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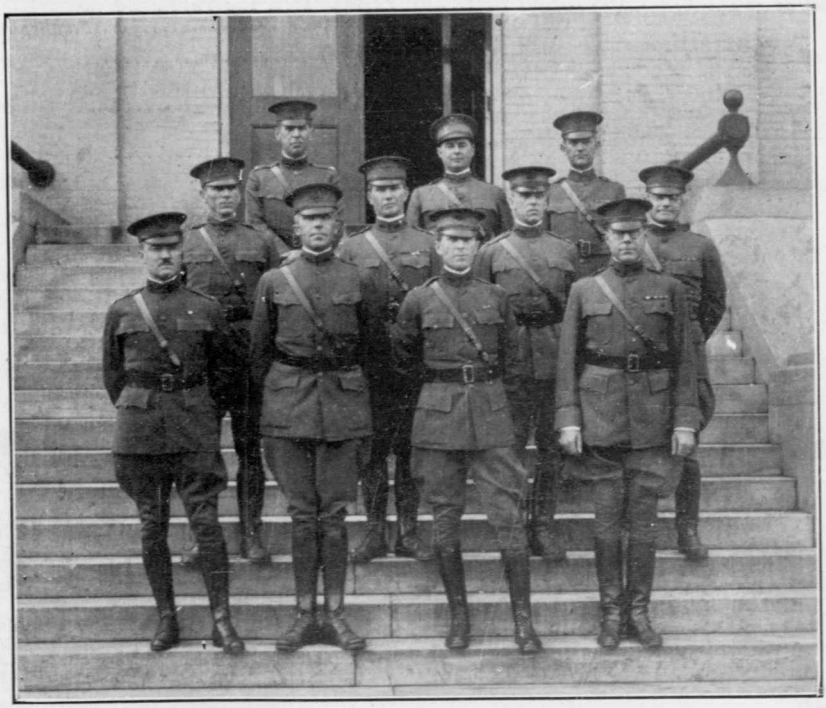

COAST ARTILLERY OFFICERS IN STAFF CLASS, AND ON DUTY AS INSTRUCTORS, GENERAL SERVICE SCHOOLS, 1922

FRONT ROW: Lt. Col. C. C. Carson, Maj. E. W. Niles, Maj. L. Turtle, Maj. P. H. Worcester.

SECOND ROW: Maj. A. J. Cooper, Lt. Col. R. W. Collins, Maj. C. R. Alley, Col. E. Kimmel.

BACK ROW: Lt. Col. F. L. Dengler, Maj. A. L. Rhoades, Maj. H. T. Burgin.

Journal of the United States Artillery

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First Prize, Essay Competition, 1921

Coast Artillery Training

By Major Quinn Gray, C. A. C.

SCOPE OF TRAINING SCHEDULES

1. It is to be hoped that with the concentration of Coast Artillery units, there will be a sufficient number of officers available at each fort to do all the necessary administrative and routine post work without infringing on the time and effort that properly should be devoted to Coast Artillery training.

It would seem reasonable that in Coast Artillery garrisons, Coast Artillery work would always be considered of paramount importance. This has not always been the case, however, and usually the fault has not lain with the Coast Defense or Fort Commanders. When more is required of these commanders than can be done properly, the immediate requirements and the things that seem to be stressed higher up will naturally take precedence, and the purely artillery work will go by the board in consequence.

It is not the purpose of this article to call the attention of those higher up to the necessity for either curtailing the requirements in work other than artillery or else providing an adequate personnel. It is assumed that this condition has been recognized, and that Coast Artillery work *will* be made of paramount importance. In that case these suggestions on the subject of training may be helpful; otherwise, there will be no incentive for any one to read them and the only valuable time wasted will be that of the type-setter.

To take up then the subject of training we would properly begin with the office that must consider the several demands made upon it and decide just how seriously the matter of artillery work is to be taken. This is the office of the Coast Defense Commander.

For the purposes of this discussion, we will assume that the circumstances warrant the subordination of all other work to that of artillery training and development. The Coast Defense Commander then probably will issue a training schedule which will be the basis of all battery, fire command and fort command training.

This schedule should have as its ultimate aim the attainment, by systematic and progressive development, of a perfectly definite object, viz., *battle efficiency;* and it should not go into such detail as would relieve subordinate commanders of responsibility for lack of results, or suppress their initiative in bringing about the results desired.

The schedule should include theoretical and practical instruction, drill, tactical exercises and target practices.

2. *Theoretical instruction.*—This should take place during the indoor period and should consist of both individual and group instruction.

Individual instruction should include a thorough and extensive study of gunnery and artillery tactics.

Group instruction should be at the war game board or reduced terrain, and should have as its main object the coordination of the artillery elements composing a battle command, and the solution of tactical artillery problems.

The advanced tactical problems should involve cooperation with other land forces, with the naval forces and with the Air Service. In these, a coast defense plans and training officer, an intelligence officer and a communications officer should be provided and required to take active part.

Qualified non-commissioned officers might well be included in the school for officers; and certainly such non-commissioned officers and other enlisted men as require training in coordination should be employed in the war game or reduced terrain exercises.

Towards the end of the indoor period special instruction should be given to all telephone operators of the complete fire control system.

Years ago the writer was ordered to the command of a battery at a new station, and reported for duty just before the beginning of the outdoor season. The first formation he attended was telephone drill. All officers and telephone men of the post were assembled in the gymnasium. Battle command, fire command and battery personnel were grouped as indicated in the usual diagram of organization. Orders and messages were issued at the top and transmitted throughout the system as they are intended to be transmitted over the telephone. The first impression was of simply an unintelligible din of voices, but in a few minutes the significance of the drill was manifest. They were merely learning the

fire control language and the structure of the fire control system. The value of the instruction compared to the time and energy expended seemed doubtful until outdoor drill was under way. Then each battery commander realized that one of his most annoying problems,—that of quick and accurate telephone transmission, had been effectually solved for the entire drill season.

3. *Practical instruction and drill.*—In this the work should be progressive from battery to battle command drill, but even in the advanced stages of training certain days of each week should be devoted exclusively to battery drill.

4. *Tactical exercises.*—For the proper training of the coast defense staff and for the coordination of all the elements of the coast defenses, tactical exercises are essential. Tactical problems should be carefully prepared in every detail before they are submitted for solution on the ground. The attack or attacks assumed should be logically directed against one or more of the enemy's probable objectives, and the corresponding naval maneuvers should be in conformity with correct naval tactics. The Coast Defense Commander's estimate of the situation should be based on the information received through his intelligence officer. A message center and intelligence service should be established and required to function as it would in war and the defense should be conducted in accordance with the standing battle plans of the coast defenses.

5. *Target practice.*—Within the limits prescribed by higher authority, target practice should be made to conform as nearly as possible to battle conditions. The annual allowance of target practice ammunition properly may be expended in progressive practices in which the simplest problems are undertaken first. It must be borne in mind constantly, however, that every condition introduced into target practice that is not also a normal battle condition not only tends towards the establishment and acceptance of erroneous principles of gunnery and tactics, but towards a restricted and harmful conception of the real battle problems as well.

TRAINING OF BATTERY PERSONNEL

6. The first thing for a battery commander to realize is that his tactical command consists of so many platoons or so many sections, and not of so many individual men. In other words, his lieutenants and non-commissioned officers must be regarded as leaders within their limited spheres and must be dealt with accordingly. Each one must be required to know, down to the most minute detail, the functions of each individual under his immediate command, and must be held strictly responsible for the efficient performance of all work under his charge. When the battery commander undertakes to deal directly with all the individual members of his command, he not only denies to himself the

benefits to be derived from organization, but he fails in one of his own most important duties, viz., that of training his subordinates in the exercise of initiative and the acceptance of responsibilities.

7. *The systematic development of the battery.*—The means of attaining battle efficiency are drill, sub-caliber target practice and service target practice, and in each of these there are certain definite ends to be accomplished.

In drill, first we train the different elements of the battery personnel separately until each man functions without error, then we combine the elements and drill for accuracy, smoothness and speed.

Sub-caliber target practice is mainly for training in observing impacts, and in determining and applying corrections. Outside of this the practice is of little value to the range section, and it is of less value to the gun sections.

Thus, in drill and sub-caliber practice we may work with a view to perfecting separately the various elements that constitute the whole system. We must remember, however, that we are not qualified to fight a battery until we have coordinated these elements and perfected the system as a whole. This should be done in service target practice. The allowance of ammunition for service target practice is limited and should not be used for training in any of the elements that can be learned in drill. Therefore, in service target practice two important conditions should be fulfilled. These are, first,—excepting the requirements for safety and record-keeping, the introduction of any conditions that would not obtain in actual combat must be absolutely prohibited, and second, the most faithful portrayal possible of battle conditions must be absolutely required.

The battery has reached the highest degree of excellence when it is able to go through service practice without delays or personnel errors and without assistance or interference on the part of the battery officers. The battery officers' work of training and instruction properly comes *before* target practice. During target practice, if the battery is properly trained the work of the officers is solely that of supervision and direction.

In order properly to train the enlisted personnel, the emplacement officers must know thoroughly the duties of each member of the gun sections, the range officer must know thoroughly the duties of each member of the range section, and the battery commander must know thoroughly the duties of each member of the battery. This is fundamental. In addition these officers must exercise judgment in assigning men to the various positions and must question and instruct the men constantly in order to be sure that each man not only is skillful in the mechanical operation of his own part, but also understands how and where it fits into the system as a whole.

8. *Analysis of drill.*—In training the enlisted personnel the most effective way of eliminating personnel errors is to discover the errors and point them out, assigning the blame where it properly belongs. The average man usually is much more painstaking and conscientious in the performance of his duties if he knows he will be confronted with any error or mistake that he may make.

The only way to discover personnel errors and find who is responsible for them is by analysis of drill, and no battery can be properly trained within a reasonable length of time if the battery officers are not skillful in analysing. At the very beginning of the drill season the battery officers must begin analysis, and the first thing to do is to learn the method so thoroughly that it becomes more or less a matter of routine. This can be accomplished in a short time by the solution of a few problems, and when it is accomplished this phase of the work ceases to be a bugbear and becomes instead a most interesting as well as a most instructive part of the drill.

I want to stress this subject of analysis of drill for the reason that a large number of officers fail to realize even in a small degree the importance of it, and a large number never learn to make an analysis until after target practice when they are required to make their reports. The analysis of target practice is in fact of the least importance. It is largely for the purpose of showing the details of the work to a reviewing officer who may or may not know what it is all about. The analysis that really counts is the analysis the battery commander makes for his own information so that he can put his finger on any man that makes a mistake, and let each man in the battery know that if he is guilty of an error in drill or target practice, not only the battery officers but every one else in the battery will know it.

Based on long experience, my advice to battery officers is this; learn the analysis until you become actually expert in it, and then you will have gone a long way towards becoming an expert battery officer and your battery will be on the high road to excellence. This applies to all battery officers, and indeed you will find that if given a chance the more intelligent members of your range section will take an active interest in the analysis. I have in mind one battery in which an analysis was made of a small portion of each day's drill. The work was divided up so that practically every member of the range section assisted: and the work was completed in a very few minutes. It got to be an interesting thing to look for breaks, and it got to be a serious thing to be discovered in making one. During the first few weeks of this scheme the range section underwent a number of changes in personnel. The inefficient and indifferent were called out and replaced by new men who proved dependable. After two or three old timers who had occupied soft seats in the plotting room until they believed the whole system revolved about them had been shown up and put to pushing ammunition

trucks, the atmosphere of the whole section underwent a decided change for the better, and the work of the new range section was of a standard that could never have been attained by the old.

9. *Individual training.*—There are certain enlisted men of the battery whose work is most important, and these should have careful individual training. It would be impossible to anticipate all the individual defects and shortcomings and to suggest training methods to overcome them. Only by diligence and ingenuity can the training officer discover and correct the defects in each particular case. The following points may be helpful, however.

(a) Telephone operators.—The quality of the voice seems to have much to do with good transmission. Apparently voices of good carrying quality in the open are best adapted to telephone transmission.

A man with thick tongue or whose enunciation is poor never makes a satisfactory telephone operator. It will be almost impossible to train him out of this defect. It is best to confine the selection of operators strictly to men of clear distinct enunciation. Afterwards they should be trained as previously outlined in the language of the fire control system, and should be taught telephone discipline.

By telephone discipline is meant the use of the telephones exclusively for the language of the system. The language of the system should be rigidly maintained. For instance, the use of such expressions as "What's that" or "Repeat that please" instead of the single word "Repeat" should not be allowed. By confining the communication to short crisp terms and expressions and training operators in the use of these and these only, the errors in transmission are reduced to a minimum and much time is saved.

(b) Observers.—The most difficult thing that confronts the observer is the quick and positive identification of an assigned target. Often the difficulty in this lies with the battery commander who assigns the target rather than with the observer. The battery commander should study the field of view from each of his observing stations so that when assigning a target from his own station he will have an idea of how it appears from each observing station.

It requires a great deal of practice and discussion to establish a complete accord between the battery commander and the observers. Frequent practice should be had in picking up as a target one particular vessel out of a number in the same general vicinity; and when this can not be done promptly, the battery commander should find out then and there wherein lies the difficulty, and should instruct the observers or correct himself until all are in accord as to the best means of indication and identification in the circumstances.

Accurate tracking can be accomplished very easily with little instruction. The observer's task is to have the point of observation accurately bisected and to stop his instrument accurately on the third

bell. This is not difficult to do but unless the observer is confronted with all of his inaccuracies he is almost certain in time to become careless and to slight his work. The best preventative measure is to record all base-end readings and find the first order of differences. With such targets as are tracked most frequently, the first order of differences should be smooth, i. e., uniformly increasing or uniformly decreasing. Once he gets the idea, the ambitious observer will apply the test himself, and it is then that best results can be expected.

(c) Readers.—To be expert, a reader must have a quick and active mind. As soon as he has made one reading he will begin estimating mentally what the next reading will be. Ordinarily his estimate should be correct within a very few hundredths. By this means he should be able to call off the whole degrees before the third bell except when the reading is estimated to fall very near a flat degree.

In this case he is likely to make an error of one degree unless he is especially cautioned and trained. When the whole degrees and hundredths of a degree are read from separate scales, the whole degree index is apparently coincident with the next higher degree whenever the hundredths scale stands between 90 and 99. Thus, for instance, an azimuth of 235.95 is quite apt to be read 236.95 unless the reader is on the alert. This is a very common error with imperfectly trained readers.

(d) Arm-setters.—An expert arm-setter will anticipate the next setting and have his arm approximately laid when the reading comes to him.

Mechanical index boxes having backlash must always be brought up from the same direction in setting.

The arm-setter should not verify the transmission by repeating immediately the azimuth received, but should first set his arm and then *verify the setting* by reading it back to the azimuth reader; otherwise he may call back the azimuth received and then set his arm at some other azimuth.

Transmission over the data lines must be restricted absolutely to azimuth readings, the word "Repeat", and brief indications of changes in course such as "Target turning sharply right," "Target headed straight out" etc. These latter are to enable the plotter to put his set-forward point on the future track of the target.

(e) Plotter.—It is absolutely impossible to make an expert plotter unless one starts with the right sort of material. The first essential attribute is coolness and self-possession in all circumstances; the next is facility in the use of the fingers as well as in the use of the head. He must be trained in the use of the pencil, in neatness of drawing and in the anticipation of target movements.

He must establish through the observers a constant and complete information service in simple direct language of accurate interpretation.

For target practice this is not essential as the target always runs a straight course; but we are agreed now that we are going to try to give the tax payer his money's worth by training for war instead of rehearsing and staging a theatrical exercise in the form of target practice. In war a target will be dodging set-forward points very much as ships dodge torpedoes from submarines, and the plotter who establishes the set-forward points must keep constantly in touch with movements of the target between bells.

It is impossible to have actual targets running sinuous or "S" courses at the speed of a battle ship; and for the proper training of the plotter it is absolutely necessary to make up a number of such courses on the plotting board, take off the base-end readings at the proper observing intervals and have them sent in by the observers just as if an actual target were being employed. One such course will serve for only a very few replottings, as the plotter will very soon get the course fixed in his mind and then the value of it is lost. Making up a sufficiently large number of such courses will require a great deal of time. It is advisable, therefore, to instruct the arm-setters in making up courses and to accumulate gradually the necessary number.

(f) Range and elevation board operators.—The range board may be used either for the determination of final range data or for the determination of the range correction. While either use is permissible, the board would better be used for the latter purpose unless the operator is naturally intelligent and trustworthy and is very well trained in addition.

Proper training of these operators can be accomplished only by watching and cautioning them during drill by careful analysis after the drill.

One of the frequent errors of the elevation board operator is in *predicting* the time of flight. It is to be remembered that he is required to anticipate the range (elevation) for the next set-forward point and take off the corresponding time of flight for the plotter's use in locating the set-forward point. When the next shot will involve a change in zone, unless this is considered the error in predicting the time of flight will be so great as to cause a serious misplacement of the set-forward point.

(g) Deflection board operator.—The training of this operator is accomplished by observation and analysis as in the case of the range board operator.

Usually in gun batteries, the training in Case III is neglected. In war our gun batteries probably would be protected from the enemy's ships and airplanes by smoke screens. In this event all firing would be by Case III, and it would be entirely reasonable, in training with the major caliber guns, to divide the time and target practice ammunition about equally between Case II and Case III.

(h) Gun commanders.—These and all other non-commissioned officers exercising command within the battery, must first be fitted for the command they exercise and then held absolutely responsible for results.

Each chief of section should know intimately the work of each member of his section, and the assignments of the members as well as their direct instruction should be left to the chief of section,—the battery officers supervising and when necessary directing the chief of section.

To inspire the proper degree of interest and loyalty in these men, it is necessary that no unusual effort or exceptional work of theirs be overlooked or taken for granted. A battery officer can make no greater mistake in his dealings with his enlisted men than by taking to himself any credit that is properly due even in the smallest degree to one of his non-commissioned officers. If an inspector finds something to elicit a favorable comment, the battery commander can make the best possible impression on both his company and the inspector by calling the non-commissioned officer directly in charge to be the recipient of the praise and entirely ignoring any application that it might have to himself. Neither inspectors nor soldiers are deceived by egotism unless it is clothed in a pretty fair grade of subtlety.

(i) Observation of fire.—Every battery should have within itself a method of determining deviations. The only battery method possible at present is bi-lateral observation. This will require two spotting observers, and a deviation or spotting board of some kind.

In general it is a serious mistake to assume that base-end observers for plotting can observe the deviations along with their regular work, or that the range section can plot splashes on the plotting board. This has been tried time and time again and always with disastrous results except in a very limited number of cases where the range section was composed of unusually well trained and specialized men. The spotting section should be a section in addition to the plotting section. It is entirely practicable to put the deviation observers and their instruments in the observing stations alongside the observers for plotting, and even to bridge them on to the intelligence line and bridge the spotting board arm-setters on to the other end of the intelligence line. Often this scheme will save the installation of long telephone lines and it does not interfere to any appreciable extent with the normal use of the intelligence lines.

The spotting section should be in the plotting room or in telephone connection with that room,—since there are certain data that must be taken from the plotting board for use on the spotting board. This however should not be allowed to interfere with the plotting section or add anything to the work of that section. In selecting a spotting system then, it would be best to select one that does not require any plotting room data other than those that may be overheard in the normal operation of the plotting board.

The major inaccuracies in determination of deviations usually are due to inexperience on the part of the spotting observers. *Splashes must be bisected accurately and promptly.* It is not sufficient to caution the observers in this respect. They must have practice.

The opportunity for practice in observation of actual splashes is very limited. First the observers should be trained at the war game board,—or better on a reduced terrain—in the observation of both single splashes and salvo centers. The reduced terrain must be laid out to scale so that the spotting board may be employed and the accuracy of the system checked up with the actual deviations set on the terrain. In addition, when any battery holds either sub-caliber or service practice the entire spotting section should be employed in determining and recording the deviations for comparison later with the deviations plotted from photographs. By keeping complete records in this it will be possible often to go over and analyse the work of the section and discover the author of any errors made.

For long range work, observation of fire from aeroplanes will be necessary. It is to be remembered that in this case, the report of deviations with reference to the battery-target line will not be possible. The report will have to be made in clock code from the direction of travel of the target. For this reason, when aeroplane spotting is employed, even at the shorter ranges, the normal system (clock code) should be used.

A trained aerial observer can report all deviations within 150 yards of the target to the nearest 50 yards with accuracy, and greater deviations to the nearest 100 yards with accuracy. We can adjust satisfactorily with this minimum scale, but we must insist upon accuracy within these limits.

An untrained observer ordinarily will not report deviations with sufficient accuracy for satisfactory adjustment, and it is doubtful if we would be able to get trained observers in war even if every member of the peace-time Air Service were trained in observation of fire. In war that service would require so great expansion that most of its permanent personnel would be required in schools of instruction. It is to be hoped that some day the Coast Artillery will have its own observers and observation planes. In the meantime, however, encouragement should be given to Coast Artillery officers who desire to go up and act as observers during target practice.

In this connection (digression admitted), it will be interesting to note the recommendations of the French Sub-commission of Artillery last year. Their opinion was that if observation squadrons were not attached permanently to the artillery in time of peace, and did not have exercises in common with the artillery, it would be impossible to establish any sort of liaison that would give results in battle. Accordingly it was recommended that observation squadrons be included in

the artillery organization; the instruction of pilots and technical questions of manufacture being left to the Air Service, however.

(j) Adjustment corrections.—The battery commander, or whomso-ever the battery commander has delegated to order range corrections based on observation of fire should have practice with the "deviation bag" until the rules of adjustment in use can be applied instantly. Delay and deliberation during action or practice is utterly inexcusable in that all manner of contingencies may be foreseen and studied in drill and instruction. In the case of an apparently erratic shot, the best rule is to *do something at once.* If the shot appears doubtful it is far better to discard it from present consideration and fire another shot than to upset the routine of the battery and plotting room while someone undertakes to weigh all the various circumstances attending it.

(k) Reduced terrain.—In the December Coast Artillery Information Bulletin appears a short account of the reduced terrain established in the Coast Defenses of Cristobal. The idea is not new, but it probably has been worked out more completely in the Coast Defenses of Cristobal than anywhere else. The value of such exercises can not be overstated. It permits ready development from simple battery exercises to fire and fort (or battle) command exercises, and it is the only way that intensive training in the coordination of the various elements of whole command may be given.

PRACTICAL GUNNERY

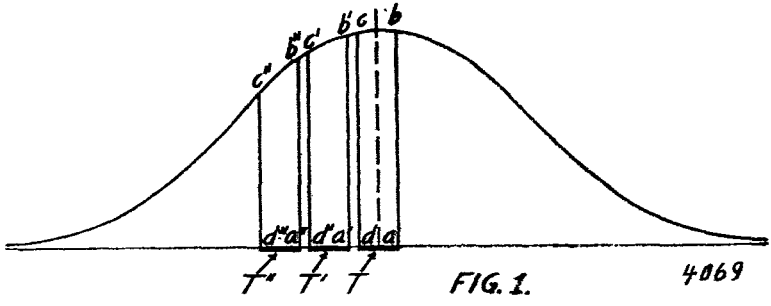
10. The battery commander who is going to train his battery up to the point of battle efficiency *must know gunnery in its practical application to fire against rapidly moving targets.* In this our gunnery texts are deficient, and it is purposed in this article to consider such more or less obscure points as have a direct and immediate influence on proper training and proper conduct of fire. Of these, the most essential are the probable error, the elements of the probable error, and the influence of these separate elements and of the probable error as a whole, upon the methods and conduct of fire.

11. *The probability curve.*—On pages 10, 11 and 12 of "Part IV, Gunnery for Heavy Artillery (Provisional)" we have a probability curve, the equation of the curve and a table of probability factors. Except as a matter of general interest, the only thing about these that really concerns the battery commander of a seacoast battery is the density of the grouping of the shots in the vicinity of the center of impact and the rapidity with which the shots thin out at a distance from the center of impact.

In Fig. 1, we have a target T drawn to the scale of the curve. The center of the target is at the center of impact. The percentage relation of the area a-b-c-d to the entire area included under the curve represents the per cent of hits to be expected on the target in the long run.

If we move T to T′ it is seen that the area a′ b′ c′ d′ is almost as large as the area a-b-c-d; but if we move T to a position T″ such that TT′=T′T″, the area a″ b″ c″ d″ has fallen away much more rapidly.

Thus the lesson, and I am afraid about the only practical lesson, that the *seacoast* battery commander learns from the text is that he must keep his center of impact near the target but in the general case is not justified in making any considerable sacrifice to get exactly on the center of the target. The table of probability factors could be employed to show that if the target is running along in the 50% zone, first on one side of the center of impact and then on the other, the battery commander could properly expect over 90% as many hits as he could with the center of impact always on the center of the target. We will see later how this would properly influence the conduct of fire.



12. *The battery probable error.*—Let us consider the normal procedure in present practice and see what constitutes that probable error with which the battery commander is most concerned.

Suppose all the armament errors could be absolutely eliminated; there still would be dispersion of impacts due to personnel errors.

Suppose we could eliminate all armament and all the personnel errors that would enter into practice at a target running a perfectly straight course. That is, the only error we have left is the error of prediction, or the error due to the target's failure to pursue a straight course through the set-forward point. Then we would have our impacts more or less widely dispersed with reference to the target due to this cause alone. If, in addition, we should base our correction on deviations from the target instead of on deviations from the set-forward point, we would greatly increase the dispersion. To employ deviations *from the target* instead of *from the set-forward* point for the determination of corrections simply has the effect of introducing errors into the spotting system, and the greater the distance from the target to the set-forward point,—or the greater the prediction error—the greater will be the error in the spotting system. Let us see next what will be the effect of errors in spotting.

Suppose we could eliminate all errors, both materiel and personnel, except errors in the determination of the sense and magnitude of deviations from the *set-forward point.* In the course of the firing we are unable to tell where our impacts actually are. All we have to base our conduct of fire upon is what our spotting system tells us. Thus errors in spotting, while they do not alter the *actual* positions of impacts observed and reported, do influence the positions of subsequent impacts. That is, they widen the distribution of the impacts and increase the size of the impact area. If it were possible to eliminate absolutely the armament errors and the personnel errors except those of spotting, we would still have the errors of the spotting system to influence our fire in exactly the same way as would armament errors.

