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ARTILLERY NOTES
No. 9.

(Reprint of a British Official Document)

No. 3. COUNTER BATTERY WORK.

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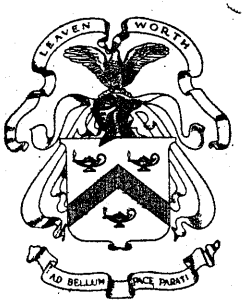
War Plans Division
April, 1918

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WAR DEPARTMENT,

WASHINGTON, D. C., *April* 24, 1918.

The following pamphlet entitled "Artillery Notes" is published for the information of all concerned.

(062.1 A. G. O.)

BY ORDER OF THE SECRETARY OF WAR:

PEYTON C. MARCH,
Major General, Acting Chief of Staff.

OFFICIAL:

H. P. McCAIN,
The Adjutant General.

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ARTILLERY NOTES

I.—THE IMPORTANCE OF COUNTER-BATTERY WORK.

1. During the course of the present war the importance of counter-battery work has become more and more accentuated. For just as artillery forms the main support of the offensive, so also is it the strongest weapon of the defence.

Destruction of the enemy's artillery is a most important factor of success, from both a moral and material aspect. Every hostile battery destroyed is one step gained, and destruction of the enemy's artillery must not be left to the eve of a battle, nor neglected till the enemy attacks.

The struggle against the hostile artillery must therefore be the constant consideration of Commanders.

Counter-battery work is not a matter of spasmodic effort, but is a continuous operation depending for success on accuracy of fire, continuity of plan, unremitting study and firm control. Its conduct on these lines will alone meet the end in view, namely, the considerable if not total reduction at decisive moments of the volume of hostile artillery fire, whether in the form of preparation for an assault, counter-preparation to meet attack by our own troops or barrages, offensive and defensive.

Unless the enemy's batteries are discovered and destroyed, not only may his barrage fire render the capture of an objective difficult and costly, but his subsequent bombardments may make its retention impossible.

The enemy's counter-battery work has recently been greatly developed on lines closely akin to those adopted by us, and it has become a factor very much to be regarded. The weight of his artillery fire has on the whole been thrown against our batteries, chiefly in the form of more or less concentrated fire against artillery areas, and against our communications with both gas shell and high explosive.

The "artillery duel" has in fact re-appeared and has become a highly important feature of the period just previous to and during active operations; and there is every reason to anticipate that the enemy will in the future redouble his efforts to reduce the power of our artillery.

II.—ORGANIZATION AND COMMAND.

2. The General Officer Commanding Royal Artillery of the Army is charged with the co-ordination of all artillery action, both in offence and defence, and he should pay close attention to counter-battery work.

Working in close touch with the General Staff he submits to the Army Commander his proposals as to the extent of the Corps counter-battery areas and also as to any subsequent modifications necessitated by considerable movements of the enemy's artillery. It is particularly his duty to ensure that hostile guns situated in the counter-battery area of one Corps, but firing on the front of another, are adequately dealt

with, for it will seldom be found that the whole of the hostile artillery which fires on the infantry and guns of any one Corps is situated within the counter-battery area of that Corps.

The Army must be kept fully informed as to the counter-battery situation, so that mutual assistance between Corps may be fully effective. To ensure this the counter-battery front of an Army must be considered as a whole, and it may therefore sometimes be necessary to site a portion of the artillery of one Corps in the area of another (*see* Section VI., 42) or even of one Army in the area of another.

It must be borne in mind that the boundaries between Corps are laid down by the Army to suit their infantry resources, and that the allotment of counter-battery areas therefore depends largely on the Corps frontages and also, of course, on the grouping of the hostile artillery.

The G. O. C., R. A., deals direct with the Brigadier, R. F. C., in all matters relating to the combined work of Artillery and Royal Flying Corps, and works in close touch with the General Staff (Intelligence) and Field Survey Company in all matters affecting artillery intelligence.

3. The General Officer Commanding Royal Artillery of the Corps, also working in close touch with the General Staff, is responsible in a similar manner to the Corps Commander, whose instructions he issues direct to the Corps Heavy Artillery and to any Field Artillery directly under his command. He is, therefore, at all times responsible to the Corps Commander for the counter-battery work of the Corps. He deals direct with the Corps Squadron and Balloon Company Commanders in all matters connected with the combined work of the Artillery and Royal Flying Corps. The Corps and Balloon Wing Commanders are, however, the executive commanders of the Corps Squadrons and Balloon Companies respectively, and, as such, act as the technical advisers of General Officers Commanding Royal Artillery of Corps, with whom they should be in closest touch.

The General Officer Commanding Royal Artillery of the Corps lays down the general counter-battery programme, both with regard to the destruction of the enemy's artillery, which must be systematically and persistently sought after, as well as for general neutralization, which at times may become a matter of necessity, as, for instance, at the moment of the infantry assault or in the face of a heavy hostile bombardment. This programme must include any share in counter-battery work that the Field Artillery may be called upon to take up.

4. Apart from such orders as may be issued by the Army as regards co-ordination of counter-battery work between neighbouring Corps, the General Officer Commanding Royal Artillery of the Corps must arrange with those of Corps on either flank for immediate assistance from their batteries whenever it becomes necessary to deal with artillery outside his Corps area which is punishing the infantry or impeding their advance. Corps must keep the Army fully informed as to the counter-battery situation.

He is further responsible to the Corps Commander for the allotment of ammunition and its proper expenditure to the best advantage. He exercises a constant control over the action of his counter-batteries, assuring himself by frequent visits, as far as his other duties allow, to brigades and batteries, that fire is conducted on sound lines, that the means of observation and communication are both adequate and satis-

factory, and, by study of air photographs, that the fire is accurate and productive of results.

5. The Brigadier-General, Commanding Corps Heavy Artillery, is the executive commander of all the heavy and siege batteries allotted to the Corps. In each Corps a Counter-Battery Staff Officer is responsible for the organization and execution of counter-battery work in accordance with the instructions of the G. O. C. R. A. of the Corps, and it is his duty to ensure that all information of immediate value is passed to the batteries concerned. In cases where the organization of the artillery for counter-battery work consists of several brigades, it is of considerable assistance if groups can be formed so that the number of individual commanders to be dealt with is reduced.

Counter-battery orders will specify the tasks to be performed, the ammunition allotted, and the aeroplanes to be placed at the disposal of batteries, in accordance with the directions of the General Officer Commanding Royal Artillery of the Corps.

A daily report on the hostile artillery and on the work carried out by the counter-batteries of the Corps will be forwarded to the G. O. C. R. A. of the Corps and to such other Headquarters as may be ordered.

6. The object of this organization, whatever its details may be, is to ensure a methodical and permanent system of counter-battery work, which in the actual battle plays a capital role.

Particular care must be taken to ensure that the counter-battery action of the Artillery of the Corps shall not degenerate into the spasmodic fire of independent batteries dependent on the individual ideas and energy of their Commanders.

7. The assistance in counter-battery work that can be and is afforded by the Royal Flying Corps is beyond dispute. Accurate artillery fire is to a great extent dependent on good observation, and this in many instances can only be obtained from the air. The closest personal touch between the Artillery and the Royal Flying Corps is a matter of the first importance. Difficulties and occasional failures will occur, but their recurrence can best be obviated by frequent interviews, both before and after work, between officers of the two arms concerned. (*See* S. S. 131, para. 16 (*d*).)

