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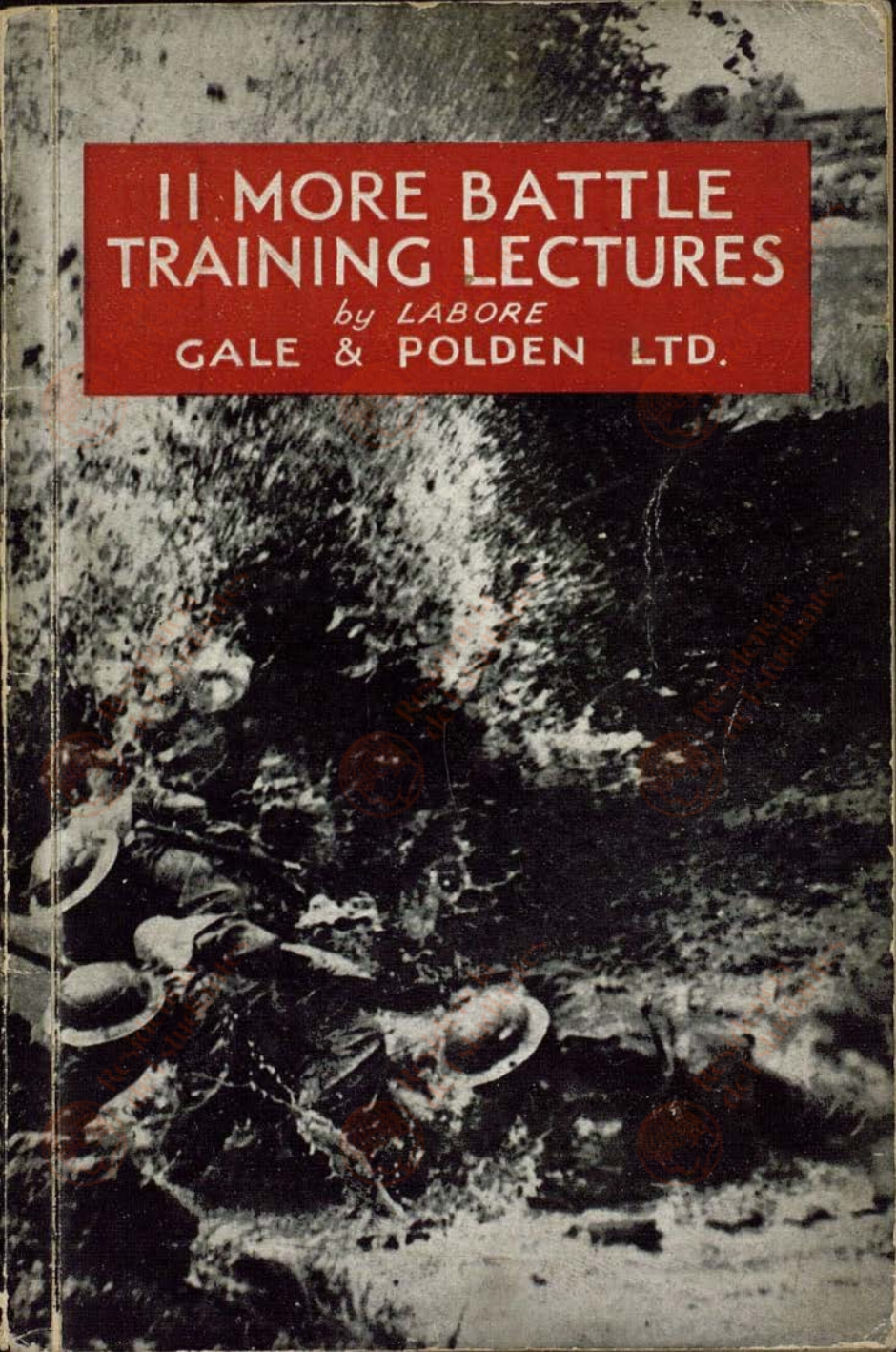

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Price Two Shillings
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THE TYPOGRAPHY AND PAPER OF THIS BOOK CONFORMS TO THE AUTHORIZED ECONOMY STANDARD

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ACKNOWLEDGMENTS

ONCE again I must thank the same people who so very kindly assisted me in various ways in writing "Battle Training Lectures," Volume I. This second effort has been evolved entirely owing to their help and co-operation, which have added so much to my pleasure in writing.

FOREWORD

THIS second book of "Battle Training Lectures" has been written in response to the many who have written in appreciation of the first book, and enclosing many and varied ideas of their own.

The principle of this book is exactly the same—to give any instructor the material from which he can compile an interesting lecture at very short notice, and one that will be of real benefit to his listeners. It is also hoped that the individual will benefit himself by just reading the subject-matter and studying the drawings and photographs carefully.

This particular booklet, in contrast to the other one, deals almost entirely with the "weapons" side, so it is hoped that the two books together will cover a wide field—twenty-two lectures in all.

LABORE.

CONTENTS

CARE OF ARMS

S.A.T., Vol. 1, Pamphlet 3 (1942), Chapter 1.
S.A.T., Vol. 1, Pamphlet 4 (1942), Lesson 6.
S.A.T., Vol. 1, Pamphlet 22 (1942), Lesson 3.

The term "Care of arms" is one that is usually taken to imply something that is deadly dull. Many probably imagine that it consists largely of keeping the barrel of a rifle in a high state of polish, and the ability to satisfy the scrutinizing eyes of the strictest of inspecting officers on a spit-and-polish guard-mounting parade.

Real care of arms has a very much wider aspect, and, even if not a thrilling subject, it is a matter of vital importance in modern war; of far greater importance than many of us realize. What is the use of weapons if they will not function at the most critical instant in battle perhaps after days of exposure to severe weather conditions? Proper care of arms is one of the first duties of every soldier and is quite as important as personal cleanliness. Take the case of individual weapons like the rifle and machine carbine; someone is the *personal* owner of that weapon, and he must treat it and care for it with the same pride and thought that he would bestow on his best friend. In emergency the weapon may well prove to be his best friend.

Men should be allowed, as far as possible, to keep the rifle with which they are first issued throughout their service. This could never be completely possible, of course, for obvious reasons. Nevertheless, far more could be done in this respect than is at present, and it should be a clear-cut principle to be achieved to the greatest possible extent. It would bring "pride of ownership." Have you ever noticed the care bestowed by the keen sportsman on his gun, his favourite cricket bat or tennis racket? He never allows anyone else to clean, care for, or put it away for him. Take the shooter, for example. As soon as he comes in from his shoot he will clean his gun, bestowing lavish care upon it. Every trace of dirt, mud and rust is removed, and everything is left clean and bright and then carefully oiled; even the stock is treated with beeswax and "elbow grease." The batsman will see to it that his bat is coated with oil. It will be carefully inspected to see that there are no signs of splitting and that the binding is sound. The tennis player will ensure that the strings are dry and that the racket is put away in its press at once. This same pride of ownership is what must be instilled into every soldier so far as his rifle, pistol or machine carbine is concerned. It must have his daily thought and care, and must always be in the best possible working order. The ideal is that it should be unnecessary to have to depend on inspection by officers to ensure that this is so.

What applies to individual weapons applies equally so to team weapons, *i.e.*, the light machine gun of the section, the mortar of the detachment. All the men in the team must feel personally and equally responsible that their gun or mortar is always kept in perfect condition and ready for instant action. Their lives and those of their comrades may depend on it. The Section, etc., Commander is, of

course, responsible, but it is up to all to play their part. A private soldier was once a No. 1 of the Lewis gun and there was no N.C.O. in charge of his section. He was a very good shot with the Lewis gun, which very rarely stopped or gave trouble, for it was magnificently cared for. He used to scorn G.S. oil, and bought his own. Realizing his responsibilities as an acting Section Commander, when the gun came off the range he carefully stripped it down and then invariably handed out groups of parts to all the men of the section to clean. That did not last for more than a few minutes; he would soon collect these groups in again and clean them all himself. "What the devil are you doing with that piston?" or "You'll ruin my barrel; give it here!" he would cry. That surely showed true pride in care of arms!

It is not proposed to deal with the detailed cleaning of weapons other than a few odd remarks, for the matter is fully dealt with in the official textbooks. It is the wider aspect with which we are concerned. Obviously, however, the first essential in care of arms is cleanliness. The main object of this is to obtain efficient working of the weapon. Contrary to general belief, it is not a matter of great importance that the barrel itself is highly polished; this is merely a relic of spit-and-polish guard-mounting parades. You have only to look down the barrel of a tribesman's rifle on the North-West Frontier of India to learn this; yet he can shoot straight enough. The state of the barrel is not of primary importance, but naturally it must be kept clean, fouling removed as far as possible, and the formation of rust prevented. Nickeling does not matter to a great extent and is not worth worrying about, for it just cannot be prevented from forming in the barrels of light machine guns. A "King's Prizeman" once said that if he got a bit of nickel in his barrel he left it there and forgot about it: it might alter his sighting slightly, but it did not cause inaccurate shooting.

The chamber of a weapon is highly important and must be thoroughly cleaned; this can easily be done with a short piece of stick and a rag of suitable size. A dirty chamber will cause hard extraction, and will play havoc with rapid fire. On service one does not want unnecessary difficulties to contend with, and one's weapons must function sweetly, easily and smoothly.

The action, bolt or breech block must be kept scrupulously clean, free from dirt, and lightly oiled.

Frictional bearing surfaces of the breech block of light machine guns should be treated with graphite; this lasts much longer and is far more effective than oil.

Much damage is caused through lack of attention to woodwork; it is apt to warp in hot climates, and this will play havoc with the zero of the weapon. Never leave a rifle exposed to the hot sun unnecessarily. At regular intervals it should be treated with linseed oil or some suitable preservative. Ordinary oil is better than nothing at all, but *never* use metal polish. I have often wondered why the use of some form of blacking for the slights is so discouraged. The official browning of these parts nearly always wears off, and it is not easy to take a good aim if the sights are shiny. Blacking can be done with

a smoky rag, or indeed the flame of a match, which is a perfectly feasible proposition on service, even if sight black is not. Consequently, on service or elsewhere always ensure that sights are well blacked, and keep them so.

Gas-affected parts of light machine guns, particularly the piston head, gas cylinder and gas regulator, must be kept clean. The carbon fouling must be scraped off, otherwise stoppages will inevitably occur. Most guns are nicely balanced, and the "carboning up" of moving parts means the gas has more work to do than it can reasonably be expected to perform. Sea air plays havoc with the working parts of weapons, and constant attention is necessary.

Men must be taught to study their weapons and know those parts that must be kept dry and those that must be treated with oil. Some weapons require a lot of oil, *e.g.*, the Thompson machine carbine, whereas others must be kept bone-dry, *i.e.*, the Sten machine carbine.

Moreover, men must be taught to use common sense under differing climatic conditions. In dusty or sandy places it is foolish to use a lot of oil, for it merely collects the dust and sand and jams the action. Far better to keep the parts almost dry. Try to keep them covered to prevent sand and dust getting in. An improvised canvas breech cover is used in India and the Middle East.

In very cold climates normal oil will freeze, and the use of specially suited lubricants becomes essential.

Remember, too, that it is not only the weapon that has to be cleaned and cared for, but also all that goes with it. For example:

(*a*) *The magazine* must be kept scrupulously clean, especially in sandy areas. Care must be taken to avoid damaging the lips, which will invariably cause feeding troubles. It is important therefore to note carefully just what the lips of a good magazine look like and their exact position. Never force rounds down *through* the lips, but always place the round in the magazine in front, then push it down and back *under* the lips. This is one common way in which they become damaged. When it is known what correctly positioned lips look like, it may be possible to reposition them if they are damaged.

(*b*) *Spare parts* must also be kept clean and ready at any time. They must be frequently checked over to see that none have been lost.

(*c*) *Cleaning kit* must also be cared for and oil and rags guarded jealously.

(*d*) *Slings*, particularly leather ones, must be kept supple or they will be unpleasant to use.

(*e*) Finally, there is *the ammunition* itself. In a critical moment one does not want to experience jams or difficulty in loading. The chargers must therefore be kept clean and the ammunition filled in them correctly, alternative rim under, rim over rim. This ensures correct and easy loading whichever way up the charger is inserted. This is far more important on service than when preparing for a rapid shoot in a competition on the range.

Ammunition cannot be left loaded permanently in light machine gun and machine carbine magazines. The springs must be given rest periods, a let-up as it were. Some system of giving this let-up must be arranged for, and the ammunition and magazines should be cleaned before refilling.

The other major factor in care of arms is care in handling them. Modern weapons are thoroughly serviceable, but there are, naturally, limits to what they can stand. At the same time, modern service conditions are extremely arduous, *i.e.*, crawling in wet, muddy ditches, crossing obstacles, perhaps scaling walls, and climbing into houses; all these are apt to impose strains which weapons cannot stand unless the owners are taught how to care for them.

The first warning is that, when crawling, the muzzle of a weapon *must* be kept clear of the ground, otherwise a lump of mud or dirt will be deposited in the barrel. The average owner may think this does not matter, as the bullet will blow it out. The fact is it will undoubtedly cause a bulge in the barrel or even a burst the moment a round is fired, which means the end of the weapon. In just the same way the action of the weapon must always be kept out of the mud and dirt.

It is possible to crawl without damaging or dirtying the weapon, and men must be taught not only how to do this but the importance of it. They must think of their weapons, and not of their own physical comfort. The fact that they get wet or dirty does not much matter, but should their weapons get in such a condition it matters very much indeed. It is all a matter of education.

Similarly, when crossing walls or obstacles it is the weapon that must first be cared for: Never impose strain on it by using it as a prop or a ladder, and never throw or drop it from a height.

It is to be hoped that enough has been said to stress the utmost importance of this subject. The present standard of weapons is not good, and much of this is due to lack of care.

It may not be believed, but it is a fact that bulged barrels are quite common, owing to a round being fired with an obstruction in the barrel. Damaged lips of magazines are also common, so is woodwork that is badly warped, and many other things which can and must be avoided.

Men must be taught enough of their weapons to know how to look after them and what particularly to look after. They must be taught to value their weapons and above all to have true pride of ownership instilled into them. The rifle is at the rock bottom of all. When men are taught to shoot, to know, to handle efficiently and care for their rifles, the care of other weapons will come as second nature.

ZEROING

S.A.T., Vol. 1, Pamphlet 1 (1942), Appendix I.
S.A.T., Vol. 1, Pamphlet 18 (1942), Section 3.

INTRODUCTORY

Those people who know what zeroing implies and realize its vital importance may occasionally have some doubts as to whether it is a practical service proposition. Some of the questions they will ask are: Will weapons remain zeroed under the arduous conditions that will have to be withstood on service, and will there be any opportunity periodically to check the zero and get it corrected? Does it really matter in any case? The answer to all this is that no unit should ever go on service without ensuring that all its weapons are properly zeroed. It can at least *start* at maximum efficiency in this respect.

With proper care of weapons, a large percentage of them will remain in zero, and, even on service, much can be done in a few quiet days to check and get it corrected where necessary. Many suitable natural features, such as banks, exist which can be adapted as impromptu ranges; tins, etc., will serve as targets. The fact remains that a unit which thinks and takes trouble about this sort of thing is the good-shooting unit who will stop any German attack; while others who just do not bother are not always of the same worth. A corps commander back from Libya said, when the view was expressed to him, that it exactly "hit the nail on the head."

MEANING OF ZEROING

The term "zeroing" means making any necessary alteration to the sighting of a weapon, so that when it is fired the shots will hit the point of aim—the centre of the target—at ranges of 200 yards and upwards. The weapon itself must also be capable of holding a group.

It is essential in *training* that weapons are accurately zeroed, otherwise men certainly cannot be taught to shoot with them. It is just as essential that they are kept zeroed on service or men will lose faith in them. What is the value of the light machine gun which shoots very low? Men will not remember what elevation is required if it is abnormal, nor indeed does this allowance remain *constant* at different ranges. Again what is the value of the rifle—and there are many about to-day—with a throw of a foot at 100 yards? At 300 yards this will be a 3-foot throw and at 600 yards a 6-foot throw. Zeroing should always be carried out on the following occasions:

(1) On issue of a weapon to a man.

(2) On receipt of a new weapon.

(3) When there is any reason to doubt the accuracy.

Every opportunity should also be taken to check the zero of all weapons at periodical intervals.

ZEROING THE No. 1 RIFLE

The No. 1 rifle (S.M.L.E.) is at present the main rifle with which men are equipped. The principles and method of zeroing it will be dealt with first in detail. The differences for other weapons will then be briefly considered; for the principles of zeroing remain the same whatever the weapon.

Correction of a Vertical Error

Provided that the rifle is correctly sighted for 200 yards (the lowest elevation on the scale), the ramps of the backsight are so curved that, when an increase of sight adjustment—say, 100 yards—is made, the correct increase in elevation to the barrel is given to make the bullet travel the requisite distance. As the increases in elevation are *not* constant at all ranges, it is essential therefore that the rifle should be correctly sighted at 200 yards—the lowest figure on the scale. Then the rifle will shoot correctly at all ranges.

There are seven different sizes of foresight available for this rifle. They are:

$+.03$; $+.015$; $.0$; $-.015$; $-.03$; $-.045$; $-.06$.

The sizes are marked on the block of the foresight and it should be noted that the height of the blade is the same in all cases: it is the thickness of the block that varies. An alteration of one size will give in theory a rise or fall in the target of:

When firing at	25 yards	... ...	$\frac{1}{4}$ inch
When firing at	100 yards	... ...	3 inches

The rule is to alter *into* the error. Thus if the shots are going high a higher foresight, and, if low, a lower foresight is required. To appreciate this, imagine that a rifle is placed in a vice and, a correct aim having been laid on to a target, the rifle is then clamped tightly so that it cannot be moved. The foresight is now taken out and replaced by one of a higher size. Now when one looks along the sights there will no longer be a correct aim but, in this case, it will be above the aiming mark. To correct this the butt must be raised and the muzzle of the rifle lowered. The effect of fitting a higher foresight is therefore to throw the shots lower.

Correction of Lateral Error

Lateral error is compensated for by shifting the foresight sideways in its bed. Again the rule is to move it into the error. If the rifle is shooting to the right it must be moved to the right; if to the left, to the left.

Imagine the rifle placed in a vice with a correct aim laid on to a target; the rifle being clamped tightly so that it cannot be moved. The foresight is now moved over to the right. On looking along the sights it will be found that the aim is no longer correct, but in this case will be to the right of the aiming mark. In order to correct it the butt of the rifle must be moved to the right and the muzzle to the left. The effect therefore of moving the foresight to the right is to throw the shots to the left.

Grouping Practice will Show when Alteration is Necessary.

