

SHORT COURSE  
IN  
INFANTRY TACTICS  
BY  
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INFANTRY TACTICS

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100th GRENADIERS

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## FOREWORD.

The idea of this book is to concentrate in simple form the tactical knowledge required by an infantry officer up to the rank of captain.

The official manuals contain a great deal more than he requires when training hurriedly for war, and it is frequently a hard problem to decide what to study and what to omit. Then again, this knowledge is scattered throughout five or six different books, and is not always in the best form to admit of easy comprehension by any but a soldier of some experience.

This book is based on the official manuals, and no independent theories are advanced. The principles of infantry tactics have been dealt with in simple language and logical form, and diagrams added to illustrate troublesome points. Sections on Modern Entrenchments, Listening Patrols, etc., have been added to bring it up-to-date, and in accordance with the latest experience of this war.

The test of war has proved the principles on which the British Army is trained to be sound, and the importance of understanding them thoroughly and well cannot be over-estimated. Their application may vary with circumstances, but the principles remain the same. The official books should therefore not be neglected but studied diligently, once the elementary knowledge necessary to do this intelligently is gained.

I wish to acknowledge the material assistance given me by Lt.-Col. W. R. Lang, General Staff, 2nd Division, who has been good enough to make a number of valuable suggestions which have greatly added to the usefulness of the book.

*February, 1916.*

A. B. R.

Extracts from the following Official Manuals are made with the permission of the Controller, His Majesty's Stationery Office, London:

Infantry Training, 1914.

Field Service Regulations, Part I.

Musketry Regulations, Part I.

Notes on Map Reading and Field Sketching.

Manual of Field Engineering.

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## DEFINITIONS.

The definitions given below are only those referred to in this book; a complete set will be found in Infantry Training, 1914.

*Alignment.*—Any straight line on which a body of troops is formed, or is to form.

*Column.*—Bodies of troops on parallel and successive alignments, at a distance from one another equal to their own frontage, *e.g.*, column of companies or column of platoons.

*Column of route.*—A column of fours with not more than four men abreast in any part of the column, including officers and supernumeraries. The normal formation for troops marching on a road.

*Deploy, to.*—To change formation from column or close column into line on the same alignment.

*Depth.*—The space occupied by a body of troops from front to rear.

*Echelon.*—A formation of successive and parallel units facing in the same direction, each on a flank and to the rear of the unit in front of it.

*File.*—A front-rank man and his rear-rank man.

*Fire unit.*—Any number of men firing by the executive command of one. The section is the normal fire unit.

*Frontage.*—The extent of ground covered laterally by troops.

*In action (of a machine gun).*—A machine gun is said to be in action when it is mounted, loaded and laid, not necessarily firing.

*Incline.*—The movement by which ground is gained to the front and flank simultaneously.

*Interval, deploying.*—The lateral space between units in close column or in column, on the same alignment, the space being equal to the frontage of a unit in line.

*Line.*—Troops formed on the same alignment.

*Position, change of.*—A movement by which a body of troops takes up a new alignment.

Ranges, terms applied to :

Terms applied to ranges.	Rifle. Yards.	Field Artillery. Yards.	Heavy Batteries. Yards.
Distant.....	2000 to 2400	6500 to 5000	10000 to 6000
Long.....	2000 to 1400	5000 to 4000	6500 to 5000
Effective.....	1400 to 600	4000 to 2500	5000 to 2500
Close.....	600 and under.	2500 and under.	2500 and under.

## PART I.

### CHAPTER I.

#### THEORY OF RIFLE FIRE.

The rifle is the deadliest of all weapons used in war, and the most effective. The essence of infantry tactics consists in beating down the enemy's resistance by the volume and accuracy of its fire and then completing his overthrow by assault. Therefore, infantry must be able to deliver a rapid and accurate fire at any target they can see, whether moving or stationary, and under varying conditions of light, wind and distance.

To do this, it is of the utmost importance that the infantry soldier should understand the theory of rifle fire and its practical application. It is of greater importance that an officer should thoroughly understand it, so as to be able to instruct his men, and, in the field, intelligently to direct and control their fire.

#### DEFINITIONS.

These are important, and a great deal can be learned from them. Consult the diagram, and be sure you understand each definition thoroughly before going on to the next. They are the foundation on which a sound knowledge of the theory of rifle fire is based.

The Axis of the Barrel is an imaginary line following the centre of the bore from breech to muzzle.

The Line of Departure is the direction of the bullet on leaving the muzzle, i.e., the prolongation of the axis of the barrel.

The Line of Fire is a straight line joining the muzzle of the rifle and the target.

The Line of Sight is a straight line passing through the sights and the point aimed at.

The Culminating Point is the greatest height above the line of sight to which the bullet rises in its flight; this is reached at a point a little beyond half the distance to which the bullet travels.

The First Catch is that point where the bullet has descended sufficiently to strike the head of a man whether mounted, standing, sitting, lying, etc.

The First Graze is the point where the bullet, if not interfered with, will first strike the ground.

The Dangerous Space for any particular range, is the distance between the First Catch and the First Graze.

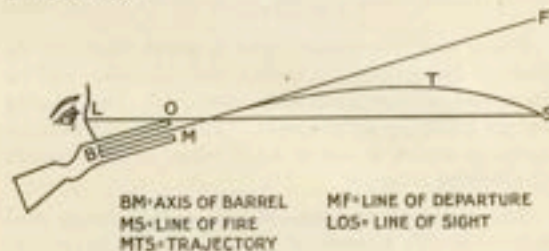


FIG. 1.

## RIFLING.

Rifling is spiral grooves cut down the "bore." It allows an elongated bullet to be used, thus allowing great weight in proportion to the surface of the bullet opposed to the air. Rifling imparts a rotary motion to the bullet which makes it travel on its longer axis, and thus keeps its point foremost.

## JUMP.

This is a movement caused by the vibratory waves set up in the barrel by the shock of the discharge. It therefore rarely happens that the line of departure coincides with the axis of the barrel before firing and the angle between the two is known as the angle of jump.

Jump may be either positive or negative according as the muzzle is deflected upwards or downwards with reference to the axis of the barrel. While nothing official has been issued, unofficial experiments indicate that the jump with the Ross Rifle using Mark VII ammunition is slightly negative; with the Lee-Enfield, Musketry Regulations give it as being negative.

## DRIFT.

This is the lateral deviation brought about by the rotation of the bullet after it has left the barrel. The left-handed rifling of the service rifle causes the bullet to rotate from right over to left, and, owing to gyroscopic action, the point works over slightly to the left. The consequent increased air pressure on the right side of the bullet therefore forces it to the left.



The deflection due to drift at distances below 1,000 yards is negligible. At 1,500 yards it may be regarded as about 7 feet.

#### RICOCHETS.

Bullets which rebound after striking the ground or any other obstacle and continue their flight, are said to ricochet. They may rebound two or even three times before they finally stop.

#### FORCES ACTING ON THE BULLET.

Three forces act on the bullet:

1. The explosion of the charge, which drives it forward.
2. The force of gravity, which draws it down towards the centre of the earth.
3. The resistance of the air, which checks its velocity.

The combined effect of these forces causes the bullet to travel in a curved line, called the trajectory (M.T.S. Fig. 1). The longer the range, the greater the curvature. Thus a Mark VI bullet, which has a muzzle velocity of about 2,000 feet per second, falls about  $4\frac{1}{2}$  inches below the line of departure in the first hundred yards; this drop is increased to about 30 inches at 200 yards. A Mark VII bullet, having a muzzle velocity of about 2,440 feet per second, drops about 3 inches and 13 inches respectively. You will note from this that higher muzzle velocity is an advantage, as the faster a bullet travels the less effect gravity has on it, and therefore the less it drops.

#### ELEVATION.

In order to allow for this drop of the bullet, it is necessary to direct it as much above the target as it would drop if aimed right at it. Thus, suppose you are standing on level ground and aim at a target 100 yards away. With Mark VII ammunition the force of gravity will pull the bullet down about 3 inches while it is travelling that 100 yards, and it will hit the target that much lower than the spot at which you aimed. But if you aim 3 inches above the spot you want to hit, the bullet will drop just that much, and consequently ought to hit just where you intended it to.

This is called giving elevation, and is done by means of the sights. You do not actually aim above the mark, but by elevating the backsight, and then aligning front and backsight on the mark, the muzzle of the rifle is tilted up just enough to give the necessary elevation.

It is well to note that no two rifles shoot exactly alike. One may shoot a little to the right or left, in which case it should be taken to the armourer for adjustment of the sights. Then again the graduations marked on the backsight may not be exactly right for that rifle. Each man must make himself acquainted with the peculiarities of his own rifle, and by practice learn to make the necessary allowances for them.

#### DANGEROUS SPACE.

You learnt from the definition that the dangerous space for any particular range is the distance between the first catch and first graze. But with

Mark VII ammunition the bullet does not rise above the height of a man on foot at 600 yards range, or above the height of a mounted man at 700 yards range. Therefore a rifle firing this ammunition is said to have a dangerous space up to 600 yards for infantry and 700 yards for cavalry. This means that if you aim at the ground line of a target 600 yards away, a man standing between you and that target is liable to be hit by the bullet.

The longer the range the less the dangerous space, due to the steeper angle at which the bullet descends. If you were shooting at 1,000 yards, a man standing between you and the target would be safe, unless he were standing in the last 50 yards where the bullet would have descended low enough to hit him. The dangerous space in this instance would be the distance between that point and where it hit the ground. Note that the greater the distance the more accurately must the range be ascertained, as the dangerous space being less, it allows you less latitude for error.

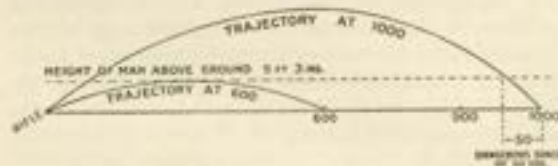


FIG. 2.

The extent of the dangerous space further depends on:

The firer's position and the consequent height of his rifle above the ground.

The height of the object aimed at.

The flatness of the trajectory.

The conformation of the ground.

The nearer the rifle is to the ground

The higher the object aimed at

The flatter the trajectory

The more nearly the slope of the ground conforms to the angle at which the bullet descends

The greater is the dangerous space.

#### ANGLE OF DESCENT.

A general knowledge of the angle of fall of the bullet in the last 100 yards of its flight, at the shorter ranges, is essential as a guide in deciding when individual fire may be opened with effect. The longer the range the more abruptly does the bullet fall; consequently, the greater the distance the more accurately must the range be ascertained. Hence, the limits of individual fire are to a great extent governed by the curve of the trajectory and the power of correctly estimating ranges; and unless the strike of the bullet can be observed, individual fire cannot be effective on small targets at the longer ranges.

The following table gives the angle of descent for the last 100 yards at ranges up to 1,000 yards with Mark VII ammunition:

Range.	Angle of Descent for the last 100 yards of each range.		Expressed as a gradient (in round numbers).
Yards.	Degrees.	Minutes.	
200	—	—	—
300	—	—	—
400	0	12	1 in 300
500	0	18	1 in 200
600	0	27	1 in 120
700	0	39	1 in 90
800	0	54	1 in 64
900	1	12	1 in 50
1,000	1	33	1 in 37
1,100	1	39	1 in 30
1,200	2	31	1 in 23
1,300	2	8	1 in 18
1,400	3	30	1 in 15
1,500	4	37	1 in 12
1,600	5	29	1 in 10

## EFFECT OF FIXING THE BAYONET.

When the bayonet is fixed to the muzzle of the rifle, its weight checks the jump. Consequently it affects the position of the muzzle at the moment the bullet is leaving it, and the primary direction given to the bullet.

No official figures are available as to the effect of fixing the bayonet on the Canadian Ross Rifle. The table for the Lee-Enfield Rifle is given in Musketry Regulations, Part I.

## FIRING UP AND DOWN HILL.

A bullet fired perpendicularly upwards or downwards will travel in an approximately straight line until its impetus is exhausted. Hence it

follows that when shooting up or down hill, less elevation is required than when the target is on the same level. The elevation to be used can be best ascertained by careful observation of fire.

## WIND AND LIGHT.

A side wind has greater effect on the bullet than one from the front or rear, as it acts on the greater surface. A wind from the front retards it and demands more elevation; one from the rear lessens the resistance of the air, and therefore calls for less elevation.

No set rules can be laid down covering allowances to be made for wind. You should observe its direction and strength by watching trees, grass, etc. At the range, study the effect of winds blowing 10, 20 and 30 miles an hour at, say, 500 and 1,000 yards, and having learnt what allowances it is necessary to make for these, make proportionate ones for intermediate winds. Remember that owing to the increased time the bullet is exposed to its effect, and to the height attained in its flight, the allowance for wind at long range is out of all proportion to that necessary for short range.

In bad light the foresight is less distinctly seen than in good light and more of it is unconsciously taken into the line of sight. This naturally affects the elevation used, less being required on a dull than on a bright day.

## COLLECTIVE FIRE.

Owing to the many causes which affect marksmanship it is evident that a series of shots fired from the same rifle at the same target and range



will not all hit exactly in the same place. Some will hit above or below the mark, others to the right or left. The shots will thus form a group around the target. If the range is short, and the firer a good shot, the group will be small, and most of the shots will hit the target. But if the range is long, the group is liable to be large, and a greater proportion of the bullets will miss the mark.

The trajectories of bullets fired in this way will not coincide, but will form what is called the "Cone of Fire" (see diagram). The bullets will hit most thickly near the point at which aim was taken, and this dense grouping is termed the nucleus of the cone of fire. The ground beaten by the best 75 per cent of the shots fired is termed the zone of effective fire.

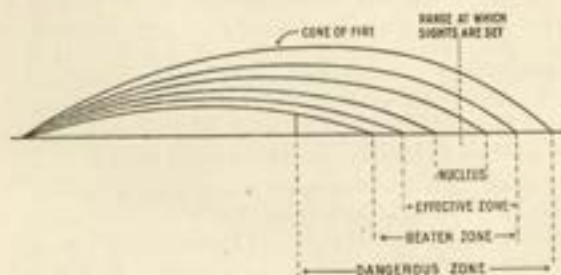


FIG. 3.

At short ranges, the trajectory being flatter, practically the whole extent from the firer to the target is swept by bullets, so the depth of the

beaten zone need not be considered. Up to 1,500 yards, when the ground is parallel to the line of sight, the depth of the beaten zone decreases with the range, on account of the increased angle of descent of the bullets. But despite the fact that at these longer ranges the bullets are less widely dispersed, fire is less effective for the same reason, *i.e.*, the increased steepness of the angle of descent of the bullets.

From the foregoing it is evident that, under service conditions at long ranges, effect must be looked for from collective fire rather than from individual effort.

#### GROUND IN RELATION TO FIRE EFFECT.

Ground has an important influence on fire effect. If it rises with respect to the line of sight, the depth of the zone beaten by bullets is decreased, and consequently errors in estimation of the range will be more serious. Then again, as the bullets will fall at a steep angle, the dangerous space is proportionately reduced. On such ground, therefore, troops should be drawn up in shallow formations.

If the ground falls in respect of the line of sight, the depth of the beaten zone is augmented in proportion to the steepness of the slope, until it reaches its greatest magnitude when the angle of fall of the bullets is the same as the slope of the ground; or, in other words, when the trajectory



is practically parallel to the ground surface (see diagrams).

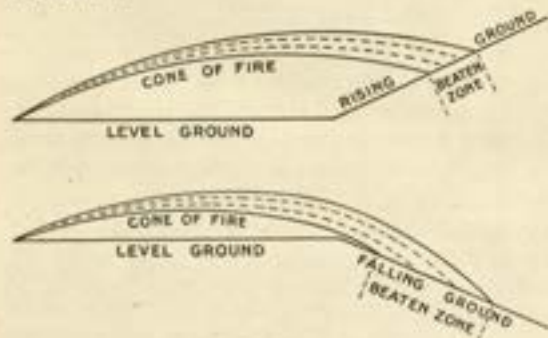


FIG. 4.

Therefore, ground far behind the objective will sometimes be swept by unaimed fire, and in such circumstances supports should be under cover, or, if there is no cover, in shallow columns on narrow frontages, with the object of reducing target surface as much as possible.

If fire is directed at the crest of a hill from short range, just behind the crest there will be a space not swept by fire, the bullets passing over it. But if the fire comes from long range, and the slope of the ground behind the crest is roughly parallel to the trajectory of the bullets it will be swept by fire. In such cases supports should be withdrawn from the crest when the fire comes from long range, and brought up close to it when it comes from short range. This, of course, only applies when the ground falls behind the crest. If it runs

level for any distance back from the crest, that ground will be swept by fire at any but the very shortest ranges.

#### SEARCHING.

Under active service conditions it may be assumed that the probability of error in ranging and judging atmospheric influences is such that, at distances beyond 1,000 yards, collective fire concentrated on any target with one sighting will probably be ineffective. In such cases it is advisable, unless sighting can be corrected by observation of results, to distribute fire in depth by using two elevations differing by 100 yards. One of these elevations would be 50 yards over, and the other 50 yards under, the sighting believed to be correct. This method of searching or distributing fire in depth is called "Combined Sights." It should not be employed if observation of results can be obtained, nor by bodies of less than two platoons.

#### NIGHT FIRING.

Night firing is not liable to be very effective except against a well defined position, the range of which is known, or moving bodies of troops at short ranges. It may, however, in some circumstances have great moral effect.

You can roughly estimate ranges at night by timing the flash of the enemy's rifle with the sound of the shot. Sound travels about 1,120 feet per second.

## CHAPTER II.

## AIMING.

Bear in mind what you learned in the Firing Exercises: to provide a good solid bed for the butt of the rifle, and to hold it well pressed in to the shoulder. Keep the eye as far back from the backsight as possible. The further back it is the more clearly the sights will be defined.

The three rules of aiming are as follows:

1. The backsight must be kept upright.
2. The left or right eye, according to the shoulder from which you shoot, must be closed.
3. Aim must be taken by aligning the sights on the centre of the lowest part of the mark, the top of the foresight being in the centre of, and in line with, the shoulders of the notch of the backsight.

The most common faults in aiming are:

1. Taking too much or too little foresight into the notch of the backsight.



TOO MUCH FORESIGHT.  
BULLET WILL GO HIGH.



TOO LITTLE FORESIGHT.  
BULLET WILL GO LOW.



CORRECT AMOUNT OF  
FORESIGHT.

FIG. 4.

The lower the sight you take the lower the bullet will go. The proper way is to have the top of the foresight on a level with the shoulders of the backsight.

2. Inaccurate centring of the foresight in the notch of the backsight.

The foresight should be in the centre of the notch of the backsight. If it is a little to the right, the bullet will go to the right, and *vice versa*.

3. Fixing the eyes on the foresight, and not on the target.

This will blur your vision of the target. This may not matter much at stationary targets, but when firing at moving objects, or service targets which appear and disappear, it is important that you keep your eye on the mark.

4. Inclining the backsight to one side.

This causes the bullet to strike low, and to the side to which the sights are inclined.

The Ross Rifle Mark III has a backsight which is neither a U nor a V but may be described as a circle with the top quarter cut off. Aim is taken by aligning the foresight on the centre of the lowest part of the mark, the top of the foresight being in the centre of the circle of the backsight.

The Mark III also has an aperture sight. When using this the aperture should be ignored and aim taken by looking through it as through a window, the top of the foresight being in the centre of the aperture sight.

## AIMING OFF FOR WIND.

The variation of one division on the wind-gauge is equivalent to 5 inches on the target per 100 yards of range. This is with the Canadian Ross Rifle. On the English Rifle it is equivalent to 6 inches. The wind-gauge, however, is not to be regarded as the normal means of making allowance for wind under service conditions.

## AIMING OFF FOR MOVEMENT.

Up to 500 yards range, you should aim as follows:

About 1 foot per 100 yards in front of a single man walking.

About 2 feet per 100 yards in front of a single man doubling.

About 3 feet per 100 yards in front of a horseman trotting.

About 4 feet per 100 yards in front of a horseman galloping.

Thus at 100 yards you would aim about the breadth of a man in front of a man walking, and at 200 yards about a horse-length in front of a horseman trotting. Firing will rarely be effective against a moving man on foot at over 300 yards, or a horseman at over 500 yards range.

## TRIGGER PRESSING.

The first joint of the forefinger should be placed around the lower part of the trigger. Press the trigger by a squeezing motion of the forefinger and thumb. Do not move the arm or hand, and restrain the breathing at the moment of pressing the trigger, so as not to disturb the aim.