At the same time, artillery must not look upon the aeroplane as an essential to successful fire, particularly as regards counter-battery work. Correct use of datum points, calibration, calculations for the error of the day, thorough and accurate intelligence as to hostile batteries and careful intersections of our own battery positions will, granted good gunnery, render it perfectly possible to deliver an effective fire on occasions when aeroplanes cannot work or are not available. On such occasions recourse may also be had to accurate instrumental observation from two stations, for which purpose it is not necessary that the target should be visible, so long as the bursts of the shell can be observed. If a hostile battery has been accurately located by bearings, this method should give good results.

Sound ranging has also become a valuable and practicable method, in certain conditions, of ranging our own batteries, and is being still further developed in this respect.

Good effect may be obtained against the enemy's artillery by means of a carefully organized system of concentration shoots. (*See* Section V., 27.)

It is to be clearly understood that, whatever be the counter-battery programme ordered for any particular day, arrangements must be such that any hostile battery (not included in the programme) reported as active, either from the air or from the ground, can be immediately engaged.

All means of observation must be fully considered and carefully organized. Observation from the air and the possibility of delivering an accurate, though unobserved, fire by means of calculations have perhaps tended to belittle the value of direct observation from the ground.

Whenever hostile batteries can be seen active from ground observing stations, they should be promptly engaged without waiting for other means of observation. Direct observation from the ground is particularly to be looked for when the progress of a battle brings possession of commanding ground with a good view of hostile territory hitherto unseen except from the air.

8. **Corps Counter-Battery Areas.**—The front of a Corps is allotted by Army Headquarters, and each Corps is made responsible for certain areas as regards counter-battery work. The Corps counter-battery area, though clearly defined for normal working purposes, must be regarded as elastic. An overlap on either flank will almost always be necessary, so that mutual co-operation between adjoining Corps will be facilitated. The same principle of elasticity must be observed in allotting areas to groups or brigades.

9. **Communications.**—The system of communications for counter-battery work must be carefully studied if efficiency is to be ensured and waste of material avoided. Counter-battery formations should, as far as material allows, be in direct communication with similar formations on either flank, the Corps Squadron and Balloon Company, the Observation Groups and Sound-Ranging Sections, and with the Artillery of Divisions in the line; for without such communication quick transmission of information and orders is impossible, and, consequently, rapid application of effective fire.

III.—THE ALLOTMENT AND SITING OF ARTILLERY.

10. **Allotment of Artillery.**—While definite brigades must be detailed for normal counter-battery work falling within the scope of the Army or Corps programme, it is clear that the actual number of guns required will and must vary in accordance with the needs of the tactical situation.

It is the duty of the Army or Corps Commander, as the case may be, to lay down from time to time the amount of artillery to be devoted to the destruction or neutralization of the enemy's batteries.

But unless the counter-battery programme states what batteries are to be employed on this work and aims at avoiding unnecessary changes, within such limitations as can be foreseen, co-operation on the part of the Royal Flying Corps will be rendered far more difficult, and the great advantage that accrues from personal understanding between Royal Artillery and Royal Flying Corps officers will be largely sacrificed.

The actual allotment of batteries for counter-battery work depends on the following considerations.

Both guns and medium howitzers are required for neutralization.

6-inch howitzers are very effective for neutralizing fire, though not always powerful enough to destroy long-established and well-constructed emplacements; they are of great value in an advance when the enemy's guns are forced back into positions more or less hastily constructed.

For destructive work heavy and super-heavy howitzers are required, and of these the 12-inch howitzer has proved particularly effective. Howitzers of long-range patterns should naturally be reserved for counter-battery work.

Long-range guns (6-inch and upwards) may on occasion have to be employed for this purpose, but their comparative inaccuracy at long ranges, and the very short life of guns of 9.2-inch calibre and upwards, place a great restriction on their utility as counter-battery weapons.

A proportion of the available Field Artillery can be usefully employed in the counter-battery work of the Corps. The employment of field howitzers for this service should be particularly considered in all artillery plans, as these weapons are provided with gas shells.

Field guns (13 and 18-prs.) with their rapid rate of fire can give great assistance in neutralizing the nearer hostile batteries; their value in this respect is perhaps apt to be overlooked, owing chiefly to the fact that there are so many calls upon them in the actual battle.

11. **Siting of Batteries.**—On all occasions it is essential that an adequate number of counter-battery howitzers and guns should be sited well forward; this is particularly important when preparing for offensive operations (*see* Section VI., 42 (*b*).)

Every endeavour should be made to exploit the use of oblique and enfilade fire, as in every case the breadth zone of a gun or howitzer is much less than its length zone, and the chances of obtaining direct hits are therefore greater as the obliquity of the line of fire to the target increases.

The advantage of cross-fire will be gained if it can be arranged that each brigade or group engaged in counter-battery work shall have at any rate one outlying battery. But the control of all batteries devoted to any one area must be vested in one man.

IV.—LOCATING AND RECORDING THE POSITIONS OF HOSTILE BATTERIES.

12. **Information as to Hostile Batteries.**—In order that the hostile artillery may at all times be engaged with accuracy and certainty of effect, every source of information regarding the enemy's battery positions, their activity, their ammunition supply routes, etc., must be thoroughly and constantly studied and all records must be kept up to date.

The recent tendency of the enemy to change the positions of his batteries frequently, and to split up his batteries by sections when subjected to our concentrated counter-battery fire, has added considerably to the difficulty of keeping this counter-battery intelligence up to date. Records must include not only the actual positions of the enemy's guns, but also the nature of protection afforded. Much can be done to immobilise the enemy's artillery, when located, by destroying all exits from the position, and these, therefore, must also be studied.

The chief sources of information are:

(*a*) Air photographs. (*b*) Reports of R. F. C. observers (including balloons). (*c*) Observation Groups of the Army Field Survey Cos.

(*d*) Sound Ranging Sections. (*e*) Reports from R. A. O.P.s. (*f*) Reports of hostile shelling. (*g*) Wireless intelligence.

All information of immediate importance must be forwarded direct to Headquarters, Corps Heavy Artillery and the C. B. S. O., who have to act on it. At the same time the closest touch must be maintained between the Counter-Battery and Artillery Reconnaissance officers and officers of the Intelligence Section of the General Staff, as well as the R. F. C. and Field Survey Companies, in collating all information concerning the enemy's artillery; any tendency to work in watertight compartments must be avoided. From the information so obtained and discussed at the periodical counter-battery conferences, the Active Hostile Battery Lists are compiled at the Headquarters of the Army or Counter-Battery Staff Office.

The frequency with which these conferences should be held will vary with the tactical situation and with the suitability of the weather for R. F. C. work. In periods of activity they should be held daily.

Good results can only be obtained by exploiting all the available sources of information to the fullest extent, and by the careful collation and minute study of the results of each. Each hostile battery when accurately located is allotted a number by the Army or Corps. These numbers consist of the zone letters (*vide* S. S. 131, para. 24) and a numeral, *e. g.*, M X 12. An Army list and a map of hostile battery positions, with their numbers, are issued periodically.

13. **Air Photography.**—The system under which the front is photographed in the counter-battery area and behind is described in S. S. 131, Section III., 12. The study of the photographs is carried out both at the Squadrons and by the Artillery Offices concerned, and also by the Intelligence Branch of the General Staff. The results of their separate studies must be co-ordinated and expressed (so far as counter-battery work is concerned) in the details given in the Active Hostile Battery Lists.

Photography is the basis of good artillery work, especially of counter-battery work, and photographs must be very carefully studied for indications of new work and of fresh dispositions. Endeavours must always be made to verify on a photograph hostile battery positions located by other means.

In the first place photography is essential if no hostile battery is to escape punishment. It does not necessarily follow that a gun position is unoccupied because no flashes are seen to appear from it, while, on the other hand, both dummy flashes and blank charges may be used to simulate active batteries. Again, it must not be assumed that because a battery is known to have moved, or to have been destroyed, its old position will not be subsequently repaired and re-occupied, nor, on the other hand, that a battery will move because it has been severely handled.