The best way to ascertain whether a rifle is in zero or whether alterations are necessary is to fire a grouping practice. Let it be said clearly at the outset that a reasonable sized group must be obtained otherwise it is not possible to make the alterations. An 8-inch group can be taken as a guiding standard, but it cannot be too strongly stated that *no* definite size can be laid down. What matters is that the pattern of the group is regular, so in fact zeroing can be effected on many 12-inch groups. Any alteration that is necessary will at once be shown by the position of the centre of the group actually obtained in relation to where it should be. The centre of the group of an accurately sighted rifle should be in the centre of the target at ranges of 200 yards and upwards, but this is not the case at ranges *under* that distance.

The centre of the group should be as follows:

At 200 yards: centre of the target (point of aim).

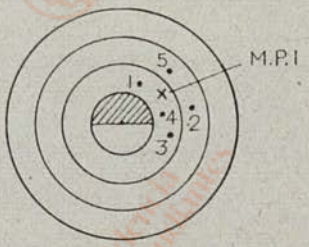
At 100 yards: 3 inches *up* from lowest central portion of aiming mark.

At 25 yards: ¼ inch *up* from lowest central portion of aiming mark.

A reasonable margin of error either way must be allowed, and a good guide to work on is to allow 2 inches up or down at 100 yards and ½ inch up or down at 25 yards.

That is to say, when firing at 100 yards, if the centre of the group is anywhere between 1 inch and 5 inches above the lowest central portion of the aiming mark it *may* be taken as correct.

ZEROING AT 100 YARDS.
Foresight on Rifle "0."



In this case the centre of the group obtained is 6 inches above where it should be—*i.e.*, 9 inches above the lowest central portion of the aiming mark, and 9 inches to the right. Two sizes higher foresight are required—*e.g.*, +.03, and the foresight requires moving over to the right. The amount to move it is readily determined with a little experience.

Examination of Weapons before Zeroing

Before weapons are zeroed they should be inspected if possible by the armourer. When the services of an armourer are not available the inspection should nevertheless be carried out, because some of the minor points can be corrected by any experienced person. Zeroing a weapon in poor condition is liable to be wasted time. The following are the main points to look for:

Foresight.—It should be perfectly tight, not deformed in any way, and not shiny. This last may be corrected by blacking.

Backsight.—The leaf should be firm in the bed, the cap tight, and the U not deformed; and the slide should work freely. When the cap is shiny it should be blacked.

Screws.—All screws *must* be tested to ensure that they are tight; it is amazing the way they work loose.

Trigger.—There should be two smooth pressures, no hang or drag.

Butt.—This should be perfectly tight.

Barrel.—This should not be influenced by the fore-end. Test by inserting a round in the muzzle end and noting whether the barrel moves on pressure being applied.

Considerations during Firing

When firing, everything possible must be done to ensure that the firer and the rifle give a true performance. The barrel must be perfectly dry and two warming shots should be fired. The sights must be set at 200 yards exactly; the wind gauge, if fitted, must obviously be central. No bayonet will be on the rifle, which *must* be correctly rested on sandbags or other cover, built to suit the firer. Good shooting weather, *i.e.*, a calm day, should be chosen if possible. When zeroing has to be carried out on a windy day the necessary allowance to be made must be predetermined by a skilled shot with a known accurate rifle.

Choice of 25-yards or 100-yards Range for Zeroing and Organization

As previously stated, the best method of ascertaining whether adjustments are needed is by firing a group, and this can be done either at 25 yards or 100 yards range. The decision as to which distance is adopted generally depends on the accessibility and availability of ranges and the time factor. Generally speaking, it is preferable to zero at 100 yards if it is possible, but it will take rather longer in time than at 25 yards.

Wherever zeroing is carried out very careful organization and a sound system are essential if it is to be done efficiently and expeditiously.

A careful record should be kept and an armourer, if available, should be on the range to carry out the necessary alterations. This is done with a tool called a cramp, after the nosecap of the rifle has first been removed.

On the 25-yards range the best method is to send the targets to the armourer so that he can make the adjustments with the actual group in front of him. On the 100-yards range this is not possible, and a system of chits must be adopted; a written slip being placed under the backsight of each rifle informing the armourer what to do. All that is required is the following:

Rifle No. 639012.
Foresight on −.015.
Foresight required, +.015.
Going 3 inches right.

When all the alterations have been carried out, check groups must be fired, and the process continued until all rifles are correctly zeroed. In this respect much will depend on the skill of the armourer or person making the adjustments. Some men have the knack of knowing just how much to turn the cramp to cater for a certain throw; others have not, and may not achieve the desired result at the first attempt.

Minor adjustments of an inch or so at 100 yards should *not* be attempted; they are unnecessary and set the armourer a very delicate problem of adjustment. Finally, it is often asked if men should be allowed to zero their own rifles. The answer is "Yes"; if they fail to get a sufficiently good group to enable the adjustments to be made then a skilled shot must fire the rifle for them.

When zeroing is completed the foresights of all rifles should be inspected to see that they are perfectly tight. Sometimes after alteration they will be found to be loose or "floating," in which case they must be secured by centre-punching. The rifle, of course, must then be rezeroed for direction.

These principles given for the No. 1 rifle apply in general to all rifles and light machine guns. Differences with these weapons will now be considered. The details as to foresights available and positions where the M.P.I. of groups should be are all given in the table on page 11.

THE No. 3 RIFLE (Patt. 1914) AND .300 RIFLE (Patt. 1917)

A Mk. II cramp will be required for adjustments. There are eleven sizes of foresight with these rifles (for details see page 11). Zeroing is carried out in exactly the same way as described for the No. 1 rifle.

THE No. 4 RIFLE

As the primary sight of this rifle, when fitted with the dual aperture battle sight, is designed for use at 300 yards with the bayonet fixed, it is essential to zero with the bayonet fixed. Exact zeroing with this rifle is not always possible; when correctly zeroed it will be correct at 300 yards, but not necessarily at 400 or 600 yards.

When dealing with No. 4 rifles fitted with the normal target aperture backsight zeroing follows on normal lines as for the No. 1 rifle. The bayonet is *not* fixed; the 200-yards sight is used.

THE STEN MACHINE CARBINE

No attempt must be made to alter the foresight of this weapon, which will be issued correctly zeroed.

THE BREN L.M.G.

It is advisable to zero all L.M.Gs. leaving a high error. Barrels soon wear and this makes guns shoot low.

With the Bren, as the sights are *off-set* 1 inch to the left of the barrel, the group at 25 yards must be approximately 1 inch to the right of the lowest central portion of the aiming mark. Although, strictly speaking, the M.P.I. will at all ranges be 1 inch right, this does not matter when zeroing at 100 yards; at this range a group when approximately central should be taken as correct. An adjustment to cater for a 1-inch throw at 100 yards is not possible, nor is it necessary. For example, suppose the gun, when zeroing at 100 yards, to be exactly central for direction; that, in reality, is a throw of 1 inch left. It will only be a 6-inch throw at 600 yards, which is immaterial. At 25 yards, however, a gun which grouped dead centrally would have a throw of 1 inch left in reality, which at 600 yards would be 2 feet.

The method of zeroing the Bren is as follows:

A skilled shot should fire the gun, which is mounted on the bipod on firm ground, sights set at 200 yards. Five warmers followed by a group of five single rounds are fired, zeroing being carried out on the latter. It is an excellent plan to fire a few bursts as a check. Both barrels must be zeroed and harmonized to each other.

THE LEWIS GUN

The sights can be set to 100 yards, which is the lowest range shown. Therefore when zeroing at 100 yards range, the M.P.I. of the group should be at the point of aim. Excepting for this, the method of zeroing is the same as shown for the Bren L.M.G.

THE BROWNING AUTOMATIC RIFLE

This rifle should be zeroed at 200 yards, which is the lowest elevation shown on the sights. Should the rifle be fitted with a bipod, then use it, otherwise support it at the point of balance on sandbags. Fire two warmers into the bank, and follow with a group of five single shots. The M.P.I. of this group should be at the point of aim. Lateral alterations can be made by moving the foresight over, using a cramp. This operation is simplified on this rifle, as there are no foresight protectors.

Weapon.	Foresights available.	An alteration of one size gives a rise or fall on the target of approximately—		M.P.I. of group should be		Permissible variation to M.P.I. of group.		Remarks.
		At 25 yds.	At 100 yds.	At 25 yds.	At 100 yds.	At 25 yds.	At 100 yds.	
No. 1 Rifle (S.M.L.E.)	Seven: +·03, +·015, 0, −·015, −·03, −·045, −·06	¾ inch	3 inches	¾ inch UP	3 inches UP	±½ inch	±2 inches	
No. 3 Rifle (Patt. 1914)	Eleven: +1·35, +1·20, +1·05, +·09, +·075 +·06, +·045, +·03, +·015, 0, −·015	½ inch	2 inches	¾ inch UP	3 inches UP	±½ inch	±2 inches	
No. 4 Rifle fitted dual aperture battle sight	Seven: +·06, +·045, +·03, +·015, 0, −·015 −·03	½ inch	2 inches	1¾ inches UP	7 inches UP	±¼ inch	±1 inch	Slightly greater variation can well be allowed. Zero with bayonet fixed.
No. 4 Rifle fitted tangent aperture sight	Seven: +·06, +·045, +·03, +·015, 0, −·015, −·03	½ inch	2 inches	¾ inch UP	3 inches UP	±½ inch	±1 inch	Slightly greater variation may be allowed.
.300 Rifle (Patt. 1917)	Eleven: +1·35, +1·20, +·1.05, +·09, +·075, +·06, +·045, +·03, +·015, 0, −·015	½ inch	2 inches	¾ inch UP	3 inches UP	±½ inch	±2 inches	—
Bren L.M.G., Mk. I	Five: ·40, ·37, ·34, ·31, ·28	⅞ inch	3½ inches	1 inch right of lowest central portion of aiming mark	3 inches UP	±¾ inch	±3 inches	Zero to suit average of section.
Bren L.M.G., Mk. II	Eight: ·46, ·43, ·40, ·37, ·34, ·31, ·28, ·25							
Lewis L.M.G.	Three: High, Normal, Low	1½ inches	6 inches	1½ inches DOWN	Point of aim	±1 inch	±4 inches	Sights set at 100 yds.

FIRE CONTROL

S.A.T., Vol. 1, Pamphlet 2 (1942), Chapter 3 and Appendix.

INTRODUCTORY

This is a subject of such vital importance that it is strange that it is so neglected and that so little thought is given to it. Commanders do not seem to understand the extreme value of good fire control, and neither platoon and section commanders nor their men are properly trained in it. It is generally accepted that "there is nothing in it" as long as the weapons fire.

It is true to say that a large proportion of shots fired in war are wasted from bad fire control and consequently many opportunities missed of killing the enemy.

Good fire control requires not only a thorough knowledge of the subject by commanders, but also sound fire discipline on the part of the men in the ranks. It will not only ensure the maximum possible fire effect, but will keep men cool in the heat of battle and undoubtedly stop many enemy attacks that might otherwise succeed.

WITHHOLDING FIRE

It must not be thought that fire is to be opened whenever the enemy is seen. The fire unit commander must consider the range, the visibility and, above all, the vulnerability. Opening fire too early will spoil all chances of surprise, which is what one always wants to achieve in war. It is far better to wait until the enemy are within really effective range; the fire will then come with a real punch and knock them out once and for all. It is fairly safe to say that nine times out of ten on service one opens fire too soon; the moral therefore must be to withhold fire until the enemy are on ground of one's own choosing and within really effective range of one's weapons.

WHAT WEAPONS TO USE AND THE RATE AND TYPE OF FIRE TO EMPLOY

Odd enemy are best dealt with by using riflemen, or, if the gun is used, it will fire single rounds only. An enemy machine gun calls for a light machine gun, and bursts are necessary to deal with it. A determined enemy attack will call for all arms, but remember to let the enemy get into the most favourable position before opening fire.

Rapid fire must not be used unless there is real justification for its use. It is justified:

(*a*) To cover movement of one's own troops over open ground.

(*b*) To knock out a determined enemy attack, but even here better and quicker results may be gained by the L.M.G. firing single rounds rather than bursts, depending on the nature of the attack.

(*c*) To deal with a vulnerable target which calls for maximum volume of fire at once. This may be a body of enemy in close formation which will not remain *once* fire is opened. Therefore "the tap must be turned on" suddenly and as hard as possible.

CONCENTRATED AND DISTRIBUTED FIRE

Fire may be either concentrated or distributed. The former implies that it is all brought to bear on one point; the latter that it is spread over a wide target. The fire unit commander by naming a point, such as a bush, will automatically cause his fire to be concentrated on the required spot.

If distributed fire is required, such as to deal with an enemy positon along a hedgerow, then the limits between which fire is required should be named. This is not necessary if the target, although wide, is obvious, *e.g.*, an enemy attacking in extended line. In distributed fire the L.M.G. should normally fire single rounds.

The method of distributing fire is for the whole of the target to be covered by the riflemen firing at points along it relative to their own position in the section. Thus the left-hand man will fire at the left-named limit, the right-hand man at the right limit. In the case of the light machine gun it should distribute fire irregularly along the whole target.

HOW FIRE ORDERS ARE GIVEN

Fire orders must be given concisely. They must be clear to everyone and yet must be as brief as possible; no unessential word should ever be used. They can be likened to a telegram of vital importance being sent by a man who is desperately hard up.

They must be given loudly enough for all concerned to hear them; calmly, because then men will keep calm and cool-headed; with proper pauses to allow men to act on them—for example, there must be a pause after the range in order to allow men to adjust their sights and be ready to follow the indication. This last should be split up by pauses, if necessary, to allow men to follow it and recognize the description.

Finally, they must be given as orders, for then they will be acted upon and obeyed as orders.

All these points are important, for they help to ensure good fire discipline and to create coolness and calmness in what may be times of great stress.

The key word to remember this by is CLAP—Calmly, *L*oudly, *A*s an order, *P*auses.

SEQUENCE OF GIVING A FIRE ORDER

Fire orders are given in a definite, logical sequence; the keyword to which is DRIK:

D—Designation—to whom the order is addressed.

R—Range.

I—Indication—the concise description of the target.

K—Kind of fire.

This sequence must be examined in some detail.

Designation

This may be:

(1) "No. 1 Section,"—in which case the whole section will fire; or

(2) "Bren Group,"—in which case only the Bren group will be required to fire; or

(3) "Rifle Group,"—in which case only the rifle group will be required to fire.

Note.—When the Bren or rifle groups are operating on their own *away* from the other part of the section the designation can obviously be omitted altogether.

Range

"400." No more, no less. Do not go into multiples of *less* than 50 yards. Consider if the target is being attacked with the beaten zone *or* dangerous zone. In the latter case, give the range greater than it really is. The range must be given first in the body of the order, because it allows men to adjust their sights and they can then give *their whole attention* to the following of the indication. Moreover, by giving the range first, men know approximately where to look, and if the above range, "400," is given they will not look on a far-away crestline.

Indication

This is the heart of the order, and consists of pointing out the required target. This *must* be done in the shortest and clearest way possible, in order to ensure that everyone recognizes the target without any waste of time or delay. Indication may be by the direct method if the target is easy, or the indirect method using aids if it is difficult. There is a golden rule to remember: "*Never use aids unless they are essential.*"

The direct method consists either of naming the target without further ado if it is obvious, or of giving the direction of it *from the general line of direction* before naming it.

Thus: "400—white house—right bottom corner"; or "400—slightly (quarter, half) right—gap in hedgerow."

The indirect method consists of using aids as follows: a reference point is selected in defence, or, in the attack, an obvious feature is named. It may then be possible to indicate the target by the direction from the reference point.

Thus (" house " being the reference point): " 400—house—slightly right and beyond—small bush."

Alternatively, the vertical clock method may be used in conjunction with the reference point, which forms the centre of the clock face. This is a good method, particularly on rising ground, but it is not so satisfactory if the ground is level.

Thus: " 400—poplars—right—2 o'clock—black patch in green field."

If still further aids are necessary, finger breadths may be used. Although it may be argued that men's fingers differ in size, it is sufficiently accurate to be of real help. When using finger breadths the arm must be held out at full extent, and both the reference point and the target must be clearly visible on either side of the fingers.

Thus: " 400—haystack—left—10 o'clock—3 fingers—small white patch on hillside."

Finally, the use of degrees may be resorted to. It can only be stated that degrees should *never* be used unless absolutely unavoidable. Men should, of course, know approximately how many degrees various portions of their hand subtend, but it is doubtful if they often understand them.

There is no real road to successful indication beyond the use of common sense. Should the target be difficult, then try to pick out something in the vicinity that is obvious and which everyone will recognize. Take any short cut possible—the firing of a round of tracer is an excellent method.

Thus: " 400—quarter right—hillside—watch my tracer."

Another possibility is firing a burst or so from the L.M.G. with ordinary ammunition if the strike can be seen.

Thus: " 500—slightly left—large green field—watch my strike." (The gun should always be used in this case.)

Kind of Fire

If distributed fire is required the limits will have been named in the indication as already stated.

So far as the gun is concerned, this will be either " Fire," " Bursts —fire " or " Rapid fire." If " Fire " is ordered, single rounds will be used, the rate of fire depending entirely on the target that is presented.

If " Bursts—fire " are ordered, the gunner will fire in bursts at the rate of a magazine a minute.

If " Rapid fire " is ordered, the gunner will fire in bursts at his own best rate.

When the riflemen only are used they will be ordered " Fire " or " Rapid fire."

When the whole section is used " Bursts—fire " will obviously mean " Fire " so far as riflemen are concerned.

It should be noted that the number of rounds or bursts are *never* given. Fire is far better controlled by " Stop " and " Go on."

TYPES OF FIRE ORDERS

There are four types of fire orders:

1. **Normal**

This, as its name implies, is used for all normal occasions, *e.g.*:

"No. 3 Section—400—quarter right—twin bushes on far side of road—left bush—bursts—fire."

2. **Brief**

This is used when the target is an obvious one, or in an emergency when time does not admit, nor is there the necessity, of using a normal order, *e.g.*:

"300—half right—rapid fire." (No target is named, because it is *obvious* that it is the enemy, who are visible.)

When fire is switched suddenly from a more distant target to deal with a sudden emergency, such as an enemy rush, it is essential to ensure that attention is attracted by the word "Stop." Alteration of the sights must also be remembered, *e.g.*:

"Stop—sights down—half left—rapid fire."

It should be added that on many occasions when the target is obvious a brief fire order will suffice instead of a normal one. There is no need to *indicate* the enemy if they are clearly visible.

Fire unit commanders should consider the brief fire order as the usual type to be used if at all possible.

3. **Anticipatory**

This type of fire order is used when anticipating movement, either by our own troops or by the enemy. In other words, the plan is laid previously so that "the tap can be turned on" the moment it is necessary, by giving the command "Fire" only. It may be to cover the forward or flank move of our own troops during the passage of an obstacle—*i.e.*, open ground.

Alternatively it may be anticipated that the enemy are likely to appear at a certain point, possibly to cross the only bridge, ford or other approach.

It is a case of getting the enemy where he is wanted and then suddenly hitting him the hell of a punch with all weapons. Try to get him well away from cover if possible.

Time is not usually so vital with anticipatory fire orders, and the Section Commander can therefore afford to "spread" himself a little more to ensure that all the men are quite clear as to the meaning of his order.