## CHAPTER III.

## VISUAL TRAINING AND RANGING.

## GENERAL.

The principal means of ranging are:

- (i) Judging distance by eye.
- (ii) Observation of fire.
- (iii) Range finding.

In addition to these there are several auxiliary methods, such as use of maps, cross bearings, back-reckoning, information obtained from artillery or machine guns, sound and flash, etc. No means of ascertaining ranges should ever be neglected if time and opportunity are favourable.

As fire is controlled at longer ranges, practice in judging distances is more necessary for Officers and Non-commissioned Officers than for the private soldier, though any soldiers who show aptitude for the work should be given all the training possible.

The mean error of private soldiers in judging distances within 800 yards range should not exceed 100 yards.

Officers and non-commissioned officers by constant practice will reduce their mean error in judging distance from about 20 per cent. of the correct distance to about 10 per cent., but much depends on the local conditions to which the observer is accustomed, and serious errors must be expected in judging under strange conditions of ground and atmosphere. Exercises in judging distances must therefore be carried out during, as well as before, a campaign overseas.



## CHAPTER IV.

## CARE OF ARMS.

Wear in the bore of a rifle is due to three causes:

1. The friction of the bullet.
2. The heat generated by the combustion of the charge.
3. The friction of the pull-through gauze.

An oil-bottle and a pull-through, which is a cord fitted with a weight, are carried in a recess in the butt of the rifle. The pull-through is packed above the oil bottle as follows:—Hold the pull-through (loop end) between the forefinger and thumb of the left hand, so that the end falls about 2 inches below the third finger; roll it loosely three times around the first three fingers. Slip the coil off the fingers, and lap it tightly with the remainder of the cord, leaving sufficient to allow the weight to drop easily into the recess in the butt. Push the cord into the trap, leaving the loop end uppermost, drop the weight into the recess, and close the trap.

The pull-through cord has a weight at one end, and three loops at the other. The first of these, *i.e.*, the one nearest the weight, is for the gauze when used; the second for the flannelette; the third is for withdrawing the pull-through in case of a jam and is not to be used for cleaning purposes.

## USE OF THE PULL-THROUGH.

Remove the bolt, and drop the weight through the bore from breech to muzzle. The pull-through should be drawn through in one motion, otherwise

the space where the cleaning material is allowed to rest will not be properly cleaned. Very great care must be taken not to allow the cord to rub against the barrel, otherwise a groove, technically known as "cord wear," will be cut that will, in the course of time, destroy the accuracy of the rifle.

## FLANNELETTE AND GAUZE.

Only regulation flannelette (about 4 inches by 2 inches) is to be used.

The regulation wire gauze, is  $2\frac{1}{2}$  inches by  $1\frac{1}{2}$  inches, and in attaching it to the pull-through, the following method should be adopted:—Turn the shorter sides of the gauze toward the upper, so that the longer sides take the form "S." Open the first loop of the pull-through, and put one side of it in each loop of the "S." Then coil each half of the gauze tightly around that portion of the cord over which it is placed until the two rolls thus formed meet.

**NOTE.**—To make this clear it is recommended that you work it out yourself with a piece of cord and some paper.

The gauze must be thoroughly oiled before use to prevent its scratching the bore.

The gauze should not be used more than is necessary as it entails wear of the bore. The best way to prevent the necessity of continued use of the gauze is to keep the bore well oiled.

## OIL.

Russian petroleum is the regulation oil for oiling rifles and no other should be allowed to remain in



the bore. Paraffin is good for removing rust, but will not prevent its formation, and traces of it should be removed after use and the bore coated with Russian petroleum.

When using flannelette, work the oil well into it with the fingers, otherwise most of it will be scraped off by the end of the barrel.

Oil is only removed from the bore :

Before firing.

For inspection.

For parades and duties as may be ordered by the Commanding Officer.

In all cases it will be replaced as soon as possible.

#### FOULING.

Fouling may be said to be of two kinds :

Internal—probably caused by the forcing of gas or harmful material into the pores of the metal.

Superficial—caused by the deposit in the bore of solid products of the charge and of the cap composition.

The result of neglect in either case is the same, viz., the formation of rust in the bore.

Internal fouling can be removed satisfactorily by the use of boiling water. Superficial fouling and grease should first be removed, and about five or six pints poured through from the breech, using a funnel to prevent its entering the body or magazine. The rifle then should be thoroughly dried, and the bore oiled. This is a good way to clean the bore even when firing has not taken place.

Superficial fouling is readily removed when warm by the use of the pull-through and flannelette, but if allowed to remain long in the barrel it will become hard, and will have a corrosive effect equal to that produced by internal fouling.

#### DAILY CLEANING.

The outside of the rifle should be cleaned daily ; all parts of the action wiped with an oily rag ; the bore of the rifle should always be left oily—this oil being removed once a week, and the bore re-lubricated.

NOTE.—Instructions as regards wiping the outside of the rifle with an oily rag do not apply in dusty countries, where all parts of the action should be kept dry and clean.

#### CLEANING BEFORE FIRING.

The action should be wiped with an oily rag and all traces of oil removed from the bore and chamber. Neither the cartridge nor the chamber are to be oiled before loading.

#### CLEANING AFTER FIRING.

Arms should be cleaned as soon after firing as possible. If it is impossible to do it at once, an oily rag should be drawn through the bore, and the rifle cleaned at the earliest opportunity.

The following method of cleaning the bore should be adopted :

Thoroughly oil the gauze, and pull it through three or four times from breech to muzzle. Then draw a piece of flannelette through until the bore is clean. Finally oil the bore with a loosely-fitting

piece of flannelette. The rifle will be cleaned in this manner for three days following that on which it is fired.

After firing blank ammunition, special care should be taken that the cleaning is thorough, as there is a greater accumulation of superficial fouling from blank than ball cartridges.

*The action and outside.* Thoroughly clean the bolt, paying particular attention to the face of the bolt-head, the striker-point, and the extractor. If the bolt requires cleaning inside it should be taken to the armorer. Wipe the exterior of the rifle with an oily rag, and see that the sights are clean.

The appearance of nickelling or metallic fouling should be watched for. This is caused by a portion of the cupro-nickel of the envelope of the bullet being left on the surface of the bore, and appears as a whitish streak on the lands, or as a slight roughness on the edge of the grooves. If it is deposited near the muzzle or the breech it is visible to the naked eye, but in the centre of the bore it can only be detected by the use of the gauge plug. It is a cause of inaccuracy, and if a rifle, for no apparent reason, shoots badly, its presence should be looked for as a possible explanation. Make no attempt to remove it yourself but turn the rifle over to the armorer to be cleaned.

#### POINTS TO NOTE IN INSPECTING RIFLES.

See that :

The interior of the bore is clean, and free from rust.  
The sights are all right, not bent or deformed in any way.

The bolt, extractor, and striker work freely.

The magazine and platform are in good working order.

The action and outside are clean.

#### A FEW DON'TS.

Don't:

Leave the rifle cocked.

Leave the back-sight up when moving.

Use the rifle as a support for the right hand when getting up from prone position.

Carry weights on the rifle.

On any account exchange bolts.

Rub the browning off.

Use any polish except oil.

Try to take the rifle to pieces.

Use the gauze too much.

Allow the wood to absorb any damp, but rub it daily with an oily rag.

#### CHAPTER V.

##### MAP READING AND FIELD SKETCHING.

An officer must be able to read a map sufficiently well to find his way in an unknown country. He must also be able to make a rough sketch of a position or tract of country, showing the main features, such as roads, villages, railways, rivers, etc.

Maps must not be regarded as a substitute for studying the country. Nothing can equal a

personal reconnaissance when it is possible to make one.

We have to deal with two kinds of maps; the military map, which is the work of a trained surveyor; and the field sketch, done by anybody on the ground.

#### THINGS TO LOOK FOR ON A MAP.

1. The scale.
2. The north point.
3. The hill features.
4. Roads, villages, railways, rivers, etc.

#### THE SCALE.

The scale is a statement of proportion between the map and the ground it represents. It may be shown in three different ways:

1. By a statement that the map is so many inches to the mile.
2. By a line subdivided, each subdivision representing a certain unit, thus:



FIG. 6.

In this case each division represents 100 yards, while the one on the left is further divided into 10 equal parts, each representing 10 yards.

3. By means of a representative fraction (R.F.) such as  $\frac{1}{6000}$ . This means that one unit on the map is equal to sixty units on the ground. Thus an inch on the map equals 60 inches on the ground, 1 foot equals 60 feet, and so on. An R.F. of a map

in which the units are inches, if expressed as  $\frac{1}{6000}$ , means that 1 inch on the map is equal to 6000 inches on the ground, and as 6000 inches equal 1 mile, the scale is evidently 1 inch to the mile.

Anything over 1 inch to the mile is a large scale, anything under that is a small scale.

The scale being known, to measure the distance between two points on the map all it is necessary to do is to mark it off on a piece of paper and compare it with the scale, or it may be judged approximately by the eye in comparison with the scale.

NOTE.—In all military sketches it is usual to give the scale in all three ways.

Sketches of a road or position are usually made on scales ranging from 1 to 4 inches to the mile. Sketches required for the defence of a village, selection of a camp site, or anything of which detailed information is required, are usually made on a scale of 4 inches to the mile and upwards.

A scale marked on a map should usually be from 4 to 6 inches long, and each unit should represent a multiple of 10.

To find the number of English miles to the inch on any map that has a R.F., divide the denominator of the R.F. by 63360; this gives the number of miles to the inch; thus if R.F. is  $\frac{1}{25000}$  then  $\frac{1}{25000} \div \frac{1}{63360} = 1.253$  miles to the inch.

To find the number of inches to the mile, divide 63360 by the denominator of the R.F.; thus if R.F. is  $\frac{1}{25000}$  then  $\frac{63360}{25000} = 2.5344$  inches to the mile.

NOTE.—A table of British and foreign scales is given in the Field Service Pocket Book.



## THE NORTH POINT.

The true north is the direction of the North Pole from the observer. It never varies.

The magnetic north is the direction in which the compass needle points. It varies with the locality.

The true north is shown on the map by a line with a star; the magnetic north with an arrow.

## VARIATION.

The variation of the compass may be defined as the angle between the true and magnetic north. There are 360 degrees in the whole circle of the

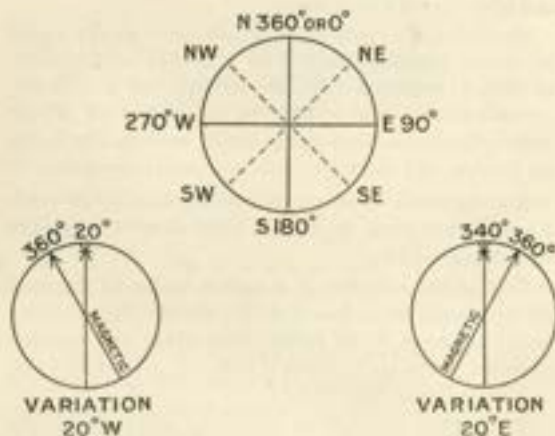


FIG. 7.

compass, and this variation is usually expressed in degrees east, or west, as the case may be. If the variation of the compass at any particular point

is 20 degrees west, then true north will be just 20 degrees to the east of the compass bearing; if the variation is east, true north will be just 20 degrees to the west of the compass bearing. In other words, if the variation is west it must be deducted from, and when east, added to, the reading of the compass. The diagrams shown on page 36 will make this clear:

As stated before, the variation varies with the locality; thus at Winnipeg, Canada, it is about 11 degrees east of true north, at Montreal about 14½ degrees west, and at London, England, about 15 degrees west.

NOTE.—The approximate variation in different localities is given in Appendix II of the Field Service Pocket Book.

## TO FIND TRUE NORTH WITHOUT A COMPASS.

By day with a watch. Hold the watch horizontally with the face upward, and point the hour-hand at the sun. Then half way between the hour-hand and 12 o'clock will be approximately south. South of the equator this would indicate the north point. This method is very rough, and not of much use when the sun is at its zenith, or in the tropics. The farther from the equator the more reliable it is.

At night by the Pole or North Star. Look for the constellation known as the Great Bear, or Big Dipper. This constellation appears to revolve from east to west around the North Star, and the two stars on the outer edge always point towards it (see Fig. 8). When the star Zeta (Z) is vertically above or below the North Star (N), the North Star



is then due north. The star Zeta (Z) is the second to last in the tail of the Great Bear, or Big Dipper. The North Star (N) is the last star in the tail of the constellation known as the Little Bear or Little Dipper.

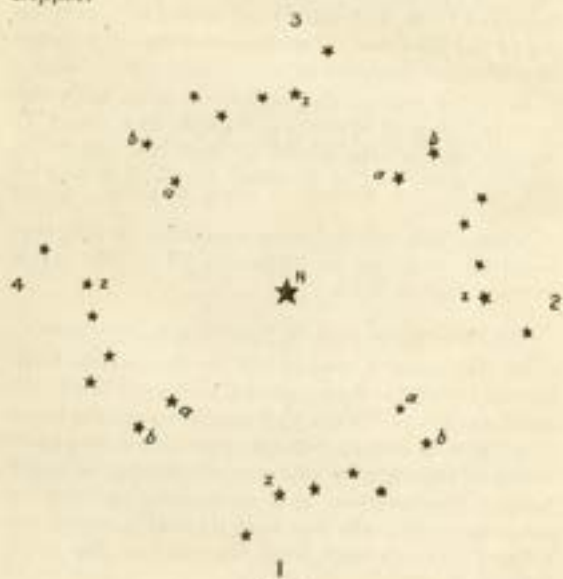


FIG. 8.

## HILL FEATURES.

These are usually shown by contour lines. A contour line is the representation on the map of an imaginary line running along the surface of the ground at the same height above sea level throughout its length.

The vertical distance between two contour lines is known as the "Vertical Interval," and is written V.I.; it is expressed in feet (except on foreign maps). A note on a map "contours at 50 feet, V.I.," means therefore that any two successive contours are separated by a vertical interval of 50 feet.

The distance in plan between two adjacent contours is known as the "Horizontal Equivalent," and is written H.E.; it is usually expressed in yards. The vertical interval being fixed it is apparent that the length of the horizontal equivalent will depend on the mean degree of slope; where the slope is steep the contours will be close together, and the H.E. small; where the slope is gentle the contours will be far apart, and the H.E. correspondingly great.

A slope may be indicated in degrees, as "a slope of 2 degrees," which means that the ground slopes at an angle of so many degrees from the horizontal; or it may be expressed as a gradient; thus, "1 in 20," meaning that there is a rise of 1 yard in a distance of 20 yards.

For a slope of 1 degree a vertical rise of 1 foot gives a horizontal equivalent of 57.3 feet or 19.1 yards. For a slope of 2 degrees, and the same rise of 1 foot, the horizontal equivalent is half this, or 9.6 yards; for a slope of 3 degrees it is one-third, and so on, but for small slopes only.

## CONTOURING A HILL.

The first step is to find out, or judge, its approximate height. Then decide on the V.I. you are going to use, and this will give you the number

of contours to draw, with one extra for the base. Thus, if a hill is 300 feet high, and you decide on a V.I. of 50 feet, you would have 6 contour lines, and an extra one for the base. This represents no V.I., therefore it is marked 0; the others are marked 50, 100, 150, etc., starting at the bottom.

Make the contour lines close together where the slope is steep, and far apart where it is gentle. Always mark the V.I. you use on the sketch.



V.I. 50 FEET

FIG. 9.

## SECTIONS.

In order to see what a hill or portion of country looks like, represented on the map by contour lines, it is convenient to make a drawing showing it in section, *i.e.*, as if it had been cut along a line and the portion to one side of the line removed. This is a good method of solving visibility problems, though there are quicker methods of doing it. In

the language of Military Topography such a section is known as a "Hand Sketch."

On the map draw a straight line A B through the hill of which a section is desired. Mark on it where it crosses the contour lines, the vertical interval which each one represents, starting with zero at the bottom.

Then on a separate piece of paper draw another line A B, and parallel to this on the upper side, lines at equal distances representing the V.I. in the sketch to the same number as there are contour lines in the hill sketch, and marked in the same manner.

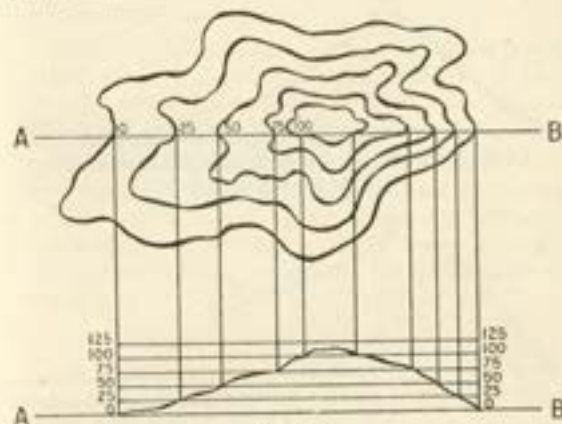


FIG. 10.

Then from each contour line in the hill sketch, where it is intersected by the line A B, drop a vertical line downwards to the horizontal line

marked with the same number. When all the vertical lines have been drawn, join the points where they intersect the horizontal lines, and the result will be a rough outline of the hill, exaggerated or otherwise in proportion to the vertical scale employed.

#### VISIBILITY.

It is obvious that in open country (*i.e.*, country devoid of hedges, walls, trees, etc.) or an open plain, two points are visible from each other when no physical feature obstructs the vision.

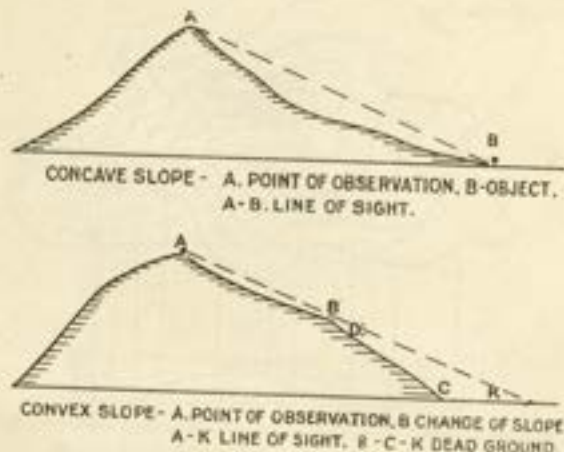


FIG. 11.

Plains, however, are seldom perfectly level; there are usually depressions or elevations quite sufficient to conceal bodies of troops; likewise,

slopes are seldom uniform throughout: they are generally either "concave," *i.e.*, steeper at the top than at the bottom, or "convex," *i.e.*, gentle at the top and steeper below (see Fig. 11).

It is evident that, on a concave slope, two points, one at the top and the other at the bottom of the slope, will be visible from each other, likewise the intervening ground, provided there are no under-features, boulders, etc., to obstruct the view.

Invisibility of one point from another or of a portion of the intervening ground, is due to some feature which obstructs the view. This will occur when a hill intervenes; it will also occur on a convex slope (see Fig. 11).

From this sketch it is evident that to a person standing at A that the portion of the slope from B to C would be unseen or "dead," and likewise that portion of the plain between C and K.

Therefore, the top of a hill with a convex slope is an unfavourable position for defence, in that the enemy will be out of sight and not exposed to fire while crossing the dead ground; it also gives him an opportunity of collecting his troops for the assault.

#### ASCERTAINING VISIBILITY FROM A MAP OR SKETCH.

If the V.I. is small, *e.g.*, 10 feet, visibility can be determined with considerable accuracy, as the unrepresented ground features are small; if the V.I. is large, *e.g.*, 50 feet, it cannot be determined in many cases without inspection of the ground, though probable invisibility may be inferred.



If the ground under consideration is a hill, first of all determine whether it is a concave or convex slope. If it is concave the contours will be closer together at the top than at the bottom; if it is convex they will be further apart at the top than at the bottom.

If the slope is concave, it is probable that the bottom and top will be visible from each other, likewise the intervening ground; if the slope is convex, there is liable to be considerable unseen or "dead" ground near the foot.

Another good plan is to make a hand sketch of the hill as taught under SECTIONS, page 40.

The following rules will be useful:

(1) If the map or sketch shows two points on the opposite sides of a valley standing well above any of the intervening ground, each will be visible from the other, and portions of the intervening ground will be visible from either point.

(2) If between any two points a feature is represented higher than both, neither point will be visible from the other, but portions of the intervening ground will be visible from either.