Thus the probable error that concerns us when we fire at a moving target is a function of not only the armament errors, but of the errors of the range section (including errors of prediction), the errors of the gun pointers, the ramming detail, the spotting section, and in general of every error of materiel and personnel that contributes to the distribution of the points of impact and to the enlargement of the total impact area.

13. *Personnel errors.*—Probably the most fruitful scoures of personnel errors are spotting and predicting.

Our attempts at bi-lateral observation of fire for purposes of adjustment, have indicated that the errors often encountered can be eliminated in a very large measure by proper training and by the development of suitable apparatus.

Prediction errors enter once as a direct factor of the final battery probable error in all cases, and when corrections are based directly on deviations *from the target,* the same prediction errors enter a second time through the spotting system. This is an extremely vital point, for under service conditions the average prediction errors will be surprisingly large.

In our target practices, where the target is moving at about one fourth the speed at which an enemy ship would move, we are accustomed to allow the plotter a leeway of ten yards before charging him critically with an error of prediction. Here we may be getting some false ideas from the false condition introduced by the slowly moving target. In this connection, the following extract from a report of the Submarine Defense Association on Automatic Course Indicators may be of interest.

"In July, 1918, in cooperation with the military authorities, the Automatic Course Indicator on the U. S. S. .....was employed in special manoeuvers before certain coast fortifications. * * *

"Mortars are the main coast defense reliance. It is publicly known that they are generally fired in view of three observations, taken at 0 seconds, 30 seconds and 1 minute. The angles and ranges noted on these occasions are used, with corrections, to locate the so-called "pre-

diction point" at the 2nd minute and the "set-forward" point," which adds the time of flight of the projectile. In the case of mortar fire, with its high trajectory, this is between 45 seconds and one minute for most ranges. It is the practice to calculate therefore, for mortar fire, the future position of a vessel from one and three-quarters to two minutes ahead. On a straight course the prediction and set-forward points come close to the vessel's actual course. Figure 25 shows this fact for ranges between 8,000 and 9,000 yards. Inspection of the results shows an average error of 35 yards. In regard to sinuous courses at the same range one finds for course S 1 an average error in the set-forward point of about 90 yards in range and 15 yards in deflection. On inspecting Cam 3 course one finds the errors are very great in the determination of the set-forward point. The Cam 3 course run at 8,000 yards range shows average errors in the location of the set-forward point of 175 yards longitudinally and 110 yards laterally. These errors are what may be ordinarily expected in mortar firing at a vessel steering an "S" course. The sinuous course causes a loss in hitting power of mortar batteries of about 50%. * * * *

"In regard to gun fire, a lesser but very material error is introduced. In the case of 12" guns the prediction interval is only 30 seconds and time of flight from 15 to 30 seconds. The error appears to be proportional or nearly so to the time interval at which the future position of the ship on the "S" course must be guessed. On a straight course the average error in the set-forward point is about 24 yards. With the target head-on when steering an "S" course, at ranges between 7,000 and 12,000 yards, the total probability of hitting is reduced by 25% and with the target broadside, the sinuous course at 8,000 yards reduces the longitudinal probability of hitting about 10%." * * *

It appears then that the average error of prediction,—always large as compared to our target practice results, may vary through very wide limits, depending not only upon the degree of training of the personnel but also upon the special conditions of the moment; and that even during the continuance of fire on a single target, the average error of prediction may change very considerably in magnitude as the target changes its course and presentation to the battery.

I think there can be no doubt whatever as to the fairness of this test, and that any battery commander will get about the same results when he first tries out a plotter who has not had experience with such courses. He will find, however, that after practice with courses made up on the plotting board as previously suggested, the same plotter will reduce very greatly his average error of prediction.

These sinuous courses represent normal battle conditions, and the plotter who has not been trained in them is not qualified for his position even if he can plot through a dozen normal target practices without an error.

In plotting such courses, the errors of prediction will be large at best, and if we wish to reduce them from a double to a single factor in our probable error, or unit of measure for adjustment, we must *determine our deviations from the set-forward point.* We may quite properly

determine first the deviations of impacts from the target and then reduce them to deviations from the set-forward points, but to attempt under battle conditions to base our corrections directly on deviations from the target is equivalent to increasing the battery probable error entirely beyond reasonable limits.

14. *Armament errors.*—Some of us have become accustomed to thinking of armament errors and armament probable errors as those determined by fire at a fixed target. In firing at a moving target we introduce not only the normal field inaccuracies that contribute to the usual field probable error considered in text books but we introduce another factor that may and normally does contribute to a very considerable further increase in the *practical* armament probable error.

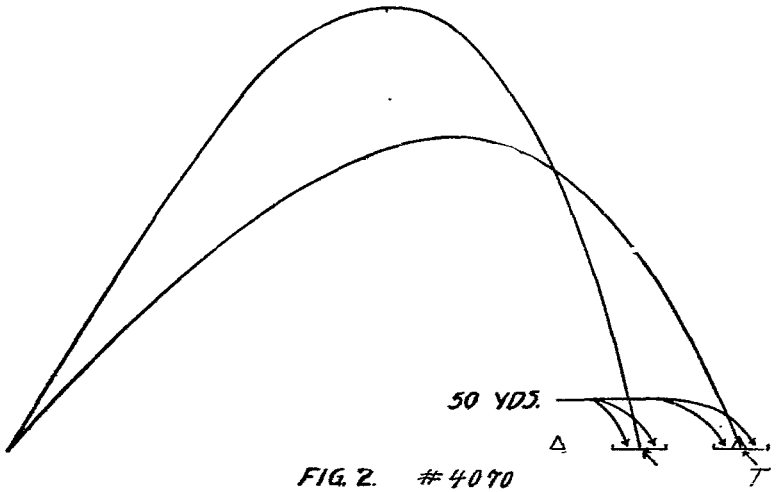


FIG. 2. #4070

To illustrate, suppose that a certain mortar in zone VIII will develop an armament probable error of 50 yards when fired at elevation 50°, and will develop the same probable error at any other one elevation between 50° and 60° in the same zone. Then in firing at a moving target which is changing in range from that corresponding to elevation 50° to that corresponding to elevation 60°, our *practical* armament probable error is 50 yards *only when the center of impact remains in the same position relative to the target.*

In Figure 2, with elevation 50°, the center of impact may be at T, the range table range for that elevation; while with elevation 60° the center of impact may be at I, a considerable distance from T′ which is the range table range for 60° elevation. Now in firing at a target moving from T to T′ our *fixed target* probable error will remain 50 yards, but our center of impact will travel only from T to I, and the armament probable error as we determine it, i. e., by measured deviations from the moving target, will be considerably more than 50 yards.

This is not at all an unusual condition. In fact it is the normal condition with mortars. In Figure 2 it is very readily seen how the wind effect on the trajectory with the greater maximum ordinate and greater time of flight will be different from that in the case of the trajectory with the lesser maximum ordinate and lesser time of flight.

Frequently a similar effect is noted when the elevation remains practically constant but the direction of the target from the battery varies. For example, in the study of a recent mortar target practice in which all the shots were fired in the same zone and with only slight elevation changes, the conditions that obtained were as follows:

(a). The target, at a range of about 9000 yards, ran a course approximately on an arc of about 50 degrees, with the battery as a center.

(b). The deviations from the target when stripped of personnel errors and adjustment corrections were such that the center of impact was found to be 100 yards short of the target. With this center of impact the errors averaged about 80 yards, making the developed *armament* probable error about 68 yards.

(c). The shots were then plotted in their true directions as in Figure 3, in the attempt to account for the large armament probable error developed.

In Figure 3, B is the battery and TT is the course of the target.

The radial lines are the actual directions of the several shots fired.

The points on the radial lines are the corrected positions of the impacts, i. e., they are the positions as determined by the analysis, that the impacts would have had if no personnel errors and no adjustment corrections had been made. In plotting these points the scale has been exaggerated in order to make the several lines show up more clearly.

The mean deviation from the target is -100 yards. The line *cc* drawn parallel to the arc TT and 100 yards inside that arc then represents the center of impact as we determine it in fire at moving targets.

The mean deviation of the several impacts from the line *cc*, or the *mean armament error*, as we determine it in our practice, is 80 yards, and the probable error is $80 \times 0.845 = 68$ yards.

Now if we draw an approximate mean curve, KK, through the plotted points we see that the tendency of the curve is to deviate more and more from the target line (TT) as the target travels to the right. That is, the trajectories have been influenced by a ballistic wind from about the direction indicated.

The line KK then represents approximately the center of impact corrected for the varying wind effect that has resulted from the varying direction of fire; and deviations measured from this line would be approximately the armament errors that would have obtained in fire confined to only one direction, or fire at a fixed target.

This tendency of the center of impact to "slip" off the target as the target changes its position in range or direction is much more marked

in mortars than it is in guns. If we could determine exactly the deviating causes and their effects and could apply exact corrections we could prevent entirely this apparent "slip." In the comparatively flat trajectories much more effective corrections can be applied than in high angle fire, but our corrections never exactly fit the conditions.

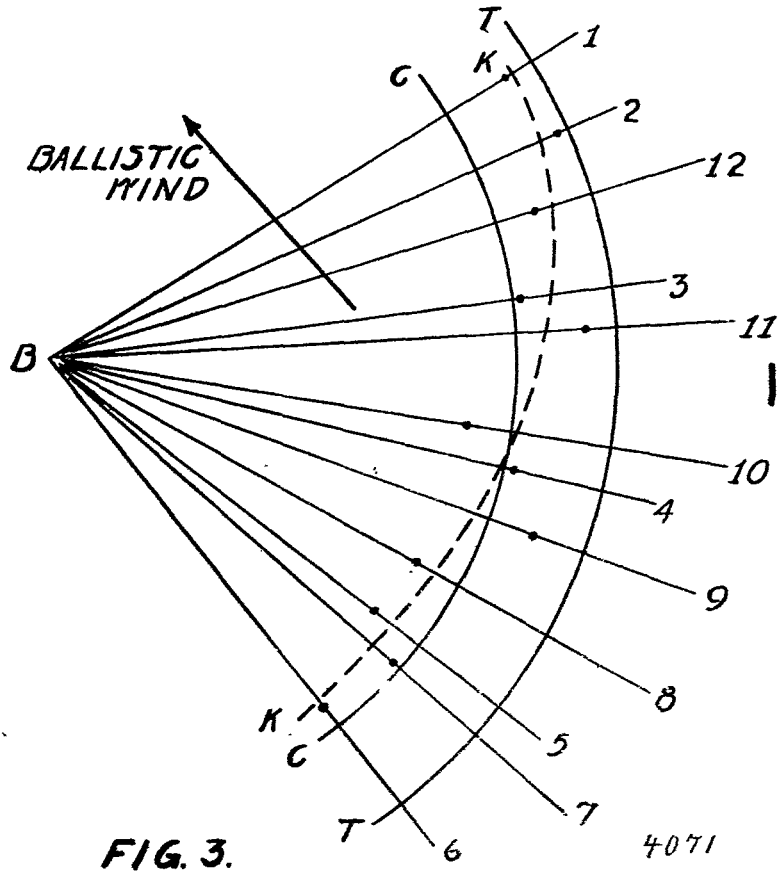


FIG. 3.

Among officers of limited experience, the idea seems to be more or less prevalent that once a *gun* battery is adjusted on a target, it will remain adjusted, however much the target may change its position in the field of fire. For this reason I am going into a more detailed discussion of this subject than would be justified otherwise.

In firing guns, we assume that a deviation otherwise unaccounted for is due to a variation in the developed muzzle velocity from the standard. In 1914 General (then Colonel) Ruckman made an exhaustive study in the office of the Chief of Coast Artillery of the target practice records of the past several years. In his report, which I believe was not generally distributed, Colonel Ruckman said:

"It is here confidently stated that we are working on a false basis when we attribute all erratic results in range to powder. With careful blending such as now generally obtained it is not reasonable to assume that the same powder for the same blend will within a few days change its muzzle velocity by 30 to 50 feet and the same amount in the opposite direction the following year."

In any one position of the target the deviation of the center of impact may be corrected on the velocity curves of the range board; but unless the deviation is actually due to a variation of the velocity from the standard, we may expect that as the target changes position, the center of impact will move with respect to the target as illustrated by the lines TT and KK in Figure 3, except in a lesser degree.

This is perfectly understandable when we consider that not only are our determinations of atmospheric conditions and our correction formulae both more or less approximations, but that there are deviating causes of which we do not pretend to take account. For instance, at long ranges the deviating effect of the earth's rotation is considerable, yet we take no account of it. Again, in the new range table for the 8" howitzer we find a new set of correction curves;—those for temperature (elasticity), a correction which heretofore has not been considered. From these curves we see that at 10,000 yards the correction varies through a range of about 320 yards as the temperature varies from 32° F to 90°F. Deviations due to these causes, and corresponding corrections applied on the velocity curves would of course introduce inaccuracies for all other positions of the target than that at which the correction was originally determined. [The range variation due to temperature (elasticity) is at its maximum for velocities around 1500 f. s. and would be of less importance for flat trajectories.]

In addition to discrepancies of the nature noted above, the manner and order of applying the various corrections introduce inaccuracies. In the general case a change in muzzle velocity entails a change in ballistic coefficient. The method we follow in applying corrections by means of the range board is to make the muzzle velocity correction, ignoring the change in C due to change in V, and to make the atmospheric correction based on the original V and C. The theoretically correct way would be to make the muzzle velocity correction, taking into account the change in C due to the change in V, and to make the atmospheric correction computed for the actual V and C. For a 14" gun at 20° elevation the error thus introduced has been determined by the Ordnance Department to be approximately 200 meters for a 10% increase in atmosphere and an increase in muzzle velocity of 30 meters per second.

Thus not only is it an established fact that the center of impact of a gun battery once placed on the target, in the general case will not remain there as the target changes its position in the field of fire, but

there is no real reason for assuming that it would remain so placed. For this reason continuous observation and adjustment of fire will be necessary.

Also, in these circumstances it would not be correct to employ the "deviation bag" in the usual way for instruction in adjustment of fire at moving targets. We may quite reasonably assume that in firing guns at a target whose speed is from 600 yards to 1200 yards per minute and whose range is 10,000 yards or more, the "slip" in the center of impact will average at least ten yards between adjustment shots. In firing mortars a similar "slip" of 20 yards or more between adjustment shots would not be abnormal at any range whatever. So, in adapting the "deviation bag" to the moving target problem we should proceed as in the following example:

(a) Assume that the ultimate center of impact at the instant of the first impact is 300 yards beyond the target, and that the rate of movement of the center of impact with reference to the target is +20 yards per firing interval.

(b) Assume a probable error of 80 yards. This is not the *armament* probable error described in gunnery texts, but is one eighth the total zone of dispersion that we anticipate will be developed due to a combination of materiel and personnel errors.

(c) Suppose the first five deviations we draw to be +2, +1½, −½, +1 and −½. These fractional parts of a probable error, when reduced to yards, would be +160, +120, −40, +80 and −40.

(d) The "deviations if no corrections are applied" then will be +300 +160 = +460, +320 +120 = −440, +340 −40 = +300, +360 +80 = +440 and +380 −40 = +340.

In this way should the initial data for all moving target adjustment problems be determined, and it is by problems of this kind that rules and methods of adjustment must be tested and practice in adjustment obtained. Unless we introduce the moving target features, we are certain to come to some erroneous conclusions in solving these theoretical problems.

For our Coast Artillery purposes, we must broaden very considerably the text-book conception of a probable error and must realize that there is no such thing as an "ultimate center of impact" when we are dealing with moving targets.

15. *The practical use of the probable error.*—How many times have we read such statements as "all methods of adjustment of fire make use of the probable errors of the pieces being used," or "The proper basis for adjustment of fire is the probable error"? We never question them, but ordinarily we go merrily along with our adjustment and our firing without ever a thought of the probable error. In fact, most of us, if asked what real use is to be made of the probable error, would discover that we really had never thought much about it.

The text-book probable error itself is of no consequence to the sea-coast battery commander except in so far as it is a factor of the *battery* probable error, or unit of measure, or correction unit, or whatever he may choose to call that value that he predicts will be his battery coefficient of effectiveness in fire. This latter has a very important bearing. It tells him when he is adjusted and when he is not adjusted.

One may not take a fixed value and say for instance; "any 12-inch gun battery must be within 50 yards of the target at a range of 8,000 yards before the adjustment is sufficient to warrant opening fire for effect." To do so is to employ adjustment of fire for the sole purpose of measuring the efficiency of the battery.

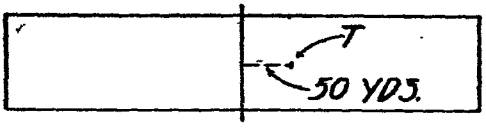


FIG. 4.

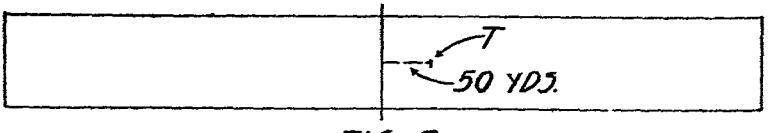


FIG. 5

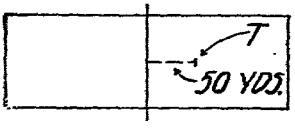


FIG. 6.

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If we have a battery (manned by average personnel) in which the total zone of dispersion is as indicated in Fig. 4, and if by a reasonable number of adjustment shots we may expect to place the center of impact within 50 yards of the target; then with a battery (manned by poorly trained personnel) whose total zone of dispersion is as indicated in Figure 5, we could not expect to place the center of impact within 50 yards of the target in the same number of shots. On the other hand if our personnel is exceptionally well trained and the total zone of dispersion is as indicated in Fig. 6, then when our center of impact is within 50 yards of the target we certainly are not adjusted.

Now these figures are not at all overdrawn or exaggerated. In the past three years the battery probable errors developed in target practices

throughout the Coast Artillery have been anywhere from 50 yards to several hundred yards, depending mainly on the battery personnel and the conditions under which the firings were held.

Adjustment is not a target practice expedient,—neither is it a yard stick to measure or compare the efficiency of our batteries. It is *a war measure to develop the maximum hitting power of the particular battery firing.* Whether that battery is good, medium or poor is not the issue. Whatever it may be, its own individual hitting power must be developed by adjustment of fire.

What constitutes an adjustment in each particular case depends necessarily upon the total zone of dispersion. We may properly take some fractional part of the total zone of dispersion as a coefficient of effectiveness; and that fractional part may be such that when the center of impact is within that distance of the target, a better adjustment can not be obtained, in the general case, with a reasonable expenditure of ammunition. The correct fraction to be employed is generally considered to be one eighth, but it is to be remembered that one eighth of the length of the total zone of dispersion and one *armament probable error* are two entirely different things.

The battery commander, if he would develop the maximum fighting power of his battery, must be able to anticipate approximately what coefficient of effectiveness he will be able to develop, and he must be prepared to increase or decrease that figure to conform to the conditions that develop in action.

The effect of assuming too large a coefficient, or unit of measure, will be to expedite the attainment of the conditions established, but the adjustment will not be satisfactory. The effect of assuming too small a coefficient, or unit of measure, will be to prolong unduly the slow adjusting fire of the battery.

The amount of time and ammunition that we may expend in slow deliberate fire, primarily for adjustment, will depend in all cases on the tactical situation. We may not anticipate that ample time and ample ammunition will always be available for a very close adjustment before we have to open more rapid fire for effect. Sometimes we will find it necessary to get the best adjustment possible with a limited expenditure of time and ammunition and make up a reasonable deficiency by additional ammunition expenditure.

As an illustration, let us consider a mortar battery. Ordinarily we can get our center of impact within a distance of one *battery* probable error of the target in four shots fired at two-minute intervals. Thus we may take eight minutes for such adjustment and in the next seven minutes we can fire $7 \times 4 = 28$ shots for effect. The effect of the fire of this fifteen minutes will be far greater than that wherein we take six shots for adjustment (12 minutes) and fire only $3 \times 4 = 12$ shots for effect, even if the additional two shots for adjustment would put our

center of impact exactly on the center of the target. According to the laws of dispersion the 28 shots fired with the center of impact one probable error off the target would be equivalent approximately to $0.80 \times 28 = 22$ shots fired with the center of impact exactly on the target. Thus the ratio of effect in the two cases would be something like 26 to 18.

This example is not intended to be an argument against the employment of salvo fire for adjustment when the situation demands it. It is merely to show the relation between time and effect. It probably would be reasonable to assume, however, that in the general case, battery fire at an enemy ship would be conducted as described below.

The tactical employment of the battery.—Throughout his training the battery commander must have in mind a perfectly clear-cut idea of how he probably would employ his battery in action against an enemy, and he must direct his training efforts with that scheme of employment constantly in view.

It is reasonable to assume that fire at an enemy would be opened and continued about as follows:

(a) By firing single shots, adjusting after each shot, until the target is included in the total zone of dispersion.

(b) Continuing to fire single shots (or firing single salvos in case the tactical situation appears to demand quick adjustment and early effective fire at the expense of additional ammunition) and correcting after each shot (or salvo) until it is evident that a fair adjustment has been obtained.

(c) After this, by firing bursts of two or more salvos per burst, the number of salvos per burst depending upon the tactical situation and the necessity for early effective fire. Between bursts, making such corrections as are necessary to maintain or improve the original adjustment.

These three stages correspond in a general way to "trial fire," "improvement fire" and "fire for effect," discussed in gunnery texts under adjustment of fire at fixed targets; but the means of determining the completion of each of the first two stages and the general conduct of fire throughout the three stages may not follow the field artillery methods, but must conform to the conditions existing.

The first stage may be considered to be completed when one shot falls within a distance of the target equal to one *battery* probable error. The second stage may be considered to be completed when certain other conditions are fulfilled. In the third stage, it may not be assumed that continuous observation and adjustment of fire will be no longer needed. It is quite possible that at some time there may be a phase of combat in which observation of fire will be impossible and in which it will be necessary to rely solely on the adjustment obtained some time before. On the other hand it is highly probable that there will be phases of combat

which call for slow deliberate fire. In this case, the third (fire for effect) stage will not be entered, but the second (improvement fire) stage nevertheless will have for its main object the delivery of effective fire. Therefore in the second (improvement fire) stage, every effort must be made to make each adjustment shot also an effective shot.

17. *Adjustment of fire.*—Quoting again from Colonel Ruckman's report, he states with reference to the method of adjustment of fire: "It must adapt itself to instruction in time of peace and to practice equally well in time of war, passing from one to the other without delay or change in procedure." And again, "As all peace methods, however, have no proper function unless they prepare all concerned for operation in time of war, a system of directing and controlling Coast Artillery fire which does not contemplate and adapt itself automatically and without revision to circumstances of war must be characterized as defective."

In selecting a method of adjustment, a battery commander should first study it closely to see that it fulfills what we may term the technical and tactical service conditions as follows:

(a) Technical.—To furnish a method of *fair* adjustment with a limited number of shots or better adjustment with additional shots; to give an indication of "adjustment completed," to provide for maintenance of adjustment, i. e., to take into account the creeping of the center of impact, and in addition to be readily adaptable to any battery probable error being developed.

(b) Tactical.—To fit in with and further the tactical employment of the battery in war.

Next the method should be tested for simplicity and accuracy. Its simplicity can be determined at drill and in the instruction of enlisted men. Its accuracy can be determined by means of the "deviation bag" as described above and by sub-caliber and minor caliber firings.

When adjusting by the method of successive approximations the battery commander must supplement the rules as follows: First, set a condition which, when attained, will indicate with reasonable certainty that the battery is adjusted and may proceed to more rapid fire for effect. Second, devise rules for maintaining the adjustment or for re-adjusting without going through the long slow process of "successive approximations" in the course of active engagement.

With reference to the long-standing controversy as to whether or not the first shot of a series is most likely to be erratic, and consequently whether correction should be made for the full deviation or only one half the deviation of the second shot, some very interesting data may be obtained from Colonel Ruckman's report previously quoted. His conclusion, based upon a study and analysis of over 2,000 trial shots from 8-inch, 10-inch and 12-inch guns, and made with a view to de-

termining among other things which shots in a series were most likely to be erratic, was in part as follows:

"These (results) may be interpreted as meaning that the 8" gun is falling away to steady and uniform action with the third shot, that the 10" gun has passed through the maximum irregularity with the second shot and is settling down as in the previous case with the third, and that the irregularity for the 12" gun reaches its maximum near the third shot. For the years 1911 and 1912 when four trials were used, the indications are that the alleged irregularity decreases therewith."

With reference to mortar trial shots, his conclusions are in part as follows:

"Trial shots in mortar practice are valuable only in obtaining an approximate correction for record practice. These corrections are applicable only when the practice promptly follows the firing of the trial shots and is executed over practically the same field of fire. Any value attaching to trial shots in this case speedily vanishes with lapse of time or change in field of fire or zone."

18. *Adjustment of minor calibers.*—In firing a 6-inch or smaller seacoast battery it is conceivable that when measured deviations can not be obtained, one would resort to bracketing. In this the text books give us no reasonable ideas whatever.

To him who is inclined to contradict this last statement, I only suggest that he lay out on his plotting board a reasonable course for a naval target and then try to adjust on it by bracketing as follows:

(a) After laying out the course, take off and record the position of the target at each observing interval. A fair and reasonable speed to assume would be 900 yards per minute.

(b) Assume that the position finding system is giving absolutely accurate results (which it will not), and post the position data at the proper intervals.

(c) Take any text book method and example of bracketing and follow it out,—making proper allowance for time of flight, determination of correction data, application of corrections and service of the piece.

(d) See where the target is when the adjustment is completed.

(e) Consider the number of guns the enemy has turned on the battery from the moment it first opened fire and fairly discount the battery work accordingly; then draw your conclusions.

Any proper method of procedure in adjustment, or in anything else, must be based upon or must conform to the conditions under which it operates. There is no text book method of bracketing that was based upon or intended to conform to the conditions introduced by one or more rapidly moving targets with all guns in action against the exposed attacking land batteries.

In observing fire by any method other than the simplest form of spotting from a single point (usually at or near the battery firing), it is practicaable to determine the approximate magnitude of deviations as

well as the sense of the deviations. When the approximate magnitude of deviations can be determined there is no reason for following a bracketing method in adjusting.

