? These and other similar questions are discussed by Dr. Rodick in his chapter on Military Necessity.

Very complete notes, references and a bibliography add greatly to the reference value of the book.—R. E. W.

The Stormy Life of Mirabeau. Translated from the French by Henry de Jouvenel. Boston and New York: Houghton Mifflin Co. 1929. 6" x 9". Ill. 286 p. \$3.50.

How often we find a queer streak in the man of genius. This is well exemplified in this new biography of the Comte de Mirabeau. Ugly, misshapen and pock-marked though he was, his life might well be called "The Rake's Progress," while his genius was evident during the first two years of the French Revolution. Undoubtedly his early experiences were responsible for the side he took in that great convulsion, a side in opposition to his own class, the nobility.

At the age of nineteen he was imprisoned by his father for what might be termed incorrigibility, one symptom being his efforts to wed a girl of the people. On his release he joined the army and soon commenced his amorous escapades. Meeting an heiress with many suitors he forced marriage by seduction. His wife's dot was soon dissipated and huge debts were incurred. A thrashing administered to a notable caused his second imprisonment during which his wife tired of her stormy husband. He published incendiary pamphlets in Switzerland; is again ordered to be confined but succeeds in escaping to Holland, taking with him the wife of another man. There he published more pamphlets of a revolutionary nature; was sued by the outraged husband for rape and seduction and condemned to death. Extradited from Holland, the death sentence was not put into execution, but he was imprisoned for four years. He then visited England

and Prussia, continued his writings and his amours and in every way opposed the established order in France. By taking the side of the people he attained popularity and was elected to the National Assembly in 1789 as a representative of the Third Estate, where he became virtually the leader of the revolution until his death in 1791 at the age of 42, a victim of dissipation. Mirabeau's aim was a limited monarchy, modelled after that of England and it is interesting to speculate on what would have happened had he lived. His amours continued to the end.

Truly his was a "stormy" life, one crowded with adventure, a strange mixture of strength and weakness.

American readers will be disappointed with the author's opinion of Lafayette. That pride of our revolution did not assume such an heroic figure when his own country rose against monarchy and M. de Jouvenel does not spare him.

This is a most interesting biography, written by a fellow-countryman having a keen insight and understanding, both of the times and of the national characteristics and the literary style is in keeping with the subject matter.—R. E. W.

Nearing the End in Imperial Russia? By George T. Marye. Philadelphia: Dorrance & Co. 6" x 9". 479 p. Ill. \$4.00.

Mr. Marye was appointed American Ambassador to Russia in July, 1914, but the outbreak of the war in Europe delayed his arrival in Petrograd until September. He remained at his post until his resignation in 1916, a few months before the revolution, giving exceptional opportunities for observing the internal affairs of that great country during the first two years of the war. These observations he committed to writing at the time and they are here reproduced, thus giving a contemporary record, not only of the events themselves, but also of the impressions they then gave. In reading this book we live again in those stirring times, but with the advantage of seeing events through the eyes of a man well placed to see and well qualified to interpret them.

This chronicle is not confined to Russian affairs, it includes important political news received at Petrograd from all Europe, but more especially from the contiguous countries, friendly, enemy and neutral. The vacillating policies of Italy, Greece and Roumania prior to their entry into the war are particularly interesting.

Mr. Marye states in his Foreword that "these notes are published precisely as they were originally written, without any changes in the light of subsequent events" which entitles the author to a high order of statesmanship, as he foresaw so many of the changes which occurred. One, however, he did not anticipate, the Bolshevik régime. Nowhere in these pages is there the slightest hint of such a complete volte face, but it would have required a super-prophet to make such a prediction.

The leading characters in Russia are skilfully sketched by Mr. Marye, the Emperor and Empress, Sazonoff and Rasputin in particular. The shortage of arms and equipment in the Russian armies is a continually recurring theme. This was particularly in evidence during the campaign of 1915, by which time the initial supplies had been exhausted and production was far behind expenditures. He gives the Russian character great praise by his comments on the way they continued the struggle under such adverse conditions, "without complaint and with the most wonderful display of patience and fortitude they fought on."

From the beginning Mr. Marye was confident of the ultimate success of the Allies. "Germany cannot win the war now. She staked all on her first mighty attack and when that failed she failed. The battle of the Marne is one of the very rare instances of a battle-decisive of a war being fought at the outset

of a long struggle." This was written in June of 1915 and is only one of several such comments.