(3) If between any two points a feature is represented higher than one of the points, each point may, or may not, be visible from the other.

In such a case the question may be decided by making a hand sketch or section drawing as taught under SECTIONS. Then, as your line of sight is always straight, you can easily tell whether it is possible to see the lowest hill from the highest one.

This method takes a little time but it is simple and easy to remember.

If the principle that the rise or fall must be in proportion to the distance be kept in mind, probable visibility or invisibility may often be determined from an inspection of the map without further calculation.

#### SETTING A MAP.

Setting a map is simply placing it in such a way as to correspond exactly with the ground, i.e., suppose you are looking at a hill due north of you, turn the map around until the same hill, as marked on it, is also due north. The map is then set.

With a compass, setting a map simply consists in turning it around until its magnetic north point is parallel with the needle of the compass.

Without a compass, a map can be set by observing two or more natural objects, and turning the map until it coincides in direction with these.

#### FINDING ONE'S POSITION ON THE MAP.

It is generally possible to do this by observing outstanding natural features, such as hills, rivers, etc., and comparing them with those marked on the map.

If it is not possible to do this, you can find your position in the following manner:—From a given point on a piece of paper, draw three straight lines away from you in the direction of three natural objects you can distinguish. Then lay the paper on the map, prolonging the straight lines if necessary until they pass through the same natural



objects as shown on the map. The pivot point will then give your position. This method can also be worked with two lines.

#### CONVENTIONAL SIGNS.

These are shown in pages 48 and 49. The best way to learn them is to make two or three sketches of tracts of country you are familiar with, then compare them with the plate, and check up your mistakes.

It is not desirable to spend time drawing bodies of troops to scale. It is sufficient to draw a symbol to attract attention, writing the necessary information as regards strength and unit alongside.

All writing on a map should be printed, not written in the usual way.

P. on a field sketch stands for Post Office; T. for Telegraph Office; S.P. for Sign Post; W. for well.

When drawing fields, state what is in them, as wheat, corn, rough pasture, etc.

In drawing railway lines mark them "railway" and state whether single or double.

Always mark a telegraph line "telegraph."

Mark a bridge; stone, wood, iron, etc., and whether it has piers.

Rivers should be marked with their approximate width, and an arrow pointing in the direction in which they flow. Give the depth and rate of current if possible.

Fords should be marked "ford."

Woods should be marked "oak, pine," etc., and whether passable or impassable, and by what arm.

Roads should be marked metalled or unmetalled. Brown colour is used to denote a metalled road, but it is not often available in field sketching.

The great point to bear in mind is, that a field sketch is not intended as a work of art. As long as it gives in a clear and intelligible manner the general lie of the land with its outstanding features, such as roads, railways, villages, hills, rivers, etc., that is all that is necessary.

Do not spend too much time drawing any one object. Put down the conventional sign to represent it, and mark beside it any additional information necessary.

Always mark the north point, and state whether true or magnetic. If possible give both.

#### ENLARGING A MAP.

To enlarge a map, rule it off into squares of uniform size; then on a separate sheet of paper rule a corresponding number of squares of a size bearing the required ratio to those of the original. Then copy the map, putting in each smaller square the country covered by the larger one on the map.

#### DEFINITIONS.

##### TOPOGRAPHICAL TERMS.

Basin.—A term used to describe (a) a small area of level ground surrounded or nearly surrounded by hills, and (b) a district drained by a river and its tributaries, as the "basin of the Thames."

Col.—A depression between two adjacent mountains or hills, or a break in a ridge; or the neck of

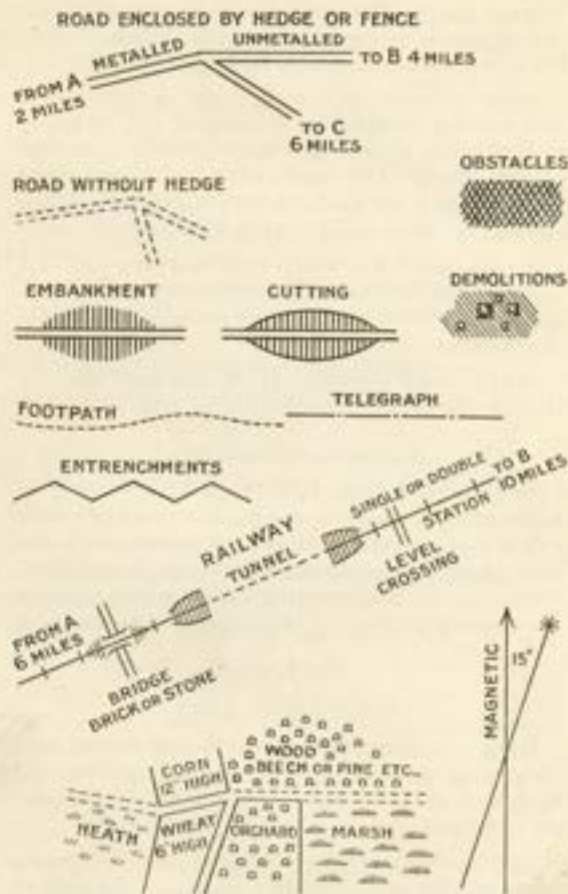
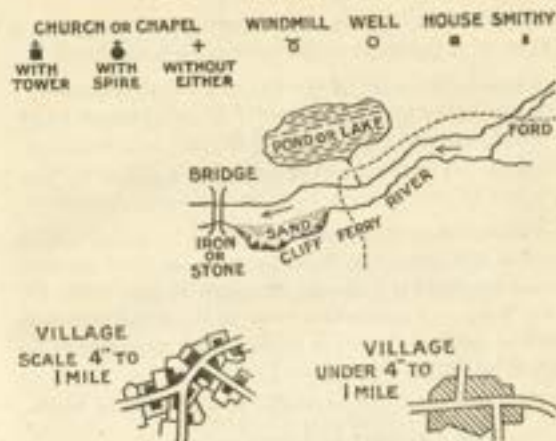


FIG. 12.



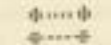
## BRITISH TROOPS

MOUNTED TROOPS  
ADD M.L. IF  
MOUNTED INFANTRY

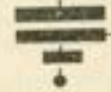
IN LINE  
COLUMN OF ROUTE  
OTHER FORMATIONS  
VEDETTE



ARTILLERY  
GUNS IN ACTION  
GUNS ON MARCH



INFANTRY  
IN LINE  
COLUMN OF ROUTE  
OTHER FORMATIONS  
SENTRY



TRANSPORT  
ON MARCH  
PARKED

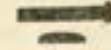


FIG. 13.

land which connects an outlying feature with a range of mountains or hills, or with a spur.

Crest.—The edge of the top of a hill or mountain; the position at which a gentle slope changes to an abrupt one, the top of a bluff or cliff.

Dune.—A hill or ridge of sand formed by the wind.

Defile.—Any natural or artificial feature which causes a body of troops to contract its normal front during its passage through it is a defile for that body. A mountain pass is the most common sort of natural defile; a bridge is an example of an artificial defile.

Escarpment.—An extended line of cliffs or bluffs.

Gorge.—A rugged and deep ravine.

Knoll.—A low detached hill.

Pass.—A depression in a mountain range through which a road or trail may pass; a track over a mountain range.

Plateau.—An elevated plain.

Re-entrant.—A "re-entrant" occurs where the hillside is curved inwards towards the main feature; it is always found between two salients.

Saddle.—A col.

Salient or Spur.—A projection from the side of a hill or mountain running out of the main feature.

Underfeature.—A minor feature; an offspring of a main feature.

Undulating Ground.—Ground which alternately rises and falls gently.

Watercourse.—The line defining the lowest part of a valley, whether occupied by a stream or not.

Watershed.—A ridge of high land separating two drainage basins; the summit of land from which water divides or flows in two directions. A watershed does not necessarily include the highest points of a chain of mountains or range of hills.

Such terms as hill, mountain, slope, ravine, river, island, cliff, etc., are not defined here, as they are in common use, and understood by everyone.

## CHAPTER VI.

### FIELD ENGINEERING.

The Field Engineering with which an Infantry Officer is chiefly concerned, is the construction and concealment of trenches, preparation of walls, buildings, etc., for defence, construction of latrines, and work of this nature.

#### FIRE TRENCHES.

The ideal site for a trench is one from which the best fire effect can be obtained, in combination with complete concealment of the trench, and of the movements of supports and reserves in the rear. Bear in mind that a good field of fire up to 400 yards is of prime importance.

The exact location of the trench will depend on circumstances. It is generally a good plan to avoid a sky line, but if it must be used, pile up earth or sods behind, and cover them with bushes,



turf, etc., to make a background for the defenders' heads.

The general dimensions of fire trenches of different types are given in the following plate:

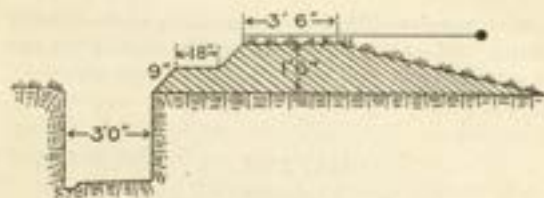


FIG. 14.

An untrained man can excavate 2 paces of a trench of the type as shown in Fig. 14 in about  $1\frac{1}{2}$  hours. This does not allow for providing an elbow rest or concealing the parapet.

If there is time, cover and facility of communication may be much improved by deepening and widening the trench as shown in Fig. 16. This allows room for men to pass behind the firing line without disturbing it.

Should a higher command than 1 foot 6 inches be required to enable the defenders to see the ground in front, the parapet must be heightened with earth obtained by widening and deepening the trench. A firing step, which should not exceed  $1\frac{1}{2}$  feet wide, unless overhead cover is provided, is necessary  $4\frac{1}{2}$  feet below the top of the parapet.

Fig. 15 shows a trench where the ground in front can be seen without any command. The excavated earth must be removed, and the inner edge covered with grass, sods, etc.

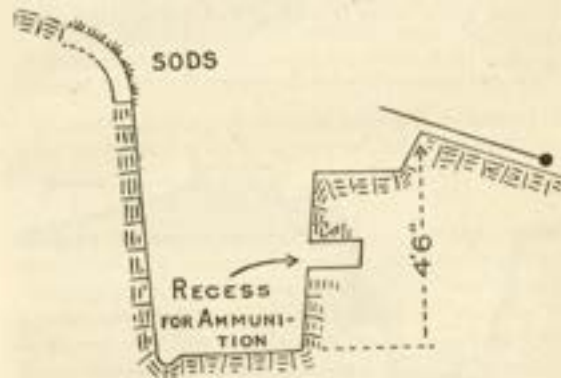


FIG. 15.

The design of a trench will depend on the time and labour available, on the soil, on the site, and on the range and description of fire which may be brought to bear on it, but the following rules are common to all:

- (1) The parapet should be bullet proof at the top.
- (2) The parapet and trench should be as inconspicuous as possible.
- (3) The interior slope should be as steep as possible.
- (4) The trench should usually be wide enough to admit of the passage of a stretcher without

interfering with the men firing, and if a step is provided as a banquette, it should not exceed 18 inches in width.

(5) The interior should be protected, as far as possible, against oblique and enfilade fire, and from reverse fire if there is a danger of fire coming from the rear.

(6) Arrangements for drainage should be made.

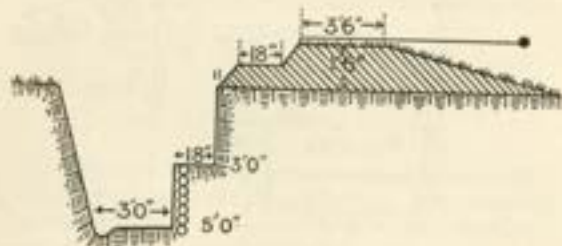


FIG. 16.

Provided the field of fire is good, a parapet cannot be too low, and in some cases no parapet at all need be provided. Every endeavour should be made to arrange the trenches so that the front of one is swept by the fire of those on either hand. For this purpose short trenches up to 40 yards or so are more easily adapted to the ground than those of greater length.

#### ENTRENCHING IN FROZEN GROUND.

If it is necessary to entrench ground which is frozen, and if there is ample time, the following

method will save the heavy labour otherwise required.

A layer of straw, 12 to 20 inches thick, should be spread so as to rather more than cover the area to be excavated. The straw is then covered with a thin layer of earth, and set on fire at intervals of 5 yards. It should be allowed to burn for about 12 hours before the ashes are removed, and digging commences.

If water is poured over a parapet constructed during frost its resistance to rifle fire will be increased.

#### HEAD COVER.

Head cover tends to diminish the number of rifles that can be put in line, as well as to reduce the field of fire and view, but it is of undoubted advantage owing to the feeling of security it inspires, and the consequent greater accuracy of fire. When it is provided, some form of loophole or notch is necessary.

#### LOOPHOLES.

Loopholes may be constructed of sandbags, sods, or any other materials, such as boxes or barrels filled with earth.

The minimum height of openings for a parapet 3 feet 6 inches thick, on level ground, using the service rifle up to 2,000 yards range, is, for the inside, 6 inches; for the outside, 4 inches. The interior height of an earth loophole should seldom be less than 14 inches, so as to enable men to get their heads well forward and under the head cover.

Loopholes should always be blinded by a ball of grass or leaves until they are actually in use.

Different types of loopholes are shown in the following plate:

#### LOOPHOLES

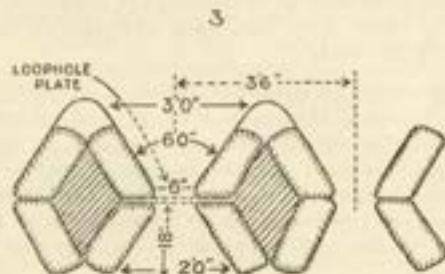
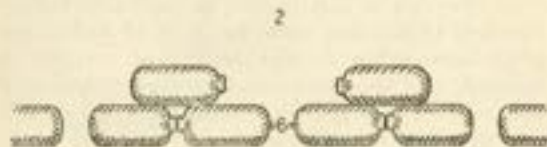
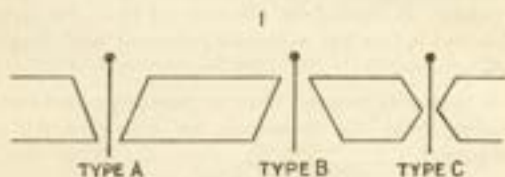


FIG. 17.

Loopholes of Type A, 1, Fig. 17, give the defender a good view but are difficult to conceal.

Loopholes of Type B, 1, Fig. 17, are less visible to the enemy but are difficult to observe from and fire through. They are suitable for use in walls, etc.

Loopholes of Type C, 1, Fig. 17, are a compromise between the first two types, and can be adapted to give a large field of fire.

Good loopholes can be made as shown in 2, Fig. 17. The sandbags, filled with shingle or gravel, are hammered out until the opening is curved, as shown. Three of them make a loophole.

A good type of loophole which gives a good field of fire and view, is a continuous narrow slit along the parapet, except for the supports required.

#### DRAINAGE.

The bottom of a trench should be sloped down to a gutter, preferably at the back. Water running into this must be led off to lower ground or into soak pits, which may be about 2 or 3 feet in diameter and 3 feet deep, and filled with large stones.

#### TRAVERSES.

Trenches which may be exposed to enfilade fire should be traversed. A traverse is a bank of earth to give cover against enfilade fire, and to localize the burst of shells. It is better to make two or three small traverses than one large one.

#### PARADOS.

This is like a parapet behind the trench, and is for protection against reverse fire and the backlash of shrapnel.



## CONCEALMENT.

The value of concealment cannot be over-estimated. Invisibility is often as good as cover itself, while one carelessly constructed trench may give away the whole position.

All the excavated earth not used for parapets, etc., must be carried away to where it will not be visible, or else formed into dummy parapets at some distance from the real trenches, so as to mislead the enemy.

The curves of parapets should be made to assimilate the natural contour of the ground. Avoid straight lines and sharp angles.

Scrub, long grass, etc., forming a natural screen to trenches should not be trampled down or otherwise interfered with more than is absolutely necessary to give a clear field of fire.

The excavated earth thrown out to form the parapet should be covered over with sods or grass of the same character as the surrounding ground; if the trench is dug in a cabbage or turnip field, plant some cabbages or turnips in the parapet.

The exact methods you use to conceal the trench will of course depend on the circumstances, but in general, use every effort to make the trench invisible to the enemy.

Cut branches become very conspicuous when withered, and if used, should be changed at night.

As the trench is being built, walk out in front from time to time, and see what it looks like from the enemy's point of view.

## IMPROVEMENT OF THE FIELD OF FIRE.

This will usually entail some clearance of the ground in front of the firing line, but this must be done in such a way as to give no assistance to the attackers in their advance or in the use of their weapons.

Range marks should be provided, and placed on that side of the object visible only to the defenders.

Hollows and dead ground, near the firing line, should be filled in or otherwise rendered untenable by the enemy in their advance.

Scattered trees are best left standing; they provide less cover for the enemy that way than if they were cut down, and besides are often useful ranging marks.

NOTE.—In determining the field of fire you will have from any entrenched position, do so with your head close to the ground, as this is how you will see it when in the trench.

## ENTRENCHING IN THE ATTACK.

When entrenching in the attack, each man should provide himself with cover as quickly as possible, by using his entrenching tool, and piling up a parapet in front of him.

In the attack, troops will not start to entrench themselves without orders from an officer, and these orders should not be given until it is impossible to advance any further, and you are pinned to the ground by the weight and accuracy of the enemy's fire.

A short note here on the present conditions of trench warfare in France may not be out of place.

Many of the so-called trenches in Flanders are not actually trenches but breastworks. The difference between them is that trenches are dug in the ground, while breastworks are raised up from it. In most of the districts where the British Army is fighting, the country is low, and it is impossible to dig down more than two feet or so before striking water; this renders breastworks necessary.

The general system in use there for constructing these trenches or breastworks is to drive stakes into the ground, string chicken-wire along them, dig as deep a trench as possible, piling the earth up against the wire, and then complete it with sandbags.

Such trenches should be as narrow as possible to render detection from the air difficult, and have numerous traverses to localize the effect of bursting shells. It is most important under modern conditions of rapid and accurate artillery, machine gun and rifle fire, that supports and reserves should be able to reach the firing line under cover. A good system of support and communication trenches is therefore essential.

In regard to the siting of trenches. Experience in this war has taught that except when preparing a position before the enemy arrives, you cannot pay much attention to choosing the best site for your trench. Generally speaking, trenches are being dug just where the advance stops, whether it be at the foot of a hill or in an open plain. When the troops are unable to advance further, they dig themselves in as best they can with their entrenching tools, and hang on until nightfall, when

tools, wire and sandbags are brought up and proper works constructed.

It has also been found that it is not always necessary to have the broad field of fire up to 400 yards as laid down up to now. Cover from view of the enemy's artillery and aircraft is of more importance, and a position which provides this should be chosen in preference to an exposed one, even though the field of fire be not as broad.

Below is given a sketch of a system of trenches such as are in use at the front to-day. Note that the machine guns are placed where they can enfilade a frontal attack on the position.

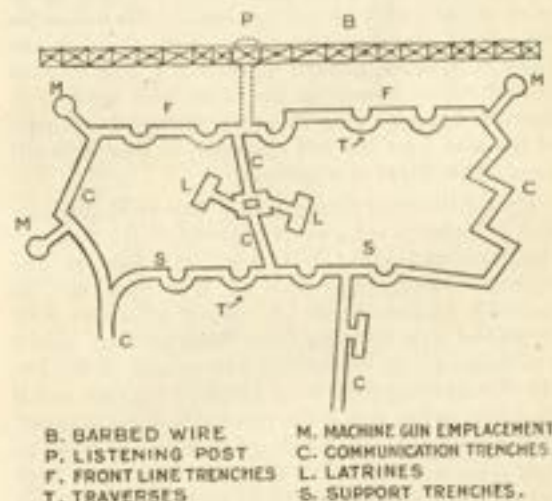


FIG. 18.

It might be well to give a brief description of how entrenching would be carried out under fire, in ground where trouble from water need not be considered.

If the firing line is absolutely unable to advance any further the order is given to entrench. The men are usually lying down in an irregular line at varying intervals and each man acts as follows:—First of all, he looks ahead and selects the point to which he will rush in case the advance is ordered before the entrenching is completed. He then charges his magazine, selects the point on which he is going to pile up his head cover, slides back about two feet from it, and places his rifle as far over to the right as he can reach. He takes his entrenching tool and starts to drive it in on the outer edge of the ground marked in 1, Fig. 19 with dotted lines, loosening the turf and pulling it towards him; he piles this up with the shovel part of his tool over his left shoulder in line with his head; this gives concealment.