Example (to cover movement of own troops): "No. 1 Section—500—slightly right copse—along the near edge—open rapid—await my order."

Example (anticipating enemy movement): "No. 1 Section—600—ford—open rapid—await my order."

In both cases it remains for the Section Commander to order "Fire" at the crucial moment.

An anticipatory fire order will nearly always warrant the use of rapid fire.

4. **Fire Order for the Individual**

When enemy movement has been seen in a certain area—a group of buildings, the edge of a wood, etc.—the above fire order is required so that the gunner or riflemen can apply fire instantly on their own, without further orders, should they see a target. It is normally used at comparatively close ranges, and is in reality nothing but a permissive order to fire as individuals, as targets are seen, *e.g.*:

"No. 1 Section—300—slightly left—farm buildings—enemy in that area—fire when you see a target."

FIRE CONTROL AT NIGHT

It remains to be added that fire control is just as necessary at night as by day. Orders must be given quietly and should be the briefest possible. There is no point in giving a range; aim is not possible through the sights nor will the enemy necessarily be visible. The direction therefore only should be named, *e.g.*:

"Half right—rapid fire."

PRACTICAL THEORY

S.A.T., Vol. 1, Pamphlet 1 (1942), Chapter 2 and Appendix IV.

REASONS FOR UNDERSTANDING SIMPLE THEORY

One may sometimes wonder why in war time there is any need to have a knowledge of theory at all. The answer is that in the first place tactics are closely allied to it because they are largely based upon and governed by the characteristics of weapons. In the second place, the best results from weapons will be obtained only when one has a knowledge of simple theory. Last, but not least, instructors and those who have to control fire on service, must have a sound knowledge. It is the "little extra" which may be of help to them in answering questions or getting the best results from their fire.

NECESSITY FOR SIGHTS ON A WEAPON

It is best to consider, at the outset, why sights are needed on a weapon. Should there be none, firing would have to be done by directing or pointing the weapon at the target. The bullet would not reach but would fall short; therefore it is obviously necessary to elevate or raise the barrel of the weapon above the target in order to make the bullet arrive there. Sights on a weapon give the necessary amount of elevation required to the barrel and, at the same time, enable the firer to keep his target in view the whole time. The above may be compared with a man who has to throw a ball some distance. He throws it up into the air in order to make it reach the desired spot.

TRAJECTORY

The path the bullet takes through the air is called its trajectory. It is always a curved path, this curve being due to the three forces acting on the bullet:

(1) The force of explosion, which drives the bullet forward.

(2) Resistance of the air, which tends to check or slow it up.

(3) Gravity, which is all the time trying to draw it down towards the centre of the earth.

How pronounced or steep the curve is depends entirely on the range at which firing is taking place. At short ranges the trajectory is comparatively flat because there is only a little elevation on the barrel. At longer ranges the trajectory takes a much more pronounced curve, going high into the air and falling at a steep angle of descent, because more elevation is needed to the barrel in order to make the bullet reach the target. A practical example is the "slips" on the cricket field, who will probably return the ball to the wicket-keeper by an underhand throw, while the man in the outfield will throw in overhand high into the air. In the one case the ball has not far to travel; in the other, it has a considerable distance (see Fig. 1).

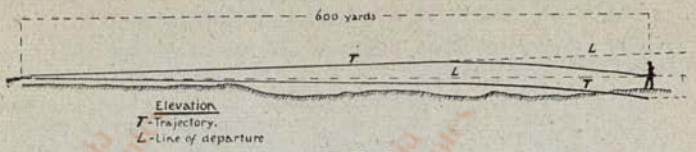


FIG. 1

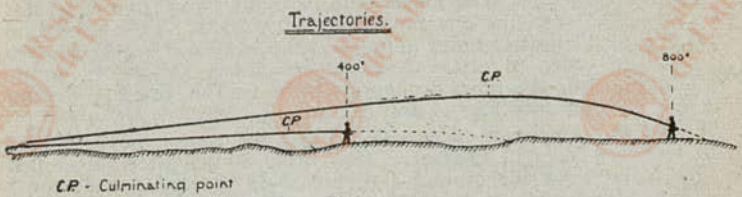


FIG. 2

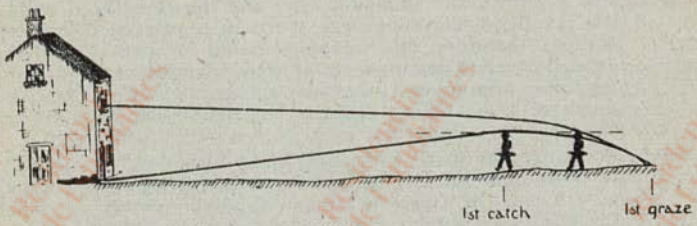


FIG. 3

CULMINATING POINT

The highest point the bullet reaches on its trajectory is known as the culminating point. It occurs somewhere beyond the half-way distance. A study of trajectory tables will be amply repaid, but one figure only need be memorized, which is that the culminating point of a bullet fired at a range of 600 yards is approximately 4½ feet above the line of sight (see Fig. 2).

FIRST CATCH, FIRST GRAZE AND DANGEROUS SPACE

The first catch is the place where a bullet had descended low enough to strike the target. It should be noted that the height of the target is not in any way defined, but where a particular bullet has descended low enough to strike a particular target, that is the first catch (see Fig. 3).

The first graze is the place where the bullet strikes the ground (see Fig. 3). The distance between the first catch and the first graze is known as the dangerous space.

FACTORS AFFECTING THE DANGEROUS SPACE

Certain factors will affect the length of the dangerous space, and these are set out as follows:

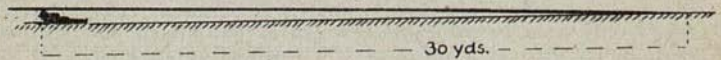
(*a*) The dangerous space will decrease as the range at which firing takes place increases. In the diagram, for the purpose of comparison, a target of the same height is shown against the final part of the trajectories of bullets fired from ranges of 600 yards and 1,000 yards. It is obvious that the dangerous space will be longer with the bullet fired from 600 yards than with the one fired from 1,000 yards. This is because at the greater range more elevation is needed on the weapon in order to make the bullet reach; the trajectory consequently is a more pronounced curve and the angle of descent steeper (see Figs. 4 and 5).

(*b*) The dangerous space will increase the nearer the firer is to the ground. Imagine a man firing at the same target first lying on the ground and then from the top window of a nearby house. In the latter case he has to fire downwards; this is known as "plunging" fire and the effect is to reduce the length of the dangerous space to a marked degree. It follows, therefore, that weapons should be sited as near the ground level as possible. Loopholes in pillboxes should be near the bottom and not high up in the walls, otherwise much of the "killing distance" of the bullet is sacrificed. This is a very important point that is often overlooked.

(*c*) The dangerous space will increase the higher the target. It is obvious that the first catch will occur earlier in the trajectory where the target is a man standing than it will when the same man is lying down (see Fig. 6).

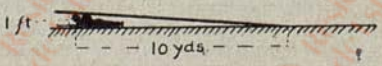
(*d*) The dangerous space will increase the flatter the trajectory. This is self-evident from the diagram (see Fig. 6).

(*e*) The dangerous space will increase the more nearly the ground conforms to the trajectory of the bullet. Imagine a man firing at a target on perfectly flat, level ground. The bullet



Range - 600 yds Slope of fall - 1 in 90

FIG. 4



Range 1000 yds Slope of fall - 1 in 30

FIG. 5

FIG. 6

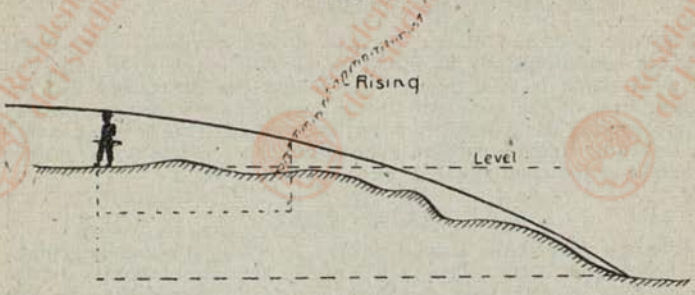


FIG. 7

has descended low enough to strike this target at a certain point, which is the first catch. The bullet goes on and strikes the ground behind—the first graze. Now if the ground were not perfectly level, but fell away, as is shown on the diagram, the bullet can then travel farther before striking the ground; consequently, the dangerous space is increased. The maximum will occur when the slope of the ground conforms approximately to the angle of descent of the bullet. The reverse should also be noted. Where the ground is a forward slope and rises up towards the direction of fire, the dangerous space will be materially reduced (see Fig. 7).

COLLECTIVE FIRE

So far, the theoretical knowledge of one bullet only has been discussed. Under normal service conditions this knowledge of the behaviour of one bullet must be applied to that of several bullets, which is collective fire. Collective fire implies the fire of several weapons under the control of a leader.

CONE OF FIRE

A cone of fire is the pattern formed by several bullets as they pass through the air.

When a magazine is fired from a light machine gun at a target which is then examined, a number of shot-holes will be found on it. These represent the "pattern" formed by the bullets as they passed through or, in other words, the true cone of fire. The same effect can be obtained with several riflemen, each firing a certain number of rounds, using the same point of aim and with the same elevation on their sights.

The following points should be noted which are true of all cones:

(1) Although the same point of aim and the same elevation on the sights are used, the bullets do not pass through *one spot*, but form a pattern or group.

(2) The shots are densest in the centre.

(3) The pattern is oval in shape; the distance vertically being longer than that horizontally.

The size does not matter, because it will obviously vary under different conditions and according to the skill of the firers, etc., but the oval shape is all-important. It should be appreciated that the highest shot of the cone will travel a considerable distance farther before striking the ground than the lowest shot. This is because they are travelling roughly parallel, although only a few feet separate them in height in the cone (see Fig. 8).

BEATEN ZONE

A beaten zone is the area of ground on which the bullets actually strike or come to rest. Theory will tell us the size of normal beaten zones of various weapons at various ranges, but again the size does not matter particularly, provided that the shape is realized. Owing to the shape of the cone, the beaten zone of any weapon is always very long and narrow, something like a cigar.

It will be noted that as the range at which firing is taking place increases so does the length of the beaten zone decrease. Think back to dangerous space: as the range increases so does the dangerous space decrease. What is true of one bullet must be equally true of several bullets. The fact that it gets a little wider with increasing range is due to the various climatic and other errors that become accentuated (see Fig. 9).

FIG. 8

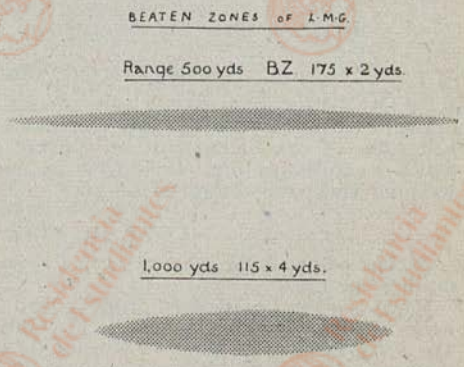


FIG. 9

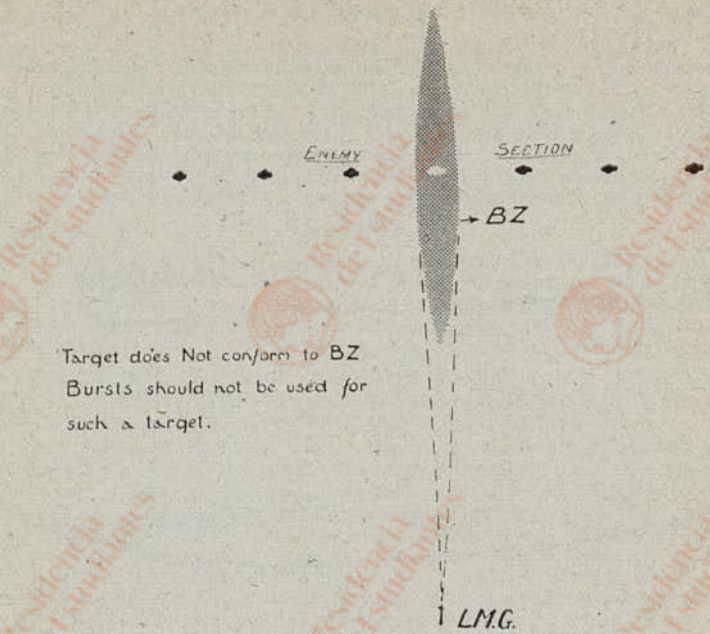


FIG. 10

Target conforms to BZ. – maximum fire effect.

FIG. 11

BEST FIRE EFFECT OBTAINED ONLY WHEN TARGET CONFORMS TO SHAPE OF BEATEN ZONE

It follows, therefore, that if the beaten zone of all weapons is long and narrow the best results from fire will be obtained only when the target is also of this shape. This affects the siting of our weapons, as we must always endeavour to obtain maximum fire effect on the target. Enfilade, or fire from a flank, will normally, therefore, give the best results (see Figs. 10 and 11).

EFFECT OF GROUND ON FIRE

The figures of beaten zones given in range tables are those for normal, level ground. It will be remembered that the dangerous space increased the more nearly the ground conformed to the trajectory of the bullet. In just the same way, if the ground on which the fire is striking falls away, so will the length of the beaten zone be increased. Conversely, if the ground rises towards the direction of fire, the beaten zone will be automatically foreshortened; the maximum being attained when firing against a vertical cliff (see Fig. 12).

FIG. 12

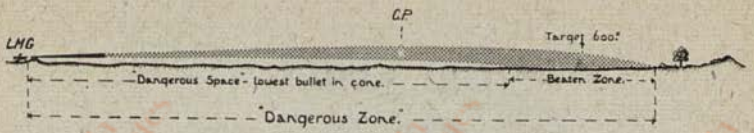


FIG. 13

DANGEROUS ZONE

The dangerous zone is the beaten zone plus the dangerous space of the lowest bullets in the cone. In discussing dangerous space there is one factor that must be predetermined—the height of the target. Let us assume that the target is a man standing, say, 5 ft. 8 in. Now take the case of a light machine gun firing at a range of 600 yards.

The fire will come down in a beaten zone, the length of which at this range will be approximately 160 yards, the centre of it being on the target, provided that fire has been correctly applied.

Now we must work out what is the dangerous space of the lowest bullets of the cone. Remember that the culminating point of a bullet fired at a range of 600 yards is 4½ feet above the line of sight. This may therefore be taken as one of the centre bullets in the cone. The lowest bullets in it will be considerably lower. The height of the target is 5 ft. 8 in., so it follows that the whole distance from the gun to the near end of the beaten zone will be dangerous space, because the lowest bullets of the cone would strike the target anywhere along that distance. Consequently, when firing at ranges up to about 600 yards there is a tremendously long dangerous zone, extending all the way from the gun muzzle to the far end of the beaten zone (see Fig. 13).

APPLICATION OF FIRE

It is important to realize the significance of the dangerous zone and the beaten zone. At ranges up to 600 yards on normal ground if the target is enemy moving forward it is not necessary to apply the beaten zone on to them; far better effect will be gained by attacking them with the whole dangerous zone, the beaten zone, in actual fact, falling behind them. On the other hand, if the target is one of little height, such as an enemy machine-gun post, it must be attacked with the beaten zone itself.

The same, of course, applies to ranges over 600 yards, when the effect of the dangerous zone decreases as the range increases, and finally the beaten zone only will give fire effect.

GRENADES

S.A.T., Vol. 1, Pamphlet 13 (1942).

Kit Required

1. Nos. 36, 68, 69, 73, 74, 75 grenades (drill).
2. Cut No. 36 grenade.

INTRODUCTORY

There is nothing new in grenades—they have featured throughout the centuries as weapons of war, and have always occupied a most prominent place amongst them. In fact, certain units of the British Army were, and still are, called after them. The grenadiers of the old days were specially selected men formed into units whose sole job was the use of grenades.

As modern science has developed so has the grenade. Always a formidable weapon, its effect now can sometimes be described as devastating. It is the auxiliary weapon of the infantry and is used for close-quarter fighting and for tank and vehicle destruction.

Every man, whether he is in the Regular Army or Home Guard, should have an intimate knowledge of these weapons. Confidence is born of knowledge, and the result is efficiency. Grenades cannot be treated as playthings, and many accidents have occurred through failure of the individual to appreciate the working or characteristics of the particular grenade that he is handling. *Grenades are not dangerous if properly handled—only if misused.*

All N.C.Os. must know the characteristics of the grenades they, and the men under them, are going to handle and use. The tactical use of these grenades is based on their characteristics. Some grenades are designed to kill the individual at close quarters, some to smoke him out, some to "put the fear of God" into him during patrol, some to damage tanks, and so on.

The grenades that are going to be dealt with here briefly, but with sufficient detail to show their characteristics and tactical uses, are the Nos. 36, 68, 69, 73, 74 and 75.

THE No. 36 GRENADE (see Fig. 14)

This is the Mills grenade of the last war. Although there have been many attempts to better it, these have not succeeded. There is no doubt that it is in a class by itself as a "killer."

It is primarily designed and meant to be used as a hand grenade, but can also be fired from a discharger attached to either the No. 1 (S.M.L.E.) or No. 3 (Pattern 1914) rifle.

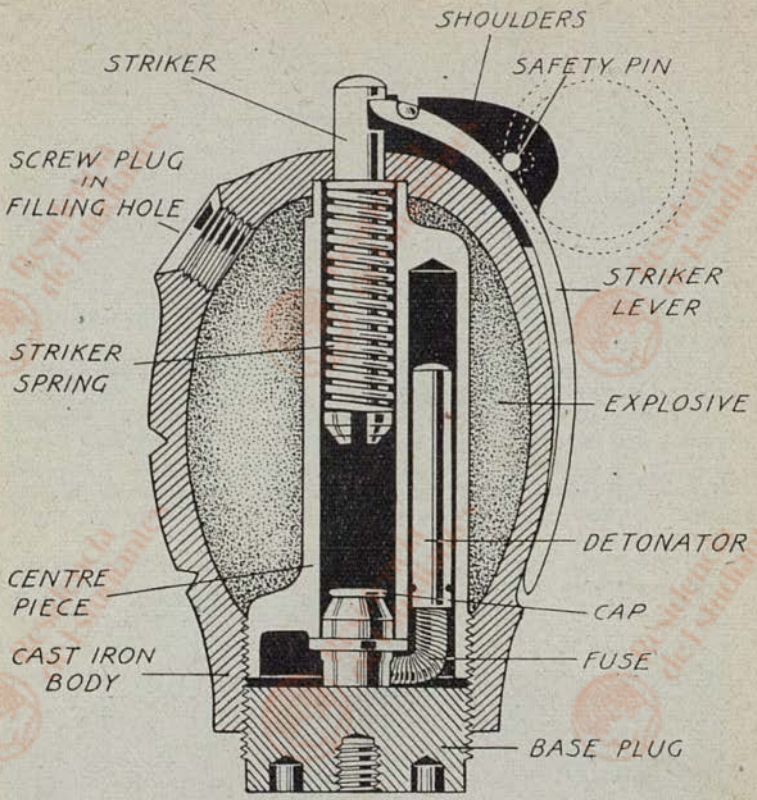


FIG. 14.—**THE No. 36 GRENADE**

Painted chocolate in colour, with red crosses on the upper surfaces to denote that it is filled with high explosive, it is criss-crossed with corrugations to assist in fragmentation. The mechanical action is as follows: on pulling out the pin and releasing the lever the striker is forced down by the compressed spring and strikes the cap of the igniter set. This starts the fuse burning, and at the end of the requisite time limit the detonator is fired and the grenade explodes.

