THE COAST ARTILLERY JOURNAL

(PUBLISHED AS THE JOURNAL UNITED STATES ARTILLERY FROM 1892 TO JUNE, 1922)

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Published monthly under supervision of the Commanding Officer, Coast Artillery Training Center, by direction of the Chief of Coast Artillery.

Entered at the Post Office at Fortress Monroe, Va., as second class matter. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized May 8, 1920. All subscriptions payable in advance.

Subscription rates:

Yearly Domestic	$3.00
Canada	3.25
Countries in the postal union	3.50
Single numbers	
Domestic	0.50
Foreign	0.60

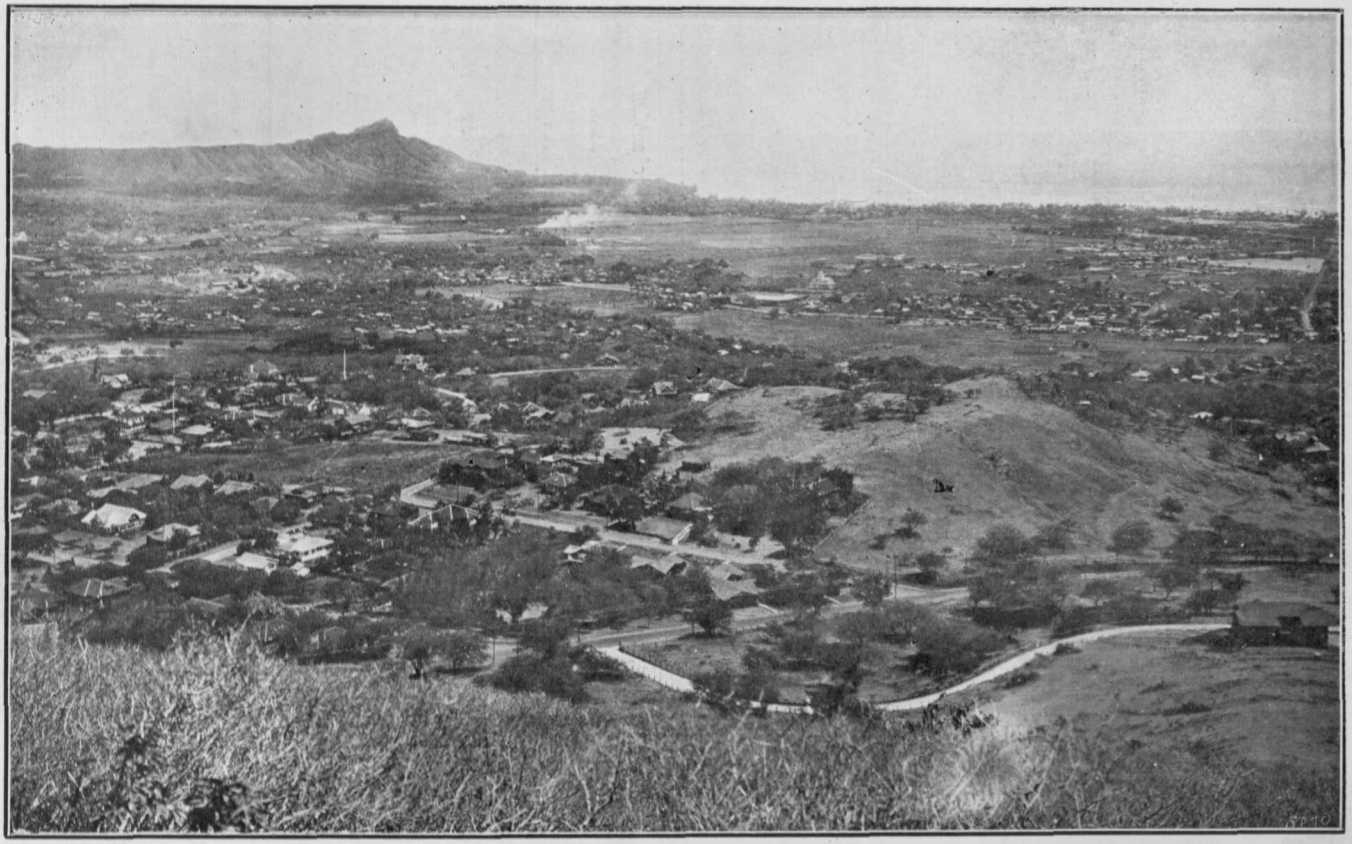
Remittances, articles intended for publication, and communications relating to the management should be addressed COAST ARTILLERY JOURNAL, Fort Monroe, Virginia.

Authors alone are responsible for statements in contributed articles.

It is earnestly requested that prompt information be given of changes of address, or failure to receive the JOURNAL. Both old and new addresses should be given.

MAJOR F. S. CLARK, C. A. C., Manager and Editor.
CAPTAIN NELSON DINGLEY, 3RD, C. A. C., Assistant Editor

C. A. SCHOOL, FT. MONROE, VA., 3-15-23-1650.



WAIKIKI AND DIAMOND HEAD FROM ROUND TOP. FORT RUGER AT THE EXTREME LEFT AT BASE OF DIAMOND HEAD. FORT DeRUSSY AT THE RIGHT. LARGE WHITE BUILDING ON THE SHORE IS THE MOANA HOTEL. SIGNAL CORPS PHOTO.

The Coast Artillery Journal

Vol. 58 No. 3 MARCH, 1923 Whole No. 199

The Coast Artillery in Hawaii

By Second Lieutenant George R. Burgess, C. A. C.

Editor's Note.—This paper completes the series of three, descriptive of conditions in the foreign service stations of the Coast Artillery. The article on Philippine service appeared in the JOURNAL for May, 1922, and that on Panama in September, 1922. The JOURNAL tenders its thanks to the officers who have made possible these articles, which it is hoped will be of useful reference to Coast Artillery officers who may subsequently be ordered to foreign service. For the photographs used in illustrating the present paper, our thanks are due to the Signal Corps and Brigadier General John D. Barrette.

> "No alien land in all the world has any deep, strong charm for me but that one; no other land could so longingly and beseechingly haunt me sleeping and waking, through half a lifetime, as that one has done. Other things leave me, but it abides; other things change, but it remains the same. For me its balmy airs are always blowing, its summer seas flashing in the sun; the pulsing of its surf-beat is in my ear; I can see its garlanded crags, its leaping cascades, its plumy palms drowsing by the shore; its remote summits floating like islands above the cloudrack; I can feel the spirit of its woodland solitudes; I can hear the plash of its brooks; in my nostrils still lives the breath of flowers that perished twenty years ago." —*Mark Twain.*

THE Hawaiian Archipelago consisting of eight islands, varying in size but all of equal beauty, is to-day the center of military interest in the Pacific. 2100 miles from San Francisco, 4600 miles from Panama, 3300 miles from Guam and 4500 miles from the Philippines, the islands are geographically situated at the crossroads of the Pacific, to be a natural outpost guarding our West Coast from

Alaska to Panama. Naval operations on our West Coast by a foreign power would not be considered without first establishing a base in Hawaii. The strategic importance of the islands is clearly realized by the War Department. The island of Oahu with the commercial port of Honolulu and the Naval Base of Pearl Harbor is at once the most important of the group.

Co. Officer's Quarters, Fort Ruger, Bachelor Quarters at Right

Swimming Pool at Fort DeRussy, Officers' Quarters in Background

From a professional view point, service in Hawaii for the Coast Artilleryman should be the choice of all stations. Every important type of armament now assigned to Coast Artillery Troops is manned by some unit of the District. This includes all types of fixed armament, a regiment of 155-mm G.P.F. guns, a regiment of Anti-Aircraft Artillery and a battalion of Railway Artillery. Due to the wonderful climatic

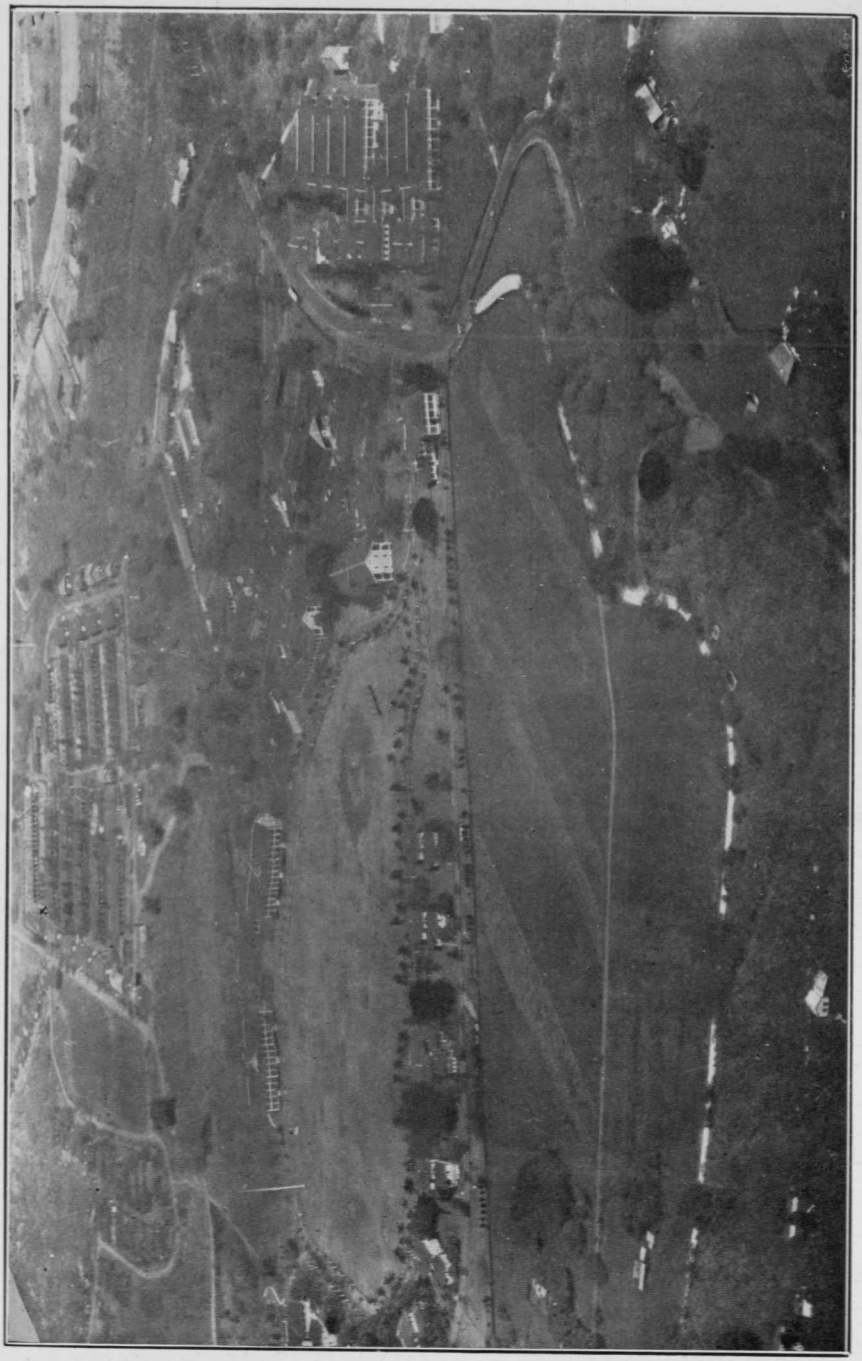
conditions, it is possible to conduct field training the year around. This makes the work doubly interesting and instructive and offers unusual opportunities to all officers to increase their professional knowledge. It is one of the few stations in the Army where the troops are trained on the

TYPE OF CO. OFFICERS' QUARTERS AT FORTS KAMEHAMEHA AND DERUSSEY

FORT KAMEHAMEHA. OFFICERS' QUARTERS. ATHLETIC FIELD, AND BN. GUN PARK, 55TH ARTILLERY

ground on which they would actually fight in case of hostilities. Approximately twenty-five per cent of the entire Coast Artillery is stationed on Oahu.

The Coast Artillery in Hawaii is distributed among the following three garrisons:

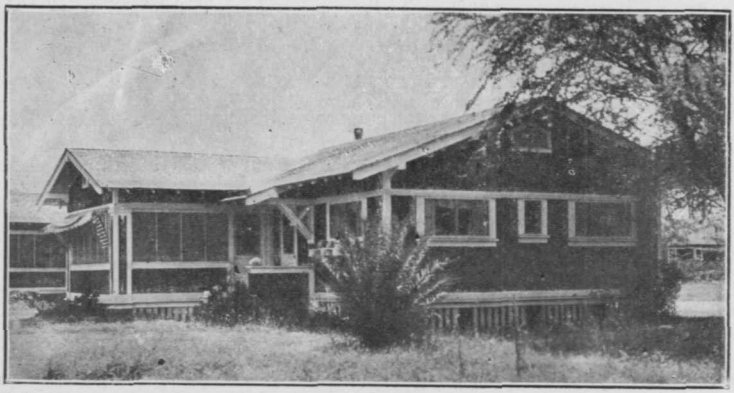


FORT SHAFTER. HEADQUARTERS BUILDINGS IN FOREGROUND. TRIPLER GENERAL HOSPITAL RIGHT CENTER. HAWAIIAN ORDNANCE DEPOT UPPER RIGHT. BARRACKS AND QUARTERS UPPER CENTER AND UPPER LEFT

Fort Shafter is a military reservation situated about three miles from town. The post is divided into two sections by a deep gulch running almost due East. One of these contains all the offices of Department and District Headquarters, and the other, Headquarters, Fort Shafter, with the personnel of the 64th Artillery, and 1st Battalion 55th Artillery.

The Coast Defenses of Honolulu consist of Forts DeRussy, Ruger, and Armstrong.

The Coast Defenses of Pearl Harbor consist of Forts Kamehameha and Weaver.



TYPE OF N. C. O. QUARTERS, FORTS KAMEHAMEHA, DERUSSEY AND RUGER

Organizations are assigned to posts as follows:

Coast Defenses of Honolulu

Headquarters, *Fort DeRussy*

10th Co., C. A. (14-inch Rifles); 104th Co., C. A. (Hq. Co.); Non Commissioned Officers School.

Fort Ruger

105th Co., C. A. (12-inch Mortars); 2nd Battalion, 55th Artillery.

Fort Armstrong

Detachment only.

Coast Defenses of Pearl Harbor

Headquarters, *Fort Kamehameha*

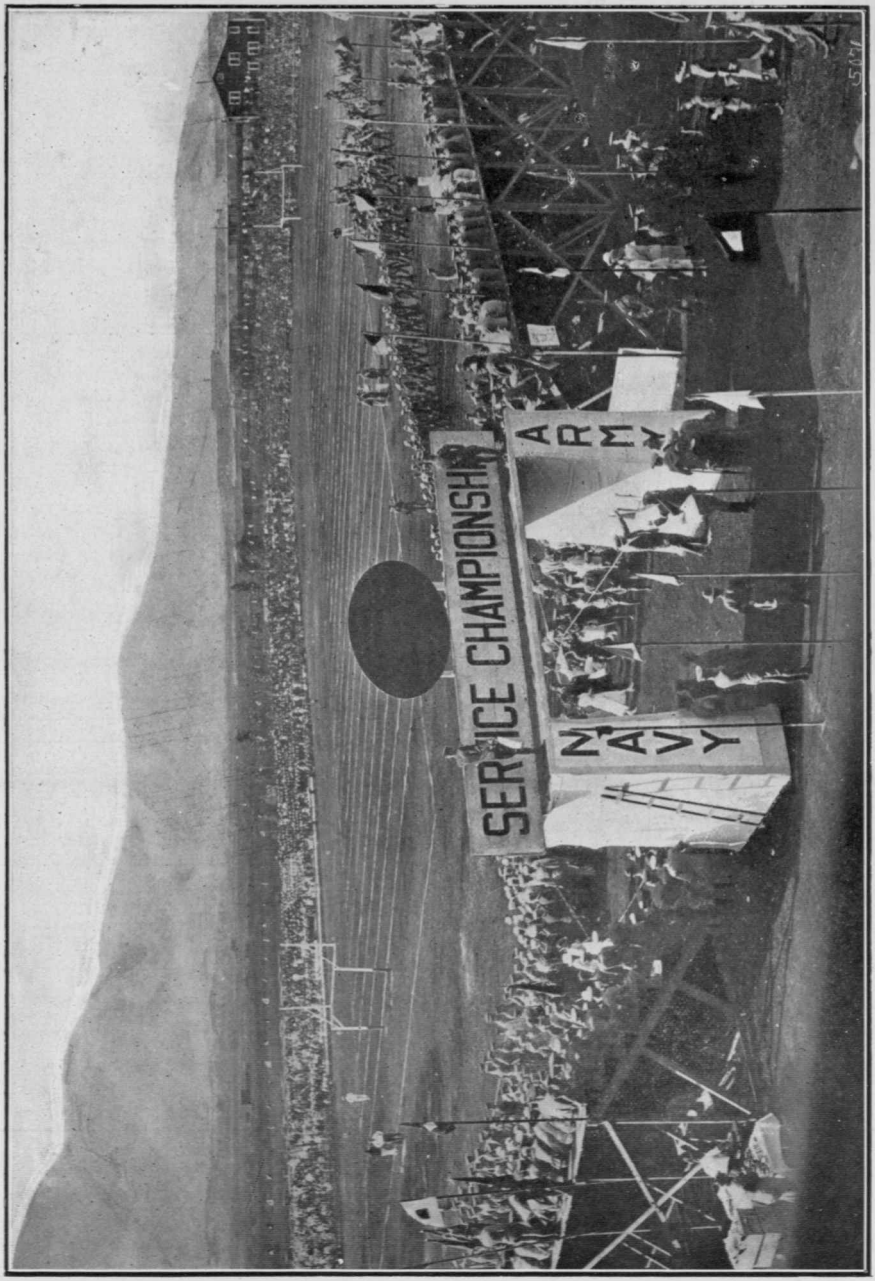
68th Co., C. A. (12-inch Mortars); 75th Co., C. A. (12-inch Rifles); 125th Co., C. A. (12-inch Rifles); 185th Co., C. A. (Hdqtrs Co.); 41st Artillery (Railway Battalion); Headquarters, 55th Artillery; 3rd Battalion, 55th Artillery.

Fort Weaver

Personnel to be assigned (16-inch Rifles).

Fort Shafter

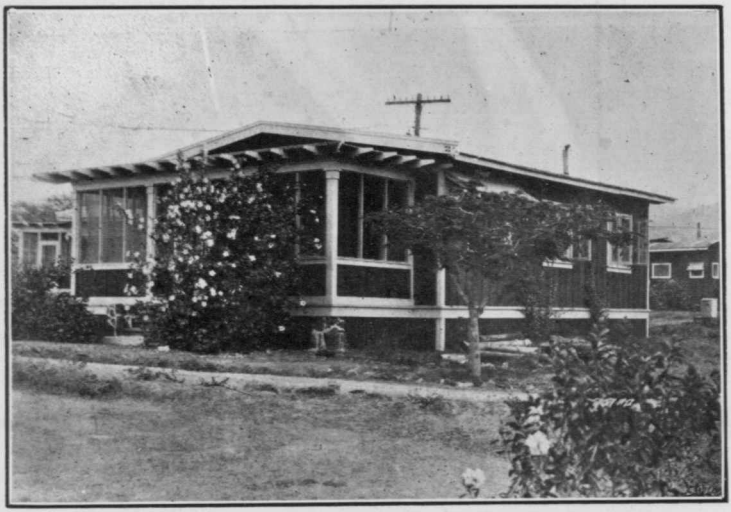
64th Artillery (A.A.); 1st Battalion, 55th Artillery (155).



Annual Football Game Between Army and Navy, Schofield Barracks

POSTS

Fort Ruger: Situated on the Northern side of Diamond Head. One of the coolest and most healthful of any of the Coast Artillery Posts. Six miles from town. Government busses connect two car lines one mile distant. Has ten sets of two story, wooden quarters, new and in excellent condition. Has seven sets of two story concrete quarters fairly new and in good condition. Excellent horseback riding. Swimming at Waikiki and Fort DeRussy. Has one tennis court. Officers' mess. Excellent roads to town.



BUNGALOW TYPE OF QUARTERS, FORT SHAFTER

Fort DeRussy: Situated at Waikiki. About one half mile from the Moana Hotel. Has ten sets of excellent wooden quarters, bungalow type. Car line passes post. Has best open sea swimming pool on the island. Excellent new tennis court.

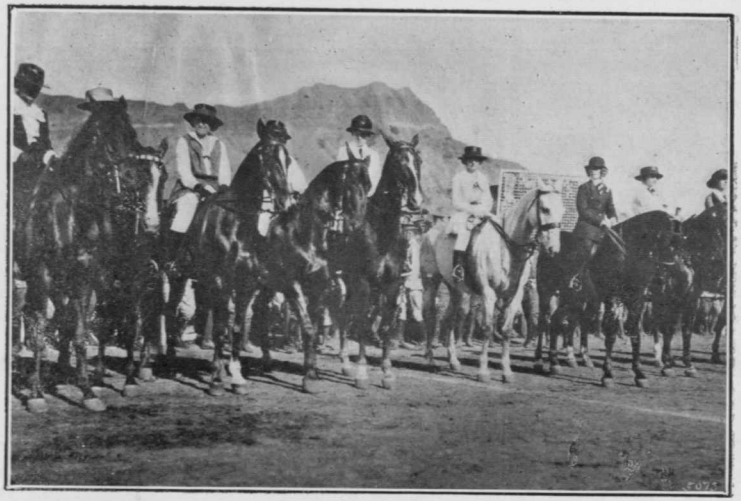
Fort Kamehameha: Situated nine miles from town. Excellent road with exception of about one half mile of corral road. Has thirty-seven sets of wooden bungalow type of quarters. Good swimming in open sea pool. Tennis court and hand ball court. Officers' mess.

Fort Shafter: Three miles from town. Car line passes post. Excellent road to town. Has twenty sets of wooden bungalow type quarters. Fresh water tank pool. Three sets of tennis courts. Fair horseback riding. Officers' mess.

CLIMATE AND HEALTH

The following extract from a report written by Dr. Leland E. Cofer, Assistant Surgeon, U. S. Marine Hospital Service, bears directly on the climate of Hawaii:

"Indeed, one lives so comfortably here the character of the climate is practically never thought of, in the same way that a sound man lives oblivious to his liver. It may be said in general that the climate is the semi-tropical variety in which the mean extremes are never reached. Surf bathing and aquatic sports, pleasures which are known to comparatively so few people on the mainland are indulged in, particularly by children, in January and July alike. In this latitude and longitude such conditions it is needless to say are unique and would be impossible were it not for the trade winds which keep intact health, comfort and commerce, and make out-of-door sports a part of the daily routine."



LADIES' EVENT, HORSESHOW

CLOTHING

Summer clothing is suitable for wear the year round. During the winter months however, slightly heavier garments are comfortable. Uniforms are generally khaki, although gaberdine and light serge are suitable from October to March. Khaki and white uniforms, including the mess jacket are obtainable at reasonable rates, ranging about $15.00 each. Gaberdine runs about $50.00 a uniform, the tailoring quality being below that in the states. There is not the same variety or quality of ladies' and childrens' clothing available here as in the states. Prices in general are higher, especially so on footwear.

QUARTERS, HOUSEHOLD EQUIPMENT, SERVANTS, LAUNDRY

Generally speaking, all the Coast Artillery posts in Hawaii are now suitably equipped with quarters. Bungalow types prevail at DeRussy, Shafter and Kamehameha, with the two story type at Ruger. Almost

all the quarters are in first class condition. There is a scarcity of government furniture however. In fact some of the quarters have none at all. Opinion varies a good deal on the practicability of bringing furniture and household effects to the islands. It is a fact that very little damage is done to rugs, paintings, heavy furniture, etc., by atmosphere or bugs. Roaches are liable to damage books, if they are not used, but with a little care, this can be easily overcome. One rarely sees any upholstered furniture in use in army houses here. Wicker furniture is in general use. Prices on bric-a-brac and heavy furniture are nearly double those in the states. Wicker furniture is about the same price as in California. Servants are available at all posts. An untrained oriental girl gets about thirty-five dollars a month. A fairly good cook gets between forty-five and fifty-five dollars. Laundries are maintained at Forts Ruger, DeRussy, Shafter and Kamehameha.