When spotting from the battery or from a position such that only the sense of deviations can be determined, the simplest and most elementary form of bracketing must be resorted to. To deal with forks and fractions of forks and proportional elevation changes and other such deliberate means will never appeal to the officer with ability to visualize the circumstances in which he must operate in action. It is utterly impossible to apply corrections in odd numbers in rapid fire. All corrections must be in multiples of 50 yards. A "short" can be spotted with much greater certainty than an "over" and advantage must be taken of the fact. Corrections should be bold to obtain the first "short," and then they should be conservative,—creeping up, as it were, to the point where nearly half the shots are spotted "short."

19. *Awards for exceptionally meritorious conduct in peace.*—Some day our seacoast batteries may be called upon to fire on an invading enemy. After that Congress may award a leather medal to all those battery commanders who have defied the conventional target practice ideas and have squarely faced the real vital problems. The target practice problems has been studied from every point of view, and it is easy to obtain expert advice on how to take advantage of its weaknesses and get the greatest number of hits out of the least number of shots. The real problem has not had nearly so much mental effort expended upon it and offers a fair field to those battery (and other) commanders who are full of energy, indifferent to criticism, and who would not mind occasionally having to explain something by endorsement.

Second Prize, Essay Competition, 1921

The Organization of a Harbor Defense for War

By Captain J. D. MacMullen, C. A. C.

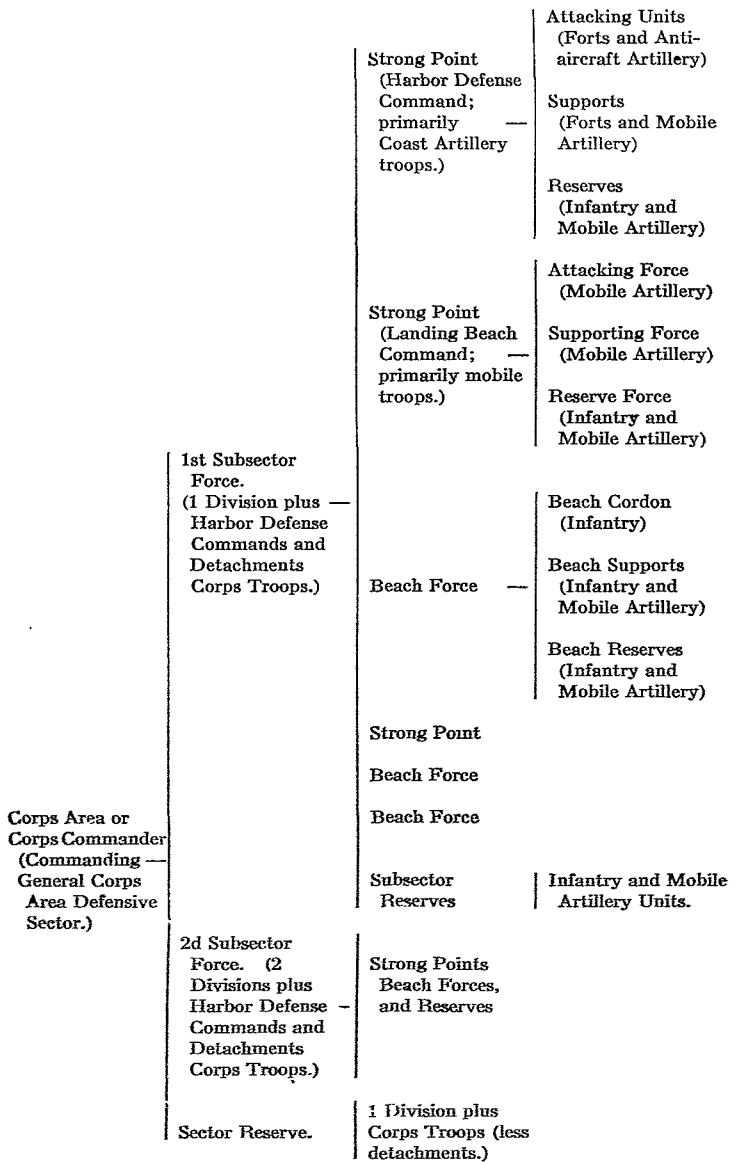
IT became natural in the good old days of fierce insular pride for the Coast Artillery Corps to think of itself as being made up of a number of small, semi-independent, highly specialized commands, each intrusted with the defense of its own harbor entrance against enemy attack from the seaward. There was no idea of combat liaison with units of the mobile army operating in the vicinity—in fact, the mobile force was regarded simply as an agency to prevent a depraved enemy from landing at an undefended point and basely attacking the fortifications from the landward side, and as a convenient source from which certain luckless small units might be pilfered with the object of setting them at various menial tasks as Artillery Supports.

This being the case preparations for war were extremely simple. Boards of officers were convened from time to time to study plans for the utilization of these Artillery Supports when a benign Providence would provide them, for an Information Service, and for a series of "Battle Orders" (even Coast Artillery strategy was held to be of so special a nature that a series of sterotyped orders might be prepared, to be drawn out of a hat as desired, the whole idea being very much the same as Bernard Shaw's "Important Decisions Machine".) Further than this nothing was allowed to interrupt the noiseless tenor of administrative routine and formal service and small arms practice. No tactical functions were prescribed for the Coast Defense Commander, it being assumed that he would take over the duties of "The Senior Fort Commander" in the event of hostilities. The fort commands and their staffs were fairly well organized, but a war staff for the coast defenses was in most cases unthought of. The various coast defense headquarters were organized on a peace-time administrative basis, and no plans were made for supply and evacuation in time of war, for liaison with the Navy and other arms, or for the participation of the coast defenses in any general scheme of coastal operations.

This Olympian state of affairs has been rudely jarred by the Joint Army and Navy Board in its enunciation of the principles of an active system of coast defense. In this system the coast or harbor defense fortifications become strong points of the defensive subsector in which

located, and it is obvious that the garrisons of these strong points must be prepared to function as units of the mobile army under a higher commander who may or may not be an artillery officer. This plan of defense establishes the organization of a corps area defensive sector to be somewhat like the outline shown below.

Organization of a Corps Area Defensive Sector.



It will be seen from this diagram that the present Coast Artillery District command has no place as a tactical entity (the District Commander becoming either the commander of a subsector in which artillery units predominate—i. e., strong-points—or the Chief of Corps Artillery) and that the harbor defenses must be so organized that they may perform the functions of a reenforced Artillery Brigade, or Grouping.

In order to study the organization in detail of one of these harbor defense strong-points, let us take as an example the Coast Defenses of Portsmouth, situated at the entrance to Portsmouth Harbor in the

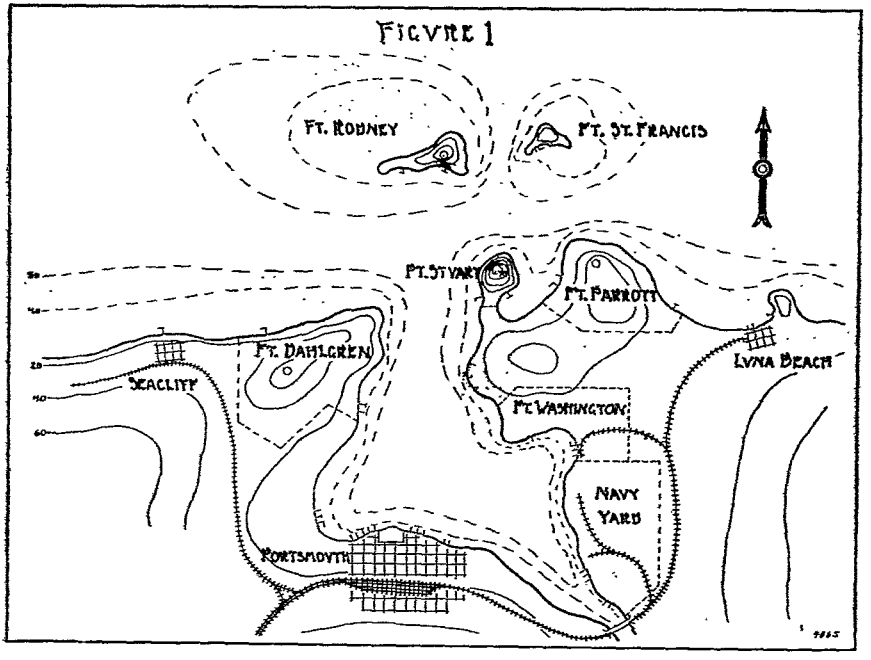


FIG. 1.

XIV Corps Area. Portsmouth is an important city of about 150,000 inhabitants, is the center of important shipping, shipbuilding, manufacturing, and railroad activities, and is the seat of the headquarters of the 22d Naval District. Corps Area Headquarters is located in the city of Harrison, 200 miles to the southwest.

The Coast Defenses consist of Forts Dahlgren, Rodney, St. Francis, and Parrott, with headquarters at Fort Rodney. Considerable thought has been given to the organization of the Fort Commands, and they have been equipped with the fixed and railway armament called for by the approved plan for the defense of the Corps Area coast line. This armament is as follows:

Table showing the armament of The Harbor Defenses of Portsmouth

Fort Dahlgren	4—16-inch Howitzers
	4—14-inch Railway Guns
	4—12-inch Guns
	8—12-inch Mortars
	20—6-inch Guns
	Mine Command
Fort Rodney	4—16-inch Howitzers
	4—12-inch Guns
	8—12-inch Mortars
	12—6-inch Guns
	Mine Command
Fort St. Francis	4—14-inch Guns.
	8—6-inch Guns.
Fort Parrott	4—16-inch Howitzers
	4—14-inch Railway Guns
	16—6-inch Guns

In addition to this armament the approved plans call for one regiment of railway artillery, one regiment of tractor artillery, and two regiments of anti-aircraft artillery (all Corps Troops: National Guard and Organized Reserves) to be assigned to the Coast Defenses in case of threatened hostilities. The assignment of infantry and other troops has not yet been worked out. Plans on file for the establishment of an Artillery Information Service and for the use of Artillery Supports are considered to be incomplete and to require modernization. No other preparations for a war organization have been made.

The peace organization of the defenses is as follows: The Coast Defense staff consists of an Adjutant, a Personnel Adjutant, a Quartermaster, an Artillery Engineer, an Ordnance Officer, an E. and R. Officer, a Finance Officer, and a Chaplain. Practically all of the time of these officers is taken up with administrative routine. The Coast Defense Headquarters Company at Fort Rodney (consisting of a band, the personnel of coast defense headquarters—Artillery, Ordnance and other troops, and students at the Noncommissioned Officers' School) has one captain and two lieutenants. The Fort Headquarters Company at each post (consisting of the personnel on duty at each fort headquarters—Medical, Ordnance, and Quartermaster troops, and the various special duty men) has a captain (Fort Adjutant) and two lieutenants (one is Materiel Officer, and the other Post Exchange and E. and R. Officer). The gun, mortar, mine, and anti-aircraft gun and machine gun companies are organized as on any other post.

The tactical command has been well thought out up to and including

the fort commands. Each Fort Commander has an anti-aircraft artillery command under him (consisting of a four-gun battery, a machine gun Company, and a section of four searchlights), which corresponds with a fire command. No provision has been made for captive or dirigible balloons or for observation planes as a part of the Coast Defense Command. No station has been provided for the Coast Defense Commander as such, nor have any tactical duties been laid down for him, it being assumed in furtherance of former Coast Artillery practice that he would assume the duties of a "Battle Command" or "Senior Fort Commander" (these two terms have been loosely and indiscriminately used) in time of war.

This assumption does not fit in with the present ideas on the subject of Coast Artillery Tactics, the study by the Coast Artillery Board entitled "Tactical Employment of Heavy Artillery," stating:

"THE SYSTEM OF COMMAND"

"A consideration of the speed of naval vessels and of the characteristics of naval attacks on land defenses, shows that in a combat between land artillery and naval vessels the intensity and rapidity of action will be very great. It is evident that one commander, no matter how numerous and able his staff, can deal with only a limited number of subordinate commanders.

"In the case of fortifications defending a harbor, the conditions of the combat render it imperative that all of the artillery and services auxiliary thereto, covering an entrance or water area, be under one superior artillery commander. In many cases this armament is divided in groups or forts in different localities, all bearing on the same general water area. In such cases the superior artillery commander, designated in our service as a Coast Defense Commander, would deal only with the local commanders of forts or other concentrations of heavy artillery. He has definite tactical duties and must have a definite post of command. The fort commanders and commanders of other heavy artillery, due to the involved and shifting conditions of combat, must be given great liberty of action.

"A fort commander or commander of the artillery of an area must direct personally or closely supervise the direction of so much of the general obsservation service and illuminating service as is not under the direct control of the Coast Defense Commander. He may command land defense units of infantry, machine guns and artillery; units of secondary armament; units of primary armamant; units of anti-aircraft; controlled mine fields; and probably, in the future, automobile torpedo units.

"During combat he should deal only with the following commanders one land defense commander; one commander of anti-aircraft artillery; one commander or staff officer in charge of the general observation and

information services; one commander or staff officer in charge of the illuminating service * * * * *". (In addition he would have group or fire commanders, an anti-aricraft artillery commander, and a mine commander who would have charge of controlled mines and automobile torpedoes—Author.)

Let us take this statement of principles as our guide and proceed to consider the needs of the Coast Defenses of Portsmouth (or rather let us call them the Harbor Defenses of Portsmouth, to be in accord with the new nomenclature,) with reference to a war organization.

THE HARBOR DEFENSE COMMAND

I. ORGANIZATION AND STAFF

It is proposed that the Harbor Defense Command be organized for tactical purposes into three Battle Commands—the first to consist of Fort Dahlgren, the second of Forts Rodney and St. Francis, with the Command Post at Rodney, and the third of Fort Parrott—plus supporting and reserve forces, and that the Staff be organized on a four-section basis, similar to that of the General Staff. The proposed organization is shown on page 422.

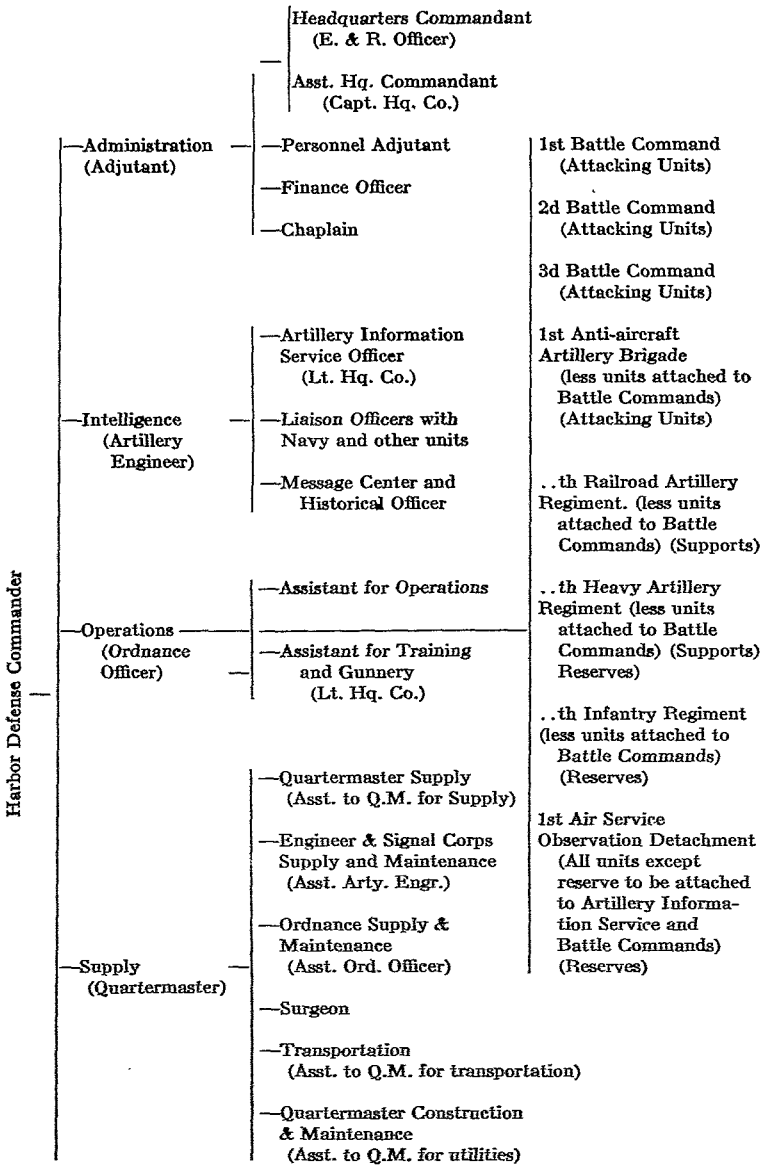
The above organization is tactical only, the term "Battle Command" being used to emphasize this and for the sake of clearness. Each present "Fort Command" will lose its identity as such under war conditions, the whole Harbor Defenses becoming one "Post" for administrative purposes and the "Battle Commanders" dealing with the Fire and other Commanders under them. This organization, as far as the staff is concerned, can be evolved from the present one with very little confusion. The officers of the present peace (or administrative) staff who are best fitted from the nature of their present duties to perform the necessary war functions are indicated in parentheses in this table. To bring it about either the peace staff may be left as it is, with the officers indicated given the additional duty of preparing and keeping up plans for the carrying out of their war functions, or else the more desirable action can be taken of putting the staff on a permanent war basis, as is done in other branches of the service and in our own Regiments.

This organization chart provides a staff corresponding with War Department instructions for the organization of the General Staffs of units with or under which the Harbor Defenses will function in time of war. A study of General Order 41, War Department, 1921, and of the special requirements (few in number) of immobilized units, indicates that the functions of the four Staff sections indicated above should be about as follows:

Functions of the Administrative Section. This section should have control over all matters of routine and administrative detail with the exception of Supply, Transportation and Construction.

Organization of the Harbor Defense Command

Harbor Defenses of Portsmouth



NOTE: In war time administrative and supply officers have direct control over their activities in the various forts.

It is the office of record for all papers dealing with activities under its control, and handles all matters of personnel, including the procurement and recruit training of replacements (the latter conducted by the Headquarters Commandant, who also has charge of the military police, permanent watchmen, and the interior guard.) It has administrative control over the combat units and the activities of the technical advisers of the Coast Defense Commander, and controls all welfare and similar work. It issues Administrative (General and Special) or G-1 Orders, Memorandums, and Bulletins. (Orders establishing regulations for troop movements, etc., to be issued by this section after a conference with Operations. They may be issued before or after the Operations Order directing the move, as the circumstances may require.)

Functions of the Intelligence Section. This section controls the following activities: the Information Service, divided if necessary into districts and comprising patrols, observation and signal stations, "listening mines," and other similar apparatus; the Intelligence Police; liaison with other arms, particularly the supporting troops, the Air Service, and the Navy; maps and surveys; codes and ciphers; censorship; communications; historical data compilation; maintenance of the "Order of Battle," showing enemy activities as reported from all sources; and technical operation of the message centre (this activity under Operations for tactical control)

Functions of the Operations Section. This section is divided as follows:

Military Operations, including the preparation and issue of Operations (G-3) Orders, Warning Orders, and Messages.

Training, including training in Gunnery and special instruction in unit schools and elsewhere. (Note: All schools under Administration Section for administrative control.)

War Plans, and

Studies of Organization and Equipment.

Functions of the Supply Section. These comprise:

Procurement and issue of all classes of supplies.

Supply plans.

Transportation.

Disposition of supply troops (after consultation with Operations.)

Evacuation of the sick and wounded.

Property.

Construction.

Maintenance and repair of all equipment.

It will be noted that no Chief of Staff is provided. It is believed that this official is not necessary in a command of this size and one relieved as this one is of the complications incident to the movements of large

bodies of troops. The Operations Officer can readily act as Chief of the Operating (or Tactical) Staff and the Administrative Officer (Adjutant) can continue to supervise the activities of the Administrative Staff much as he does now.

II. Location and Organization of Command Post

The present location at Fort Rodney is faulty in that the Harbor Defense Commander should have his tactical station at such a point that communication with all elements of his command including his supports, reserves, and supply base and with higher authority will be as easy as possible. He should not be in the "Front Line" for the same reason that a division commander should not be there (i. e., events occurring around him attain an undue importance in his eyes and he cannot help from interfering with the functions of the subordinate commander with whom he is in immediate contact, leaving the rest of the command to shift for itself to a considerable extent,) but should be far enough back so that all information reaching him from below will be given equal weight—yet not far enough back for his communications to suffer.

In the particular case under consideration it is believed that the Harbor Defense Commander should establish his "P. C." on the Lighthouse Reservation on Point Stuart, which is situated in the center of the fixed elements of his command and from which communication with railway, mobile, and anti-aircraft artillery and with the Infantry under him, with the elements of the Information Service and with Navy and Air Service Units with which he must maintain close liaison, will be easy. He may also keep in touch with administrative and supply functions from this location, which is in every way superior to Fort Rodney.

Consequently this reservation or part of it should be taken over by the War Department in peace time, and shelters for commissioned and enlisted personnel and a command post should be built thereon. All these buildings should be bomb-proofed. (This does not mean that they should merely be made "splinter-proof." At least 30 feet of earth or its equivalent in armored concrete should be provided.) No batteries and no searchlights, and no stations except observation and signal stations should be constructed here. Provision should be made for a captive balloon and for seaplanes, which will be used exclusively by the Harbor Defense Information Service.

The Harbor Defense Command Post should be constructed as indicated by Fig. 2.

Its various activities function as follows:

Artillery Information Service Division: The A. I. S. Officer controls and is responsible for the technical maintenance of all means of communication, for the upkeep of all observation and signal stations, sound ranging and flash ranging sections, and other means of gathering information, and for the instruction of the personnel of these stations

and of his patrols and runners. Information obtained by any of his agencies is transmitted by the most suitable means of communication available to the Harbor Defense P. C., the station sending this information by wire, telegraph, or radio link being switched onto one of the Mes-

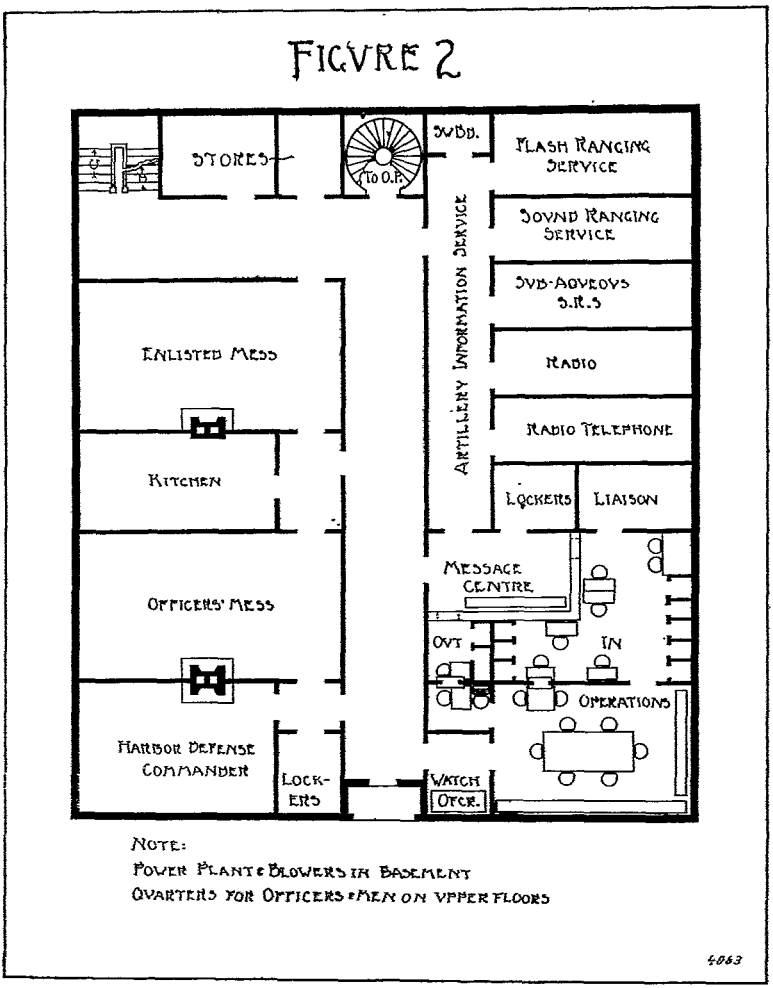


FIG. 2. HARBOR DEFENSE COMMAND POST

sage Centre lines, or, if the information comes in by runner it is taken directly to the Message Centre.

Message Centre Division: All incoming orders and information of every sort are sent to the Message Centre, where the time of receiving each communication is recorded and the necessary record copies are made. The incoming information is evaluated by the Message Centre Officer (who prepares the daily Intelligence Report and "Order of Bat-

tle,") and copies of the important messages or summaries of them are posted upside down on one of a series of endless belts passing over rollers which can be rotated so as to bring the messages right side up on the wall of the Operations Room near the double desk occupied by the Harbor Defense Commander and the Intelligence Officer.