There are two types of igniter set—one has a time fuse of 4 seconds and the other of 7 seconds. The former is for the hand

grenade and the latter for the rifle grenade. The igniter sets can be distinguished as follows:

(1) The 4-second fuse is white in colour and has a band round it to enable it to be picked out by feel in the dark.

(2) The 7-second fuse is buff in colour and has *no* band.

The grenades are packed in a wooden box, which contains twelve of them together with a small tin box containing twelve igniter sets, and the base-plug key fitted to the inside of the lid.

Characteristics

1. When thrown has a relatively short range—25 to 35 yards, dependent on the strength and skill of the thrower. When fired the range is from 80 to 200 yards.

2. When properly thrown there is a high trajectory and a steep angle of descent (see Figs. 15 and 16).

3. Weight is 1½ lb., which is fairly heavy. This must be remembered when they are carried on the man. Use them sparingly.

4. The danger area is 20 yards in all directions from the point of burst. However, large fragments can inflict casualties up to 300 yards or more, especially when the burst is on hard or stony ground.

5. When fired from the discharger, it is very susceptible to wind. Allowances must be made, and the firer must aim off into the wind.

Tactical Uses

These are evolved from the characteristics. Consequently, the system of training must also be based on the characteristics.

The tactical uses are:

(1) To kill the enemy behind cover.

(2) To make it so hot for him behind cover that he is forced out into the open and then dealt with by other weapons. It can be compared with putting a ferret down a hole and bolting a rabbit.

(3) It has especial value when used in cramped localities, enclosed places, and in street and house fighting.

Notes

1. The thrower must remember to be behind cover when the grenade explodes, otherwise he is likely to blow himself up owing to the large area of burst. Naturally, he need not take cover when throwing into trenches, dug-outs, houses, etc.

2. The great advantage of a time fuse over percussion fuse is that the grenade can be lobbed down steps into dug-outs, rolled through doorways, etc., and does not go off until it is there.

FIG. 15

FIG. 16

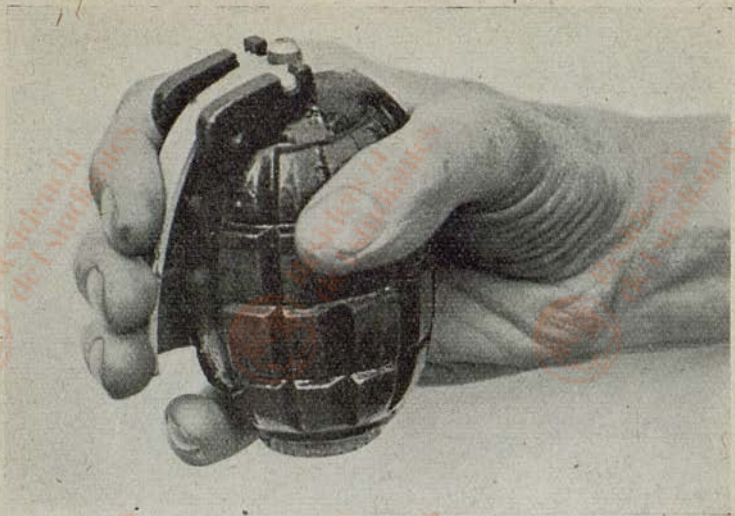


FIG. 17.—**INCORRECT HOLD, No. 36 GRENADE**
(Fingers insufficiently over lever)

FIG. 18.—**CORRECT HOLD, No. 36 GRENADE**

3. Always remember, do not use a grenade if the job can be done by the bullet or bayonet.

4. The correct hold is all-important (see Figs. 17 and 18).

THE No. 68 GRENADE

The object of this grenade is to damage hostile armoured fighting vehicles. It is fired from the discharger fitted to the No. 1 (S.M.L.E.) or No. 3 (Pattern 1914) rifle. The muzzle end is strengthened by being bound round with wire or cord. A 30-grain ballistite cartridge is used.

The mechanical principle is as follows: pull out the safety pin and insert in the discharger. On firing, the shear wire is broken. On impact the striker overcomes the resistance of the creep spring and hits the cap, which in turn sets off the high explosive.

Seventeen and a box of twenty ballistite cartridges are carried in each tin box. The other equipment is the discharger and special sight.

Characteristics

1. A flat trajectory is necessary in order to hit a moving armoured fighting vehicle or tank, and so the rifle must be fired at a very flat angle—about 10° above the horizontal.

2. The range is limited to about 100 yards. A rough sight is provided and the firer should lie in the same position as when firing a rifle, *i.e.*, on his stomach, and grip the rifle in his left hand at the point of balance. The rifle is the correct way up.

Tactical Uses

To damage enemy armoured fighting vehicles. It is of great value in any defensive position, pillbox or when used to cover a road block.

Owing to the short range, cover from the enemy's fire is essential. The ideal is to fire from slit trenches, having first let the tank or other vehicle pass by, and then give it a crack on the backside, where the armour is thinnest. Remember that the force of the explosion is all forward.

Notes

1. Owing to the very considerable recoil experienced, an object such as a sandbag or sod of earth should be placed behind the butt when firing. Another way is to kick a hole in the ground or place the butt against an existing bank or tree stump.

2. The firer must always ensure that the gas port is fully closed and that the discharger is screwed fully home. The grenade must be inserted fins first; failure to do this will mean a trip for the firer for an interview with St. Peter!

THE No. 69 GRENADE (see Fig. 19)

This grenade is an offensive action hand grenade made of bakelite. The mechanical principle is as follows: remove safety cap and throw the grenade. On striking the ground in any position the two-pronged striker overcomes the creep spring and strikes the cap and explodes the grenade.

Thirty-four grenades and detonators are packed in one tin box.

Characteristics

1. A percussion type of grenade. Explodes on impact.

2. Goes off with a loud bang, so has a big moral and frightening effect.

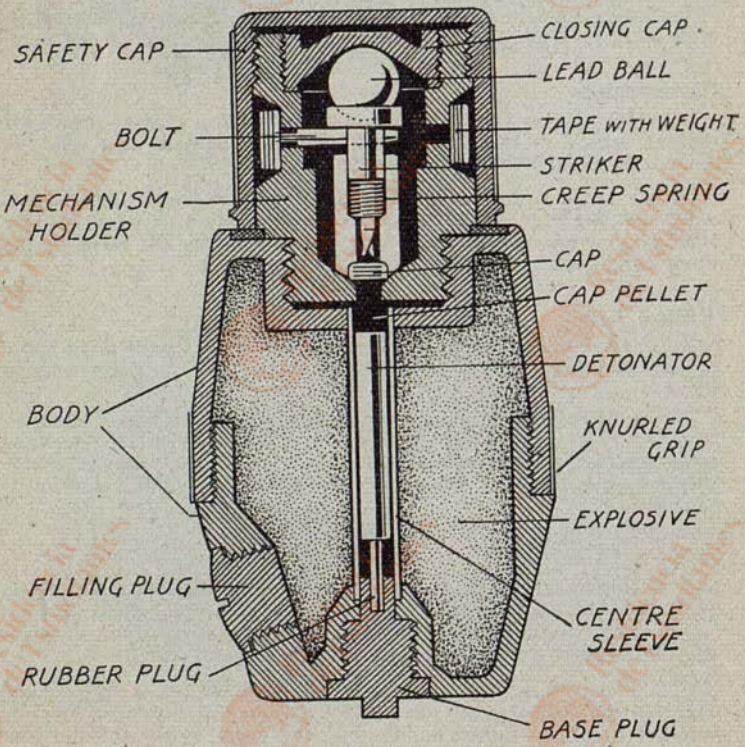


FIG. 19

3. The material effect or damage done is small. Area of burst is very small.

4. Can be thrown with impunity in the open.

5. Weight just over ¼ lb., so can be lobbed or thrown in any manner, orthodox or otherwise.

Tactical Uses

1. Ideal for patrol work, especially at night. Should an enemy patrol be encountered the surprise and general effect on morale should enable it to be conclusively dealt with.

2. Use at short range. Throw straight at enemy only a few yards away. There is no need for the thrower to take cover.

3. Lends itself for use in booby traps.

THE No. 73 GRENADE (Obsolescent)

This grenade was introduced as a stop-gap in 1940 during the emergency period. It is a hand anti-tank or armoured fighting vehicle grenade. Packed in a box containing ten with detonators. The mechanism is similar to the No. 69 grenade.

Characteristics

1. A percussion type of grenade that explodes on impact.

2. Very clumsy and heavy—weighs 4 lb. so can only be thrown about ten yards.

3. Thrower must be behind cover before it strikes owing to the force of explosion.

Tactical Uses

1. To damage the suspension of armoured fighting vehicles.

2. Can be used to good effect from road blocks, or when dropped from roofs or windows on to vehicles below.

THE No. 74 (S.T.) GRENADE

Commonly known as the "sticky" grenade owing to the coating of sticky material on the outside of the globe. The object of the grenade is to damage armoured fighting vehicles (see Fig. 20).

The mechanical principle is as follows: remove casing, pull out the safety pin in the handle. Release the lever and the striker is forced down by the spring on to the detonator assembly. After 5 seconds the grenade explodes (see Fig. 21).

Each tin box contains five grenades and a box of detonator assemblies.

Characteristics

1. A time-fuse type of grenade—5 seconds.

2. Will stick to the surface of armoured fighting vehicles provided the surface is not oily, wet, dusty or at a steep angle.

3. The thrower is safe when only 10 to 15 yards away from the burst.

Tactical Uses

1. Damage to armoured fighting vehicles. Can be thrown or placed on.

2. Can be used with great effect as a portable demolition charge. For instance, during a raid on tank parks at night, etc. Smash it on to the vehicle, still holding the handle, in some vulnerable part—release the grip and run round the tank to cover or away.

THE No. 75 (HAWKINS) GRENADE MINE

This is a very efficient anti-tank weapon. Somewhat similar in appearance to the respirator container (see Fig. 22).

A box contains twelve, also igniters and detonators.

Characteristics

1. Can be used as a grenade, mine or portable demolition charge.

2. Owing to fairly light weight is easily portable.

3. Does not explode when thrown—must have pressure put on it.

4. Can be picked up and reused with safety.

Tactical Uses

1. As a grenade, can be thrown in the path of oncoming armoured fighting vehicles. Several should be thrown to ensure that the vehicle passes over at least one of them.

2. As a mine—laid out in staggered rows. Try to conceal by covering in with grass, heather or leaves, but do not bury it unless absolutely necessary—and then as shallowly as possible, compatible with concealment.

3. As a portable demolition charge. Explode with a length of time fuse and a detonator.

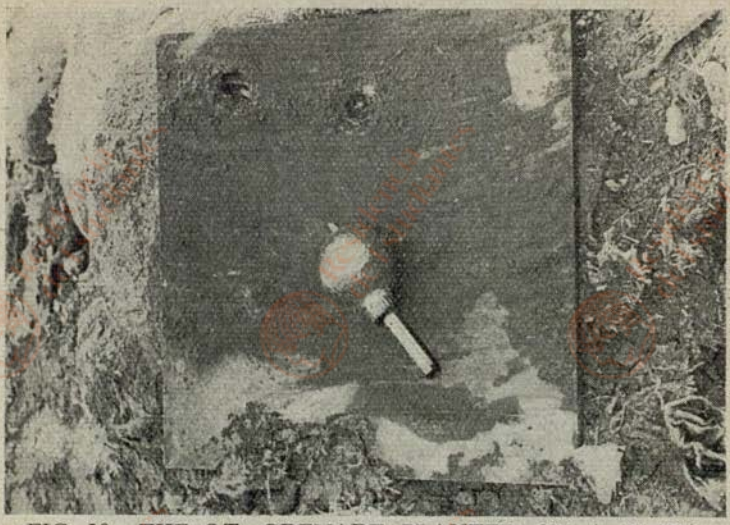


FIG. 20.—**THE S.T. GRENADE PLANTED ON A PLATE**
(Note the sticky envelope)

FIG. 21.—**S.T. GRENADE BURSTING**

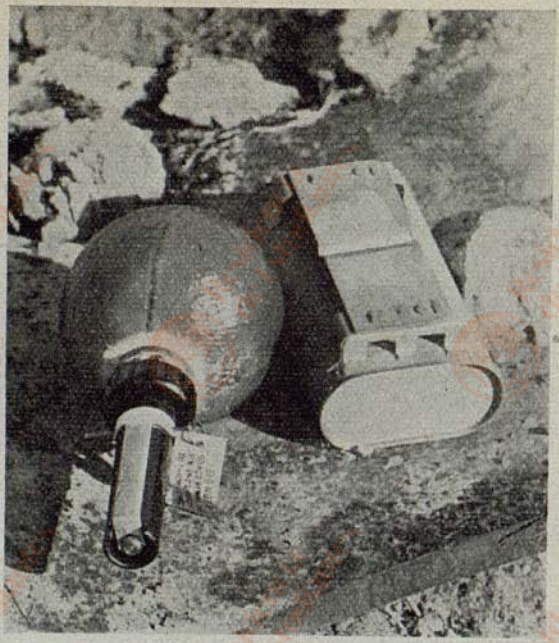


FIG. 22.—**DESTROYING A "BLIND" No. 75 WITH AN S.T. GRENADE**

S.T. grenades may be used for destroying all types of "blind" grenades. Either the pin may be pulled out by hand should cover be available at hand, or a length of string may be used to pull out the pin from behind safe cover at a considerable distance.

SUMMARY

No man can be considered to be trained in grenades until he has handled and thrown or fired live material. Once he has done this he will have attained the confidence required.

It must be remembered that the grenade is in *no* sense a dangerous weapon. Accidents are rare, and nearly always due to one of the following reasons:

Ignorance.—This is overcome by adequate preliminary training.

Negligence.—The man must carry out what he has been taught to the letter.

Bravado.—There is always the man who likes to show off. Watch him, and "jump on him" heavily.

Fear.—Overcome by knowledge and live practice.

DESTRUCTION OF GRENADE "BLINDS"

S.A.T., Vol. 1, Pamphlet 13 (1942), Lesson 10 and Appendix II, para. 5.

Kit Required

1. Demolition box made up complete.
2. Long piece of thick string or thin rope.
3. Two bricks.
4. Filled sandbag.
5. Two No. 36 grenades.
6. Two No. 68 grenades.
7. Two No. 69 grenades.
8. One No. 74 grenade.
9. One No. 75 grenade.

(5–9: Drill grenades.)

Demonstrations

1. Make up a demolition set.
2. Show method of destroying No. 36 grenade "blind" with another No. 36 grenade.
3. Ditto No. 68 grenade "blind" with No. 68 grenade.
4. Ditto No. 69 grenade "blind" with No. 69 grenade.
5. Show method of pulling safety pin out of the No. 74 grenade with the rope or string.
6. Disarm a No. 75 grenade.

Note.—No live material must be used in demonstrating any of the above.

Whenever a "blind" occurs, whatever the type of grenade, it *must* be destroyed by the officer in charge of the practice personally before leaving the range or area.

Whenever a grenade is difficult to find owing to long grass, mud, etc., a thorough search must be made for it at the conclusion of the practice, and this must not be abandoned until it is found or the impossibility of ever finding it established. When it is not found an immediate report must be made and measures taken to wire off the area and place danger flags in position. The importance of this cannot be over-emphasized, as quite recently an officer trod on a "blind" left by another unit in some long grass and lost a foot.

It must be borne in mind that there is only one type of "blind" and that it must always be treated with care and respect. It will *never* be handled, picked up or moved from the position in which it has fallen, whatever the circumstances. Numerous accidents have occurred through failure to observe these elementary precautions; for instance, a certain N.C.O. kicked a No. 69 grenade into a ditch and was dismayed to see pieces of his foot following it—he is now C3!

Many accidents, all of them quite unnecessary, have occurred through mishandling by officers faced with the problem of "blinds." One officer, having quite rightly personally marked the position of a No. 69 grenade "blind," shouted to the next man in the detail to throw before he was back behind cover. The man was nervous and threw the grenade at him. The officer ducked and it exploded just behind him. Fortunately he was not killed, but the medical officer had a delightful time for hours afterwards probing for pieces in his backside! Another officer demonstrated at a lecture with live material with disastrous results.

When demolition sets are not available, other methods must be used. These methods are shown here in addition, but will *not* be used when a demolition set can be obtained.

THE DEMOLITION SET

While the men are carrying out inspection procedure prior to proceeding on to the range, then is the time for the controlling officer to prepare some demolition sets so as to save time later on. He must prepare these sets for himself, and *not* call in outside help, however much experience that help may have had. It should be a point of honour to do all the "dirty work" oneself. Half the battle is won directly the troops realize that their controlling officer knows his business.

All the appliances for making up a demolition set should be carried in a box, locally made, known as the demolition box, which contains:

1. A cylinder of 1-oz. gun-cotton primers.
2. A box of fuse, safety, No. 11.
3. A box of detonators, No. 8 Mark VII or No. 27.
4. A rectifier.
5. Luting.
6. Pair of pliers.

In addition, a knife and box of matches are required (see Fig. 23).

The Fuse

The procedure in preparing the demolition set is now as follows: Cut off a small length of fuse and light it. Watch the length of time it takes to burn. This is to make sure that it is safety fuse and not instantaneous. Safety fuse is coloured black and the outside is bound with waterproof tape. It is issued in tin boxes, each containing 48 feet of fuse which burns at the rate of one inch in 2½ seconds.

Now cut off the length of fuse required. Thirteen inches (one inch allowed for lighting) gives about 30 seconds in which to get to cover. Actually to use 8 or 9 inches is ample, and for the No. 69 grenade 3 or 4 inches will do. The end to be inserted in the detonator must be cut clean and at right angles. Near the other end bore a hole through the fuse with the point of a sharp knife. Draw a match through this hole until the head is almost flush with the fuse.

FIG. 23

FIG. 24.—**CRIMPING THE DETONATOR TO THE FUSE**

FIG. 25.—**DEMOLITION SET PLACED READY TO BLOW A No. 68 "BLIND"**

(Note that the gun-cotton primer is placed against the head of the grenade.)