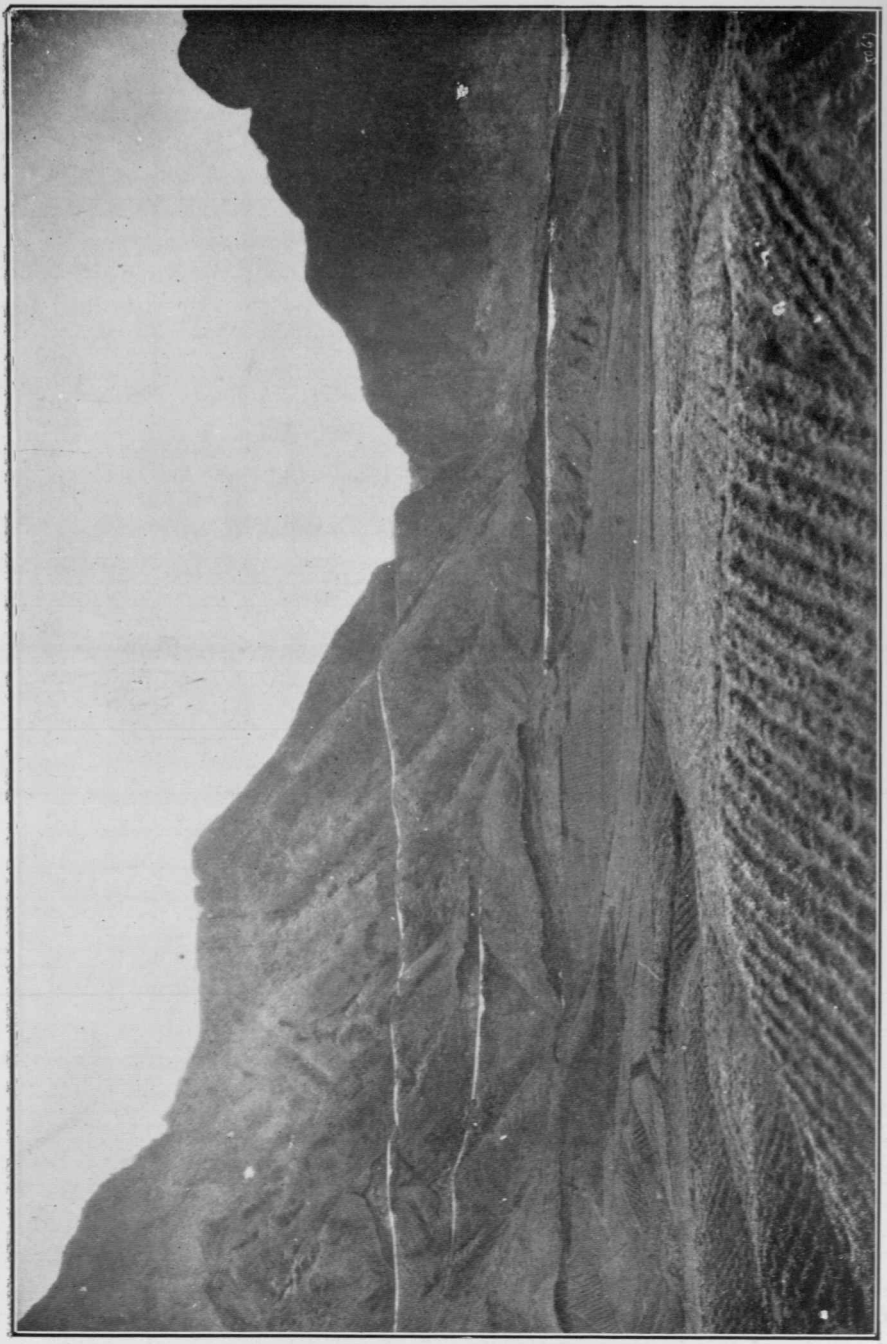
KILAUEA REST CAMP

An excellent commissary is operated in Honolulu. Deliveries are made to Ruger, DeRussy and Shafter daily. Fort Kamehameha maintains a separate commissary. Orientals call at all posts with fruits and vegetables. Good milk is obtainable at all posts.

Nearly all the officers send their children to private schools. A separate elementary public school for English speaking children is now established, however, and some send their children there. Tuition at the private schools, which are of excellent type, runs about one hundred and twenty-five dollars a year. This is payable in quarterly installments.

RECREATION

An automobile is an absolute essential. Cars weighing 3000 lbs. are about three hundred dollars more expensive here than in California. A Ford touring car, model 1923, costs $574.62. A Dodge touring car, model 1923, costs $1275. If government freight is still available, it is most desirable to bring your car with you. An excellent "around the Island" road has been constructed, and the trip is famous the world over. Nearly all the roads are now in excellent shape and the real



LOOKING UP AT THE PALI, FROM PINEAPPLE FIELDS

beauty and charm of the island are gained by visiting various places of attraction. Nearly every sport is not only represented here, but thrives, and an intensive football season is invariably fought out. Baseball, swimming, polo, all have a standard which is surpassed by few localities in the states. Hunting and deep sea fishing have a strong following and are indulged in by many officers. Two country clubs have excellent courses, one being 18 holes. Sea-bathing in Hawaii is unexcelled in any place in the world. Sir Frederick Treves once stated that "One great joy of Honolulu is the sea bathing, for nothing can surpass it. Those who find delight in this rudimentary pursuit must go to the Hawaiian Islands to understand it in its perfection. It may be claimed that there is luxurious bathing on the Lido by Venice, or at Atlantic City, or on

THE LARGEST ACTIVE VOLCANO IN THE WORLD. THE REST CAMP IS ONE MILE FROM THE CRATER

the Coast between Cape Town and Durvan. These places, as Mercutio said of his wound, "will serve," but they fail to approach such bathing as can be found in the cove which lies in the shelter of Diamond Head." Sea bathing is delightful the year round, the average temperature of the water being 78 degrees Fahrenheit. Other sports include shark-hunting, rowing, and tennis. At least once during a tour in Hawaii, everyone visits the active volcano at Kilauea. The army maintains a rest camp there, where, for a nominal fee, every officer and his family may spend ten days. The crater of the volcano is only one mile distant from the rest camp. The sister islands of Oahu are equally beautiful.

CLUBS

Country Club.—Located in Nuuanu Valley. It has a club building in the center of its 18 hole golf course, golf constituting the chief diversion of the members. Special initiation and monthly fee for military members. Dances, receptions, teas and other social events are held.

University Club composed of university men, membership of about 300. Occupies fourth and fifth floors of the McCandless Building.

There are several other social, boat, tennis and swimming clubs.

MISCELLANEOUS

There is hardly any trouble or annoyance from vermin. Even in the hills, the most dangerous reptiles are centipedes. Their bite though painful is not poisonous.

The 18th Amendment and Volstead Act have the same effect in Hawaii as in the states. Baggage is examined on arrival.

There are movies at all posts, and three new, excellent, theaters in Honolulu.

THE KOOLAU RANGE

Swimming regattas, horse races, carnivals and other interesting celebrations are frequently held.

Officers on commutation status may obtain furnished houses in town at rates from $65 to $100.

Any other points not covered may be given the benefit of doubt. The station is unquestionably desirable. This is not only the sincere belief of the writer but the conviction of nearly every Coast Artillery officer interviewed on the subject. Few service people leave Hawaii without regret. The three years' tour passes quickly. The general effect on health is not damaging. The sphere of living is not confined to your own post. The entire island becomes your post. To those readers who have never been stationed here, it is hoped that this article will in some way interest them in one of their own most beautiful stations. With changing time, the conveniences of Hawaii are continually increasing. It has the advantages of a large, congenial mainland city, with the beauty and charm of a semi-tropical resort.

First Prize, Essay Competition, 1922

Some Phases of the Effect of Aircraft on the Future Mission, Organization, Equipment and Tactics of the Coast Artillery Corps

By Captain Thomas R. Phillips, C. A. C.

I.

INTRODUCTION

THE Coast Artillery Corps is charged with the Navy with the defense of the land from attack from the sea and with the Air Service with the defense of the land from attack from the air. Any development of the offensive power of the attacking force either by sea or air must be met by the Coast Artillery Corps by a corresponding defensive development. The outstanding features of the offense affecting the Coast Artillery Corps are the rapid development of aircraft and its adoption by the navies of the world in combination with their naval offensive powers, and the Five Power Agreement for the Limitation of Naval Armament. Aircraft have not yet reached the development of offensive power to such an extent that they need be considered for the immediate future except in their combination with the naval offensive.

In order to determine the changing functions of the Coast Artillery Corps it is necessary to consider the effect of these developments on the powers of the offensive. This paper will examine the probable offensive powers of the attack in the near future as a result of the combined attack from the sea and the air, consider the effect on this offensive power of the Limitation of Armament agreement, and attempt to deduce from these considerations the future mission, organization, tactics and equipment of the Coast Artillery Corps.

It is trite to say that new powers of offensive develop before their appropriate defense; we cannot defend against a force not in existence; a new offensive power is here. Have we considered its possibilities and have we a defense against it? We place our nation in a condition of great danger through our failure to appreciate the possibility of the airplane as a new offensive weapon in conjunction with an attacking navy. Let us guard against military conservatism and be prepared to

defend ourselves against this new weapon before we have to learn our lesson through unnecessary bloodshed. The United States is now probably in a poorer defensive condition than at any time since the Civil War on account of our failure to prepare adequate defense against the air-naval offensive.

This paper will consider under the following headings:

1. Future Naval Development Resulting From Present Tendencies, Limitation of Armament, and Aircraft.
2. Future Naval Tactics in the Light of Future Naval Development.
3. The Strategy of National Coast Defense with Combined Forces: Air, Sea and Land.
4. The Tactics of Air Defense.
5. The Requirements of an Adequate Defense to Meet the New Offense.
6. Present Defense Measures and Their Deficiencies.
   (a) Anti-Aircraft.
   (b) Other Defenses with Reference to Air Attack.
7. Some Phases of Organization, Tactics, and Training.

II.

FUTURE NAVAL DEVELOPMENT RESULTING FROM PRESENT TENDENCIES, LIMITATION OF ARMAMENT AND AIRCRAFT

It is obvious that the capital ship has about reached its limit of development. This limit has not been reached because of technical limits but because of the great cost that its construction involves. The real cause of the limitation of armament is financial. A limitation thru economic necessity or agreement was inevitable.

Any development of gun power by the capital ship can be easily met with a corresponding increase of gun power by the land defenses. It is a fact admitted by naval strategists that a capital ship concentration is at a decided disadvantage against land batteries of equal power even though in numerical inferiority. Other naval development except airplanes and airplane carriers will affect principally the domain of naval warfare and need not be considered in connection with land defense.

The Five Power Agreement for limitation of armament preserves a tonnage of capital ships of roughly: Great Britain 525,000 tons, United States 525,000 tons, France and Italy 175,000 tons each, Japan 315,000 tons. This assures that for the next ten years our defensive gun power by land will be superior to the offensive gun power by sea. The present program of placing sixteen-inch guns and howitzers in our harbor defenses coupled with the limitation of size and number of capital ships definitely assures for the next decade a land superiority against the capital ship.

The development of aircraft carriers is limited as follows: "Article VII. The total tonnage for aircraft carriers of each of the contracting powers shall not exceed the standard displacement for the United States 135,000 tons, for the British Empire 135,000 tons, for Japan 81,000 tons, for France 60,000 tons, for Italy 60,000 tons." The agreement provides also that no aircraft carrier exceeding 27,000 tons standard displacement shall be constructed by any of the contracting powers with certain exceptions in the reconstruction of capital ships which will not be completed as capital ships; and that aircraft carriers can be replaced in accordance with the advance of the science of their construction. The gun power of aircraft carriers is also limited. The number of anti-aircraft guns with which these vessels are equipped is not limited.

It is difficult to determine in the present infancy of aircraft carrier construction the capacity of aircraft carriers for carrying planes, but a rough estimate of their capacity would be two planes per thousand tons. It is probable that the capacity would be nearer three planes per thousand tons. A ten thousand ton carrier constructed by Great Britain had a capacity of twenty-five planes. The air plane carrier "Lexington" to be constructed by the United States Navy from the battle cruiser "Lexington," which will not be completed as a battle cruiser in accordance with the limitation of armament agreement, has a displacement of 33,000 tons, speed 22 knots, length 874 feet, beam 104 feet. It is provided with two catapults for launching planes and another launching device in addition. It is interesting to note that the problem of landing planes on ships has so far been solved that it was not considered necessary to utilize the entire length of the deck for landing. The deck is divided into two parts, the rear of the ship for landing and the front for launching. The difficulty in the past of landing airplanes on carriers has been to stop them quickly enough and to prevent them falling off the side in rough weather. Nets are provided on the "Lexington" to stop landing planes and to prevent their going off the side of the deck when the ship is rolling.

It is probable that any aircraft carrier constructed could launch planes at a minimum rate of one every five minutes. It is apparent that a foreign navy with aircraft carriers totaling 61,000 tons could on the aircraft carriers alone carry 162 planes and that they could launch six planes each five minutes. This great concentration of air planes (162) would be possible from a floating airplane base against any of our bases or harbor defenses.

The limitation of armament agreement prescribes no limit to the number of airplane tenders. It would be entirely practicable to carry an additional two or three hundred planes knocked down in airplane tenders and to set these up and launch them with sufficient rapidity to keep the aircraft carriers loaded to their maximum capacity. Thus all

waste of planes from aircraft carriers can be immediately replaced from airplane tenders.

Bombing planes can operate from a naval base or a land base 100 miles from their objective. Any future naval engagement will be preceded by a great air attack before the naval attack.

III.

FUTURE NAVAL TACTICS IN THE LIGHT OF FUTURE NAVAL DEVELOPMENT

In general attacks on the seacoast can be divided into two classes, (a) unsupported attacks, and (b) supported attacks. Unsupported attacks are slight attacks on land made by a light enemy force for the accomplishment of a minor mission. Supported attacks are those in which the ships which carry out the actual attack will be supported by a considerable naval force in the attempt to carry out any important mission. There are the following eight general forms of attack on the seacoast each of which may be made as unsupported or supported attacks:

(a) Aircraft attacks on seaports.
(b) Mine laying attacks off the seacoast.
(c) Torpedo bombing and gun fire against all vessels off the seacoast.
(d) Torpedo fire into seaports.
(e) Blocking attacks on seaports.
(f) Bombardment of seaports by naval vessels.
(g) Penetration into harbor or water area by naval vessels.
(h) Landing attacks. (See *Joint Army and Navy Action in Coast Defense.*)

Aircraft Attacks Against Seaports. Enemy aircraft attacks against our seaports can be launched in two ways, (a) from a land base, and (b) from a ship base. Aircraft attacks on the Pacific coast would probably be made from a combination of the two bases, land base and naval base, in order to get a greater concentration in the air. Aircraft carriers would be kept at full capacity and aircraft tenders would land their planes and operate them from a land base.

In case of an attack by airplane such as would be the case in an attack on the naval base and harbor defenses on Oahu or the Pacific entrance to the Panama Canal, airplane bases would be established on nearby islands and planes would operate from the land base and from the naval base on airplane carriers in order to make a concentration of aircraft greater than any preparation made at these places for defense against aircraft.

The naval development of airplanes is far behind the army development. This is due to the failure of the navy to realize that an airplane

operates the same over sea as over land and that the same requirement for an airplane operating over sea should be made for those operating over land. The airplane operates against land and water, in the same manner. Airplane carriers will carry pursuit planes, reconnaissance planes, and bombing planes, probably all of the land type.

It is obvious that any future naval attack on land for any purpose will be preceded by an airplane attack and that all such attacks will be supplemented and protected by airplanes. Bombing planes will bomb our fixed defenses leaving the fleet many miles at sea beyond the range of our land guns. These bombing planes will be protected by pursuit planes. With the concentration of air force possible by a foreign navy, no airplane defense or anti-aircraft defense we have now can cope with them. The airplanes from the fleet will be used instead of cruisers or destroyers for raids against shipping and bases.

It is probable that any attack in force will be preceded by a great air attack. In the same manner that the navy can concentrate a greater number of guns against a certain defended point, they can also concentrate a greater number of planes. Our resources must be spread out over a great area for defensive action. In offensive action they can be concentrated.

We can safely assume that in the case of a great naval attack preceded by an airplane attack that the enemy will have a superiority in the air just as we can assume that a great naval attack will not be made against a fortified harbor unless the enemy has a superiority on the sea. There will be no attack in force unless the enemy has superiority in the air as well as at sea.

Airplanes, on account of their speed, greatly increase the raiding possibilities of the enemy. It will be comparatively easy to make a successful raid on account of the ease with which they can effect a surprise. Aircraft carriers will accompany the battle cruiser force in most navies. Judging by the slow speed of the "Lexington," the United States Navy plans to have their aircraft carriers accompany the battleship force. The great speed and radius of action of the airplane removes any necessity of risking the aircraft carriers away from the main naval body.

Torpedo, Bombing, and Gunfire Attacks on Vessels Off the Seacoast. All attacks of this nature will be protected by airplanes and in the future will probably be made by airplanes rather than by ship.

Torpedo Fire into Seaports. It is probable that the airplane will be used in this type of raid very extensively.

Blocking Attacks on Seaports. In blocking attacks all means will be used to prevent the defense from concentration of force on the destruction of the blocking vessels. Airplanes will be used to bomb the defenses and to destroy defending ships attempting to protect them.

Landing attacks in connection with blocking will be protected by airplane machine gun fire. A bombardment by naval vessels and submarines will be assisted by bombing from airplanes.

Bombardment of Seaports by Naval Vessels. In general, bombardment of our seaports by naval vessels is possible only when the enemy has command of the sea. Any future bombardment of seaports by naval vessels whether in raids or in force will be accompanied by airplanes. In the event of an attack in force an attempt would be made by airplane to destroy the harbor defenses and defending ships before the naval bombardment commences. The use of ships to raid seaports will be greatly lessened and bombing planes will be used in their stead.

Landing Attacks. History shows that adequate harbor defenses are almost impossible to capture or reduce by direct attack from the sea. They have generally been taken by land forces landing outside the range of the defense works and investing them from land. The Japanese capture of Port Arthur is a recent example of this. No effort was made to take it by direct naval attack. It was bombarded by naval forces from long range to keep the defenders busy. The land forces landed sixty miles from Port Arthur and finally took it by land. The British operations against the Dardanelles are another example of the difficulty of taking seacoast fortresses by direct naval attack. The effort to take it by a direct naval attack, although the attacking battleship force had a great superiority of armament was quickly given up and large numbers of troops were landed under the protection of the ships and the defense works invested by land. The Dardanelles Expedition would have succeeded if it had been carefully planned and the landing forces properly equipped.

Landing attacks of all kinds will be assisted by airplanes. The airplanes will be used to make the defense take cover by machine gun fire and to destroy the heavy defense guns by bombing.

The offensive nation will be thoroughly prepared for war before declaration of war and they will attempt to gain a decisive advantage by taking action with the airplane fleet. The necessity for defense against the airplane is so apparent that the entire resources of our army and navy should at once be concentrated on the preparation of adequate defense against this form of attack. A foreign power would attempt to gain a decisive advantage at sea before an effective army could be mobilized. It is probable that within the next five years an attacking power could put our navy entirely out of commission by the use of airplane bombing and could put our harbor defenses out of action by the same means. The necessity for the preparation of an adequate defense is apparent.

IV.

THE STRATEGY OF NATIONAL COAST DEFENSE WITH COMBINED FORCES: AIR, SEA AND LAND

The report of the Joint Board for Joint Army and Navy Action in Coast Defense, approved by the Secretaries of the Navy and War prescribes, I believe, for the first time in our history a sound strategy of national coast defense. This policy apparently represents an acceptance by the Army of the sound strategy of national defense as taught at the Naval War College for the past thirty years.

In this connection the following extract from Admiral Mahan's book *Naval Strategy* is illuminating.

"When war exists between two nations separated by the sea, it is evident that the one which invades territory occupied by the other takes the offensive, and that the instrument of offense is the arm which carries on the invasion, that is, the army. The navy preserves, and assures, the communications of the army. That the navy alone makes invasion possible, does not make it the invading force. That it alone makes the offensive possible, does not make it the offensive arm. That its own mode of action is offensive does not necessarily constitute it the offensive factor in a combined operation. In the joint action it takes the defensive. That, in pursuit of this defensive rôle, it takes continual offensive action whenever opportunity offers to destroy an enemy's ships, does not alter the essential character of its operations. It defends by offensive action, whenever its guns reach; but it defends. This certainly was the function of the Japanese navy in the late war.

"Again, granting an invasion, what relation to the war is borne by the coast fortresses of the country invaded? What function do they discharge? Apparently defensive, on the first glance; but is this a true account of the matter? Is the obvious the exact truth? On the contrary; just as the method of the navy is offensive, while its function is defensive, so the method of the coast fortress is defensive, but its function offensive. So far from defending a country, a coast fortress in itself cannot protect against invasion;—a condition manifestly impossible. Landing can almost always be effected beyond its reach. Port Arthur in itself did not produce an iota of effect upon the landing of the Japanese besieging force, which took place sixty miles away. During that part of the operation, Port Arthur did not begin to defend itself, much less the country.

"Fortresses, coast or other, defend only in virtue of the offensive power contained behind their walls. A coast fortress defends the nation to which it belongs chiefly by the fleet it shelters. Its works, and the troops which man them, conduce to the activity of that fleet, by assuring to it supplies, repairs, and shelter in extremity. This being the case, it is plain that the coast fortresses of an invaded country are really instruments of offense, although the country itself, by the mere fact of being invaded, is waging a defensive war. The particular characteristics of the fortress are a matter of detail only; its essential function is offensive, because it conduces to defense only by facilitating offense. This is exactly the relation of fortresses to a land frontier. Their protective function to their country does not reach so far. It is because of the shelter given to garrisons, large enough to be able to take dangerous action against the communications of an invading army that the fortress defends. The garrison being on the flank of the enemy's communications menaces the life, and so protects by arresting advance. It is its offensive power which exerts the effect; not its defensive.

"In land warfare, it becomes immediately obvious that a fortress must be secured on every side, either by nature or art. Fortification is the art of supplying deficiencies in natural protection. On an exposed sea frontier, this is equally true, but much less obvious. We have come to look upon sea-coast fortification so entirely as a defensive measure against fleets, that sight has been lost in great measure of that true conception of fortresses as offensive instruments which I have been asserting. The consequence is that it might be possible to deprive our fleet of the use of this or that important naval base, by an army landing some distance away, as the Japanese did at Port Arthur; only I fear much more easily, for I doubt if any one of our naval bases is nearly as well protected on the land side as was Port Arthur."

The strategy of coast defense consists of a series of strong points protecting our naval bases, essential war industries and essential harbors. The naval bases are protected to assure the navy freedom for offensive action. The unfortified coast is protected by the naval coast defense forces and the mobile forces of the army.

The use of the airplane by the attacking navy will require the protection from airplane attack of the fortified points and the utilities they protect, and in addition of essential war industries located within a bombing distance of the coast, and of our great land transportation centers near the coast.

Our great air bases will have to be protected from air attacks in the same manner as our great naval bases from sea attack: in order to give the air fleets freedom of action for their offensive use. Our air bases will be located in the vicinity of naval bases and harbor defenses since the naval bases and harbor defenses must have aircraft for protection from attack from the air and since our air offensive can only be prosecuted in combination with the navy.

In its present limited development the strategy of the use of the airplane is bound with naval strategy. When the airplane reaches a state of development so that it can cruise five thousand miles without return to a base then it will have a strategical mission of its own. At the present time it must base on the fleet. It assists the fleet in the offensive part of our national defense strategy.

V.

THE TACTICS OF AIR DEFENSE

It should be understood to start with that the airplane operates against any enemy on earth, either on land or on water, in the same manner. It is a battle between the air and the earth. The tactics of defense against the airplane are the same on sea as on land. The tactics of air defense on land were well developed, although not completely, during the World War. These will be roughly outlined and their analogy to the tactics of naval air defense pointed out.

"The primary function of any anti-aircraft defensive organization is the establishment of a continuous barrier, in altitude and depth, thru which enemy air-

craft may not pass to observe and bomb areas and agencies situated behind the barrier.

Thus far, it has been impossible to conceive and establish a barrier that will prevent infallibly all enemy aircraft from passing through to the protected areas beyond. An efficiently organized barrier, however, can seriously embarrass and confuse the enemy, inflict on him severe losses and cause his observing and bombing elements to fly so high as to neutralize greatly their effectiveness.

A secondary function of the defense is to prevent the close range bombing and machine gunning of advanced front line positions, by the lighter and faster airplanes of the enemy." (Maj. J. S. Pratt, C. A. C., in August, 1921, JOURNAL OF U. S. ARTILLERY.)

When the area being defended is not in direct contact with the enemy this barrier can be established completely around the defense area. When the fronts come in contact the barrier is thrown back upon the foremost elements of the front and combines to supplement the secondary defense.

"The material elements of an anti-aircraft defensive organization may consist of listening and plotting apparatus, searchlights, pursuit planes, anti-aircraft artillery, machine guns and automatic rifles, captive balloons and kite entanglements, signal communications, and pyrotechnics. The employment of captive balloon and kite entanglements is confined usually to the defense of the most important agencies situated in the rear of Army areas." (Maj. J. S. Pratt, C. A. C., in August, 1921, JOURNAL OF U. S. ARTILLERY.)

The success of anti-aircraft defense is frequently questioned. Its failure has been due to its limited development. The success of the anti-aircraft defense of Paris is well known. During 1918, 483 planes attempted to bomb Paris. Of these only 37 actually flew over Paris; 13 were brought down by the anti-aircraft defenses. Following the last raid on Paris, a German radio message announced that: "By way of reprisal for the bombardment of German towns, 22,000 kilograms of bombs were dropped on Paris during the night of September 15-16." As a matter of fact only 1060 kilograms were dropped on Paris during the raid. Furthermore, during the whole of 1918, a total of only 11,680 kilograms of bombs fell on Paris; that is to say only half of what would have been dropped on it on the single night of September 15-16, but for the efficient protection given by the anti-aircraft defenses.

The best defense against aircraft is furnished by aircraft; just as the best defense against naval attack is a navy. But in the same manner that harbor defenses are needed to supplement the navy, anti-aircraft defenses are needed to supplement the air service. Each major defense area must have the two services in combination. The anti-aircraft service will call on the supporting air force as soon as they distinguish an enemy squadron and will attempt to break up their formation and prevent them crossing the barrier line. One of the most important functions of the anti-aircraft service is to give timely warning of the approach of enemy aircraft. This is done by advanced listening posts with the proper equipment. All well known avenues of approach of

air-craft such as railroads, great highways, streams and shorelines are watched far in advance of the barrier.

A very serious misconception of the tactics of anti-aircraft defense of harbor defenses exists. Because these defenses are on a natural barrier from the sea they are habitually considered as front line defenses. The contrary is the fact. The sea does not prevent the extension of the barrier many miles out in front of the defense area. Any plan for the anti-aircraft defense of our harbor defenses must provide for a barrier of anti-aircraft ships forming a barrier far out at sea and connecting up with the land barrier at the seashore. It would seem that this part of the defense is a part of the navy's duty in connection with coast defense. The seashore is no barrier from air attack as it is from naval attack. An airplane recognizes no such boundary. It operates in the air and whether over land or sea makes little difference.

The anti-aircraft defense of a harbor defense would consist of: a primary defense barrier extending completely around the area both on land and sea; a group of airplanes; and a secondary defense in the immediate vicinity of the elements defended.

The tactics of night defense differ from day defense. Pursuit planes, on account of their great landing speed (over a hundred miles an hour) are too frequently damaged in landing at night. In mingling with the enemy planes they come under the fire of our anti-aircraft guns. It is interesting to note in this connection that the anti-aircraft defenses of Paris used no planes at night for defense after March 1918. Searchlights are offensive weapons against aircraft. Anti-aircraft guns must use indirect fire at night. The gunner is blinded by the flash of his gun and cannot follow the plane with the illumination given by a searchlight.

Naval tactics for anti-aircraft defense will be developed on the same principle as the land tactics. The navy will have to establish a barrier of anti-aircraft ships around the fleet when in danger of air attack. As the fleet approaches the land or an enemy fleet this barrier will have to fall back and assist the secondary defense, the point of contact becoming a front line defense area.