Careful comparison of photographs of various dates will greatly assist decision as to whether emplacements are occupied or not, attention being particularly paid to the marks made by tracks and the blast of guns, and to the actual condition of the pits.

Air photographs will also disclose the position of emplacements constructed for the support of the enemy's rearward lines of defence, and will thus enable a Commander to work out in advance his arrangements for counter-battery work in the future. Constant photography of the areas likely to be occupied by hostile artillery is therefore called for at all times, in the hope that new positions may be detected in the first

stages of their construction, before effective concealment has been obtained.

Finally, air photographs will assist a Commander to appreciate the extent to which his counter-battery work is crowned by definite results. It is of distinct advantage if aeroplane photographs of hostile batteries are taken before and after destructive shoots.

Photographs must be kept properly indexed in boxes or portfolios, so that any photograph can be turned up at a moment's notice.

14. **Reports of R. F. C. Observers.**—At least one machine should be up in every corps counter-battery area during the hours of daylight, whenever flying is possible, as an artillery patrol to locate targets.

Even when low flying only is possible much useful work can be done by artillery patrols working from behind their own troops, especially in spotting flashes, which are often more easily seen on a dull day, and in reconnaissance of the enemy's trenches. Squadron Commanders must be kept fully informed by the Counter-Battery Staff Officer as to the latest information concerning their Corps and Flight areas. The duties of pilots and observers in locating and reporting hostile batteries are laid down in S. S. 131, Section X.

15. **Reports of Balloon Observers.**—Balloons can afford special assistance owing to the fact that they can combine aerial observation with good telephonic communication with the ground. Owing to their position they are suitably placed to observe hostile bombardments and barrage fire, and to report on their intensity and on the areas bombarded. They can sometimes, in addition, observe the connection between the flashes of the enemy's guns and the fall of their shell. Such information is of great value to the artillery during trench warfare, since it enables the arcs of fire of the enemy's batteries to be established approximately. This, in its turn, enables counter-battery fire to be directed on to the most likely hostile batteries when any particular area is subsequently bombarded by the enemy, or when general neutralization is required over a particular area.

Night observations from balloons should also give valuable results (*vide* S.S. 131, para. 60).

16. **Observation Groups.**—The Observation Groups of the Field Survey Company are charged with a general surveyance of their front; their most important duty is the location of the enemy's batteries by means of accurate intersection of flashes observed from the different Survey Posts. The extent to which these Groups are employed for ranging our own guns must depend on their development, and as to whether this duty or that of locating hostile batteries is the more important at the moment. This is a matter which must vary with the tactical situation, and therefore can only be decided by Armies. Ranging carried out by these Groups has been marked by a high standard of speed and accuracy.

17. **Sound Ranging.**—Improvements in "Sound Ranging" greatly facilitate the work of recording hostile batteries. Hitherto wind has interfered considerably with the accuracy of their results; with the improvements in methods and apparatus now being introduced the number of unreliable results should be very small. No results can be expected during a bombardment of any intensity, nor when a strong wind is blowing from our lines over the enemy's. By the collation of a number of "Sound Ranging" results it is possible gradually to work

out the arcs of fire of hostile batteries, and knowledge of this nature will obviously much facilitate counter-battery work, especially during periods of trench warfare. By the same process "dummy flashes" regularly used by the enemy's batteries should gradually be discovered. (*See* S.S. 199 "Co-operation of Sound Ranging Sections and Observation Groups with Artillery.")

Useful co-operation can be carried out with the R.F.C. if Sound Ranging Sections can be supplied with a Wireless Receiving Set. On seeing a flash, the air observer sends a pre-arranged signal to the Sound Ranging Section, who can at once set their apparatus in motion. This method is of special use when visibility is not good enough to enable a flash to be accurately pin-pointed. It is also of use for the detection of dummy positions on days of good visibility when positions can be accurately located.

18. **Royal Artillery Observation Posts.**—The principal *role* of these posts is direction of fire, but where the ground is favourable to observation a considerable amount of location of hostile batteries should be effected by the R.A. O.P.s on the Corps front by means of cross-observations. This work requires considerable development. For it, Mark V. directors or similar instruments, properly oriented, are required in at least two O.P.s per Artillery Brigade for recording flashes. Such observation should always be transmitted to the Counter-Battery Staff Officer as quickly as possible, and be reported as so many degrees right or left of a clearly defined point from the O.P. (co-ordinates to be given), or as a grid line bearing. In order, however, to be quite certain that intersections are obtained on the same flash, some system of instantaneous communication between the two O.P.s or a co-ordinating central office is essential. Single bearings at a stated time are rarely of much value; if they are to be of any use, the synchronization of watches must be carefully attended to.

In every Brigade at least one O.P., in which a director can be used, should be manned continuously during the 24 hours.

The Brigade F.O.O. must keep a log-book containing all information of hostile activity.

19. **Reports of Hostile Shelling.**—In order to achieve prompt and effective neutralization, if not the immediate destruction, of a hostile battery which is causing material damage of any sort, it is most important that hostile fire should be reported as promptly as possible through the Artillery Brigade Commander concerned to the Counter-Battery Staff Officer. It is the duty of all units and of all branches of the service to do this. Officers are often inclined to think, when they see another battery or infantry trenches, etc., being shelled, that the unit concerned will have reported it if it is causing either annoyance or loss; it frequently occurs, however, that communications with the bombarded area are cut, and consequently a direct report cannot be furnished.

In reporting cases of hostile shelling the following facts should be clearly stated, as far as known:

(i.) Hour at which shelling began. (ii.) Calibre and nature, and number of guns firing. (iii.) Area shelled (by map square, not by local name). (iv.) Direction by grid bearing (of flash or of sound to be stated), or by bearing from some prominent landmark. (v.) Whether material damage is being done. (vi.) *Hour at which shelling ceases* and approximate number of rounds fired.

It is advisable that the counter-battery organization of every Corps should maintain a permanent look-out, night and day, to report direct to the Counter-Battery Staff Officer the occurrence and details of hostile shelling within their view.

Arrangements must be made for Counter-Battery Staff Officers to obtain these reports, not only from the infantry and other troops of their own Corps, but also from the troops of adjoining formations which hostile guns in his counter-battery area are wont to shell.

In order to draw the enemy's fire, various ruses may be employed. Practice barrages in conjunction with smoke shell will often prove successful; field guns employed as roving sections or single guns may draw fire; "Chinese" attacks, or even a vigorous display of trench mortar activity, are other methods. Generally speaking, however, infantry must take part in such demonstrations, as action by artillery alone cannot be guaranteed to achieve the desired effect.

20. **Counter-Battery Instructions and Registers.**—Every battery detailed for counter-battery work should have a file, in which all instructions relating to this work will be kept. In addition, a Target Book should be kept up, containing the following information regarding hostile batteries within their arc and range—namely, A.H.B. number, co-ordinates of the pit pre-arranged for registration by aeroplane, switch from zero line, angle of sight, range, charge, elevation reduced to normal, and remarks.

A complete record of all hostile battery positions will be kept up in the Counter-Battery Staff Office on A.F. W.3710, and air photographs should be arranged and indexed with reference to these sheets.

By this means it is possible to compile a list showing at a glance the positions and natures of hostile batteries that are known to fire on the various sectors of our line, while constant reference to this list and to the batteries' records will not only enable counter-battery fire to be directed from day to day on reasoned lines, but will build up a valuable store of knowledge on which to work in a battle.

Each Brigade will keep a record of daily activity of hostile batteries, showing measures taken to deal with them.

V.—PRINCIPLES OF ACTION.