Operations Division: The Harbor Defense Commander estimates each situation as it develops, and issues his instructions regarding the handling of it to the Operations Officer, who sits at the head of a long

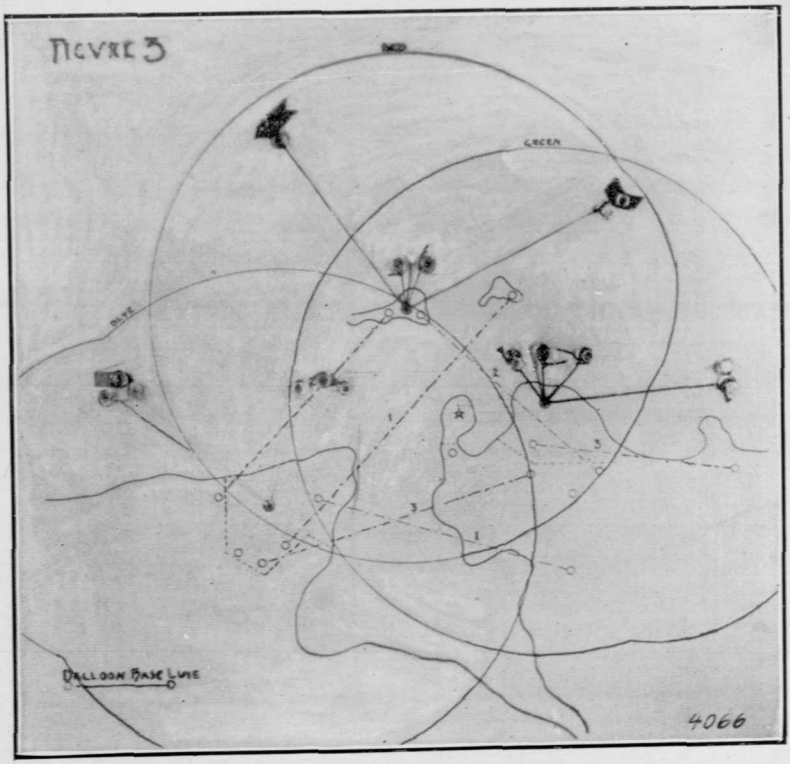


FIG. 3. OPERATIONS BOARD

table on which is placed the Operations Board. This board (see Fig. 3) consists of a C. and G. S. or other chart glued to an inclined drawing board which the Harbor Defense Commander, the Intelligence Officer, and the Operations Officer and his assistant can see, and which has holes bored through it at each Battle Command and Group Directing Point. Strings (of a different color for each Battle Command and equal in number to the batteries of the Command) are led through these holes, each string terminating at the upper end in a glass "push pin" and at the other end in a lead weight. The fields of fire of the different Battle Commands are drawn on the chart in colors corresponding

with the strings. Enemy targets (represented conventionally by variously colored and shaped bits of cardboard pierced by pins—vessels opening fire are decorated with wisps of white cotton, ships put out of action or sunk are indicated by markers of black cardboard, and a smoke screen is represented by a twist of black wool) are moved about on the board by the Assistant Intelligence Officer in accordance with data furnished by the Information Service.

As the Battle Commands come into action their Activity Reports are furnished to the Assistant Intelligence Officer, who pulls out a string for each battery firing and plugs its terminating pin into the target being fired upon.

The Operations Officer keeps in touch with the situation as it develops, and formulates the orders and messages to be sent to the subordinate and neighboring units. These orders and messages are telephoned from his booth by the Operations Officer in person (being taken down by the Operations Secretary for purposes of record) or, if relatively unimportant or of considerable length, are dictated to the Operations Secretary who reduces them to writing and sends them out by runner.

The Assistant Operations Officer keeps in touch with the situation and is the relief of the Operations Officer. The Gunnery Officer furnishes necessary information with respect to gun power, armor penetration, and number of hits required to put a ship out of action, and handles problems dealing with fire adjustment and gun power and the designation of land targets. He also keeps a graphic record of the consumption of ammunition. The Master Gunner assists the Gunnery Officer, prepares the daily Munitions Report, and gets out any maps and charts required by anyone in the room. The staff Secretary keeps a chronological record of events and prepares the Operations Report and the War Diary, supplementing them with copies of orders and important messages received and sent out.

On the walls, so disposed that they can be seen and consulted without difficulty by the persons working with them are placed the following maps and charts:

General Situation Chart.

Shows activity of the enemy and our own forces in the theatre of operations by means of colored cardboard tags giving all available information with respect to strength and disposition.

Table of Organization.

Chart showing detailed organization of the Defenses.

Plan of Communications.

Diagram showing all means of communication with the higher command, the A. I. S., and the subordinate and neighboring units.

Graphic Charts.

Charts showing speed of our own and enemy vessels and aircraft; our own and enemy gun power; probability of hitting at different ranges;

number of hits required to put different classes of ships out of action; and armor penetration of our guns.

Munitions Chart (see Fig. 4)

Chart constructed with hours of time on abscissae and rounds of ammunition as ordinates. The amount of ammunition on hand by types in each Battle Command is shown by colored tags (a different color for each type of ammunition) labelled appropriately and placed opposite the zero time line. Strings of the same color are led from these tags

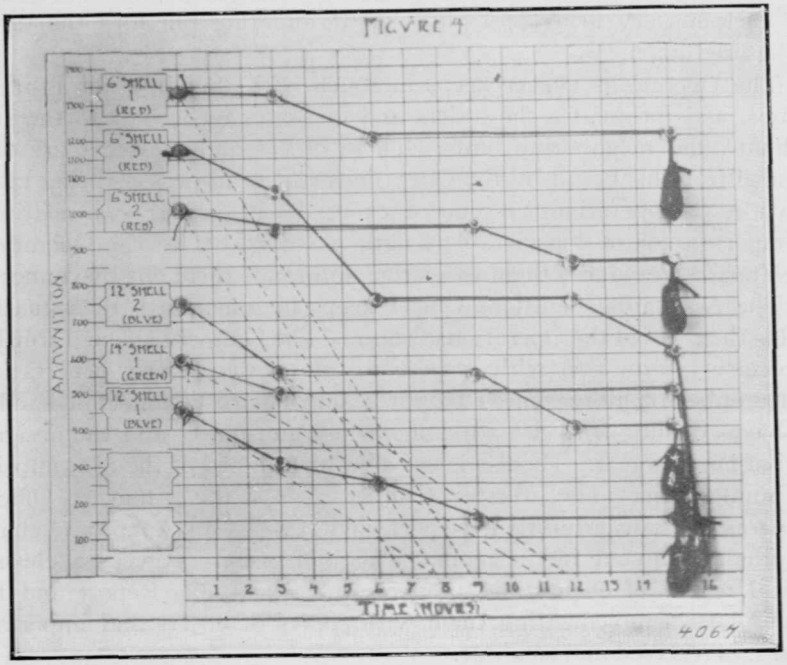


FIG. 4. AMMUNITIONS CHART

across pins placed as the periodic Munitions Reports are received from below, and show the amount of ammunition by types on hand in each Battle Command at any time, with the rate at which ammunition has been consumed.

III. LOCATION AND ORGANIZATION OF ADMINISTRATIVE HEADQUARTERS

Administrative Headquarters should be at or close to the supply base for the command and should be sufficiently close to the "P. C." and to the forts and other elements of the command to facilitate supply and administrative liaison. Such a location exists at a point near the Naval Base (see Fig. 1). A Headquarters Post, which may be named "Fort Washington" should be established here.

Quarters and barracks should be provided for the personnel of the

Harbor Defense operating and administrative staffs, for the Headquarters Command, and for a limited number of casuals (recruits and replacements.) A spacious building for Administrative Headquarters, a large hospital, warehouses (Quartermaster, Ordnance, Signal Corps, and Engineer), and shops should be constructed, with ample trackage and docking facilities. Space should be reserved for cantonments or tents for the war reserve forces for the command, for a parade ground, and for a target range and any other facilities that may be desired for training troops. No armament other than a saluting battery will be needed, though it is conceivable that a portion of the Railway Artillery may take advantage of the trackage facilities to emplace some of their armament in the vicinity.

NOTE: To cut down administrative overhead in time of peace Forts Rodney, St. Francis, and Dahlgren, and the reservation on which the "P. C." is located may be turned over to caretaker detachments and the personnel of the command (less that of Harbor Defense Headquarters) concentrated at Fort Parrott. This plan would render the construction of permanent quarters and barracks unnecessary at the three forts affected.

THE BATTLE COMMAND

I. ORGANIZATION AND STAFF

The Battle Command, being a purely tactical unit, will not need to be encumbered with an administrative staff, and its operating staff will be somewhat more specialized than the operating staff of the Harbor Defense Command. Let us take as an example the First Battle Command, the proposed organization being as shown on Page 430.

This organization is not dissimilar to that of a typical Fort Command as at present constituted, the only differences being the minor ones necessitated by the requirements of a modern long range system. Such a system, which will, it is believed, take care of most if not all local requirements, is laid down as follows:

BATTLE COMMAND FIRE CONTROL SYSTEMS

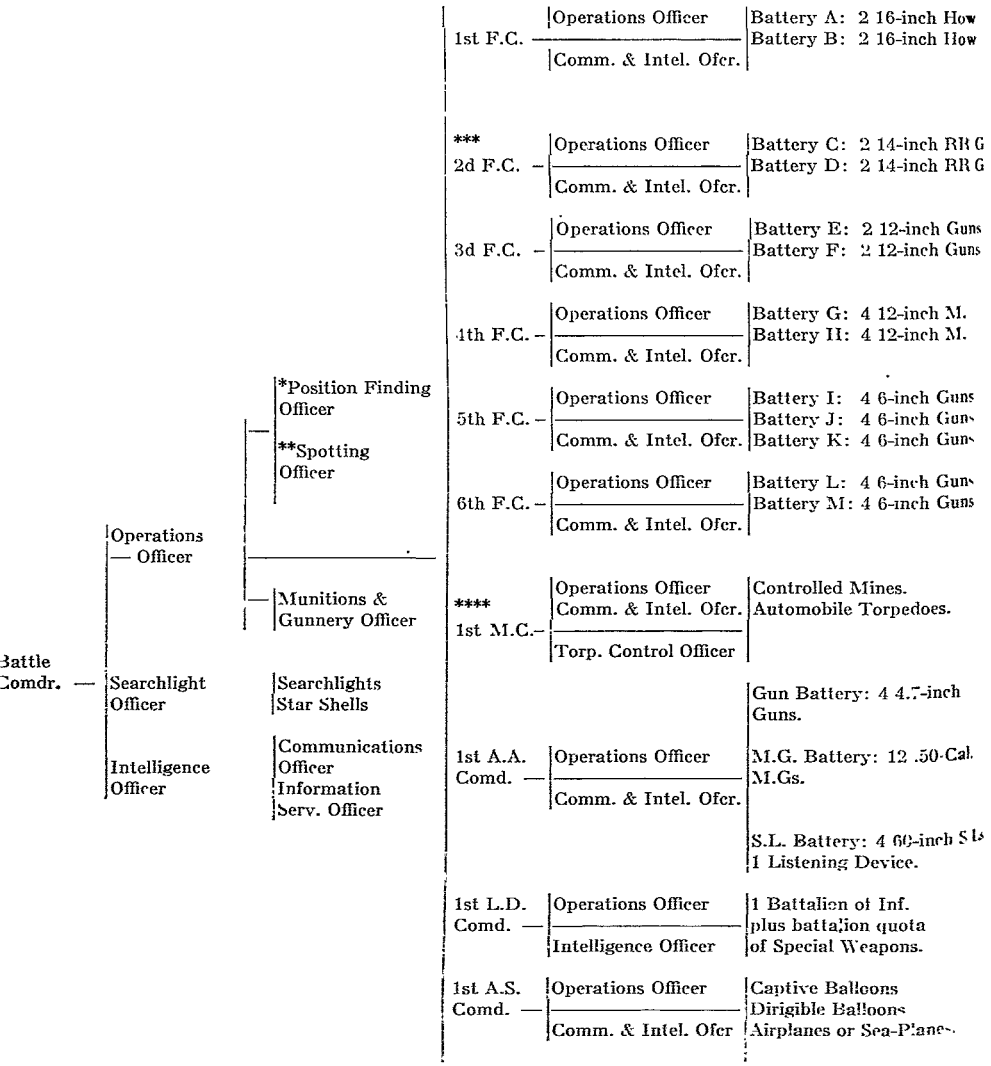
Long Range

Primary Armament.

Position Finding—by balloon base line or (advanced) terrestrial base line, or by sound-ranging, controlled by the Battle Command Position Finding Section. Range and azimuth of the target from the Battle Command Directing Point furnished to the fire command (if batteries are calibrated and firing as a unit on a single target) or battery (if each battery is firing on a target of its own) firing.

Spotting—by airplane or balloon, by balloon or (advanced) terrestrial base line, or by sound ranging, controlled by the Battle Command Spotting Section. Compass deviation or deviations with respect to the D. P.—target line furnished to the fire command or battery firing.

Organization of the First Battle Command (Fort Dahlgren)



* For Long Range only. Primary and Secondary Armaments furnish their own ranges and azimuths or deflections for Mid and Short Range.

** Long and Mid Ranges for Primary Armament. Primary Armament does its own spotting for Short Range: Secondary Armament does its own spotting for Mid and Short Ranges.

*** 1st Battalion, ..th R. R. Artillery.

**** Organization same as present Mine Command with the exception that the Gun Section will become the Torpedo Section.

Combination Position Finding and Spotting (probably the normal method to be used, and certainly the simplest)—by airplane or balloon, controlled by the Battle Command Spotting Section. Position, course, and speed of target, and deviations of single shots or salvos furnished the fire command or battery firing.

Mid Range

Primary Armament

Position Finding—same as for long range, except that the elements of the Position Finding Section used are transferred to the fire command or battery using them.

Spotting—same as for long range, except that the elements of the Spotting Section used are transferred to the fire command or battery concerned.

Combination Position Finding and Spotting (emergency method, used when visibility is poor) same as for long range, with the elements of the Spotting Section used transferred to the fire command or battery interested.

Secondary Armament

Position Finding—by terrestrial base lines or coincidence range finders assigned to batteries.

Spotting—by terrestrial base lines or spotting towers assigned to fire commands or batteries.

Short Range

Primary Armament

Position Finding—by terrestrial base lines assigned to batteries.

Spotting—by terrestrial base lines or spotting towers assigned to fire commands or batteries.

Secondary Armament

Position Finding—same as for mid range.

Spotting—same as for mid range.

In order that the control of elements of this system may be transferred from one command to another as desired and without confusion or loss of time a flexible form of Fire Control Switchboard, resembling a manually operated telephone board, will be found necessary. The Battle Command Operations Officer should have one of these boards by means of which base lines, stations, captive balloons, and airplanes and dirigible balloons communicating by radio link can be shifted between the Battle Command Information Service, the Spotting Section, the Position Finding Section, and the Fire Commands as desired. Each Fire Command Operations Officer should have a similar board by means of which he can shift base lines and stations normally assigned to his Fire Command, and additional ones which may be turned over to him temporarily, between the constituent elements of the command.

All stations should be duplex or triplex, and all captive balloons should have special baskets which will permit of two observers functioning at the same time, so that position finding, spotting, and information service work may be carried on together without undue multiplication of stations.

A plan of employment of the searchlights in each Battle Command as searching and illuminating lights, following the principles laid down in Major Pratt's article in the June, 1921, JOURNAL, and a plan for the operation of the star-shell battery, should be worked out so as to avoid interference. It will be noted that in the particular example we are considering the control of searchlights has been vested in the respective

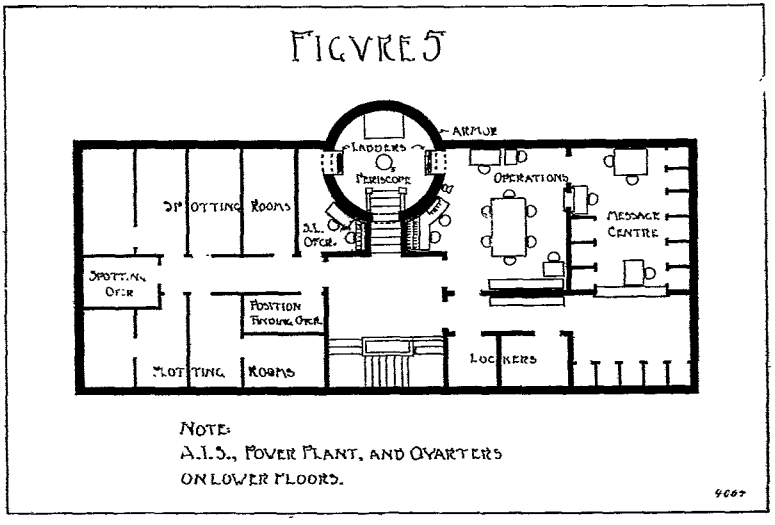


FIG. 5. BATTLE COMMAND STATION

Battle Commanders. This has been done for the reason that the forts are so far apart that centralized control is inadvisable. Even in the general case the author believes that decentralized control of everything but the elements of the Artillery Information Service necessary to keep the Harbor Defense Commander in touch with developments is desirable for the sake of simplicity.

II. ORGANIZATION OF BATTLE COMMAND STATION

A Battle Command Station, designed to facilitate the functioning of the system of fire control just described, is shown by Figure 5.

The Information Service, Message Centre, and Operations Divisions, function very much the same as do those of the Harbor Defense Command—the Information Service being much simpler, however, as its functions are limited to an area slightly larger than that covered by the fire of the armament.

The Operations Board, (which becomes a simple Harbor Chart in the Fire Command) has drawn on it the field of fire of each battery and fire command and of the neighboring battle commands which intersect its own, with red strings from each battery D. P. and white strings from each searchlight. The Munitions Chart shows by means of strings the ammunition of each type on hand and previously expended by each battery. The other charts and diagrams are the same as these used in the Harbor Defense P. C.

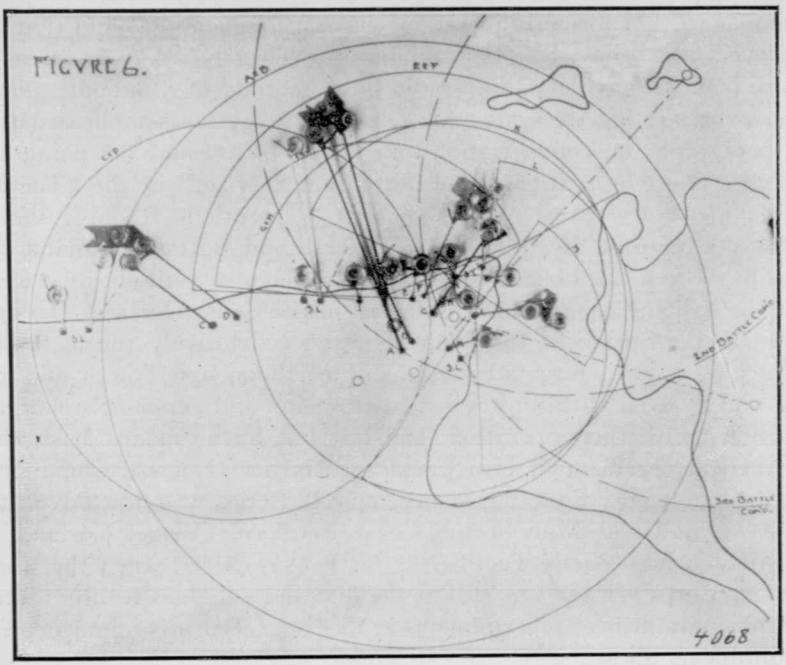


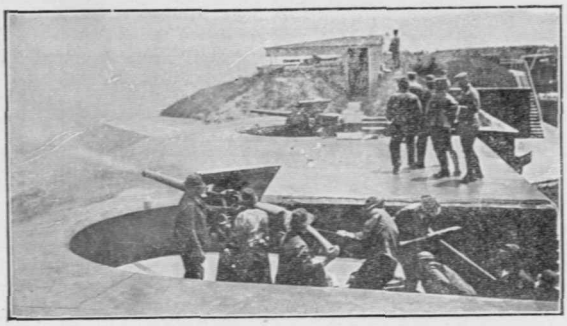
FIG. 6. OPERATIONS BOARD

The Operations Officer has a jack set for communication with the elements of the command. He is assisted by an operator who manipulates the fire control switchboard referred to above and also records the orders and instructions issued by the Operations Officer. The Searchlight Officer has a booth near the "conning tower" from which he can control his lights and his star-shell battery. The Position Finding and Spotting Officers each have a series of plotting rooms over which they exercise technical control even when some elements of their sections are placed for operating purposes directly under subordinate commanders.

The above plan of organization for a Harbor Defense Command, based on the assumption that a Harbor Defense Commander cannot control—and has no business trying to control—the intimate personal

affairs of his subordinates, but must turn the battle over to them in its early stages, contenting himself thereafter with observing its progress and bringing his supports and reserves into play as needed, is not set forth by the author as being anything particularly brilliant or revolutionary, or even original. It has merely been designed to show how a number of principles which have been realized or are coming to be realized as sound doctrine may be combined into a workable whole.

In order to demonstrate the hide-bound conservatism of this plan, it may be pointed out that the type of fire control switchboard proposed is similar to that formerly in use in seacoast fortifications, and that the Engineers are believed to be working on such a board to be used for future installations; that the "radio link" method of communication is a *fait accompli*; that the system of fire control suggested is predicated upon the paragraphs on concentration and tactics of fire and the paragraph headed "The Observation and Information Services" in the "Tactical Employment of Heavy Artillery"; that "Operations Rooms" similar to those advocated for the Harbor Defense and Battle Command stations have been tried out in several Coast Defenses with entire success; that the balloon experiments conducted in the Coast Defenses of Puget Sound in the Spring of 1920 demonstrated conclusively the feasibility of tracking moving targets by means of a balloon base line at mid and long ranges, even with improvised instruments and personnel relatively unfamiliar with their operation; and last but by no means least, that the tactical organization into Coast (or Harbor) Defense Commands, Battle Commands, Fire Commands, and Batteries was first advocated by the Grand Old Man of the Coast Artillery, Colonel Garland N. Whistler, in his "Battle Tactics" as far back as 1905, when the Coast Artillery Corps as such was still in the dim and nebulous future. Tempora nos mutantur et mutamur nos in illis—but Truth is immortal, and immutable as the stars.



A Spotting Chart for Rectangular Coordinates

By Colonel R. S. Abernethy, C. A. C.

THE following simple system has been developed for spotting when using rectangular coordinates.

A separate card is to be used for each shot or salvo.

Operation:—

(a) Locate set forward point (T) by rectangular co-ordinates in square adjoining center.

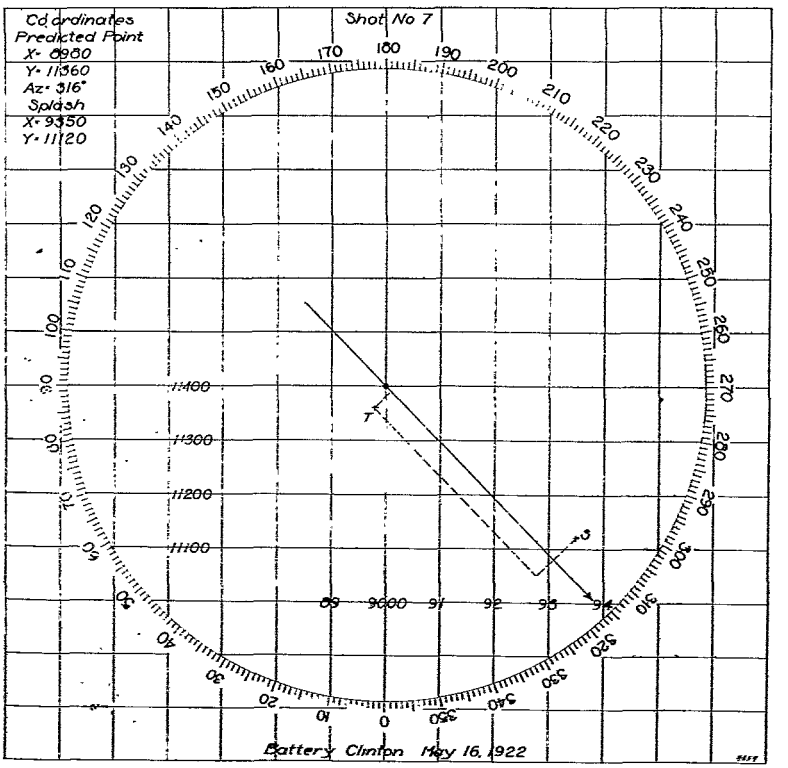


FIG. 1.

(b) Mark hundred lines to correspond.

(c) Draw true azimuth of set-forward point through center.

(d) Erect perpendicular to this line from set-forward point.

(e) Upon receipt of co-ordinates of splash plot splash (S).
(f) Erect perpendicular from azimuth line to splash.
(g) Range deviation is measured between perpendiculars. Direction deviation by adding or subtracting perpendiculars. Reduce latter to mils by dividing by $\frac{1}{1000}$ of range.
(h) Graduated T square will be found very convenient.

Comments of Battery, Fire and Fort Commanders and other interested officers are requested.

The First Practice for 1922

First reports of Coast Artillery target practice held under the provisions of Coast Artillery Memoranda Nos. 3 and 4, were received from the 9th Corps Area and referred to the practice held at Battery Barlow, 12-in. mortar battery, in the Coast Defenses of Los Angeles. Colonel Henry J. Hatch, Coast Artillery Corps, was in command of the Coast Defenses of Los Angeles, and Captain G. M. Wells, Coast Artillery Corps, was in command of the battery. One gun only was used during the practice; the trial shot method of adjustment was prescribed. Three shots were fired within a period of three minutes and improvement fire was commenced within four minutes after trial fire. Thereafter firing was continuous at approximately one minute intervals until practice was completed. Corrections were applied without slowing down the rate of fire, but the corrections as determined by the deviations of a series of shots could not be applied to the next succeeding shot of the particular series as it would have resulted in delaying the fire. The firing was sufficiently accurate to warrant this procedure. A total of 16 shots was fired, including three trial shots; four shots were fired for improvement and the remainder for effect. The total time of the series from the beginning of trial fire was 21 minutes. 46% of the shots, trial shots not considered, fell within 50 yards of the target. The Corps Area Commander in forwarding this report made the following statement:

"This is the first practice held in this Corps Area under the provisions of Coast Artillery Memoranda Nos. 3 and 4, and it indicates that the provisions of these two memoranda are most satisfactory. The completed reports of this practice were received at these headquarters four days after the completion of the practice."

Notes on Colonel Steger's Proposed Method of Anti-Aircraft Fire

By Captain H. R. Kilner, Royal Artillery

IN the December 1921 issue of the JOURNAL OF THE UNITED STATES ARTILLERY appeared a most interesting article by Colonel J. O. Steger, C. A. C., entitled "Notes on Employment of Anti-Aircraft Artillery." The points raised therein are of particular interest to all A. A. gunners, and more especially those paragraphs dealing with his proposed new method of fire. Colonel Steger suggests the employment of a range disc which shall be graduated in height curves to be set against a pointer moving radially according to the Q. A. E. or total elevation of the gun. By this means the gun will be given an elevation above the future line of sight, of such a magnitude as to cause the trajectory to intersect it exactly on the height plane for which the sight has been set. In conjunction with this it is proposed to employ a fuze setter which, when set to the Q. A. E. of the gun, and to the height of the target, will set the fuze to burst at this same point of intersection.

To anyone who realises the limitations and difficulties of the present method of firing against aircraft, this suggested method must make a strong appeal, as it offers so many advantages, not the least of which is the abolition of "dead time." As Mr. Morse, in his article published in the June issue of the JOURNAL, so clearly demonstrated, the chances of success decrease very rapidly as the period of "predicting time" increases, and, in consequence, every effort should be made to reduce this period by all available means.