The author was greatly concerned for his own country during those two trying years. He foresaw the inevitable conflict with Germany unless we made active military preparations. In June of 1915 after the sinking of the *Lusitania*, he wrote, "We are not sufficiently prepared for war to inspire the Germans with any respect. They care for nothing but physical force and they will hold our rights in light esteem so long as we are only prepared to assert them on paper."

The next month he says, "In ordinary times it would not be possible to make adequate preparation of our resources after the outbreak of hostilities, but now, under the protecting aegis of the armies and navies of the Entente, America could prepare and if she once enters the struggle fairly well prepared the outcome will not be in doubt."

Again in October of the same year: "It would be a good investment of money for us to enroll an army of not less than two million men and keep them organized and prepared for instant service until the war is over. It would make the belligerents respect our rights and that is all that we ask for." Truly Mr. Marye is a pacifist of the same brand as we in the Army.

Fifteen excellent illustrations add greatly to one's enjoyment of this excellent book.—R. E. W.

The Blocking of Zeebrugge. By Capt. Alfred F. B. Carpenter, Royal Navy. Boston and New York: Houghton Mifflin Co. Ill. 6" x 9". 270 p. \$2.50.

Six miles in the interior of Belgium, connected by a canal with the North Sea at Zeebrugge, is the port of Bruges, used by the Germans as a base for their submarine operations against the continuous stream of ships which crossed the English Channel, but a few miles away. The story of how the British blocked the harbor of Zeebrugge in April, 1918, thereby bottling the submarine base, is told by Captain Carpenter, who commanded the *Vindictive*, the leading vessel in the expedition. As a gallant feat of arms this operation will live in naval history alongside Somers' exploit at Tripoli, Cushing's destruction of the *Albatross* in our Civil War and Hobson's gallant effort at Santiago, while in its results it was more important than all of them.

Not only is this book a valuable contribution to military literature but it makes fascinating reading. The veriest tyro in naval matters will have no difficulty in understanding the plan of operations, so well and minutely is it described and explained, while the magnitude of the task, the number of diversions which occurred simultaneously and the hand-to-hand fighting which ensued makes it read like a chapter from the adventures of Vikings or buccaneers of the olden days.

The *Vindictive* led the party which stormed the Mole at Zeebrugge as a secondary attack. She came up under a well-laid smoke screen, with about zero visibility—"the forecastle was invisible from the bridge"—until the smoke suddenly cleared and a six-gun battery of 5.9-inch guns appeared "barely three hundred yards distant." The *Vindictive* passed the battery and anchored at the "Mole" a short distance away, after running the gauntlet of a heavy fire. "The petty officer of one of our 6-inch guns, when asked afterwards at what ranges he had fired, replied that he opened fire at about two hundred yards and continued until close to the Mole. "How close?" he was asked. 'Reckoning from the gun muzzle,' he replied, 'I should say it was about three feet.'" This, to the modern coast artilleryman who has been led to believe that fifteen thousand yards

is a short range, is apt to be a bit stupefying, particularly as the ship ran by the battery, executed its mission and regained its home waters. So also is the firing of 7.5 and 11-inch howitzers from the deck of the *Vindictive*—especially emplaced for the occasion—which appear to have done considerable damage to the crews of the German guns. In other words we may get many surprises in a coastal attack; we must be prepared to meet anything in the coast artillery.

The author very truly says, "Those who worship matériel have followed a false god. The crux of all fighting lies with the personnel—a fact borne out again and again on this particular night." Yea, verily! and it is to be hoped that such false worshippers will not only read this book but will apply its lessons, so that we will not be forced to read so often about the time which is coming when war will be waged by a mere handful of mechanics operating machines.

Admiral Beatty wrote the introduction, while Marshal Foch, Admiral Sims and Count Visart, the Burgomaster of Bruges, wrote letters of appreciation. One sentence from Admiral Sims is worthy of repetition here, "it (this story) will prove of great value to those military men of both branches of the service who realize the tremendous influence of the morale of their forces." A high morale was needed to carry out such an operation, while its success correspondingly depressed the enemy.—R. E. W.

The Practice and Procedure of International Conferences. By Frederick Sherwood Dunn. Baltimore: Johns Hopkins Press. 1929. 6" x 8 $\frac{3}{4}$ ". 223 p. \$2.50.

The substance of this book was presented in six lectures delivered at Johns Hopkins University in 1928 and, as the author says in his preface, "it was not designed as a handbook of reference procedure, but rather as an introduction to the study of the conference as an instrument of international collective action."