The Detonator

The clean-cut end of the fuse is now inserted into the open end of the detonator. It must be pushed in straight and not twisted. Should it be too large, compress between the forefinger and thumb or shave it with a knife until it does fit. Push it in as far as it will go. Now crimp the ends of the detonator over the fuse by using the pliers (or a knife will do) (see Fig. 24). Having done this, take a thin piece of luting and rub it into the join between fuse and detonator so that the cracks are filled. A very little luting is required for this.

The detonators usually used are the No. 8 Mark VII or the No. 27. Detonators must be handled with great care, as they are filled with very sensitive explosive. Do not bang them, place them near heat or rub them thus causing friction. They must always be kept in their box, as damp also affects them.

The Gun-cotton Primer

The central hole of the gun-cotton primer is often too small to admit of the entry of the detonator. Take the rectifier and ease it open gently until the detonator fits in snugly. The detonator must be inserted until the end is flush with the base of the gun-cotton primer. Now take some luting and "weld" the detonator into position firmly: this is done by placing some over the hole in the base of the gun-cotton primer and also round the join on the top.

The gun-cotton primer consists of 1 oz. of gun-cotton. Ten are issued in each cylinder.

The Use of the Demolition Set

The set has now been made up.

When a "blind" occurs, place it so that the gun-cotton primer is hard up against it (see Fig. 25). Now take hold of the matchstick that is protruding through the other end of the fuse, and rub a matchbox sharply across the head. It is obvious when the fuse is alight, as there is a sort of hiss and puff of smoke. When certain that the fuse is alight get to cover.

Personally, I light the demolition set away from the "blind" altogether, and when burning place it in position against the "blind." Do not try this until you are certain of the timing.

THE No. 36 GRENADE

Advice

This grenade is best destroyed by the demolition set.

Do not attempt to destroy it by rifle fire.

Do not place another No. 36 grenade alongside and pull out the pin by hand. Four seconds are not sufficient for the "get-away," nor are seven seconds.

Do not attempt to blow it up by throwing another grenade. It is extremely unlikely to prove successful.

Don't go away and leave it, deliberately or otherwise.

Don't mark its position and then leave for another day or for some other poor devil to deal with.

Don't attempt to pick it up, unprime it, put it back in its box, kick it or take it to the armourer to deal with. (He is a useful man to remain friends with!)

Remember that you are the officer on the spot—the "baby" is yours and you MUST *deal with it alone. On your prompt decision and decisive action you will be judged.*

Safe Methods to Use

When a demolition set is not available there are two certain methods that are both simple and easy, provided that reasonable care is exercised.

Have a look at the "blind" and note two things in your mind:

(1) The position in which it is lying, *i.e.*, in the open, thick undergrowth, shell hole, etc.

(2) The position of the striker—down or up.

The above is only for one's own guidance as to the difficulty or otherwise of destroying the "blind," and the possible cause of it.

First Method.—Get a reasonable-sized rock, stone or brick. Attach a piece of thin rope or thick string securely to it. Have sufficient so that it will reach to safe cover.

Have another No. 36 grenade properly primed. Pull out the pin, taking care to hold down the lever with the fingers. Place it against the blind, lever away. Put the stone or rock against it on the other side, so that the lever is held down. It does not matter in the least if the lever comes away from the grenade slightly as long as it does not come right off. Go to safe cover and pull on the string or rope. The rock will come away. The lever will fly off the grenade, which will explode 4 seconds later and destroy the "blind" with it (see Fig. 26).

FIG. 26.—**DEALING WITH No. 36 GRENADE "BLINDS"**

Second Method.—Two or three pieces of wood or pegs are required. Prime another grenade and make sure that the safety pin is loose and easy to withdraw with only a slight pull. Place this grenade alongside the "blind," lever uppermost.

Attach a thin rope or thick string, in this case, to the ring of the safety pin and lead it away to safe cover. Hammer in the pegs so that the grenade is wedged tight and can withstand the pull on the pin without shifting position. Go to safe cover and pull on the rope. The pin will be pulled out of the grenade, and 4 seconds later the grenade will explode, thus destroying the "blind" (see Fig. 26).

Note.—Before trying out either of these two methods it is advisable to practise on dummy materials or unprimed grenades.

THE No. 68 GRENADE

Advice

The best method of destroying this grenade is by using a demolition set. Whenever possible place it against the face of the grenade, as the "skin" at the sides is tough and it may not be destroyed first time (see Fig. 25).

When safe cover is close to the "blind" do not put the demolition set against the grenade on the far side away from this cover. The resultant explosion has been known to blow the "blind" completely into the safe cover.

Do not attempt to destroy this grenade by rifle fire.

Do not move, touch or pick up this "blind." Note carefully its position and whether the face is exposed or not.

Safe Methods to Use

When a demolition set is not available, either of the methods described for the No. 36 grenade can be used. Try to place the No. 36 grenade against the face of the No. 68 grenade "blind."

Another method is to use another No. 68 grenade. Make sure that the safety pin can easily be withdrawn. Remove the shear wire by breaking off the end and pulling out with the fingers or pliers.

Place this grenade alongside the "blind" *face downwards,* making sure that the tail unit is upright.

A couple of bricks or a heavy stone are now bound round by a piece of thin rope or thick string, and placed in position on top of a sandbag, box, etc., alongside and overlooking the "blind." The rope is run out to safe cover. A drop of about 2 feet is required. A gentle pull must suffice in causing the bricks or heavy stone to drop.

Now, with care, remove the safety pin from the No. 68 grenade and go back to safe cover. Pull on the rope. The bricks should topple off and strike the tail unit of the grenade, which will explode and destroy the "blind" (see Fig. 27).

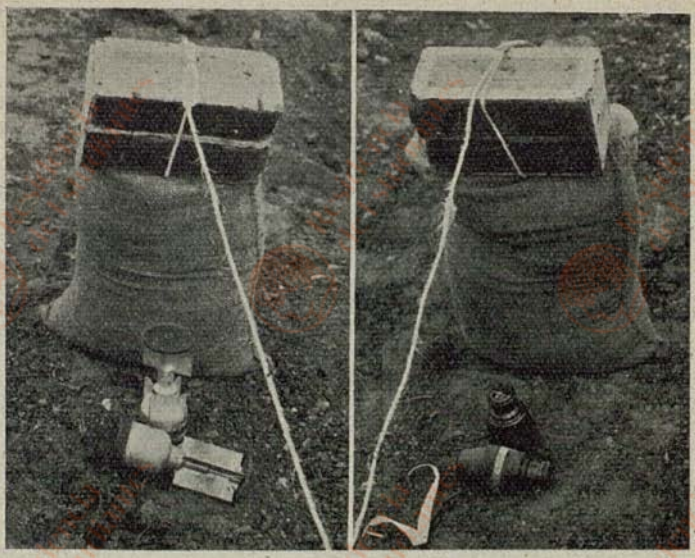


FIG. 27.—**No. 68 GRENADE** FIG. 28.—**No. 69 GRENADE**

Note.—The reason for the explosion is as follows:

When a No. 68 grenade is fired and hits a tank, the sudden stop causes the striker to go forward and fire the cap.

In this case there is no sudden stop, so a similar condition must be produced. This is done by striking the tail unit hard, which forces the striker forward to fire the cap.

THE No. 69 GRENADE

Advice

Whenever possible use a demolition set to destroy this "blind."

A rifle or pistol bullet will not destroy this "blind." It will merely smash it to smithereens, but unless it is directly hit the detonator will be left lying about, and if it is not found it will constitute a serious danger. It is very difficult to find.

Remember that this is a percussion grenade, so the slightest jarring might set it off. Don't move it or touch it.

Don't try to put the safety bolt back in position, even if it does appear possible.

Don't throw another grenade at it.

Don't get slack about this grenade because it is not so damaging as the No. 36 grenade.

Safe Methods to Use

When no demolition set is obtainable, but should a No. 36 grenade be available, either of the methods described under that grenade are applicable here.

Another No. 69 grenade can also be used to do the job. Prime the grenade. Remove the safety tape and bolt, and very carefully (because it may go off if shaken) place it upright alongside the "blind," mechanism chamber upwards.

In the same way as with the No. 68 grenade, have a sandbag, box, log of wood, etc., placed near to the two grenades ("blind" and "destroyer"). On top place a rock, heavy stone or bricks, attached to which is a thin piece of rope or thick string running to safe cover.

When safe cover has been reached pull the rope. The bricks will fall on to the grenade, which will explode and destroy the "blind." The drop should be between 1 and 2 feet (see Fig. 28).

The explosion is caused by the jar causing the striker to overcome the creep spring.

Another method is to take another No. 69 grenade and remove the base plug. Take the detonator and insert a length of safety fuse and crimp it in. Now place the detonator in the detonator sleeve of the grenade and put it alongside the "blind." Light the fuse.

Safety fuse is the only "extra" required for this method, as the detonator belonging to the grenade will do. Any type of "blind" can be blown by this method.

Note.—Sometimes, after throwing, the tape does not fully unwind. This does not constitute a "blind" in the true sense of the word, because the safety bolt has not been withdrawn. Pick up the grenade, wind back the tape and screw on the safety cap. The grenade may now be thrown again.

THE No. 73 GRENADE (Obsolete)

Advice

Use a demolition set if available.

Don't touch or move this "blind."

Don't try to replace the safety bolt, even if it does appear to be possible.

Don't throw another grenade (whatever type) at this "blind."

Safe Methods to Use

This grenade is instantly destroyed by rifle fire. Take up a position about 25 yards away behind cover before firing.

When it is in an awkward position and cannot be got at by rifle fire, use a demolition set.

Should no demolition set be available, then use a No. 36 grenade —one of the methods already described.

Note.—Should the safety tape only partially unwind, take the same action as in the case of the No. 69 grenade.

THE No. 74 (S.T.) GRENADE

Advice

Use a demolition set to destroy this grenade when possible.

Don't attempt to destroy it by rifle fire. It will merely aggravate the " blind."

Don't try to set fire to it. This is a highly dangerous procedure.

Don't pull it off with the intention of dealing with it elsewhere.

Safe Methods to Use

When a demolition set is not available, use another No. 74 grenade. Ensure that the safety pin will slide out easily. Tie a piece of thick string to the loop and run it to safe cover.

Stick this grenade alongside or above the " blind " or use pegs as for the No. 36 grenade. Go to safe cover and pull the string. The pin will be withdrawn and 5 seconds later both grenade and " blind " will be destroyed.

The " blind " can also be destroyed by using a No. 36 grenade. The " lever " method rather than the " peg " method is the best one to use.

Notes

1. Safe cover is not absolutely essential unless a No. 36 grenade is used. Lie down 15 to 20 yards away with your feet towards the " blind " and you will be quite safe.

2. This grenade can be used as a portable demolition set, and used to blow up the " blinds " of any other type of grenade. It is excellent for this purpose—also for destroying mortar bombs.

THE No. 75 GRENADE MINE

To Disarm

This grenade may be required for another day, in which case it can be disarmed. Straighten out the tabs individually and remove the detonator assemblies. Roll the rubber tube back into its original position on the igniter and slip out the detonator. Replace them both in their boxes. Force must not be used.

When a No. 75 grenade mine is damaged and becomes a " blind " in the true sense of the word, use a demolition set if one is available. Otherwise use a No. 74 (see Fig. 22) or No. 36 by methods already described.

GENERAL NOTE

After destroying any " blind " search the area carefully to ensure that the job has been done properly, and that the detonator is not still lying about for someone to tread on.

THE GRENADE

LIVE BOMBING RANGES AND PROCEDURE

INTRODUCTION

No man is trained until he has handled live material. This fact has always been appreciated, but on the outbreak of war the sudden influx of men into the Regular Army meant that approved ranges were scarce in proportion to the number of units requiring to use them. Another difficulty occurred in 1940, when the threat of invasion meant the introduction of numerous new types of grenades, many of which are now obsolete.

Modern training procedure has also recognized the fact that "life-like" conditions should be introduced as soon as possible into the soldier's training curriculum.

All this has led to the introduction of three types of ranges:

(1) The pre-war solidly built range.

(2) The range which has been built for war purposes is more of a rush job and is varied according to the type of grenade being thrown.

(3) The improvised or natural range, the area selected being any piece of open country such as common land, seashore, etc. The throwing positions are from behind banks, rocks, etc., or in ditches, river beds, etc.

THE No. 36 GRENADE

Danger Area and Precautions

It is essential to bear in mind that the danger area is up to 300 yards all round from the point of burst. Consequently, this area must be kept clear of persons and livestock. In open country this means that a system of red danger flags and look-outs must be carefully sited. Should the range be in a quarry or any similar confined space, these look-outs would be unnecessary, but the danger flags must still be put out.

The Permanent Range (see Fig. 29).

There are three main parts to the "cover" portion of a permanent range:

1. *The Shelter*, in which the men wait for their turn. This must be roofed over and be of sufficient thickness to withstand the explosion of any grenade that might inadvertently land on the top of it. (It is incredible how bad some throwers can be!) There should be a seat on the inside for the men to sit on, provided they are not nervous! The front and sides must be constructed thickly enough to withstand splinters, blast, etc. There is a doorway to the rear.

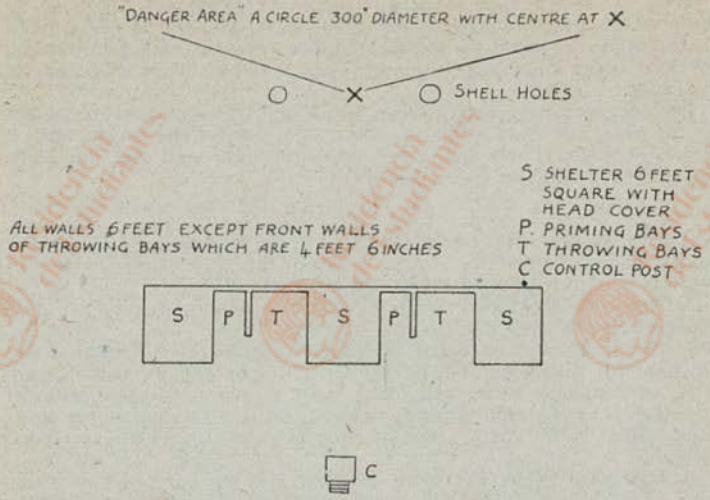


FIG. 29.—**LIVE-BOMBING RANGE FOR No. 36 GRENADE**

2. *The Priming Bay.*—One N.C.O. or instructor who is qualified must be in this bay. He has with him the box containing the igniter sets. Each man unscrews the base plug from his grenade, is handed an igniter set which he inserts. He then waits until it is time for him to move on. The priming bay is quite small in size—some 3 feet in width. The walls are thick and must be at least 7 feet high to permit a man to stand upright comfortably.

3. *The Throwing Bay.*—An N.C.O. or instructor must be present in this bay. He is responsible for repeating words of command received from the control post, watching the thrower "like a cat" to ensure that all actions are carried out correctly, giving the thrower verbal encouragement, acting quickly in case of emergency, and in taking strict disciplinary action in the case of any breach of regulations. There are three types of man met with in the throwing bay:

(i) The very nervous or frightened.

(ii) The average, with a hearty respect for the grenade.

(iii) The "I don't care a damn, there is nothing in this."

Of these types beware of (i) and (iii). The very nervous man may drop the grenade from nerveless fingers, throw it into the front wall just in front of him, or even lob it sideways into another bay. Whichever he does, *do not pick up the grenade.* Seize the man by the scruff of the neck and kick him into the priming bay or round the rear protecting wall. All other bays will act on the warning that will be given from the control post.

The "bravado" type of man is the worst of the lot. He may let the lever go with the grenade still in his hand and get an aerial burst on throwing it. Stand no nonsense from this type of individual and put him under close arrest immediately and have him marched off the range.

The throwing bay itself is from 6 to 8 feet in width, and the height of the side and rear walls is about the same. The front wall is 4 ft. 6 in. high. There is a gap between the rear wall and side walls for entry and exit (see Fig. 29).

Notes

1. The thrower can watch the fall of his grenade and then duck behind cover. Watch that a man does not throw, get down, and then pop up to look just as the grenade goes off.

2. The range described is a built-up one. Sometimes they are dug-down. The principle is the same, however.

3. The front walls of the throwing and priming bays are the essential ones for thickness. The breastworks can be constructed of sandbags, or can have outer and inner walls of old corrugated iron, or other revetting material wired to upright stakes—the intervening space being filled with earth. Bricks—header and stretcher—are good enough.

4. The usual range has three shelters, priming bays and throwing bays. This allows for more men to be "put through" in a shorter space of time. This will allow sixty men to throw two grenades each in an hour.

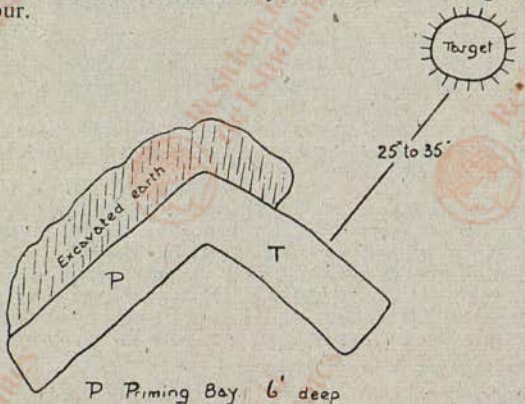


FIG. 30

The Control Post

This is required by the conducting officer and should be only large enough for him to stand in. He requires head cover, and a slit at eye level through which he can look and give his words of command. The best site is in rear of the bays and raised up above them so that he can look down into them.

GENERAL

The Open Range (see Fig. 30)

Throwing should take place from behind a bank, in a ditch, etc. Priming must be carried out behind cover nearby, but not in the same place as the throwing occurs. The remainder are kept well behind under cover, and do not move out until it is their turn. Strict supervision must be kept on these waiting men. The conducting officer is as near to the throwers as possible—in a position where he can see and control and behind suitable cover.

The Drill

On arriving on the range the men, who must all wear steel helmets, are lined up opposite a throwing bay. Safety precautions are then read to them (see Appendix to this chapter). A demonstration of procedure, using a stone instead of a grenade, is then carried out. This is a great time-saver later on. The commands given from the control tower are as follows:—

"*First detail into priming bay.*"—The first detail then moves from the shelter into the priming bay and primes its grenades.

"*First detail into throwing bay.*"—The first detail moves from the priming bay into the throwing bay. The second detail moves from the shelter into the priming bay.

"*No. 1, prepare to throw (or ready).*"—The man adopts the "ready" position. His finger is in the ring of the pin ready to withdraw it. Directly the N.C.O. in charge is satisfied he raises his hand.

"*No. 1, throw.*"—The man withdraws the pin, which he keeps on his finger, throws and watches the grenade drop. The N.C.O. in charge criticizes.

"*Down!*"—After a couple of seconds this order is given and must be obeyed instantly. (There is usually no trouble about this—it is!) The grenade now explodes.

Note.—The same orders would be repeated for any other bays, *i.e.*, "No. 2, ready," "No. 2, throw," "No. 3, ready," "No. 3, throw." On the command "Down!" everyone gets down behind cover.