The time of flight can only be decreased by improved equipment, but it may well be possible to reduce "dead time" by an alteration in the method of firing; and Colonel Steger's method would effect a very great reduction if not complete elimination of this factor. It would therefore seem justifiable to adopt the method on these grounds alone, provided that it prove a practical possibility, but with regard to this a certain degree of doubt may be entertained, for the following reasons—

Considering firstly the proposed graduations of the range disc. Colonel Steger in his article says:—"At first thought it appears that they introduce undesirable errors at low sites and unsuitable curves on the range disc, but investigation shows no disadvantage over other systems." This statement is open to question, as the curves undoubtedly appear most unsuitable. Examining the question from a purely geo-

metrical point of view, it is apparent that at the lower angles of sight a considerable change in range implies only a small change in the angle of sight, when the height remains constant, and an even smaller change in Q. A. E. In consequence of this, when a height curve is drawn on the range disc in the manner suggested, it will be found that, below an angle of sight of about 45°, the curve becomes nearly circular about the centre of the disc, and therefore not only must the movement of the Q. A. E. pointer be extremely accurate, but the adjustment of the pointer to the curve must be very exact indeed, if serious errors in the setting of the range disc are to be avoided. The range disc being attached to the sighting mechanism of the gun, is of necessity subjected to a great deal of vibration and rough treatment both when firing and travelling, and furthermore the operator is working under the worst possible conditions for obtaining a very fine adjustment. In view of this it appears very doubtful whether a system necessitating such a degree of accuracy in the setting of the sights would ever prove satisfactory in practice. Comparing this to the method in use with the British A. A. Artillery, where the range disc is graduated in curves of fuze setting to obtain bursts on the line of sight, it must be remembered that the function of the Q. A. E. pointer, in this case, is purely to correct the super-elevation for the change in Q. A. E. and for the variation in the time of burning of the fuze. It is a correctional element and not a fundamental measurement.

Turning now to the question of the suggested fuze-setter. The production of an instrument on the lines indicated presents many difficulties, and although several attempts to evolve a fuze-setter of this type have been made in the past, none have so far proved satisfactory. The difficulties encountered are very similar to those enumerated above, in the discussion of height graduation of the range disc. The setting of the fuze depends upon the Q. A. E. and the height, and there is no mathematical law connecting these three factors. A three dimensional cam is therefore the only method by which it would appear possible to obtain the required results. Owing to the considerable change in fuze-setting necessitated by a comparatively small change in Q. A. E., at the lower angles of sight, the cam is of necessity very steep at one end, and inaccuracies of a grave nature are thereby introduced into the setting of the fuze. Should the above difficulties be surmounted, Colonel Steger's method undoubtedly warrants the fullest investigation and trial. Its advantages over the present methods are very marked, and a considerable increase in the accuracy of A. A. fire might reasonably be expected to result from its adoption. In theory it is sound, but the crux of the question would seem to be whether it is possible, rather than whether it is desirable.

The Coast Artillery and the California Rifle and Pistol Association

By Captain E. H. Stillman, C. A. C.

AS a result of the enthusiastic interest of individuals returning to California from the National Matches at Camp Perry, Ohio. 1921, there has been formed on the Pacific Coast, the California Rifle and Pistol Association. The first meeting was called by Major L. F. Zerbee, C. A. C., November 1st, 1921 with representatives of the C. A. C., 19th U. S. Infantry, U. S. Navy, Southern Pacific Co. Rifle Club, Olympic Club and Golden Gate Rifle Club. They gathered at luncheon, and, after an informal talk, formed the California Rifle and Pistol Association. The following officers were chosen:

Major L. F. Zerbee, C. A. C.	President
Lt. Commander J. R. Palmer, U. S. N.	Vice President
Captain C. W. Linder, Inf., O. R. C.	Executive Officer
A. R. Johnson, Sou. Pac. Co.	Treasurer
Captain W. H. Mallett, C. A. N. G.	Secretary and Statistics

The plans of the organization were as follows, in order to further interest in small arms shooting in the State of California. It was decided to hold a shoot about once every two months. Each match would be held under the auspices of the Association and would have an appropriate Trophy and Medals. All rifle clubs in the vicinity would be encouraged to enter teams in these matches whether members of the Association or not. The trophy and medals would be offered by clubs in turn, the Trophy having to be won three times in succession for permanent possession. Each match would be named after the club or organization offering the prizes. Teams would be composed, for the present, at least, of six shooting members, two alternates, a team captain and a team coach. Entrance fee, $6.00 per team. N. R. A. rules would govern the distribution of prize money for individual high scores.

Thanks to the initiative of Major L. F. Zerbee, backed by the Coast Defense Commander, Colonel I. A. Haynes, C. A. C., the Coast Artillery Corps U. S. A. offered the first cup and medals, announcing the match to be as follows:

200 yds. offhand	10 shots for record.
200 yds. R. F.	10 shots for record.
300 yds. R. F.	10 shots for record.

500 yds. R. F.	10 shots for record.
600 yds. Slow Fire	10 shots for record.
No sighters.	
Service teams,—	rifles as issued,
Others,—	any service rifle with any sight—no glass.

THE C. A. C. CUP MATCH

The match to be held at Fort Barry, California, December 4th, 1921. Now for the C. A. C. Team. Captain E. H. Stillman, C. A. C. was appointed team Captain. He immediately set to work looking for material. He found Major Stewart W. Stanley, C. A. C., 1st Lieutenant P. S. Lowe, C. A. C. and Sergeant Ligman all of whom shot on last year's C. A. C. National Match Team, 1921. Of these, however, Sergeant Ligman was the only one whose duties were such that he could shoot in matches for the present. Looking further, he found Major Zerbee, Captain Stillman and Sergeant George Ping,—who had been members of the C. A. C. squad at Camp Perry, 1921. Captain Percy Adams and Corporal J. Cheaviaro, also in the Coast Defenses, had been at Wakefield, Mass. last summer, so he had a splendid start.

Due to recent changes in personnel it was deemed advisable to hold a short try-out ten days before the Match, in a search for new material. Major C. W. Baird, C. A. C., C. D. Adjutant, Captain E. F. Olsen, Sergeant York of the 11th Company and Corporal Leslie of the Machine Gun Company were the pick of this and later tryouts and are good material to send to Wakefield, Mass. for further examination. With this squad in hand, excepting Major Stanley and Lieutenant Lowe, the following team was picked for the first or C. A. C. Cup Match:

Major L. F. Zerbee, C. A. C.	
Captain E. H. Stillman, C. A. C.	(Team Captain)
Captain Percy Adams, C. A. C.	
Sergeant Ligman, C. A. C.	
Sergeant George Ping, C. A. C.	
Corporal J. Cheaviaro, C. A. C.	
Major C. W. Baird, C. A. C.	(Alternate and Coach)
Captain E. F. Olsen, C. A. C.	(Alternate)

The day of the match found eleven teams on the ground. By the end of the 200 yd. R. F. stage it was evident that there were but three teams having a chance for first honors. At the end of the 300 R. F. stage the C. A. C. Team were many points above the nearest competitor. Then came the 500 R. F. stage. The match was settled right here because the lowest score made by a C. A. C. Team member was 45! The 600 stage was fired next, and with it the C. A. C. piled up a total of 1385 out of a possible 1500.—The 19th Infantry came next with a total of 1314 points. The Olympic Club made 1293, and the other teams trailed along in the rear, the lowest score being 1048.

The results of this match were most surprising. People were stunned to think that the Coast Artillery could enter a team where the average per cent was 92.2, and decided then and there that the Coast Defenses of San Francisco were a tough proposition in rifle shooting.

THE 19TH INFANTRY CUP MATCH

This match was scheduled for February 4th, 1922. The interest in club shooting spread like wild-fire throughout the bay region and all looked forward expectantly to the next "battle for points." The C. A. C. was feeling very optimistic over the prospects. We were sure we would win. A few of the sages predicted disaster but the team spirits were too high. Things started happening. Sergeant Ligman was ordered to the Philippines. This was a hard blow for he was our best shot at the time. The gloom passed away however. We still expected to win by 50 points. February 4th dawned, and the team, assembling for the trip to the Fort Barry Range discovered that there was a second casualty. Sergeant Ping, next best shot to Ligman had been bundled off to the hospital during the night with flu. More grief and more bouyancy of spirits for we still believed that we could win by 25 points.

Arriving at the range, the 200 firing point looked like a mobilization camp. Eighteen teams were entered, and the struggle started. The C. A. C., Infantry, U. S. Navy and Olympic Club were very close at the end of the 200 yard stages. There was an intense light and at 300 R. F. the C. A. C. team lost more points than they expected to at 500 R. F. They went to 500 R. F. stage and lost a lot more. Old Man Optimism with his retinue of joys arose from his position in rear of the C. A. C. firing point, brushed his clothes and from then on divided his time between the Olympic Club and the 19th Infantry.

The Coast Artillery team struggled hard at 600 yards but could not get back the points that had been lost. The match closed with the following results:

Olympic Club	1335 points
19th Infantry	1334 points
C. A. C. (U. S. A.)	1318 points
U. S. Navy	1307 points

The rest of the teams followed, 900 points being the lowest. The C. A. C. went back to the post low in spirits but with a new wisdom and experience.

THE CHARLES G. MORTON PISTOL MATCH

This pistol match was scheduled for March. Major L. F. Zerbee was appointed team Captain for the Pistol Team, and after a short try-out, picked the following team:

Major L. F. Zerbee
Major S. W. Stanley

Captain E. F. Olsen
Captain E. H. Stillman
Sergeant G. Ping
Sergeant W. Herbst

The course fired was as follows:

Slow Fire, 25 yds.	10 shots for record
Rapid Fire, 25 yds.	10 shots for record; time, 20 seconds per string of 5.
Rapid Fire, 25 yds.	10 shots for record; time 10 seconds per string of 5.

Standard Target.

When the dust had settled, the Coast Artillery discovered that they had won the march by 29 points over the Olympic Club. Nine teams had entered, the total as follows:

C. A. C. 1474 out of a total of 1500 points.
Olympic Club 1445 out of a total of 1800 points.
U. S. Navy 1400 out of a total of 1800 points.
19th Infantry 1388 out of a total of 1800 points.

The lowest team score was 1211. Captain I. C. Nichols of the 19th Infantry made highest individual score with 276 out of a possible 300, which was truly remarkable over this course. Captain E. H. Stillman, C. A. C. won second place with 262.

THE U. S. NAVY CUP MATCH

This match was scheduled for April 2nd. The Navy slightly changed the course as follows:

200 yds. offhand	10 shots for record
200 yds. R. F.	10 shots for record
300 yds. R. F.	10 shots for record
600 yds. Slow Fire	20 shots for record

No sighters.

This match was held at Leona Heights, the State Range, in the hills back of Oakland, California. Our team prepared for the match knowing that there would be strong competition and excellent shooting, by at least the Navy, Olympic Club and 19th Infantry. The latter, however, were unable to take part. We settled down to a hard week's practice, firing with members of other teams, also in training, so we knew immediately that we would not have the cup handed us without a struggle.

Sunday, April 2nd found 23 teams entered. There were, including individual shots, about 150 riflemen. It was a beautiful warm spring day. The match was the largest rifle match yet held in the state of California, and there were many spectators. At the end of the 200 offhand stage the C. A. C. (US) were four points below the highest team —the Olympic Club. At the 200 R. F. stage the artillery made a remarkable score. The six men only dropped 4 points, making a 296

out of a possible 300. 4 possibles, a 47 and a 49. We now led the nearest competitor by 8 points. At the 300 R. F. a jam caused one of our men to have to hurry so that he made only a 44. This left the C. A. C., Navy and Olympic Club all well at the top of the list and within a few points of each other. Then came that slow, steady grind which always occurs at 600, 20 shots for record in a hot sun and intense light. Here is where the C. A. C. won because they were the better long range shots. We slowly increased our lead until, at the close, we were 12 points ahead of our nearest competitor. There was a fish-tail wind varying from three-fourths right to three-fourths left. Much credit is due to Major C. W. Baird, our team coach who caught these changes beautifully with his glass, a large azimuth instrument.

The team was composed of the following:

Major L. F. Zerbee	
Captain E. F. Olsen	
Captain E. H. Stillman	(Team Captain)
Sergeant York	
Sergeant Ping	
Corporal Cheaviaro	
Major C. W. Baird,	Team Coach and alternate
Corporal Leslie, alternate	

The five highest team scores were as follows:

C. A. C.	1373 out of 1500—91.5%
Olympic Club	1361
U. S. Navy	1334
Oakland Rifle Club	1314
Oleum Rifle Club	1314

As a result of small arms shooting during the last four months the following facts stand out:

The Coast Artillery has won three out of the four matches, held so far. Material has been developed under match conditions to send east for prospective places on the Coast Artillery National Match Team. These victories have been largely due to the whole hearted support, enthusiasm and interest of our Coast Defense Commander, Colonel Ira A. Haynes, who has attended nearly every match and seen to it that our team had time for practice. The writer feels that if all Coast Defense Commanders get behind their rifle teams, material for our National Match Team will be developed which when united as one will be unconquerable.

Furthermore, the good sportmanship on the part of all has further welded the one army spirit and a closer relationship has been established between the Regular Army, Navy, National Guard and Civilians. Let us hope that all states will soon have an organization such as our own with the idea of promoting interest in rifle shooting.

Coast Artillery Life in the Philippines

By Major Fred. M Green, C. A. C.

Editor's Note.—This paper is the first in a series, which the JOURNAL intends to publish, descriptive of the conditions at present affecting Coast Artillery life at our three foreign stations.

LOCATION OF POSTS

THE Coast Defenses of Manila and Subic Bays consists of: (1) Fort Mills, on Corregidor Island, about thirty miles west of Manila. The Island is about four miles long and shaped like a pollywog; the head end, which points west, is about a mile wide and forms the highest part of the Island; the body and tail are of decreasing width and height and extend generally east. Its surface is well wooded and the ground quite variegated. There are two hills, (Morrison and Malinta), besides the high ground at the western end of the Island. This is the headquarters post and contains the bulk of the garrison; the other four forts are spoken of as "out-posts." The garrison is geographically divided into four components: (1) "Topside," which is the highest ground at the west end of the Island, contains the headquarters and the garrison of the fixed armament; (2) "Middle side," which is eastward and downhill from "Topside", contains the 59th Artillery and the Medical Garrison; (3) the "Scout Level," which is down the hill toward the docks, ("Bottomside") contains the Philippine Scout Garrison; and (4) "Kindely Field," the Air Service Garrison, is about two miles east toward the tail of the Island, separated from the other garrisons by Malinta Hill. A street car line operated by the Quartermaster connects the first three garrisons with each other and with the dock; communication with Kindley Field by road only. The "Barrio" is the native village at "Bottomside," whence servants are derived: there are small shops of various kinds there.

(2) Fort Hughes, on Caballo Island, about two miles south of Corregidor, is a narrow and exceedingly high and precipitous island of most picturesque appearance. Like Corregidor, the island is high and has steep cliffs at the west end, and tapers off to a low tail toward the east. But a small garrison is kept here in peace time; the same remark applies to the next two posts.

(3) Fort Drum on El Fraile Island, some five miles south of Caballo, is the so-called "concrete battle-ship."

(4) Fort Frank, on Carabao Island, about three miles south-west of El Fraile, is larger than the last but of limited area and resources.

(5) Fort Wint, on Grande Island, is the most distant of the out-posts. It is about forty miles north-west of Corregidor, and stands in the center of the entrance to Subic Bay. It is somewhat larger than either Fort Frank or Fort Hughes. Due to its distance from the other posts, it is most conveniently referred to as being about five miles from Olongapo and seventy five miles from Manila by boat. This post is more independent of Corregidor than is any other of the out-posts; it has its own commissary, ice plant, laundry, etc.

COMMUNICATIONS

At present the boat schedules are as follows:

(1) Corregidor; boat for Manila leaves 7:10 A. M. reaching city about 10 A. M.; leaves city 2 P. M. arriving at Corregidor about 5 P. M. A week end trip enables one to leave Corregidor Saturday P. M. and return Sunday evening.

(2), (3) and (4): Ration boat leaves Corregidor daily 8:30 A. M., touching at Hughes, Drum and Frank, arriving at the last named about 10:30 or 11 A. M.; after any wait indicated at the latter retraces its course, arriving back at Corregidor usually about 2 P. M.

(5) Army boat leaves Wint about 8 A. M. on Tuesday for Corregidor; leaves to return to Wint about 8 A. M. on Wednesday; running time about five hours; one trip per week. Navy boat runs between Manila and Olongapo, making two round trips per week. Arrangements can often be made to transfer to or from the Navy boat by a D. B. boat as the Navy boat passes Corregidor, thus shortening the trip between Wint and Mills to about forty miles. Communication between Corregidor and Manila by radio only—no telephone; same as regards Fort Wint. Other outposts have telephone connection with Corregidor.

CLIMATE

The several seasons are not exact as to dates, but may be approximately indicated as follows: December to February, cool and fair weather; March to June: fair, hot and dry; July to September, rainy and windy; October and November; moderate temperature with occasional showers. Except from March to June, the weather is generally more moderate than at Gulf stations in summer, and the nights are always cool. A particular feature of the climate is its temperateness as long as one is in the shade, not exerting physically, and the surprising apparent rise in temperature as soon as any bodily effort is made, especially in the sun. There is usually a good breeze at any of the posts. Fort Mills temperature averages 7° lower than Manila, and the air is fresher and better. Same applies to outposts, except with less force in the case of Fort Wint. Stories of terrific heat in the Philippines need not worry one; it is often hotter in the states, and sunstroke is

unknown in the Islands. However, the absence of the tonic effect of cold weather does prove enervating after a year or two.

Khaki and white only; both are cheaper and better in Manila and at Corregidor than in the States, uniforms costing about $8.00 gold each. Wool uniforms required on the transport enroute, and for visiting China or Japan an overcoat may also be required. Civilian clothes are not permitted officers during their entire tour. O. D. Caps are not worn in the Philippine Islands. Goodlooking underwear, pajamas, etc., obtainable at reasonable prices from native tailors, but their life is rather short. White mess jackets not necessary. A white cap may well be purchased in the States.

HEALTH

The average officer's health does not suffer from a two years tour, provided that he is careful to drink no unboiled water and eat no uncooked vegetables. The use of a mosquito bar is unnecessary at Corregidor, but care must be taken to avoid malarial infection on hunting trips. Most people experience a gradual diminution of vitality during their tour. The effect of the climate upon women is less certain than upon men, due largely to their disinclination for outdoor exercises in a hot climate. Children do not seem particularly affected either way; some are more and some are less vigorous than in the States. All persons are likely to need a few weeks to become acclimated, during which they may feel a little below par. A few people suffer from boils or skin eruptions; the latter, while unpleasant and annoying, are usually not serious, though often stubborn. Infection of even the slightest cuts must be avoided by prompt use of iodine. The principal danger is intestinal infection from drinking water and uncooked food. As cow's milk is rare in the Philippines and unobtainable in the defenses, small children with whom condensed milk does not agree are out of luck.

EXERCISE

Excellent swimming at Corregidor and Wint, except during the rainy season; not practicable at other posts due to sharks. Golf at Corregidor; also tennis for those who feel sufficiently energetic to play it.

Riding is popular at Corregidor, though mostly at a walk along the narrow trails. Baseball is played from November to June. No football. Excellent fishing all the year round; best in May and June, when good game fish are obtainable. Bird shooting and some deer and wild-pig shooting in the vicinity of Manila Bay. Regular (and preferably daily) exercise is necessary for the maintenance of health; it cannot be omitted without material injury.

QUARTERS

Coast Defense Staff Officers and those assigned to fixed armament are mostly at Topside; officers of the 59th Artillery, C. A. C., mostly

at Middleside. The former quarters are perhaps slightly preferable. Both kinds are of concrete with wide porches. Field Officers are generally in single story bungalows; line officers in two story apartments, though many field officers live in the latter type, often from choice. The quarters are all about five or six years old, and are generally in good condition.

All quarters are of practically identical pattern, and there is very little choice between them. A central living room in front, opens into a dining room in rear. Two bed-rooms on one side of the house, with a bath room between them. A single bed room on the opposite side of the house, with separate bath. In rear of the latter the kitchen, butler's pantry, servants quarters, etc. The walls, (and on Topside the floors), are of concrete. Large sliding shell windows provide ample ventilation. No cellers or attics; storage space except a small trunk-room is wanting. Closet space somewhat restricted.

Quarters on outposts are generally of poor construction, being of temporary type. The outpost tour is usually four months, (six months at Wint), and is run by roster. Officers going on outpost may store their furniture at Corregidor, taking only necessities. As but about 6% to 8% of officers are on outpost at a time, no officer has more than one such tour. At Fort Drum, two officers alternate a week on and a week at Corregidor; their families remain at Corregidor during their entire tour.

MONEY

Payment is made either by U. S. check or in pesos at the current rate of exchange, as the payee may elect. Exchange varies from par to about 12% in favor of U. S. Funds. Savings accounts may be made in gold, but checking accounts are all in pesos. Officers coming from the States may bring funds in cash, or even better in the form of a bank check, U. S. check or draft; the premium on these latter is generally higher than on cash.

SERVANTS

Authorized maximum rates of pay now are: Houseboy, P20.00; Cook, (Native), P40.00; Cook, (Chinese) P60.00; Lavendera, P20.00. In small families one servant may sometimes be obtained to do both houseboy and lavendera service, reducing the number of servants to two. Subsistence of servants, if honest, is very cheap. Compared with conditions in the states, servants are plentiful, cheap and easy to get. Some understand English very well, some are hardworking and remarkably reliable, and some are honest. Practically all are dirty as regards preparation of food.

AMUSEMENTS

Excellent movies are shown at all posts, and at Fort Mills there are three "Cine's" (Bottomside, Middleside and Topside). At Cor-

regidor there are frequent evening dances, bridge parties and dinners. Lunches and bridge during the day for the ladies. The Army and Navy Club is the social center of town-goers at week-ends. There are two clubs and three post exchanges on Corregidor, and numerous small shops in the Barrio.

JOURNEY

Sailings from San Francisco usually on the fifth. The eighth day of the voyage is usually spent at Honolulu, and there is normally opportunity for a good deal of sightseeing if automobile parties are made up and ready upon arrival. Duration of the stop at Honolulu varies; sometimes several days. Stop at Guam around the twenty-third day; this is usually for a few hours only but it is generally possible to get ashore if no infectious diseases exist on board. Arrive Manila about the twenty-seventh day of the voyage. Officers should be prepared to pay the subsistence accounts of their dependents on boarding the transport and should also have sufficient funds for sightseeing, automobile hire, etc., en route, before boarding the transport. Toilet articles and tobacco obtainable from small commissary on board. Bring plenty of reading matter.

ARRIVAL AT MANILA

Theoretically, one's baggage must be examined at the customs. This occasions little inconvenience except in the event of an officer having firearms therein. Any firearms carried should be so taken as to be readily accessible, for the model and serial number of each gun must be verified and the piece registered with the Constabulary Authorities. An officer from Fort Mills, meets each transport and assists newcomers. The transport usually docks early in the morning. Should you intend to spend a night in Manila before reporting in the defenses, you should radio the Army and Navy Club for a reservation several days before arriving, and ask for a reply. The accommodations for transients in Manila are very limited.

BAGGAGE

Two trunk lockers with a reasonable amount of hand baggage can be kept in one's stateroom, or one may substitute for the lockers a steamer trunk of no greater height. Wall-pockets for toilet articles and small things will be found very convenient during the voyage, as there are no shelves in the staterooms. One trunk may be kept in the baggage room of the transport where it is accessible during certain hours of each day. Other trunks are in the hold; these cannot be reached during the voyage and may be a few days late in delivery at the post. Railroads will transport 300 lbs. of baggage per full fare ticket for persons passing through San Francisco en route for Manila if no stop-over is to be made,

and this opportunity should be taken as one's furniture is likely to be one or two months late in arriving.

FURNITURE

On the subject of how much furniture should be taken to the Philippines, opinion differs widely. Some advocate taking everything on the ground that you might as well have the use of it; others advise taking as little as possible because of the risk of loss, damage in handling and deterioration due to climate. Books and pictures do deteriorate in the Islands; the bindings of the former loosen, due to heat, moisture, mould and white ants, though varnishing the bindings with shellac will preserve them to a considerable extent. Pictures wrinkle and may discolor and mould during the wet season. Leather moulds badly during wet weather and silk splits and rots quickly. Veneered furniture splits up badly due to heat and dampness. Pianos generally suffer from the voyage or from the warmth and moisture of the climate. For those who contemplate leaving their more expensive articles of furniture in the states, it may here be stated that wicker furniture of good quality is obtainable at reasonable prices from Chinese merchants on Pinpin Street, Manila; furniture of better quality but of much higher price may be purchased from the Bilibid Prison; with the Q. M. furniture and some additional wicker, one can get along without much inconvenience. Rugs should by all means be brought. General opinion favors bringing everything except perhaps valuable books and pictures.

LAUNDRY

There is absolutely no opportunity to have any laundry work done between San Francisco and Manila, except in the event of an exceptionally long stop at Hawaii. To be clean and comfortable on the trip it is imperative to have an ample supply of clothing. The last two weeks of the voyage are likely to be hot. It is advisable not to discard old, worn underwear but to save it in anticipation of this period; after wearing it can be thrown overboard. White uniforms are allowed for evening wear after passing Honolulu, but are not required; due to lack of laundry facilities, it is difficult to maintain a smart appearance during the latter part of the voyage no matter what uniform is worn. After arrival at your post you may either send your laundry to the Q. M. laundry in Manila, to a commercial laundry, or, (if with family), employ a lavendera. The last course of action is most desirable. Cost of laundry work is very low compared with prices in the states.

AUTOMOBILES

Officers owning automobiles should dispose of the same before leaving the states if they anticipate being stationed in the Coast Defenses. At present, automobiles bring very poor prices in Manila, though for-

merly they could be sold for more than their cost in the states. Some officers who brought automobiles to the Islands keep them in Manila garages, but the garage bills are so large and the amount of time an officer stationed in the Coast Defenses can spend in Manila is so small that it is not to be recommended as a paying proposition. On the other hand, for officers stationed in the City of Manila the ownership of an automobile is a real comfort and economy, saving on carriage hire and allowing one to take many pleasant trips in the vicinity. There is no real opportunity to use an automobile on any af the Islands in the defenses, though a few officers at Kindley Field do use them to advantage.