21. **Characteristics of Counter-Battery Work.**—The characteristics of counter-battery work are four-fold:

A.—Destruction of the enemy's batteries. B.—Destruction of artillery personnel. C.—Fire to obstruct ammunition supply. D.—Neutralization.

It is evident that destruction of the enemy's batteries offers the most satisfactory means of reducing his artillery to impotence. But since this ideal cannot be completely achieved, valuable results may be obtained by concentrating fire on battery positions, and even on areas occupied by batteries. Further, occasions will arise, both during active operations and when holding the line, when the infantry must be protected against hostile artillery fire by means of neutralization. The immediate object of all counter-battery work is to obtain maximum effect on the enemy's artillery, and therefore it cannot be too often repeated that batteries employed on this work must in principle be placed well forward, so that distant hostile batteries may be reached, and also that full benefit may be reaped from enfilade and cross fire.

A.—Destruction.

22. **Principles.**—The howitzer is *par excellence* the counter-battery weapon for destructive purposes, owing to the advantages it possesses over the gun in accuracy and its ability to deliver its shell at very steep angles of descent.

Destruction must be regarded as a continuous procedure, as already stated in a previous section, and is to be carried out at all times with relentless vigor, both during actual battles and in the intervals between them.

To ensure the destruction of a hostile battery, certain requirements must be met:

(*a*) It must be established that the position to be engaged is actually occupied. (*b*) Fire must be carefully controlled and observed, not only during ranging, but also while firing for effect. (*c*) A sufficient quantity of ammunition must be devoted to the task in hand.

As regards (*b*), fire is only of value if it is accurate, and this depends on control and observation. Both guns and howitzers have a tendency to lose exact range or line to a target from a variety of causes, even though ranging may have been satisfactorily accomplished.

Fire must therefore be carefully controlled and observed, not only during ranging, but also while firing for effect, if destruction is to be definitely achieved.

During a destructive shoot with aeroplane observation, after ranging has been completed and fire for effect has begun, the fire of one gun of a battery should be withdrawn at a time and its fire checked on the nearest suitable datum point, and then once more turned on to the aeroplane target. If for any reason it is necessary to continue the series without any observation, the Battery Commander should cease firing on the target from time to time, range on a datum point, and make any necessary corrections before resuming fire for effect. Records of this procedure should be retained for reference in case of future unobserved shoots on the same target.

23. **Ammunition.**—Touching the expenditure of ammunition, it is useless to attempt the destruction of a hostile battery with a small number of rounds. As a general guide, it may be assumed that under ordinary conditions not less than the following number of rounds will be required to effect the complete destruction of a single well-protected gun pit:

	Rounds.
6-inch Howitzer	100
8-inch "	80
9.2-inch "	60

Figures for the 12-inch howitzer cannot be stated, as this weapon will usually only be used in conjunction with continuous aeroplane observation. Fire should, under these circumstances, be maintained until the observer is satisfied that the hostile battery has been destroyed.

When a battery position is engaged in enfilade and the pits are not far apart, the average number of rounds per pit can be considerably reduced.

Economy in ammunition is to be sought, not in withholding any of the amount required for a legitimate task, but by taking every precaution to ensure accuracy of fire and by avoiding the possibility of waste, either to the engagement of a doubtful target or to the adoption of a

policy of half-measures. If a hostile battery is to be destroyed, then fire should not cease till the result, as far as it is possible to tell, has been achieved.

24. **Importance of Saving Time.**—Time is a factor of great importance in destructive work as regards the co-operation of the Royal Flying Corps, and every step that can be taken to expedite fire observed from the air is an emphatic gain.

This is particularly important during periods of preliminary bombardments, and also in the winter, when the hours of good flying weather and visibility are few; in both these cases every minute saved is valuable.

During active operations the number of machines that can work on a Corps front is limited (S.S. 131, paras. 7 and 37) and the number of hostile batteries which have to be engaged for destruction tends to increase.

Rapidity in ranging and attention to ground strips are, therefore, essential; otherwise the observer's time is wasted, and fire for effect cannot be observed throughout.

With the slower firing howitzers the destruction of a hostile battery may be undertaken simultaneously by two or more batteries of the same group. Each battery is ranged in turn, and signalled to wait until all are ranged. Fire for effect can then be opened by all batteries. Unless guns are well calibrated and shooting accurately much time will be lost by this method, as should the fire of one battery become inaccurate it will be necessary to stop the fire of each in turn to discover which is off the target and to range it afresh. Normally, however, destructive effect is, under present conditions, best assured by concentrating all the guns or howitzers of a battery on each emplacement of the hostile battery in turn; the order in which the emplacements are engaged being arranged beforehand.

25. **Programmes and Observation of Fire.**—Known batteries must be definitely selected for an attack, in order of their importance and activity, both before and during active operations, and be notified in the daily programme of counter-battery work. This programme must be drawn up and issued each evening. Details as to its contents are given in S. S. 131, para. 16 (*c*).

It is essential that these programmes should be submitted to the Corps Squadron as early as possible each evening. To obtain the greatest effect from aeroplane co-operation, shoots should commence at the earliest possible moment of the day. Aeroplanes cannot be detailed for the following day's work until the programmes are received by the Squadrons. After this pilots must have ample time, if the best results are to be achieved, to study all available photographs of the hostile batteries to be engaged, in addition to reading up the past history of the batteries, studying the position of ground strips, the position of our own batteries, etc.

Pre-arranged shoots should be carried out as systematically as possible so as to admit of the maximum amount of aerial observation of fire for destruction.

Fire for destruction with aeroplane observation should, when possible, be followed from two ground observing stations, the observers being informed when the aeroplane observer gives "O. K." This procedure may assist to secure accurate fire at some future date when no aeroplane is available.

Aeroplane observation should, however, invariably be provided, if the tactical situation admits, in the case of fire for destruction when accurate observation from the ground is impossible. Time, however, can often be saved by combining aeroplane and balloon observation (*see* S. S. 131, para. 59 (*b*).)

Whenever an observer signals that he is ceasing to observe a report should at once be made to the C. B. S. O., stating the number of rounds fired, whether the battery has been successfully ranged, and if a balloon has signified its ability to observe for the remainder of the series. The C. B. S. O. can then, if necessary, arrange for another aeroplane to complete the shoot, for balloon observation, or direct the battery to fire the allotted number of rounds without observation.

26. **Choice of Weapons to be Employed.**—Consideration must always be directed towards the selection of the most suitable weapon for destructive work in each instance. Apart from the question of oblique fire, which has already been touched upon, it is obvious that the heaviest howitzer should preferably be employed when the protection of the target is known or reasonably believed to be of the strongest. Similarly, against a battery unprotected or merely camouflaged, the field howitzer may prove a perfectly adequate weapon. Commanders should bear in mind that at times of abnormal artillery movement, such as must occur in the case of a hurried reinforcement on a large scale, or of a sudden retreat, there will be periods during which a number of hostile batteries will be little if at all protected. Under such circumstances full use can be made of the lighter forms of artillery for counter-battery work, so long as the protected and unprotected targets can be distinguished.

27. **Concentration Shoots.**—The principle of concentration of the fire of several batteries against the enemy's batteries, or rather battery positions, has recently been adopted by us, both as a means of adding to the results to be expected of observed destructive fire, and as the only procedure possible when weather conditions have denied or seriously limited the artillery work of aircraft. This method of fire has been taken up by the enemy, and has on many occasions proved a source of material annoyance. Its practice, therefore, on intelligent and controlled lines is worthy of exploitation, so long as it is never suffered to over-ride the prior claims of observed fire for the deliberate destruction of individual hostile batteries.