"*Detail change.*"—The detail that has thrown now moves out of the throwing bays into the shelters—one above that in which it started. The second detail comes from the priming bay, and the third detail from the shelter into the priming bay.

At the conclusion of this demonstration, the men go to their respective shelters; N.C.Os. take up their posts; and the officer goes to the control post. The practice then begins.

THE No. 68 GRENADE

The range of this grenade is 200 yards. The force of the explosion is all forward, so the danger area does not have to be on anything like the same scale as with the No. 36 grenade. An area of 100 yards round the point of burst would be ample.

In this case, too, no special built-up range is required. Firing should take place in the open, from behind low cover, or from a slit trench. The N.C.O. in charge must ensure that, in the case of the use of cover, the grenade will clear it.

High banks, 100 yards away, are best for firing into. A square to represent the area of a tank can be marked out—say, 6 feet by 6 feet—on the surface of the bank. These areas can be moved when required, when the bank shows signs of great damage. Quarries, the faces of cliffs on the beach, a few old sleepers placed vertically into the ground, are other possibilities. Artificial targets are very soon shot away.

The Drill

There is a No. 1 who is the firer, and a No. 2—the loader. (The No. 2 is not absolutely essential, but is required for complete efficiency.)

The controlling officer gives the following commands:

"*Load ballistite.*"—The No. 1 will take out one round of ballistite from his pouches, load it into the rifle and apply the safety catch.

"*Load grenade.*"—The No. 2 places the grenade into the discharger after pulling out the safety pin—FINS FIRST. He then raises his hand to show the conducting officer that he is ready.

The conducting officer then gives off the number he wants to fire—for example:

"*No. 3, fire.*"—The No. 2 of No. 3 rifle team then drops his hand. No. 1 pushes forward the safety catch, takes aim and fires.

After everyone has fired, the conducting officer gives the command

"*Detail change.*"—No. 2 now becomes No. 1, and a new No. 2 gets down.

Notes

1. The officer in charge must ensure that the gas port of each discharger is fully closed before firing takes place. Failure to close the gas port fully means that the grenade will travel only a short distance.

2. Emphasis is again made that the grenade *must* be put in fins first. Failure to do this may mean death to both No. 1 and No. 2.

3. As a matter of interest, it is easy to tell the difference afterwards (i) when the grenade has been inserted the wrong way round; (ii) a premature. In the first case the barrel of the rifle is broken clean off at the muzzle end or peels back like a banana skin. In the second case the rifle is not damaged, but the discharger is destroyed.

4. Sometimes pieces come back and must be watched for. Spectators should be kept at least 25 yards behind the firers.

THE No. 69 GRENADE

This grenade is designed so that it can be thrown at close ranges with safety to the thrower. It is obvious, then, that any open space will do and that a range in itself is not required.

However, there is no getting away from the fact that the lead ball does travel and I have seen it lodge in the back of a man's hand—I have also seen it knock another man unconscious about 100 yards away. These instances are, of course, very rare. It is better, though, for practice either to utilize a small breastwork about 4 ft. 6 in. high or a bank, so that cover can be taken in case of a bad throw.

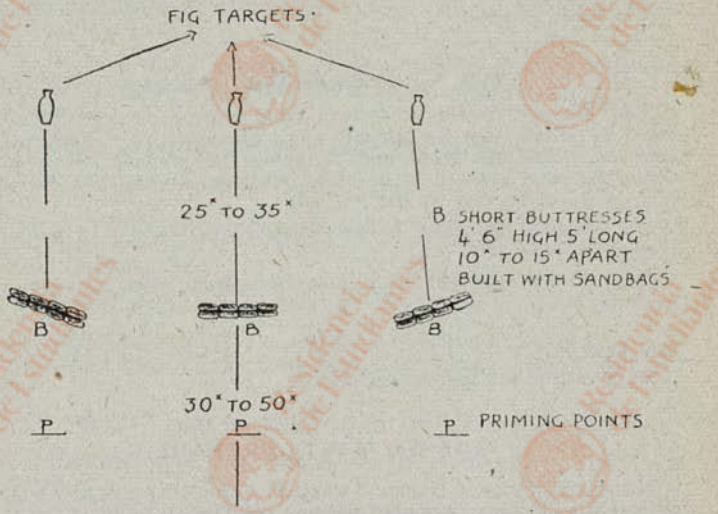


FIG. 31.—**LIVE-BOMBING RANGE FOR No. 69 GRENADE**

The lay-out should be (see Fig. 31):

(1) Waiting details about 100 yards back from the throwing bays.

(2) Priming points about 30 yards in front of the waiting details.

(3) Targets from 25 to 35 yards in front of the throwing bays.

Note.—There must never be a back wall to the throwing bay or any object behind the thrower when in the open, because there is always the possibility of his hitting his hand against it and dropping the grenade. In nine cases out of ten this would be all right, but the tape *may* unwind and the grenade go off; it has actually happened.

The Drill

Same as for the No. 36 grenade:

"*No.* 1, *priming point.*"

"*No.* 1, *throwing bay.*"

"*No.* 1, *ready.*"

"*No.* 1, *throw.*"

"*Down!*" (if necessary).

"*Detail change.*"

THE No. 73 GRENADE (Obsolete)

This grenade should be thrown from a proper range. The blast effect is severe. On no account must there be any chance of the thrower hitting his hand and dropping the grenade. In order to throw, he must allow it to lie along his forearm, and grip the safety tape in the same way as the No. 69.

On throwing, he must *at once* take cover, as it is a percussion grenade.

High banks and brick walls may be utilized when a range is not available.

The Drill

Same as for the No. 36 grenade.

THE No. 74 (S.T.) GRENADE

No special range is required when throwing this grenade, which is designed to damage armoured fighting vehicles.

The target should consist of a piece of armour plate, a square of tin or anything similar that might be considered to be suitable.

The grenade is either thrown from a short distance away—about 10 yards—or is planted by hand. There is a delay action of 5 seconds before the explosion takes place.

When there is no cover at all the thrower should run 10 yards, then lie down with his feet towards the grenade. There is no danger, but bits of iron or stones from the target may be thrown about. Spectators must be kept well away.

APPENDIX

SAFETY PRECAUTIONS

(To be read out before all "live" practices.)

1. Steel helmets will always be worn.

2. The area must be protected by putting out red danger flags and look-outs.

3. There must be a red flag in the place where the controlling officer stands and directs. This must be lowered when the practice is taking place.

4. A doctor or qualified medical orderly should be present.

5. No smoking may be permitted.

6. The controller must be a qualified officer or warrant officer fulfilling the conditions laid down by Army Council Instructions. He will give all commands.

7. The order to take cover must be carried out instantly.

8. Grenades and igniter sets will be inspected and cleaned prior to the practice taking place. This must take place separately—*never* together.

9. All "blinds" must be destroyed by the officer in charge.

10. Some method of carrying out demolitions must be available on the range.

11. No primed grenade will be taken away from the range. Whenever possible remove the detonator and replace it in its box. When this is not possible destroy the grenade.

12. One qualified N.C.O. (see Army Council Instructions) will be in each priming and throwing bay. He will be responsible for ensuring that all orders are carried out, and be prepared to act quickly in case of emergency.

13. Only one person in addition to the above N.C.O. will be allowed in any priming or throwing bay at the same time. A No. 2 will be allowed in the case of a No. 68 grenade.

14. Everyone, other than those on duty, priming or throwing *must* be under cover.

15. Priming will take place in the priming bay and nowhere else.

COACHING

S.A.T., Vol. 1, Pamphlet 1 (1942), Appendix II.
S.A.T., Vol. 1, Pamphlet 18 (1942), Section 5.

INTRODUCTION

It is safe to say that coaching on the range is almost invariably bad and this is probably due to a number of causes:

(1) Lack of range organization both on the firing-point and in the butts.

(2) Lack of knowledge of what coaching entails.

(3) The unfortunate but prevalent idea that firing on the range consists of letting men fire their rifles and then get home as soon as possible.

The result is that men often never really get to know their rifles and the true capabilities of them. They fail to acquire confidence, and it must be fully appreciated at the outset that the whole *object* of range practices is to give a man the confidence which will enable him to shoot effectively. Confidence is the whole crux of shooting and if a man gains it on the range he will go on service knowing that he can shoot to kill and is consequently a far better soldier.

A coach needs certain knowledge and, additionally, abundant practical common sense. Book knowledge alone cannot produce the good coach; he must consolidate this knowledge by practical experience. A coach must also learn to be patient, because he must always give encouragement, no matter how vexing his pupil may be.

KNOWLEDGE NECESSARY

1. The first point that every coach must understand is that grouping is the foundation of all shooting. Should a man be unable to group he will certainly never be able to shoot. Grouping merely means that a man fires his shots with the same aim and the same hold and tries to keep them as close together as possible on the target—that is in the smallest possible group. Although this is what a man does in a grouping practice, it is not generally appreciated that he does exactly the same in any type of practice he fires, whether application, snapshooting or rapid, with the addition that he has also to apply this group to the centre of the target.

The elementary grouping practices that a man fires are of fundamental and vital importance therefore, and every one of them should be carefully recorded. A man should always be taken up to the target and allowed to see his group if at all possible.

Finally, the more grouping practices that a man fires the better; it does not much matter whether they are fired in a miniature range with .22 or on a 30-yards or 100-yards range with .303 ammunition.

2. The second point the coach must realize is that no rifle is so perfect that it will place all its shots through the same hole. In other words, if a really first-class rifle is fired mechanically, in order to obviate the human element, its shots will still form a group. The

size of this group, of course, varies with different patterns of rifles and even with rifles of the same pattern: some will be found to group more closely than others. Every Service rifle should be capable of producing a 4-inch group at 100 yards; if it will not, there is something wrong and it should be examined by the armourer.

3. The third point the coach must realize is that every individual man has his own grouping standard. This is the size of group that a firer together with his rifle can normally achieve, provided he is shooting as well as he can.

There are three main classifications of groups, viz.:

A 4-inch group at 100 yards, which is the same as a 1-inch group at 25 yards.

An 8-inch group at 100 yards, which is the same as a 2-inch group at 25 yards.

A 12-inch group at 100 yards, which is the same as a 3-inch group at 25 yards.

There are, of course, intermediate standards which must be looked for, but no man who cannot normally achieve a 12-inch group at 100 yards should be allowed to pass on to more advanced types of shooting. It has already been stated that every group that a man fires must be recorded, because it is of vital importance to know what is his grouping capacity. How this recording is done does not much matter; the point is that it must be done. From it the coach learns the size of group the man can normally achieve. For example, let us suppose that a man has fired the following groups: on the miniature range, a 3-inch and a 2-inch; on the 25-yards range with .303, two 2-inch; and on the 100-yards range, two 8-inch groups. It is obvious that his normal grouping capacity at 100 yards is that of an 8-inch group.

Now if a man can normally achieve an 8-inch group at 100 yards, at 200 yards he should be capable of a 16-inch group, and at 300 yards a 24-inch group, and so on. Thus, if it is known what size of group a man can achieve at 100 yards it is also known what size of group he may be expected to obtain at any range, always, of course, provided that he is shooting up to his usual form.

The following table will show the size of groups to be expected from 4-inch, 8-inch and 12-inch groupers at 100 yards over different ranges:

100 yds.	200 yds.	300 yds.	400 yds.	500 yds.	600 yds.
A 4-inch group will be ...	8	12	16	20	24
An 8-inch group will be	16	24	32	40	48
A 12-inch group will be	24	36	48	60	72

The above table must, of course, be used with common sense; for example, particularly at the longer ranges, factors may come into play which cause further dispersion of the shots, *e.g.*:

(*a*) Indistinct aiming mark, which causes the aim to be varied slightly with each shot.

(*b*) The wind, which may be variable.

Nevertheless, practical experience has shown it to be the basis of a good, sound guide.

4. The fourth and last point is that the coach must understand the main reasons which cause bad shooting. This is a subject in itself and can only be touched upon here. The main causes are:

(*a*) *Faulty Aiming.*—Inclined sights; inaccurate centring of foresight; varying the amount of foresight taken; dwelling too long on the aim.

(*b*) *Faulty Holding.*—Loose hold with either or both hands (very common); resting the rifle incorrectly on the cover; bad and uncomfortable position.

(*c*) *Faulty Control.*—Pushing the shoulder forward or flinching as the rifle is fired; unsteadiness; failure to stop breathing when pressing the trigger; lack of determination.

(*d*) *Faulty Rifle.*—Rifle incorrectly zeroed (very common); loose screws on the rifle (very common); rifle does not fit the firer.

(*e*) *Difficult Conditions, e.g.,* wind, light, etc.

It is the coach's duty not only to try to find out in the case of a bad shot what is wrong, but also to know what to do to put it right.

COACHING IN GROUPING PRACTICES

Before Firing

The coach should:

1. Examine the man's rifle, pouches, etc. (This is done not only for safety reasons, but also to see, as far as possible, that the rifle is in good condition).

2. Ensure that the man understands what a grouping practice is.

3. Point out the number of the man's target.

4. Look at his record. (This will tell the coach what size group he may expect, also whether the rifle has been correctly zeroed.)

5. Help the man to adjust the cover to suit him. (In grouping practices a man should have the cover built to suit him, and some modification of it will be necessary for nearly every firer.)

6. Allow the man to take a couple of snaps with an empty rifle. (This is a great help; if a man can press the trigger on an empty rifle without disturbing his aim it should be possible to convince him that he can do the same when there is a round in the chamber.)

Note.—Of the above, Nos. 1, 2 and 3 may be done collectively on the arrival of the party on the range.

During Firing

1. The coach must watch the firer the whole time; he can best do this by adopting the same position.

2. He must watch him intelligently—that is to say, he must try to make his eyes convey to his brain what they really see. Many coaches stare at the target; others, though watching the firer, never see the things that are happening before their eyes.

3. He should watch the man's position, that he is comfortable and, once settled, does not continually change position.

4. He must watch the man's hold: a really good, firm hold with both hands, *particularly* the left one.

5. He must watch the trigger release.

6. He must watch the control of the breathing: that the man stops breathing while pressing the trigger.

7. He must watch for his determination to shoot well: determination plays a big part in shooting.

8. He must be on the look-out for pushing or flinching; so many men, while perfectly capable of pressing the trigger on an *empty* rifle without disturbing the aim, fail to do so the moment a live round is in the chamber.

9. He must not talk to the man or in any way distract him while he is aiming and firing, but leave him severely alone; he must talk to him only during the intervals of rest between shots and then, as far as possible, in an encouraging manner.

10. He must insist on a truthful declaration from the man after each shot as to where his sights were aligned the moment the trigger was pressed.

11. He must note down this declaration in a record or notebook. (*Note.*—If firing on the miniature or 25-yards range he must also record the position of each shot on the target, which he can do by using a pair of binoculars. This does *not* apply to the open range, where the markers can tell the coach, when he goes down to the target, the order in which the shots arrived.)

After Firing

1. The safety precautions having been carried out, the coach will accompany the firer down to the butts to view the target.

2. On arrival he will ascertain the order in which the shots arrived on the target; this the markers should have recorded for him.

3. He will then criticize the man's group as may be necessary, but he must never look for trouble. That is to say, he will not find fault for the mere sake of criticism. Many coaches feel that they must find some fault with every shoot. This criticism must be carried out in the following sequence:

(*a*) The position of each shot on the target is compared with the man's declarations. It should be noted that truthful declarations are of great help to a coach, whereas untruthful declarations are of no help. Due credit must therefore be given to a man whose declarations are truthful. A man's ability to declare his shots correctly or otherwise is closely related to his grouping capacity, *e.g.*, the better the shot the more accurate will be his declarations.

(*b*) The group is measured for scoring purposes.

(*c*) The group is assessed for coaching purposes. [This may differ from (*b*) on page 59, depending largely on the man's declarations compared with the position of his shots.]

(*d*) The position of the centre of the group is studied in relation to where it should be, both for direction and elevation. [The No. 1 (S.M.L.E.) rifle should group 3 inches above the lowest central part of the aiming mark at 100 yards—see chapter on Zeroing.]

(*e*) The pattern of the group is studied. For example, a string of shots one above the other denotes a variation in the amount of foresight taken by the firer.

(*f*) Last but not least, the man should be given encouragement on his shoot.

The particulars of the group should now be carefully recorded. (For criticism of specimen groups, see appendix.)

COACHING IN APPLICATION PRACTICES

It is essential in the first place for the coach to understand what application really means. Application consists of firing each shot up to the firer's best standard, so that he will keep his shots within his normal group at the range at which he is firing (*e.g.*, a 12-inch grouper at 100 yards, when firing at 300 yards, should keep his shots within a 3-foot group).

Further than that, it consists of applying this group so that the centre of it will fall on the centre of the target. In the case of the 12-inch grouper firing at 300 yards, should he be able to do this, then all his shots will fall within the magpie circle (3-foot). It is in the latter respect that the problem arises, for, although the man's rifle may be perfectly zeroed, climatic conditions, *e.g.*, light, wind, etc., may on any particular day cause the centre of the group *not* to fall on the centre of the target unless the firer aims off or alters his elevation from the normal.

Before Firing

The coach should:

1. Examine the man's rifle, pouches, etc.

2. Ensure that the man understands what application means.

3. Look at the man's record. This will tell him what the normal group is at 100 yards and he can then calculate the area into which to expect the shots to fall at this particular range.

4. Advise the man as to the elevation required and point of aim for that particular day.

5. Point out the number of the man's target.

6. Help the man to modify his position to suit the available cover and ensure that the rifle is correctly rested.

7. Allow the man to take a couple of snaps with an empty rifle.

During Firing

The same points apply as for grouping, but, in addition to noting the firer's declaration, he must also note the position of the shot on the target as signalled by the markers (glasses are used on 25-yards and miniature ranges).

Provided that the man is shooting up to his capacity for the range at which he is firing, and provided that the group is forming with its centre on the centre of the target, he will allow *no* alteration to the sight adjustment. When the group is not forming in the centre of the target, but right, left, low or high, and he is convinced that the man is shooting up to his best standard, he will advise sight alteration or alteration of point of aim as necessary.

As to whether a man is shooting up to his normal standard the coach must be guided by what he sees of the man during the actual firing and by the man's declarations. Beyond this, the crux of the matter is whether the man's declarations are truthful, because untruthful declarations are of no help to the coach in getting the man to apply his group to the centre of the target.

After Firing

The safety precautions will be carried out, the score and position of the shots entered in the record book, and advice and encouragement given if possible. (For specimen shoots, see appendix.)

COACHING IN TIMED PRACTICES—SNAPSHOOTING AND RAPID

The same principles apply as in application, because when firing in a timed practice a man is merely firing application at a quick rate. There are, however, additional difficulties to contend with because not only is the man competing against time but also the shots will be unmarked.