He continues working round this oval until he has a bullet-proof parapet about 3 ft. 6 in. in thickness and about 1 ft. 6 in. in height in line with his head. The oval by this time will be partially hollowed out. It should be about 6 ft. long, and dug slanting from front to rear, about 6 in. deep in front and about 1 ft. in rear (2, Fig. 19). He rolls over into the oval, picks up his rifle and is then able to fire round the right side of his parapet. If the next man on his right is close to him, he may pile up a small bank of earth, about 6 in. high between the two parapets to provide extra cover when firing. Such hasty fire cover can be

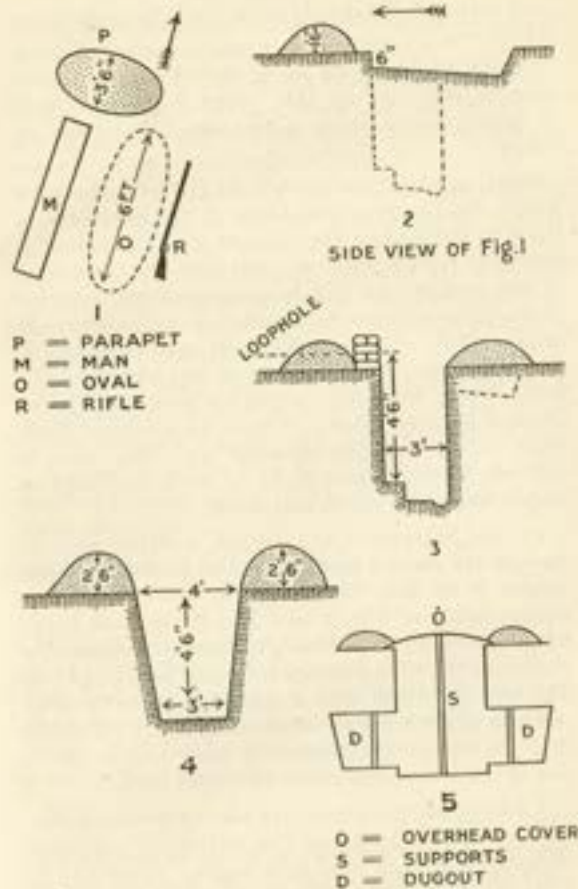


FIG. 19.



constructed in moderately easy soil in from 30 to 40 minutes.

In the event of its being found impossible to advance any further this hasty fire cover could be improved to form a regular fire trench as follows:

Starting about the middle of the oval the man would dig down, piling some of the earth up in front to strengthen the parapet and the rest of it behind to form a parados. Between the front edge of the trench and the beginning of the interior slope of the parapet he should leave a short space of about 1 ft. This was formerly used as an elbow rest but it has been found from experience in the present war that men leaning forward on this rest present greater lateral targets to shrapnel than they would standing straight up. The space is still left but it is now built up with sandbags in which loopholes are constructed.

At the bottom of the trench a firing step or banquette, about 1 ft. high should be left, and the height from this banquette to the firing crest should be about 4 ft. 6 in. The firing crest is the height the man fires from; it does not necessarily mean the top of the parapet, it may be a loophole. The bottom of the trench should slope to the rear where a small drain to carry away water should be dug. A shelf for ammunition and steps to climb out of the trench are cut in the front wall.

A trench of this character should be as narrow as possible in order to provide better cover against shrapnel and high explosive shells. From 2 ft. to 3 ft. is about right. There should be sufficient

room for men to pass behind those on the banquette without crowding and for a stretcher.

When the soldier has his trench completed this far, he starts to break through to the trench on his right, and thus all the individual trenches are connected up in an irregular line.

In event a section of the line of trenches so connected happens to form a straight line, each man must dig an individual recess in front to provide protection against enfilade fire and the effect of high explosive shells. These recesses take the place of the traverses that would be built in a regularly constructed trench.

Communication trenches are usually dug as in 4, Fig. 19, wider at the top than at the bottom. They should never be dug straight but in zig-zag fashion.

Support trenches may be dug as in Fig. 5, with overhead cover and dug-outs for the supports to sleep in.

#### UTILIZATION OF EXISTING COVER.

##### HEDGES.

Hedges are principally valuable for the concealment they afford. When used as a firing line, a trench should be dug on the defenders' side, and the earth thrown up against the hedge. Do not forget that hedges are conspicuous, and provide good ranging marks for the enemy.

##### EMBANKMENTS AND CUTTINGS.

A position on the enemy's side offers opportunity for an advance at any time, and also provides cover for the supports. But under some circum-

stances a position on the defenders' side is to be preferred. The front side gives a better view of the ground, but cover can be obtained on the rear side with less labour. Cuttings are generally conspicuous, and provide good ranging marks for the enemy's artillery.

#### WALLS.

Walls should not be held under effective artillery fire, but utilized after it has ceased. To give protection against rifle fire, a wall must be well built, and at least 9 inches thick.

If a wall is under 4 feet high, a trench should be dug on the defenders' side to give additional cover. A wall between 4 feet and 4 feet 6 inches can be used as it stands; over that it must be notched, loopholed, or a step provided to fire from.

Loopholes should not be closer together than 3 feet, and the opening should be smaller on the outside than on the inside.

#### HOUSES.

Houses should not be held when exposed to effective artillery fire, but utilized after it has ceased.

Doors and windows should be made bullet-proof by means of mattresses, bricks, sandbags, etc., and loopholes made in these barricades.

Provision should be made for extinguishing fires, and for the care of wounded.

Any outbuildings that might provide cover for the enemy or enable him to collect troops for an assault, should be destroyed.

Interior partitions, and the upper floors, should be loopholed and strengthened, so that if the enemy gains the front rooms, or even the lower floor, the defence can still be maintained.

#### OBSTACLES.

Obstacles are of value chiefly to impede the enemy's advance, and to turn it into areas more favourable to the defenders. They are especially useful against night attacks.

Obstacles should be covered by the defenders' fire, and, if possible, invisible to the enemy until he is close upon them. They should be firmly constructed, and not capable of easy removal.

They should be placed so as not to impede counter attacks.

#### ABATIS.

Abatis formed of limbs of trees firmly picketed down, with the branches turned towards the enemy, form a very efficient obstacle.

#### WIRE OBSTACLES.

A high wire entanglement forms a very effective obstacle. Stout posts should be firmly driven into the ground at irregular intervals, and the wire strung from them. Wire should be wound around each post, and secured with staples. Barbed wire should be hung in festoons, and on no set pattern.

The idea is to have as thick a tangle of wire, and as many different patterns as possible, in order to render cutting difficult.

## BARRICADES.

Barricades to close narrow streets or bridges can be made of almost any material. If they are to be used as a defensive position, they should be bullet-proof, and flanked front and rear by the fire from adjacent houses.

## PASSAGE OF OBSTACLES.

Wire entanglements may be passed by doors, planks, or especially constructed ways, carried forward and thrown upon them.

A passage may be cleared by the deliberate application of explosives. One way of doing this is to put a charge on a long pole and push it under the wire.

The wire may be cut.

Grapnels attached to long ropes may be thrown into the wire, and the whole section pulled over bodily.

## PASSAGE OF RIVERS.

It will frequently happen that means of crossing a river must be improvised from the materials found near at hand or carried by the troops.

In shallow water, carts or waggons may be used to form the superstructure of the bridge.

Small gaps may be filled up with bundles of brushwood, etc., channels being left for the passage of the water.

Rafts or even piers for bridges may be made of waterproof material such as tarpaulins, ground-sheets, etc.

A light framework of poles about 6 feet square by 2 feet 6 inches high is first made, covered with a tarpaulin, and filled up with hay, then tied. Two of these are then lashed together with spars. This forms half the raft. The other half is made in a similar manner. The two halves are then lashed together with more spars or road-bearers.

Ground-sheets can also be used for this purpose. Twenty-four of them made into a raft will support 1,800 lbs.

Where casks are obtainable in small quantities only, a light footbridge may be made by lashing them to planks at intervals of about 9 feet. The smaller the casks the closer they should be together. A double row should be made if possible, and the two joined together with more planks, thus giving greater stability.

## WORKING PARTIES.

Working parties should be told off into reliefs. For digging, short reliefs are best, and four hours is quite long enough.

With full-sized tools, the average untrained soldier should excavate in ordinary easy soil the following volumes in each hour:

1st hour	30	cubic feet.
2nd	25	" "
3rd	15	" "
4th	10	" "

A rough average of what a man can do is 1 cubic yard per hour.



Care should be taken that the men arrive at the site of their work provided with tools, and in such formation as to permit of easy distribution to the works.

During the excavation of defence works, temporary field depots for tools and materials will be formed as close as possible in rear of each group of works. All tools and materials not in use should be received and collected at these depots only.

Working parties should be distributed by one of the following methods:

(i) Each party, having first extended to the required interval a suitable distance in rear, is advanced and halted on the line of the proposed excavations, while an officer details each man to his task.

(ii) Each party is halted in column about 3 paces in rear of one flank of the proposed line of excavations, and formed in file or single rank according as one or two men are allotted to each task. The Officer who has marked out the works then explains each task to the men as they arrive; the men moving off, wheeling to the right or left as the case may be, and forming up in succession on the alignment.

In either case a man, having marked out his task with a pick, places it on the left of his task, takes four paces to the rear, grounds arms, removes his accoutrements, and lies down until ordered to commence work.

If a sudden attack is likely to take place the rifle and accoutrements must be within reach without

necessitating the men leaving the cover of the trenches.

The following table gives the maximum penetration of the pointed bullet in various materials.

In order to obtain proof cover, a percentage must be added to these numbers, e.g., earth parapets should not be less than 3½ feet thick. If the soil is free from stones, a thickness of 4 feet is desirable.

Material.	Penetration.	Remarks.
Steel plate, best hard, . . .	$\frac{1}{2}$ in.	At 30 yards normal to plate; $\frac{1}{2}$ is proof at not less than 600 yards.
Steel plate, ordinary mild or wrought iron, . . . . .	$\frac{1}{2}$ in.	
Shingle, . . . . .	6 in.	Not larger than 1 in. ring gauge.
Coal, hard, . . . . .	9 in.	
Brickwork, cement mortar, . . . . .	9 in.	150 rounds concentrated on one spot will breach a 9 inch brick wall at 200 yards.
Brickwork, lime mortar, . . . . .	14 ins.	
Chalk, . . . . .	15 ins.	Very high velocity bullets have less penetration in sand at short than at medium ranges.
Sand, confined between boards or in sandbags, . . . . .	18 ins.	
Sand, loose, . . . . .	30 ins.	
Hardwood, e.g., oak with grain, . . . . .	38 ins.	
Earth, free from stones (unrammed), . . . . .	40 ins.	Ramming earth reduces its resisting power.
Soft wood, e.g., fir, with grain, . . . . .	58 ins.	Penetration of brickwork and timber is less at short than at medium ranges.
Clay, . . . . .	60 ins.	
Dry turf or peat, . . . . .	80 ins.	

## PART II.

### CHAPTER I.

#### TRAINING IN FIELD OPERATIONS, AND GENERAL PRINCIPLES.

##### TRAINING IN FIELD OPERATIONS.

We now come to the actual work in the field—marches, camps and bivouacs, protection, infantry in battle, in attack, and in defence.

In training men in field operations, owing to fire effect being absent, the tendency is to pay more attention to numbers, formations, and consequent vulnerability of opposing forces than to fire direction, fire control, and fire discipline. It is of the utmost importance to guard against this tendency, and all infantry commanders should devote special attention to seeing that the principles of fire tactics are correctly taught and applied.

At this period of his training the soldier should be taught the various methods of advancing under fire, the importance of the relationship between fire and movement, and that the wise employment of every feature of the ground is of great importance in promoting fire effect and reducing losses.

He should be taught that the most important requirement in cover when firing is that he can use his rifle to the best advantage. If an equally good view can be obtained it is better to fire round cover than over it, as the firer is then less visible.

It should be explained that cover from view, which does not also afford cover from fire, should not provide a good aiming or ranging mark for the enemy. A hedge or bush may become a dangerous trap if men crowd behind it, and the enemy discovers they are there.

Cover from air-craft can best be obtained by moving through woods or along hedgerows. On roads troops are less visible from the air if they march on the grass at the sides, or along the hedges, and not on the metalled portion. Difficulties of observation from the air are increased if men stand still or lie down when a hostile air-craft approaches, and refrain from looking up when it passes overhead.

When once committed to the attack no attempt should be made by the firing line and supports to seek cover from the enemy's air-craft, the mission of which at this time will more probably be to locate the reserves.

##### GENERAL PRINCIPLES.

The principles laid down in the following chapters have been evolved from experience as generally applicable to the leading of troops. They should be so thoroughly impressed on the mind of every commander that, whenever he has to come to a decision in the field, he instinctively gives them their full weight.

In war one is often called upon to make a decision when excited or hurried. At such times it is impossible to sit down and carefully figure out the best thing to do: quick action is imperative.

Here then is the important thing:—if these principles are thoroughly impressed upon the mind through long study and practice, the decision will automatically be made along the right lines, and as long as this is so, and it is carried out promptly and energetically, success will follow.

It lays down in Field Service Regulations that "the fundamental principles of war are neither very numerous nor in themselves very abstruse, but the application of them is difficult and cannot be made subject to rules. *The correct application of principles to circumstances is the outcome of sound military knowledge, built up by study and practice until it has become an instinct.*"

It should not be necessary to add anything to this to emphasize the importance of learning these principles thoroughly and well.

## CHAPTER II.

### SYSTEM OF COMMAND; CHARACTERISTICS OF THE FIGHTING TROOPS.

#### SYSTEM OF COMMAND OF AN ARMY IN THE FIELD.

At the head is the Commander-in-Chief, who has complete control over the whole army. He is assisted by a Staff, which is divided into three branches, as follows:

The General Staff Branch.

The Adjutant-General's Branch.

The Quartermaster-General's Branch.

The General Staff Branch is concerned with the preparation and carrying out of all military plans and operations. It has a principal Officer known as Chief of the General Staff, who is the Commander-in-Chief's right hand man.

The Adjutant-General's Branch attends to everything concerning the military personnel of the army, such as enlistment, discipline, military law, appointments, honours and rewards, promotions, pay, prisoners, casualties, etc.

The Quartermaster-General's Branch is concerned with the supplying of stores, ammunition, and equipment to the army, the provision of transport by land or water, and the allotment of quarters.

In addition to these there will be an officer, assisted by a suitable staff, known as the Inspector-General of Communications. He has complete charge of the Lines of Communication from the base to the army in the field, rolling stock, buildings, and traffic.

If operating in a hostile country there is generally appointed an officer known as Commander of the Lines of Communication defences, in whom is vested the responsibility for their security.

#### ADMINISTRATIVE AND FIGHTING TROOPS.

The troops themselves are divided into two branches, Administrative, and Fighting Troops.

The *Administrative Troops* are those whose business it is to minister to the comfort of the Fighting Troops. They are:



The Army Service Corps (supply and transport).

The Army Ordnance Corps (material for war).

The Army Pay Corps.

The Army Medical Corps.

The Army Veterinary Corps.

The *Fighting Troops* are:

Cavalry.

Artillery.

Engineers.

Aviation Corps.

Infantry.

#### CHARACTERISTICS OF THE FIGHTING TROOPS.

##### CAVALRY.

They have the ability to move rapidly, and to cover long distances in a short time; this gives them the power to obtain information and to combine surprise and attack to the best advantage. They did about 90% of the reconnaissance work in front of an army, until the air-service was instituted. On the battlefield they chiefly employ shock tactics, when possible, though being armed now with a long range rifle they can also develop an effective fire.

Mounted Rifles act chiefly by fire. Their mobility enables a Commander to transfer them quickly from one portion of the field to another, and thus turn to account opportunities which he would otherwise be unable to seize.

Cyclists are very useful in a country where the roads are good and numerous. They move quicker

and can cover more ground than cavalry, find cover more rapidly, and develop more fire in proportion to their numbers as they do not require horse holders. They can be more effectively concealed and no forage need be carried.

##### ARTILLERY.

Horse Artillery is employed with the cavalry to provide covering fire for it. Horse Artillery has lighter guns than the Field Artillery, and all the men are mounted, or carried on limbers.

Field Artillery moves, lives, and has its being with the infantry. Its function is to assist in breaking down the enemy's resistance, and thus enable the infantry to close with him. In Canada, Field Artillery Batteries have 4 guns, in England they have 4 or 6.

Heavy Batteries are equipped with special heavy guns for use against prepared or fortified positions. They have great shell power, and can fire accurately at long ranges, but are not so mobile as Horse or Field.

Mountain Batteries are for use in broken, hilly, or close country. They are weakest in shell power, and all their equipment is carried on animals, generally mules. They can find cover easily, and therefore can often be used in support of infantry at shorter ranges than either horse or field artillery. There are none on the Canadian establishment.

##### ENGINEERS.

Engineer Field Troops are mounted, and accompany the cavalry to do demolition work, construct light bridges, etc.

Engineer Field Companies accompany the infantry. Their duties include construction and improvement of defences, destruction of obstacles, repair of bridges and roadways, etc.

#### INFANTRY.

Infantry cannot move as quickly as cavalry and artillery but on the other hand it is capable of moving over almost any ground. Its action is less affected by darkness, it can find cover and concealment more readily, and therefore moves under fire with less loss. It can employ either fire or shock action, as the occasion may demand, and engage the enemy either at a distance or hand to hand. It has the power of developing a rapid fire when necessary, and of concentrating that fire in any direction.

#### MACHINE GUNS.

A machine gun in action requires a frontage of about 2 yards. It can deliver a fire equal in volume to that of about 30 men firing rapidly, the frontage required for the latter being about 15 times as great. The effective range of the machine gun equals that of the rifle; on the other hand owing to the concentrated nature of its fire the effect of small errors in aiming or elevation is greater than that of the same number of rifles. Rapid fire by machine guns cannot be long sustained owing to the great expenditure of ammunition, and they should be employed chiefly to develop rapid bursts of fire. They should be concealed, if possible, but the peculiar noise of the automatic firing attracts attention, and when steam is given off, owing to

the water in the jacket boiling, the position of the gun is revealed.

It will be seen from the foregoing that each arm of the Fighting Troops has its special characteristics, and is dependent on the assistance of the others. Thus infantry in mobile warfare is dependent on cavalry to carry out widespread reconnaissance and protect the flanks, artillery to help to overcome the enemy's resistance, and engineers to construct bridges, destroy obstacles, and improve communications.

### CHAPTER III.

#### INTERCOMMUNICATION, FIELD MESSAGES, AND REPORTS.

The constant maintenance of communication between the various parts of an army is of paramount importance; it is on this to a great extent that the possibility of co-operation depends.

All subordinate commanders are responsible for keeping their respective superiors, as well as neighbouring commanders, regularly informed of the progress of events and of important changes in the situation as they occur.

On coming into any position it is every commander's duty to at once open communication with other commanders in that vicinity. If at any time the regular means of communication are destroyed or interrupted, he must improvise others.

All ranks are responsible for doing everything in their power to keep the means of communication intact.

GENERAL RULES REGARDING THE PREPARATION  
AND DESPATCH OF ORDERS, FIELD  
MESSAGES, AND REPORTS.

Orders, reports, and messages, should be written whenever possible. If given verbally or sent by signal they should be confirmed in writing if practicable to do so.

They should be as concise as is consistent with clearness. Avoid indefinite words or expressions such as "dawn," "dusk," "if possible," etc. When speaking of a time or place be very definite.

The hour of 12 will be followed by, "noon" or "midnight" written in words.

If a map is referred to, the one must be specified.

Names of persons and places must be spelt in **BLOCK CAPITALS**.

If a unit is named from which a portion is excluded, it should be named, and the words "less...." appended, *e.g.*, "10th Hussars, less one squadron."

When bearings are given they should invariably be true bearings, and this should be so stated.

After writing an order, message, or report, it should be read through carefully to see that the meaning is clear, and that there are no mistakes. If possible have someone else confirm this by reading it also.

Every precaution should be taken to assist the person receiving an order, message, or report, in grasping the meaning with a minimum of delay and trouble.

ORDERS.