A fierce concentrated fire from as many batteries as can be made available should achieve good effect on ammunition pits in rear of or to the flanks of the position, battery command posts and signal communications; indeed, the general result should be to so cut up the ground as to render that position useless for further occupation.

Fire of this nature may be divided into two main categories:

(*a*) Concentration shoots with aeroplane observation. This form of artillery attack may undoubtedly prove very effective, but generally speaking it is only justifiable when time is short, our aeroplanes limited in numbers, our batteries numerous, and the target an exceptionally important one. (*b*) Concentration shoots without observation.

This form of attack may be further sub-divided into:

(i.) Fire for neutralization. A concentration of artillery fire will prove a most effective form of neutralization, particularly if our batteries are well dispersed. (*See* para.33.) (ii.) Fire for destruction. Provided that guns can first be ranged and corrected on a good datum point, with approximately the same range and line as the target, good results may be expected. The most successful concentration shoots have been effected during the afternoon by batteries which have been accurately ranged during the morning of the same day on targets situated in the area selected for concentrated attack.

At the same time it must be remembered that fire deliverd on this principl becomes less likely to be effective as the course of a battle lengthens. With deteriorating platforms, salvaged or un-lotted ammunition, and tired detachments, or when, after an advance, accurate battery boards are for the time being not available, it cannot be expected that this method of fire will attain results commensurate with the ammunition and energy expended.

The best chance of success will often lie in directing the fire of several batteries against the furthest hostile battery of three or four close together. Experience shows that fire at long ranges tends to be short rather than over, particularly when guns and ammunition are not in the best condition. Thus, fire aimed at the most distant battery of a group may under these conditions obtain effect on the others. A single concentration of fire may be carried out with, say, 150 rounds per battery employed; or in two or three shoots at intervals during the day, with a proportionately decreased expenditure for each series.

Occasionally a whole nest of hostile batteries may be known to be collected within a limited space, for instance, in a village or small wood; in such cases it may prove well worth while to carry out a concentration shoot on a large scale, employing every available battery, with the object of blotting out the whole of the guns assembled in the area.

B.—Destruction of Artillery Personnel.

28. A destructive shoot carried out on a battery at a time when the detachments are bound to remain at their guns will, if accurate, automatically result in casualties to personnel.

But at other times, when the situation admits of the detachments of a shelled battery being withdrawn, satisfactory effect upon personnel can only be obtained by surprise and, even so, only for a short period.

It is with this object that it has been laid down (S. S. 131, Section VII., 31) that all counter-battery shoots should commence with two salvos fired in rapid succession, and with instantaneous fuze. Short, sharp concentrations of fire on hostile batteries, particularly if active at the moment, may achieve good results on the gun detachments before they can be withdrawn.

Shrapnel or H. E. fire with No. 106 fuze may be employed with advantage at night, after a successful destructive shoot, in bursts at irregular intervals, with the object of inflicting loss on personnel

and horses sent up to move the damaged battery. Fire of this nature must not be allowed to die down during the early hours of the morning.

Again, the moment that a destructive shoot has been successfully completed, and so before atmospheric conditions have altered, a salvo (with No. 106 fuze) may be fired at one or two neighboring hostile batteries or other likely targets, with the object of inflicting casualties on any spectators. Occasional rounds placed well to the flanks and rear of a hostile battery undergoing destructive fire, have been known to do useful execution on personnel.

Other surprises of this nature should be thought out and applied, but anything in the nature of a hard and fast procedure is to be avoided, or else the enemy will soon learn what to expect and act accordingly. This last consideration may also be turned to advantage if some minor scheme can be adopted for a few days, and then be suddenly and advantageously altered.

C.—Fire to Obstruct Ammunition Supply.

29. Material results may accrue from deliberate attempts to destroy, or at least to block, roads, railways, tramways and bridges, which reconnaissance and intelligence records show as likely to be used by the enemy for supplying ammunition to his batteries.

To what extent destruction can be undertaken must depend on tactical requirements. The obstacles that may be created by the effect on roads, etc., of heavy shells fitted with delay action fuzes must be fully considered when an advance by our own troops is intended. But where this consideration does not apply, experience shows that the constant cutting of ammunition routes by shell fire proves a serious handicap to the opposing artillery. Under all conditions the enemy's system of supply to his batteries may be rendered hazardous and costly by means of harrassing fire, intelligently directed and frequently varied in its application. (*See* Artillery Notes No. 4, Section V., "Fire to effect physical and moral damage.")

D.—Neutralization.

30. **Object.**—Neutralization is a temporary expedient designed to paralyze and blind by a sudden and violent application of fire those hostile batteries which have not been destroyed. It will therefore be required in both offence and defence. It is normally the task of medium guns and howitzers, assisted by Divisional Artillery, when available. Heavy howitzers may also be usefully employed on occasions.

31. **Application.**—In the offensive, directly the infantry leave their trenches they must be relieved as far as possible of the burden of the enemy's barrage, which may otherwise inflict considerable losses, and even arrest their movement.

At this moment fire must be opened on every hostile battery, known or suspected of a sufficient intensity to prevent the service of the guns. By cutting the batteries' communications and by engaging

all known observing stations the power of the hostile artillery will be still further reduced. The necessary neutralization scheme must, of course, be pre-arranged. If flying is possible, all active hostile batteries will be reported under the NF (or WPNF) and those ceasing to fire under the NT call (*see* S. S. 131, para. 29 (i.) (*b*)), so that fire can gradually be concentrated on those batteries which are actually firing.

After the attack every effort must be made to resume pre-arranged shoots as early as possible, "MQNF" and "ANF" calls being employed to supplement the work.

New counter-battery areas must be allotted at once and notified to all without delay, where in the case of a limited objective it has not been possible to do this beforehand.

32. In cases of preparation by the enemy for attack or counter-attack, and at other times when he subjects our infantry to a severe bombardment, the need of neutralizing fire will occur just as much as at the moment of our own assult. The infantry again must be relieved of the weight of the enemy's fire, and under such circumstances relief can only be immediately effected by a general neutralizing fire, which must for the time being take precedence over the pre-arranged destructive programme of the day.

33. In all schemes, therefore, of offence and defence regard must be had to the orders and arrangements necessary to produce effective neutralization, either at a pre-determined hour or at a moment's notice, as the case may be. Neutralization schemes must always be kept up to date, varying in their details from day to day, in accordance with changes in the disposition of the hostile artillery. Advantage should be taken, whenever possible, of cross-fire, and the concentration of widely dispersed sections or batteries is likely to give the best results.

34. Neutralization zones must be allotted to groups and batteries (*see* S. S. 131, para. 28 (i.)), and, in considering action to meet attack or counter-attack by the enemy, the counter-battery programme must include a scheme of general neutralization to be executed, if required, by every available gun that can be spared for the purpose. (But *see* Section VII.)

35. Neutralizing fire must always be brought to bear as rapidly as possible, apart, of course, from occasions when it is opened simultaneously by a number of batteries at a pre-arranged hour. During periods of activity fire for effect will often have to be undertaken from the map without any previous ranging and without observation. If observation is available, rapid fire should be opened as soon as range and line have been obtained. Fire should be distributed over the whole target from the first round.

36. The essence of neutralizing fire is not only to silence, but to keep silent, a hostile battery which has not been destroyed. Methods of neutralizing fire should therefore be constantly varied (notably as to the number of rounds and rate of fire), so that the enemy may never know what to expect.

A sterotyped scheme whereby a given number of rounds is always

fired in a given time will soon prove ineffectual, for it is of little use neutralizing a hostile battery if the personnel realise that fire will always cease after so many rounds or so many minutes.