LADIES CLOTHING

Ladies coming to the Philippines will do well to purchase a considerable number of thin muslin and organdie dresses before leaving the states. These are somewhat expensive to have made in the Islands. Some evening dresses will also be required, but due to splitting of silk in this climate too many should not be brought. Net or lace dresses are to be preferred for this reason. Gloves are not required and they mildew fast in the rainy season. Hats, (except sport hats), are very expensive, but many report their hats ruined from dampness or from crushing in their trunks en route. Dark materials for summer dresses are hard to get in the P. I. Either bring an ample supply of shoes, or arrange to have them supplied from the states. Good lingerie, embroidery and lace obtainable at reasonable prices, but linen may well be brought from the states. Table and bed linen is well embroidered by natives very cheaply. Light sweaters can be used in the cool season and in the evenings. Heavy clothing is needed in visiting Baguio and for the China trip.

CHILDRENS CLOTHING

Boy's underwear and outer clothing is made to order by native tailors at very reasonable prices. Stockings (except short socks) can seldom be obtained; except for these, it will be well to wait until arrival for buying. Girl's clothing can be made by local dressmakers, but less advantageously than boy's. Infants clothing can easily be obtained here.

SCHOOLS

There are eight grades of grammar school on Topside. Four grades are assigned to each teacher, and school is held from 8 to 12 only. Vacation from April to June, inclusive. No High School nearer than Manila.

MISCELLANEOUS

Dark and amber glasses will prove a comfort on the transport, and many wear them in the defenses on the sunniest days.

Athletic clothes are authorized for wear when taking exercise. This is construed to include the wear of white hats, shirts and trousers, going to and coming from the bathing beach, at golf, etc.

Rubber boots and rain coats or capes are essential during the rainy season. Many ladies provide themselves with these articles and if owned, they should be brought.

Moths are very active in the Philippines. Woolen clothing brought to the Islands must be kept in camphor or cedar chests to prevent its destruction. Camphor chests may be purchased in Manila for about $15 or $20 gold; they are much cheaper in China.

Vermin in the Philippines are about as troublesome as on the Gulf coast, but not more so. Cockroaches are large and active and are excellent at flying. It is well to examine strange bedding; "look before you sleep." Flies are scarce and mosquitos not troublesome in the defenses, though they are very active in Manila. Contrary to popular expectation, snakes are rare in the defenses, though large pythons are likely to be met in hunting on the mainland. Ants and lizards are common; the former are annoying when found in one's food as is sometimes the case.

Unless one cares to combine their reaction with seasickness it is well to be vaccinated and inoculated with typhoid serum before boarding the transport. Bring your certificates for evidence.

Flowers are rare in the Philippines. Due to absence of palm trees in the defenses the scenery is less tropical than would be expected. Fruits common in the states are rare here, but some of the native fruits are very good—especially mangoes and papayas. Oranges, grape fruit and apples are imported and are usually of good quality; bananas rather poor.

The 18th Amendment and Volstead Act do not apply to the Philippine Islands.

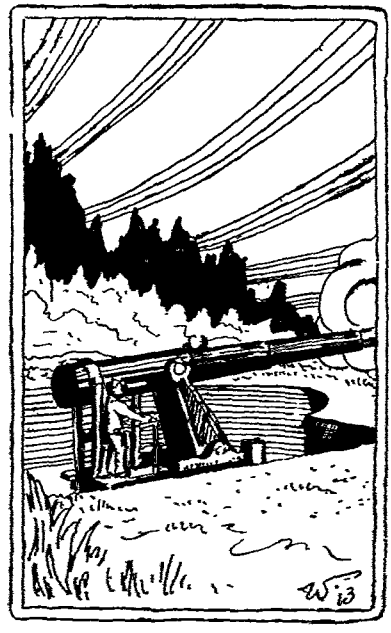
Few people are able to get satisfactory photographs in the islands, either because of deterioration of the films, or on account of fungus growth on the lens, or on account of the rather peculiar light. Use of cameras in the defenses by permit only.

Mothers nursing children should continue to do so until their arrival in the Philippines. The transport is no place to wean a child, especially since only condensed milk is obtainable, and the facilities for caring for a sick child are naturally few. Much illness can be avoided, even tho the child be nursed but once each day.

Do not come to the Philippines expecting to save money. It seems to be the universal experience that expenses run fully as high here as in the states. One can save a little on the outposts, but the amount of entertaining at Corregidor renders saving very difficult there. This will be more than ever true if (as now seems probable), foreign service

pay is to be abolished. Do not be misled by accounts of those who served here years ago; times have changed.

For those whose means admit, there are many interesting trips to be taken. Everyone visits Baguio (a post in the mountains in northern Luzon) at least once during their tour. There are several points of interest within a day's journey by automobile from Manila. The China trips, or a trip to Japan, not only provide experiences of interest, but also allow one to purchase rugs, brass, lace, and silk, at reasonable prices. A trip to Jolo (still known as the "southern islands trip") can be taken. Officers are not eligible to take the above trips until they have served six months in the Philippine Department.



Bombardment of the Hartlepools

16th December, 1914

By. Col. L. Robson, C. M. G., D. S. O., V. D., T. D.

Reprinted from Journal of the Royal Artillery, January, 1922

I. INTRODUCTION

REPORTS of the Action at Hartlepool between 3 German Warships and the Shore Batteries, were rendered, at the time to the War Office. The narrative of the action was called for by the Military Authorities in June, 1921. Attached is also an interesting report by Skipper Horsley. Since this narrative was written I have read Mr. Filson Young's book "With the Battle Cruisers" in which there is a chapter describing the Raids on the north-east coast, which I have criticised in "Notes."

It is an interesting fact that this is the second recorded artillery action at Hartlepool, I quote from the publication of the "Surtees Society." "In 1650 an Irish Frigate boarded a Newcastle Ship near Hartlepool, which, the Governor seeing caused some of his guns to be so planted that they shot the Irish Frigate through and through and caused her to hasten away and leave her prize which came safe into Hartlepool."

In those days the Prince Bishop of Durham collected the shipping dues at Hartlepool and would, no doubt, have had up-to-date Batteries for the Defense of the Port.

The artillery defences at Hartlepool can be traced back for over 300 years, and the present Durham R. G. A. are the lineal descendents of those ancient Gunners who manned the local batteries. I have a list of the officers of "the Hartlepool Volunteer Artillery in 1803," all Gentlemen of the district.

The Personnel, Officers and men of the manning details furnished by the Durham R. G. A. in 1914 belonged to the Hartlepools, many of them living close to the Batteries. As Fire Commander owing to interrupted communication I had little to do during the action, but had the satisfaction of having personally trained the Fire Command.

One of the principal lessons from this engagement is that Fire Commanders and their communications should frequently be made casualties during gun practice and that the Battery Commanders should "carry on" by means of "standing orders."

II. NARRATIVE

8 a. m. Weather conditions, hazy, with a bank of fog lying about 4,000 yards off Hough Battery and parallel with coast line. At 12 o'clock (midnight) 15th and 16th a message was received by the Fire Commander that a German Squadron was in the North Sea and to expect attack. As the Works of Defence were always manned one hour before daybreak this message did not perturb us at all. At 8.5 a. m., the P.W.S.S. telephoned to the F .C. "three warships coming in at great speed" and the F. C. replied "What Class and Nationality" (they were hid from the F. C. Post by Lighthouse). P. W. S. S. replied "they are our ships, they are flying the White Ensign and have answered our signal." The leading ship passed the Lighthouse and the F. C. observed it was painted grey, German. The ships were then firing seawards.

At 8.10 a. m., the leading ship "Van Der Tan" opened fire on the Hough Battery, training 326° range 4150 yards from Hough Battery, (of 2.6" B. L. gun). The "Seydlitz" was then in sight and the "Bleucher" was about 6,000 yards from Lighthouse Battery training 308. Hough Battery opened fire on the "Van Der Tan" and continued until the guns were in blast at 357°. They were ordered to change target on the "Seydlitz" and carried on with high explosive shell at her upper works until she passed 357°. Meanwhile the "Bleucher" at about 6000 yards training 308 from Lighthouse Battery was engaged by the latter and a 3-round H. E. shell carried away the fore-bridge at about 4,000 yards. (She had shortened range by about 2,000 yards during observation and correction of first two rounds which fell short). The "Bleucher" then got in front of the Lighthouse and masked the L. H. gun. The three ships concentrated their fire on the Batteries for about 15 minutes, and then the "Van Der Tan" and "Seydlitz" moved slowly north and bombarded West Hartlepool Works and Shipyards; the "Bleucher" remaining and engaging the Hough Battery giving a succession of broadsides at about 4,000 yards range. When both guns of Hough Battery engaged her, after "Seydlitz" passed through blast angle, the "Bleucher" quickly steamed seawards, training 288° from Hough Battery. The "Van Der Tan" and "Seydlitz" put about off Crimdan Dene, followed the "Bleucher" and gave us their starboard broadsides as they passed the left front of the batteries, steering east. Our last round was fired at the "Seydlitz" at 8.52 a. m., and she disappeared in the mist.

Armament

"Van Der Tan"	34 Guns.	It was estimated they were
"Seydlitz"	38 Guns.	using 70 guns.
"Bleucher"	36 Guns.	
	108 Guns.	

The "Bleucher" had two 5.9" guns dismounted by our fire.

Casualties

"Bleucher"	10 killed	19 Wounded. Reported at Leith.
"Seydlitz"		
"Van Der Tan"	80 killed	200 wounded.

(By report copies from Dutch and German press).

Hough Battery	2	6″ B. L. Mk. VII Guns.
Lighthouse Battery	1	6″ B. L. Mk. VII Gun.

Casualties of the Durham R. G. A.—2 men killed.

We fired 123 Rounds

At "Van Der Tan"'	70 rounds.
At "Seydlitz"	20 rounds.
At "Bleucher"	33 rounds.
	123 rounds

Frequent stoppages due to smoke of enemy shells bursting in front of batteries, on the rocks.

Manning details of the Durham R. G. A. at Hartlepool were:—

11 Officers

155 Other Ranks

III. SKIPPER HORSLEY'S STATEMENT

I, John Horsley, of 21 Bedford Street, Hartlepool, state that, on Wednesday morning the 16th December, 1914, I proceeded to sea in the motor fishing boat "Childrens Friend" at about twenty minutes to eight. When we got outside we saw three warships flying the Union Jack and English White Ensign. Just before that I saw the centre ship exchange signals with the Lighthouse. They then hauled down the Union Jack and White Ensign and ran up the German Flag. That was just before they opened fire on our destroyers about two or three miles E. N. E. of the German Warships.

There were four of our boats together, I turned about to come into Hartlepool but the other three boats ran ashore on the sands north of Hartlepool. Shortly after, the leading ship fired on the batteries. Before they began firing at all, the centre ship showed a red light at the mast head which was answered by the other two with red lights. They fired on the batteries and the first shot from the Lighthouse battery fell short, the second shot would have hit him but was a little to the north. The next smashed on board and appeared to do damage. I saw the shots from the battery hit the ships and as far as I could see very few of the battery shots missed. I saw some of the shots bounce off the ships sides and go into the air.

At this time we were only half a mile from them. The crew had gone below and I called them out to see the way our guns were hitting the ships every time. When we were rounding the breakwater we saw

the "Patrol" get hit. The submarine was alongside of her, a little to the north side.

We ran inside the breakwater for three or four minutes. The shells commenced to fall about which appeared to come over the battery.

When we got as far as the Harbour opening, about three minutes before the firing ceased we saw the "Forward" being towed out and cleared into West Hartlepool to get out of her road.

(Signed) John Horsley.

Hartlepool.

IV. NOTES

Since the narrative was written, I have read Mr. Filsen Young's Book, in which he states that the "Molke, Seydlitz and Bleucher" were at Hartlepool, and the "Derfflinger and Van Der Tan" at Whitby and Scarbro, this I learn he copied from Admiral Schiers' Book. The evidence, in my opinion, is conclusive that the "Van Der Tan" was one of the German ships at Hartlepool, "Janes' Fighting Ships" gives the "Van Der Tan" 11.2″ guns as 45 calibre in length and the shell 85 lighter than the 11″ shells of the other Germans ships which have 11″ guns of the 50 calibre in length. Amongst the 11″ "Duds" we found a difference in weight of 11″ shells and a difference in size and number of impressions of-the groves on the copper driving bands, this proves that the "Van Der Tan" was at Hartlepool. This is important as the Germans evidently do not wish to admit that we damaged their ships. The "Bleucher" 8.2″ shell were filled with black powder and all burst. The fire of our guns was frequently interrupted by smoke from bursting shell. The telephones fixed on poles were put out of action by the first 11.2″ shell from the "Van Der Tan" which struck the right hand front corner of the battery, four 11″ shells burst within 50 yards of the F. C. Post.

The guns were manned by the Durham R. G. A. (T. A.), about half a dozen District Gunners were in the magazine, the Fire Discipline was perfect, but, as F. C. I had little to do but observe results, the communications being interrupted, the action was practically fought by the B. C.'s under standing orders which I had compiled to meet all possible form of attack, our daily routine being Individual Gun Drill in the morning and Fire Discipline in the afternoons, with fortnightly gun practice. The ranges were practically "Point Blank." We got range usually by the first shot, then raised the Point of Impact, got on to their Upper Works and kept there, we had few misses, when the two 6″ Mk. VII, Guns of Hough Battery "Changed Targets" from "Seydlitz to Bleucher," the B. C. went to Auto sights and A. P. Shell, after 19 rounds he changed to H. E. Shell (Case II.) and raised P. of I. and continued on her Upper Works. Then the "Bleucher" steamed rapidly away.

With exception of the 19 rounds A. P. the action was fought by Case II. The D. R. F. were practically out of action, the repeated concussion

of bursting enemy shell caused vibration of pedestals and shook the D. R. F., but, as the ranges were short due to fog, this did not effect the shooting. The batteries were hit front, rear and both ends. By all the Rules of the War Game we should have been "Knocked Out." Two 6" shells glanced off the concrete apron around the emplacement and ricoched to the rear and burst. The enemy used Naval Delayed Action Fuzes hence our small loss.

Professional Note.—TEST OF THE 240-MM. HOWITZER MOTOR CARRIAGE MARK IV AND IVA

Tests were conducted recently at the Aberdeen Proving Ground of the 240 mm. Howitzer Motor Carriage Mark IV and IVa, for the purpose of studying the operation of the gas-electric power plant and transmission with which these vehicles are equipped. Representatives of the General Electric Company assisted at the tests and gathered much useful information as to the characteristics of the equipment upon which will be based a design study for a similar type of power plant and transmission for the 240-mm. Howitzer Motor Carriage, Model 1923.

The 240-mm. Howitzer Motor Carriage Mark IV and IVa is a two vehicle type of unit, one vehicle mounting the howitzer and the other the gas-electric power plant which supplies electric power for propelling both of the vehicles, the power to the gun carriage being transmitted through a flexible two-wire cable. Each vehicle is equipped with two driving motors, one for each track.

The tests, which were preliminary to a more elaborate series of tests, demonstrated that the gas-electric system as applied to these vehicles has a number of serious defects which must be modified to insure satisfactory operation on army vehicles. The performance of the various units of the electric system was satisfactory, the motors, the generators and controllers all functioned properly. A rearrangement of the control group was found to be necessary to insure satisfactory operation.

The arrangement of the control group had a direct effect on the performance of the power plant at times when maximum output was necessary. When turning in soft ground, the gas engine usually stalled, due to the fact that the operator could not handle the control lever quickly enough to reduce the generator load. Under such conditions the engine governor was too slow in operation to give proper engine speed in proportion to power demand. A regrouping of the control group, with proper engine governing will eliminate this difficulty and provide sufficient power under any condition of operation.

An interesting result of the test was the fact that the series driving motors with which the vehicles are equipped, cannot utilize the full available power of the power plant when traveling on level ground. In order to utilize the maximum output of the power plant, it was determined that a change in the gear ratio from motor to track would be advisable if the maximum output was to be utilized when traveling on level ground—the driving motors operating at the highest speed under this condition. When operating over rough ground or up steep grades, or when turning, the higher motor torque required will cause a reduction in speed of the vehicle. Under these conditions the gas engine will not stall since the simplified control group will operate to prevent it.

The results to be obtained with the new equipment are to proportion the power plant to give the specified speed of vehicle under average conditions of operation and to have proper control of the power plant to insure the engine not stalling under adverse conditions.

Radio Telephones as Used at Fort H. G. Wright

By Captain James B. Muir, Jr., C. A. C.

RADIO telephones have been used extensively at Fort H. G. Wright during the past year and a half, and have proven to be a reliable and efficient means of communication for all artillery work. They are especially valuable for emergency communication with base-end and auxiliary observing stations, for communication with a flank or forward O. P., for emergency communication between forts within the Coast Defense Command, for communication with a tug towing a target and for communication with airplanes engaged in observation of fire.

Following are some concrete instances of their use:

During the Fall and Winter of 1920-1921 extensive alterations were made in the system of fire control cables at Fort Wright. All cables were cut, which resulted in a complete absence of telephone communication between base-end stations.

It was necessary that targets be tracked in connection with Sub-aqueous Sound Ranging development, so radio telephone communication was installed between M'East and M"East. By this means targets were tracked with complete success, the radio operator at M"East giving "Ready, Take" every fifteen seconds, followed by the azimuth. The plotting room being located at M'E obviated the need for telephone communication with the M'E observer and reader.

A Navy type C-W 938 Radio phone is installed at M'East and an SCR—67 set was used at M'West. About 2½ hours were required to install the SCR—67 set, including erection of a small antenna on top of the observing station. Another SCR—67 was installed on the vessel running courses, for use in directing her movements.

In much of the Sub-aqueous Sound Ranging construction work it is necessary to direct a vessel to within a few yards of predetermined position. Radio phone communication has proven most satisfactory for this purpose. The vessel is furnished with coordinates of her position, with respect to the desired point, every fifteen seconds by radio phone from M'East. Coordinates are determined by drawing North, South, East and West lines through the plotted position of the desired point on the plotting board, and then measuring the rectangular distances from the plotted position of the ship, the co-ordinates being reported to the ship as, "280 yards North, 370 yards East," of the point, etc.

By this means it has been possible to plant hydrophone stations and marking-buoys within a few yards of the desired position.

Radio phones are used in a similar manner when laying cable for S. A. S. R. work. For purposes of economy cable should be laid in as nearly a straight line as practicable. By furnishing the ship laying the cable with her position every fifteen seconds, by radio phone, much cable has been saved and the work greatly facilitated.

Before planting the hydrophone stations it was necessary to select locations where the bottom was level, hard and free from big rocks. To do this extensive soundings were made, the position of the ship being plotted at the exact instant the lead struck bottom. This was accomplished by means of an SCR—67 set on the ship and the visual position finding system using M'E-M''E baseline. When the lead was heaved over the side the radio operator on the boat called, "Ready," and when the man taking soundings felt the lead strike he called, "Take," which was immediately repeated to the shore observing stations by the radio operator. The depth of water and character of bottom were then immediately reported by radio phone, and a record was kept and the points numbered on the plotting board. From the plotted positions and depths of water a depression contour map of the sea bottom was made and afterwards enlarged by pantograph.

During target practice in the Fall of 1920 airplane observation of fire was used at both Forts Wright and Terry. The airplanes were equipped with radio phones and overs and shorts were reported to the battery within five seconds after the splash occurred. During target practice at Fort Terry perfect communication was maintained between an SCR—67 set at Fort Terry and M'E at Fort Wright, a distance of about nine miles. The tug towing the target was also directed by radio phone from shore with satisfaction to all concerned.

Communication has been maintained between Fort Wright and the U. S. A. Mine Planter Brig. Gen'l. Absalom Baird over a distance of fifty miles, using an SCR—67 on the Baird.

It has been necessary to survey a new base line and set up an auxiliary observing station on private property in order to see an essential water area. Here again the SCR-67 set is used for all communication with this station. A small antenna has been erected and whenever the station is manned an SCR—67 is taken to the station and set up in a few minutes and communication established with the plotting room.

The men operating these sets are all privates and privates 1st Cl., C. A. C., without previous experience. They have all been trained here in a short time. The necessary qualifications for good radio phone operators are the same as for good telephone operators using ordinary fire control telephones, that is, good hearing, clear speech, alert mind and attention to duty.

The radio phones are always in order and never give trouble when

needed. A reasonable amount of care of the sets and storage batteries is all that is required, and as a rule only minor repairs are needed to keep all the sets in working condition.

But few materials and very little time are required to install an SCR—67 set either on ship or shore. Complete installation was made here on the D.B. boat L-42 in 1½ hours, including erection of an antenna.

Reliability of communication with these sets has been excellent even under adverse circumstances. On one occasion it was necessary to install a set on a big barge equipped with a 90-ton crane. The only place available for an antenna was inside the steel A-frame of the crane. The antenna was put up and set installed in two hours, and perfect communication maintained at a distance of about six miles until the job was finished.

The auxiliary observing station mentioned above is located on a rocky cliff, where it is impossible to obtain a good earth connection. Using a counterpoise of the same shape and size as the antenna, and composed of insulated field wire laid on the ground under the antenna, radiation of .5-ampere is obtained.

A few words here about antennas may not be amiss. While it is no doubt better to erect a carefully constructed antenna of just the right dimensions, nevertheless most any sort of antenna will do in a pinch. Using an SCR—67 and an antenna consisting of one copper-plated, steel twisted pair about 120 feet long, hastily run out of a second story window of headquarters building to an adjacent barrack building, and with a steam pipe as an earth connection, excellent communication was established with the Mine Planter Baird at a distance of more than twenty miles. The antenna used on the Baird is the one supplied with the radio-telegraph installation, an inverted L of six wires about three feet apart and seventy-five feet long. Radiation obtained on the Baird is from .75 to .90-ampere, depending on the wave-length used.

The antenna on the Steamer Pickering is an inverted L of four wires, two feet apart and fifty feet long. Radiation is about .80-ampere. The antenna on the L-42 is a triangular affair running from the ends of the cross-arm on the mast of the after boat davit, (about thirty feet), the apex of the triangle being at the boat davit and the lead-in taken from the upper ends at the mast. Radiation is about .5-ampere.

The antenna at M'East is a four-wire T, forty feet high at one end and twenty-five feet high at the other, and about 100 feet long. Radiation is about .80-ampere. The antenna at M"East is one wire 140 feet long, twenty feet high at one end and ten feet high at the other. Radiation is about .4-ampere.

While fifty miles is the maximum range obtained with these sets, and this was done with good antennas, nevertheless for distances of ten to twenty-five miles most any sort of antenna suffices. A final word of caution; do not have your antenna too large.

EDITORIAL

Awards for the 1921 Essay Competition

ANNOUNCEMENT is made of the decision reached by the action of the Committee of Award, for the JOURNAL'S 1921 Essay Competition.

First Prize, One Hundred and Fifty Dollars

To Major Quinn Gray, C. A. C. for a paper entitled, *Coast Artillery Training*, published in this issue.

Second Prize, One Hundred Dollars

For this prize, the decision resulted in a tie between Captain James D. MacMullen, C. A. C., subject, *The Organization of a Coast Defense for War*, also published in this issue, and Major Paul D. Bunker, C. A. C., subject, *The Test System of Instruction*, to be published in the June issue. Each of these contestants receives half of the amount of the Second Prize.

Honorable Mention

To the following contestants, for the papers whose titles appear opposite their names:

Major Sanderford Jarman, C.A.C.	*Land Artillery to the Fore*
Major Louis B. Bender, S. C.,	*What Ails Our Fire Control Telephones?*
Major Fred M. Green, C.A.C.	*The Future of our Minor Armament.*
Major Paul D. Bunker, C.A.C.	*The Casemate Electrician*
Major Joseph C. Haw, C.A.C.	*Improved Training Methods for the Fixed Defenses*

The Committee of Award, to whom are due the thanks of the JOURNAL and its readers for their painstaking effort, were

Brigadier General Wm. C. Davis, U. S. A., Retired
Colonel Clint C. Hearn, C. A. C.
Colonel Henry J. Hatch, C. A. C.

Two Views of Our Far Eastern Relations

There are surely no classes of Americans more seriously concerned to arrive at a true appraisal of the results of the Arms Conference than officers of the Army and the Navy. No prophecy as to the eventual results of the Conference is worth considering which is not based on a correct appreciation of the Far Eastern relations of the United States. As in many of life's other problems, there are diverse foundations for formulating an appreciation of what the proper attitude of the United States should be in Pacific and Asian affairs. Whether fortuitously or through design, *The Atlantic Monthly* for April, 1922, presents two papers which exhibit two widely separated bases for the consideration of our Far Eastern problems and the evaluation of the Conference's work.

One of the *Atlantic* articles is entitled "The American Mind in the Orient," and is written by George M. Stratton, professor of psychology in the University of California. The other, written by William Howard Gardiner, is entitled "A Naval View of the Conference."

The subject matter and handling of argument in each of these papers is of a sort which renders quotation or extract in a service journal of questionable propriety, and without copious quotation it is almost impossible to give a fair impression of the fundamental divergence in outlook which distinguishes the argument and inferences of these two authors. But it is desired to urge that every Coast Artilleryman lay hands on the *Atlantic Monthly* for April, and read these two articles carefully, each in the light of the other, and with due regard to his own service and observation, if he has been so fortunate as to serve in the Far East.

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Air Service and Coast Artillery Cooperation

The War Department has announced that a series of practical tests is to be conducted this summer by the Coast Artillery and Air Service in conjunction, with a view to obtaining experimental data on the combined tactics of these two arms in coast defense operations. It is expected these tests will include:—

a. Anti-aircraft target practice against air targets to determine the altitude at which bombing planes could operate without being subjected to effective fire.

b. Bombing practice against coast defense installations to determine the effect of aircraft bombs on such objectives.

c. Combined target practice at extreme coast artillery ranges to determine the relative efficiency of bombing planes and large caliber coast artillery guns in operation against an enemy fleet.

This announcement brings to mind the bombing tests against naval

craft which were conducted last year and the controversies which have been raging ever since among the general public as well as among members of the Army and Navy.

This year another phase of the subject of bombing is to be brought forward. It is hoped that in the forthcoming tests the problems will be given such clear prior public statement that the issues involved will not subsequently become confused in the public or professional mind.