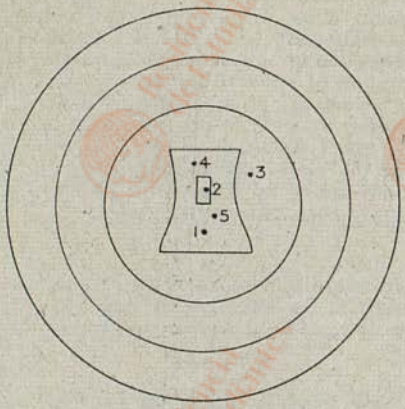
Before firing, therefore, the man must be advised as to the elevation to put on the sights and the point of aim to use, in order that he may have the best possible chance of applying his group with its centre on the centre of the target. This is the problem—a problem which even many great shots cannot always solve satisfactorily. They produce their group, but not in the *right* place owing to the trickery of light, wind and so on.

During firing the coach must remain perfectly quiet and leave the firer alone; he must, however, watch him closely the better to advise him for future shoots.

GENERAL RULE

Finally, the golden rule in coaching is never to accuse a man of making a fault unless you are quite sure that he is doing so. Watch him all the more closely in future is the only slogan.

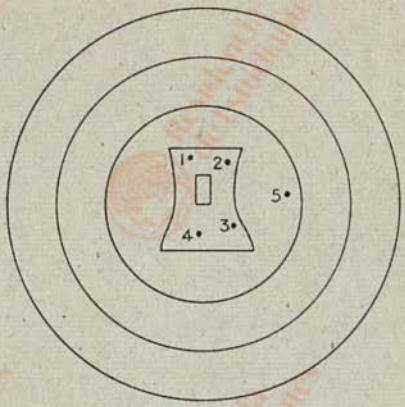
GROUPING 1



1. **Comparison of Shots.**—All shots declared correct. Coach believes them to have been well-fired shots.
2. **Size Group and Score.**—12-inch; 15 points.
3. **Size Group for Coaching Purposes.**—10-inch.
4. **Position of M.P.I. of Group.**
   (*a*) *Direction.*—Correct.
   (*b*) *Elevation.*—Correct.
5. **Pattern.**—Regular.
6. **Encouragement.**—A very fair shoot, a promising man.

Notes for Coach.—Here is a case of a group fired by a man of only average grouping capacity. Nevertheless, it is quite a good shoot, for the pattern in itself portrays the man to be capable of something better than a 12-inch group. A coach must always be on the look-out for signs of improvement.

GROUPING 2



1. **Comparison of Shots.**—All shots declared correct, except No. 5, which was declared "Right." Coach believes them to have been well-fired shots.

2. **Size Group and Score.**—12-inch, 1 wide; 10 points.

3. **Size Group for Coaching Purposes.**—8-inch.

4. **Position of M.P.I. of Group.**

(*a*) *Direction.*—Correct.

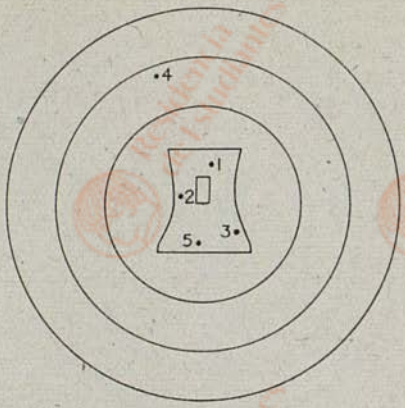
(*b*) *Elevation.*—Correct.

5. **Pattern.**—Very regular.

6. **Encouragement.**—A very good shoot. Try to avoid one wide shot, which spoils value of group. If you can group with four shots you should be able to do the same with five, especially as you *know* what you have done with the loose one.

Notes for Coach.—An excellent shoot, most encouraging because with a little more care he can obviously group to an 8-inch standard. The fifth shot can be ignored for coaching purposes, because it has gone where the firer believed it to have gone—*i.e.*, it was truthfully declared.

GROUPING 3



1. **Comparison of Shots.**—All shots declared correct. The coach did not notice any error when No. 4 shot was fired, but believes all to have been well-fired shots.

2. **Size Group and Score.**—12-inch, 1 wide; 10 points.

3. **Size Group for Coaching Purposes.**—12-inch.

4. **Position of M.P.I. of Group.**

(*a*) *Direction.*—Correct.

(*b*) *Elevation.*—Correct.

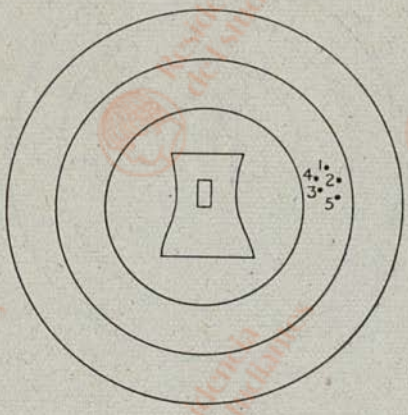
5. **Pattern.**—Regular.

6. **Encouragement.**—If he can place four shots in a good group he should be able to do so with five. He must try to declare more accurately; this will give him confidence.

Notes for Coach.—Here is a case of a loose grouper. Although declared correct it is *probable* that the fourth shot was, in fact, incorrect. The man cannot be accused of committing any fault because it was *not* observed. It is suggested that he might be coached on a 12-inch standard, despite the principle that untruthfully or incorrectly declared shots cannot be used as a basis for coaching.

He must be watched all the more closely in future for pushing or anticipating the shock of discharge. This is a common fault with men, committed often *only* when firing live ammunition.

GROUPING 4



1. **Comparison of Shots.**—All shots declared correct. Coach believes them to have been well-fired shots.

2. **Size Group and Score.**—4-inch; 25 points.

3. **Size Group for Coaching Purposes.**—4-inch.

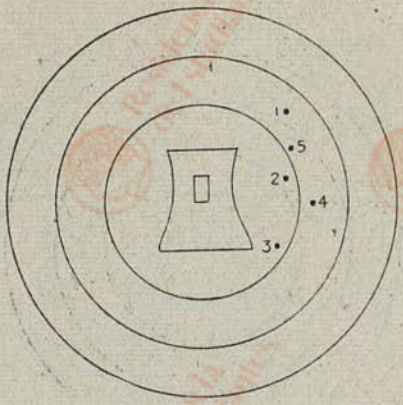
4. **Position of M.P.I. of Group.**
   (*a*) *Direction.*—15 inches right.
   (*b*) *Elevation.*—Correct.

5. **Pattern.**—Very regular.

6. **Encouragement.**—An excellent shoot.

Notes for Coach.—This is obviously a rifle badly out of zero. Action: get rifle zeroed.

GROUPING 5



1. **Comparison of Shots.**—All shots declared correct. Coach believes them to have been well-fired shots.

2. **Size Group and Score.**—12-inch, 1 wide; 10 points.

3. **Size Group for Coaching Purposes.**—Not capable of grouping yet.

4. **Position of M.P.I. of Group.**

(*a*) *Direction.*—9 inches right.

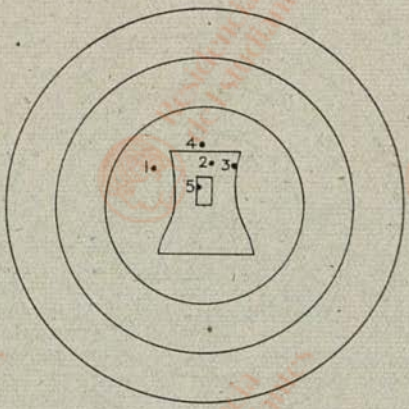
(*b*) *Elevation.*—Probably correct.

5. **Pattern.**—It is obvious that the man is varying the amount of foresight taken with each shot.

6. **Encouragement.**—He must get out of this fault, then he would get a good group.

Notes for Coach.—Rifle obviously out of zero for direction; it is probably correct for elevation. The firer must be got out of this habit of varying amount of foresight taken; until he does get out of it he is not fit to go on to more advanced types of shooting.

GROUPING 6



1. **Comparison of Shots.**—All shots declared correct. Coach believes them to have been well-fired shots.

2. **Size Group and Score.**—12-inch; 15 points.

3. **Size Group for Coaching Purposes.**—12-inch.

4. **Position of M.P.I. of Group.**

(*a*) *Direction.*—Probably correct, impossible to say exactly.

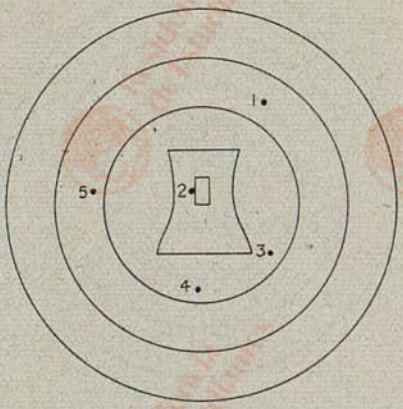
(*b*) *Elevation.*—Correct.

5. **Pattern.**—It is obvious that this man does not centre the foresight accurately for each shot.

6. **Encouragement.**—He must try to get out of this fault, then he would get a better group.

Notes for Coach.—The firer must be got out of his habit of inaccurate centering.

GROUPING 7



1. **Comparison of Shots.**—All shots declared correct. Coach knows this man to be a poor shot.

2. **Size Group and Score.**—No group; nil.

3. **Size Group for Coaching Purposes.**—Nil.

4. **Position of M.P.I. of Group.**

(*a*) *Direction.*—Probably correct, but impossible to say.

(*b*) *Elevation.*—Ditto.

5. **Pattern.**—Nil.

6. **Encouragement.**—This is difficult, but try to look for *something* the man does well, be it only his bolt action or his fondness of flusies.

Notes for Coach.—It is probably best to start this man from scratch. Instruction in some or all of the following is obviously required: holding, aiming, trigger release, determination. It may be that he flinches or anticipates shock of discharge. He is best started, after preliminary instruction, with .22 ammunition

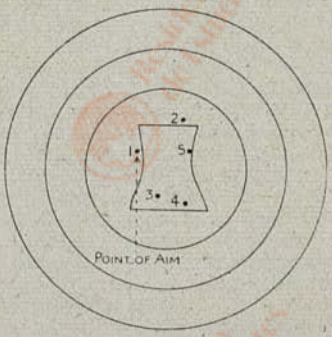
APPLICATION 1

Notes.—An 8-inch grouper is firing at 300 yards. Rifle is correctly zeroed. If group is correctly applied firer should keep his shots within inner ring. Firer declares all shots correct.

If the firer declares his shot correct, and if the coach believes it to have been correctly fired, it must be assumed that firer is firing up to his *best* standard. It remains, therefore, to apply the centre of the group to the centre of the target.

In this particular example the coach should have appreciated, as soon as shot No. 2 was signalled, that the group was forming low, and more elevation was therefore required.

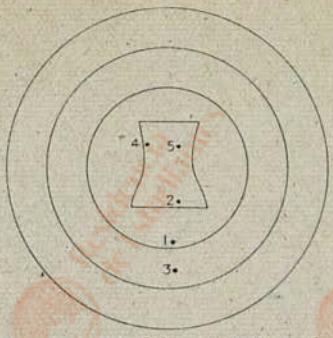
APPLICATION 2



Notes.—A 12-inch grouper is firing at 200 yards. Rifle is correctly zeroed. If group is correctly applied, firer should keep shots in inner circle. Wind blowing from left to right and coach advises left edge of figure as point of aim. Firer declares all shots correct.

As group is forming in the correct place and man is obviously firing up to standard, no alteration in sights or point of aim is allowed throughout. Had no aim-off been advised at commencement group might have formed to the right. Coach would obviously then have been justified in altering point of aim as soon as he realized what was happening.

APPLICATION 3



Notes.—An 8-inch grouper is firing at 300 yards. He should therefore keep his shots within the inner circle if the group is up to his best standard and correctly applied.

The first shot was declared low. The remainder correct. The coach cannot advise any sight alteration after the first shot because it was declared (*truthfully*) low. Incorrect shots are of no help to a coach any more than untruthfully declared ones are.

After the *third* shot the coach rightly decides that the group is forming low, and advises more elevation. This raises the centre of the group to the centre of the target for the last two shots.

APPLICATION 4

Notes.—An 8-inch grouper is firing at 300 yards. He should keep his shots within the inner ring. All shots are declared correct. It is only after the third shot in this case that the coach can be sure that the group is forming low, and advise more elevation, which raises the last two shots.

The first and second shots were both within the firer's grouping capacity for the range and the group may well have been forming in the correct position, *i.e.*, they were merely two low shots of a group forming centrally. It is only the third shot which proves them to have been two central shots of a group forming low.

MINIATURE RANGES

S.A.T., Vol. 1, Pamphlet 1 (1942), Chapter 3, Section 13.

S.A.T., Vol. 5 (1931), Chapter 5 and Chapter 9, Sections 47, 48, 49.

While in some European countries rifle shooting, both service and small-bore, has for many years received government encouragement and has become a national pastime, in our own country this has not been the case.

Shooting has not been looked upon as a sport, but only as a necessary part of the soldier's training. We are now suffering from this unfortunate state of affairs. It must be remembered that in many European nations the civilian population had been taught to shoot and shoot well. For example, the Russian nation.

It can truthfully be said that men can be almost completely, if not quite, taught to shoot using .22 ammunition. A man who can shoot reasonably well with .22 will also be able to shoot with a Service rifle, and shoot well with it. Anyone with practical experience of shooting will also agree that a man who can shoot with the rifle will quickly become adept with other weapons, such as light machine guns, pistols and so forth.

Although it may not be feasible in this country for all civilians to shoot with a Service rifle, it should be possible for them to take up small-bore shooting. This will give them a good grounding for shooting with the Service rifle and other weapons if they are later suddenly called upon to use them. Another aspect is that they will become weapon-minded and will appreciate the absolute necessity for caring for them and keeping them properly clean.

In small-bore shooting men learn to shoot under easy conditions, which brings out the point that the miniature range is the ideal training ground for Service shooting.

Who will deny that, once men have been taught the elementary lessons of aiming, holding, trigger release and so forth, they will consolidate these lessons far better and more quickly by actual firing in a miniature range than by an untold amount of practice and instruction with drill cartridges?

These elementary lessons will be learnt practically, because they will see the results for themselves. They will then know that, if they do hold their rifle firmly, take a correct aim, and release the trigger without disturbing their hold, a good shoot will be the result. This will quickly give confidence, which is the essence of good shooting. Once gained it will not be lost. Therefore one of the disadvantages of starting men straight off using Service rifles is that it may never be gained at all.

The first object in shooting must always be to get men to achieve a good group, so that all the early shoots should be grouping practices. Grouping is the foundation of all shooting, and it is quite

certain that *if a man cannot group he will never be able to shoot.* Some people say there is no value in small-bore shooting because there is no shock of discharge, but they must remember that a child must learn to walk before it can run, otherwise it may grow up bow-legged. They must also understand that, as the muzzle velocity of .22 ammunition is far less than that of .303, the bullet is a relatively longer time in the barrel; consequently any error that is made when firing, such as disturbing the hold when pressing the trigger, will produce a greater error with .22 than with .303. Faults are therefore more easily detected and the remedies more readily applied. A man who can hold a good group with .22 will certainly be able to do the same with .303.

Now what applies to elementary lessons applies equally to the more advanced lessons. Once men can shoot a good group regularly they can be taught how to apply their fire, how to aim off by using the wind gauge, and how to take a snapshot. All these can be taught practically.

In fact, the only limitations in miniature shooting are that rapid fire is not normally possible, the difficulties of Service shooting cannot be reproduced, and there is no shock of discharge.

Rapid is not possible, as there is no charger loading, but in this connection there are devices on the market which make it possible.

The full difficulties of Service shooting are not present because the wind and the light do not play tricks, and distance does not have to be judged.

The fact that there is no shock of discharge is probably an advantage, because without it men learn to shoot well. When later introduced to conditions where it occurs they have no fear of it. It is probably one of the main causes of poor shooting, but one that is only present with those who started their shooting on .303 without first firing a certain amount of .22.

Every feature of fire control can be taught by means of landscape targets with skyscreens, and the use of harmonized sights. This is practical instruction, because the fire unit commander is practised in the framing and giving of a fire order and the men in acting on it and recognizing the indication. Also the results are there on the skyscreen and can be assessed. The essence of any fire order is fire effect. It may not have been a perfect order, but it cannot have been a bad one if it produces fire effect.

In fire control, to gain the greatest value the firers should be organized into the L.M.G. group and the riflemen. This is easily done and yet at the same time everyone can still fire. Moreover, each fire order should demand of the giver a little problem as to what weapons are to be used and the type and rate of fire required for the occasion.

On a permanent miniature range there should always be a portion of it made up to represent a piece of actual country, which may extend either the full width or only half-way across the range. It is easily constructed, and natural and artificial features can be put in to make the whole very realistic. With a little ingenuity all sorts of surprise and moving targets can be fitted in. This, of course, is ideal.

for the further practice of fire control, and simple collective battle practices for a section can be carried out.

Much actual instruction, dealing with shooting, can be given collectively in a miniature range—for example, demonstrations can be given ranging from such items as the correct resting of the rifle and the use of cover to those of zeroing, coaching and firing-point instruction.

At the commencement of this treatise shooting was referred to as a pastime. It cannot be too strongly emphasized that, while the ability to shoot is one of the soldier's first duties and responsibilities, it is also a most enjoyable and fascinating pastime. The greatest encouragement must be given it, and shooting must be regarded not only as something to be done during parade hours but as an ideal recreation and sport for leisure hours. Much can be done by encouraging voluntary shooting. It must be made interesting and attractive, and there is no limit to this.

The simplest form of voluntary shoot is to give small prizes for the best groups obtained. Pool bull and sweepstake shoots are also always attractive. Simple tile shoots are easily organized; small portions of broken tile being easily obtainable. Anything that will either fall or is shattered when it is hit and not merely pierced will serve the purpose.

In conclusion, the question of the range itself must be considered briefly. There are many excellent miniature ranges, both civil and military, in the country. The utmost use must be made of them, for they are usually handy and can be used in any weather or season of the year, and also after dark (see Fig. 32).

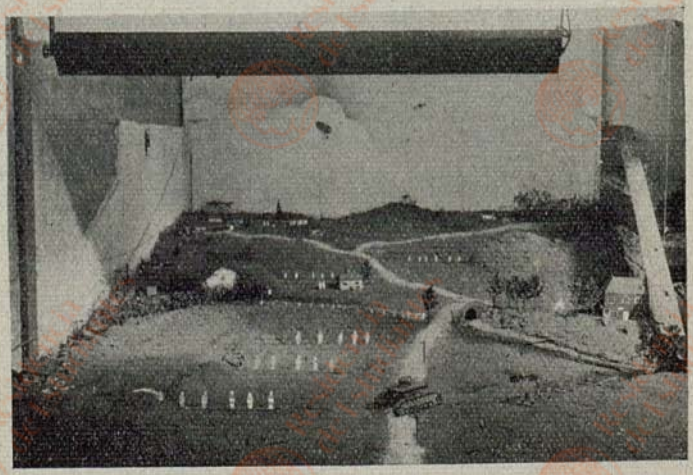


FIG. 32.—MINIATURE RANGE

However, for those not fortunate enough to have ready access to a proper miniature range, it must be pointed out that it is not difficult to construct something that will serve. Outdoors it is an easy matter, for a quarry or steep bank will serve as a natural stop butt. An indoor range is not quite so easy to provide, but something is generally possible. Provided some suitable building, barn or hut can be found, a stop butt or bullet-catcher can be built up at one end with sandbags. The firing-point can be constructed of wood, or again sandbags may be used. An electrical enthusiast must be called in to provide the necessary lighting, both at the target end and on the firing-point.