37. **Gas Shell.**—Gas shell are particularly valuable in counter-battery work for neutralizing hostile batteries immediately prior to and during an attack, and should be employed in large quantities for this purpose. Recent experience has shown that this procedure has been attended with very excellent results, some hostile batteries so neutralized having subsequently remained silent for two or three days.

Another useful method of employing gas shell is to shell certain batteries persistently with gas night after night. A sufficient expenditure of gas shell to compel the enemy's gunners to wear their masks all night will gradually produce physical exhaustion from want of sleep.

The method of conducting gas shell bombardments is laid down in S. S. 134 (Instructions on the Use of Lethal and Lachrymatory Shell), which must be carefully studied.

38. **Co-operation of R. F. C. and A. A. Guns.**—The Royal Flying Corps play a direct and important part in neutralization. For while the enemy's ground observing stations and occasionally his balloons are the charge of the artillery, his aeroplanes and the majority of his balloons must be engaged by the Royal Flying Corps, who thus assist to deprive him of his means of observation.

Anti-aircraft guns must also take a vigorous share in denying to the enemy the benefits of aerial observation. Similarly, to assist the R. F. C., vigorous artillery action must be taken against the enemy's anti-aircraft batteries.

39. A thorough and detailed scheme is therefore essential to effective neutralization, and such a scheme can only be built up on knowledge. Hostile batteries will not be neutralized unless their whole history is studied from day to day with untiring energy. Further, to increase the chances of success, measures must be taken to arrange as far as possible for observation from the air and from the ground of the fire of neutralizing batteries.

40. **Ammunition.**—The expenditure of ammunition in neutralizing shoots depends largely on the tactical situation at the time and on the artillery resources available. Instructions on this subject must therefore be laid down from time to time by Armies and Corps. Uncontrolled expenditure of ammunition on neutralization undoubtedly leads to great waste. As a general guide, 10 to 30 rounds should suffice for an ordinary neutralizing shoot when holding the line.

VI.—COUNTER-BATTERY WORK IN THE OFFENSIVE.

41. **The Artillery Plan.**—The counter-battery scheme forms a definite part of the Artillery Plan. As stated in Section I., counter-battery work is a continuous procedure, and therefore the counter-battery scheme should at all times be readily and easily extended so as to embrace the requirements of active operations. For the latter

purpose three main factors have to be considered, apart from the general plan of operations:

(i.) The hostile artillery. Its disposition, quantity and nature; the probability of increase thereto prior to "Attack Day" (a matter directly affected by the General Plan and by the length and scope of the preparations), and the areas in which reinforcements are most likely to be disposed; the enemy's artillery tactics. (ii.) The amount and natures of artillery required and the siting of it, based on the two foregoing considerations. (iii.) The extension and improvement of all available means of observation, reconnaissance, and communication.

42. **The Hostile Artillery.**—As regards the disposition of the enemy's artillery, certain tendencies have frequently been remarked, and require consideration at the hands of Commanders when framing the counter-battery portion of their Artillery plan:

(*a*) When offensive operations by us have been anticipated, the enemy has on several occasions established a large force of artillery on the flanks of the front of attack.

This procedure affords the enemy the ability to concentrate a powerful fire on our artillery behind the centre of the attack, and at the same time confers on him the advantages to be derived from cross-fire. It entails on our part special attention to counter-battery work on the flanks, and so directly affects the allotment and siting of counter-batteries.

A particular problem is presented where our attack is launched from a salient of moderate size (about 5,000—7,000 yards radius), such that the enemy's medium-range artillery can reach the centre of the salient from several directions.

In this case some of the hostile batteries grouped round the salient will be in the normal counter-battery area of Corps on the flanks of the salient, but out of range of their counter-batteries.

In these circumstances it has been found advantageous to detach a counter-battery group towards the centre of the salient rather than to require the centre Corps to undertake the duty of engaging these distant hostile batteries. The disadvantages of long transverse telephone lines will be more than compensated for by the ability to direct fire against troublesome hostile batteries under the usual Corps arrangements. It will also facilitate the collection of shelling reports relating to hostile batteries on the flank that habitually shoot into the centre of the salient.

At all times there must be considerable elasticity in the dividing line of Corps counter-battery areas:

(*b*) The occupation of positions by hostile artillery so far behind their front line as to be out of reach of the mass of our counter-batteries, but yet able to shell our infantry and the general line of our field batteries, has frequently occurred. This tendency has been generally observed after a successful assault has brought about a modification in the enemy's original scheme of artillery defence, though certain batteries may be held back in such positions from the time that an attack by us is contemplated.

To compete with this problem two main principles must be fol-

lowed. Firstly, rearward enemy positions must be sought for studiously by means of air photographs (*see* Section IV. 13), both before and during offensive operations. Secondly, on all occasions and at all stages of an attack sufficient counter-batteries must be placed well forward, so as to be ready to deal with the enemy's distant batteries, either at once, if such already exist, or when they come into being later.

Counter-batteries, therefore, should have priority among Corps Heavy Artillery in the choice of forward positions, and, when circumstances admit, masked counter-batteries may advantageously be placed in position prior to an assault, with the above object. Long-range pattern howitzers are obviously to be preferred for counter-battery work, and if artillery of this type can be placed well forward a material advantage is gained:

(*c*) The increasing use of alternative positions by the enemy's batteries, the employment of sections and single guns, the occupation of temporary and unprotected positions in hedge-rows, etc., the system of running forward field batteries for night-firing (especially for gas shelling), and the employment of mobile batteries in the support of counter-attacks, are other developments against which our counter-battery methods have to contend.

The best hope of success in these directions lies in the tireless employment of every available means of counter-battery reconnaissance (*see* Section IV.), particularly by night, and in co-operation with Intelligence as regards roads, tracks, etc., likely to be employed for the movement of artillery.

Beyond this, it may prove best to base counter-battery programmes on the NF calls received during the early part of the day, and to carry out destructive shoots the same afternoon, or, at latest, early the following morning. Full use should be made of the M. Q. N. F. call under these conditions.

43. **The Support of the Attack.**—With the mass of artillery that is usually available to support the infantry in offensive operations on a grand scale, the quantity of artillery to be allotted to counter-battery work after the assault has been successfully launched, needs to be very carefully considered; for it is evident that the more guns that are devoted to this task, the fewer remain available for barrage work.

Experiences show that, in the case of our attacks on a large scale, the enemy's artillery is rarely dangerous except:

(*a*) While our Infantry are forming up, if our intention to attack is known or suspected, at "Zero" hour and for a short time afterwards. (*b*) During prolonged halts on intermediate objectives. (*c*) During the early stages of consolidation.

It appears, therefore, that, with the present strength of artillery and assuming the previous counter-battery work to have been effective, a large proportion of counter-batteries may be devoted for a time with advantage to strengthening the depth and power of the barrage, as soon as the assault shall have been successfully launched. The situation must, however, be closely watched. If the enemy's artillery becomes a serious factor, either to our infantry or to our

guns, it must be possible to turn on an adequate force of artillery to take up counter-battery work again without delay. To this end arrangements should be made, if the ground is suitable, for a counter-battery observing station to be established, from which an intermediate or the final objective can be seen. An experienced officer should be detailed to occupy it. He will be able to see if the enemy's fire becomes troublesome, and must be held responsible for recommending that the application of an increased number of batteries to counter-battery work is necessary.

44. **Allotment of Aeroplanes to Counter-Battery Work.**—The considerations affecting the allotment of aeroplanes to the various natures of artillery work are fully discussed in S. S. 131.

It must always be remembered that the number of aeroplanes that can work at the same time on a Corps front is limited by the length of the front and the strength of the squadron. The practical extent of these limitations is explained in S. S. 131 (paras. 7 and 37).