Notwithstanding the greatest care and skill in framing orders, unexpected local circumstances may render the precise execution of the orders given to a subordinate unsuitable or impracticable. Under such circumstances the following principles should guide an officer in deciding on his course of action:

(i) A formal order should never be departed from, either in letter or spirit—(a) so long as the officer who issued it is present; (b) if the officer who issued the order is not present, provided there is time to report to him and await a reply without losing an opportunity or endangering the command.

(ii) A departure from either the spirit or letter of an order is justified if the subordinate who assumes the responsibility bases his decision on some fact which could not be known to the officer who issued the order, and if he is conscientiously satisfied that he is acting as his superior, if present, would order him to act.

(iii) If a subordinate, in the absence of a superior, neglects to depart from the letter of his orders, when such departure is clearly demanded by circumstances, and failure ensues, he will be held responsible for such failure.

(iv) Should a subordinate find it necessary to depart from an order, he should at once inform the issuer of it, and the commanders of any neighbouring units likely to be affected.



## MESSAGES.

Messages intended for the headquarters of units or formations will be addressed by the title of the unit or formation in an abbreviated form, *e.g.*, First Army, Second Inf. Bde., etc. The abbreviation H.Q. is only used for general headquarters.

A field message should contain:

Number . . . . . Place . . . . .

Date . . . . .

To . . (Rank, name and address)

*Message*

Signature, (Rank and appointment)

How sent and time despatched.

If a message is in reply, or has reference to, a previous one from the addressee, the number of this should be quoted.

When the sender desires to inform different addressees that the message has been circulated, he should add this information at the end of the text, thus:—"Addressed First Div., repeated Fourth Cav. Bde., etc."

When information has been sent to another unit, the message should contain at the end of the text:—"—(unit) informed."

## REPORTS.

It is more important that the information contained in a report should be relevant and accurate, and should arrive in time to be of use, than that the report should be long or elaborate. This

applies to written reports, verbal reports and sketches.

In furnishing information, distinction must be clearly drawn between what is certain, and what is presumed or inferred. The source of information should be given, and the reason for surmises.

Negative information, and the repetition or confirmation of information already sent are of importance. For a commander to know positively that the enemy was or was not in a certain locality at a certain time may be of great value.

A plan or sketch is often a useful adjunct to a report, and often the report may be dispensed with entirely, the plan or sketch, with marginal notes, conveying all the information required.

## ORDERLIES.

The bearer of a verbal message should repeat it to the issuer, and understand its import; whilst the person who receives it should commit it to writing and request the bearer to sign it, if it is of any importance.

The bearer of a written order or message should know its import, in case he loses the despatch or has to destroy it.

A messenger must always be given a receipt for his message. The envelope, if there is one, may serve as such. The recipient must note the hour and date of receipt on it, and return it to the bearer.

Orderlies bringing messages from advanced bodies of troops should carry them open. Commanders of troops, whom such orderlies may pass

on the way, are authorized to read the message, which they should initial. Orderlies should not be detained for this purpose a moment longer than is necessary.

The sender will instruct the messenger as to his rate of speed, the route he is to take, and where he is to report himself on his return. The words "trot," "walk," or "gallop," should be written on the envelope.

Commanders should assist in forwarding messages by all means in their power, supplying a new messenger, if necessary, or replacing tired horses by fresh ones.

#### CHAPTER IV.

##### INFORMATION, RECONNAISSANCE, AND SCOUTING.

###### INFORMATION.

Timely information regarding the enemy's dispositions and the topographical features of the theatre of operations is an essential factor of success in war.

No source of information should be overlooked—reconnaissance and scouting, statements of inhabitants, newspapers, letters, telegraph files, documents captured from the enemy, and the information so gained should be forwarded without delay to the nearest Staff Officer.

###### RECONNAISSANCE.

Reconnaissance is the service of obtaining information with regard to:

(i) The topographical features and resources of a country.

(ii) The movements and dispositions of an enemy.

There are two kinds of reconnaissance, strategical, and tactical.

Strategical reconnaissance is required before the opposing armies are within striking distance of each other, for the purpose of locating the hostile columns, and ascertaining their strength and line of march. It will normally be carried out by the cavalry, where the air-service is not available.

Tactical reconnaissance is required when two forces are within striking distance of each other, for the purpose of discovering the tactical dispositions of the opposing force. It is normally carried out by the cavalry.

There is another kind of reconnaissance which is most important, especially to commanders of smaller bodies, and that is the personal reconnaissance. It should never be omitted. What is meant here by personal reconnaissance is the reconnaissance of the ground over which the commander who makes it will lead his troops, whether it be a field, a wood, or a village.

Time spent in reconnaissance is seldom wasted, and no matter how small the command may be a personal reconnaissance of the ground in front should be made. There may be some dead ground which will afford cover in the advance; or a swamp which will cause a halt half-way across and leave the command exposed to the enemy's fire in the open; there may be a better line of advance, perhaps, to the right where the ground is broken;

all these things will be seen if a personal reconnaissance is made.

#### INFANTRY PATROLS.

It is the duty of infantry when in touch with the enemy to gain as much information as possible, both of the enemy and the ground over which it may have to act. This is done by means of infantry patrols, consisting of from two to eight men under an officer or non-commissioned officer.

The officer who sends out a patrol should give the leader definite and precise instructions as to the points on which information is required. He should also inform him of the probable movements of other friendly troops in the neighbourhood, and should tell him what is known of the enemy and the country in which he is to operate, the length of time he may expect to be away, and the place to which reports are to be sent.

No man engaged in patrol work should carry any written instructions or documents that might give information to the enemy. If captured he should refuse to give any information beyond stating his rank and name. By international law he cannot be punished for this refusal.

Patrols move in the same manner as scouts, from cover to cover, taking care not to expose themselves against the sky line. They should keep as much as possible in the shadows, both by day and night. Any place likely to harbour an ambush, such as a wood, ravine, or village, must be approached with caution, one or two men advancing first under cover of the rifles of the remainder. The whole party should never rest together in the

same spot, but one or more look-out men should invariably be posted at these times.

Patrols should never return by the same road as they went out, as an enemy, seeing them go out, may wait in ambush for them on their return.

The great point in carrying out patrol work is to see without being seen, and to move in such a formation as to make it impossible for the enemy to destroy or capture all the party at once. One at least must get back with the information already gained.

There are two common formations in which infantry patrols move, the diamond, and the arrow. In the following diagram Figs. 1 and 2 show what

#### INFANTRY PATROLS

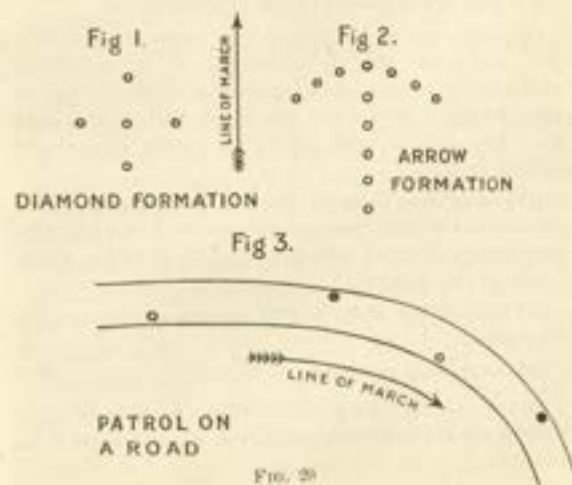


FIG. 20



these are like. Each dot represents one or more men according to the strength of the patrol. The distance they are apart depends on the nature of the country but the guiding principle, as stated above, should always be borne in mind:—don't let the men get close enough together for the enemy to capture or destroy all at once.

Fig. 3 shows the manner in which a patrol, working on a road, would move round a bend.

#### RECONNAISSANCE OF A POSITION.

In reconnoitring a position with a view to attack, information should be obtained on the following points:

- (i) The extent of the position.
- (ii) The weak points of the position.
- (iii) Any point or points the capture of which will facilitate the development of a searching enfilade or reverse fire against a large extent of the position, and thus render it untenable; and to what extent such point or points have been strengthened.
- (iv) The best line of attack, and the tactical points of which the possession will favour the development of an effective fire against the weak parts of the position.
- (v) Localities from which covering fire can be directed.
- (vi) Artillery positions.

In reconnoitring a position with a view to defence information should be obtained on the following points:

- (i) The best distribution of the infantry, and the means of protecting the flanks.
- (ii) The positions for the artillery.
- (iii) The positions which the enemy may endeavour to seize in order to develop an effective fire against the position.
- (iv) The probable positions of the enemy's artillery.
- (v) Any points the possession of which might exert a decisive influence on the issue of the fight.
- (vi) The most favourable lines of attack.
- (vii) The most favourable ground for the counter-attack.
- (viii) Ground to be occupied by the general reserve, by the cavalry, and by the other mounted troops.
- (ix) Positions to be occupied in case of retreat.

#### SCOUTING.

Infantry scouts work on foot, and usually operate near the force to which they belong. One non-commissioned officer and four men in each company should be specially trained as company scouts.

The role of scouts is to see as much as they can without being seen, and they should only use their rifles in self defence.

Each body of scouts sent out should have a particular objective assigned to it, and must be given specific questions to answer.

The methods to be adopted in the training of scouts are left to the officers concerned. The

standard to be aimed at is that a scout should fulfil the following conditions :

- (i) Know how to observe.
- (ii) Be able to read a map easily.
- (iii) Know what to report on, and how to make a report.
- (iv) Be able to express himself clearly and concisely.
- (v) Possess good eyesight, and know how to use his eyes and ears.
- (vi) Be self-reliant, resourceful and prepared to take risks.
- (vii) Understand semaphore signalling, and, if possible, be acquainted with all methods of visual signalling.
- (viii) Thoroughly understand the use of ground ; be able to move about and see without being seen.
- (ix) Be able to judge distance accurately and estimate numbers correctly.
- (x) Be able to form sound conclusions from signs, such as clouds of dust, footprints, and so on.
- (xi) Understand how to guide himself by compass, by the sun, and by stars.
- (xii) Be of thoroughly sound physique, and in good condition.

## CHAPTER V.

### MARCHES, CAMPS AND BIVOUACS.

#### MARCHES.

Good marching depends largely on march discipline, under which head is included everything that affects the efficiency of man and horse during the march.

No compliments are paid during a march on service.

Smoking, while on the march, should be discouraged.

In hot weather shirts should be opened at the neck and chest, and belts unbuckled.

The excessive drinking of water should be discouraged. The soldier should be taught that the sensation of thirst is aggravated rather than reduced by frequent recourse to his water bottle, and endeavours should be made to develop a sense of self-discipline in this respect.

Care should be taken that boots and socks fit well ; feet should be bathed as often as possible ; socks taken off and aired at every opportunity.

The length of the average march is about 15 miles in a day ; trained troops can do more, but they should not be called upon to make a forced march unless the expenditure of fighting power thus entailed is justified by the object to be gained. When making a forced march the troops should be made to understand that it is for a specific object.

## DISTANCES AND PACE.

To prevent minor checks the following distances are laid down in F.S.R. to be maintained:

In rear of an infantry company,	6 yards
- - a squadron or battery,	10 "
- - an infantry battalion,	10 "
- - a brigade,	30 "
- - a division,	100 "

If distances are lost on the march, stepping out to regain them is forbidden, except by order of the Officer Commanding.

The usual pace at which infantry move is 100 yards per minute; 1 mile in 18 minutes; 3 miles an hour, including short halts.

Cavalry, at a walk, move about  $3\frac{1}{2}$  miles per hour, or 1 mile every 15 minutes. They can trot about 7 miles per hour.

## STARTING POINT.

The starting point is a point mentioned in the orders for the march, which the head of the column will pass at a certain time. At night it will usually be marked by a fire or signal lamp, the exact method used being mentioned in the orders.

If all the troops are not quartered together, it may be necessary to fix more than one starting point, so as to enable subordinate commanders to take their places in the line of march punctually, without unnecessary fatigue to the troops and without crossing the line of march of other commands.

## HALTS.

Short halts should be arranged at regular intervals, the signal for them coming from the head of the main body. The troops at once fall out, loosen their equipment and gain all the rest possible.

## FORDS.

The depth of water fordable by the different arms is as follows:

Infantry, 3 feet.

Cavalry, 4 feet.

Artillery, 2 feet, 4 inches.

Fords with gravelly bottoms are best; those with sandy bottoms are bad as the sand gets stirred up and the depth of water thus increases. Fords should be marked by pickets driven into the river bank above and below, their heads being connected with a strong rope.

## BRIDGES.

On approaching a bridge, infantry should break step; cavalry should dismount and lead their horses across.

## CAMPS AND BIVOUEACS.

The site for a camp or bivouac should be dry, and on grass if possible. Steep slopes should be avoided, but gentle slopes facilitate drainage.

The following should be avoided:

Large woods with underbrush.

Narrow valleys.



Newly turned soil.

Ravines.

Water courses.

Old camping grounds.

Any ground which is low and damp.

Near the end of a march a staff officer accompanied by a medical officer, an engineer officer and some military police, ride forward to select the camping ground.

When the column arrives within two or three miles of its destination, staff officers of brigades accompanied by representatives of their units, ride ahead, receive instructions, and lead their units on arrival direct to the ground allotted to them.

Each commander should be told how much ground he may occupy, what roads he may use, where he is to draw his fuel and water from, and all such necessary details, as will prevent his conflicting with other units.

#### GENERAL RULES IN CAMPS.

Large camps should be laid out with two main cross streets running the full length of the camp. Units should not be unduly extended as this involves extra fatigues and delays the circulation of orders.

A trench should be dug around each tent, the earth piled on the outside, and the curtain of the tent pegged to the inner slope. Tent flies should be looped up every morning, and in standing

camps tents should be struck periodically, and the ground exposed to the sun and air for some hours.

A light is never to be left burning in a tent when there is nobody there.

If rain or heavy dew is likely, tent ropes must be slackened.

Tent doors should face away from the prevailing winds.

#### GENERAL RULES IN BIVOUECS.

By day, infantry pile or ground arms on the alarm post, articles of equipment being laid by the arms. By night, men should sleep with their arms and equipment by their sides. In some cases men must sleep fully equipped.

NOTE.—An alarm post is the ground laid aside for troops to fall in on when "the alarm" or "assembly" goes.

#### SHELTERS.

Simple shelters may be formed in many ways, with blankets, waterproof sheets, brushwood, etc. One method is to drive two forked sticks into the ground with a pole resting on them; branches are then laid resting on the pole at an angle of about 45 degrees, and the screen made good with smaller branches, ferns, etc.

A shelter tent for four men may be formed with two blankets or waterproof sheets laced together at the ridge, the remaining two blankets being used for cover inside.

When no other materials than earth and brushwood are available, a comfortable bivouac for 12

men can be formed by excavating a circle with a diameter of about 18 feet, and building up the earth to form a wall 2 or 3 feet high. The men lie down like the spokes of a wheel with their feet towards the centre. Branches of trees, or brush-wood, stuck into the wall improve the shelter.

Earth uncovered in this manner is liable to be damp, and a fire should be built in the middle of the excavation and kept going for as long as possible before the men occupy it.

#### WATERING ARRANGEMENTS.

The first troops arriving on a camping ground should mount sentries over the water supply, with such orders as will prevent any form of pollution.

Before any water is drawn, the medical officer is responsible that it is fit for use.

If water is obtained from a stream, horses should be watered below where the troops obtain their drinking water, but above bathing and washing places.

The water supply is usually marked by flags, as follows:

*White*, for drinking water.

*Blue*, for watering places for animals.

*Red*, for washing or bathing places.

If running water is not available a fence should be placed round the water supply to keep out animals, which should in this case be watered by bucket or nosebag. Washing should be allowed only at some distance from the water supply.

empty biscuit tins or other receptacles being used to draw water for this purpose.

A daily average of 1 gallon per man is sufficient for drinking and cooking purposes. A horse, bullock, or mule, drinks about  $1\frac{1}{2}$  gallons at a time. In standing camps an average allowance of 5 gallons should be given for a man, and 10 gallons for a horse.

#### PURIFYING WATER.

The best method of purifying water is by boiling it for at least five minutes. Boiled water should be aerated before drinking, which can be done by passing it through a sieve, or a biscuit tin with small holes in it will do.

If the regulation filters as carried by the field ambulances, or the regular service watering carts provided with filters, are available, the water may be filtered.

Muddy water should be strained before filtering. A good method is to tack a sheet on to a wooden frame so as to form a bag or basin in the bottom of which are put a couple of handfuls of wood ashes. The water is then poured on to them and allowed to percolate into a receptacle below.

Muddy water may be cleared by adding alum. Six grains of crystallized alum per gallon or one teaspoonful to 10 gallons is sufficient. It should be added some hours before the water is required.

#### COOKING ARRANGEMENTS.

The simplest arrangement for cooking in the field for any party over 20, if the halts are not of long duration, is to place a proportion of the

## KITCHENS

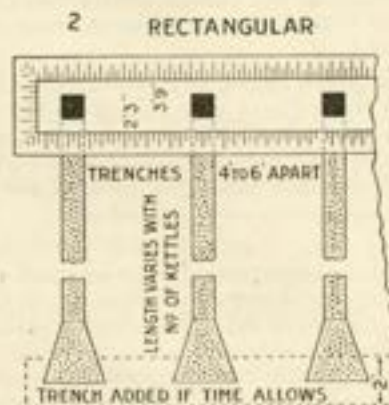
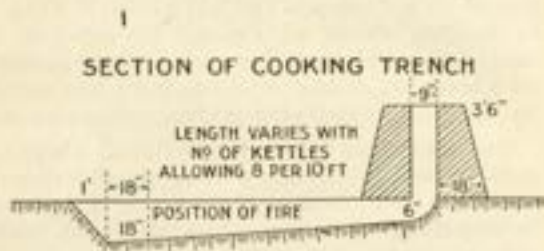


FIG. 21

kettles on the ground in two parallel rows about 9 inches apart, handles outwards, block the leeward end of the trench so formed with another kettle, lay the fire between the kettles and place one or two rows of kettles on those already in position.

Mess tins can be arranged similarly, but in their case not more than eight should be used together.

The most economical method where time is available is to dig or raise a narrow sloping trench for the fire on which the kettles are placed. The interstices are then filled up with stones and clay so that the fire, fed from the windward end, may draw right through. A chimney may be built at the other end to increase the draught.

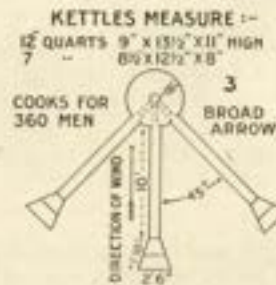


FIG. 22

The chimney may be built of sods, supported where it passes over the trench by flat stones, wood covered with clay, etc. The inside of the trench may be plastered with clay, and the inside of the chimney as well, to make them last longer.

Several such trenches may be dug parallel to each other, and about four to six feet apart.



forming what is called the parallel or rectangular kitchen, or three of them may converge into one flue, forming what is called the "broad arrow kitchen."

More elaborate kitchens, and the method of constructing field ovens for baking bread, etc., are given in the Manual of Field Engineering.

## LATRINES

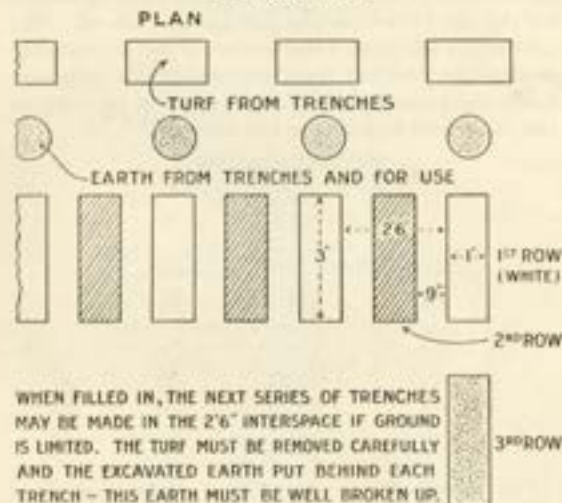


FIG. 21.

## LATRINES.

Latrines should be dug in every camp or bivouac, no matter how short the stay may be, and as soon as possible after the arrival of the troops.

They should be dug in a long line with 2½ ft. clear space between each trench. The size of each trench should be 3 ft. long, 1 ft. broad, and 1 ft. deep.

In excavating the trenches, the turf covering each should be removed and placed about 3 ft. behind each trench, the sides should be kept vertical, and the excavated earth should be well broken up and piled up close to the trench.