The value of airplanes against the fleet has been greatly exaggerated by the fact that in all attacks made so far the ships have had no primary defense barrier and have had no accompanying aircraft. The airplane will be a feeble weapon against a properly protected fleet. In recent British maneuvers the attacking airplanes first covered the ships with a smoke cloud putting their anti-aircraft guns out of action and then bombed them at will. The umpire decided that the fleet was destroyed. The destruction of a fleet will not be so simple with a proper anti-aircraft defense on the principles worked out by the army during the World War.

VI.

THE REQUIREMENTS OF AN ADEQUATE AIR DEFENSE

Each harbor defense must be defended from the air as well as from the sea and land; and all elements of the defense must be located and constructed with reference to the triple defense. The various means of defense against aircraft and their relative value are as follows:

1. Invisibility
2. Aircraft
3. Anti-aircraft guns and machine guns, and searchlights
4. Passive defenses such as smoke, captive balloons and kites, and false works.

Any harbor important enough to be defended from the sea must in addition be constructed with reference to the above means of defense from the air. All means of defense must be used. Each new weapon has taught the lesson of combined arms; but each time the lesson must be learned over again. The present claims of enthusiastic air officers that the airplane makes coast defenses obsolete are as illogical as certain statements made during the war that artillery had made infantry obsolete. Defense against attacks from the air presents a parallel with defense of the land against attacks from the sea. The first line of defense will be our offensive aircraft; the second line our anti-aircraft barriers, aircraft and passive defenses. Just as land defense against the sea is more powerful than the offensive, so will terrestrial defense against the air be more powerful when its means and tactics are developed. Navies will attack the land defenses as in the past except that they will be protected from air attack by their air defenses. Our great strong points will simply have added to them aircraft and the required defense from it.

Correct national strategy indicates that our great air bases should be in the vicinity of our naval bases and harbor defenses. They must likewise have complete anti-aircraft protection and could assist in this protection.

Minor harbors subject to raids but not of sufficient importance for an attack in force can probably be most economically defended by aircraft and anti-aircraft defenses. It is probable that most raids having for their object a minor or destructive mission will be made by aircraft and not by ships. Submarines may be used. Aircraft are probably the most effective means of defense against submarines.

Essential war industries, arsenals, ammunition plants, and transportation centers must be defended from air attack. The means of defense of each will be determined by its importance and the available means. The well known avenues of approach from the air will have to be defended. Defensive aircraft can cover a large territory. Plants, bridges and railroad yards can be defended by passive means. Cities

and industries not essential to war will have to be left undefended except by aircraft from the main defensive areas. The points that have to be defended from the air will have to be selected in the same manner as the harbors that must be defended from attack from the sea. Their selection is dependent upon their utility in war. We cannot so disperse our forces for defense that we shall have left insufficient forces for the offensive thru which only the war can be won.

VII.

PRESENT DEFENSE MEASURES AND THEIR DEFICIENCIES

(a) Anti-Aircraft

The first and most important deficiency is that of aircraft. Since it is outside the subject of this paper, it will not be taken up but in general it can be stated that aircraft must be provided for every point where we have harbor defense in addition to the harbor defenses and that certain important manufacturing areas in the interior area will have to be provided with aircraft as part of the anti-aircraft defense elements.

There are the following organizations of anti-aircraft artillery now in existence in the Regular Army:

1 regiment, Hawaiian Islands,
1 regiment, New York,
1 battalion, Fort Winfield Scott,
1 battalion, Fort Monroe,
1 battalion, Fort Crockett.

This is all the anti-aircraft matériel and personnel at present available for making the barrier defense of any defended area. The magnitude of anti-aircraft defense is such that anti-aircraft artillery will need a personnel equal to the entire coast artillery. Even such a personnel as this will provide only a peace time strength.

Coast defenses are provided with secondary anti-aircraft defense in the fixed anti-aircraft guns but these are of an old type. Most of them are not furnished with range finding apparatus and have no definite personnel assigned to them. A company assigned to fixed batteries is apparently expected to man these anti-aircraft guns in addition to their other duties. The result is a complete lack of anti-aircraft training. The means of passive defense are not utilized and no plans are made for their use.

Even tho personnel and matériel for an adequate anti-aircraft defense were not on hand, it is still practicable to have the defense completely planned, the location of batteries decided and arrangements made with the commercial telephone companies for an efficient anti-aircraft information service.

Our present anti-aircraft matériel is an effort to adapt a gun made for fire at a slow moving target for fire on a very fast moving target.

The necessity for a type with greater range and greater muzzle velocity is well known and will undoubtedly be met. The efficiency of the anti-aircraft gun service is dependent upon the development of a proper gun and a proper fire control system. The fire control system must eliminate dead time. At present the best chance the anti-aircraft service has of hitting a plane is to catch it on the first salvo; after the first salvo the course of the plane will be staggered and render accurate tracking of the plane impossible. Hitting the target at any other time is so improbable that it may be considered an accident. It can however confuse him and keep him from accomplishing his mission by keeping him high in the air and by making him follow a zig-zag course.

(b) Other Defenses with Reference to Air Attack

The sixteen-inch gun and howitzer program of Coast Artillery assures a land superiority for the next decade over naval attack. But these guns and emplacements have been constructed or are planned without protection from attack from the air. The camouflage of any fixed emplacement is almost impracticable and even if well done the location of the emplacement will be known by the enemy intelligence service and it will be bombed from the air. Since emplacements of the size of these cannot be hid, they must be protected. In the German defenses of Heligoland, there were eight 305 mm. guns in turrets with sixteen-inch armor over them. All of our major caliber guns should be likewise armored and protected from the air. It is not probable that a hit by a bomb would injure the gun, but the elevating and traversing apparatus, the breech loading mechanism and the electrical connections around the gun would be destroyed and the gun as effectively put out of action as if it had been destroyed. Protection by means of armor could be secured from all bombs dropped in the vicinity of the gun without interfering with the maximum and minimum elevations now planned for these guns.

Proper tactical employment of these guns requires that they be fired by salvos of at least four guns, preferably more. No reason is seen why they should not be built in two gun turrets and four gun emplacements, saving the great expense of emplacement construction for two guns only. The battle of Jutland showed that one gun in a turret could be put out of action and the other gun still function. This happened to the British in a number of cases. The lessons from the battle of Jutland were used as a defense of the American navy system of placing three guns in a turret and this argument is considered applicable to the present contention.

Such major caliber emplacements as we now have of sufficient power to be of use in the future and not constructed so that the guns can be armored, should be protected from the air by passive means, camouflaged to make the exact location unknown, and batteries of smoke bombs

placed toward the prevailing winds so that they could be ignited electrically at the approach of a hostile plane provided it was certain that the emplacement could be seen from the air and that an attack on it was probable.

All our pre-war major caliber gun and mortar emplacements are made obsolete by the airplane. They cannot be well enough camouflaged to hide them, their range is insufficient for any probable future engagement. Any personnel or money spent in their upkeep is considered wasted.

The railroad major caliber artillery can be camouflaged and made invisible. Its mobility is questionable after an air attack. Undoubtedly its tracks will be among the first things bombed. Its value lies in the fact that through it a great concentration of heavy guns may be made at any threatened point before the outbreak of hostilities. Before the outbreak of a war we can tell which coast and probably which area will be the enemy's objective and all this movable major caliber artillery could be concentrated in this area, greatly increasing our defensive strength. It is not probable that it could be moved until some time after an attack for aircraft will render it immobile in its positions. This will render it of limited value for coast line defense as distinct from harbor defense. Mobility must be considered with reference to the fact that a land attack on the coast line will always be preceded by a great air concentration and bombing attack on all defenses and transportation.

The medium range railroad artillery guns and mortars, because of its probable immobility during and after an attack is considered of less value than tractor artillery of the same range and it is thought that the manufacture and development of this type should be stopped and the effort concentrated on tractor artillery.

Aircraft will render our minor armament in fixed emplacements obsolete. These emplacements cannot be made invisible and cannot be protected by armor. They have an advantage over tractor artillery for secondary armament in their greater field of fire, but the comparative cost is so much greater that the use of tractor artillery in its place and for all new armament would be much cheaper. There are enough 155-mm G.P.F. guns on hand to replace all fixed secondary armament.

Tractor artillery can be made invisible against aircraft. Its mobility permits a concentration of armament at a danger point. No tractor artillery should be used in coast defenses except that with a traverse of at least 60°. The split trail mounts now developed by the Ordnance Department for use with either the 155-mm G.P.F. giving a range of 23,000 yards or with the eight-inch howitzer giving a range of 18,000 yards, are ideal for secondary armament for harbor defense. This mount has a 60° traverse. A battalion of these guns can be emplaced so as to cover a 120° field of fire. Additional spades can be placed in

the ground for each gun and one battery can easily change its field of fire while the other battery continues on the target, by unbolting from one set of spades and fastening to another set. This method of covering the entire field of fire has been successfully used. The change from one set of spades to another can be made in five minutes.

It cannot be too strongly emphasized that any mount except that with a split trail and a large traverse is not suitable for harbor defense. The secondary armament will be required to fire on targets moving at a high rate of speed, 30 to 35 knots, and if it is necessary to maneuver the trails with blocks in order to keep on the target, the rate of fire will be so slow that the target will be entirely out of the field before enough shots could be fired to render the probability of a hit other than negligible.

It is known that there are a large number of 155-mm G.P.F. guns in storage in the United States. These guns have a range of 18,000 yards and are a very powerful weapon for secondary armament. They should be furnished all harbor defenses at a ratio of about two guns of secondary armament to one of major caliber armament.

The method of fire control to be used with them is the same as the regular coast artillery method except that all corrections except for adjustment are discarded after the first salvo. The 55th Artillery in the Hawaiian Department have successfully fired these guns in this manner in a number of practices during the last year and a half.

The 155-mm G.P.F. guns are provided with 4-power sights which are insufficient for direct firing. Direct fire sights of sufficient power should be provided for them. Any such matériel organized into regiments should be provided with searchlights. Their probable function now will be in harbor and coast line defense. They need a searchlight company with the regiment just as much as the fixed guns in the harbor defenses need searchlights. History shows that landing operations are usually attempted at day break, the preparations being made at night. These guns could, with the help of searchlights, effectively prevent transports from preparing to land troops.

The present caterpillar tractor used for towing 155-mm G.P.F. guns and which it is presumed will be used for the new 8-inch howitzers with split trails and the new 155-mm G.P.F. is unsatisfactory for the use of this matériel in coast line defense because it is too slow. An organization can not make in excess of three miles an hour while actually on the road. Each gun should be provided with a wheeled tractor which can make a speed of fifteen miles an hour towing the gun; and two spare wheeled tractors towing ramp trailers which would carry a ten ton caterpillar tractor should be provided for each battery. The caterpillar tractor could be unloaded and used when it was necessary to emplace the gun in bad or sandy ground, or to pull the guns over excessive grades where traction for wheeled tractors was poor.

The development of a single unit, gun and tractor, for a gun of this weight is considered very poor policy. The weight of the gun, 13 tons, is now excessive for many bridges they must encounter. If this weight were increased by putting the entire weight into one unit, the mobility of the gun would be seriously impaired. There are many considerations in favor of the combined unit but none of these in favor are as important as the single consideration against it.

Great emphasis is now being made on the use of airplanes for observation of fire for our long range armament. When it is considered that any future naval attack will be accompanied by an air attack, the futility of this effort becomes apparent. Observation planes will be driven out of the air. It may be assumed with certainty that a naval attack will not be attempted without the enemy having an air superiority. The case of an officer of my acquaintance during service with a heavy artillery regiment at the front in France is interesting in this connection. He called for airplane observation three times. Each time it was furnished and the plane shot down. He did not call for it again feeling that his request meant the death of the observer.

The present planes used for observation of fire are equipped with radio sending apparatus and not receiving apparatus. Assuming that they could be used, if they were firing at a range of thirty to forty thousand yards, it would be necessary for the plane to return approximately fifteen miles to the battery to get signals from the battery. This would be intolerable. Any observation planes used must be equipped with both receiving and sending radio apparatus and in addition the planes and the batteries must have other means of communication. It would undoubtedly be practicable for the airplane to carry rocket signals of four colors and to signal by means of these "over right," "over left," "short right" and "short left" and other messages by combinations of these rockets.

Captive balloons will probably furnish a more dependable means of observation for adjustment of fire than airplanes. They can be protected to a certain extent by anti-aircraft guns. Captive balloons should be provided for all harbor defenses. It is probable however that in an engagement we shall have to depend upon our terrestrial observation.

Radio in its present development is of a very doubtful utility in fire control. It is well known that a powerful set will drown out a weaker set, even tho the weaker set is working on a different wave length. It is to be presumed that the powerful sets in operation by an attacking navy would completely drown out the weaker sets furnished for coast defense and airplane work. It might be good policy to provide our defenses with sets of sufficient power to drown any sets installed on enemy naval vessels.

An interesting historical example of the drowning out of radio is furnished by the escape of the German cruiser *Goeben*. The movements of the *Goeben* were being watched by a British cruiser. The *Goeben* made a false start in the direction of the Adriatic. The watching British cruiser sent a radio message to the British fleet in code, but which was deciphered by the *Goeben* to read "*Goeben* headed for Adriatic." The *Goeben* continued in this direction for some time and then turned directly around and made for the Dardanelles. At the same time the Captain of the *Goeben* told his wireless operator to open his set full power. This was done and the radio communication from the British cruiser was drowned out for several hours making it impossible for the British cruiser to get their message of the change of direction to the British fleet. The *Goeben* made its escape through the clever use of the weakness of radio.

The great range at which future naval attacks will be made precludes the use of search lights. Illumination can be furnished by flares dropped from airplanes or by illumination bombs fired from guns for this purpose. Both means should be prepared. It is improbable that our air service will be able to stay in the air for this purpose. Among the German defenses of Heligoland were two 150-mm guns used solely for firing illuminating bombs. It would seem that all our harbor defenses should be provided with the same equipment.

VIII.

SOME PHASES OF ORGANIZATION, TACTICS, AND TRAINING

The entire Coast Artillery Corps should be organized into regimental and battalion units and the districts into brigade harbor defense or brigade subsector defense headquarters. A typical peace time brigade harbor defense organization might be:

- 1 Harbor Defense Brigade Headquarters
- 1 Battalion of Major Caliber Fixed Armament
- 1 Battalion of Major Caliber Railway Armament
- 1 Regiment of Tractor Artillery Armament
  - 2 battalions motorized for coast line defense or secondary armament
  - 1 battalion of two batteries of 8 guns each for secondary armament
- 1 Regiment of Mobile Anti-Aircraft Artillery
- 1 Battalion of Fixed Anti-Aircraft Artillery.
  - (Note: A battery can man eight fixed anti-aircraft guns and necessary searchlights and fire control apparatus.)

The desirability of a regimental, battalion, brigade organization is obvious to any officers who have served in a coast defense and in a

regiment. That peculiar thing, spirit or morale, is much more easily aroused by the personal interest that can be awakened in a unit such as a battalion or regiment. This may theoretically be practicable for a coast defense but actually does not seem to work out. The regimental and battalion organization would also be much more easily used without confusion in the case of the use of coast artillery as infantry on such occasions as they may be used as infantry.

The amount of anti-aircraft defense needed is so great and the importance of its being instantly ready for action is so essential that it is apparant that the peace time army cannot furnish a sufficient quota and that it cannot be properly organized for immediate action after war is declared. It would seem that the only possible means of providing trained personnel for anti-aircraft defense is to entrust it to the National Guard. This type of service is particularly attractive to the National Guard and men without the qualifications for line service could be enlisted for it. Both fixed and mobile anti-aircraft units could be placed in the locations needed for actual use and cared for by a detachment of the regular army and the appropriate national guard units.

The advantage of a large amount of mobile anti-aircraft artillery is doubtful. A battery can man double the number of fixed guns that it can man of mobile guns. Mobility is no help for constant readiness for action. The difficulties of accurate fire control are greatly increased with mobile armament. The advantage of the mobile type is that it can be transported from one coast to another and help in concentration of armament at a threatened point and that it is available for use with a field army. It would seem to be better policy for defense to concentrate on fixed anti-aircraft guns protected from bombing by armor or walls of suitable height.

The report of the Joint Army and Navy Board discusses the tactics of the movable heavy artillery. This discussion fails completely to realize the value of this artillery in coast line defense. The discussion reads as follows:

> "Movable heavy artillery. In many cases movable high-power artillery will form an important auxiliary for the mobile detachments assigned to beach defense. Such weapons will increase the difficulty of hostile landings by keeping hostile warships at a distance from certain particularly favorable beaches. Artillery of this type should, however, be regarded purely as auxiliary. *Except as auxiliaries to mobile forces, they will have no conclusive influence on coast defense,* and, on the other hand, *mobile forces equipped with the usual field artillery types will generally be sufficient for the purpose of the defense even without the intervention of the heavier types.* Another important rôle of these heavier weapons will be in the reenforcement of the armament of existing harbor defenses and as auxiliaries to the field army wherever siege operations may develop." (Italics are the author's.)

Movable heavy artillery is designated as auxiliary only. The statement is made that it will have no conclusive influence on coast defense. The function of movable heavy artillery in coast line defense is exactly

parallel to the function of heavy artillery in harbor defense. It should prevent a transport from ever discharging its troops. It should be the first unit placed in position and if properly used and quickly enough it will entirely prevent a landing and dispense with all other arms and their machine guns and wire entanglements.

Movable heavy artillery should be divided into two groups, (a) that to be used for minor armament in fixed defenses and (b) that to be used for coast line defense or for aiding the minor armament of fixed defenses. The number of men required to man a mobile battery of this armament of four guns could man a battery used as secondary armament of eight guns. Eight guns are not too many for salvo fire. A battery of mobile artillery to be used for secondary armament in harbor defense could have assigned two tractors to it. Its base lines, observing posts and communications can all be prepared in advance and at the threat of war it could be emplaced and would not need to be moved again.

The preparation of positions for the mobile artillery used for coast line defense is of greatest importance. All positions from which it might possibly be used in the defense of a coast line should be prepared in advance. That is, observation points should be selected and oriented, base lines oriented and gun positions selected and oriented. For each complete battery position a data sheet should be prepared showing all the data, thus dispensing with all this work if the battery were to move quickly into position. A typical data sheet for a battery position is shown on Page 222.

The field training of mobile tractor artillery should consist principally of marches into these selected positions and the firing of problems from these positions. Firing is but a small part of the problem. The speed with which they can occupy their positions will determine their effective use. It cannot be too strongly emphasized that this armament should be the first line of the coast line defenses and that if it is effectively placed it will absolutely prevent a landing and render the use of any other troops unnecessary.

The training of officers in the coast artillery is insufficient for the varied duties that they have to perform. Too much time in the service schools is devoted to technical instruction in the construction of matériel. This time could much more profitably be devoted to naval strategy and tactics, air service and the tactics of all different arms of coast artillery corps.

The British blocking attack on Zeebruge is an example of the seriousness of the lack of training in naval tactics in harbor defense officers. The officers of the harbor defense had no conception of the probable objects of the attack until after the harbor had been successfully blocked. If they had had proper instruction in naval tactics they could have

REPORT ON FIRING POSITION.....No.....

Date.....

Organization.....Armament.....

1) Co-ord. Regimental P.C. X.....Y.....
" " Battalion P.C's. (1) X.....Y..... (2) X.....Y.....
(3) X.....Y.....
" " Dressing Stations X.....Y.....

(2) Battery Co-ordinates	X	Y	Elevation	Directrix
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
(3) Observation Posts	X	Y	Elevation	
No. 1	.....	.....	.....	
No. 2	.....	.....	.....	
No. 3	.....	.....	.....	
No. 4	.....	.....	.....	

(4) Defilade.....
.....
.....

(5) Camouflage (available or necessary).....
.....
.....

(6) Camp Sites.
(a) Location, brief description, and capacity of camp sites.....
.....
.....
.....
.....
.....
(b) Fuel available (if any).....
.....
(c) Water, distance to, source and purity of supply.....
.....
.....

(7) Ammunition and supplies, amount and location of dumps.....
.....
.....

(8) Approach roads, brief statement on condition.....
.....
.....
.....
.....

(9) Property owners concerned (peace time exercises).....
.....
.....

(10) Field of Fire—attach section 1/62,500 map showing field of fire outlined *black;* dead areas outlined *red;* field of view from each observation post outlined *blue;* invisible areas outlined *blue* OP No. 1, *yellow* OP No. 2, *Green* OP No. 3 and *brown* OP No. 4.

(11) Communication and orientation nets—attach section 1/62,500 map showing commiuncation net *red*, properly labeled; orientation net *black*, label necessary data.

NOTES: If space is insufficient, enter remark "See attached Sheet". Write data on separate sheet for each item and attach in proper sequence as given above. This form to be top sheet of report.

This report will be made in duplicate, original copy forwarded to District Headquarters and carbon copy retained by organization.

foreseen without difficulty the object of this attack and have made an attempt with good chance of success to stop it.

Co-operation between the coast artillery and the air service is frequently unsatisfactory on account of the lack of appreciation by coast artillery officers of the difficulties of the air service. Air service officers state when they are observing for artillery fire the artillery officers seem to expect them to be able to support themselves in the air over the target. Air service officers expect the artillery to fire upon word from the observer. It is thought that this difficulty can only be worked out by a thorough mutual understanding by each service of the difficulties of the other service. This will have also a very good influence on the proper employment of aircraft attached to Harbor Defense Brigades when the younger officers who will get this education reach positions of high command.

Training cannot be too diversified. One point in the training of each organization must be emphasized. In fixed defenses, speed in opening fire and accuracy in fire; in tractor artillery, mobility and speed in getting into position are of primary importance; in anti-aircraft artillery, instant readiness for action, speed and accuracy of fire; are of primary importance.

The tendency in coast defense is to emphasize garrison training at the expense of the field training so necessary for mobile artillery organizations. This tendency can only be removed by requiring all officers of the coast artillery to serve in all branches of coast artillery so that they may all have an appreciation of the problems of each of its branches.

Certain mobile artillery organizations both tractor and anti-aircraft have had rifles assigned to them for riot duty. The effect of this has been to emphasize garrison training at the expense of field training, greatly to the detriment of training of the organization to accomplish its essential mission. These organizations were already equipped with two machine guns and eight automatic rifles per organization and pistols for each enlisted man. No reason is seen why this powerful equipment is not sufficient for any riot duty that the coast artillery may be called upon to perform. If they were sent out as infantry during a war, there would be ample time to draw infantry equipment and train with it.

IX.
CONCLUSION

It seems that the race for naval supremacy has been transferred from the capital ship to the airplane, and that national supremacy will go to the nation having naval air supremacy. The failure to realize this and failure to prepare to meet this change in the method of warfare places our country in a most dangerous state against an enemy. The nation first developing this new weapon of enormous destructive power and of relative immunity to effective resistance by any means except a

decisive superiority of similar weapons will occupy a commanding position.

The naval attack with airplanes will probably demobilize all our railroads in the vicinity of any point that they attack. It would appear that all troops, including infantry, should be furnished with trucks for transportation to facilitate the speedy movement to a threatened point.

The lesson of this new offensive weapon is a repetition of the lesson learned from each new weapon developed—that of combined arms. If any one could have seen the development of weapons from the knife to our present rifle he would have laughed at the idea that the rifle would not displace the knife as a weapon of warfare. It has not. Battles are still won by a knife stuck on the end of a rifle, and probably as long as men fight the battle will be decided by this same knife and all other weapons will remain auxiliary.

It is incumbent upon all officers to study carefully the possibilities of and defense against this new weapon and particularly the duty of Coast Artillery Officers since we are charged with the land means of defense against it. The development considered is not over five years in the future. This paper is an effort to stimulate such study for the very immediate future.

CAPTAIN PHILLIPS HAS OPENED UP A NUMBER OF VERY IMPORTANT QUESTIONS FOR CONSIDERATION

MAY THIS PAPER BE THE BEGINNING AND NOT THE END OF THE DISCUSSION

Maneuvering Aircraft in Formation

By the late Lieutenant Edward L. Ericsson, U. S. Navy
in U. S. Naval Institute Proceedings, January, 1923

Editor's Note. This paper is reproduced through the courtesy of the Editor, U. S. Naval Institute Proceedings, who also loaned the cuts by which the paper is illustrated.

An especial and tragic interest attaches to this article from the fact that Lieutenant Ericsson was killed in an airplane fall on October 26th, 1922, the very day the manuscript for this paper was received at the Naval Institute.

AT the present time there is very little information regarding the maneuvering of large numbers of naval aircraft. In the past the flying done by the navy was largely limited to instruction and patrol work for seaplanes, and fleet spotting for land planes. This called for single plane flying, and so comparatively little formation work had been done.

Lately, however, naval aviation has broadened in scope. It is planned to have bombing, torpedo, spotting, scouting, and combat squadrons which will use both land and sea planes. Gas attack, smoke screens, and photography will be used as auxiliaries. The possibilities are infinite, and call for large numbers of aircraft maneuvering and working together.

To do this expeditiously and efficiently, obviously requires methods of maneuvering, tactics, and communication, which are as simple as possible. Groups of aircraft will function in a similar manner to the various units of the battlefleet or an army. In action each will depend upon the other, and similar policies and tactics will govern them all as far as the size, type, and design of these planes will permit.

Some thought must be given to this by everyone, and the information thus gained by thought and experience promulgated throughout the service. Such methods as have proved themselves efficient will become axiomatic, and the whole system can thus be built up step by step on sound tried lines. A beginning must be made somewhere, and it is with this end in view that the present elementary article on formation flying is written.

A great many formations have been flown by the Torpedo Plane Squadron. The methods which have seemed to be the best will here be outlined. Little claim is made to originality, for the experience and opinions of others are being used, and these, coupled with the results of a great many experiments and much practice, have determined the doctrine of the Squadron. No claim is made that these methods are

the only ones by which similar results may be achieved. However, they have been carefully thought out and have worked successfully.

Primarily, an explanation will be given stating the reasons for, and the great importance of, formation flying, and why proficiency in this kind of flying is so essential an accomplishment to a pilot flying any type of airplane.