45. **The Attack of Hostile Batteries located just prior to an Attack.**—It is open to question whether hostile batteries definitely located just prior to an attack should be destroyed at once or not. Every battery that is destroyed is one less to reckon with on the day of attack. On the other hand, batteries that are severely shelled, and not actually destroyed, may be induced to move to a new position, and so be unlocated at the hour of assault. In this case it may be impossible either to destroy or even to neutralize them at the critical moment. These considerations must receive due weight in the artillery plan for an offensive operation.

VII.—COUNTER-BATTERY WORK IN THE ADVANCE.

46. The maintenance of systematic counter-battery work during an advance is a matter of the utmost importance; and the more rapid the advance, the more difficult will it be to keep touch with the hostile artillery dispositions. The infantry must be protected from the enemy's fire, and this can only be accomplished by most carefully organized action on the part of the artillery primarily responsible for counter-battery work, by the closest co-operation between R. A. and R. F. C., and by untiring energy in the services charged with the locating of hostile artillery.

Continuity of effective counter-battery work depends primarily on the fulfilment of four main conditions:

(*a*) A prepared and systematic scheme of artillery movement. (*b*) Ability to maintain an adequate ammunition supply to batteries detailed to advance. (*c*) The fullest exploitation of the zone call system, supported by all other means, applicable to the situation, of locating hostile batteries. (*d*) A carefully co-ordinated and detailed scheme for the forward movement of Observation Groups and Sound Ranging Sections.

The first two conditions affect all artillery, whatever its tasks may be, and are discussed in detail in Artillery Notes No. 4. But it is of particular importance as regards counter-battery work to ensure that a sufficient number of counter-batteries are placed well forward.

prior to the original assault (*see* Section VI., 42 (*b*)) in order that it may be possible to continue effective counter-battery work without a break while more retired batteries are advancing.

In the earlier stages of an advance, before the situation has begun to assume the character of open warfare, the normal counter-battery system will still hold good in most respects. Sound Ranging Sections will not, however, be able to carry out their normal functions until a pause occurs in the operations; and Observation Groups will scarcely be able to co-operate with the artillery so long as a steady advance continues.

The forward movement of these units must, however, be expedited to the utmost, in order that they may resume their functions with the least possible delay at the first pause in the advance.

The burden of finding the enemy's batteries will therefore fall on the Royal Artillery and Royal Flying Corps, who must combine their efforts in the closest possible touch. It is for this reason that the zone call system must be exploited to the utmost. Success will very largely depend on the rapidity with which wireless receiving stations are brought into action and also on having a definite scheme of responsibility, pre-arranged and universally understood, for answering zone calls over specified areas. Whenever circumstances permit, it will be found best to detail one or two batteries to reply in the first instance to calls from such areas. At the same time Artillery Brigade Commanders must take in all zone calls at their masts in order to keep touch with the situation and bring additional fire to bear when required.

In the early stages of a rapid advance the Field Artillery must be prepared to take up a greatly increased share of counter-battery work. Such R. G. A. Brigades as have moved forward and can no longer be controlled by the Corps Heavy Artillery Commander, will be placed under the orders of Divisional C. R. A.s, who will then be responsible for the direction of counter-battery work.

The Corps Heavy Artillery Commander must, however, keep in close touch with the situation, so that he may resume tactical control of all the heavy artillery under the Corps at the first possible moment.

As more artillery comes up it is essential that definite areas of responsibility for dealing with zone calls shall be allotted to batteries, and new counter-battery areas delimited and notified to all concerned without delay.

The extent to which the hostile artillery can be engaged by zone call and with aerial observation will be limited, even under the most favorable circumstances, and the eyes of the Battery Commander must be exploited to the utmost. The artillery must not rest content with merely firing unobserved series in answer to "NF" calls, but must endeavor to destroy the enemy's batteries whenever and however located.

A rapid advance will throw the organization of the C. B. S. O.'s office temporarily out of gear. He must take every precaution not to lose touch with the enemy's artillery dispositions. For this purpose, as soon as a state of open warfare develops, he and his staff will

join Corps Headquarters. He will there be best able to collect all the information that is available regarding the hostile artillery. The G. O. C. R. A. of the Corps must then arrange that this information is disseminated among the artillery formations supporting the advanced troops, and that information is in turn collected from them. As soon as a marked pause in the operations occurs, the counter-battery office should be quickly re-established in the forward area and counter-battery work resumed on normal lines.

VIII.—COUNTER-BATTERY WORK IN THE DEFENSIVE.

47. As a matter of general principle, notification of a marked increase in the activity of the enemy's artillery should immediately be made to Corps Squadrons so that additional aeroplanes may be sent up to report which of the hostile batteries are active.

From a counter-battery point of view, however, the defensive may assume three forms:

(*a*) The defensive-offensive, or a defensive attitude temporarily imposed by a threatened or actual counter-attack during offensive operations. (*b*) The conditions existing when holding the line and opposed by an approximately equal artillery. The action to be taken in the face of raids by the enemy is included under this heading. (*c*) The true defensive, in the face of a numerically much superior hostile artillery.

48. **Counter-battery Work to Meet Counter-Attack.**—In considering the counter-battery action suitable for meeting a hostile counter-attack, it may be assumed that our original attack has been delivered with a force of artillery at least as strong as the enemy, and usually superior in morale. Consequently a counter-battery duel can be entered on with good prospects of success, always bearing in mind the principle that the target most dangerous to the infantry at the moment must receive first consideration. In the event then of a heavy bombardment being initiated by the enemy of sufficient intensity to betoken the threat of a hostile counter-attack, vigorous counter-battery work must at once be taken up.

The enemy's preparation may last for a few hours, or it may endure for several days. In the first case counter-preparation, as far as counter-battery work is concerned, will at the outset have to consist almost entirely of heavy neutralizing fire, though every advantage must be taken of the zone call system to correct the fire and to pass gradually to destructive shoots. In the latter case, more opportunity exists for deliberate destruction of the enemy's batteries, and neutralizing fire should take the form of powerful concentrations of artillery fire. Gas shell bombardments may be employed advantageously on such occasions.

Should the enemy advance to the attack, his infantry becomes for the time being the most important target. As soon as the "S. O. S." signal is made, fire must be opened at once on the targets arranged as "S. O. S. Lines." The fire of the majority, if not all, of the counter-batteries should be super-imposed on that of bombardment batteries in order that an annihilating fire may be brought to bear upon the infantry of the counter-attack and upon their reserves.

As soon as the situation admits, the fire of the counter-batteries should be devoted again to their particular task. It is evident that a clear distinction must be made between the action of the artillery during the hostile artillery preparation and its action at the moment when an actual attack by the enemy's infantry takes place, or at least appears imminent. Artillery instructions must be drawn up before hand, distinctly indicating the tasks to be undertaken by the artillery in the various phases of counter-preparation. S. O. S. Lines to meet these conditions, that is to say, lines laid out on the enemy's batteries and others designed to bring a devastating fire against his infantry, are therefore just as necessary for counter-batteries as for artillery devoted primarily to other tasks.

49. **Counter-Battery Work when Holding the Line.**—Counter-battery work under these conditions follows the general principles laid down in this book. The location of the enemy's batteries must always be pursued with the greatest energy, and their destruction be undertaken to the fullest extent that resouces and weather conditions admit. The spirit of counter-battery work should be based on the principle that at some future time an offensive may be planned for the particular front, or even that a defensive attitude may be imposed by the enemy. Therefore every item of knowledge concerning the hostile artillery will be of value and every battery destroyed a point gained, when and if active operations develop.