With this idea in mind, Dr. Dunn traces the development of international conferences. The first one of importance was the Congress of Westphalia in 1648, which met to adjust the territories of the various monarchs after the Thirty-Year War, the first "world war". In those days the people of the different states had few transactions with each other, consequently the Congress was occupied almost entirely with the "ambitions and rivalries of autocratic rulers", and its results "touched only in the lightest manner the daily lives of the great mass of the people." Now all this is changed, popular governments are the rule, autocrats are almost gone; the dealings of individuals of one country with those of another greatly transcend political dealings, and the evolution of conferences as the result of these changes forms most interesting reading.

It was not until after the Napoleonic wars that the idea was born of conferences during peace to prevent such world convulsions, conferences which would deal with international relations "from the standpoint of general European interests rather than from the traditional view of the individual sovereigns." Several such congresses were held during the next few years. True, little was accomplished by them because Europe was still controlled in the main by despotic monarchs who attempted to use these conferences as a means of suppressing popular governments, but the idea grew, until it found its fruition in the League of Nations.

It was for these reasons largely, Dr. Dunn notes, that our policy of isolation was formulated by Washington. At that time collective action of international affairs was "confined almost entirely to the political relations of monarchical governments. That policy had no reference, at least in its origin, to coordinated action with European states for the regulation of interests common to the people at large. Such interests did not, in fact, exist at that time."

The first conference for the settlement of such interests was not until 1863 when representatives of fifteen nations met to discuss international postal affairs. Two years later telegraphic communications were successfully handled, while in 1874 the General Postal Union was established, which became a universal and permanent association of the nations. Various other conferences followed, on copyright, labor, international traffic and navigation, public health, etc., until the League of Nations, which can deal with such matters in addition to political questions.

It is not only the international law student who will be interested in this book; the student of modern history will find the story of this evolution invaluable, as it is virtually a résumé of international relationships during the past century.—R. E. W.

Lorenzo the Magnificent. By David Loth. New York: Brentano. 6½" x 9¾". Ill. 330 p. \$5.00.

Of all epochs in history probably the most interesting, certainly the most romantic, is that of the Renaissance.

It was in Italy that this movement found its most complete expression and Florence, under Lorenzo de' Medici, was the crowning jewel of Italy. The Magnificent, as he was styled during his lifetime, was the greatest patron of art that the world has ever known. Painters, sculptors, architects, philosophers, poets, musicians, all flocked to Florence where they were sure of a welcome from Lorenzo and the opportunity to display their talents without hindrance. Himself a poet of distinction, Lorenzo favored the Italian language in preference to the Latin in which most authors had been accustomed to write. This sounded the death knell of the classical tongue as a common vehicle of expression and thereafter all writings were in the vernacular, not only in Italy, but throughout Europe.

Nothing pleased the Magnificent more than the company of artists and scholars. In art he was a connoisseur, whose opinion was valued by all; among writers he dominated the conversation, no matter what subject was under discussion.

With all this he was a statesman. The Medici were the international bankers of Europe, kings went to them for loans and, as commerce always follows money, the coffers of the city and of the people were well filled. Everybody was prosperous and happy under the benevolent despotism which Lorenzo established. In a country where "no man could travel without armed escorts and when Rome was represented as a den of thieves and cutthroats" a traveler wrote that "we have here (Florence) no robberies, no nocturnal commotions, no assassinations. By night or by day every person may transact his business in perfect safety."

Autocrat though he was, the Magnificent had liberal ideas for his era, as evidenced by his treatment of Savonarola, that dour monk, the John Knox of Italy, who thundered his denunciations of Lorenzo and his wicked city, even when Lorenzo was in the congregation. Not only did the Magnificent refuse to permit any action to be taken against the monk, but he allowed him to be appointed head of the Priory of San Marco, which the Medici family for nearly a century had considered as their own particular house.

This characteristic, together with the prosperity of the city, explains the extreme popularity of Lorenzo. It was the golden age of Florence, a city still regarded by the traveler as without a peer for beauty, romance and interest.

Lorenzo was essentially a man of peace. To refuse loans to crowned heads when the money was to be used for warlike purposes was not uncommon. War

was tabu to him, as it interfered with prosperity, with art and, by no means least, with his pleasures. To say that the Magnificent was a libertine is merely to acknowledge that he was a man of his generation, at least he was not scandalous for the fifteenth century. He did not execute or repudiate his wives like Henry VIII, neither were his illegitimate children in evidence as were those of Sixtus IV, Innocent VIII and Alexander VI, three successive popes of that period. Lorenzo was characteristic of his age and Mr. Loth's book shows the reader just what that age was like. It gives an excellent picture of Italian life and society at the dawn of modern history, the period of the great discoveries and of the revival of learning and art which preceded the Reformation. The account of Lorenzo's life and achievements shows just how he fitted in the picture.