The effort of a number of planes can usually be co-ordinated best if they are maneuvered together. This is true of any kind of attack, bombing, or torpedo work. Similarly, in being attacked by an enemy, it is the best method of defense. Each plane, if a multi-place one, can defend the plane ahead, the plane behind, and itself by machine gun fire if it is in formation. However, if any plane strays from its formation it will become the easy prey for an enemy lurking behind a cloud or flying at a higher altitude.

Then too, the formation leader must have the planes near enough to him so that he can see them. It is even more necessary that they be able to see him and receive his signals and follow his movements in maneuvering, attacking, and retreating.

In bombing, particularly, it is necessary to fly certain types of formations, not only for the above mentioned reasons, but so that the desired pattern of bombs can be dropped when bombing a moving target, such as a ship or train. This is absolutely necessary to insure hits.

Another good reason for formation flying is one which has directly no military value. The pilot learns the "feel of plane" to a greater degree in formation flying than any other way. He learns absolute control of his machine. He becomes part of it and ceases to fly mechanically and by rule. There can be no skidding or slipping in formation flying.

After having explained why it is necessary to fly formation, the next question of how to fly it will be taken up. There are several factors which are necessary to do so properly.

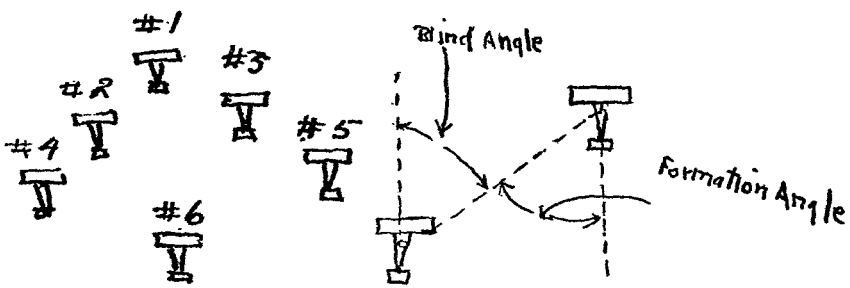
The primary, and most important requisite, is a good leader. He must know how to direct the other members of his flight and to keep them together. He must be able to fly properly himself and know how to take advantage of the clouds and the sun. He must keep a weather eye out for enemy formations or decoys, so that he will not be surprised. He must be the eyes of the formation, and his is the responsibility for the safety, proper directing, maneuvering, and handling of the flight.

The second requisite is the absolute maintaining of the formation. Planes must be kept in position, both in a vertical and a horizontal plane. They must not stray and in case of one having to drop out, the next behind must immediately close up the gap. This is necessary for several reasons.

In case the formation is attacked, each plane defends not only itself, but the plane ahead and the plane behind. The blind angles of each plane are protected and covered as far as possible by the type of formation used. The greater the blind angles of the plane in front, the more obtuse will be the angle of the "V" of the formation.

Another reason for staying in position is that the leader can make his signals seen and understood. Visual signals from a plane are hard to understand anyway at best, and if the planes are not closed up the difficulty is augmented.

The third essential is a simple system of signals whereby the offensive and defensive qualities and possibilities of the formation can be most advantageously utilized. As has been stated before, signals of any kind are rather hard to receive, and for this reason, the Squadron Doctrine should determine largely the particular line of action in each individual case.



MODIFIED DIAMOND FORMATION

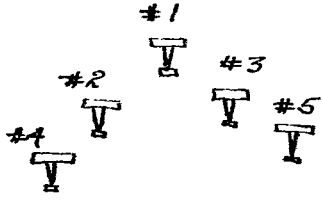
There are two methods of signaling and communicating in the air. The most positive, and the one most used up to this time, is visual signaling. Radio and radio telephones have not been developed to the point of reliability as yet, but they will undoubtedly be perfected in the near future, so that their use will be practicable and essential.

Visual signals can be made with the arms, by zooming the plane, by tipping the wings, by little hand flags, or by Very Pistol. For closing up and opening out, or raising and lowering the planes directly behind him, the leader can use his arms. The planes receiving this signal can pass it along to the rear. In forming, breaking up, landing, attacking, retreating, and for other more complicated maneuvers, the more unmistakable signals of zooming and tipping the wings are the best. In bombing, flags or a Very Pistol have been used quite successfully. However, the most positive way for the planes behind the leader to release their bombs at the proper time is to watch the fall of the bombs in the leading plane. For simple 90° or 180° turns no signals at all are necessary because it is very easy to see the leader go into a turn and follow accordingly. Very often, however, the leader

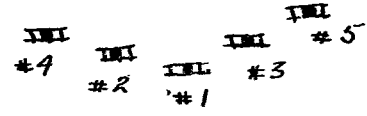
will raise his right or left arm for a turn and raise it again when he straightens out.

In large planes, where it is possible to carry a radio operator who can spend all his time operating the set, marked success has been attained in all kinds of communication. It is necessary, however, to have a good set and an operator who is experienced.

The fourth factor in formation flying is a knowledge by all hands of the chain of responsibility. In case the leader finds it necessary to leave, the command should pass along to the next man, and all of the members of the unit should be so indoctrinated that each can take up the leadership competently, and carry out the mission properly, along the lines which were planned, and that there is no question in the minds of any, who the leader is. This calls for a complete understanding and co-operation of each individual pilot. The minds of all should function along similar channels, and the mission and the procedure in carrying it out be so well understood by all that a change of leadership will affect but little the morale of the flight or the resultant effort which is the mission.



"V" Formation From Above



"V" Formation From the Rear

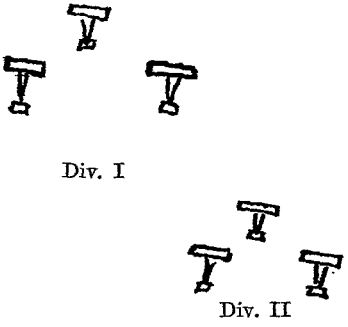
The type of formation flown is usually "V" or some sort of diamond. The largest number of planes that can be maneuvered by a single leader in one unit is seven or eight. Even that number is somewhat unwieldy to handle quickly. A five or six-plane formation is about the handiest of all. The "V" is used for an odd number of planes, whereas with an even number, one plane will fly directly behind and below and thus make a modified diamond.

In bombing a stationary or moving target, it is usually desirable to drop the bombs in some sort of a pattern. The factors which determine the shape of the pattern are as follows: (a) the type and shape of the formation, (b) the number of bombs carried, and (c) the time interval of dropping. The arc of visibility of the plane affects the shape of the formation because in some planes it is difficult for the pilot to see a plane ahead if it is at a lower level. In this case the following planes step down from the leader instead of up, as is usually the case.

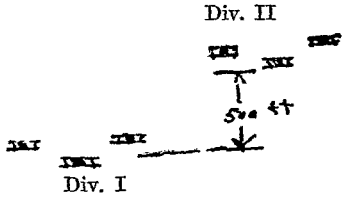
Planes fly above the leader for two reasons. First, the leader can see all of his formation better if they are above him. When planes are below he has to look down on either side of the fuselage, and this is difficult in any type of plane and impossible in some. The second, and

even more important reason, is that a plane can protect the tail of a plane ahead if it is flying above, whereas it becomes almost impossible if the rear plane is flying below. This applies only to single motored planes with fixed guns.

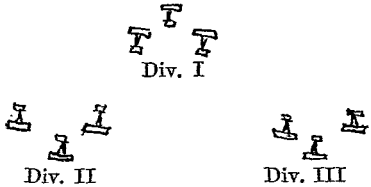
Where the number of planes to be maneuvered is more than eight it becomes necessary to form several flights, and to fly as a group. A group is rather similar to a single unit, that is, in echelon or "V" shapes. However, each flight is at a different altitude from any other. The best difference in altitude is about five hundred feet. The diagrams show these two methods. The angle of the "V" should be kept as acute as is possible without having the wing flights overlapping the leading flight. In other words they shouldn't forge ahead.

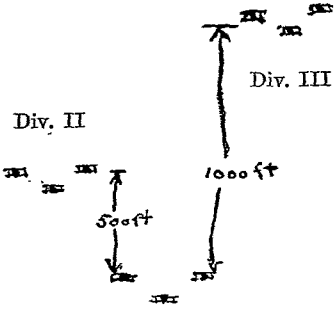


GROUP ECHELON FROM ABOVE



REAR VIEW OF GROUP ECHELON

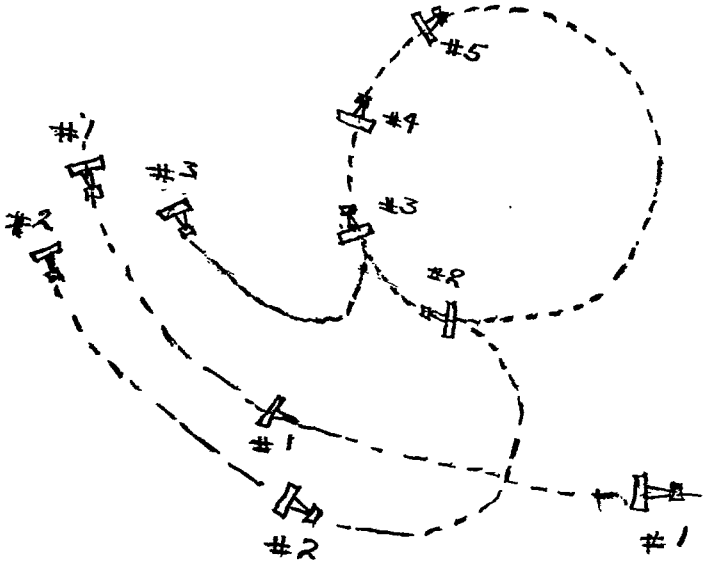




In extended operations, the gasoline capacity has to be taken into consideration. Time and operations schedules must be followed according to the military plan. For this reason the actual forming and beginning of an operation must be prompt and expeditious. The quickest and best way to form a flight is to take off from the water or the ground in formation. However, it often becomes necessary, because of a restricted field or area of water, to have rendezvous over some designated spot. The best way to do this seems to be as follows: all planes, but the leader, will follow each other in a counter clockwise circle. Their order in the circle will correspond to their number in the formation. No. 2, who is second in command, will lead the circle. The leader

stays outside of the circle at 100 feet lower altitude. He meets No. 2, who does a wingover or tight flipper turn and falls into place. The leader continues outside in a clockwise circle and picks up all of the other planes in a similar fashion. The diagram will explain this more fully.

A group is formed by the leading flight picking up the other flights one by one in a somewhat similar fashion. Flights rendezvous over some specified area with 500 feet difference in altitude between flights. The leading flight will maneuver previously, so that it comes in towards the others at a converging course.



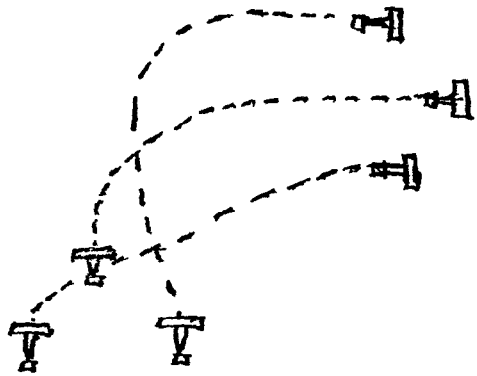
LEADER COMING IN AT 100 FEET LOWER ALTITUDE

When the squadron has been formed, unless the radio communication is quite perfect, the flights following will each govern their movements by the leading flight. The mission of the group will determine to a large extent, its action in the event of an attack or in being attacked. Generally speaking, however, all flights will follow the leader.

Maneuvers should be made as simple as possible, and should consist only of such movements as will expedite and make easy the handling of a flight group. Complicated movements only tend to cause confusion.

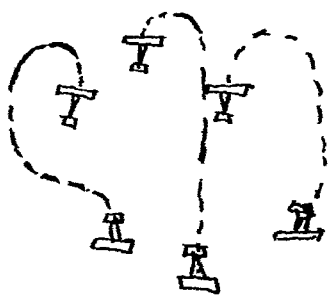
The first thing a beginner at formation flying learns is the making of ordinary turns. The inside turn particularly, while actually being the easiest to do properly, seems to be the most difficult, until the knack has been mastered. The leader goes into a turn making average cruising speed. He may or may not give a signal first, it matters little which. He must under no circumstances skid or slip. If he does so he will get out of position relative to the whole formation. The planes on the

outside crowd in very slightly and increase speed so as to make up for the additional distance which they have to go and still stay in formation. The inside planes decrease speed materially and drop down below the level of the leading planes and "step down" in a similar manner to their "stepping up" on straight away flight. Thus the whole formation is



No. 2 Dives Under No. 3 Crosses Over No. 2

banked and every plane is flying at a different level. This obviously prevents any collisions, or being in each other's way, or obstructing each other's view. When the leader straightens up, the inside planes pull up to position as before. The great tendency of pilots flying inside is to drop too low and to forge ahead. Sometimes it becomes necessary to almost stall the plane to stay in position. If any plane drops too low it forces the plane behind down also, and makes it difficult for all to get back up when flying straight once more.



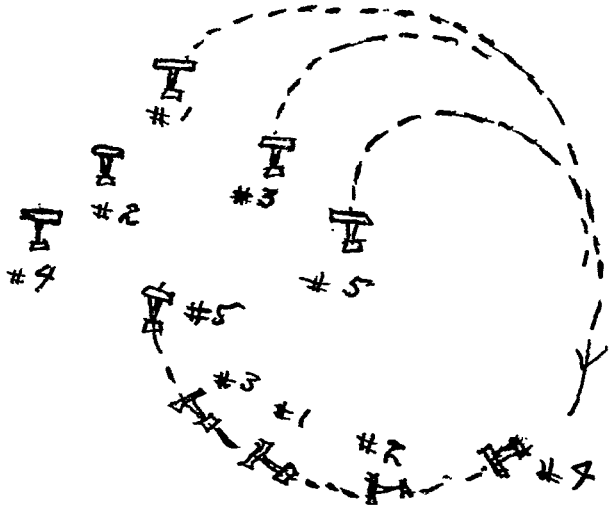
Division Reversements

Crossover 90° turns are quicker than ordinary turns, but are, however, somewhat dangerous. The leader makes an ordinary turn as before. The outside planes dive under and come up into position. The inside planes simply cross over the outside planes, and all in out position. The diagram explains it more clearly than words.

For a quick 180° turn, which would be used in a sudden retreat or in an attack from the rear, a renversement is the quickest. This can

be done only with planes that can stunt. The leader does renversement to the right or left. The planes on the right flank each make one to the right in succession as soon as the plane ahead has completed its turn. The planes on the left do a renversement to the left in a similar fashion. After it has been practiced for a while each pilot will be able to judge when to start, relative to the plane ahead.

At times a Lufberry, or Milling circle has been used by single seater planes as a defensive measure against attack by superior numbers. The principle of this is, that if all planes are flying in a close circle at the same level, each plane will be able to protect the tail of the plane ahead of it. It is not as practical as it seems because it is rather difficult to keep a close enough circle. Then too, it cannot be moved quickly



LUFBERRY CIRCLE

and the circle must be kept up until the attack has ceased or help has arrived. A straight away formation is much better for multiplaced machines. The Lufberry circle, however, is a very pretty maneuver and is done as follows: Upon a designated signal the last plane on the right flank does a wing over or right flipper turn to the right and continues in a circle, keeping the same altitude. The other planes on the right flank and the leader do the same thing. The planes on the left flank follow in behind the leader. The circle is tightened up by the first plane to turn, and the size is determined by the number of planes in the formation—the more planes the larger the circle. The flight is reformed by a signal from the leader. He can dive down through the circle and have the other planes fall in as best they can. The neatest way, however, is to have the leader give a zooming signal, and at the end of it he and all planes which were on the right flank in the beginning will do a wingover or flipper turn to the left. The planes on the left

flank will merely ease in behind the leader. The leader should make less of a turn than the planes further back and if he throttles down they will have little difficulty in catching up and getting into position.

All of these methods of maneuvering have become part of the Squadron Doctrine, and a word of explanation will be given to define the term. Doctrine means method, and indoctrination means knowledge of method. The personnel of the squadron must be indoctrinated into the squadron methods as soon as these have been evolved. This applies to every endeavor and every bit of work done by the squadron. As far as possible methods should be standardized with this end in view. Operation orders, flight formations, rendezvous, flying signals, beach procedure, division routine, officer-of-the-day duties, and a hundred other things should all be done in certain standard ways, which have been thoughtfully worked out, and proved by experience. Then after they have been learned, the issuing of orders will be very much simplified. The less supervision and explanation of details which is necessary, the more complete the indoctrination of the squadron. When the subordinate officers of an organization are properly indoctrinated it is only necessary for the commander to explain briefly the mission to be performed and the general method of doing it. His subordinates then merely follow the tried and accepted methods with which they are all familiar. The minds of all function along certain known and tried lines, and each man knows what he and the others are going to do, and how it is to be done. In the absence of the commander the mission can be carried out as well as if he were present, because his subordinates all know what he would have done were he there to direct himself.

Doctrine is so very necessary in formation flying. There must be a mutual confidence and understanding between the leader of a flight or group and his subordinates. Acts on the part of each, which are different from the preconceived plan, must be construed intuitively as being the right thing to do under the circumstances. When orders are not being carried out the leader should know that it is utterly impossible for the subordinate to do so. When the leader does something different from the plan, as conceived on the ground, the remainder of the flight must know that his reasons are sound, and that his actions are the best under the circumstances. The members of a flight must understand each other, whether things go right or wrong. When this becomes so, they have become properly indoctrinated.

Arms and the Young Idea

By Maj. Gen. John F. O'Ryan

Reprinted with permission from The American Legion Weekly of Nov. 24, 1922

SOLDIERS are frequently asked whether it is not in the interest of the peace of the world that the school children of the land be made to understand the cruelty and wastefulness of war, and whether in that connection it would not be advisable to keep from them all that would tend in any way to glorify war.

It is obviously true that the impressions gained during the schooling period are lasting impressions, and tend mightily to affect the later views and convictions of manhood and womanhood. What the Germans did, in preparation for war, with several generations of German boys and girls, is well known. Undoubtedly, the efforts made to imbue the school children of Germany with a spirit of sacrifice for the Fatherland, to have them believe in the primary necessity for the maintenance of a great army, in the invincibility of that army, and in the dominating importance of the part played in history by soldiers had much to do with the remarkable morale of the German Army during the World War and with the willingness of the soldiers of that army to continue the fight after the outcome seemed, even to them, hopeless.

Before the World War, the Germans frequently employed a maxim for the purpose of steeling the hearts and imaginations of their young men in preparation for the trials and suffering of battle, and to minimize the effects of temporary military reverses. The phrase was, "Durch Nacht und Blut zu Licht"—"Through darkness and blood to light." What is worth having must be contended for, which was interpreted to mean, fought for. And in the fighting, one must expect incidental sacrifices and reverses. One could expect, in short, to emerge into the light of victory only through the blood of sacrifice and the darkness of reverses.

One interested in the problem of developing the readiness of a people for war will find much of psychologic interest in a study of the efforts of the German government to that end during the period from the termination of the Franco-Prussian War to the commencement of the World War. Apparently, very little was left undone to increase the value of the German Army as a fighting machine, particularly by the

helpful cultivation of the minds of the German youth who were later to constitute that army.

Passions growing out of the war are still so warm and the spectacle of Germany's complete defeat is so overpowering, that the mass of our people fail to recognize the really great spirit of sacrifice maintained by the German people throughout the war. What a tremendous morale they must have possessed to enable them to continue their sacrifices in the face of continued defeat. Recognition of their martial qualities in no way justifies the German policy which brought on the war or excuses the hypnosis which the German people permitted themselves to suffer by dictate of their military masters.

No subject can be profitably discussed unless facts are frankly considered and their respective influences determined, and an outstanding fact of the World War is that the Germans possessed a magnificent army. More remarkable than the efficiency of its weapons was the human element—its morale, its organization, and its military leadership. And in relation to its morale, it is hardly possible to over-emphasize the influence upon its development of the boyhood training of its soldiers, and, it might be added, by the schoolgirl training of the women of the families of its soldiers.

The question therefore naturally arises, if recourse to the psychologic devices of the military system in the school training of children can be made to develop them into men and women ready and even eager for war when their government calls, is it not reasonable to believe that the suppression of the use of such devices during the period of school training, and the substitution of other psychologic counteracting devices and artifices, would develop men and women having a detestation of war, and perhaps even possessed of a determination never to contribute, directly or indirectly, by service or otherwise, to the prosecution of any war? I think the answer to this question, conservatively stated, is that undoubtedly very much can be done by early training, carried on intelligently and persistently throughout the school system of any country, to produce, at least among the great majority of those who become the products of such a system, a very hearty abhorrence of war, and among many of them a determination to refuse participation in what they have been made to believe is never justifiable.

The next question, and a very practical one, is to what extent, if at all, should such a policy of training be inaugurated in our own country at this tme. That such a policy is seriously proposed is attested by the public utterances of sincere people who believe in its effectiveness to lessen the probability of war. Undoubtedly some of the peace societies, in their efforts to contribute something toward the creation of a better world, go so far as to advocate a policy of this character.

Before undertaking to comment upon the desirability of inaugurating such a policy in our country, it is due the importance of the subject to

consider some aspects of war, the justification of ever resorting to war, and the probabilities of our having to resort to war, either for self-preservation or for any other justifiable reason. War, of course, has been defined many times. In brief, it is the utilization of force for the accomplishment of the national will. This force known as war is often resorted to when diplomacy fails. A nation may, of course, fail through diplomacy to accomplish the national will and not go so far as to resort to war. Recourse may be had, for example, to a tariff war, to the severance of official relations for a period of time as a protest or rebuke to the other government or governments concerned. But when war does occur, it is to be recognized as an abnormal state of human relations. Its prosecution is contrary to the fundamental teachings of Christianity. War certainly is a flouting of the doctrine of brotherly love, of turning the other cheek, and of the commandment, "Thou shalt not kill."

Writers, of course, have undertaken to explain away the anomaly presented by a Christian people engaged in war. Some of them have made a considerable success of their efforts. But soldiers, at least, should be sufficiently frank to recognize the fact that the killing and maiming of war and the rancor and hatred that are by-products of war are entirely out of harmony with the conception of correct living laid down by the Founder of Christianity. Soldiers, however, have not found it necessary to give much consideration to the moral aspect of war as such. Their official field lies on the technical side, and furthermore, whatever qualms of conscience soldiers may have in regard to their participation in war, these have usually been anaesthetized by the exhortations of justification made by those whose duty it is to have a more profound knowledge of Christianity. So it was during the World War, when Christians on opposing sides, engaged in the attempt to exterminate each other, were stimulated in their efforts by the impressive appeals of their leading Christians, who raised their voices in prayer to the common God to strengthen and make more effective the work of their respective armies.

As I estimated the point of view of the average soldier of our war army—and I had an intimate acquaintance with the habits and thoughts of many of them—I came to believe that he recognized the inconsistency of Christians doing the things that war impels men to do, but that he justified his participation in the war because of the conviction that the success of the Allies was a step toward the realization of the fundamental teachings of Christianity. By the fundamental teachings of Christianity is meant, of course, those general rules of proper human relations that are subscribed to alike by the teachers of all religions. The general idea was expressed in the phrase so often heard: "A war to end war."

We cannot gain a true concept of war unless we remind ourselves that wars have marked the life of man upon this earth from the earliest time of which we have record. To state this is not to conclude that the future of human relations will continue to be marked by frequent recourse to war, any more than to have held some years ago that because man had never flown in the air from the beginning of time he never would fly. It seems only yesterday when grown-up men of education, in discussing the gliding flights of the Wright Brothers, averred with heated impatience that the time never would come when man would remain in the air for more than a few seconds. The average sensible man believes firmly that the time is not far distant when the relations of men upon this earth will be governed by rules of justice and fair dealing as effective and commonplace as are the laws which govern the relations of the peoples of the several States of our own Union. It is obvious, however, to the most optimistic of us that this time has not yet arrived, in spite of the untold sacrifices of the World War. Much, apparently, remains to be done in the way of organization, of effort, of education, and of agreement, before the hope expressed in the phrase, "a war to end war," can be made effective.

Quite generally throughout the world, the mass of mankind would advance the inevitable time when an effective organization will maintain world order. The majority of every people in the world would undoubtedly advance that time to the immediate future, but thus far they have been unorganized for the attainment of their common purpose. Their prayers and their hopes have not been translated, except here and there, into effective action. And where there has been a contribution toward the end sought in the form of effective action, such action has been unco-ordinated with similar efforts elsewhere. No great cause has ever progressed far without great leadership, and recently there has not been, in a world sense at least, any great leadership in this fruitful field of effort of sufficient might to call forth a great and unanimous response from the millions who are ready and who wait only the recognition of that leadership.

That is the situation as it exists today. Stated in another way, it means that the governments of the world, in formulating their national policies, are still unhampered by any police power of the world. They are circumscribed only by the composite conscience of their own leaders and by the relation which their military and naval might bears to the military and naval might of the governments which would oppose their policies.

If this is a fair statement of the condition of the world today, then, whether we like it or not, it follows as a logical conclusion that we must preserve the efficiency of our might, if we would defend our rights against the encroachment of any government inaugurating an unjust policy of aggression directed at us. If this be true, then in the work

of keeping our might effective we must remember the dominating importance of the human element, and in no way can the human element in war be made more effective in its morale than by the inculcation in the minds of the youth of the land of the spirit of sacrifice, of love of country, and of respect for those who have sacrificed in the past for the common good. Therefore, the time is not yet ripe for implanting in the minds of our school-boys and school-girls an abhorrence of war, under all circumstances. The time has not yet arrived when self-preservation will permit us to acclaim, as we should otherwise like to acclaim, a sincere and practical allegiance to the true spirit of Christianity. For some further period of time, apparently, we must continue to live as Christians, in theory only, at least so far as our readiness to participate in organized and wholesale homicide is concerned.

If, therefore, it is unwise to permit what might be called the spirit of pacifism to color the lives of our school children at this time, why, it may be asked, would it not be logical and a measure of efficient preparation to breathe into their impressionable hearts and souls a real Spartan spirit of service to country, a sense of unquestioned obedience to government will, a determination to suffer any sacrifice and to go the full route, wherever it may lead, to make effective the government might in the enforcement of the government will?