After use on the second day these trenches are filled in, and fresh ones dug in the intervals. On the third day a fresh row similar to the first is commenced 1 foot to the front and parallel to it.

As a rule, 5 trenches should be provided for 100 men for 1 day, 15 trenches (i.e. 3%) will suffice for a strength of 500 men.

Latrines should be provided with pole seats, screens, etc., if time and labour permit. Seats should be cleaned daily, preferably with cresol solution.

It is very important that a couple of inches of the driest earth obtainable should be thrown each day into latrine trenches in use. If carefully carried out this will obviate all smell, and will tend to prevent flies from collecting. The use of kerosene oil or lime, in and around the trenches, will still further assist in keeping flies away.

During operations in tropical countries where natives are employed, special latrines for them are necessary.

Urine may spread infection, and men are on no account to urinate elsewhere than in the latrine trenches or in pits set aside for that purpose. Receptacles such as empty biscuit tins should be

placed close to the tents at night to prevent pollution of the ground.

Latrines, urinals, refuse pits, etc., must be at least 100 yards from, and, when practicable, to leeward of the water supply and kitchens.

In permanent camps the best form of latrine accommodation consists of board sheds fitted with rough wooden seats. Under each seat a deep pit may be dug into which some dried earth is thrown after use. The location of the latrine must be shifted as each hole becomes filled up. This method is all right where the latrines are located some distance from the troops, but a better plan is to have pans or buckets, into which a few inches of dry earth have been thrown beneath the seats. More earth is thrown in after use and the pans are emptied daily.

Where an issue is made of disinfecting fluid no earth is used, but the buckets emptied daily (or twice daily) and a few inches of the fluid placed in the bottom of each. The same applies to urine buckets. All unpleasant or unhealthy odour is thus obviated.

Whatever form the latrine takes, the great point to bear in mind is that the excreta must be quickly and completely covered with dry earth, a supply of which should always be provided; and that the pans or buckets, if used, should be emptied daily at least half-a-mile away from camp.

When vacating a camp or bivouac the position of latrines should be marked with the letter L, formed with stones, etc.

All camp refuse should be collected and burned. Tins should always be buried.

## CHAPTER VI.

## PROTECTION.

## GENERAL PRINCIPLES.

*Every Commander is responsible for the protection of his command against surprise.*

A force can only be regarded as secure from surprise when protection is furnished in every direction from which an attack is possible.

The commander of a body of protective troops, whether large or small, and wherever situated, should keep his command in such readiness for action as the circumstances require.

In the event of attack a protective detachment must at all risks, and at any sacrifice, gain time for the body which it protects to prepare to meet the attack.

At the end of a march, the troops which have been protecting the march remain responsible for the protection of the main body until the outposts are put out; and *vice versa* when the march continues, outposts must not be withdrawn till the troops detailed for the protection of the march are in position.

## GENERAL PROTECTIVE DUTIES.

## EMPLOYMENT OF MOUNTED TROOPS.

Mounted troops are necessary to a force moving forward from day to day. Their mobility enables them to sweep the country far ahead of the advancing columns, furnishing valuable information as to the roads, resources, etc.; they gain touch with

the enemy, uncover his dispositions, and give timely warning of any threatening advance. They may also be employed on special missions, such as raids on the enemy's lines of communication, convoys, etc.

They screen the advance by keeping the enemy's patrols and scouting parties at a distance, thus preventing their gaining detailed information of the movements and strength of the main columns.

Their duties, which include amongst others the service of protection, may be classified under three heads as follows:

- (i) Divisional duties.
- (ii) General protective duties.
- (iii) Special missions.

#### GENERAL PRINCIPLES.

The mounted troops allotted to divisional duties usually form a permanent part of the division to which they belong. They are known as "divisional mounted troops."

Mounted troops made temporarily independent of the remainder of a force in order that they may carry out a special mission, are designated, while so employed, "the independent cavalry," those employed on general protective duties being known for the time as "the protective mounted troops."

When the opposing forces are at a distance, the duties of the protective mounted troops are:

- (i) To afford the commander of the force they may be covering timely information regarding the

enemy's movements and the front which he is covering.

- (ii) To furnish information regarding tactical features, resources, and roads of the country in advance of the main body.

- (iii) To oppose hostile enterprises and prevent the enemy obtaining information regarding the movements of the columns in rear.

The protective mounted troops may also be employed to seize and hold positions in front of the slower moving infantry and deny their occupation to the enemy until the main body arrives.

The protective mounted troops best assure the safety of the force they cover by keeping the enemy continuously under observation when contact with him has been gained.

#### LOCAL PROTECTION.

##### ADVANCED GUARD TO A FORCE ADVANCING.

When troops are on the move in column or route they are very vulnerable to attack, and cannot readily defend themselves. It takes time to bring large bodies of men from a marching formation to a fighting formation. Therefore, to guard against sudden attack, a force known as "the advanced guard" is sent some distance ahead to guard against surprise, and if attacked, it must delay the enemy long enough to enable the main body to deploy.

The advanced guard is also charged with the duty of clearing the way of small bodies of the enemy who may seek to delay the advance.



The strength of an advanced guard will depend on the situation, and the nature of the protection it is required to afford. It may vary from a fourth to an eighth of the whole force.

It will usually consist of all arms; cavalry to sweep the country ahead, and on the flanks; artillery to shell small bodies of the enemy out of houses, defiles, etc.; engineers to repair bridges, destroy obstacles; and infantry to provide the main offensive and defensive power. But there will be occasions when infantry, acting alone, will provide its own advanced guard, and in the following paragraphs it is an infantry advanced guard that is dealt with.

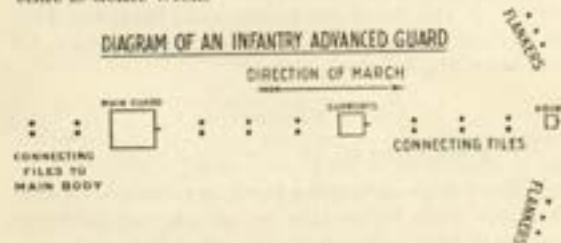


FIG. 21.

An advanced guard is divided into two main portions, a vanguard, and a main-guard. The duty of the vanguard is reconnaissance; of the main-guard, resistance.

The above diagram will give an idea of how an advanced guard is put out, supposing half a company of infantry to be detailed for the purpose. Normally this would be split up as follows:

Vanguard, 1 platoon (Advanced Party, 2 sections.  
Supports, 2 sections.

Main-guard, 1 platoon.

The vanguard as indicated above is further divided into two portions, the advanced party and the supports.

The advanced party furnishes the point, which is generally on a road, and is responsible for the direction; and the flankers who spread out to cover the country on either side.

The distance the flankers will be from the point depends on the nature of the country, but it should never be more than 200 yards.

The function of the supports is to assist the advanced party if they are attacked or held up by the enemy.

The distance the supports will be from the advanced party likewise depends to a great extent on the nature of the country. Where it is open and the view good they may be further apart; where it is close country and the view restricted they should be closer together.

The main-guard provides the main offensive and defensive power of the advanced guard. Thus, if the advanced party be held up by the enemy, the supports move up to assist them; if that is not sufficient the commander of the advanced guard brings up his main-guard, and uses them to clear the way. Similarly in the event of attack, the advanced party, making what resistance they can, fall back on the supports, while the main-guard comes up to assist the supports. In some cases

the supports may retire on the main-guard, the exact course pursued depending on the ground, and other circumstance of the moment.

#### COMMUNICATION.

Communication must be maintained between the different portions of an advanced guard, and between the advanced guard and the main body. This is done by means of connecting files, men thrown out from a force in front to connect it with the next force in rear. Each connecting file consists of two men, and files should be within easy sighting distance of each other. When halted one man turns to the front, and the other to the rear. Their duty is to maintain communication between the two bodies by passing signals and messages down the line.

#### POSITIONS OF COMMANDERS.

In the case of the half company taken above, the advanced party would be in charge of a non-commissioned officer, who would march with the point. The subaltern in charge of the vanguard would march at the head of the supports. The commander of the advanced guard would normally march at the head of the main guard with the subaltern in charge, but sometimes he may find it advisable to march with the supports.

When considering the distance an advanced guard should be ahead of the force it is protecting, these two points should be borne in mind (a) How long it will take the main body to deploy, and (b) The necessity of keeping the head of the main body out of range of effective artillery fire.

#### ADVANCED GUARD COMMANDER.

The commander of an advanced guard should have the following information:

What is known of the enemy.

The route to be followed.

The intention of the Commander-in-Chief.

What time the main body will start.

It is absolutely essential that he know the intention of the Commander-in-Chief, otherwise he might commit his force to an engagement that would necessitate the employment of the main body before it could be withdrawn, at a time and place where the Commander-in-Chief did not wish to fight. By neglecting to press vigorously small bodies of the enemy in his path he might delay the main body at a time when the Commander-in-Chief wished to get on with all speed. So it is of the utmost importance, to enable him to carry out his duty intelligently and in harmony with the general intention, that he be informed just what the Commander-in-Chief has in mind.

He issues the necessary orders to the troops allotted to him, explains the route, what is to be done in case of attack, etc.

He also takes steps to see that communication is maintained between the different parts of the advanced guard, and with the main body.

#### ADVANCED GUARD TO A FORCE RETIRING.

A force retiring will require a small advanced guard to clear away obstacles, etc., but it must also observe every precaution against surprise. If it is

possible for the enemy to intercept the head of the retreating column, a strong advanced guard of all arms is required.

#### THE FLANK-GUARD.

A force liable to be attacked in flank throws out a flank-guard, the strength and composition of which and its distance from the main body, is governed by the same principles as laid down for the advanced guard.

A flank-guard may be thrown out in the same way as an advanced guard, *i.e.*, advanced party, supports, and main-guard, in which case the troops would face and move in the same way as the main body.

Stationary flank-guards are sometimes used to occupy positions on the threatened flank, and hold them until the main body has passed.

#### THE REAR-GUARD TO A FORCE ADVANCING.

If there is a possibility of the enemy attacking the rear, the rear-guard will be composed of all arms, and be strong enough to meet all emergencies. Otherwise it will consist mainly of infantry whose principal duty will be to round up stragglers, etc.

#### THE REAR-GUARD TO A FORCE RETIRING.

When a force is retreating after a defeat, the rear-guard becomes of prime importance. The first requirement of a defeated force is to be relieved from pressure of pursuit, and it is the duty of the rear-guard to impede the enemy's advance as much

as possible, and thus gain time for the main body to get away. In this case a rear-guard will be composed of all arms, including engineers to destroy bridges, erect obstacles, etc.

The main idea in rear-guard fighting is to compel the enemy to lose time by halting and deploying as often as possible. This is done by taking up a position on some strong natural feature, and making as great a display of force as possible. The enemy, not knowing what force is in his front, halts, deploys, and makes a reconnaissance. All this takes time, and then when he finally advances to the attack, the rear-guard withdraws, and takes up another position some miles further on.

There are some delicate points involved in operations of this character, one of them being deciding on the right moment to withdraw. If one retires too soon the work is only half done; on the other hand, if the force becomes heavily engaged it may be impossible to break off the action at all, and the main body may be compelled to come back to the rear-guard's assistance.

Then again, care must be taken not to occupy positions too close together, otherwise the enemy may not take the trouble to re-form column of route, but may advance in fighting formation, and have the rear-guard out of the second position in half the time it took to drive it from the first.

With a view to delaying the enemy's advance, the following expedients may be resorted to:

(i) Narrow roads, etc., can be blocked by locking together several waggons and removing one or more of the wheels, or by felling trees across them.



(ii) Fords may be rendered impassable by throwing in ploughs, harrows, etc.

(iii) Boats may be removed to the side of unfordable rivers further from the enemy, and burnt or sunk.

(iv) Villages, woods, heather, scrub, etc., if the circumstances demand it, may be set on fire by the rear-guard, so as to conceal its movements, and impede the enemy's advance.

Skilfully laid ambushes will cause the enemy to move with caution in pursuit.

#### PROTECTION WHEN AT REST.—OUTPOSTS.

##### GENERAL PRINCIPLES.

Every body of troops when halted should be protected by outposts.

The duty of outposts is to give warning of any threatened attack, and in the event of attack, to gain time at any sacrifice, for the commander of the force protected to put his plan of action into execution. A force can only be regarded as secure from surprise when every body of the enemy within striking distance is so closely watched that it can make no movement without its immediately becoming known to the outposts.

The first duty of outposts, therefore, is observation of the enemy, the second duty resistance.

Observation of the enemy will consist of:

1. Keeping such a close watch on all bodies of the enemy within reach of the outposts that no movement can be made unobserved.

2. Watching all approaches along which an enemy might advance.
3. Examining all neighbouring localities in which his patrols might be concealed, or which he might occupy preparatory to an attack.

Resistance will consist of delaying the enemy on a prepared defensive line, called the outpost line of resistance, until further orders are received from the commander of the protected force.

Outpost work is most exhausting; not a man nor a horse more than absolutely necessary should be employed. The duty of observation should never be relaxed whatever the distance of the enemy, but the number of troops detailed for resistance will depend on the ground, the distance of the enemy, and the tactical situation.

The distance of an outpost position from the troops protected is regulated by the time the latter require to prepare for action, and by the importance of preventing the enemy's artillery from approaching within effective artillery range of the ground on which these troops will deploy if attacked. On the other hand, especially in the case of small forces, the distance must not be such as to permit of the outposts being cut off, or as to necessitate the employment of an undue proportion of men on outpost duty.

When outpost troops are detailed from the main body the troops which have covered the march will remain responsible for protection until relieved by the outposts. When the march is resumed

outposts are not withdrawn till the troops responsible for the protection of the column are in position.

To see without being seen is one of the first principles of outpost duty. All troops on outpost must therefore be carefully concealed.

Machine guns with outposts may be employed to sweep approaches and cover ground which an enemy in advancing may be compelled to pass or to occupy.

Detachments in close proximity to the enemy should avoid useless collisions. Attempts to carry off detached posts, sentries, etc., unless with some special object, are to be avoided, as they serve no good end, give rise to reprisals, and tend to disturb the main body.

Outposts stand to arms one hour before it begins to get light, and remain under arms until the patrols which should be sent out at that time (see Patrols) report that there is no sign of an immediate attack. When the outposts are relieved in the morning, the relief should reach the outposts half-an-hour before it begins to get light. The troops relieved will not return to camp until the patrols report all clear.

No compliments are paid when on outpost duty.

#### THE OUTPOST COMMANDER.

Sometime during the march the Commander-in-Chief will name his outpost commander, and allot him certain troops. The outpost commander must have the following information:

(i) What is known of the enemy, and other bodies of his own troops.

(ii) The intention of the Commander-in-Chief in case of attack.

(iii) The general position of the outposts.

(iv) The hour of relief.

On arrival on the ground the outpost commander decides on the line to be occupied by the outposts, and divide this into sections, delegating responsibility for the holding of each section to the commander of a subordinate unit or formation. Each subordinate commander concerned then details the necessary troops for his own portion of the outpost line and appoints an officer to command them.

The extent of frontage allotted to each section depends on the nature of the ground, probability of attack, number of approaches to watch, etc.

As soon as the foregoing details have been decided on, the outpost commander issues orders on the following points:

(i) Information of the enemy and his own troops so far as they affect the outposts.

(ii) General line to be occupied by the outposts; frontage or number of roads allotted to each outpost company; situation of the reserve, if any.

(iii) Disposition of the outpost mounted troops if any.

(iv) Dispositions in case of attack. Generally the outpost line of resistance, and the degree of resistance to be offered.

(v) Special arrangements by night.

- (vi) Smoking, lighting fires, and cooking.
- (vii) His own position.

As soon as the outposts are in position he will inform the commander who appointed him. He will also be responsible for maintaining communication with the main body.

#### COMPOSITION OF THE OUTPOSTS.

Outposts will normally be made up of the following:

- (i) Outpost mounted troops.
- (ii) Outpost companies.
- (iii) Reserve.

The outpost mounted troops are furnished by the divisional cavalry, and have two main duties:

- (a) To carry out all reconnaissance at a distance by day.
- (b) To furnish standing patrols.

A standing patrol is a small body of mounted men posted about a mile ahead of the outpost line; by night always on a road, and at a cross road if possible; by day on any commanding ground. A standing patrol is for observation purposes only, not for resistance.

Outpost companies are companies of infantry told off for outpost work.

A reserve is only required on the following occasions:

- (a) If the force is large, say a division.
- (b) If the outposts occupy the ground which the main body will take up in case of attack.
- (c) If the outposts are in touch with the enemy.

Artillery with the outposts is only used:

- (a) If there is danger of the enemy's guns getting within range of the main body.
- (b) If the enemy in advancing to the attack has to pass over very limited ground, such as a bridge, defile, etc.
- (c) If the outposts occupy the ground which the main body will take up in case of attack.

#### THE OUTPOST COMPANY.

A company on outpost is divided up into Piquets and Supports. The following diagram will give an idea of how an outpost company is distributed.

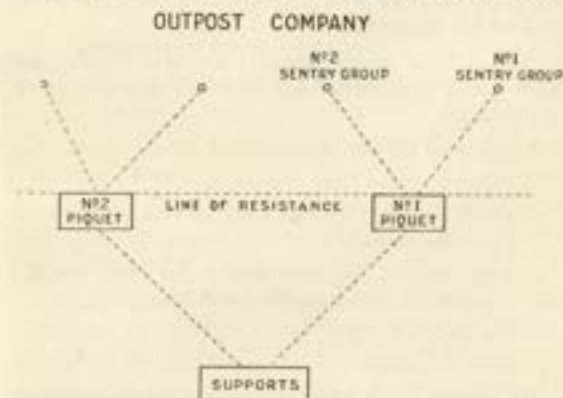


FIG. 25.

The piquets provide sentry groups in front of the piquet line. The piquets themselves occupy the piquet line or line of resistance, where the



stand is to be made if attacked. The supports are in rear of the piquet line ready to reinforce it at any moment.

The piquet line is always entrenched, and this is the first thing to be done when it is occupied. At night the supports may move up to the piquet line.

#### THE OUTPOST COMPANY COMMANDER.

The commander of an outpost company would normally act as follows when coming on the ground:

Send scouts out well to the front.

Examine the ground allotted to him; decide on his piquet line or line of resistance, and the position of his supports.

Decide how many piquets he will need, and how many supports, and tell off his company accordingly.

Explain to his company:

What to do in case of attack.

What friendly troops may be out in front or on the flanks.

Any special arrangements for the night; smoking, lighting fires, cooking, etc.

The hour of relief.

His own position.

He should open communication with the companies on his right and left, and see that all the ground is being covered.

He should superintend the entrenching of the piquet line, and the placing of the sentry groups.

When the piquet line is occupied and in a state of defence, and the sentry groups set out, scouts should be called in.

He should visit his sentries and piquets at intervals.

#### THE PIQUET COMMANDER.

On reaching the ground allotted to him, the piquet commander would normally act as follows.

Explain to his piquet:

What to do in case of attack.

Where the neighbouring piquets are.

Where the supports are.

Direction of the enemy.

What friendly troops are out in front or on the flanks.

Decide where his trenches will be dug, and start work on them.

Look over the frontage allotted; decide on the number of sentry groups required, and where to place them.

Post the sentry groups, appointing a commander for each, and allotting to each group a definite frontage.

Give the sentry group commander his orders.

Open communication with the piquets on his right and left, and see that all the ground is being covered.

Post a sentry over the piquet.

Make the necessary sanitary arrangements.

NOTE.—The trenches dug on the piquet line should be large enough to accommodate the supports as well as the piquet, and therefore a portion of the supports may have to be brought up to help the piquet to dig them when the ground is first occupied.

#### THE SENTRY GROUP COMMANDER.

On reaching his post the sentry group commander would normally act as follows.

Tell off his sentries into reliefs, and explain to them:

The direction of the enemy.

The position of the piquet.

Where the support is.

Where the sentry groups to the right and left are.

The frontage they have to watch.

Any friendly troops out in front.

Names of all villages, rivers, roads, etc., in the vicinity.

How to deal with persons approaching their posts.

What to do in case of attack.

The countersign.

Arrange for cover for the sentry group, and the sentry also if possible.

#### SENTRIES AND SENTRY GROUPS.

A sentry group consists of from three to eight men under a non-commissioned officer or the oldest soldier, and remains on duty for from eight to twelve hours. In open country one man is posted as sentry while the others lie down close at hand; but if the country is close or special precautions are necessary, the sentry post may be doubled. Sentries should always be posted double when the men are very tired. Sentries are doubled at night.