The illustrations are well executed from paintings and drawings of the period, while the volume itself is a beautiful example of Brentano's workmanship.—R. E. W.

The India We Served. By Sir Walter Roper Lawrence. Boston and New York: Houghton, Mifflin Co. 1929. 6¾" x 10". 317 p. \$5.00.

Sir Walter Lawrence is a retired Indian Civil Service official who spent twenty-one years in India. By far the greater part of that time he served in the districts—or, to use a Philippine expression, in the bosque—where he came into intimate contact with the villagers, the workers in the fields who constitute the real India. For five years he was private secretary to Lord Curzon, then Viceroy, giving him a thorough comprehension of the entire Indian administration. He took charge of the tour of King George—then Prince of Wales—in 1905, which, as Rudyard Kipling says in an introductory letter, gave him "the complete panorama and pageant of all India." Finally he served for a short time in London as a member of the Indian Council.

It is evident from this that Sir Walter Lawrence has had unrivalled opportunities for observing the British administration of India, and his selection by Lord Curzon and the Prince of Wales shows that he was a man of unusual ability and attainments, so his book is entitled to the highest consideration. There is nothing sensational about it; in well-chosen phrases and in a most interesting manner Sir Walter gives a graphic picture of a Civil Service official doing his daily work among the Indian people, the villager, the Brahman, the Indian prince; a work which required much tact and judgment; a knowledge of Indian customs and characteristics, unbelievably different from those of the European; and, above all, a sympathetic feeling for all classes in the country.

That Sir Walter had such sympathy is abundantly shown throughout his book and his word of caution is worth quoting: "We shall never understand the Indians, never gain their sympathy nor win their confidence, while we deal with them on purely official lines. We shall never get near their hearts while we dismiss with a superior smile the strange beliefs and fancies which mean so much to them and constitute their way of life." This book is written entirely from that standpoint and gives a new light on the attitude of the British official and of the British government in India towards their native wards. We often wonder why that government does not change the social structure of India, abolish the caste system, redeem the "untouchables," in fact, westernize their civilization. This apparent failure is well explained in Sir Walter's book, and no one can read it without gaining a better comprehension of the magnitude of the problem which faces Britain in the East, and of the patient and diplomatic way in which it meets that problem. That social reform is a paramount consideration in the improvement of India is acknowledged, and Sir Walter does

not believe that there can be any "real and healthy advance in political life" until there is an improvement in social standards, but this must come from the Indians themselves, it is "impossible for the Viceroy and his government to take up social reform."

Few Americans are aware that two-fifths of India is governed by its own native princes. There are some six hundred and seventy-five of these "Indian States," as they are called, acknowledging the sovereignty of the King of England, as Emperor of India, otherwise they are independent. True, each has its British Resident and frequently other British advisers, nevertheless, the rajahs are virtually free in governing their domains so far as internal affairs are concerned. Their external relations are handled by the Viceroy's government, which has preserved peace in India, for over seventy years.

It will doubtless come as a surprise to many to read that a man of Sir Walter Lawrence's service should advocate an extension of this system to all India. In governing the remaining three-fifths, known as British-India, the British, during this century, have followed the same plan that we have in the Philippines, gradually installing Indians in various governmental positions, and this system, in Sir Walter's opinion, has been a failure. "The Indian in order to develop his full capacity should work with and under Indians, side by side of the British the Indian seems to shrink from initiative. He is very different in the Indian States and there is scarcely an Indian State in which there have not been men of outstanding ability, great thinkers and men of initiative and action; men of the same race, caste and religion as those working in British India but worlds apart, solely by reason of opportunity." Sir Walter's suggestion is to divide British India into a number of small provinces, each under its own rajah. In this way the drab uniformity of British rule will be avoided, each state will be governed by a native prince in a manner suitable to the particular race therein. Social reform could then be properly handled. Above all would be the King-Emperor, who, Sir Walter suggests, should be represented in India by a member of the royal family as Viceroy. His experience, particularly on the royal tour, showed him "That the real strength of the British connection lies in the Royal House of Windsor. In India all classes turn to the Royal House with veneration, love and hope."

This book fills a long-felt want, India has been much in the limelight of recent years. Sir Walter quotes President Roosevelt as saying to him that there is "danger caused in America by daily misrepresentations of England's action in India." This authoritative account of the actual conditions will do much to dispel the serious misunderstandings which are so prevalent. In addition it is written with so much sincerity and is so full of interesting anecdotes of the great and the small, of Viceroys and rajahs, of Brahmans, Fakirs and tillers of the soil that the last page is reached with regret; we wish for more.—R. E. W.