Neutralization will be called for in the daily routine, when, for instance, the infantry are being troubled by artillery fire or material damage is being done to defences. The morale of a hostile battery may be considerably affected by the knowledge that it will be subjected to prompt and accurate neutralization whenever it opens fire. But it must be clearly understood that spasmodic neutralizing fire is wasteful of ammunition, as it is unlikely to achieve good results; ammunition is far better expended in destructive shoots.

It is therefore important that hostile batteries should be quickly engaged not only when their flashes are seen from aeroplanes, balloons or observing stations, but also when their activity is deduced from current reports. Such deductions should frequently prove correct if the records of hostile batteries are carefully kept on the lines laid down in Section IV., and if a quick and reliable system of transmitting reports of hostile artillery activity exists.

50. **Raids.**—The action of counter-battery work in support of raids naturally follows the principles adopted in larger operations to the extent required.

Trench raids by the enemy, however, present certain features for consideration. The artillery support of a raid generally consists of a local barrage of the "box" type, possibly preceded or accompanied by a feint barrage elsewhere, the strength of the attacking force is usually small and should be adequately dealt with by the field artillery of the sector. If the enemy's barrage can be materially checked, the infantry will be in a far better position to repel the attempted raid by their own weapons. These circumstances, therefore, indicate that the enemy's batteries should be neutralized as promptly as possible, to which end counter-battery "night-lines"

should usually be laid out on those hostile batteries which are most likely to be used as barrage batteries to support a raid.

51. **Counter-Battery Work in the Defence.**—As soon as preparations by the enemy for an attack on a large scale are suspected, the counter-battery work of the defence must exhibit the utmost vigor on the general principles of counter-preparation. But if it becomes apparent that the numerical superiority of the enemy's artillery is such that the counter-battery duel must inevitably turn to his advantage, the action of the defending artillery must be carefully considered. The vital condition is that at the moment when the enemy's attack is launched, a prompt, accurate and adequate artillery fire shall be brought to bear on his infantry.

If the defending artillery has been materially reduced in power during the course of an unequal counter-battery struggle, it will not be able to fulfill its mission at the moment of assault, and the infantry will be deprived of that support to which they are entitled and to which they look. In such circumstances, the counter-battery work of the defenders may have to be severely curtailed; not that the artillery may merely avoid certain and severe losses, but in order that it may still retain power to shield the infantry at the decisive moment. The principles already stated in para. 47 hold good in this case also as regards meeting the enemy's actual attack, but with the additional proviso that the fire of every available gun, including those of all the counter-batteries, should be turned on to the hostile infantry.

Various points in connection with the action of the enemy's artillery on the defensive have been remarked in Section VI., 42, and these should receive consideration.

A material reinforcement to the artillery of the defence would naturally change the whole situation, and therefore need not be discussed here.

So long as the mastery of the air has not been gained by the enemy, opportunities for observed destructive fire will be presented under all conditions, and full advantage of them should be taken. The defending aircraft, too, will be able to indicate which groups of hostile batteries are most persistently active, and they can be selected for periodical and special attention in the form of concentrated neutralizing fire. But if the aircraft of the defence are placed at a disadvantage by the enemy's aeroplanes, the probability of effective counter-battery work on the part of the defending artillery will be very materially reduced. Under these conditions the enemy's artillery superiority may be best countered by a judicious use of alternative positions, by fire to destroy the dumps, railways, roads and tracks by which the enemy's batteries are fed, and by strong concentrations of gas shell at opportune moments.

It is evident that the combined concealment and strengthening of battery positions, and of observing posts, will do much to make it possible for batteries to live and to fire effectively in the face of a superior artillery. But this work must have been undertaken and constantly pursued long before the development of the expected attack; it cannot be improvised at the eleventh hour.

IX.—MISCELLANEOUS.

52. **The engagement of long-range guns on railway mountings.**—The enemy's long-range guns on railway mountings have recently proved a source of material annoyance. The general plan adopted for the employment of these guns is to bring them up to different sidings on his railway system, to fire a few rounds and then to cease fire. A careful study of the enemy's railway developments will often disclose the arrival of a hostile heavy gun before it opens fire, and enable counter-measures to be taken. All gun sidings should be accurately located.

The lives and capabilities of British long-range railway guns are not favorable to their employment as regular counter-battery weapons. A duel between long-range railway guns is unlikely to achieve material results, except possibly at very great cost, and therefore the actual destruction of such hostile guns will seldom prove practicable. The following methods may, however, be tried against those that lie beyond the reach of our 6-inch guns.

As soon as a hostile long-range gun is located, it should be engaged at the earliest opportunity:

(*a*) In clear weather, arrangements should at once be made to bomb the target from the air and to engage it with our long-range guns assisted by aerial observation. A limited number of rounds only should be fired. (*b*) In dull weather or by night, ranging by cross-observation may be feasible or sound ranging may prove of value, if the wind is favorable. (*c*) If no corrections can be obtained, a few rounds may be fired by means of calculations worked from the map, atmospheric conditions, etc., provided that the target has been accurately located. (*d*) It may in some cases be possible to hamper the movements of the gun by the destruction of the railway bridges over which it has to pass.

53. **Wireless—Responsibility of Artillery Commanders.**—The following paragraphs, which are reprinted from S. S. 131, "Co-operation of Aircraft with Artillery." December, 1917, edition, define the responsibility of Artillery Commanders as regards wireless personnel and material attached to their units:

"They must ensure:

"(*a*) That adequate care is taken of the instruments, especially when on the move. The complete station should always be packed in the carrying bags provided for the purpose. Strapped firmly on the top of a limber, wireless instruments can be taken over rough country without injury. (*b*) That suitable cover is provided for the operators. It must be as soundproof as possible, and not too near the guns. A blanket must be provided to cover the entrance of the dug-outs for use in case of gas attack, and operators must be instructed in the best means of protection against gas, including the fitting of gas masks. The operator can be in the same dug-out as the battery commander, provided it is on high ground and not too close to the battery. Otherwise he must be provided with a separate dug-out and connected by telephone with the battery commander. (*c*) That one operator is always on duty whenever there is any

possibility of a machine working with his station. (*d*) That the operators are informed by the unit with which they are working as to what calls they are to take, and notified of any changes. (*e*) The wireless receiving sets and their operators must accompany the 'firing battery' in any movement during operations, and will invariably move with the unit to which they are attached on its transfer to another formation or area. Batteries and Headquarters provided with motor transport will convey the instruments and operators on the battery or headquarters vehicles. Field and horse-drawn Heavy Batteries must arrange for their conveyance on the vehicles accompanying the 'firing battery.' (*f*) Two operators are required for each ground set (one only in the case of the heaviest natures of artillery). Their sole duty is the reception of wireless messages. (*g*) A man must be detailed by the artillery unit concerned to work the ground signals; the wireless operator is fully occupied."

Unless these instructions are loyally observed, failures are sure to occur, or trouble to arise, when any movement of artillery takes place.

54. **Calibration and Datum Points.**—Much time will be saved if guns are kept carefully calibrated and checked on datum points. Calibration is a matter of the greatest importance. (*See* G. H. Q. Artillery Circulars No. 3 and No 4.) Every observed shoot, wherein guns have been ranged successfully, should be utilized for the purpose of checking calibration. If the terrain affords no point on which really good ground observation can be obtained, the guns can be ranged on any well-defined mark by an aeroplane or balloon before the shoot commences. Every battery should have a number of datum points within its arc of fire, at suitable ranges for counter-battery work. Other datum points should be selected by the Royal Flying Corps, so that batteries can be ranged on such points on days when visibility is too bad to admit of observation of destructive shoots. These points should be as far distant as possible. A datum shoot should always be carried out, if possible, before engaging a target without observation; for, unless this is done, fire will probably be ineffective. All batteries should therefore fire a few rounds on a suitable datum point daily, when weather conditions admit.