The distance of a sentry post from the piquet depends entirely upon the nature of the ground. Sentries should be placed so as to gain a clear view of the ground in their front, whilst concealed from the enemy's view. To avoid attracting attention they should not be permitted to move about; on the other hand permission to lie down, except to fire, should only be given for special reasons, since sentries permitted to lie down may not remain sufficiently alert. Sentries must be made to realize the importance of their work, and their eyes and ears must always be ready to catch any indications of the presence or the movement of the enemy. Except at night, or in a fog, the bayonets of sentries should not be fixed, as the glitter might give them away.

On the approach of any person or party, a sentry immediately warns his group. When the nearest person is within speaking distance the sentry should call out "Halt," take cover himself, and get ready to fire. Any person not obeying the sentry, or attempting to make off after being

challenged, should be fired on without hesitation. If the order to halt is obeyed, the group commander should order the person or one of the party to advance and give an account of himself.

#### OUTPOST PATROLS.

Whether mounted troops from the outpost line are patrolling to the front or not, every commander of an outpost company is responsible for his own protection against surprise. He will be informed by the outpost commander as to what mounted patrols have been sent out, and must then decide what further patrols, if any, are necessary for his own security.

In the absence of definite orders piquet commanders are responsible for taking such action as they deem necessary for the security of their piquets.

An outpost patrol consists of from three to eight men under a non-commissioned officer. When going out it should inform the nearest sentry of the direction it is taking, and arrange some signal by which it may be recognized on its return. If a patrol does not return within a reasonable interval after the time it was expected, the chances are it has been captured or destroyed by the enemy, and another patrol should be sent out to discover what has happened, and if the enemy are actually in the neighbourhood.

Patrols are sent out at varying intervals during the night, and also during the day if the country in front is wooded or the weather misty. Patrols are always sent out one hour before daybreak, to

cover the ground in front of the outpost line, remaining out until after the sun is up.

#### LISTENING PATROLS.

Trench warfare has brought into existence what are known as listening patrols. These patrols consist of small bodies of men, from three to eight under an officer or non-commissioned officer, and are sent out at night between the lines to reconnoitre ground and ascertain what the enemy are doing in the way of erecting entanglements, constructing new works, etc. Their main duty is reconnaissance and they should not fire unless absolutely forced to do so, as firing between the lines at night will almost invariably cause the whole area to be lighted up by flares and the ground swept by fire from both trenches.

Listening patrols move in varying formations according to the nature of the ground. On a dark night in unexplored territory single file is a good formation, the men keeping close enough together so that the man in front can touch the one behind him. Patrols should be prepared to remain motionless or drop to the ground on a flare going up. Hostile patrols are liable to be met with, in which case the patrol should remain under cover until the enemy has passed.

Listening patrols adopt the usual precautions on going out; they notify the sentries of the direction they are taking and the length of time they expect to be out; they also ascertain whether there are any friendly patrols out.

The commander should be told definitely on what points information is required.



## TRAFFIC THROUGH THE OUTPOSTS.

No one other than troops on duty, prisoners, deserters, and flags of truce are allowed to pass through the outposts either from within or from without, except with the authority of the commander who details the outposts. Inhabitants with information are to be blindfolded, and detained at the nearest piquet pending instructions, and their information sent to the outpost commander.

No one is allowed to speak, otherwise than as directed under Sentries and Sentry Groups, to persons presenting themselves at the outpost line, except the commander of the nearest detached post (see below), piquet, or outpost company, who should confine his conversation to what is essential. Prisoners and deserters are to be sent at once, under escort, through the commander of the outpost company, to the outpost commander.

## DETACHED POSTS.

A detached post is a small body of men sent out to cover some dead ground in front of the outpost line. They should only be employed in exceptional circumstances, owing to the danger of their being cut off.

The strength of a detached post will depend on the duty required of it, and may vary from a section to a platoon.

Detached posts act in the manner laid down for piquets and sentry groups. When only required for night dispositions they should not be posted till after dusk.

## NUMBERING.

All outpost companies, piquets, and sentry groups are numbered from right to left each within themselves. Thus the outpost company occupying the first section on the right of the line would be known as No. 1 Outpost Company. Its first piquet would be known as No. 1 piquet of No. 1 Outpost Company, its second piquet No. 2, and so on. The sentry groups of each piquet would be similarly numbered, as No. 1 Sentry Group of No. 1 piquet, No. 1 Outpost Company, and so on.

## BATTLE OUTPOSTS.

If the enemy is close at hand, and battle imminent, or if the battle ceases only at nightfall to be renewed next day, the whole of the troops must be in complete readiness for action. There may not even be room for outposts, and the troops will have to bivouac in their battle positions, protected only by patrols and sentries. In such cases the firing line takes the place of the piquets. It will often occur in these circumstances that no orders can be issued by superior authority as to measures of protection, and in any case nothing can relieve the commanders of advanced battalions and companies of the responsibility of securing themselves from surprise, and, unless circumstances forbid, of keeping touch with the enemy.

## CHAPTER VII.

### INFANTRY IN BATTLE.

#### GENERAL CONSIDERATIONS.

In no two military operations is the situation exactly similar. The character of the ground, the climatic conditions, the extent of the co-operation of the other arms, the strength and fighting spirit of the opposing forces, their physical condition, and the objects they wish to achieve must always differ.

It is impossible, therefore, as well as highly undesirable, to lay down a fixed and unvarying system of battle formations. General principles and broad rules alone are applicable to the tactical handling of troops in war.

The attitude originally assumed by either, or both, of the opposing forces may be reversed during an engagement; a vigorous counter-attack by an army offering battle in a defensive position may throw the adversary on the defensive; or an assailant may fight a delaying action in one part of the field, while in another part his action may be essentially offensive. These and all other variations in a combat, however, resolve themselves in every case into attack and defence, and it is under these headings that the action of infantry will be discussed in the two succeeding chapters.

The following sections of this chapter deal with general principles which apply to all stages of a combat, whether in attack or defence.

#### POSITION AND DUTIES OF COMMANDERS IN ACTION.

During the fight, the commander of a considerable body of infantry influences the course of the action by means of his original orders and subsequently by the employment of his reserve.

Once troops are engaged, superior control by means of further orders is difficult, and much must be left to subordinate commanders and the troops themselves.

It will be seen, therefore, how important it is that the orders issued before an engagement should be full, clear, and explicit. All ranks should understand what is required of them so that in the varying circumstances of the combat they may act in harmony with the intentions of their commander, and the actions of other troops.

The commander's position will, as a rule, be selected so that he can obtain an extensive view. It should be sufficiently central to facilitate the receipt of reports and the issue of orders. Brigade and battalion commanders and company officers should occupy positions where they can best exercise supervision over their commands, watch the enemy, and receive and transmit orders.

In view of the importance of decentralization of command, it is essential that superior officers, including battalion commanders, should never trespass on the proper sphere of action of their subordinates. Personal example has undoubtedly an extraordinary influence, especially under heavy fire, and there are times when every other consideration must be sacrificed to leading or steadying

the troops. But any attempt to exercise personal control over all portions of the force must inevitably lead to the neglect of other duties, such as feeding and supporting the firing line at the right place and time, protecting the flanks, meeting counter-attacks, reporting to or communicating with the superior commander, and maintaining connection with the artillery and adjoining units.

#### FIRE DIRECTION AND FIRE CONTROL.

To obtain full value from the rifle, its powers and limitations must be understood, and its fire be applied with intelligence towards the object in view.

However skilful individual men may be, the greatest effect is produced by their fire only when it is efficiently directed and controlled. Fire is said to be directed by the commander who defines the objective against which it is to be used, and to be controlled by the fire-unit commander who gives the necessary executive words of command. In attack, occasions will frequently arise when fire-unit commanders must both direct and control the fire of their units, while at close ranges, or when men are widely extended, it may happen that the transmission of any fire order is impossible, and that each individual man must control his own fire.

The normal infantry fire unit is the section, though under certain conditions at the longer ranges the fire of a platoon or even a whole company may be controlled by its commander. *The efficiency of section commanders is therefore of paramount importance.*

The value of a fire-unit commander depends upon his ability to apply the fire of his unit at the right time and in the right volume to the right target.

In addition to his other duties the fire-unit commander is responsible for:

- (i) Indicating targets.
- (ii) Issuing orders for sighting, and, when possible, supervising the correct adjustment of sights.
- (iii) Regulating the volume of fire; whether deliberate or rapid.
- (iv) Reporting when ammunition is running short.

When from his position it is possible for him to do so, the company commander decides as to the time for opening fire, subject to such orders as the battalion commander may issue, and regulates the supply of ammunition. In the defence he also normally arranges for the distribution or concentration of fire, and indicates the targets generally to his subordinates; but in the attack these duties will usually devolve upon the subordinate commanders with the firing line.

In forming a decision as to when fire should be opened, the following considerations must have weight:

- (i) The early opening of fire discounts surprise and, whether in attack or defence, often indicates the positions of troops which would otherwise be unnoticed by the enemy. In attack it may unnecessarily delay the advance.
- (ii) Beyond 100 yards the fire of even large and well controlled units of infantry has seldom much



effect upon the decision of the struggle for the superiority of fire. Exceptional circumstances, such as the appearance of considerable bodies of the enemy in vulnerable formations, may, however, justify the use of long range fire, especially in the defence (see below).

(iii) Between 1400 and 600 yards, carefully controlled collective fire produces better results than the uncontrolled fire of individual men, which ceases to be sufficiently effective beyond ranges of about 600 yards to counterbalance the expenditure of ammunition involved.

Fire should therefore rarely be opened by infantry in attack when satisfactory progress can be made without it. The leading troops in particular should save every possible round for the final struggle for superiority of fire at close range, as the replenishment of ammunition in the firing line at that time will be a matter of considerable difficulty. When progress is no longer possible fire should be opened, either by such parts of the firing line as cannot advance, or by bodies of infantry specially detailed for this purpose, to enable a further advance to be made. Subject to these principles fire may be opened in attack when there is a probability of its producing good effect, or when withholding fire might lead to heavy loss.

When infantry is acting on the defensive, there is usually less difficulty in arranging for the supply of ammunition. Fire may therefore be opened at longer ranges than when attacking, if it seems probable that any advantage will be gained thereby, especially when it is desired to prevent the

enemy coming to close quarters, and when the ranges have been ascertained beforehand. If, however, the object is to gain decisive results, it is generally preferable to reserve fire for closer ranges and for surprise.

It is usually necessary to keep the enemy's firing line under fire throughout its length in order to disturb his aim and prevent his movement, but against very vulnerable targets, or to produce an increased effect at a particular place, fire may with advantage be concentrated.

Oblique or enfilade fire has greater moral and material effect than frontal fire, for it comes usually from an unexpected direction and the target presented to it is generally more vulnerable. In defence, opportunities for the employment of enfilade fire may be created by careful pre-arrangement between the commanders of adjoining units.

In deciding on the volume of fire to be directed against the enemy at any particular time, a commander should consider chiefly the tactical situation, the target presented, the effect it is desired to produce, the range, and the state of the ammunition supply.

Fire should, as a rule, be delivered deliberately, each man satisfying himself that every time he presses the trigger he will hit the object aimed at.

*Rapid fire should be considered as a reserve of power to be used when the occasion demands it. It must combine accuracy with rapidity, and never degenerate into a wild expenditure of ammunition at the fastest possible rate.*

Rapid fire may be required when it is necessary to beat down the enemy's fire quickly; when covering the withdrawal of other troops; when pursuing an enemy with fire; when meeting cavalry attacks; or when good targets are exposed for a very short period; also, in attack, by all troops as a final preparation for the assault, and in defence to beat off an enemy in the act of assaulting.

The effect of surprise by a sudden burst of accurate fire from an unexpected quarter is very great. Short bursts of rapid fire, followed by pauses, favour observation of results and give time for the adjustment of sights. They also facilitate the control of fire in critical situations. The duration of such bursts must be strictly controlled, and limited to the requirements of the occasion, for if rapid fire is continued for any length of time it excites and exhausts the troops and leads to waste of ammunition.

A sudden effective fire is known to have a particularly demoralizing effect on the enemy; it is often advantageous therefore to seek for surprise effects of this sort by temporarily withholding fire.

Wild, unsteady fire causes little or no loss, and tends to encourage the enemy by inducing a belief in his mind that his opponent is shaken. It is therefore worse than useless against good troops.

Every available means should be used to obtain the correct ranges. Observers will be employed, as necessary, to assist in observation of fire, in watching the enemy and neighbouring troops, and in keeping up communication between platoons.

Observation of fire is the best means of ensuring that fire is effective. If uncertainty as to the elevation exists it is better to underestimate than to overestimate the range. If it is necessary to fire at ranges beyond 1000 yards and observation has failed, or the situation requires that some effect should be produced quickly, combined sights may be employed, but satisfactory results will seldom be obtained by bodies of less than two platoons.

#### FIRE DISCIPLINE.

A high standard of fire discipline in the men is not less important than skilful direction and control of fire by the commanders.

Fire discipline means strict attention to the signals and orders of the commander, combined with intelligent observation of the enemy. It ensures the careful adjustment of the sights, deliberate aim, economy of ammunition, and prompt cessation of fire when ordered or when the target disappears.

It requires of the men endurance of the enemy's fire, even when no reply is possible, and a cool and intelligent use of the rifle when superior control can no longer be exercised.

#### FIRE AND FORMATIONS IN BATTLE.

The formations to be adopted in battle will depend principally on the ground and the tactical situation. In order to avoid unnecessary loss in the attack, however, the comparative effect of artillery and rifle fire on the various formations at different ranges must be clearly understood by all

leaders. Similarly, if infantry in defence is to make the best use of its ammunition, it must know what targets are most vulnerable under the various conditions of the battlefield.

At effective ranges, troops advancing steadily and rapidly suffer less than when they remain lying down, even under moderately good cover. This is due to the moral effect on the enemy and to the constant alteration of the range. In retiring losses are always heavier than in advancing.

Against frontal artillery fire, or direct long-range infantry fire, small shallow columns, each on a narrow front, such as platoons or sections in fours or file, offer a difficult target while admitting of efficient control, and may be employed during the earlier stages of an attack. These columns, making full use of the ground, should be on an irregular front, so that the range from the enemy's guns to each column is different, regard also being had to the forward effect of shrapnel.

Infantry coming suddenly under artillery fire will usually avoid loss more easily by advancing than by halting and making use of cover, the position and range of which will probably be known to the enemy.

Although serious effect from aimed infantry fire is not to be anticipated at ranges beyond about 1400 yards, zones of considerable width, beaten by unaimed fire, may have to be crossed at such ranges. It is necessary that troops should be prepared for this and be ready to adopt formations which will reduce casualties. This applies, not only to firing lines and supports, but to reserves

and other bodies in rear. Rifle fire at these long ranges has so steep an angle of descent that effective cover from it may be difficult to find.

On open ground swept by effective rifle fire an extended line is the least vulnerable formation, and on such ground it will usually be advisable to extend before it becomes necessary for the advancing troops to open fire. A formation in small columns should, however, be employed as long as it is applicable to the situation, for when once extended, a unit loses its power of manoeuvre. As a general principle deployment is necessary when fire is to be opened, the amount of extension then depending on the volume of fire which it is required to produce, and upon the effect of the enemy's fire.

The greater the extension of a line, the fewer will be the casualties, but the less will be its fire effect. When the infantry struggle for the superiority of fire has begun, casualties will be reduced, not so much by the formations in which the troops are disposed, as by the material and moral effect of their fire and, still more, of the fire of the artillery, machine guns, and infantry who are covering the movement.

The fire effect which infantry can develop against cavalry is such that infantry which is ready to open a steady and timely fire has nothing to fear from a cavalry charge, provided the cavalry cannot find dead ground over which to approach. Any formation which allows fire to be delivered quickly and accurately is suitable for meeting cavalry. Closing an extended line to meet cavalry delays the opening of fire and may offer a



vulnerable target to the enemy's artillery. Even if cavalry succeeds in riding through a firing line it can inflict little loss upon it if the infantry holds its ground. Whenever there is a possibility of being charged by cavalry, special care must be taken to watch and guard the flanks.

Charges carried out by friendly cavalry will necessarily distract the enemy's attention from the firing line of the attack. The attacking infantry must take advantage of such co-operation on the part of the cavalry by at once pressing forward and gaining as much ground as possible.

Artillery coming into action, limbering up, or in movement, is a vulnerable target against which rapid fire or even fire at long infantry ranges is justifiable. Infantry will experience difficulty in putting shielded artillery out of action by direct fire even at close infantry ranges, but it can prevent the artillery from moving, and interfere with the service of the guns. Infantry can best obtain decisive effects against guns with shields by means of enfilade or oblique fire.

The gun teams when coming up or going back are vulnerable targets, and their destruction will often prevent the artillery being moved or withdrawn.

Machine gun sections with their guns on travelling carriages are as vulnerable as artillery limbered up; but detachments carrying the gun into action are difficult to distinguish from infantry. Machine guns in position are a difficult target; to obtain good effect against them it is usually necessary to employ a considerable number of rifles.

Aircraft form a very difficult target to fire directed from the ground, and only a small proportion of their area is vulnerable. Bullets can pass through the fabric of aeroplane wings without doing serious damage. Indiscriminate fire at hostile aircraft is, moreover, likely to cause casualties in neighbouring units, and will also disclose the position of the troops to the enemy's observer. The strictest control must be exercised over all fire directed against aircraft. In the case of rifle fire at aeroplanes, men should be instructed to aim six times the length of the machine in front, and in the case of airships at the nose of the envelope.

#### INTERCOMMUNICATION AND PASSING OF ORDERS.

*All subordinate commanders are responsible for keeping their respective superiors, as well as neighbouring commanders, regularly informed of the progress of events and of important changes in the situation as they occur.*

All ranks should notice what takes place within their view and hearing, and report anything of importance accurately and at once to their immediate superior, who must pass the information on to the higher commanders and to neighbouring units.

This is the foundation of co-operation in war and is essential not only in battle but at every stage of a campaign.

The senior in any body of troops is responsible for forwarding messages to their destination.

During an action every company commander will leave with the battalion commander one man

of his company who can be trusted to carry a verbal order or message correctly and to describe intelligently the local situation. These men will be used to convey urgent orders to the companies in action, when this is possible.

Similarly, battalion commanders will send a representative of their battalions to brigade headquarters during an action.

Within the battalion, orders and messages in battle will normally be verbal. Verbal initial instructions by a commander on the battlefield should conform generally to the accepted type of written orders. They should give first such information of the enemy and his own troops as may be necessary, then his task and the general manner in which he intends to carry it out, and after that, detailed orders for the units at his disposal.

The importance of giving orders in a firm tone of voice and in a calm, determined manner cannot be exaggerated.

The passing of verbal orders and messages is to be reduced to a minimum owing to the liability of errors in transmission. In the firing line all verbal messages must be passed as quietly as possible, as a rule from section commander to section commander. The fewer the individuals by whom the message has to be repeated, the less chance will there be of errors creeping in.

The telephone has become one of the best means of maintaining communication between stationary units. It is quicker and more reliable than

semaphore signalling or messages carried by orderlies, and darkness or fog does not limit its use.

Infantry battalions are now supplied with field telephones which are used to link up companies with each other and with battalion headquarters. Similarly the headquarters of the battalions in a brigade are connected by telephone with brigade headquarters whenever possible.

Control by commanders of scattered portions of their units is thereby greatly facilitated and, information being received and orders transmitted within a few minutes, they are enabled to turn to account opportunities which they would be unable otherwise to seize.

An infantry division has, as part of its establishment, a signal company which carries telephone equipment, but battalion signallers should be trained in the laying, concealment, and use of field telephones.

The telephone is of great service to the artillery. In order to ensure unity of control it was formerly necessary to have the guns of a battery or brigade close together. This made concealment difficult. Now, guns may be considerable distances apart and in concealed positions while the observer, posted where he can see the targets, directs and controls their fire by telephone.

Field telephone service is liable to interruption especially if the wires are laid along the ground: if near the enemy they may be destroyed by shells. Telephone service should not be relied upon

exclusively for communication but alternative means provided in case it fails.

Motorcycle despatch riders are being used in the present war with excellent results. Their chief advantages are their speed, ability to cover long distances, and the difficult target they offer to the enemy, but their use is restricted to districts provided with roads. Where roads exist between the units or localities to be connected, a motorcycle despatch service can be formed in less time than a telephone service.