Such is the conception of education as it would be established by the God of War. On the basis of such education does militarism thrive? No, as in every other practical problem of life, there is a practical and reasonable solution. Without glorifying war, and while accentuating justice and peace, we can educate our schoolboys and girls to have an understanding of the problem of war and peace: that while the governments of the world remain unconfederated for the maintenance of world order, there will always remain the danger of war, and that while that danger does remain, prudence, common sense, and a regard for all that we hold worth while demands a reasonable readiness to participate in any war that may be necessary to make that regard effective.

The Attack of Maubeuge by the Germans

By Captain Koeltz, appearing in Revue Militaire Generale, April, 1921. Translated by Major F. P. Hardaway, C. A. C.

General von Zwehl, former commander of the VII German Reserve Army Corps which attacked Maubeuge in August 1914, has just set forth how and in what way he took this fortified place. (Maubeuge-Aisne-Verdun, by von Zwehl, General of Infantry.)

The present study has no other object than to summarize the statements of General von Zwehl in order to place before the reader some very interesting information.

THE general situation of the armies of the German right wing on August 25th, the date on which Maubeuge was first menaced by a possible attack has been explained in detail in the September, 1920, number of the *Revue Militaire Generale.* (Captain Koeltz "The First Strategic German Check" *Revue Militaire Generale*, September, 1920). It is represented schematically in figure No. 1 herewith.

During the day of August 25th, General von Bulow, who directed not only the operations of his own Army (Second), but also those of the First Army (von Kluck), had given the following orders with a view to the primary investment of Maubeuge:

The IX Army Corps (First Army) will invest the place to the North of the Sambre;

The VII Army Corps (Second Army) will invest to the South.

The VII Reserve Army Corps (available elements, Second Army) will assure liaison between the two preceding Corps to the East.

The VII Reserve Army Corps, which had had to leave one of its divisions, the 13th Reserve, to guard Liege and two battalions to guard railroads and works of art in the vicinity of Namur, did not have on August 25th but:

10 Infantry Battalions (6 active and 4 reserve)
3 Reserve Squadrons
6 Reserve Field Batteries
2 Heavy Batteries
1 Reserve Battalion of Pioneers.

On the evening of the 25th, the VII Reserve Army Corps, thus reduced, reached Binche with its advanced guard and Fontaine-l'Eveque with its main body.

On the 26th of August, von Bulow charged General von Einem with the attack of Maubeuge and for this purpose placed at his disposition a division each of the IX Army Corps (First Army), of the VII Army Corps and VII Reserve Army Corps (Second Army) as well as all the

siege organizations of the Second Army now available as a result of the fall of Namur. General von Einem with his subordinates began, at once, a study of the means of investment. The above mentioned arrangement did not, however, please General von Kluck, who given over to the idea of an envelopment of the Franco-British left wing, saw himself thus deprived of one of his active divisions. He protested at General Headquarters and, as a result, orders were issued, on the morning of the 27th for the Second Army to take entire charge of the attack on Maubeuge. Von Bulow, henceforth the only person interested in the question, decided that from now on the VII Reserve Army

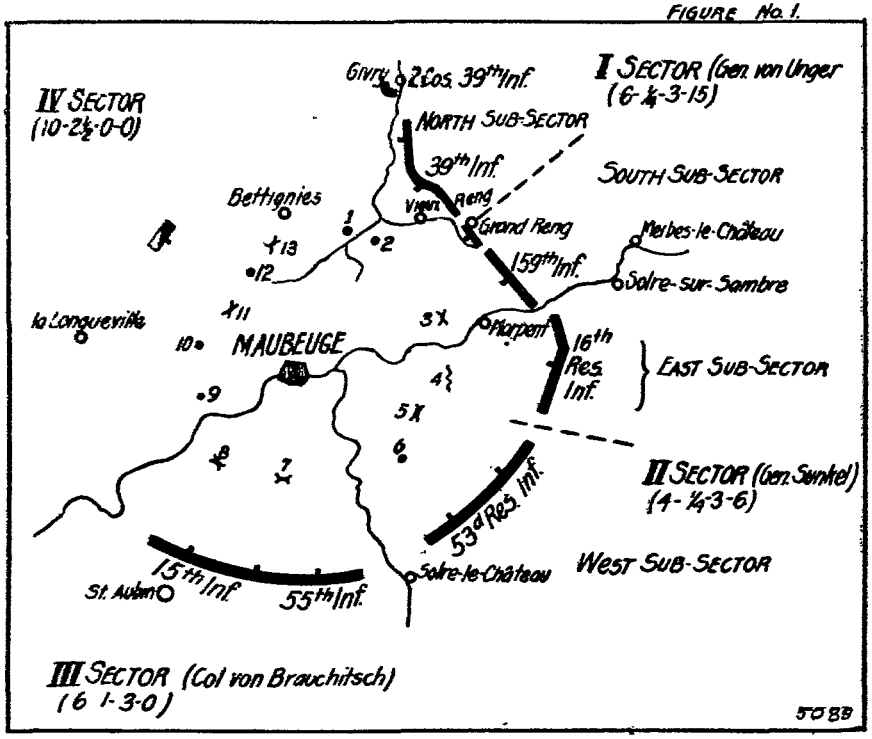


FIG. 1.

Corps would be sufficient to capture the place. General von Zwehl, who, at this time did not have half his forces at his disposition complained to von Bulow that he could hardly invest Maubeuge with 10 battalions and 3 squadrons and succeeded in obtaining a reinforcement of a mixed brigade of the VII Active Army Corps (the 26th Brigade, comprising the 15th and 55th Infantry, a group of the 58th Reserve Field Artillery and a Squadron).

The German General Staff had studied in time of peace, as one may

readily imagine, the conditions of an attack on Maubeuge under a given general plan of operation. The Staff had come to the following conclusions regarding the possibilities of attacks on different fronts:

South Front (from the work of Ferrière-la Petite [included] to the Sambre above Maubeuge): Artillery positions around Eccles and the West as far as the Maubeuge-Avesnes road, favorable; close attack of the modern forts of Bourdiau and Haumont difficult.

Western Front (from the Sambre above Maubeuge) to and including Fort de Leveau): Favorable artillery positions in the zone:—edge of the forest of Mormal-Audigny-Taignières. Close attack of the works of Crevaux and of Freignies does not present any difficulty.

Northern Front (from Fort de Leveau [included] to and including the work of la Salmagne): Artillery positions and conditions of observation unfavorable, the ground sloping downward to the North. Likewise the close attack of the works would be difficult, the terrain offering few supporting points. The attack on this front is not to be recommended especially as there is located here the modern fort of les Sarts.

Eastern Front (from the works of Bersillies to the work of Ferrière-la-Petite): Artillery positions and conditions of observation very favorable on the line Haulchin-Merbes-le-Chateau-Bersillies-Eccles, especially South of the Sambre. The close attack is not very difficult in view of the weakness of the works on this front and the void that exists between Salmagne and Fort du Boussois.

From the point of view of communications, the possibilities of attack are very favorable on all fronts as the railway network is very complete. It is necessary nevertheless to see to the rapid repair of the railways if the attacker desires to gain his objective rapidly.

The troops and means that the German General Staff estimated would be necessary to take Maubeuge were as follows:

Large Units	2 Reserve Army Corps) 1 Reserve Division) } i.e. 5 reserve divisions.
Heavy Artillery	9 Battalions of 150 howitzers—36 Batteries 2 Battalions of 13 cm guns—4 Batteries 3 Battalions 10 cm guns—12 Batteries 10 Battalions 21 cm mortars—20 Batteries 2 Batteries of seacoast mortars (305) 2 Batteries.
Special Units	2 Pioneer Regiments 12 Heavy minenwerfer 3 Air Squadrons 36 Heavy machine guns 10 Companies Landwehr Several sections of projectors Some labor troops, etc.

General von Zwehl knew of the project prepared in time of peace by the German General Staff not on August 27th but several days later, in fact, after he had already reached his essential decisions.

On the morning of the 27th, General von Steinmetz, who had commanded the German artillery before Liege and Namur, joined General von Zwehl at his headquarters at Binche to fulfill at Maubeuge as well the functions of commander of the attacking artillery.

A conference was held at Binche immediately during which General von Steinmetz proposed that the principal attack should be made on the North-East Front from the works of Salmagne to Fort du Boussois and a secondary attack on the South-East Front from the works of Rocq to the Fort de Cerfontaine.

General von Zwehl accepted this proposition and, accordingly at 1 p.m., gave the following orders:

To the 14th Reserve Division: 1st, to invest the fortress from the Creek de la Trouille to Solre-le-Chateau while keeping the greater part of its forces to the North of the Sambre on account of the contemplated operations; Second, to have the roads to the West and Northwest observed by the cavalry;

To the 26th Brigade of the VII Army Corps to invest the South Front from Solre-le-Chateau to Aulnoye.

As a result, the 14th Reserve Division, on the 28th, pushed its 28th Brigade on Rouveroy-Paissant and to the South and its 27th Brigade on Solre-sur-Sambre. Thus, on August 28th, a third of the place was invested by 10 battalions, a second third by six battalions and the last third by two and a half squadrons.

The 28th of August, General von Zwehl held another conference with his artillery commander (General von Steinmetz), his pioneer commander (General Friemel), different officers of his staff and the commanders of artillery units.

General von Steinmetz remained by his stand of the day before, namely: to make the principal attack on the North-East Front and the secondary attack on the Eastern part of the Southern Front.

General Friemel made the objection that he, personally, could not recommend the idea of the principal attack as suggested by General von Steinmetz because of the strength of the works of Bersillies and la Salmagne and Fort du Boussois.

General von Steinmetz replied pointing out that the strength of these works was not extraordinary and that the projectiles of his heavy artillery could pierce all the armor.

General Friemel permitted himself to become convinced little by little and, in consequence, General von Zwehl held to his decision of the day before.

* * * * *

What forces did General von Zwehl have under his command and what was their disposition?

Up to the first of September, he had only 16 Battalions, 4 Squadrons, 9 Light Batteries, and 21 Heavy Batteries instead of some 60 Battalions, 15 to 20 Squadrons, 30 Light Batteries and 74 Heavy Batteries as prescribed in the peace time project of the General Staff. These forces were progressively increased by 11 Battalions, 2 Squadrons, and 6 Light Batteries.

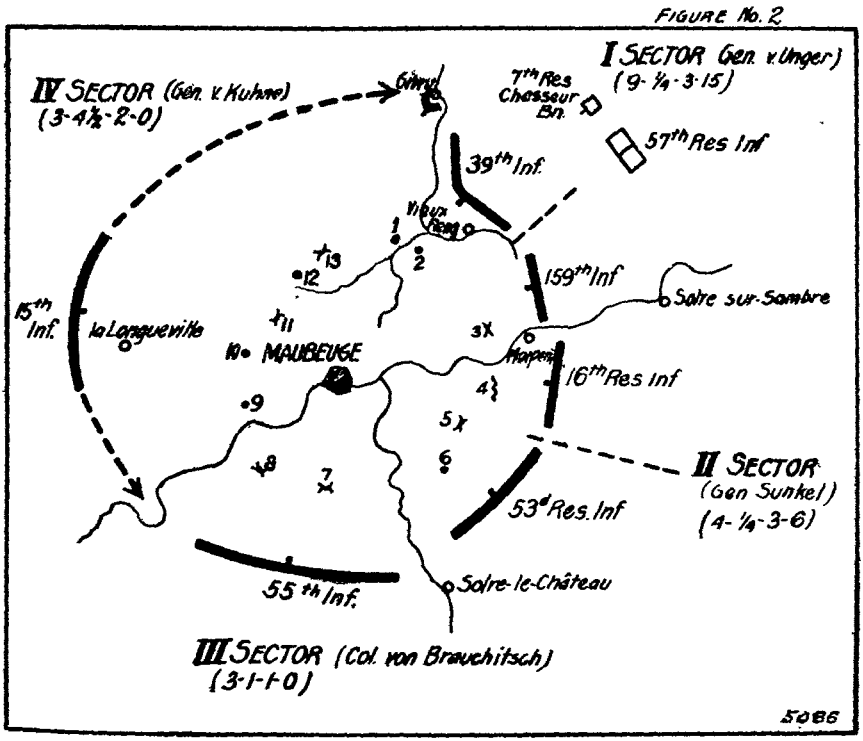


FIG. 2.

The circle of investment was divided into four sectors which, up to the first of September, contained the forces given in the table shown hereafter.

The general mission which the commander of the siege forces gave to his artillery was "to prepare Fort des Sarts, the works of Bersillies and la Salmagne, and Fort du Boussois for the attack; to enfilade the organizations of the interval between the works of la Salmagne and Fort du Boussois."

The artillery deployment was not simultaneous but progressive; it was made as the heavy batteries arrived; the great majority of the

latter had just taken part in the attack in Namur. The deployment was in progress from the 27th to the 30th of August (see Fig. 5) and was naturally covered by the infantry which on August 29th was established on the following general line:—1 kilometer South-West of Givry—Northern edge of Villers-Sire-Nicole—Western edge of Grand Reng—Erquelinnes.

The right wing of the artillery was thus uncovered; particularly, the two 420 pieces and the three 305 pieces near Givry were protected by only two companies of infantry which were attached to them from the time of their arrival on Belgian soil to guard them against raids by the civil population. To give them further protection, General von Zwehl, on August 30th sent to the vicinity of Givry a mixed detachment consisting of two companies of the 39th Reserve Infantry and one battery of the 14th Reserve Light Artillery.

The opening of fire was likewise progressive. In spite of the small stock of ammunition in the hands of the siege troops and the difficulty of regular and continuous supply, General von Steinmetz asked permission to open fire as soon as part of the batteries went into position. General von Zwehl consented provided fire would cease at the end of a given time; advantage would be taken of this suspension to summon the Governor to surrender and, incidentally, to save ammunition. As a result of this decision, fire was opened on the afternoon of the 29th to the North of the Sambre and only on September 3rd to the South (2nd Sector), the infantry not having gained enough ground to cover the positions of the artillery observers on this side.

The general arrangement of the artillery suffered no important change during the attack except that the 2nd Battalion of the 9th Regiment of Mortars went from the second to the first sector on September 2nd.

The heavy artillery, however, changed position toward the front several times as the infantry advanced.

These movements commenced in the second sector where, as we have seen, the slower advance of the infantry had obliged the artillery to take position, at first, rather far away from the works of Maubeuge.

Figures 5 and 6 show the battery emplacements at the end of August and on September 6th.

August 30th—During the day of August 30th the German infantry remained in position while the artillery kept up a slow fire due to shortage of ammunition; the attempts made by the commander of the siege forces to obtain ammunition from the Supply Service of the II Army were vain, the II Army being itself strongly engaged on the Oise.

This same day General von Bulow, anxious about the result of the battle of Guise, telegraphed to General von Zwehl to send him immediately the 26th brigade of the VII Active Corps. The Commander of the siege troops, fearing the Maubeuge garrison might make a sortie to the South which could seriously menace the communications of the

II Army, sent a staff officer to General von Bulow and obtained authority to keep the 26th brigade under the condition that it would be given up as soon as no longer urgently needed.

August 31st—On the morning of the thirty-first, General von Steinmetz, thinking that the French responded very feebly, proposed the launching of the infantry attack against the interval between the works of Salmagne and Fort du Boussois. General von Zwehl, fearing the lack of ammunition, preferred to wait until the batteries and parks

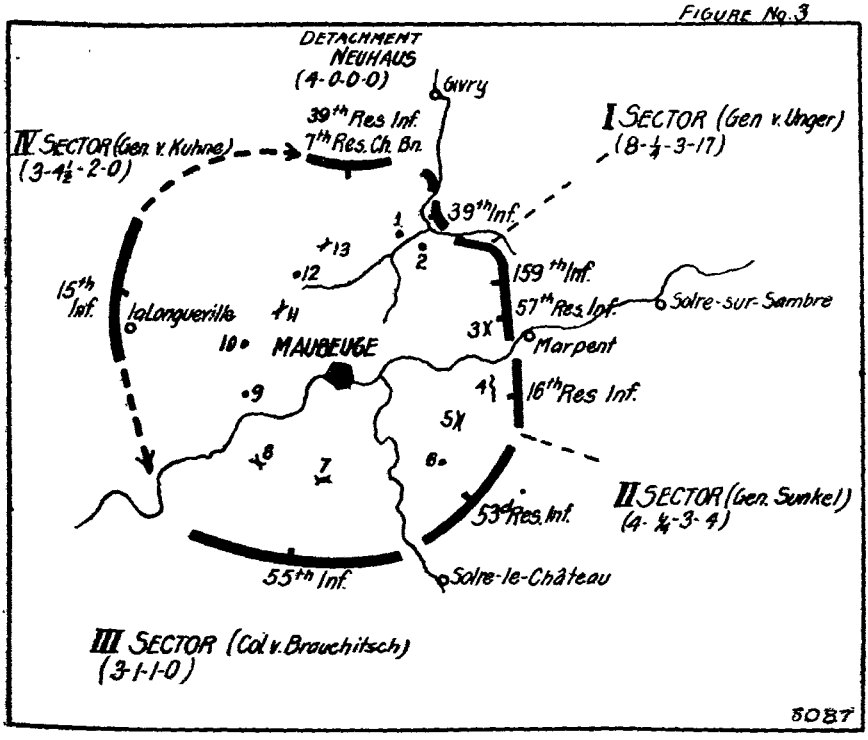


FIG. 3.

had an ample supply; moreover, the French artillery fire became so much more intense during the course of the afternoon that General von Zwehl was very glad that he had not launched the attack, which he said, would have been repulsed with bloody losses.

September 1st—During the course of the day, the first troops of the 13th Reserve Division, which had been left in front of Liege, namely, 2 squadrons of the 5th Reserve Hussars, the 57th Reserve Infantry (2 Battalions), and the 7th Reserve Chasseurs Battalion, began to arrive at Maubeuge with their division commander, General von Kuhne.

As the enemy had not yet undertaken any serious action on the

Eastern front, General von Zwehl feared he might attempt a sortie to the West (IV Sector) which was held by only two and a half squadrons. As a result, he resolved to reinforce this sector.

With this in view, he established a special detachment under General von Kuhne which comprised:

2½ Squadrons of the 8th Reserve Hussars already in the sector.
The 15th Reserve Infantry } Taken from the III Sector.
2 Batteries of the 58th Light Art. }
2 Squadrons of the 5th Reserve Hussars coming from Liege.

About noon on September 2nd, this detachment reached Saint-Waast, seven kilometers west of Longueville.

On this same day, September 1st, while the heavy artillery continued its slow bombardment (due to lack of ammunition), the siege troops repulsed two offensives on the part of the garrison: one in the first sector to the East of Fort du Boussois, the other in the second sector on Marpent and Marpent Woods. These attacks inclined General von Zwehl to the belief that the fort was not ready to surrender.

September 2nd—Finally, the siege troops had the services of two aeroplanes whose observers established the following:—1st, that Fort du Boussois was badly damaged; 2nd that the works of la Salmagne were burning; 3rd that Fort des Sarts was intact because the 420 battery at Givry had been firing not on the works themselves, but on the trench system in front which the German observers had mistaken for the fort; 4th the works of Rocq had suffered little; 5th that the fire had been well adjusted on Fort de Cerfontaine.

September 3rd—During the period September 2-3, the siege troops received new reinforcements from Liege, namely, the 39th Reserve Infantry (3 battalions).

A new division of the forces was accordingly ordered as follows:

The 57th Reserve Infantry, up to now in reserve in the first sector, was put in line to the South of the 159th.

A mixed detachment under the orders of General Neuhaus, and comprising the 39th Reserve Inf. and the 7th Res. Chasseurs Battalion, was charged with the occupation of the Bettignies region. Not able to withstand the French artillery fire, this detachment withdrew to the Bois-Bourdon and Havay.

The general staff of the siege troops then discussed the advisability of commencing the infantry attack. Reconnaissance showed that Fort du Boussois was severely damaged but an infantry position existed behind this fort so that, in case of an advance, the German artillery ran the risk of being no longer able to properly support its infantry.

General Zieten, commanding the artillery of the first sector, estimated that two days would be needed to attack the forts and one day to carry the attack beyond them; then allowing one day of bombardment, he

thought that, with four days' ammunition, the affair could be wound up satisfactorily. General von Steinmetz agreed with these views but General Friemel, commanding the pioneers, thought differently. He declared that the defense appeared well conducted; that the (French) artillery was better off in open country than in the forts; that, if the works became silent, it did not prove that they were destroyed; that the hostile artillery opened a violent fire at times proving that there were batteries in the intervals; in short, that one could not employ against Maubeuge the same tactics as against Namur. Oh the contrary he recommended a plan very similar to a regular siege, namely:

1st, to increase the offensive power of the infantry which was tired by diminishing the front of the sectors and increasing the troops;

2nd, to execute successive attacks going from one position to another;

3rd, to continue a methodical bombardment;

4th, to not attack the works of Salmagne and Bersillies;

5th, to execute the close attack only on the front between Salmagne and the lower Sambre.

In order to carry out this methodical attack, infantry reinforcements would have been needed but nothing could be hoped for in this respect. General von Zwehl decided to bring matters to a head and attempt an assault.

On September 3rd at 10:30 a. m. he gave orders for the troops of the first sector to advance to a position within 800 to 1000 meters of the works.

September 4th.—On the fourth, the infantry reached the line marked roughly by Bettignies–Villers–Sire–Nicole–Vieux-Reng–Cense du Fagnet–Marpent–Marpent Woods. It should be noted that the 57th Res. Inf. was able to dig in, in spite of violent artillery and infantry fire, at about 500 meters from Fort du Boussois, thus permitting the installation of heavy minenwerfer the following night.

During the day of September 3rd, information received from the Governor of Namur announcing the landing of English forces at Ostend (25,000 to 40,000) caused great excitement among the staff of the siege troops. A staff officer was sent immediately to the Governor of Belgium at Brussels; he brought back reassuring news. Nevertheless, for some time, General von Zwehl continued to think it might be necessary to raise the siege, send the heavy artillery toward Binche and lead his troops against the English if the latter were really marching East from Ostend.

September 5th.—Orders had been given to continue the attack during the day of the fifth. The objectives were as follows:

To the North of the Sambre, to encircle the group of works Bersilliesle Salmagne; to bombard Fort du Boussois with minenwerfer until it was in a condition to be assaulted;

To the South of the Sambre, to bombard the works of Rocq and

Fort de Cerfontaine and with the aid of this bombardment, get possession of the village of Rocq.

To the North of the Sambre, the attack succeeded and the German infantry took the works of la Salmagne and Bersillies. To the South of the river, the 16th Reserve Infantry penetrated well into the village of Rocq but had to evacuate it shortly and retire to the Marpent woods.

This same day, the siege troops were reinforced by two battalions of the 13th Reserve Infantry which were placed in reserve in the first

FIGURE No 4.

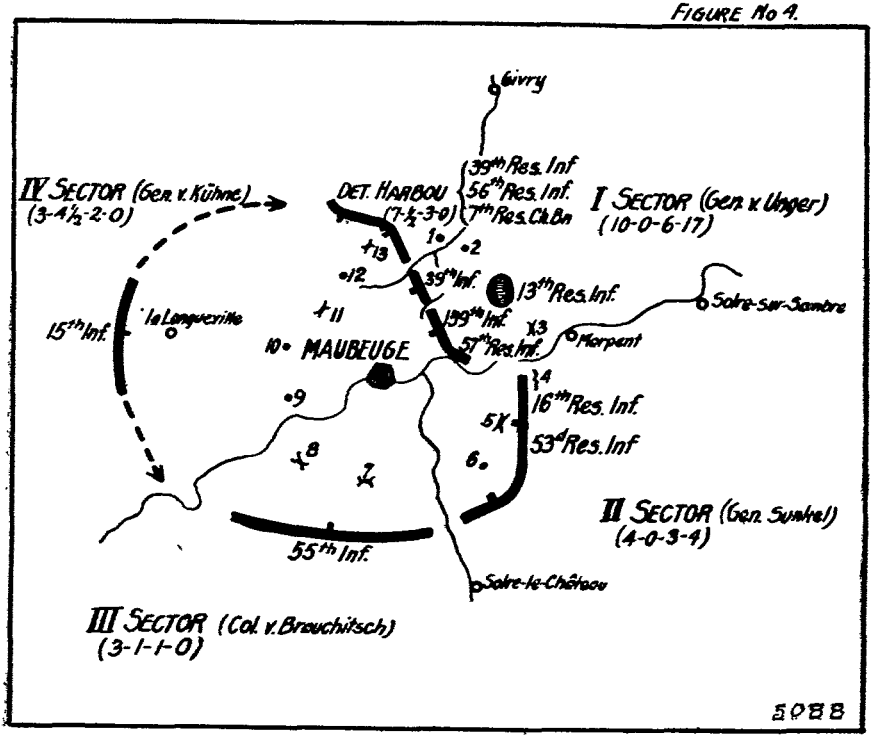


FIG. 4.

sector at Grand-Reng. Meanwhile, the battle of the Marne had commenced and von Bulow again called for the 26th Brigade of the VII Active Corps which was investing the South and South-West fronts of Maubeuge. General von Zwehl, still fearing that the garrison might make a sortie to the South or West, sent a staff officer to von Bulow and obtained permission to keep this brigade with the understanding that he forward it as soon as possible and, if need be, a battalion at a time.

The prospect of being deprived of the 26th Brigade induced the commander of the 7th Reserve Army Corps to push the infantry advance in the direction of the breach between la Salmagne and Bersillies.

September 6th.—On the evening of the fifth orders were given: 1st, on the sixth to take Fort du Boussois and the line between this fort and Bersillies; 2nd, to push the artillery forward in such a way as to be able to fire on Forts Sarts, Leveau, and Cerfontaine from the flank and the rear.