In connection with the former tests which have aroused such animated discussion it must be remembered that the warship may fully accomplish its mission without coming within range of aircraft operating from a land base. The basic assumption of the coming tests is that attacking air forces are operated from such bases that they can attain designated points of the enemy shores in strength. The Coast Defense is a purely defensive weapon. It can not seek its opponent nor can it evade him. Certain elements are fixed and must by their very mission remain so. Forts are designed to protect harbors, bases and industrial centers from long range bombardment and from raids by light vessels. Acknowledging the advent of the "fourth arm," a new defensive armament in the form of anti-aircraft artillery has been developed and installed. The program would indicate a competitive test of the use of the defensive means at the disposal of the Air Service and those of the Coast Artillery Corps. That is well, but we must exercise due caution in interpreting the results.

So much hinges upon the word *effective* in the first test. Here enter so largely the factors of the concentration of anti-aircraft artillery and machine guns and of the personal courage of the pilots assigned bombing missions. Conditions affecting these factors will differ in time of war. Not only can a higher concentration of more effective materiel be expected by the defense but the attacking forces may be more ready to risk losses.

The test bombing of coast defense installations can have but one result: they will be destroyed. The tests will be so arranged that hits will be made to enable observers to study the effects of such hits. No elaborate tests are necessary to determine the probability of hitting a fixed target from any given altitude. The destruction of the installations will be no proof of their obsolescence.

The Coast Artillery Corps already requires the cooperation of the Air Service with its observation planes and balloons in the conduct of extreme long range firings. Grant this cooperation and the test resolves itself into the comparison of probability of hitting and the destruction caused by a hit by either method combined with the cost of installation, upkeep and operation for each service. Though a bombing plane under certain conditions may destroy an enemy vessel well beyond the range of our heaviest armament, the coast defenses may still retain their value.

It is probable that a far more profitable result may be obtained from the projected exercises than any arbitrary finding as to the relative efficiency of aerial bombing and long range gunnery. Such a comparison is likely to attract the attention of the general public, but in the two arms of the service involved we may hope to obtain the basis for specific procedure in combined operations of the Air Service and the Coast Artillery. Such considerations as the share of each in surveillance, in identification of targets, in position finding and spotting, involve details which eventually will call for the adoption of a specific procedure—for a Drill Regulations, so to speak, of these combined arms. A specific doctrine and procedure is also yet to be developed as to the tactical cooperation between the two arms. For instance for what targets, at what ranges, in what formations, in what weather, is it preferable that guns or planes should carry out the mission? Under what conditions can both arms engage the enemy at once without interference? What tactical principles should govern the two arms in distributing their assignments of objectives when confronted by an enemy in force? All such questions call for specific determination, and in their determination an ounce of experience is worth a pound of theory.

Let us then await these tests with interest, carry them through with a spirit of whole hearted cooperation and judge the results cautiously with full realization that the most elaborate tests of peace can not firmly establish principles of war.

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A Correction

The Arma Engineering Company has brought to our attention certain errors appearing in an article "Data Transmission for Heavy Artillery" in the JOURNAL U. S. ARTILLERY of November 1921. Official investigation develops the fact that the contract taken by that company to supply an automatic range finder was not executed until 1920 instead of 1918, and had been in effect one year instead of two when terminated. The contract was not terminated because of slow progress alone but because non-completion of the contract within the agreed period made it necessary to carry the contract over into the succeeding fiscal year for which funds were not available in the War Department.

Investigation also discloses the fact that the company's financial position was satisfactory and had no influence on termination of the contract. Both the author and editor regret the cause for objection on the part of the company and are glad to make this correction.

Solution of Problem No. 54—Gunnery

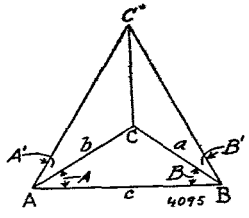


FIG. 1

Let C' represent the position of the balloon at the end of a time interval and C be the horizontal projection of this point. Let the angle of elevation from station A be A' and that from station B, B'.

Compute the horizontal distances a and b (see Figure 1) from the observing stations B and A to the successive positions of the point C using the law of sines.

$$b = \frac{c \sin B}{\sin C} \qquad a = \frac{c \sin A}{\sin C}$$

$c = 1541$

Time	C	sin C	B	sin B	b	A	sin A	a
	°		°			°		
1	96.6	0.9934	18.5	0.3173	492	64.9	0.9056	1405
2	51.6	.7837	41.2	.6587	1295	87.2	.9988	1964
3	31.7	.5255	52.3	.7912	2320	96.0	.9945	2916
4	22.3	.3795	59.2	.8590	3488	98.5	.9890	4016
5	17.1	.2940	63.7	.8965	4699	99.2	.9871	5174
6	13.4	.2317	67.3	.9225	6135	99.3	.9869	6564
7	10.6	.1840	69.1	.9342	7824	100.3	.9839	8240
8	8.5	.1478	70.5	.9426	9828	101.0	.9816	10234
9	6.9	.1201	71.3	.9472	12153	101.8	.9789	12560
10	5.9	.1028	72.3	.9527	14281	101.8	.9789	14674

Compute the elevation of the balloon at the end of each time interval using the data from each station and determine the mean altitude, by the use of the formulae $h = b \tan A'$; $h = a \tan B'$

Time	A'	tan A'	b	h	B'	tan B'	a	h	Mean h
1	34.0	0.6745	492	332	13.3	0.2364	1405	332	332
2	26.0	.4877	1295	632	17.6	.3115	1964	618	625
3	22.3	.4101	2320	951	18.0	.3249	2916	947	949
4	19.5	.3541	3488	1235	16.9	.3038	4016	1221	1228
5	17.9	.3230	4699	1518	16.0	.2867	5174	1482	1500
6	16.2	.2905	6135	1782	15.0	.2679	6564	1758	1770
7	14.7	.2623	7824	2052	13.8	.2456	8240	2024	2038
8	13.0	.2309	9828	2269	12.3	.2180	10234	2231	2250
9	11.5	.2035	12153	2473	10.9	.1926	12560	2419	2446
10	10.5	.1853	14281	2646	10.0	.1763	14674	2588	2617

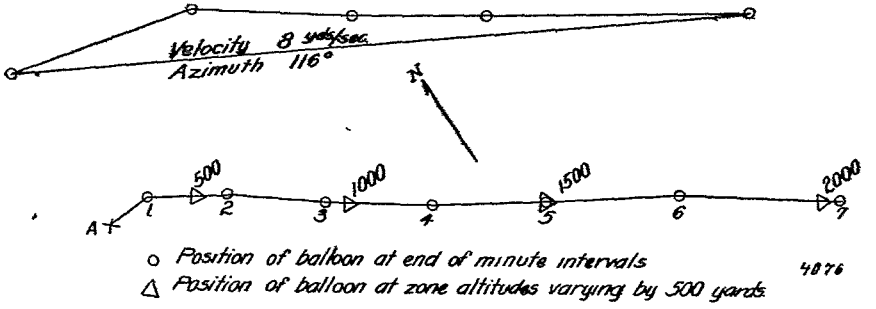


FIG. 2

Plot the horizontal travel of the balloon from the data of either station; in Figure 2 it has been plotted from station A. Since we are interested only in a ballistic wind for a maximum ordinate of 2000 yards and at Time 7 it is seen that the altitude of the balloon is 2038 yards, the plot will be made only to that point.

Plot the Time-Altitude curve as in Figure 3 and from this determine the time corresponding to zone altitudes of 500, 1000, 1500 and 2000 yards, which prove to be 1.6, 3.2, 5.0 and 6.9 minutes, respectively. Plot these positions on the track of the balloon in Figure 2 and measure the distances between successive points on the plot. This gives the horizontal travel of the balloon in each zone. Divide these distances by the time in the zone and determine the true wind velocity in yards per second in each zone. Multiply these values by the weighting factors and plot the ballistic wind polygon as shown in Figure 2.

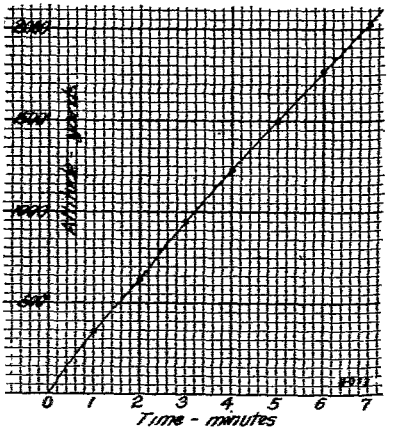


FIG. 3

Solution of Problem No. 6—Orientation

TRAVERSE....Gun Position.... BATTERY..... REGIMENT..... Computed by.....

Initial Point...Sta. 4 : x 192376.5 y 307618.7 alt. 476.3 ft. Y-azimuth of orientation line 350°57′
Gun Position...Sta. B : x 193251.5 y 307734.8 alt. 482.7 Y-azimuth of aiming line 68°02′
Closing Point..Sta. 5 : x 193433.4 y 308042.3 alt. 478.8 Y-azimuth of final orientation line 167°45′

Station	Line	Deflection Angle	Y-azimuth V	Vertical Angle	Horizontal Distance D (ft.)	Altitude Increments +	Altitude Increments −	log sin V + log D = log dX	dX to next station +	dX to next station −	log cos V + log D = log dY	dY to next station +	dY to next station −
△ 4	△4−△3 △4−△A	96°18′ R	350°57′ 267°15′	−1°03′	231.0		4.2	9.99950 2.36361 2.36311	230.7		8.68104 2.36361 1.04465	11.1	
△ A	△A−△B	41°13′ R	128°28′	−4°09′	165.1		12.0	9.89375 2.21775 2.11150	129.3		9.79383 2.21775 2.01158		102.7
Gun position △ B	Aiming point △B−△C	60°26′ L	68°02′	+2°20′	555.3	22.6		9.96727 2.74453 2.71180	515.0		9.57295 2.74453 2.31748	207.7	
△ C	△C−△D	64°13′ L	3°49′	−3°15′	174.1		9.9	8.82324 2.24080 1.06404	11.6		9.99904 2.24080 2.23984	173.7	
△ D	△D−△5	48°06′ R	51°55′	+1°33′	216.8	5.9		9.89604 2.33606 2.23210	170.6		9.79015 2.33606 2.12621	133.7	
△ 5	△5−△7	115°50′ R	167°45′										
Totals						28.5	26.1		1057.2	0		526.2	102.7
Minus						26.1			0			102.7	
Net difference						2.4			1057.2			423.5	
Initial Point						476.3			192376.5			307618.7	
Closing Point (computed from traverse)						478.7			193433.7			308042.2	
Closing Point (given data)						478.8			193433.4			308042.3	
Error of Closure						0.1 ft.			0.3 ft.			0.1 ft.	

NOTE: These errors are so small that the traverse need not be adjusted, the results obtained are well within the desired limits of accuracy.

Zone	Altitude	Travel	Time in Zone	True Wind Velocity	Weighting Factor	Weighted Wind Velocity
	yards	yards	seconds	yds/sec.		yds/sec.
1	500	945	96	9.8	.21	2.06
2	1000	1670	192	8.7	.20	1.74
3	1500	2120	300	7.1	.20	1.42
4	2000	2970	414	7.2	.39	2.81

From the diagram, it is seen that the ballistic wind for this maximum ordinate has a velocity of 16 miles per hour and is from an azimuth of 116°.

Solution of Problem No. 7—Orientation

From the given coordinates of the points K, L and M, compute the length and azimuths of the sides LK and LM

x_K	195323.9	x_M	195851.3
x_L	195243.6	x_L	195243.6
dx	80.3	dx	607.7
y_K	304047.7	y_M	303489.1
y_L	303604.5	y_L	303604.5
dy	443.2	dy	−115.4
log dx	1.9047155	log dx	2.7836892
log dy	2.6465998	log dy	2.0622058
log tan φ	9.2581157	log tan φ	0.7214834
V_{LK}	10°16′10″	V_{LM}	100°45′08″
log dy	2.6465998	log dy	2.0622058
log cos φ	9.9929864	log cos φ	9.2708235
log LK	2.6536134	log LM	2.7913823

azimuth KL	190°16′10″	azimuth ML	280°45′08″
angle HKL	111 30 11	angle LMH	92 36 43
azimuth KH	78 45 59	azimuth MH	13 21 51
azimuth LK	10 16 10	azimuth LM	100 45 08
angle KLH	42 48 52	angle HLM	47 40 06
azimuth LH	53 05 02	azimuth LH	53 05 02 check
angle LHK	25°40′57″	angle MHL	39°43′11″

Find the lengths of the sides KH, LH and MH by the Law of Sines

KH = KL sin KLH/sin LHK		LH = KL sin HKL/sin LHK	
log KL	2.6536134	log KL	2.6536134
log sin KLH	9.8322701	log sin HKL	9.9686688
colog sin LHK	0.3631272	colog sin LHK	0.3631272
log KH	2.8490107	log LH	2.9854094

MH = LM sin HLM/sin MHL		LH = LM sin LMH/sin MHL	
log LM	2.7913823	log LM	2.7913823
log sin HLM	9.8687966	log sin LMH	9.9995486
colog sin MHL	0.1944770	colog sin MHL	0.1944770
log MH	2.8546559	log LH	2.9854079
		mean log LH	2.9854087

Using the usual equations for the determination of coordinates, when knowing the length and Y-azimuth of a line

$dx = D \sin V$		$dy = D \cos V$			
x_H	196016.7	x_H	196016.7	x_H	196016.7
x_K	195323.9	x_L	195243.6	x_M	195851.3
dx	692.8	dx	773.1	dx	165.4
log dx	2.8406093	log dx	2.8882358	log dx	2.2185301
log sin V_{KH}	9.9915986	log sin V_{LH}	9.9028271	log sin V_{MH}	9.3638742
log KH	2.8490107	log LH	2.9854087	log MH	2.8546559
log cos V_{KH}	9.2896107	log cos V_{LH}	9.7786169	log cos V_{MH}	9.9880774
log dy	2.1386214	log dy	2.7640256	log dy	2.8427333
dy	137.6	dy	580.8	dy	696.2
y_K	304047.7	y_L	303604.5	y_M	303489.1
y_H	304185.3	y_H	304185.3	y_H	304185.3

Mean Value of Coordinates of H, x 196016.7 y 304185.3

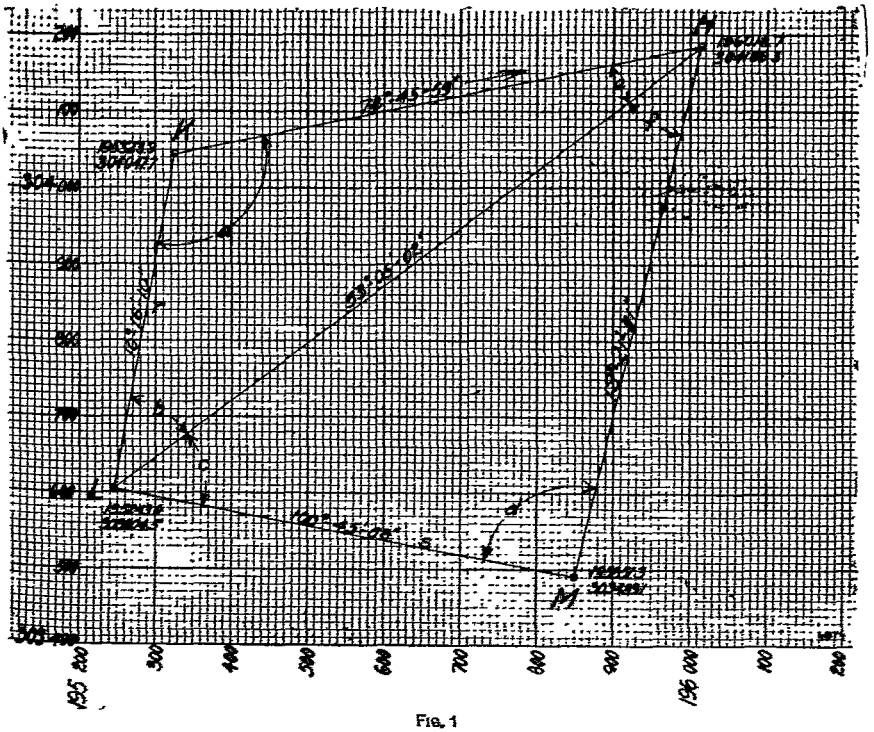


Fig. 1

Problem No. 8—Orientation

RESECTION

Reference: Chapter XI—Orientation for Heavy (Coast) Artillery

GIVEN:

The coordinates of three known points

A,	x 96580.35	y 104047.17
B,	x 99141.60	y 105731.15
C,	x 102136.30	y 109978.11

Unknown point P from which angles were read as follows:

angle APB 31°12′00″
angle BPC 26°01′30″

REQUIRED:

Compute the coordinates of the unknown point P.

The methods of solution shown in the text are long and tedious. The Common Chord Solution is now the popular one at the Coast Artillery School and is used there extensively. For that reason, a description of the method will follow and the solution of this problem will be by that method.

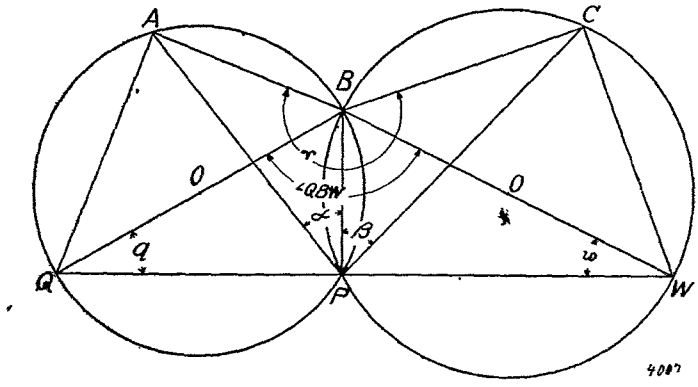


FIG. 1

Three Point Problem—Common Chord Solution

Proof

Angles QAB, QPB, WPB and WCB are right-angles, each being subtended by a diameter.

Angles AQB = α, BAP = q, BCP = w, and BWC = β, each pair being subtended by the same arc.

Angles ABQ = $90°-\alpha$, QBP = $90°-q$, PBW = $90°-w$, and WBC = $90°-\beta$.

As angles QPB and WPB are each a right-angle, angle QPW is a straight-angle, and QPW is a straight line. Thus QPWB is a triangle.

Angle QBW = $\gamma - (90° - \alpha) - (90° - \beta) = \alpha + \beta + \gamma - 180°$.

This gives us two sides and the included angle of the triangle QBW, which therefore can be solved for q and w by the law of tangents.

Y−az BP = Y−az BA − $(90°-\alpha)$ − $(90°-q)$ = Y−az BA + α + q − 180°

Y−az BP = Y−az CB + $(90°-\beta)$ + $(90°-w)$ = Y−az BC − β − w + 180°.

The other relationships are sufficiently evident.

1. Draw a rough sketch showing the relative position of the point whose coordinates are to be found (P) the points whose coordinates are known (A, B, and C, lettered clockwise, as seen from P). Call the observed angles: APB = α, and PBC = β. Draw a circle thru the points ABP, and a circle thru the points PBC. Draw the diameter BQ in the ABP circle and the diameter BW in the PBC circle. Draw the lines BA, BP, BC, PQ, PA, PB, PC, PW, AQ and CW. (See figure 1). Call the angle BQP, q; and the angle BWP, w.

2. From the coordinates of A, B and C, compute the length and Y-azimuth of BA and BC. Call the angle ABC, lying inside the quadrilateral ABCP, γ.

3. $\angle QBW = \alpha + \beta + \gamma - 180°$.

$$BQ = BA/\sin \alpha$$

$$BW = BC/\sin \beta$$

This gives two sides and the included angle of the triangle QBW.

4. Solve this triangle for the angles q and w, by using the tangent formula:

$$\frac{\tan \frac{1}{2}(q-w)}{\tan \frac{1}{2}(q+w)} = \frac{BW-BQ}{BW+BQ}$$

$(q + w = 180° - \angle QBW)$

5. If $\angle$ QBW came out minus in step 3, this shows that Q is on the right and W on the left, instead of vice versa as in the normal case. In this special case, the q and w which you get by solving the tangent formula in step 4 are not q and w proper. Each must be subtracted from 180° to get the proper q and w to use in succeeding steps. Except for this rare special case, step 5 will be omitted.

6. Find the length of BP.

$$BP = BQ \sin q.$$

$$BP = BW \sin w. \quad \text{Check.}$$

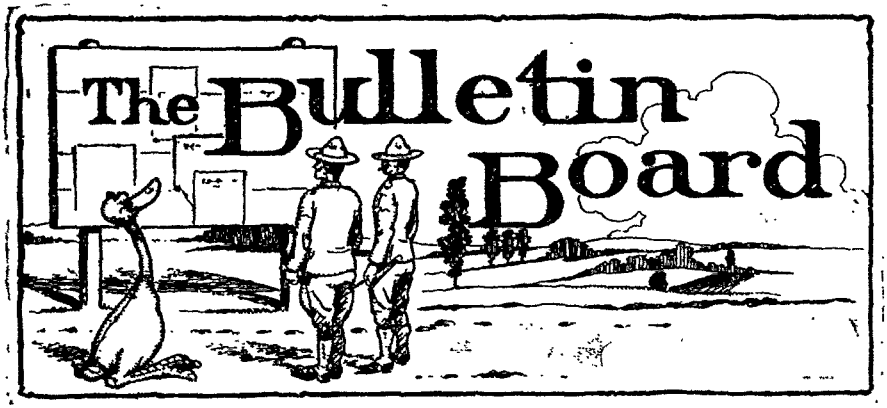
7. Find the Y-azimuth of BP.

$$\text{Y-az BP} = \text{Y-az BA} + \alpha + q - 180°.$$

$$\text{Y-az BP} = \text{Y-az BC} - \beta - w + 180°. \quad \text{Check.}$$

8. From the length and Y-azimuth of BP, find its dX and dY, and hence the coordinates of P.

NOTE:—In brief, the solution consists in roughly drawing the QBW triangle, obtaining from the initial data two sides and the included angle of this triangle, solving the triangle for the other two angles, and then using this data to get the length, dX and dY of BP.



The Rifle Team Fund

The following contributions to the Rifle Team Fund have been received between April 3rd and May 3rd:

SOURCE OF DONATIONS	AMOUNTS
Army Music School (Coast Artillerymen on duty)	$ 2.70
Hdq. Panama Coast Artillery District	4.00
Coast Defenses of Balboa	9.00
Coast Defenses of Cristobal	23.10
Colonel Edward Carpenter, C. A. C.	1.00
Coast Defenses of Los Angeles	8.00
Coast Defenses of Manila and Subic Bays	47.00
Total this month	94.80
Previously acknowledged	473.98
Grand total	$568.78

With this month's contributions, the roll of Coast Artillery commands is practically complete, and the grand total has expanded to an amount which insures that as far as the financial sinews are concerned, the Rifle Team may know that the Corps stands behind it.

Government Compensation

Reprinted from The Infantry Journal, for March, 1922.

Under the provisions of the War Risk Insurance Act and the amendments thereto the following compensation is allowed to the widow, minor children or dependents of an officer or enlisted man who dies while in active service, death being the result of injuries received or disease contracted in line of duty:

1. (*a*) To a widow without minor children, $25 per month during her widowhood.
   (*b*) To a widow with one child, $35 per month.
   (*c*) To a widow with two children, $42.50 per month.
   (*d*) To a widow with three children, $47.50 per month.
   (*e*) To a widow with four children, $52.50 per month.

There is no further increase in the compensation for additional children.

2. Where minor dependents are left and there is no widow the following compensation is allowed:

(*a*) For one child, $20 per month.
(*b*) For two children, $30 per month.
(*c*) For three children, $40 per month.
(*d*) For four children, $45 per month.
(*e*) For five children $50 per month.

There is no further increase in the compensation for additional children.

The payments provided for above continue until the child reaches the age of 18 years.

3. Where there are dependent parents the following compensation is allowed:

(*a*) For one dependent parent, $20 per month.
(*b*) For two dependent parents, $30 per month.

If compensation is being paid to a widow and minor children on account of the death of her husband and the deceased also leaves dependent parents surviving him, additional compensation is payable on account of such dependent parents.

All of the above compensation is in lieu of pensions, which are no longer allowed for the dependents of deceased officers and enlisted men.

In the adjustment of claims for compensation with the Veterans' Bureau a prescribed prodecure is necessary and certain forms and papers have to be prepared and submitted:

1. In the case of a widow:

(*a*) File with the Veterans' Bureau a properly executed copy of Form No. 527 (Application for Compensation).

(*b*) Attach to Form No. 527 a certified copy of the record of her marriage to the deceased.

Proof of wife—i. e., record of marriage to the deceased—may take the following forms:

1. The original marriage certificate duly executed, or
2. A photostat copy of the original marriage certificate indicated in (1) above or
3. A certified or verified copy of the public or church record of marriage, or
4. The affidavit of the clergyman who officiated at the marriage, or
5. The affidavits of two eye-witnesses to the ceremony, or
6. The affidavits of two persons having personal knowledge of the marriage.

In case the method indicated in 4, 5 or 6 above is employed to establish proof of marriage, the widow is required also to submit an affidavit stating why a record of marriage is not obtainable.

In the case of a widow who was divorced from a former husband she must file with Form No. 527 a certified copy of the court order or decree of divorce from her former spouse.

(*c*) If there are minor children: Attach to Form No. 527 a certified copy of the public record of the birth of each child.

In case it is impossible to secure a certified copy of the public record of birth, a certified copy of the church record will suffice. Failing in both of these, the affidavits of two persons having knowledge of the date of birth are acceptable. The main point in this is to establish the age of the child:

In the case of a stepchild there must be filed with Form No. 527 the affidavits of two persons to the effect that the child was a member of the deceased household.

In the case of an adopted child, adoption must be shown by a certified copy of the court order or decree of adoption.

In the case of an illegitimate child relationship must be shown by an acknowledgment in writing by the father.

2. In the case of minor dependents where there is no widow:

(*a*) File with the Veterans' Bureau a properly executed copy of Form No. 527 (Application for Compensation). This form may be executed and filed by an interested person on behalf of the minor children.

(*b*) Attach to Form No. 527 certified copies of the public records of the birth of each child concerned.

The same rules with respect to records of birth stated in paragraph 1 above are applicable here.