Throughout an action all commanders should try to anticipate the various situations which may occur, and should decide what steps they would take to meet them. They will thus be better able, when the necessity arises, to issue orders promptly and with decision.

On a battlefield, when the ground is open, intercommunication between bodies of troops, taking part in an attack becomes very difficult as soon as the enemy's fire is severely felt. Messengers may be unable to approach, and signalling may be impossible. In these circumstances co-operation is only secured by the watchfulness of the officers, especially those superintending the fight in any portion of the field. If officers are alert to act on indications expressed by the movement, or absence of movement, of their own troops or of the enemy, and if their tactical training has been conducted on sound and uniform principles, suitable action will follow in spite of the breakdown of positive methods of intercommunication.

#### ARTILLERY ESCORTS.

Artillery on the field of battle is generally protected by the other arms.

Should the guns not be protected by the existing distribution of troops, a special escort should be detailed, and if this has not been done it is the duty of the artillery commander concerned to apply to the commander of the nearest troops, who must provide an escort. The duties of this escort will be:

- (i) To give timely warning of any threatened attack.
- (ii) To keep hostile bodies beyond effective rifle range of the guns, or, in cases of necessity, to cover the withdrawal of the guns.

All ground within rifle range which might afford concealment to an enemy should either be occupied by the escort or be under its effective fire. The escort commander should place himself where he can best superintend his command, and ensure rapid communication between himself and the artillery commander. The senior officer present, whether artillery commander or escort commander, will issue the necessary instructions to the escort, but the escort commander must in either case have a free hand in carrying them out.



## CHAPTER VIII.

## INFANTRY IN ATTACK.

## GENERAL CONSIDERATIONS.

Infantry in attack is usually divided into (a) Firing Line and Supports, and (b) Local Reserves. The relative strength of these bodies will depend on the ground, the information available, time conditions, and the possibility of effecting a surprise. Each portion of the firing line should be given a definite objective or task, and it may also be advisable to fix the limits of its flanks.

The main essential to success in battle is to close with the enemy, cost what it may. A determined and steady advance lowers the fighting spirit of the enemy and lessens the accuracy of his fire. Hesitation and delay in the attack have the opposite effect. *The object of infantry in attack is, therefore, to get to close quarters as quickly as possible, and the leading lines must not delay the advance by halting to fire until compelled by the enemy to do so.*

*The object of fire in the attack, whether of artillery, machine guns, or infantry, is to bring such a superiority of fire to bear on the enemy as to make the advance to close quarters possible.*

The whole of the attack may be divided into three periods, or phases, as follows:

- (i) The advance to the first fire position.
- (ii) The fire-flight.
- (iii) The assault.

If the assault is successful a fourth period, the pursuit, follows.

## ADVANCE TO THE FIRST FIRE POSITION.

Troops advancing to the attack come under artillery fire first, generally at ranges above 1400 yards. The formation to adopt under artillery fire has already been explained, viz., small, shallow columns on an irregular frontage, with at least 50 yards lateral interval between columns, and 200 yards between lines. The forward spread of shrapnel is about 200 yards, and the lateral about 50 yards. Troops in this formation, advancing steadily, present the least vulnerable target possible to artillery, and if a shrapnel shell does happen to burst just above a column its effect will be local. Having the heads of the columns on an irregular frontage makes the range differ with each one, and consequently hinders the enemy's artillery from making good practice all along the line.

At 1400 yards long range rifle fire starts to become effective, and at some point after this range is passed, the exact place depending on the nature of the ground and other circumstances, it will be so severely felt that it will be necessary to deploy into extended order so as to reduce casualties.

This extended line then advances until, when checked by a heavy and continuous fire, it becomes necessary to continue the advance by rushes, which, according to the ground and the proximity of the enemy, will be made by the whole line simultaneously or by portions of it alternately.

Infantry in attack should not delay the advance or diminish the volume of fire by entrenching. Entrenchments in the attack are only used when, owing to further advance being impossible, the efforts of the attacking force must temporarily be limited to holding the ground already won. The advance should be resumed at the first possible moment.

In this manner the troops work themselves up as close as possible to the enemy's line; in hilly or close country they may get within 50 yards of it, but are generally compelled to stop at a greater distance than this. The advance should be continued until it is absolutely impossible to gain another yard, and the troops are pinned to the ground by the weight and accuracy of the enemy's fire. The leading troops then lie down and engage the enemy in a fire-fight.

#### THE FIRE-FIGHT.

The length of time the fire-fight lasts depends on circumstances. The leading troops are continually reinforced by others advancing in a similar manner from the rear. These reinforcements also bring up supplies of ammunition, and it might be noted here that the first duty of a man who becomes a casualty in an advance, is to place his ammunition by his side in some conspicuous place where it may be picked up by other men passing by.

The main idea at this stage of the attack is to bring as many rifles into line as possible so as to gain what is known as "superiority of fire" over the enemy, and thus pave the way for the assault.

#### THE ASSAULT AND PURSUIT.

The fact that the superiority of fire has been obtained will usually be first observed from the firing line; it will be known by the weakening of the enemy's fire, and perhaps by the movements of individuals or groups of men from the enemy's position towards the rear. The impulse for the assault must, therefore, often come from the firing line, and it is the duty of any commander in the firing line, who sees that the moment for the assault has arrived, to carry it out, and for all other commanders to co-operate.

On rarer occasions the commander of the attacking force may be in a position to decide that the time has come to force a decision, and may throw in reinforcements from the rear so that the firing line may gain the necessary impulse for the assault.

Subordinate commanders in the firing line will decide when bayonets are to be fixed, in accordance with the local conditions of the combat and the nature of the ground. The commander who decides to assault will order the charge to be sounded, the call will at once be taken up by all buglers, and all neighbouring units will join in the charge as quickly as possible. During the delivery of the assault the men will cheer, bugles be sounded, and pipes played.

If the assault is successful, and the enemy driven from his position, immediate steps must be taken to get the attacking infantry in hand for the further work that lies before them. The victory is as yet but half won; decisive success will be

achieved only by the annihilation of the enemy. A portion of the troops must at once be pushed forward to harry the retreating forces, while the remainder are being re-formed, under their own officers if possible, in preparation for a relentless pursuit.

Owing to the possibility of hostile gun-fire being brought to bear on the captured position, units should not be re-formed on the position itself, but should move forward to the least exposed localities available. The task of re-forming units will usually fall to subordinate leaders.

Infantry in pursuit should act with the greatest boldness and be prepared to accept risks. Delay for the purpose of detailed reconnaissance or for turning movements is not warranted, and the enemy must be attacked directly he is seen.

The three preceding paragraphs deal with the outcome of a general assault and organization of the pursuit. Local assaults on a position such as a trench or village demand separate consideration.

Once such a position has been gained the prime consideration is to hold it. Immediate steps must be taken to consolidate the position by driving out any small bodies of the enemy who may still be holding out, and preparations made to meet a counter-attack. This is almost certain to follow unless the enemy has been absolutely destroyed and has no fresh troops at hand.

The attacking force will have become somewhat mixed up during the assault, and, if there is time, units should be re-formed under their own leaders.

The position should be divided into sections for defensive purposes, and a body of troops under a commander allotted to each section; scouts sent well out in front to watch the enemy and give warning of any advance; any fresh troops that are available brought up; defences improved to face the new front, sand bags, barricades, etc., being lifted over; the flanks secured; the heads of any communication trenches or streets leading in the enemy's direction blocked up and put in a state of defence; arrangements made for replenishing the supply of ammunition which at this stage is apt to be low; machine guns brought up and placed in position; entanglements in the rear cleared away; communication established between the different parts of the position and with the troops in rear; precautions taken that no ground from which the new position might be enfiladed is left unoccupied or unswept by the fire of the defenders.

It may be expected that effective artillery and machine gun fire will be brought to bear on the position before the counter-attack materializes. This should be foreseen and the troops ordered to cover until the actual attack develops.

Unless the enemy has fresh troops at hand, counter-attacks are apt to be hastily organized, and it depends mainly on the firm front which the defenders present, as to whether they are successful or not. (See Infantry in Defence, Chap. IX.)

#### COVERING FIRE.

When the ground permits, it is generally necessary to detail special detachments of infantry to



provide covering fire for the leading troops. These detachments will usually be detailed from local reserves in the original distribution for the attack, but any commander, at any stage of the fight, may detail troops from those under his command to assist his advance. No fire-unit commander, however, is justified in abandoning on his own initiative an advancing role in order to become a detachment for covering fire.

During the advance, all important tactical points gained, such as suitable buildings, small woods, etc., should, when required, at once be put in a state of defence, so that the enemy will not be able to recapture them and that they may serve as supporting points to the attack. Local reserves will often find opportunities for strengthening localities gained by the firing line, and to assist them in this work, detachments of engineer field companies may be attached to them with advantage.

#### CO-OPERATION OF ARTILLERY.

When a subordinate commander of artillery is allotted a task necessitating co-operation with a force of infantry, he should consult with the infantry commander, ascertain his plan of action and decide how he can best support it.

Quick-firing guns cannot maintain a rapid fire throughout a battle. Artillery use rapid fire when the infantry firing line is seen to be in need of assistance to enable it to advance; *infantry must take every advantage of periods of rapid artillery fire to gain ground.*

In communications between infantry and artillery the mutual adoption of some system for

describing the features of the ground, will often prevent delay and misunderstanding. The squared map system is largely used in France to-day for this purpose. Maps of the district are ruled off into squares, which are numbered numerically in one direction and alphabetically in the other, squares being known as A3, C8, etc. Thus without having to go into detailed descriptions, an infantry commander in the front line trench would telephone back to the artillery that the white house in square B6 was occupied by the enemy; the artillery commander would look this square up on the map, probably already having the range marked in it, and there would be no doubt but that the proper place would receive the artillery's attention.

#### THE SURPRISE ATTACK.

If the enemy is surprised, the gradual development of the attack should be dispensed with, and he should be pressed vigorously from the outset.

#### THE BATTALION IN ATTACK.

A battalion forming part of the force launched to the attack is usually divided by its commander into (1) firing line and supports (2) local reserve. The relative strengths of these two parts will depend on the task allotted to the battalion and on the ground. A normal distribution would be as follows:

- $\frac{1}{2}$  Battalion, Firing line.
- $\frac{1}{4}$  " Firing line supports.
- $\frac{1}{4}$  " Local reserve.

When the ground permits a portion of the battalion is usually detailed as special detachments to provide covering fire.

If, owing to the presence of other units on the flanks, a definite frontage as well as an objective is allotted to the battalion, it should be occupied lightly, though not necessarily continuously, from the outset. In the attack 4 men per yard are allowed, so a battalion 800 strong would normally occupy a frontage of 200 yards, but the actual frontage allotted to it must be governed largely by the nature of the ground, the task allotted to the battalion, and the strength of the enemy's position at that point.

When more than one company is detailed for firing line and supports it is advisable that each company so detailed should be represented in the firing line from the outset and should have a definite portion of the battalion's objective allotted to it. Thus, if two companies are detailed to form the firing line and supports, each company would have two platoons in the firing line and its other two platoons right behind in the supports; when the supports come up they will, therefore, find themselves amongst their own comrades and officers in the firing line. The maintenance of control and command will thus be facilitated by each company being distributed in depth rather than in breadth, and the inevitable mingling of units will be delayed and reduced.

The battalion commanders orders should be clear and concise. If possible he should assemble his company commanders where a view of the ground

over which they are to attack can be had, indicate the task assigned to the battalion, how he proposes to carry it out, the part each commander is to play, and assign a definite objective to each portion of the battalion in the firing line. If the objectives are not visible from the spot where the orders are issued, they should be pointed out on the map.

For example, his orders might be issued as follows:—"Our objective is the enemy's position in the orchard and white farmhouse you see on the slope of that ridge about 1500 yards straight ahead, and the frontage allotted to us extends from the farmhouse itself on the right to the end of the orchard on the left, about 200 yards. The —th battalion will be on our right and the —th on our left. They will attack with us, and the —th Artillery Brigade will be in position on this ridge to support the movement. The advance will start at 6.30."

"A and B Companies will form the firing line and supports, A taking the frontage from the house on the right to the beginning of the orchard, B from there to the end of the orchard. The right of our advance will move along that sunken road and the left about 50 yards west of that stream. C and D Companies will form the local reserve and remain here under my orders for the time being. Get into position, gentlemen, and be ready punctually at 6.30."

Company commanders should act on similar principles when issuing orders to their subordinates, indicating the task, objective and direction of each platoon. Platoon commanders pass this

information on to their section commanders and so on until every man in the battalion is aware of what is going to happen and what part he is to take in it.

Occasions, will, however, constantly arise in war when instant action is imperative. All commanders and bodies of troops must therefore, when in the neighbourhood of the enemy, be prepared to dispense with preliminaries and to act at a moment's notice.

The battalion commander generally retains the local reserve in his own hands as long as possible. He uses them to reinforce the firing line, guard the flanks, provide covering fire and resist a counter-attack should the enemy make one; finally what is left of the local reserve is thrown in to assist in the assault.

#### THE COMPANY IN THE FIRING LINE.

The orders which the company commander will issue before advancing to the attack will be based primarily on those received from his battalion commander, and secondly, on the reports of scouts, on his personal reconnaissance of the ground, and his knowledge of the situation.

The company should, as a rule, be divided into firing line and supports, and, if operating alone, a reserve should be kept in hand as long as circumstances permit.

If necessary, ground scouts may be sent out in front of the firing line to feel the way for the advance, and give warning of anything which

might impede it. When checked by fire they lie down and await the firing line.

Commanders in the firing line must take every advantage of covering fire furnished by artillery, machine guns and infantry to get forward.

The distance between the firing line and supports will vary according to the ground. The supports should be close enough to reinforce the firing line, when required, without undue delay but not so close as to suffer heavily from fire directed at the leading line. Care must be taken not to dissipate energy by reinforcing in dribbles.

In the latter stages of the attack supporting troops should carry extra rounds of ammunition into the firing line where the supply is apt to be running low. An infantryman normally carries 120 rounds and 80 more may be issued to him before an action.

#### THE COMPANY COMMANDER.

Throughout the action the company commander will maintain communication with his platoon commanders, with the battalion commander, and with the companies on his flanks. He will as a rule accompany the final reinforcement of his company into the firing line.

#### THE PLATOON COMMANDER.

As soon as he has received his orders the platoon commander should explain the situation to his subordinates and point out the line of advance. He must ensure that the movements of his platoon do not mask the fire of units on his flanks, and



must endeavour to co-operate with neighbouring units throughout the attack. He must direct the fire of his platoon as long as it is possible for him to do so, regulate the expenditure of ammunition, and take steps to secure a further supply when required. He must watch the enemy's movements and report at once to the company commander and to neighbouring units if anything of importance is observed; he must also be on the lookout for signals from his company commander and should detail an observer to assist him in this duty. During the advance he must take every opportunity of rallying his command on suitable ground. When the whole platoon is advancing by rushes he must select and point out successive halting places, and must himself lead the rush. After a successful assault he must get the men in his vicinity under control as quickly as possible in preparation for an immediate pursuit.

#### THE SECTION COMMANDER.

The duty of the section commander is to lead his section. He must see that direction is maintained, and that he does not mask the fire of neighbouring sections. When the advance is being made by sections, he must select and point out the successive halting places of his section and must regulate the number of men to occupy particular portions of cover. He must control, and when necessary direct the fire of his section, pass on quickly all reports that come to him and inform his platoon commander of any hostile movements he may observe.

As the advance continues reinforcements constantly arrive in the firing line and units become mixed up. It is his duty then to form what is known as an *impromptu* section, taking the nearest 10, 12 or 15 men as the case may be, under his command and forming them into a section. The men will conform to this by placing themselves under his direction and looking to him for their orders regardless of what other unit they may have belonged to previously.

All commanders should bear in mind that units are particularly liable to lose direction when moving forward from a hedge or similar feature which lies obliquely to their line of advance.

#### THE MAN.

Combined action is always more likely to be successful than isolated effort, and so long as control is possible the individual man must watch his leader and do his best to carry out his intentions. When, however, the section is under heavy fire, section commanders cannot always exercise direct control, and in these circumstances men should endeavour to work in pairs, estimating the range for themselves, firing steadily, and husbanding their ammunition. If incapacitated from advancing, the soldier's first duty is to place his ammunition in a conspicuous place, ready to be picked up by other men, and all ranks must seize opportunities that offer for replenishing their ammunition in this manner.

If, when reinforcing the firing line, or at any other time, a soldier loses touch with his section commander, it is his duty to place himself under

the orders of the nearest officer or non-commissioned officer, irrespective of the company or battalion to which he may belong.

No man is permitted to leave his platoon in action to take wounded to the rear, or for any other purpose, without special orders. After an action any unwounded man who has become separated from his company must rejoin it with the least possible delay.

## CHAPTER IX.

### INFANTRY IN DEFENCE.

There are three kinds of defence :

*The active defence* in which the idea is to remain on the defensive only until a favourable opportunity to attack arises.

*The passive defence* which aims at beating off an attack or holding ground, without any thought of offensive action.

*The delaying action*, as in the conduct of rear-guards or when it is necessary to gain time for the arrival of reinforcements.

The passive defence should never be adopted unless absolutely necessary. It means loss of the initiative and no strength of position will compensate for that.

#### THE ACTIVE DEFENCE.

The troops should be divided into two main portions (1) Firing Line, Supports and Local Reserves to defend the position, and (2) the General Reserve to deliver the decisive counter-attack.

The General Reserve should be as strong as possible, so not a man more than is absolutely necessary should be employed in the defence. The General Reserve is normally retained somewhere in rear of the defensive line in the hands of the Commander-in-Chief until the time for the decisive counter-attack arrives.

The position should be divided into sections, the commander of each section named, and a distinct unit assigned to each, with its own firing line and local reserve.

The supports should be under cover as close to the firing line as possible, and have covered communication with it when this can be arranged. Their strength should be roughly from one-fifth to half of the firing line.

*The local reserves support the firing line by making local counter-attacks*, and should be posted where they will have an opportunity of carrying these out. Their strength should be roughly about equal to the firing line and supports.

A position of any extent can rarely be occupied continuously; localities of special tactical importance will usually be defended and the intervening ground left clear for counter-attacks. The localities defended are known as pivot points.

The field of fire in front of the position should be cleared, ranges marked, any natural features which might assist the enemy in his advance filled in or otherwise rendered useless to him, obstacles erected (bearing in mind that their main object is to deflect the enemy's advance into channels

more favourable to the defence), communication improved between the different sections, and arrangements made for the supply of ammunition, food, water, etc., and for the care of wounded.

The construction and siting of trenches should be carried out on the principles dealt with under Field Engineering.

It is the duty of the firing line to prevent the enemy from reaching the position and, by forcing him to use up his reserves, prepare the way for the decisive stroke by the General Reserve.

The fire of troops in defensive positions must be carefully controlled and directed, and care must be taken that the troops are kept well in hand.

Infantry must be prepared to meet a charge with a counter-charge, if they find it impossible to stop it with fire. In this case the side which is best in hand and presses its charge home with the most determination will win.

#### RETIREMENTS.

Retirements in face of the enemy must be conducted with the greatest circumspection. A hurried retreat is not only a fruitful source of panic but a great encouragement to the enemy. A steady deliberate retirement, on the other hand, carried out in silence and good order, imposes respect and caution on the hostile troops.

In retiring under fire, portions of the firing line should usually retire alternately, affording each other mutual support by taking up successive fire positions at some considerable distance apart, from

which the retirement of the portion nearest the enemy can be covered.

Machine guns skilfully handled may be of great assistance in movements of this nature, and the detachments must, if necessary, be prepared to sacrifice themselves to cover the retirement of their infantry.

Men retiring under fire in extended order should, if well in hand, move from cover to cover at the quickest possible pace, a few men, preferably the most active, being left behind at each halt to cover the retirement of the remainder, and rapid fire being used to deceive the enemy as to the numbers left behind. If, however, the men are at all shaken, as when an attack has failed, every effort must be made to rally and restore order. All ranks should exert themselves to the utmost to ensure that the retirement is carried out, notwithstanding losses, with steadiness and precision.

If the enemy presses hard, a sudden counter-attack, not followed up too far, may give good results.

When mounted troops are available, they will be used to cover the final withdrawal of the infantry from each successive fire position.