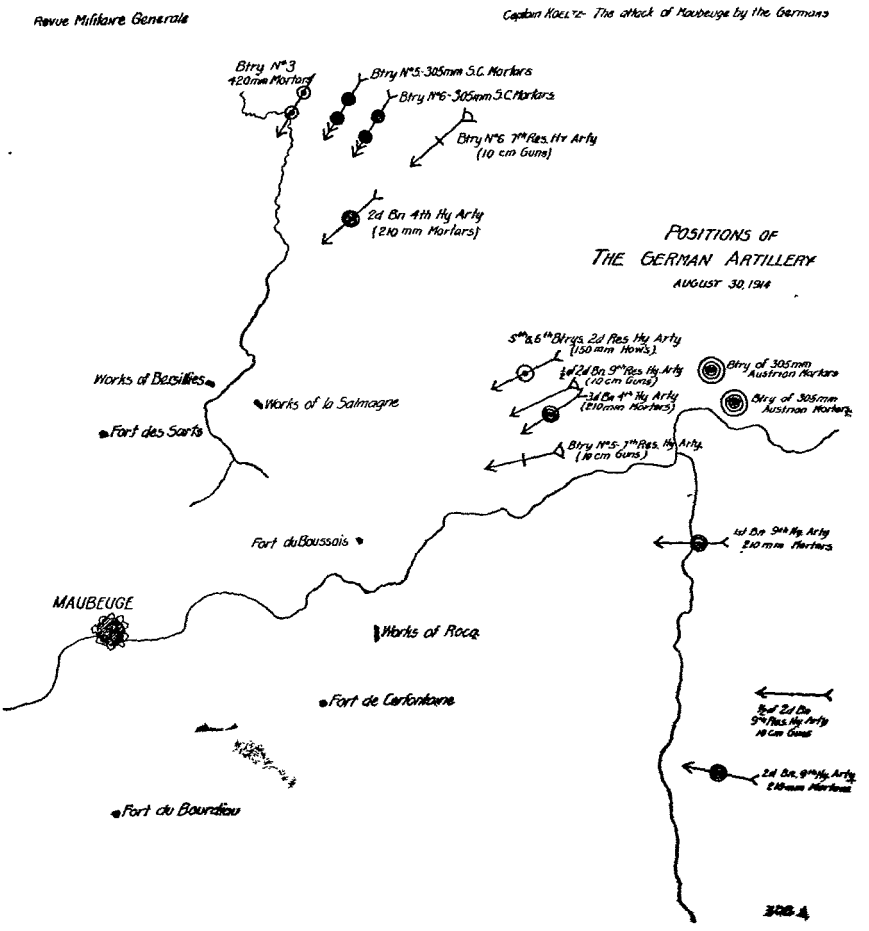


FIG. 5.

On the morning of the sixth, the 57th Reserve Infantry took the fort and village of Boussois.

At 8 a. m. General von Zwehl ordered the commander of the first sector to continue his attack while directing the bulk of his forces toward his right flank and pushing his left flank in the direction of the artillery objective without at any time going beyond the general line from Fort Des Sarts to the western edge of Elesmes. The advance to the North of the Sambre was very slow because of resistance encountered

in Elesmes; but to the South of the river, the 53rd Reserve Infantry succeeded in occupying the works of Rocq; it was stopped, as well as the 16th Reserve Infantry, before the works of Saints-Pères.

While the Infantry advanced, the artillery, on the other hand, began to experience a serious shortage of ammunition, especially the mortar batteries. General von Steinmetz thought it best to continue the attack nevertheless and advance, even without artillery support, on the main defenses; General von Zwehl, his Chief of Staff, and the general commanding the pioneers, on the other hand, could see no advantage in occupying the City situated in a hollow without having taken the majority of the forts and they thought that the artillery, which would take position on the general line from Elesmes to Assevant could be enfiladed by the neighboring batteries in Forts des Sart and de Cerfontaine. General von Zwehl then decided to take, successively, Forts de Sarts, Heronfontaine, and Leveau on the North bank of the Sambre and Cerfontaine on the South bank and to await their fall before committing himself to a decisive infantry attack.

As a result, at about 5 p. m. he gave orders as follows:

1st, to the commander of the first sector, to occupy Bettignies and Coegnies and to establish himself during the night on the line from Mairieux to Assevant;

2nd, to the commander of the second sector, to take Fort de Cerfontaine.

September 7th.—During the evening of the sixth and the night of the 6th-7th, the siege troops were reinforced by the last elements of the 13th Reserve Division (56th Reserve Inf. and 1st Group of the 13th Reserve Light Artillery).

General von Zwehl then formed a new detachment under General General Harbou whose mission was to advance on the seventh against Forts des Sarts, Heronfontaine, and Leveau. This detachment comprised:

The 39th Reserve Infantry
The 56th Reserve Infantry
Two platoons of the 8th Res. Hussars
The 1st Group of the 13th Res. Light Artillery
Two companies of the 24th Pioneers
Two companies of the 7th Battalion, Reserve Pioneers.

But, on the morning of the seventh, the mortar ammunition, so long awaited, had not yet arrived and fire could be continued only with heavy howitzers (150) and batteries of 10 cm. and 13 cm. guns.

To augment their fire, General von Zwehl ordered the 2nd battery of seacoast mortars on railway carriages (420), which had just arrived from Mons, to go to Aulnois in order to bombard Fort de Leveau as soon as possible; he also ordered the 420 battery at Givry to fire on

this front 25 of its remaining 45 rounds while the two neighboring 305 batteries directed their fire on Leveau and Heronfontaine.

Towards noon, Fort des Sarts and the works of Heronfontaine fell in the hands of the German infantry; a little later Fort de Leveau also fell as well as Fort Cerfontaine South of the Sambre.

Fearing a sortie of the garrison in force to the West or South, General von Zwehl ordered the commanders of the third and fourth sectors to oppose any such attempt, taking the offensive if necessary.

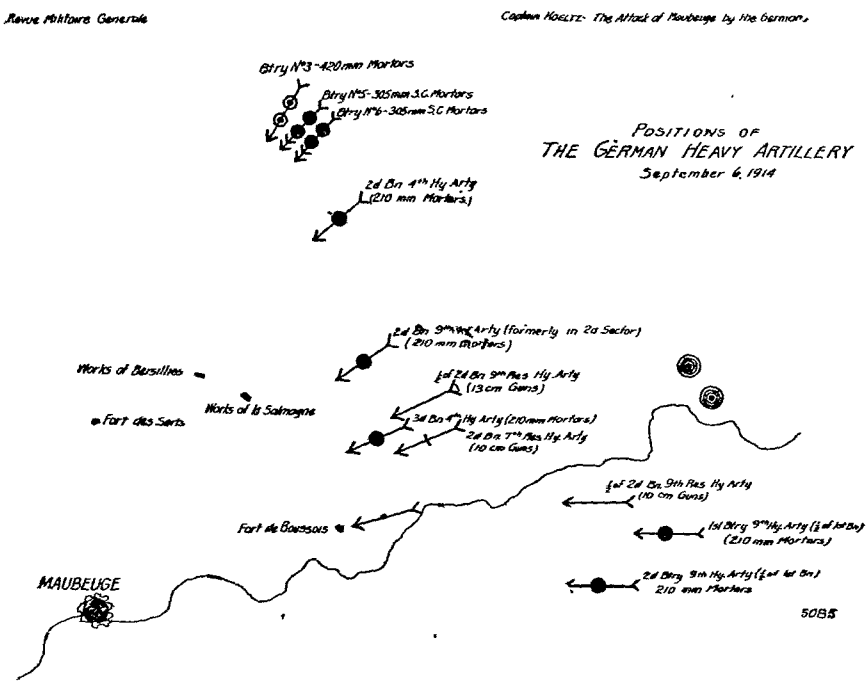


FIG. 6.

At this time the commander of the siege troops received another order from von Bulow directing him to start the 26th Active Brigade on the road to Laon in time to arrive there by the 10th.

Several moments later, a French staff officer appeared before General von Zwehl to seek a truce.

The capitulation was signed in the evening and Marbeuge was turned over to the Germans the next day, September 8th, at noon.

It is not possible, because of insufficient data, to make a detailed comparison between the siege of Maubeuge and the other siege operations of the Germans.

Let it suffice to give here certain facts concerning the means employed by our adversaries against the fortifications of the Western Front-Maubeuge, Namur, Antwerp.

ORDER OF BATTLE OF THE SEIGE FORCES ABOUT MAUBEUGE FROM THE 27TH TO THE 31ST OF AUGUST

Sectors	*Sub-Sectors*	GARRISONS				
		Infantry	*Light Artillery*	*Heavy Artillery*	*Cavalry*	*Pioneers*
1ST SECTOR (From laTrouille to the lower Sambre) Gen. von Unger	North (from laTrouille to Grand Reng)	39th Inf. (3 Bns.)	1st Group of the 14th (Res.) Light Artillery	2nd & 3rd Bns., 4th Hy. Arty (Mortars) 4 Btrys. 5th & 6th Btrys., 2nd Res. Hy. Arty. (howitzers) 2 Btrys. 2nd Bn., 7th Res. Hy. Arty. (10-cm. guns) 2 Btrys. ½ of 2nd Bn., 9th Res. Hy. Arty. (13-cm. guns) 2 Btrys. 2 Btrys. of Seacoast mortars (305-mm.) 2 Btrys. 1 420-mm. Mortar battery 1 Btry. 2 Btrys. of Austrian mortars (305-mm.) 2 Btrys.	1 platoon of the 8th Reserve Hussars.	1 Bn. of the 24th Reg. 2 Companies of the 7th Reserve Battalion.
	South (from Grand Reng to the Sambre)	159th Inf. (3 Bns.)				
2ND SECTOR (From the lower Sambre to the Creek of Solve) Gen. Sunkel	East	16th Res. Inf. (2 Bns.)	2nd Group of the 14th (Res.) Light Artillery	1st Bn., 9th Hy. Arty. (mortars) 2 Btrys. 2nd Bn., 9th Hy. Arty. (mortars) 2 Btrys. ½ of 2nd Bn., 9th Res. Hy. Arty. (10-cm.) 2 Btrys.	1 platoon of the 8th Reserve Hussars.	1 Bn. of the 25th Regiment.
	West	53rd Res. Inf. (2 Bns.)				
3RD SECTOR (From the Creek of Solve to the upper Sambre) Col. Brauchitsch		15th Inf. (3 Bns.) 55th Inf. (3 Bns.)	1st Group of the 58th Lt. Artillery		1 Squadron	None
4TH SECTOR (From the upper Sambre to laTrouille)		None	None		2½ Squadrons of the 9th Reserve Hussars.	
Totals		16 Bns.	9 Light Batteries	21 Heavy Batteries	4 Squadrons	2½ Bns.

COMPOSITION OF THE SIEGE FORCES ON THE EVENING OF SEPTEMBER 1ST

Sectors	*Sub-Sectors*	*Infantry*	*Light Artillery*	*Heavy Artillery*	*Cavalry*	*Pioneers*
1ST SECTOR (Gen. von Unger)	North	39th Infantry (3 Bns.)	1st Group of the 14th Reserve Light Artillery	Former strength	1 platoon of 8th Res. Hussars.	Former Strength
	South	159th Inf. (3 Bns.)				
	Reserve	57th Reserve Infantry (2 Bns.) 7th Bn., Reserve Chasseurs				
2ND SECTOR (Gen. Sunkel)	East	16th Res. Inf. (2 Bns.)	2nd Group of the 14th Res. Lt. Artillery	Former strength	1 platoon of 8th Res. Hussars.	Former Strength
	West	53rd Res. Inf. (2 Bns.)				
3RD SECTOR (Col. v. Brauchitsch)		55th Inf. (3 Bns.)	1 Btry. of 58th Lt. Artillery	None	1 Squadron	
4TH SECTOR (Gen. von Kuhne)		15th Inf. (3 Bns.)	2 Btrys. of 58th Lt. Artillery	None	2½ Sq. of 8th Res. Huss. 2 Sq. of 5th Res. Huss.	
Totals		19 Bns.	9 Batteries	21 batteries	6 Squadrons	2½ Bns.

COMPOSITION OF THE SIEGE FORCES ON THE EVENING OF SEPTEMBER 2ND

Sectors	*Sub-Sectors*	*Infantry*	*Light Artillery*	*Heavy Artillery*	*Cavalry*	*Pioneers*
Detachment of Bettignies (Gen. Neuhaus)		39th Res. Inf. (3 Bns.) 7th Res. Chass. Bn.				
1st Sector (Gen. von Unger)	North	39th Inf. (3 Bns.)	Former Strength	Former strength and in addition— 2nd Bn., 9th Hy. Arty. (210-mm.)	Former Strength	Former Strength
	South	159th Inf. (3 Bns.) 57th Res. Inf. (2 Bns.)				
2nd Sector (Gen. Sunkel)	East	16th Res. Inf. (2 Bns.)	Former Strength	Former strength less 2nd Bn., 9th Hy. Arty. (210-mm.)	Former Strength	Same
	West	53rd Res. Inf. (2 Bns.)				
3rd Sector (Col. von Brauchitsch)		55th Inf. (3 Bns.)	1st Btry., 58th Lt. Arty.	None	Same	Same
4th Sector (Gen. von Kuhne)		15th Inf. (3 Bns.)	2 Btrys. of 58th Lt. Arty.	None	Same	Same
Totals		22 Bns.	9 Batteries	21 Batteries	6 Squadrons	2½ Bns. of Pioneers.

COMPOSITION OF THE SIEGE FORCES ON THE MORNING OF SEPTEMBER 7TH

Sectors	*Sub-Sectors*	*Infantry*	*Light Artillery*	*Heavy Artillery*	*Cavalry*	*Pioneers*
Detachment of Bettignies (Gen. von Harbou)		39th Res. Inf. (3 Bns.) 56th Res. Inf. (3 Bns.) 7th Res. Chass. Bn.	1st Group, 13th Res. Lt. Artillery		½ Squadron of 8th Res. Hussars.	2 Cos. of 24th Reg. 2 Cos. of 7th Res. Bn.
1st Sector (Gen. von Unger)	North	39th Inf. (3 Bns.)	1st Group, 14th Res. Lt. Arty. 2nd Group, 13th Res. Lt. Arty.	Former Strength (15 batteries)	None	½ Bn. of the 24th Reg.
	South	159th Inf. (3 Bns.) 57th Res. Inf. (2 Bns.)				
	Reserve	13th Res. Inf. (2 Bns.)				
2nd Sector (Gen. Sunkel)	East	16th Res. Inf. (2 Bns.)	2nd Group, 14th Res. Lt. Artillery	Former Strength (6 batteries)	None	1 Bn. of 25th Reg.
	West	53rd Res. Inf. (2 Bns.)				
3rd Sector (Col. von Brauchitsch)		55th Inf. (3 Bns.)	1 Battery, 58th Lt. Artillery	None	Former Strength (1 Squadron)	None
4th Sector (Gen. von Kuhne)		15th Inf. (3 Bns.)	2 Batteries, 58th Lt. Artillery	None	Former Strength (4½ Squadrons)	None
Totals		27 Bns.	15 Batteries	21 Batteries	6 Squadrons	2½ Bns.

The following large units were employed:

Maubeuge	2½ Divisions (27 Battalions)
Namur	4 Divisions (51 Battalions)
Antwerp	5½ Divisions (66 Battalions).

The heavy artillery was as follows:

	At Maubeuge	*At Namur*	*At Antwerp*
Batteries of 10-cm guns	4	3	6
" 13-cm guns	2	1	4
" 15-cm guns	0	0	2
" 150-mm howitzers	2	6	16
" 210-mm mortars	8	8	12
" 205-mm mortars	4	4	5
" 420-mm mortars	1	1	2
Totals	21	23	47

At Namur the heavy artillery fire was opened August 21st at noon; the infantry attack started on the morning of the 23rd; by evening of the same day, three forts had fallen and the approaches of the main fortifications had been reached; three more forts fell on the 24th and the last on the 25th at dawn. The resistance had lasted, from the beginning of the bombardment, three and a half days.

Antwerp was partially invested September 27th; fire was opened on the 28th at noon; the first fort fell October 1st, the Belgian Army withdrew Oct. 8th and the Germans entered the town the next day. The resistance, counting from the beginning of the bombardment, had lasted ten and half days.

The bombardment of Maubeuge commenced August 29th at noon; the first fort fell September 5th. The capitulation took place on the evening of the 7th. The resistance had lasted nine and a half days counting from the beginning of the bombardment.

Maubeuge, with most of its forts out of date, thus held out three times as long as Namur with its modern forts and almost as long as Antwerp, one of the strongest fortifications in the world.

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Remodeling an S.C.R. 54A Receiving Set

By Captain Harry R. Pierce, C. A. C.

RADIO music broadcasting has become so general that no remarks of explanation are considered necessary here.

There are many in the service who, perhaps, have never heard radio music and others who have no set of their own who will be interested in the following and to these, this article is humbly dedicated.

The increased popularity of radio and its many applications to both civil and military life make it necessary for the up-to-date person to be more or less familiar with this science. The best way to become familiar with it is to own and operate a set preferably one made at home. This is, however, generally, quite expensive.

The sale of obsolete S.C.R. 54A receiving sets has opened a path for those in the service to purchase a receiving set at relatively small cost, $7.50. Also, in order to receive the great distances that nowadays determine a good set, some construction work is necessary. This work can readily be done at home and so doing will teach a great deal about radio and radio instruments and furnish a lot of amusement.

The following diagrams are submitted as being two very satisfactory methods of modifying one of these sets to meet the requirements of music reception, special care being taken to make the work easy and the cost small.

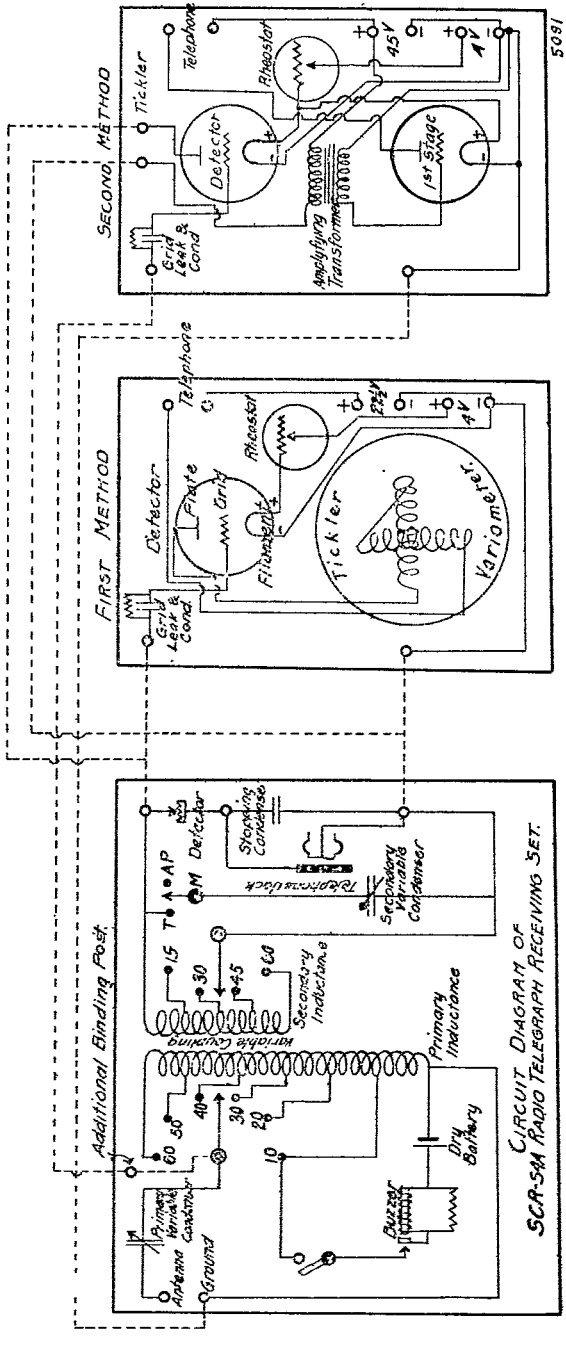
In addition to the set itself as modified by one of these methods are needed vacuum tubes, an "A" battery and a "B" battery.

Vacuum tubes are of two general classes, those requiring 4 volts and those operating on 1½ volts. The 4 volts require a storage battery while the 1½ volt tubes require only one ordinary dry cell, There is little, if any, difference in the operation of these two classes of tubes, however, the expense of a storage battery might easily cause one to lean toward the 1½ volt tube although it costs slightly more.

The approximate cost of fitting up one of these sets is given below:

Purchase of set from Signal Corps	$7.50
Remodeling first method	9.80
Remodeling second method	12.50
Remodeling second method, one tube only	6.00
4 volt vacuum tube	5.00
1½ volt vacuum tube	8.00
6 volt storage battery	16.00
22½ volt "B" battery	3.00
Headset	6.00

Computing from the above we arrive at the following total costs:



CIRCUIT DIAGRAM OF SCR 54A RADIO TELEGRAPH RECEIVING SET

Purchase of set, remodeling first method with one tube, one 1½ volt tube, one "B" battery, one pair headsets $34.30

Purchase of set, remodeling second method with one tube, one 1½ volt tube, one "B" battery, one pair headsets $30.50

Same, but with two tubes requiring an additional "B" battery $40.00

With either method, one tube should bring in the larger stations loud enough to enjoy, two tubes should bring in all stations that are usually heard and should enable the use of a loud speaker for the larger stations.

The S.C.R. 54A radiotelegraph receiving set is designed for use on the ground in communication with airplanes using damped wave, interrupted wave or modulated wave signals.

It consists of a set box and a panel on which are mounted a primary variable condenser for tuning the primary circuit, a vario-coupler with switches and taps in both primary and secondary circuits, a secondary condenser for tuning the secondary circuit and a crystal detector. A stand-by switch marked M, can be used for quick aperiodic tuning. A buzzer and switch are furnished for use in adjustment of the crystal.

This set may be used as it is for short distances, but for distances over about twenty-five miles, a vacuum tube will ordinarily be needed.

The diagrams below show two ways of connecting this set to vacuum tube circuits, both ways employing regeneration of the plate. Both methods contemplate the addition of a small panel to fit the extra space in the set box, all connections being made outside, only one change being made in the original set. If desired, these connections may be made beneath the panel, permanently, and the appearance would undoubtedly be improved by so doing.

First Method.—As shown, exterior connections dotted. Coupled circuit, detector only, regeneration by plate variometer. Additional cost $9.80.

Second Method.—As shown, exterior connections dotted. Single circuit, detector and one step of amplification, regeneration by coupling the plate circuit magnetically to primary circuit. Not as selective as first method but louder on account of the extra step of amplification. Additional cost $12.50.

In either method, greater sensitiveness may be obtained by the addition of more steps of amplification.

Parts recommended.—Tube sockets, General Radio, $1.50; Amplifying transformer, Acme, $5.00; Rheostats, Fada, $1.00 (transmitting) or Bradleystat, $1.85; other parts, no reference; approximate cost, variometer, $5.00; bakelite panel, $1.00; Binding posts, $.10 apiece; Grid leak and condenser, $1.50.

The above does not include vacuum tubes, "A" or 4 volt battery or "B" or 22½ volt batteries.

The Crown Prince's Memoirs

Translated From the Militar-Wochenblatt, No. 15, October 11, 1922, by Colonel George Ruhlen, U. S. A., Retired, with his comments thereon

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THE leading article in this number purports to be a review of the second volume of the Memoirs of the former German Crown Prince Wilhelm by Major General Borries, Retired, of the German army, which was recently published under the title: "My Recollections of Germany's Heroic Struggle."

A full translation is given not on account of its intrinsic value as an impartial and intelligent interpretation and criticism of the work to which it refers or as an instructive essay on military administration and strategy, but rather on account of the illuminating side lights it throws upon some phases of German military management. Among the salient bright spots thus brought out by the author of the book and touched upon by his reviewer the following may be mentioned:

The Crown Prince, at the outbreak of the war, was apparently considered capable of being entrusted with the command of a division, but on account of the illness of the commanding general of the 5th German Army his command, consisting of not one but of a number of army corps, was given to a division commander but with the admonition of the commander in chief that with the transfer to him of these troops he had also provided him with a chief of staff and that *he must do whatever this chief of staff tells him.* At the same time the Chief of the General Staff of the Army tells him that *he himself will be held responsible for whatever he does even though he follows the advice of his chief of staff.* Later on when there is a falling out between him and the chief of staff whose advice, as he himself says he followed implicitly, it is not he but the chief of staff who is removed. Another side light appears where the reviewer states: the superior leaders, Hindenberg and Ludendorff, meet him readily and understandingly: "they take into account that he embodied not only the army under his command *but also the heir to the throne.*"

The only real criticism ventured by the reviewer is the suggested question: why the Crown Prince, when he became convinced of the utter uselessness of the operations at Verdun long before that fact had been impressed upon the army leadership, did not use his whole power and influence to put a stop to an operation which had completely failed of its purpose of bleeding the French to death but had become a material factor in destroying the working power of the German army.

Taken all in all one may agree with the writer that the Crown Prince's memoirs are well worth reading not only for what is found in the book itself but between the lines for the thoughtful and imaginative reader.

MY RECOLLECTIONS OF GERMANY'S HEROIC STRUGGLE

By Crown Prince Wilhelm

The first book of Memoirs of the Crown Prince, which appeared in May of this year gave rise to some doubts as to the extent to which he should be hailed as an author, because the compilation and arrangement of the diary-like notations had been given over to the writer Rossner. Those acquainted with the latter's manner of writing were, however, soon convinced that the book came almost entirely from the pen of the Crown Prince himself and that Rossner contributed only here and there a few points to throw light upon some special features. This judgment is verified by the new volume of the book of Memoirs. This is written in the same style as the first volume, responding to the purely warlike contents but only more condensed, more powerful and stirring. A work of a single cast, original and mastering the comprehensive material at hand even when it becomes dry and apparently rigid. The author describes his activities and experiences with the 5th Army and later with the "Army Groups of the German Crown Prince" with clearness and fluency, maintaining always continuity with the entire line of conduct of the war; illuminating strategic observations are interspersed which are interesting even though they may give occasion for controversy, pen notations of personalities here and there, frequently by a few strokes only but also occasionally rounded out to complete portraits of characteristics, stirring descriptions from the front of the quarters and of staff life. The whole is pervaded by proud but also sad reminiscences of the great, glorious, overwhelming and endlessly burdensome experiences that fell to the lot of the Crown Prince in the world war. He never fails to bring in his soldiers, who were to him the real bearers of war happenings, and we know that in the open field he knew how to find his way to their hearts in a remarkable manner. He speaks of the incomparable German army of 1914 with the greatest enthusiasm, of the hard and determined fighters in the war of position, of the ragged, tired out but unbending heroes of the last battles of the retreat. His book is dedicated to the memory of his comrades in the war, of the fallen and living, to whom he gives the tribute of his heartfelt gratitude.