(*c*) Attach to Form No. 527 letters of guardianship of the children. While Form No. 527 may be filed by any interested person without waiting for the legal guardian to be appointed by the courts, no payments of compensation can be made until a legal guardian has been appointed and letters of guardianship have been filed in the case.

3. In the case of dependent parents:

(*a*) File with the Veterans' Bureau a properly executed copy of Form No. 527 (Application for Compensation).

(*b*) Attach to Form No. 527 proof of relationship.

Relationship must be proven by certified copy of the public record of birth or church record of baptism of the person who was injured or died in the service and the affidavits of two persons identifying the claimant as one of the parents named in such record, or by the affidavit of the physician, midwife, or nurse in attendance at the birth, or by the affidavits of two persons having personal knowledge of the relationship if public records are not available.

(*c*) Attach to Form No. 527 proof of dependency.

Dependency must be shown by affidavits of two persons, stating the amount of the total annual income of each parent claiming compensation, the amount received monthly by each such parent from each separate source, including the monthly earnings of such parent, if any, and if none, the reason such parent is not capable of self-support. These affidavits must also show the amount contributed monthly by the deceased or disabled person before entering the service and the location and value of all property, real and personal, owned by each such parent, the encumbrances thereon, and the net monthly income therefrom, as well as the source of the affiant's information.

The above gives complete information on the subject of compensation for dependents, together with what is necessary to be done by your dependents in order to secure the benefits under the law.

The question that comes up in connection with all of this is: What should an officer or soldier do during his lifetime to facilitate the matter of his dependents receiving the compensation that is due them after he is gone? It is simply a business proposition. It is as important as making your will or providing insurance for your family. It does not bring the end any closer, and it will make you feel more comfortable to know that you have done everthing possible for your dependents.

The following action is suggested:

1. Write to the Veterans' Bureau, Washington, D. C., and request that two copies of Form No. 527 be forwarded to your address. Use one of these as a work sheet and keep it up to date as circumstances may require.

2. Secure the necessary papers to complete the record of your marriage as indicated herein.

3. Secure the necessary papers to complete the record of your minor dependents so as to establish their rights to compensation under the various contingencies that may arise.

4. Secure the necessary papers to complete the record of your dependent parents to establish their claim for compensation.

Assemble all of these papers and file them, together with the blank copy of Form No. 527, in your safe-deposit box ready for the emergency that will come after your passing away.

Having done this, all that is necessary is for your dependent to complete Form No. 527, attach the necessary papers, and forward the whole to the Veterans' Bureau with the assurance that the case will receive expeditious consideration.

Programs and Schedules

Close on the heels of the editorial of last month on this subject, the Commanding Officer of the Coast Defenses of Chesapeake Bay sent the JOURNAL a copy of his Annual Program for Troop Training. It is reproduced below as one solution of the problem.

HEADQUARTERS
COAST DEFENSES OF CHESAPEAKE BAY
Fort Monroe, Virginia.

April 11, 1922.

MEMORANDUM NO. 38-A

SUBJECT: Annual Program for Troop Training—April 1, 1922 to Feb. 28, 1923.

I. TRAINING PERIODS. The period April 1, 1922 to February 28, 1923 is divided into the following periods. For each period a major instruction subject is assigned.

1. *First Period.* April 1, 1922 to June 5, 1922. Major Subject—Practical Artillery Instruction.

(a) Artillery Training.

(1) Coast Defense Command-Two drills per week, one day and one night, and a five day period to commence about May 28th, will be devoted to the training of the Coast Defenses as a fighting unit. The object to be attained will be to have the personnel so trained and the materiel (Fixed Guns, Antiaircraft Artillery, submarine mines, and accessories pertaining thereto), in such condition that the whole will function as an efficient unit in keeping the water areas within its reach free from assumed hostile enemy craft, and with this end in view will be able to cooperate intelligently with the neighboring naval and air services.

(2) First Battle Command—The period until May 15 will be devoted to preparation and training for battery and mine practices. The 10 days following this will be set aside for such practices. A five day period (coincident with the Coast Defense period) will be set aside for the training of the Battle Command as a unit. The object of drills and practices during this period will be to so train the personnel that each organization will be able efficiently to operate the battery, fire command, battle command, meteorological and other station to which assigned. Tests of the state of training and the condition of the materiel assigned thereto will be made by the Coast Defense or Battle Commander. Battery Commanders will be assigned targets without warning and the time required to open fire and the manner of so doing will be taken into consideration in judging the state of preparedness of the battery. In training his command the Battle Commander will be guided by the requirements of Memo. 27, these Headquarters, c. s., (TARGET PRACTICE PROGRAM FOR THE FIXED DEFENSES FOR 1922 AND DETAILED AND SAFETY REGULATIONS FOR THE SAME).

(3) First Antiaircraft Battalion-Gunners' Examinations will be started April 1st and must be completed before April 15th. Immediately thereafter and continuing until the end of the first period (except for the five-day Coast Defense Period) drills, target practices, and battalion exercises will be held. It is desired

that by the end of this period the personnel of the Battalion will be efficiently trained in the proper handling of its guns, searchlights, machine guns and transportation. In addition the Battalion is to be trained to take the field promptly and to occupy positions as a unit quickly. With this end in view all officers will be given instruction, both map and terrain, in the selection of positions, not only for their own units but for those of other units of the Battalion as well. In training his command the A. A. Bn. Comdr. will be guided by the requirements of Memo. 36-A, these hq., c. s., (TARGET PRACTICE PROGRAM FOR 1ST ANTIAIRCRAFT BN., AND DETAILED AND SAFETY REGULATIONS FOR THE SAME).

2. *Second Period.* June 6, 1922 to August 31, 1922. Major Subject-Instruction of Visiting Units.

(a) General—During this period the entire personnel of this command, both enlisted and commissioned, will be used as necessary to further the instruction of visiting troops. However, personnel not being used for this purpose will be given instruction in any subject prescribed under Part III, Par. 1, of this memorandum, in which they failed to qualify during the first period. The remainder of the time during this period, excepting for the time consumed in ceremonies, inspections, infantry drills, calisthenics, and athletics, will be devoted to the preliminary training of personnel leading to rifle and pistol firing.

(b) Schedule for Visiting Troops—The units to visit the Coast Defenses and the dates during which they are to be present is set forth below:

Coast Artillery School.....June 5 to June 10.
R. O. T. C. June 15 to July 27.
Virginia National Guard.....July 30 to August 13.
C. M. T. C.....July 27 to August 26.

3. *Third Period.* September 1, 1922 to October 31, 1922.

Major Subject—Small Arms Instruction.

(a) Rifle Firing—This will be confined to firing by the individual. It is expected that every man will receive such preliminary instruction and instruction on the range that he will be able to qualify at least as a marksman at record practice.

(b) Pistol Firing—Instruction will be carried on with the object in view of qualifying every man as at least a marksman. Requirements for a marksman are not high and can be attained by any man if given correct and sufficient preliminary instruction.

(c) Machine Gun and Automatic Rifle Firing—Instruction and practice will be carried on with the object in view of teaching the personnel assigned to these weapons to handle them with confidence, to open quick and accurate fire, and to set up and make minor repairs and adjustments quickly.

(d) Practice Marches—A practice march of at least three hours duration will be held once each month. During these marches special attention will be paid to the fit of the shoes, the care of the feet, and the proper method of preparing and carrying the heavy marching order equipment.

4. *Fourth Period.* November 1, 1922 to February 28, 1923.

Major Subject—Theoretical Artillery Instruction.

(a) All men will be instructed with the object in view of qualifying them as second and first class gunners. In addition specially selected men will receive instruction for rated and specialist positions.

(b) Examinations—Examinations for gunners, rated positions and specialist grades will be held commencing February 10, 1923.

II. GENERAL PRINCIPLES OF TRAINING.

1. Environment—To accomplish successfully the object of training it is essential that, in addition to training in discipline and technique, the soldier be

provided with an elevating environment and imbued with a proper appreciation of the dignity of his position, a desire for clean thinking and right living, a love of country, and a knowledge of his responsibilities as a citizen.

2. Method of Prodecure—Training, to be successful, must be based on sound principles; systematic and progressive; designed to cultivate leadership and have the soldier attain a specified standard of proficiency; diversified in order to maintain the interest of the soldier; so arranged as not to retard the progress of the intelligent and alert due to the dullness or indulgence of others; planned to prevent confusion in the minds of the soldiers resulting from attempts to teach many principles at the same time; and devised to develop a spirit of competition and friendly rivalry.

3. Instructors' Qualifications—Instructors must have a thorough knowledge of their subjects and know how to impart it. They cannot impart that which they do not possess, nor can soldiers be expected to absorb knowledge reserved in the minds of instructors.

4. Harsh Criticisms—Harsh criticisms of subordinates, nagging, undue severe correction and other tyrannical or capricious conduct is destructive of self-respect. Unrestrained indulgence in such practices marks an officer or an enlisted man as unfit for the instruction and command of men.

5. Disagreeable Tasks—Training will be accomplished as far as practicable during seasonable hours and with a minimum of time devoted to non-essential tasks that are disagreeable or objectionable.

6. Responsibility for Efficiency—Responsibility for producing efficiency must rest upon the subordinate commanders. It is only by prescribing the task and leaving the details of its accomplishment to the responsible commanders that initiative and readiness to accept responsibility will be cultivated. Efficiency of the higher commander in respect to the training of subordinate units consists of great activity and keenness of observation in the detection of deficiencies, as well as in the skill with which he applies prompt and efficacious corrective measures.

7. Leadership—Any system of training which ignores the value of aggressive and intelligent leadership on the part of all commanders of units is inexcusably faulty. In all drills, exercises, and other training, commanders of organizations must take advantage of every practicable opportunity to foster and develop this important qualification.

III. GENERAL INFORMATION.

1. *Subjects general to all periods.*

(a) Calisthenics and Athletics-Calisthenics will be held for 15 minutes daily except Sundays. A period of one hour per week will be set aside for combined athletics. Whenever practicable this will be of a competitive nature in order that the period may be of both recreation and physical development.

(b) Riot Duty—Special attention will be given to this subject. Troops must at all times be prepared to take the field. Enlisted men not already trained in the use of the rifle or pistol will be given such instruction as is necessary to qualify them to handle these weapons with confidence.

(c) Ceremonies, Inspections, and Infantry Drills—These will be held with sufficient frequency to determine from time to time the state of training of the personnel; the condition of the materiel, equipment, and clothing; and to maintain a high degree of discipline within the organizations. At infantry drills every effort will be made to develop leadership among the noncommissioned officers. This will be done by giving them sufficient opportunity to command squads or platoons at drills to become accustomed to giving commands, explaining movements, and securing confidence in themselves. Every noncommissioned officer must know

thoroughly every movement of the school of the soldier and of the school of the squad, and must know how to explain these movements to others.

(d) First Aid, Hygiene, and Sex Morality—Sufficient instruction will be given in these subjects to teach everyone how to resuscitate the apparently drowned, how to use correctly the first aid packet, and how to keep clean and guard against ill health.

(e) Artillery Instruction—In addition to the intensive artillery training specified in Part I, Par. 1 (a) of this memorandum sufficient drills and instruction will be carried on to keep all organizations at the same standard of proficiency as is required to be attained at the end of the first period.

(f) Signalling and Gas Instruction—The first named will be carried on with the object in view of meeting the requirements of Par. 1562, A. R.; sufficient instruction will be given in the second named to acquaint all soldiers with the uses of gas and smoke on the battlefield and with the importance of knowing how to operate and care for the gas mask.

(g) Schools.

(1) Post Schools—Post Schools will be discontinued during the period May 1, 1922 to Sept. 30, 1922. During the remainder of the year post schools will be in operation. The object of these schools is to give general education and vocational training to enlisted men, to increase their efficiency as soldiers and their value as citizens upon their return to civil life, and to develop soldiers with a training suitable for assignment to the more technical positions on the manning table. It is the duty of organization commanders to see that all men of their commands know of the various courses taught at the schools and the advantages to be derived by attendance thereat.

(2) Troop Schools—Troop schools for both officers and noncommissioned officers will be held on an average of three hours each week. During the period May 1st to Sept. 30th they will take the form of informal conferences, critiques, and demonstrations. During the remainder of the year schools will be formed with detailed instructors, a definite course, and classroom periods. The subject matter of instruction though must relate to current training or be definitely preparatory thereto. For instance during the third period it is expected that special instruction will be given on rifle markmanship (W. D. Document 1021). Subjects to be taught and their scope will be shown on the monthly schedules submitted by the commanding officers of the First Antiaircraft Battalion and the 1st Battle Command.

2. *Schedules*—In compliance with instructions contained in Par. 3, C. A. M. No. 1, W. D., 1921, and Memo., C. A. T. C., Nov. 28, 1921, schedules will be prepared as follows: Monthly—by Commanding Officers of the 1st Antiaircraft Battalion and the 1st Battle Command; Weekly—by the commanding officers of all companies, batteries, and detachments. Schedules will be submitted for approval to the next higher commander. Monthly schedules will be submitted for approval during the first week of the month preceding that for which they are to be effective. Weekly schedules will be submitted for approval by Friday of the week preceding that for which they are to be effective. In preparing schedules all concerned will be guided by the list of calls as published from these headquarters from time to time. The monthly schedules for the 1st Antiaircraft Battalion and the 1st Battle Command will be submitted for final approval to the Coast Artillery Training Center. Thereafter they will be published in memorandum form from these headquarters. Schedules will contain a detailed statement of the portions of subheads of the subjects of instruction and the specific tests (see Par. 15, G. O. 5, Hq. 3d C. A. c. s.) to be conducted, giving the hours and time allotted to each, and, when necessary or expedient, the place, instructor, text

reference, and any other pertinent remarks. The use of schedules requires that all general subjects of training be analyzed in advance and the divisions of each arranged in an orderly and sequential manner according to the order of progress.

BY ORDER OF COLONEL MITCHELL:

C. W. Bundy,
Adjutant

The Infantry Journal for May

The Infantry Journal out on May first is up to its usual standard. The leading article "The Penalty of Leadership" is brimful of truth and food for thought. Has Leavenworth justified itself? The answer is to be found in the "War Records of Leavenworth Graduates" in which an analysis of their war service has been made. Captain A. B. Carson writes of a drill experiment he made while with the Army in Germany. In these days of talk of demotion, elimination, reduction, etc. etc., it is interesting to know just what the basis for officer classification is. Colonel Ralph McCoy tells how it is done in his article "Classification of officers." When the American Army went to France certain instructions were given to General Pershing by the Secretary of War, Mr. Baker. On what were these based? The one page article "Historical Precedent" reveals the source. Col. John Parker, sums up his 34 years of tactical experience in "Infantry Organization—An Experiment in War." This is the first installment of three, which are to appear in the Journal. Captain Hugh D. Adair, 20th Infantry produces some pertinent thoughts in his article "Suggestions for a Field Uniform." We know that Russia failed the allies at the critical moment of the war and her failure made possible the Great German drives of 1918 which came so near winning the war. The true causes of this failure are told by General Theodore Rostortzeff, formerly of the Russian General Staff, who has prepared an article on the "Military Errors of Russia" especially for the Infantry Journal. Captain H. W. Caygill, 34th Infantry appreciates the necessity for keeping the Journal filled with high grade reading matter and sets forth his views. As the commander of a battalion in one of the leading combat divisions in France Lt. Colonel Jenning C. Wise has had wonderful opportunities to observe the effects of various classes of fire. His article on "Automatic Fire" brings up much food for thought. Out in Muskingum County, Ohio, a local sculptor, Daniel Bryce Baughman, produced a wonderful statue of the American Doughboy. Mr. Howard Philips Rhoades one of the artist's townsmen has prepared an illustrated article on the history and unveiling of this masterpiece. Captain J. S. Switzer's serial on the Champagne Marne Defensive is drawing to a close. This is the next to the last consignment and deals with the great counter offensive that turned the tide of the war. The Americans have done wonders for the Porto Ricans. Athletics has played an important part in this great work. Captain A. M. Weyand, 65th Infantry, tells in a most interesting way of the progress that has been made. Mr. Henry Bidou, in *Le Journal*, makes a comparison between the Army of France and her neighbors. It shows causes for France's apprehension and serves to throw some light on the situation on the other side. A sub-caliber attachment for the one pounder, has been developed by Lieutenant E. A. Kimball, 34th Infantry. He describes his device and the practical use of it in sub-caliber practice. Captain W. L. Tydings, who is the Executive Officer of the 3rd Corps Area Correspondence School for National Guard and Reserve Officers tells of the operations of the school from his end of the line. General Fries, the Chief of the Service in our Army delivered a lecture on the Development of the Gas Mask. It is included in the May Journal and is an authoritative history of this important article of the soldiers' equipment. That the Press of the Country is not in accordance with the recent action of Congress looking to a serious and un-

warranted reduction of the Army is evidenced by the editorial utterances that have been made. Samples of these have been collected and are made of permament record. The Notes from the Chief of Infantry—a regular feature of the magazine —are over-flowing with excellent reading of interest to every Infantryman of the Army of the United States. Varied Ground is replete with a variety of short articles. The Editorial Section as usual contains its quota of sound thoughts. The Reserve Officers Department will prove of special interest to the Reserve Officers. A number of questions of members are answered—Tables of Organization; Reserve Corps Eligibility; Subjects included in the Examination for Promotion; What you can Do, Etc. The refresher course in Map Reading and the Terrain Exercise Problems are continued. These are most valuable for reserve officers preparing for the work at the Summer Training Camps. The Pictorial Section contains four pages of wonderful pictures brought back from China by Captain Warren J. Clear, 34th Infantry to illustrate his splendid article "From Tientsin to Peking."

All in all this is a most exceptional number of the Journal and it will be widely read and enjoyed throughout the service.

Coast Artillery Reserve Officers Meet in Boston

Nearly all the Coast Artillery Reserve Officers residing in Boston and vicinity met at the City Club in Boston on the evening of April 20 for an informal reunion. Colonel J. T. Geary, commanding the Coast Defenses of Boston gave a short talk explaining the laws and regulations governing the Officers Reserve Corps and the relation of the regular army to the Organized Reserves. Among others who came some distance to attend this meeting was Major C. A. Meserve, who came all the way from Amherst, Massachusetts.

BOOKS CATALOGUED
Library, Coast Artillery School, Fort Monroe, Va.

November, 1921, to January, 1922

Military Science

Unless noted thus "*," these books may be obtained by any Regular Coast Artillery Officer; Warrant Officer, A.M.P.; or Non-commissioned Officer (Grades 1-3), C. A. C., upon request to Librarian.

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History of Battery F, 323d Field Artillery, A*.....Riggs, M. H.
History of the Twenty-Ninth Division*.....Cutchins, J. A.
History of the 322d Field Artillery*.....
History of the 324th Field Artillery*.....Ashburn, T. Q.
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Notes on Fire on Aeroplanes.....U. S. General Staff.
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Three Years of War in East Africa.....Buchanan, A.
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BOOK REVIEWS

Handbook of Municipal Government. By Charles M. Fassett. Thos. Y. Crowell Co. New York. 1922. 5″x7½″. 192 pp. Cloth.
Assets of the Ideal City. By Charles M. Fassett. Thos. Y. Crowell Co. New York. 1922. 5″x7½″. 177 pp. Cloth.

These two books are companion volumes by an author who, first of all a successful engineer, became President of the Chamber of Commerce of Spokane, and later Mayor of this city. while now he is a professor and specialist in municipal government at the University of Kansas. Both of Mr. Fassett's books are so condensed and simple in treatment as to serve admirably both for college texts and for the perusal of the non-technical general reader. Uniformly made up with clear type, bold face side headings, ample bibliographies and complete indices, the two volumes are easy to read and easy to use.

The *Handbook of Municipal Government* constitutes a descriptive outline of the historical development of cities, the different forms of municipal government, the distribution of functions through officers, legislative bodies and other agencies, and a practical discussion of the lessons of experience in city administration and finance.

Assets of the Ideal City combines a catalog and an appraisal of the institutional, communal and mechanical betterments and activities which have been devised and tried in different places for the physical and aesthetic amelioration of the conditions of city life.

The Evolution of Civilization. By Joseph McCabe. G. P. Putnam's Sons. New York. 1922. 138 pp. 5¼″x7½″. Cloth.

In this narrative of the story of civilization, the author takes us from a "Million years of childhood," at a time when man had emerged from lowest savagery up to the fall of Roman civilization. He discusses "the Wonders of Ancient Crete," and "the Wisdom of Old Egypt." The chapter "By the Rivers of Babylon" shows us a civilization in striking contrast to the one tradition has given us of Babylon. He has a chapter on "The True Position of the Hebrews," one on "The Splendour of Greece," as well as one on "The Vices and Virtues of Rome." Finally, he shows us that science is the hope of civilization; the application of it to the whole life is only the application of truth which *is* science.

The Outlook for the Philippines. By Charles Edward Russell. The Century Co. New York. 1922. 5½"x8¼". 41 pp. 16 Ill. Cloth. Price $3.00

"The purpose of this book is to give a summary view of actual conditions, political, social, economic, industrial, in the Philippine Islands, of the traits and characteristics of the inhabitants, of their capacities and defects, and of their achievements, especially since the government of their country was entrusted to their hands. It treats of the home life of these people, the position of women in the islands, the civilized and so-called "wild" people, their moral and intellectual status, their schools, legislature and governmental activities as the author found them upon his recent return to the Philippines after an absence of ten years.

There are detailed reports of visits to native schools, to copra and other plantations, to factories and to places of amusement. There are descriptions of old and new methods in agriculture, of some novelties the natives have introduced into their government and of a Philippine election.

The ever burning question of independence is considered, the arguments on both sides being fairly stated. There is also a report of the author's visit to Japan, his conversations with Japanese statesmen concerning the future of the Philippines and an exposition of Japan's real interest therein."

Studies in the Theory of Human Society. By Franklin H. Giddings, LL.D. The Macmillan Co. New York. 1922. 6"x8¾". 308 pp. Cloth. Price $3.00

This book combines a historical examination of the development of Sociology, with the progress in conceptions and agreement of sociological theory brought down to the present day, and an analytical and synthetic discussion of the proper field for further investigation, and the actual trend of determination in theory. All of this examination and discussion is carried on in conformity with Doctor Giddings' own theory of human society, which he states as follows:

"1. A situation or stimulus is reacted to by more than one individual; there is pluralistic as well as singularistic behavior. Pluralistic behavior develops into rivalries, competitions, and conflicts, and also, into agreements, contracts, and collective enterprises. Therefore, social phenomena are products of two variables, namely, situation (in the psychologist's definition of the word) and pluralistic behavior.

"2. When the individuals who participate in pluralistic behavior have become differentiated into behavioristic kinds or types, a consciousness of kind, liking or disliking, approving or disapproving one kind after another, converts gregariousness into a consciously discriminative association, herd habit into society; and society, by a social pressure which sometimes is conscious but more often, perhaps, is unconscious, makes life relatively hard for kinds of character and conduct that are disapproved.

"3. Society organizes itself for collective endeavor and achievement of fundamental similarities of behavior and an awareness of them are extensive enough to maintain social cohesion, while differences of behavior and awareness of them in matters of detail are sufficient to create a division of labor.

"4. In the long run organized society by its approvals and disapprovals, its pressures and achievements, selects and perpetuates the types of mind and character that are relatively intelligent, tolerant, and helpful, that exhibit initiative, that bear their share of responsibility, and that effectively play their part in collective enterprise. It selects and perpetuates the adequate."

In this emphasis on the importance of individual adequacy in social environment, which recurs throughout the book, lies the stimulating significance of the work to the general reader, if not indeed to the sociologist.

Ideals, Aims and Methods in Education. Published by Sir Isaac Pitman and Sons, Ltd. London. 1922. 4″x6½″. 110 pp. Cloth. Price $0.85

This little volume is one of several in a set called the *New Educator's Library*, each of which is an abridged sectional edition of *The Encyclopedia and Dictionary of Education.* The volume at hand contains twenty one short papers by different eminent educational authorities each intended to focus attention on fundamental principles or procedure in some aspect of teaching methods or ideals.

Values in Education, Methodology, The Inductive Method, Fallacy, Correlation, Specialization, Study, are a few of the titles which indicate the scope of the book.

In these days when every officer is slated to spend a considerable proportion of his service as an instructor, it behooves each one to put himself in touch with the best thought and practice of the teaching profession. Here is a convenient little handbook for the purpose.

The Red, White and Blue Manual for Citizens' Military Training Camps, Volume I, The Red Course. By P. S. Bond, O. O. Ellis, E. B. Garey and T. L. McMurray. Baltimore, Maryland. Johns Hopkins University Press. 1922. 6¼″ x 9½″. 326 pp. Pro. il. Price, $2.50.

The title of this volume is truly indicative of its contents. This is the first of a series of texts designed to meet the needs of students at Citizens' Military Training Camps. Consequently it discusses no purely artillery instruction since only the fundamental training for every soldier regardless of later branch assignment is given at the Red Camp. The book is written especially to meet the needs of the man with little or no military training who enrolls for the Red Course of the C. M. T. C.

The opening chapter of "General Advice" will carry the candidate through the procedure of reporting and getting settled at his camp. The succeeding chapter on "General Information" sets forth the military policy of the United States together with notes on training and discipline. From this beginning, the authors discuss the various subjects included in the Red Course. The earnest candidate may well study this volume before his attendance at camp to get some notion of the course; he should use it during the camp as a reference text; and he will have it upon the completion of the period as a record of his camp and a handy source from which to refresh his memory when preparing for the White and Blue courses.

Directive Wireless Telegraphy. By L. H. Walter. New York. Isaac Pitman Sons. 4″ x 6½″. 132 pp. 57 il. Price $0.85.

The rapid advance and development of directive methods for the production and detection of high frequency alternating fields in space within recent years has been remarkable, especially during and immediately following the World War. A considerable amount of information along these lines has been published but it can be stated in general, it is necessary to refer to the original papers, many of which are difficult to follow by the average person engaged in Radio work aside from the time involved to do so.

The author has briefly stated the essentials with sufficient explanation to give a clear understanding of this special phase of Radio work. A ready list of references is given in the back of the book which will enable the reader to investigate the subject further should he so desire.

The book assumes that the reader is reasonably well versed in the fundamentals of wireless telegraphy and will be found very useful to those about to take up the subject and the operation of direction finders in practice and more so to the engineer engaged in research.