The Crown Prince's memoirs, which are really to a large extent his self confessions, furnish an important cue for a judgment of his leadership of an army and of army groups When, on account of the illness of the ranking general and army commander, Eichhorn, the command of

the 5th army was assigned to him who had entered the campaign as a division commander only, his imperial parent notified him of that assignment with the supplement: "You will receive Lieut. General Schmidt von Nobelsdorf as chief of your general staff. What he advises you must do." General von Moltke, the chief of the general staff added some words of encouragement, praised the good military perceptions of the Crown Prince and invited his attention to the fact that he himself would bear the responsibility even though he followed the advice of his chief of staff. The Crown Prince had passed through a many sided but nevertheless active military course of training, but which carried with it hardly sufficient foundations for a leader of an army, hence it may be assumed, and can be read from his book, that he depended, during the first period of the war, very much upon his energetic chief who had, in addition been his instructor in the general staff up to the time of the war. But it also becomes manifest from the book that with his good military faculties he grew into his place, his self reliance awoke, his self reliant judgment took the initiative in marking out his own course, so that in the course of the very unsatisfactory ending of the Verdun operations of 1916, there arose very decided differences between him and his chief of staff which brought on a complete rupture. When, as leader of the army group the very discreet and skillful Colonel count von der Schulenburg was placed at his disposal, his personality had opportunity for development in his co-operation with that officer who was highly appreciated by him, and he came into the foreground and compelled the attention of higher authorities to his views and intentions. The superior leaders, Hindenburg and Ludendorff met him readily and understandingly; they took into account the circumstance that he embodied not only the leader of the armed forces but also that of the heir to the throne. The means that the crown prince used to assert his influence was his individual manner of coming into personal touch with and giving mutual expression in discussions,—whether at general headquarters, with his subordinate commanders or with his troops.

The book is an exceedingly important and productive source of judgment of the activities and purposes of the commands entrusted to the Crown Prince. It is evidently written on the basis of a carefully kept and complete diary and has given consideration to German and foreign war literature that has heretofore made its appearance. It is self evident—the author himself gives expression to this in different words—that the book has a subjective character, as has every work of memory, and is not free from errors and prejudices. It is of great value that the author makes a clear distinction between the operating lines of thought that prevailed with him in detailed transactions of the war and the resulting conclusions arrived at after study. When he believes that he cannot sustain his original acceptation he candidly admits the

fact. The criticisms of the Crown Prince are not limited to his own measures but cover, with great discernment all operations of the supreme leaders of the forces, including the war plans of Count Schlieffen. The discussions pertaining to the struggle around Verdun in 1916 take up the larger part of the space. It seems to be the special purpose of the Crown Prince to throw light upon that very disagreeable chapter of German war leadership—because, as a matter of course, he bore before the world the responsibility for that sanguinary conflict and its unsuccessful result. His report squares itself practically with the already known presentation of Lieut. Col. Foerster in the work: "Count Schlieffen and the World War"; but he brings out many supplemental details. He corroborates the conclusion that the method by which the superior German army leadership expected to utilize the struggle around Verdun as a means of letting the French bleed themselves to death, failed by reason of the narrow limits within which the attack had to be carried out and failure to supply reserves at the decisive moment when the way to the fortifications lay open, and the final exhaustion of German working power. Still there arises the question: why the Crown Prince, who recognized the uselessness of the struggle before the chief of staff and the superior leadership of the forces admitted it, did not stake his personality and influence to put an end to the Verdun operations.

The Crown Prince was not an optimist, even before the Verdun days. At the outbreak of the war he was siezed with apprehensive anxiety over the unfavorable situation of Germany and Austria-Hungary in their struggle against the whole world. Still the surpassing quality of the German army induced in him again and again a feeling of equanimity and belief in the future outcome, even after Verdun. But certain doubts remained permanently: the weak German interior and foreign political policies; the inactivity of the fleet of which only a part, the submarines, was effective. The anxiety over the end of the war again became active with him after the brilliant successes of his army groups in the May attacks of 1918 on the Chemins des Dames. After that victory the difficulties of the situation became manifest to him because the means of conducting that attack were not sufficient to furnish means for a decisive and conclusive successful ending of the war. From that time on his doubts and impressions could be no longer silenced; the bitter end that was in prospect and which took the commander's baton out of his hands and led him into exile was at hand.

The Crown Prince's book stands at the head of memoirs of the world war. It will find many readers and will meet with general recognition on account of the honesty and warmth of feeling with which it is written and its substantial and intrinsic scientific character, and, finally, on account of the tragic and undeserved fate of the author.

EDITORIAL

Awards for the 1922 Essay Competition

THE Committee of Award for the JOURNAL's 1922 Essay Competition, consisting of Colonel R. S. Abernethy, C. A. C., Colonel Harold E. Cloke, C. A. C., and Colonel James B. Mitchell, C. A. C., has reached a decision resulting in the following awards:

First Prize, One Hundred and Twenty-five Dollars,

To Captain Thomas R. Phillips, C. A. C., 55th Artillery, Fort Kamehameha, H. T., for an Essay entitled "Some Phases of the Effect of Anti-aircraft on the Future Mission, Organization, Equipment and Tactics of Coast Defense."

Second Prize, Seventy-five Dollars,

Tc Captain H. H. Blackwell, C. A. C., Fort Amador, C. Z., for a paper entitled "Notes on Target Practice Methods."

Honorable Mention,

To First Lieutenant H. C. Fowler, C. A. C., Fort Monroe, Virginia, for a paper entitled "The Tactical Employment of Anti-aircraft Machine Guns."

The First Prize Essay appears in this issue of the JOURNAL and the other two mentioned will appear in subsequent early numbers.

The JOURNAL and its readers owe their sincere thanks to the Committee of Award for the thoughtful effort which was involved in the consideration of these papers and the attainment of a decision.

The announcement of the conditions for the Annual Essay Competition for the current year appears on the inside front cover of this issue of the JOURNAL. With all the new and important problems coming to the front in the daily work of the Coast Artillery Corps, it is suggested that the opportunity presented by this Annual Competition is one which may profitably be seized by every officer who has the interests of the Coast Artillery at heart, and who possesses the divine gift of original thought. The attention of the younger officers of the Corps is especially invited to the fact that during the years since these

Annual Competitions have been held, a large proportion of the prizes have been awarded to officers who had less than five years' service at the time their Essays were submitted, and that the expression of the ideas of the younger officers of the Corps is not only keenly desired, but is frequently of inestimable value in the progress of Coast Artillery effort.

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Salute and Speak

For years it has been the custom of many officers, when returning the salutes of noncommissioned staff officers and sergeants of their acquaintance, to accompany the return of salutes from these men with a word of acknowledgment or greeting when within speaking distance. It is desired to suggest that it would be worth while to extend the application of this recognized custom to the acknowledgment of salutes from all soldiers, when the officer and the soldier meet within speaking distance. In all our text books and Regulations which refer to the salute, emphasis is laid on the fact that this is an act of military courtesy. In the instruction of recruits never failing emphasis is laid on the time-honored significance of the salute, as a mark of recognition not only of the respect and subordination of a junior for his senior, but as well as its symbolism of the bond of comradeship which exists between all the members of the military service. When two officers meet and exchange salutes, this symbolism is fully emphasized by the well-nigh universal practice of exchanging a word of greeting at the time the salutes are rendered. Can there be any good reason for not extending this logical practice to the exchange of salutes between officers and soldiers?

It would seem that there could be but two objections to the adoption of this practice. The first might be that if officers were to greet all soldiers with a "good morning" or "good afternoon," those whom they knew personally and those whom they did not know alike, there might be opened the opportunity for unwarranted familiarity on the part of untrained and indiscriminating soldiers, and the breakdown of what is sometimes considered to be a necessary reserve in the relations between officers and soldiers. As a bit of positive testimony to the fact that no such calamitous peril lies in wait, there may be pardoned the personal statement of the writer that for years he has followed this custom, and that while his verbal greeting has sometimes occasioned evident surprise on the part of soldiers who did not know him, yet not once in all these years has there been indicated the slightest tendency to take unwarranted advantage of this courteous practice.

The second possible objection is that if an officer felt called upon to speak to every soldier whom he passed within hearing, that the demand on his attention and vocal organs would constitute an insufferable

nuisance. In answer to this objection it seems only necessary to hark back to the conception that the salute itself is considered an act of courtesy, an act which is as incumbent upon the officer for its performance as upon the soldier and that if it is not considered intolerable to require the salute as an act of courtesy, it is not intolerable to make the act one of courtesy in fact as well as in name.

From time to time one hears complaint as to the difficulty in securing compliance with the regulations concerning the salute. It is believed that the general adoption of the custom hereby suggested, would go a long way toward removing this difficulty. Again injecting an item of personal experience, the writer may state that the failure to tender him the required salute by soldiers is an extremely rare occurrence, and a practically unknown occurrence in so far as soldiers who know him are concerned. Furthermore, since the change in Army Regulations has gone into effect which does not require the exchange of salutes when not on a military reservation, the writer has not in a single instance failed to receive a salute under these conditions from soldiers who know him by sight.

The value of the salute in the military service is generally recognized, and consequently the insistence on proper saluting was one of the fundamental items in the training of our huge war-time Army. There is ample evidence to show that thousands of men now in civil life who were in the Army during the War entertain a feeling of bitterness and resentment toward the salute that transcends any other unpleasant recollection of their military service. It is not unreasonable to suppose that if this custom had been generally modified to include a verbal acknowledgment on the part of officers, that the memory of the salute would have left no sting in the minds of these war veterans. Not only would this spoken word have made the salute appear to them in fact an act of miltary courtesy, but in addition it would doubtless have had the effect of modifying the attitude of the officers themselves so that their acknowledgment of salutes would have been not merely perfunctory and palpably impersonal, but unconsciously and genuinely courteous. Real and spontaneous courtesy can never do any harm, either inside the Army or outside.

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COAST ARTILLERY BOARD NOTES

"Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the corps or of the service at large. These communications, with models or drawings of devices proposed may be *sent direct* to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration."—

JOURNAL OF U. S. ARTILLERY, June, 1922.

Work of the Board for the Month of January, 1923

1. Lieutenant-Colonel H. L. Butler, C. A. C., Major J. S. Pratt, C. A. C., and Major H. F. Spurgin, C. A. C., were relieved from duty with the Coast Artillery Board on January 3rd, 1923.

2. Training Regulations, "Service of the Piece for 12-in. Mortars" and the "Battery Command" have been received back for revision at the request of the Board. No new work on Training Regulations has been initiated. It is intended that "Gunnery" shall be the next pamphlet to be prepared.

3. New Projects received:

a. Proposed form for Range (Firing) Tables. Project No. 74

(1) A form was submitted by the Ordnance Department for consideration. The form consists of the tables for the 8-in. Seacoast Gun, reproduced last April by the Engineer reproduction plant (No. 4580) modified to conform to the changes recently suggested by the Field Artillery for Field Artillery Range Tables, as far as applicable, combined with the differential variation formerly worked out for the Pratt Range Board and published as T. S. No. 239 (A. P. G. A-1-34, Jan. 1922).

(2) Some of the modifications are:

(*a*) The Wind Component Table, Page 2; has been omitted and the wind chart doubled in size so as to include tables 2 and 3.

(*b*) The chart for percentage change in M.V. for Temperature of Powder, page 5, has been omitted.

(*c*) The Barometric Table, page 6, and the Thermometric Table, page 7, have been omitted, but the formulae at the top of these pages have been inserted at the bottom of pages 4 and 5.

(*d*) The Air Density Table, pages 10 and 11, has been omitted and the Air Density chart doubled in size so as to include pages 4 and 5.

(*e*) The Table of Probability Factors, page 8, has been omitted.

(*f*) Tables A and B of Part 2 have been combined into one table.

(*g*) Tables C and D of Part 2 have been curtailed.

(*h*) Tables F, G, I and J have been extended by incorporating the corresponding tables (differential variations) from T. S. 239.

b. Front Area Anti-Aircraft Sights.—Project No. 77.

These sights are designed for use on Browning automatic rifles by the Ordnance Department. They are to be tested by the Coast Artillery to determine

their suitability for use with this weapon by either the Infantry or Coast Artillery. A program has been drawn up for the test which is to be carried out by the 61st Artillery Battalion (Anti-aircraft).

c. Haw Deflection Computing Device.—Project No. 78.

Submitted to the Coast Artillery Board by Captain J. C. Haw, C. A. C. Means are described in Captain Haw's notes for using the Direction Prediction Board for obtaining—

(1) Deflection for Panoramic Sight with Aiming Point.

(2) Sight Deflection for Direct Aiming (Case II).

Drawings covering the necessary modifications and rules describing methods for obtaining (1) and (2) accompany the notes. A test will be made in the near future.

d Test of Sperry Searchlight Lamp.—Project No. 79.

The Sperry Gyroscope Company has made numerous modifications and improvements in the lamp which is the present army standard seacoast lamp.

The chief alterations are:

(1) A new thermostat system rigidly attached to the lamp, instead of being located on the projector.

(2) A new voltage regulation coil with a compensating resistance, intended to eliminate the necessity for adjustment of arc length.

(3) Rigid, cast, positive and negative columns.

(4) New type heads with improved mechanical and electrical action.

One of these lamps has already been given a laboratory test at the Engineer Reserve Depot, Schnectady, N. Y., and is to be shipped to Fort Monroe for a field test by the Coast Artillery Board.

e. Automatic telephones.—Project No. 80.

(1) In compliance with instructions from the Chief of Coast Artillery in April 1919 the Coast Artillery Board made a study of the suitability of automatic telephone systems with view to determining the suitability of such a system for Coast Artillery purposes as a Post Telephone system whenever new exchanges were to be installed or old ones extensively remodelled.

(2) Upon the recommendation of the Board an automatic system was installed at Fort Monroe and has been in operation for over a year.

(3) The system so far has proved satisfactory. A report on the actual operation of this system will be made shortly.

f. Range Table Correction for Rotation of the Earth.—Project No. 81.

The Coast Artillery Board has drafted a revision of Chapter 4, Part I of "Gunnery for Heavy Artillery" (Provisional) dealing with the theoretical effects of rotation of the earth on the deviation of projectiles. The present chapter omits the discussion of one of the principle factors of the rotational effect. When approved by the Chief of Coast Artillery the revised chapter will be published.

A recommendation was also forwarded to the Chief of Coast Artillery with regard to range table corrections for rotation of the earth. The Board favors incorporating in the range tables the effects in range and deflection due to rotation of the earth instead of the various factors that make up the expressions used in determining these effects. A tentative form for tabulating these effects was inclosed. Also a device similar to the omnimeter or circular slide rule was provided for determining range effects due to rotation of the earth.

g. .50 Caliber Machine Guns, Water and Air Cooled.—Project No. 82.

The .50 caliber air cooled machine gun has been given a preliminary test by the 61st Artillery Battalion (Anti-aircraft). When conditions permit, further

tests of the air cooled in comparison with the water cooled guns will be conducted. The preliminary tests have not yet lead to any conclusions as to the efficiency of this weapon or recommendations as to its adoption.

h. Study of the Rôle of Anti-Aircraft Defense together with Organization, Equipment and Methods.—Project No. 83.

(1) First obtain equipment programs present and proposed from the Chief of Coast Artillery, Chief of Ordnance, and Chief of Engineers.

(2) Then obtain bibliographies on anti-aircraft defense including its rôle, organization. equipment, tactics, etc.

(*a*) Congressional Library.

(*b*) Library, Coast Artillery School.

(*c*) Coast Artillery School.

(*d*) Any information, not included in (*a*), (*b*) and (*c*) above, bearing on anti-aircraft defense on file at Army War College, Military Information Division of War Department, in offices of Chief of Coast Artillery, Chief of Ordnance, Chief of Engineers, and Chief of Air Service.

(*e*) Correspondence with individuals having experience in anti-aircraft defense, as complete a list as possible of experienced individuals to be obtained from the Chief of Coast Artillery.

(*f*) Notice of the project to be published in the COAST ARTILLERY JOURNAL and cooperation and direct correspondence of experienced individuals invited.

(3) Based upon all information obtained make an exhaustive study with the object of determining:

(*a*) Rôle of Coast Artillery troops in anti-aircraft defense, its extent and limitations, when considered in connection with other branches of the service. In this connection consider especially artillery defense, machine gun defense, obstructions and other auxiliary means such as searchlights, listening devices, etc., information and intelligence service, camouflage.

(*b*) Study of existing equipment with a view to determining its adequacy and deficiencies.

(*c*) Study development programs and determine to what extent existing deficiencies will be eliminated when such development programs are complete.

(*d*) Studies with a view to recommendations as to new development programs designed to meet deficiencies not corrected by present development programs.

(*e*) Recommendations for service tests by Coast Artillery troops alone or in conjunction with other branches of the service in order that suitability of equipment in existence or proposed, as well as tactical considerations and fire control methods may be judged, and the best types and methods determined therefrom.

(4) The scope intended to be covered by this study is indicated in general terms in an article "Doctrine of Anti-aircraft in France, page 54, Coast Artillery JOURNAL, January 1923."

Note: This study has been initiated and the program for it prepared with a view to determining the questions involved mainly by centering the interests of individuals in the service at large and the Coast Artillery Corps in particular on the importance of anti-aircraft defense which is one of the most important missions of the Coast Artillery Corps today.

i. Spotting Devices.—Project No. 84.

The results of the test of spotting devices recently completed by the Coast Artillery Board were reported on in the January and February 1923 issues of the COAST ARTILLERY JOURNAL, This subject has been reopened for the purpose of completing the work already started and testing out modifications of devices previously submitted and new devices now under consideration and any that may be received in the near future.

j. Ground Panels for Signalling to Airplanes.—Project No. 85.

This project is a continuation of the tests conducted under Project No. 35, the modified "Galitzka Panel" reported on in considerable detail in the Coast Artillery Board Notes appearing in the September 1922 issue of the COAST ARTILLERY JOURNAL. The test of the new panels now on hand will proceed much the same as the test given the Galitzka Panel. Final action on this Project may be anticipated at an early date.

4. Projects previously submitted on which work has been accomplished.

a. Self Contained Anti-Aircraft Range Finders.—Project No. 47.

Two phases of the test of these instruments have been completed, i.e., Reading on fixed targets and targets moving on water. Some readings have been made on airplanes and compared with results obtained by range finders in present use by Anti-aircraft Artillery. This part of the work has to be further extended before final report of test can be completed.

It is also proposed to test the suitability of the stereoscopic type of instrument in spotting. It is particularly desired to ascertain if the magnitude of "overs" or "shorts" can be determined by observation on the Battery Target line.

b. Radio Direction Finders.—Project No. 62.

A super heterodyne receiver and amplifier was tested for use with the Signal Corps—Bureau of Standards Direction Finders. This apparatus did not give satisfactory results in connection with the direction finder loop. The project is being continued using the old apparatus.

c. Test of Motor Driven Time Interval Apparatus for Mobile Artillery Units.—Project No. 56.

During the month the Board completed tests on a motor driven T. I. apparatus with quite satisfactory results. The data given below shows the maximum variations of the timing element observed during a period of 38 hours operation.

1st day, 3/10 seconds in 9 hours.
2nd day, 45/100 seconds in 4 hours.
3rd day, 7/10 seconds in 10 hours.
4th day, 4/10 seconds in 8 hours.
5th day, 4/10 seconds in 5½ hours.

The mechanical features were in general found to be satisfactory excepting that a redesign appeared desirable to incorporate several points of which the following are considered pertinent.

The timing element to be changed to give throughout each minute one bell at 10 seconds, two bells at 20 seconds, 3 bells at 30 seconds, one bell at 40 seconds, two bells at 50 seconds and 3 bells at 60 seconds.

The present indications are that this arrangement will be satisfactory for both railway and tractor artillery for firing at moving targets. Future developments involving the use of self contained range finders with tractor and railway artillery may make desirable taps of the bell at 15 or 20 seconds intervals, should this need develop the necessary change may readily be accomplished by substituting a different timing disc properly notched to obtain these or other timing features that future developments may make desirable.

It is the opinion of the Artillery Board that the redesigned apparatus will prove entirely satisfactory for the needs of both railway and tractor artillery; further that it will be suitable as an article of issue to Coast Artillery National Guard and R. O. T. C. units for training purposes.

d. Range Rule for Rapid Fire Batteries.—Project No. 48.

(1) It was devised by Major C. Thomas-Stahle, C. A. C., and Captain A. K. Chambers, C. A. C., as a means of applying the salvo center of impact method of range correction to rapid fire batteries, at the Coast Defenses of Puget Sound.

It is of limited application. A depression position finder or a self contained horizontal base range finder is required in the immediate vicinity of the battery. Under these conditions it offers a means for applying the trial fire corrections in a very short time.

(2) Figure "A" shows the construction of the rule.

(*a*) Range rule on one side of the face of which the last three digits of the corrected range appear on a typewritten paper scale pasted on the rule. On the other side of the face of the rule, and near one end is a scale of corrections on a similar paper strip. The zero is opposite a pointer on the slide rule (b).

(*b*) A slide rule on which is pasted a typewritten strip of the last three digits of the actual range.

(*c*) A platen of cardboard and wood which slides along the range rule, has four windows for ranges 0 to 3000 yds., 5000 to 6000, 6000 to 9000, 9000 to 12,000 yards. The size of each window is equal to the mean probable error in range at these groupings and the actual dimensions of the window depend upon the typewritten spacing on the slide rule (b). Through these windows the graduations on the slide rule (b) may be read.

(*d*) Apertures in which appear thousands of yards as marked on the sliding wooden rods (e) and (e′).

(*e*) (e) and (e′). Sliding wooden rods 1/6-in. square. The upper face of each has marked upon it the numbers 1 to 12 as indices of thousands of yards in range. These fit into the platen (c). When the platen is placed over the rule (a) any desired index on the rod (e) can be made to appear in the aperture (d) opposite the graduations on the slide rule (b). Similarly the rod (e′) appears opposite the graduations on the range rule (a).

(*f*) A cardboard in which the windows are cut. This is mounted on the platen and pivots about the center shown in diagram.

(3) (*a*) In operation, after a target is assigned, the reader at the range or position finding instrument announces the actual range about every five seconds. For the first shot or salvo, the relation between the two scales of the range ruler should be such that the splash will certainly be short. The rule operator slides his platen along to each actual range and reads over the telephone the corresponding corrected range to the range setters at the guns. This continues until the first splash occurs when the observer sets his cross hair on the splash and says "Splash." If there are two or more splashes he sets on their center of impact as nearly as he can judge it. The reader reads the range to the splash. The rule operator keeps his reading window over the last corrected range sent to the guns just before the splash occurred and slides the actual range scale along under the window until the splash range is opposite the corrected range last sent. This automatically corrects for the travel during the time of flight by making the corrected flight agree with the actual range to the splash. It also introduces a correction for the time lag between the reading of the actual range and the firing of the gun but does not correct for the time betweeen the last reading before the splash, and the splash, which should be made as short as possible. The time of flight and the time lags mentioned will vary from salvo to salvo but the variation should not be more than a few seconds. For the subsequent ranging shots or salvos the procedure is exactly the same except that if the actual range to the splash appears anywhere in the reading window the rule operator does not move the actual range scale but merely announces "Range Correct" for the information of the Battery Commander.

(*b*) When trial fire has been completed the battery commander signals to the observer to discontinue observations on the splash. Battery Commander's corrections are thereafter applied by the rule operator on the "Up or Down" correction scale.

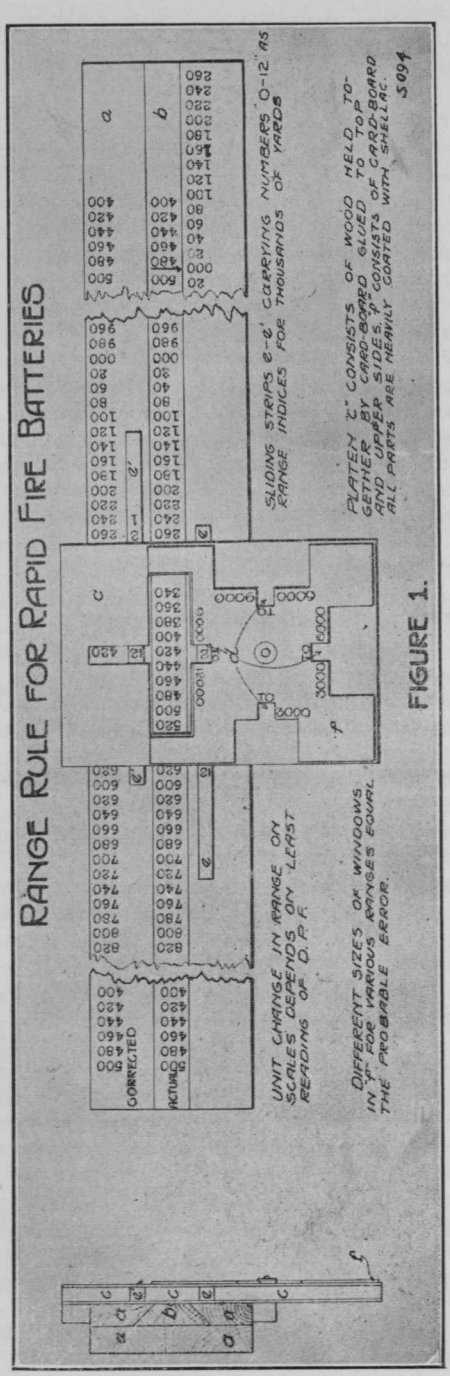
RANGE RULE FOR RAPID FIRE BATTERIES
SLIDING STRIPS 'a-b' CARRYING NUMBERS '0-12' AS RANGE INDICES FOR THOUSANDS OF YARDS
PLATTEN 'c' CONSISTS OF WOOD HELD TOGETHER BY CARD-BOARD GLUED TO TOP AND UPPER SIDES. 'P' CONSISTS OF CARD-BOARD ALL PARTS ARE HEAVILY COATED WITH SHELLAC.
5094
UNIT CHANGE IN RANGE ON SCALES DEPENDS ON LEAST READING OF O.P.F.
DIFFERENT SIZES OF WINDOWS IN 'P' FOR VARIOUS RANGES EQUAL THE PROBABLE ERROR.
CORRECTED
ACTUAL

FIGURE 1.

(c) For subcaliber practice substitute an "actual range" scale computed by means of the range table for the subcaliber ammunition.

(4) Figure "B" shows a method for making corrections for a rapid fire battery. It is of general application and was used by Major G. A. Wildrick, C. A. C., at Fort Randolph, Canal Zone. The construction is apparent from the diagram. In operation, the deviation of shot 1 is plotted, then the deviation of shot 2 (if a salvo is fired). The mean deviation is seen at a glance midway between the plotted deviations. The amount of the correction to be applied (1/2 - 1/3, etc., of the mean deviation) is determined by inspection. The plot furnishes a running record of the pattern.

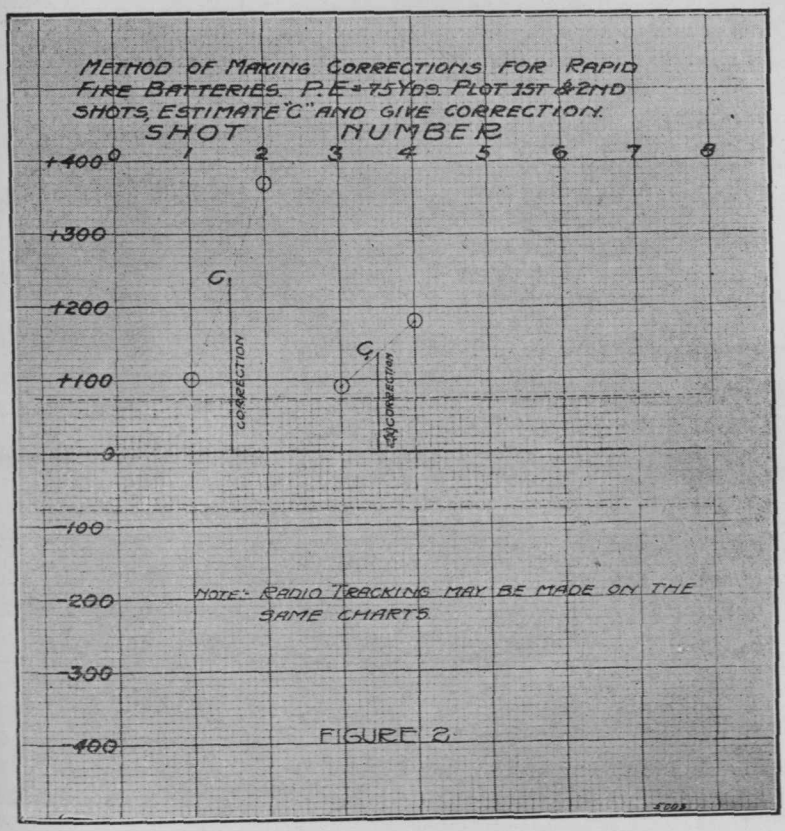

FIGURE 2.

(5) The Coast Artillery Board recommended that the range ruler be not manufactured and issued as a part of organizational equipment because the needs of the service are met sufficiently by this publication.

e. Cloke Plotting Board.—Project No. 74.

The project was completed and a report forwarded to the Chief of Coast Artillery. A comprehensive description of the Cloke board will appear in the April number of the COAST ARTILLERY JOURNAL. The Coast Artillery Board found the Cloke device suitable for use as a plotting board and as a relocating device, and recommended its adoption as standard equipment for certain types of artillery.

THE BEATEN ZONE

Employment of Heavy Artillery—Problem No. 8—A Solution

Major A issues the following verbal order on 11 April.

"There has been no change in the hostile dispositions on our front since receipt of last summary of intelligence. The 3d Corps attacks on D day at H hour with the White Run lines as an objective.

This Bn will support the 3d Corps by firing concentrations on the reverse slopes of Wolf Hill and by neutralizing enemy casemated batteries in same vicinity.

Batteries will fire on targets as indicated on firing schedule herewith.

Messages to Bn CP here. Are there any questions?"

At 10:00 pm 16 April the following is issued in writing:

"Secret. D day is 17 April. H hour is 5:00 AM."

Note: Mention of ammunition supply is unnecessary due to the fact that 96 rounds per piece are normally kept near battery positions. See Problem 4.

FIRING SCHEDULE FOR 1ST BN 901ST ART

Target	*Battery*	*Total No. of Shots*	*Time*	*Remarks*
V	A	132	H−2 to H	Fuse: Short delay with 1 superquick in each 4.
V VII	A (1 plat) A (1 plat)	84 84	H to H+2 H to H+2	Fuse: 2 superquick and 2 short delay in each 4.
VII	B	132	H−2 to H	Fuse: Short delay with 1 superquick in each 4.
II IV VI II IV VI IV VI II IV II VI	B B B B B B B B B B B B	16 16 16 8 8 8 16 16 16 16 16 16	H to H+2	Fire will be delivered in the order here given. Fuse: Superquick for first two salvos on each target, thereafter, two superquick and two short delay in each four.

Zone fire limits ½ fork over and short and 10 mils right and left of target, will be employed in the absence of observation. The first 4 salvos on each target will be at the maximum rate of fire. Thereafter, the rate of fire will average 1 shot per piece every 3 minutes.

COMMENTS ON PROBLEM NO. 8

1. In a limited offensive operation when the time limits are given it is always preferable for the Bn Commander to make up a complete firing schedule indicating the method of fire, order of fire, number of shots per fire, total number of shots fired on each target, fuses used, etc. For offensives it is the rule to make this in the form of a time table rather than to give the order of fire as was done in the defensive operation.

2. It is, in general, undesirable to assign individual heavy guns separate target areas.

3. With armament traversed as easily and quickly as 12-inch mortars it is preferable to concentrate the entire battery on a single target. If more than one target be assigned to be covered at the same time, shift from one target to the other.

4. As targets V and VII are enemy batteries they should be neutralized at H hour, and immediately thereafter. For this purpose it is better to place 2 mortars on each target temporarily, and revert to battery fire later, if desired.

5. In opening fire on any target, it is well to commence at the maximum rate of fire, and then take up a rate consistent with prolonged fire.

6. If at all practicable an attempt should be made to adjust fire on some registration point before H−2 hours.

Employment of Heavy Artillery—Problem No. 9

References: Maps, Gettysburg 1-inch reduced from 12-inch, and Gettysburg 3-inch, Bonneauville, Gettysburg, Arendstville and Knoxyn Sheets.

General Situation:

In continuation of Problems 1, 3, 5, and 7.

The local attack of 17 April was successful, and the lines along WHITE RUN were retaken and held against the hostile counterattacks. Between 21 April and 2 May the Blue 1st Army has been reinforced by the VIII and XII Corps, the latter having taken over the portion of III Corps front between GRANITE HILL and the HANOVER ROAD.

Special Situation (Blue):

On 4 May Major A received F.O. 9 Hdq 301st FA Brig (Corps Artillery, III Corps), extracts from which are as follows:

* * * * * * *

"The hostile forces opposed to our 1st and 2nd Armies have not been reinforced and have been materially weakened by our local operations since the 17 April. The Blue forces have been reinforced.

On D day and H hour our 1st and 2nd Armies attack, driving the enemy west of the line ORRTANNA - CASHTOWN."

* * * * * * *

"The 301st FA Brig (reinforced) supports the attack of the III Corps, North boundary (355-749)—COUNTY ALMSHOUSE—(344-754)—HILLTOWN, South boundary HILL 484—N. CADORI—RJ 587—J. HERTER MILL—McKNIGHTSTOWN STATION—RJ 717, with counterbattery and interdiction fires."

* * * * * * *

"The 1st Bn 701st Art. at D day and H hour will neutralize batteries Targets V and VII, (Ed. Note.—See December JOURNAL, Chart to accompany Annex No. 4, Problem 6), and after the WOLF HILL RIDGE is taken, one battery will interdict the junctions of the EMMITTSBURG ROAD with the TANEYTOWN ROAD and BALTIMORE TURNPIKE until our infantry reaches CULP'S HILL.

* * * * * * *

"Forward displacement as follows:

1st Bn 701st Art. 1 Btry march order at H plus 1 hours; as soon as WOLF HILL RIDGE is taken, proceed via S.H.—RJ 531—RJ M. RUDISH—RJ 529 to position near 353-749, prepare on receipt of orders to interdict roads and RRs west of GETTYSBURG. Other Btry after our infantry reaches CULP'S HILL, march order and await further orders."

* * * * * * *

"Arty Ax Sig Com: BALTIMORE TURNPIKE—GETTYSBURG—CHAMBERSBURG ROAD."

* * * * * * *

"CP 301 FA Brig: TWO TAVERNS, effective D Day, H-5 hour."

* * * * * * *

On 5 May Maj A was informed that D day was 7 May, and H hour 5 AM.

On 7 May the attack started as scheduled, and at 11.30 AM the Bn CP received a message from Liaison officer with 8th Division that WOLF HILL was taken, and at 4.45 another that CULP'S HILL was taken.

1st Requirement:

Maj A's detailed arrangements prior to the attack to carry out his assigned missions, including distribution of targets to his batteries, choice of battery and plan for forward displacement, orders for the displacement, ammunition supply, rations, disposition of Bn CP, rear echelon, and communications.

2nd Requirement:

Sketch to scale 3-inches equal 1 mile, showing new battery position, all CP's, OP's, rear echelon, and wire connections.

Note:

While it is generally recognized that in the employment of an artillery battalion, the batteries of the battalion should be kept together whenever possible, to facilitate tactical control, yet in the forward displacement of heavy artillery during a general attack, the individual movement of batteries is justified under conditions such as those indicated in this problem.

These conditions, which are worth enumerating, are as follows:

(a) The fire of the battalion is required for interdiction purposes up to a limit of time in the progress of the attack which would seriously increase the gap in time when further fire support could be expected if neither battery were to move until the attack had passed out of range from its initial position.

(b) It is evidently important to interdict the roads and RRs just west of GETTYSBURG as soon as possible. Due to the length of time necessary to put an 8-inch Howitzer Btry in march order, accomplish the march over congested and shell-damaged roads, and then occupy a new firing position, it is necessary to plan for the commencement of the forward displacement at the earliest moment,

(c) Even if there were no conflict in the tactical demands of (a) and (b) above, experience has demonstrated that if an attempt were made to put on the road at once, during the progress of an attack, with the inevitable congestion of traffic, the entire equipment of an 8-inch Howitzer Bn (over 4000 yards road space), the chances are that no part of the Bn would get through in time to accomplish its mission.

(d) On account of the congested and damaged condition of the road to the forward position, the question of ammunition supply is going to be a difficult one, at least for the first few days after the attack starts. There is no use in displacing more guns forward than can be supplied with ammunition. In view of the difficulty to be expected in this direction, it is wise for Hdq 301st FA Brig to limit this difficulty, especially in view of the fact that the new mission of the Bn can be accomplished by one Btry.

THE BULLETIN BOARD

C. A. Non-Com Graduates at Fort DeRussy Listen to General Summerall

SERGEANT JAMES D. LOVETT LEADS CLASS OF 51

Graduation exercises for the seventh regular course at the Noncommissioned Officers' School, Hawaiian Coast Artillery District, were held at Fort DeRussy, H. T., on Tuesday, January 23.

Major General Charles P. Summerall, U. S. Army, addressed the class and presented the diplomas to the graduates.

The Thirteenth Band, C. A. C., played appropriate music during the ceremonies.

POSTS REPRESENTED

All the coast artillery posts were represented by former graduates and visiting officers. Among those who attended were General John D. Barrette, Professor Van Dyke of the University of California, Colonel Burgess, Major W. K. Wilson, Major French, Major Mountford, Major Lemmon, Chaplain Bebe, Captains Welch, Summers, Anderson and Cole, Lieutenants Hohenthal, McCullough, DeRussy, Bardsley and Horn.

Forty-one students received diplomas. Sergeant James D. Lovett, Service Battery, 55th Artillery of Fort Kamehameha, H. T., led the class.

The course just completed has been in session for the past ten weeks.

Men from every Coast Artillery organization in the department made up the student body and they have devoted their entire time while at the school in studying and being trained in the various duties that a noncommissioned officer is called upon to perform while serving in a coast artillery organization.

GENERAL SUMMERALL'S TALK

General Summerall's address was most interesting and fully appreciated by everyone present. It is as follows:.

"In presenting you with your diplomas from the school for noncommissioned officers of the Hawaiian Coast Artillery District, I cannot fail to invite your attention to the added responsibilities that these evidences of your qualifications place upon you and to the immediate problems of the command, in the solution of which you can render the greatest assistance.

"Throughout the course at the school you have been taught, not only technical skill in your profession, but also standards of deportment and efficiency that are essential in the Army. These ideals you are expected to take to your organi-

zations, and not only live up to them yourselves, thereby becoming examples to those about you, but you are also expected to teach them to others and incorporate them in the routine of your companies and posts.

"Whatever may be the nature of your duty or assignment, you can make it worthy of your time, labor and thought by the thoroughness and the zeal displayed in performing it.

"The efficiency of the Army depends less upon its numbers than upon the quality of the men who compose it. It must be recognized that the country will not maintain a large military establishment and that appropriations will be less than the amount required for adequate support. These limitations, however, should not be the cause for dissatisfaction, but rather they should emphasize the necessity for higher efficiency and a greater effort to accomplish results.

"One of our chief difficulties is the shortage of men. While the war department has given priority to recruiting for this department, the funds for transportation are inadequate. However, our ranks are being gradually filled and the replacements will continue as rapidly as the funds permit. In the meantime, the increased demands upon the personnel present should be met with a spirit of cheerfulness and soldierly pride.

"The new men should at once find themselves in an atmosphere of industry and contentment. They should be encouraged by the older men of the organizations, and the good features of service in the department rather than the difficulties should be emphasized. Nothing is more demoralizing to the recruit than to find grumbling, shirking, discontent, poor discipline in the the command that he joins. It is expected that each one of you will demonstrate his leadership and development of character by the example and the advice that he can furnish to the new men as they arrive.

"On account of the deficiency in men and in funds, much labor is required of the troops in the care and upkeep of material and equipment, repairs and construction of buildings, improving and maintaining roads, and in various other activities that are essential for the efficiency of the command. Such labor is just as meritorious as the military training, and should not be regarded as drudgery or as a hardship.

"On the contrary, every member of a post or command should be so much interested in improving the conditions of living and in keeping the equipment on a war footing that he should take a pride in excelling in the quality of his work. Here, again, you are expected to do your full part in cultivating a healthful sentiment of industry among the men entrusted to your leadership.

"Speak well of your company, your post and the service. Idle criticism should be suppressed and the truth clearly stated to all who indulge in it.

"Have confidence in your officers and present to them in a proper way and in a proper spirit such conditions as you think may be improved.

"At the same time, be absolutely loyal in carrying out the orders you receive and in a support of the policies of your superiors.

"You may rest assured that no useless restriction is imposed or unreasonable task is required. On the contrary, every effort is being made in a sympathetic manner to afford to every one healthful recreation and relaxation.

"By living up to the dictates of your conscience and the knowledge that you have acquired, you will become invaluable assets to the service and you will vindicate this school and its teachings.

"To all of you who have finished the course, I offer my sincere congratulations and appreciation of the effort put forth, and I shall follow with my interest and my good wishes your further contributions to the service.

"In conclusion, I wish to commend the director of the school, the school staff

and the enlisted personnel who have labored faithfully and effectively to make the past term a success."

8TH COURSE BEGINS FEBRUARY 15TH

The preceding notes on the Graduating Exercises of the 7th Course of the school were furnished to the JOURNAL through the courtesy of Brigadier General John D. Barrette, commanding the Hawaiian Coast Artillery District, who also furnished the information that the 8th regular course was to begin February 15th.

General Barrette also included a copy of the Report of Major M. B. Willett, C. A. C., the Commandant, from which it is desired to present the following extract concerning Lieutenant Claude L. Kishler, who served for years as the JOURNAL's Office Manager, and who, the Editor well knows, undoubtedly deserves fully the quoted commendation:

"The Commandant wishes to express his appreciation of the interest and spirit shown, as well as his entire satisfaction with the manner of performance of all duties, by his only commissioned assistant, 1st Lt. C. L. Kishler, C. A. C."

Expert Riflemen from the C. D. of San Francisco

In the 1922 matches conducted by the California Rifle and Pistol Association, the team from the Coast Defenses of San Francisco, takes first place against seventeen competing teams with a season's percentage of 90.58, and at the same time, under the direction of the same association, Sergeant G. B. Ping, C. A. C., takes first honors for himself and the Coast Artillery Corps by running up a season's percentage of 93.4 against one hundred and thirty-six competitors. Major L. F. J. Zerbee, C. A. C., takes seventh place with an average of 91.7 and Sergeant Charlie York, C. A. C., takes thirteenth place with an average of 90.7. Altogether, nineteen places were won by Coast Artillerymen.

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BOOK REVIEWS

A Budget of Paradoxes, Volumes I and II. By Augustus De Morgan, Second edition, edited by David Eugene Smith. The Open Court Pub. Co. Chicago. 1919. 6 "x 9". Vol. I, 402 pp.; Vol. II, 385 pp.

The subject-matter contained in these two volumes originally appeared in the London Atheneum, from 1863 to 1866. Professor Smith in preparing this second edition laid down for himself two definite rules at the beginning of his task; (1) That no alteration in the text should be made save in slightly modernizing spelling and punctuation and in the case of manifest typographical errors; (2) That whenever a note appeared it should show at once its authorship to the end that the material of the original edition might appear intact.

The English mathematician De Morgan defined the paradox as "something which is apart from general opinion, either in subject-matter, method, or conclusion." Among the subjects dealt with besides mathematics, are astronomy, medicine and religion. The circle squaring, the trisection of the angle problem, the duplication of the cube, the numerical juggling with the number 666, are some of the favorites among the would be scientists whose great ambition was "to revolutionize the established order."

This delicious bit of satire may not be of particular interest to the average reader because the hundreds of names referred to that were known in England half a century ago are now forgotten, because many books that were then current have now passed out of memory, and because many things that agitated England in De Morgan's prime seem now like ancient history. The additional information

as to dates and publications supplied by Professor Smith will greatly aid the casual reader who wishes something unusually entertaining. This work of reference is a wonderful book to browse around in.

Kinematics and Kinetics of Machinery. By John A. Dent and Arthur C. Harper. John Wiley and Sons. New York. 1921. 6" x 9". 383 pp. Profusely illustrated.

The methods here given of determining velocities, accelerations, and inertia forces, applicable to practically all mechanisms, are almost wholly graphical. The authors have wisely laid aside the analytical methods with their accompanying complicated equations. The book is not meant for the mathematician but for the engineering student.

As to whether the graphical method admits of sufficient accuracy, the authors have found, as a result of several years experience in teaching kinematics and kinetics of machinery, that, if the work is done to a large scale, the results should be accurate enough for all practical purposes.

The subject-matter has been so arranged as to permit of its use for short courses or more complete and detailed courses. The average undergraduate could not be expected to appreciate the mathematics involved in the chapter on critical speeds and parts of the chapters on governors and gyroscopes. These parts are especially intended for the advanced students who intend to specialize in scientific design.

Descriptive Geometry. By George Young, Jr. and Herbert E. Baxter. The Macmillan Co. New York. 1921. 5" x 7½". 309 pp. Price, $3.25.

The plan of this text-book is made clear in the authors' reason for adding to the already long list of texts on descriptive geometry. In the first place they have not attempted to present any new abstract material nor even to include all of the standard problems, but realizing the value of this subject in developing the imagination, through the ability to visualize, they attempt to hold the student's attention by means of introductory paragraphs and other explanatory matter intended to show the relation of the principles under discussion to structural work. But in order to avoid the tendency of the whole subject to degenerate into practical rules and formulas, the treatment of the various subjects has been kept purely abstract. As a balance there has been added a set of exercises designed to show the application of the abstract ideas to concrete, work-a-day problems.

This book's importance is due to successful efforts of the authors in presenting the subject-matter so as to encourage intuitive rather than rigidly formal methods.

Education and the Army. By Captain Elbridge Colby, Infantry, U. S. A. The Palmer Co., Boston, Mass. 1922. 5½" x 7¾". 66 pp. Price, $1.00.

The author of this little book was an instructor in English at Columbia University and at the University of Minnesota prior to obtaining his appointment in the Regular Army. After completing a course at the Infantry School he was detailed for duty with the school staff. Since September, 1922, he has been a student officer at Columbia University and a candidate for the Ph. D. degree. His experience in the University, as student and instructor, and in the army qualify him to write on the subject of education.

This book is really a comparison between educational methods in the army and in civilian educational institutions, with the army methods explained more than are civilian methods. Into it the author has injected his personal views on "Teaching—In the Army and Out" (Chapter IV), "The Question of Academic

Freedom" (Chapter V) and "Teaching—Outside of the Army and In" (Chapter VI). He shows the value of uniformity, its importance in the army, and urges its necessity in the university. He condemns academic freedom, stating that prior to his army service he had believed in it but was converted when, for a short time after the Armistice, he donned the cap and gown to resume teaching, only to return to the army a thorough believer in army methods of instruction, in the "applicatory method" and in uniformity. "National Education" (Chapter II), or the value of the army in educating citizens, and "Higher Education in the Army" (Chapter III), which outlines the army educational system for the professional training of its officers, with a natural emphasis on the Infantry, are briefly discussed.

On the whole this book should prove decidedly more interesting to the civilian than to the army man, though not a few of the latter may be curious about the matter of academic freedom, a subject all too brifly discussed and one on which much might be said. Incidentally, the author makes no bones about the faults of civilian teaching methods and their wasteful results. As an introductory agent to win converts to the army and to its training methods, especially the educational field offered by an army career, this book is a good one. Parts of it have already appeared in various educational and military periodicals.

The Middle Game in Chess. By Eugene Znosko-Borovsky. Harcourt, Brace and Co. New York. 1922. 5½" x 8½". 226 pp. 100 Diagrams. Cloth. Price, $3.50.

Znosko-Borovsky, the well-known Russian chess master, now an exile from his own country, has accomplished something of a pioneer task in launching the theory that the middle game in chess, as distinguished from the opening and the end game, is in reality the essence of chess itself. In commenting on this theory and its treatment in the book under consideration, it is at once natural and fair to compare *The Middle Game in Chess* with two other contemporary chess works, Edward Lasker's *Chess Strategy,* and Capablanca's *Chess Fundamentals.* These three modern chess books stand out as a distinctive trinity in chess literature, together setting a new standard in the treatment of the elements of the ancient game. Of the three authors, Znosko-Borovsky and Lasker are preeminently theorists and natural instructors, while Capablanca, the world's champion, is essentially a pragmatist in chess, an instinctively practical chess player, who by intuition can do the right thing in each situation which confronts him, and who quite evidently labors when he essays the rôle of instructor and philosopher, seeking to formulate general principles for the justification of his play, which instinct has taught him to be right in the given instance. So it is that in *Chess Fundamentals,* Capablanca has not given the middle game any distinctive place in chess philosophy. On the other hand Edward Lasker has elaborated a very definite theory of the middle game, which however, in keeping with the modern development of chess as a war of attrition, avoiding brilliancies and hazards, looking only to the attainment and maintenance of the essential minimum of advantage, conceives the middle game merely as the necessary careful preparation for a successful end game.

Znosko-Borovsky goes further, asserting that the successful molding of the elements of *space, time* and *force* in the middle game is the whole essence of chess, from which, if the end game stage is reached, a winning end game is sure to follow. This contribution to chess thought is salutary and necessary, yet a careful study of his book leaves the reviewer with the feeling that the author is led, as often an enthusiastic protagonist of a radical idea must be, into a certain exaggeration of the preeminent importance of the middle game. Not to labor the point too

far, it may be enough to cite the fact that there are numerous games in master play, which after having been left at the conclusion of the middle game stage in a condition for one player, which by Znosko-Borovsky's own standards, gave him a *superior position*, yet have been lost by this player in the end game, through a faulty mastery of end game play itself.

In the presentation of his ideas and the development of the material at his disposal, the author was obliged to invent a classification to serve his purpose. The result is the grouping of middle game situations into three classes, from the point of view of the side under consideration, as affording Superior Positions, Inferior Positions, or Equal Positions. Each of these classes is further subdivided into three sub-classes, resulting from the analysis of its superiority, inferiority or equality in each of the three elements of Force, Time and Space. Briefly, then, the purpose of the book is to define the qualities of Superiority, Inferiority and Equality in each of the three elements, to show the student how to analyze a situation so as to recognize its real qualities, and finally, having arrived at a correct analysis, to know how to conduct the game thenceforward in the most effective manner.

The author himself recognizes the inadequacy of one book for an exhaustive treatment of such a method. Perhaps the greatest value of his work is in pointing the way for future effort of the same kind. The outstanding example of the author's method is the examination of a middle game position attained in play between Pillsbury and Tarrasch. Nineteen pages and six diagrams are devoted to an analysis of the proper progress of this situation through 27 further moves, (with 36 in a minor variation.) The comprehensiveness of this analysis is probably unparalleled elsewhere in chess literature.

The book is hardly one to be used profitably by a rank tyro, and yet one does not need to be a master to profit by it. Harcourt, Brace and Company are to be congratulated for having brought out so important a work, and for the new standard of typographical excellence established by this book and by Capablanca's *Chess Fundamentals*, which are almost uniform in style and binding.

Unto the Hills. By Edward N. Dingley. The Stratford Company. Boston. 1922. 5″ x 7½″. 201 pp. Price, $2.50.

The author of *Unto the Hills* is a veteran publicist and writer on economic and political subjects. In this, his latest work, he has attempted to lift the discussion of some of the most urgent of American present day problems from the plane of the commonplace and matter of fact "Unto the Hills" of idealism. In this effort he has been singularly successful in combining the practical experience of a life time in the every-day touch and go of political affairs with the viewpoint of aspiration and altruism.

Among the many important subjects which Mr. Dingley presents for earnest consideration are Immigration, the Protective Tariff, the international economic problems brought about by the War, our relations to the Philippines, our Banking System, the Merchant Marine, the Monroe Doctrine and an examination of the reasons for political parties. Particularly interesting is the chapter in which is emphasized the fact that the United States is now, as it was always intended to be, a Republic and not a Democracy, and by which some of the current loose thinking with regard to Democracy should be set straight. "Unto the Hills" approaches the solution of our problems from a standpoint which will be distinctly new to many readers.