"Necessity is the mother of invention," and it can only be stated that if there is no range in the area a site must be found and one built. Once provided it should never be empty throughout the day.

NIGHT FIRING

S.A.T., Vol. 1, Pamphlet 2 (1942), Chapter 3, Lesson, 6, para. 11.
S.A.T., Vol. 1, Pamphlet 4 (1942), Lecture for N.C.Os.: Firing on a Fixed Line and within Fixed Limits.

INTRODUCTORY

The great advantage of an attack by night is that the defence cannot see the attackers to shoot at them; consequently the fire of the defence is unaimed and its effect materially lessened.

Although the Germans rarely attack by night, such a contingency must be prepared for. Very little attention is paid to small-arms fire under such conditions, yet it is a subject which requires not only thought but training.

FIRE FROM RIFLES AND LIGHT MACHINE GUNS ON BIPODS

Fire at quite close range, something under 200 yards, only will be possible. On a bright night the enemy may be seen 100 yards or more away, while on a dark night the visibility will certainly not be greater than a few yards. The darker the night, however, the more likely is the enemy to make a noise, such as stumbling over obstacles and other obstructions. It is important to appreciate that, *however bright the night*, it is never possible to see the sights of rifles and light machine guns. Consequently even if the enemy are visible it is not possible to aim at them.

There are, therefore, two golden rules which must be observed at night for fire with rifles and light machine guns on bipods:

(1) To shoot by sense of direction at what is seen or heard.

(2) To keep the muzzle down and shoot low.

The first implies the directing or pointing of the weapon at the enemy if he can be seen or in the direction where he is heard if the night is dark—in other words, firing by sense of direction.

The second rule cannot be too strongly stressed. All experience has shown that there is an invariable tendency for men to shoot high at night. It is difficult to explain why this is so, but it is a fact. Men must therefore be trained to shoot low; the proper place is the *bottom* of the wire obstacle out in front, should one be there.

It may be argued that, if this is the case, why not overcome it by arrangement of posts, with a wire stretched along them under which the muzzles of the rifles are placed in order to keep them down?

Arrangements of this kind are nearly always unsatisfactory because:

(*a*) They are difficult to erect.
(*b*) Materials may not be available.
(*c*) Wires stretch.
(*d*) Should the rifle be quickly withdrawn, in order to use the bayonet, it will nearly always catch in the wire.

The only answer is not to rely on any arrangement or contraption of this kind, but to train the men to shoot low.

USE OF ILLUMINATION

Very lights, illuminating grenades, and bombs are of the greatest value, because they show up the enemy. They do not enable the sights to be used, but do facilitate shooting by sense of direction. No attempt must be made to wait for the full effect of the light to develop, otherwise the enemy will have gone to ground. Fire must be opened the moment the light is fired and adjusted as it starts to take effect.

NIGHT SIGHTS

Although night sights have been produced, nearly all are unsatisfactory, and there is very little real requirement for them. They are gadgets which have to be fitted for night shooting because they impede the use of the ordinary sights by day and consequently will almost certainly get lost. Many of them depend on luminous properties which, if they are to be efficient, entail exposure to the sun and light previously. In short, they are not a practical Service proposition, and, apart possibly for use by snipers, are certainly undesirable.

FIRING ON A FIXED LINE

Where a tripod mounting is available for a light machine gun, firing on a fixed line is possible. The tripod must be mounted and the gun laid in daylight. A fixed line may be used to protect the front of another locality on the flank or to fire down a covered approach which the enemy might use. The greatest use must be made of the flat trajectory of the bullet up to 600 yards; that is to say, the sights should be set for 600 yards and the gun laid on a point that distance away, if the allotted task admits of it. The bullets will hit all the way up to that distance.

The great disadvantage of fixed-line firing is that the fire *is on a line*. Provided that the enemy has to go through it all is well and good, but from the very fact that it is on a definite line he may be able to go round it, or pass through in the intervals between firing, thereby avoiding casualties.

Should no tripod be available, firing on a fixed line is still possible by propping and wedging the gun with sandbags, so that it rests securely in the desired position.

FIRING WITHIN FIXED LIMITS

When a tripod mounting is available, the most effective use of a light machine gun at night is to fire within fixed limits. The tripod is mounted and the gun placed on it. The limits within which it is

desired to traverse are fixed by the adjustable stops on the tripod. Aim is directed first at one limit and the necessary stop moved and secured against the traversing gear; the process then being repeated for the other limit. The sights having been set at the required range, aim must be laid on the piece of ground where the bullets are to strike. This will very often necessitate the tripod being mounted so that the traversing arc is on a slant, in order to conform to the slope of the ground. Otherwise, while firing the bullets may be falling in the correct place at one limit, while at the other they may either be going high into the air or falling far short, thus being totally wasted. Firing within fixed limits is an excellent way of using a gun to protect its own post at night. In this case the aim should be laid for elevation on the bottom of the wire obstacle with the sights at zero; probably the maximum limits of traverse will be required.

Again a likely enemy approach such as a small stream, valley, hedgerow, etc., may be covered by this method.

Finally, for coast and beach defence, in the event of invasion, a continuous series of interlocking arcs of fire can be provided. All this fire will be in enfilade. The sights should be set for, and the aim laid on, a point some 600 yards away, in order to get the maximum effect from the bullets. The inner limit of the arc will be just clear of the next flank gun (5 degrees safety angle should be allowed in theory, but in practice this would in all probability be dispensed with), the outer limit being the maximum possible. The tripod must be mounted on a considerable slant to conform with the slope of the beach (see Fig. 33).

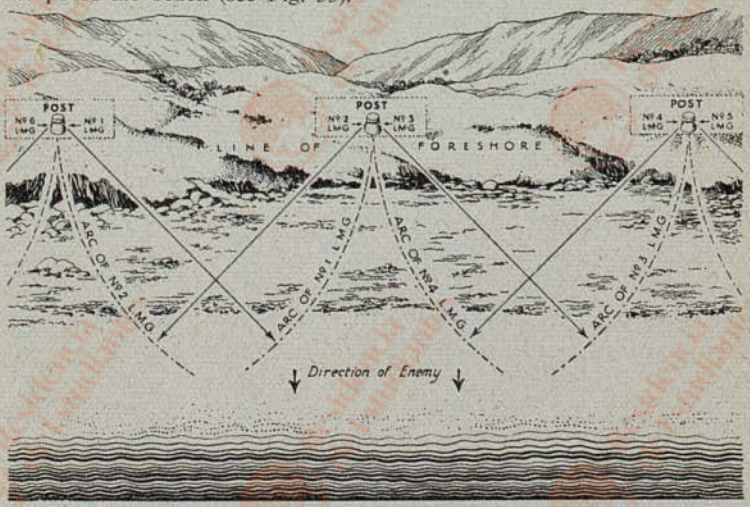


FIG. 33.—**PROTECTION OF BEACH BY INTERLOCKING ARCS OF FIRE**

In the case of light machine guns without a tripod, it may be possible to improvise a means of firing within fixed limits at night. The best method is probably an emplacement made of sandbags. The limits of the required traverse are effected by sandbags built up on either side of the muzzle of the gun, the butt being propped up by sandbags in order to keep the muzzle down so that the fire will fall in the correct place.

FIRE CONTROL

The control of fire by night is more important even than by day, otherwise firing will be indiscriminate and often valueless. Well-controlled fire will keep men cool and prevent them from becoming jumpy. Fire orders must be given softly, just loud enough for men to hear and act on, but not so loud as to broadcast them to the whole countryside. They must also be very brief; indeed, there can be no point in giving a range or indication other than the general direction required. "Slightly right—rapid fire" is probably all that is required; it can be controlled by "Stop" if the men are well disciplined. The great point at issue is that fire *is* controlled. The importance of silence also cannot be over-emphasized.

CHARACTERISTICS

S.A.T., Vol. 1 (1942), Pamphlets of weapons concerned.
I.S.L. (1938), Chapter 4.

GENERAL

Every weapon has certain characteristics or, put in simple language, vices and virtues. It is not always appreciated that the tactical use of every weapon is entirely dependent on its characteristics. In other words, a weapon must be used tactically according to what it is capable of doing, and not misused, as frequently occurs, by expecting it to do something it is not capable of doing. It is essential, therefore, that all commanders understand the characteristics of the weapons they have under their command, in order that they can use them to the best advantage and make a sound plan. They frequently make the tactical plan dictate the method of use, which, of course, is contrary to what should be done. The characteristics of platoon weapons only will be considered here. These should be understood down to the Section Commander.

THE SERVICE RIFLE

It is capable of very accurate and also a high rate of fire. Men should be trained to shoot at least to a standard of an 8-inch group at 100 yards and to fire, with accuracy, up to 10 rounds in three-quarters of a minute. The rifle, of course, is capable and has been designed to do much more than that; it will certainly group to a 4-inch standard at 100 yards, and the expert will fire 30 reasonably accurate shots in a minute.

Every man must be trained to be:

(*a*) A steady, accurate shot.

(*b*) Quick and reliable, able to take a snap at a target that is visible for a short time only. For example, an enemy observer who exposes himself for a short time only, or an enemy visible while moving from one piece of cover to another.

(*c*) A handyman, capable of firing short bursts at the rapid rate —that is, his *own* best rate retaining accuracy. The need for prolonged rapid fire is not so essential in these days owing to the predominance of light machine guns.

Finally, it is quite impossible sufficiently to stress the value of the rifle; it is the personal weapon of so many and is capable of so much. Altogether, a magnificent Service weapon capable of astounding performances and giving years of faithful and reliable service, provided it is properly cared for.

All men, whether soldiers or civilians, must learn to master their rifles and be worthy of them. They must learn to use them and realize how easy it is to kill with them.

THE BAYONET

The characteristic of this is that it is ideal for close-quarter and night fighting and has a considerable moral effect.

In a clash at close quarters, when firing may well endanger one's own friends, the bayonet is the weapon to use.

At night, if patrols clash it is ideal, for it is silent and quick.

By day, the mere threat of the bayonet in the hands of determined troops is often sufficient to drive the enemy from his position. It has been said, and probably correctly, that two sides advancing with the bayonet rarely meet. One or the other will always turn and flee. It is certain that nothing has happened in the present war to lessen the value of the bayonet; one has only to remember the exploits of the New Zealanders in Crete, to quote one example.

Remember always, when using the bayonet, that it is on the end of the rifle and that it is only necessary to press the trigger to fire a shot in an emergency.

THE LIGHT MACHINE GUN

The chief characteristic is that it can produce a large volume of fire with the employment of a few men. In simple language, this means that it can send a lot of bullets through the air following one upon another in very quick succession, and this can be done with only one man manning the gun in movement, or two in defence. Several deductions can be drawn from this characteristic. Casualties do not diminish fire-power, because only one man is needed to produce all this volume of fire, provided always, of course, that ammunition is available and handy to him.

Use can be made of quite small features of ground which, although sufficient cover for the gunner, would be quite inadequate for a number of riflemen.

The gun can cover narrow approaches, such as railway cuttings or sunken roads where there is literally insufficient space on the ground to put enough riflemen to stop a determined enemy rush. As to the type of fire to be employed, the nature of the target will determine whether single rounds or bursts will be used—a few men call for single rounds, whereas a group of men or an enemy machine gun demands bursts (see chapters on Fire Control, page 12, and Theory, page 18).

Single-round firing should always be employed if possible. The reasons for this are economy of ammunition. This must always be the gunner's constant thought: the fact that extremely accurate shooting is possible when firing single rounds and also, if necessary, a high rate of fire. The gunner will therefore be trained.

(*a*) To fire single rounds up to a rate of a magazine a minute *if necessary*. Obviously the rate of fire will depend entirely on the target he gets.

(*b*) To fire bursts at the rate of a magazine a minute. This is the slow rate. Bursts will be of four or five rounds and, after each burst, the gunner must observe the effects of his fire if possible in order that he may correctly apply the next burst.

(*c*) To fire at the rapid rate. Something in the region of four magazines a minute is the standard to achieve, but it is the gunner's own best rate while still maintaining accuracy.

MACHINE CARBINE

The characteristics are:

(1) A high rate of fire and good stopping-power at short ranges.

(2) Good accuracy up to 100 yards or even slightly over.

(3) An ideal weapon for close-quarter fighting because of the ease with which surprise and moving targets can be engaged in different directions.

(4) Great moral effect combined with the element of surprise when fire is suddenly opened.

These characteristics need examining rather more closely. It must be appreciated that, while the stopping-power is good at short ranges, at distances of 300 yards or so it is non-existent. That is to say, even if the bullet hit the enemy at that distance, which is doubtful, it would probably barely penetrate his equipment. Consequently any idea of using it as a light machine gun is wholly wrong; it is definitely a weapon for close-range work only. When firing from the shoulder and using a rough sight, such as the battle sight on the Sten, or the recess in the cocking-handle of the Thompson, a trained man should be able to kill at 100 yards four times out of five.

The short barrel makes it such a handy weapon that it can easily and quickly confront targets appearing in different directions, so that it is unequalled for close-range "in-fighting" work.

Most machine carbines can fire either bursts or single rounds. This is effected by a change lever, but there will certainly never be time to fumble with this on service. Therefore the change lever should always be set to "Automatic," for, with a little experience, a quick flick on the trigger which will release only one round at a time, or two at the most, can easily be achieved. Thus either single rounds or bursts can be fired without reference to the change lever.

Contrary to the general belief, the normal and proper type of fire to use is single rounds. There are three reasons for this:

(*a*) The need for economy in ammunition, which is always important.

(*b*) The far greater accuracy that can be obtained, particularly when firing from the shoulder, using a quick sight.

(*c*) The speed with which single rounds can be fired in quick succession, rendering the use of bursts unnecessary on most occasions.

Bursts should therefore be reserved for extreme emergencies, or when a really ideal target presents itself, such as a group of enemy at close range. When firing in bursts they must be kept short—only two or three rounds in each burst; it is not possible to hold the weapon on a target for more than this.

As stated, the machine carbine should normally be fired from the shoulder. It takes only a fraction of a second to bring it up, and far better results will be achieved, because a glimpse of the sights can be obtained.

Firing by sense of direction from the waist should be reserved for real emergencies. Considerable skill is necessary to fire well like this.

Finally, provided the length of the sling admits, the weapon should be carried slung round the neck. Both hands can be removed for negotiating an obstacle and the weapon can be instantly brought to the shoulder or the waist. Except for exceptional circumstances, the butt of the Thompson should *not* be removed: this prevents the use of the sights and sling.

GRENADES

There are so many grenades in use that it is essential to appreciate their particular roles, for all have been designed for definite specified purposes, and must be used according to their characteristics. They are dealt with in a separate chapter.

PISTOL

The chief characteristics of the pistol are:

(1) The short barrel.

(2) The fact that it is normally a one-handed weapon.

(3) The high rate of fire, combined with good stopping-power of the bullet.

The short barrel makes it an ideal weapon for close-quarter fighting, especially in cramped localities. It is so easy and quick to turn and use it at surprise targets in different directions. On the other hand, the short barrel renders it a dangerous weapon in the hands of an unskilled man, from the very fact that it can so easily be pointed anywhere thoughtlessly. The short barrel also limits the effective range.

The normal man cannot fire a pistol using the sights and aiming, because he cannot hold it steady with one hand. Moreover, the very occasions when the pistol is likely to be required demand instantaneous shooting—it is your life or your enemy's. Consequently, the pistol must be fired instantaneously by sense of direction; all that is required is to hit the opponent, and it does not much matter where. On the other hand, there may be occasions when it will be possible to fire resting the hand or elbow on a piece of cover, such as when firing from a trench. In this case, as the wrist of the firing hand can be supported by the other hand, the pistol is no longer a one-handed weapon and the sight should be used. These occasions will be the exception rather than the rule, because speed of firing cannot be the primary factor under such conditions.

The high rate of fire and stopping-power are of great value in close-quarter fighting. The stopping-power obviously depends on the calibre of the weapon, but it is sound practice always to fire two shots in quick succession at every target. Two shots will make sure of stopping; one may not.

THE 2-INCH MORTAR

The chief characteristics are:

(1) The ability to produce a smoke screen.

(2) The ability to neutralize an area, or search out an enemy from behind cover, with high-explosive bombs.

With regard to the first, an enemy position can be temporarily blinded and prevented from using aimed fire. This may enable our own troops to cross a piece of open ground or an obstacle.

The smoke screen must be put down as close as possible to the enemy position, so that no great extent of open ground is left to be traversed after passing through it. It is also an excellent plan to mix a few rounds of high explosive in with the smoke, because this will have the effect of keeping the enemies' heads down. The direction of the wind is, of course, the primary factor to be considered when laying a smoke screen, and it is essential to drop the bombs in approximately the correct place according to the strength and direction of it. This place is known as the " point of origin " or " burst."

The second characteristic means that with high-explosive bombs it is possible to keep the enemy quiet in a small area. This is what neutralization means. It does not necessarily mean that the enemy will be killed or wounded, but it does mean that he will be frightened, by the bombs bursting in his vicinity, into keeping his head down.

Should the enemy be known to have collected in dead ground or behind cover, such as a high bank, where the bullets of small-arms weapons cannot reach, they may be " searched out " by high-explosive bombs. These can be fired at high angle when the steep angle of descent of the bomb will enable it to drop behind the cover or into the dead ground. It is like ferreting: the ferret is put down the hole to drive the rabbit out so that it may be shot with a gun. The bomb is the ferret, the enemy the rabbit, and rifles and Brens take the place of the shot-gun.

With regard to the choice of firing high or low angle much will depend on the task and mortar position. High angle sends the bomb high into the air so that it falls at a steep angle of descent, while low angle gives a flatter trajectory.

The task is the first consideration. If " searching " effect is required high angle must be used. The mortar position is the other main factor. If firing from behind a piece of high cover it may be essential to use high angle to ensure that the bombs clear the cover.

Speed of firing will be greater if high angle is used (except for maximum range, when it is immaterial), because the barrel will not have to be elevated as each bomb is loaded.

Wind has a very considerable effect on mortar bombs. A head wind will reduce the range materially, while side winds will blow the bombs a considerable distance off their course. This is especially the case when firing high angle, and allowance must be made to counteract it.

Generally speaking, it is sound to use low angle if it is possible according to the nature of the task and the mortar position.

THE ANTI-TANK RIFLE

The chief characteristics are:

(1) Great accuracy and good penetration.
(2) Comparatively light and therefore mobile.
(3) A distinct flash and muzzle blast when firing.

It cannot be too strongly stated that the anti-tank rifle was designed to penetrate the armour of light A.F.Vs. and to damage their crews. It will not, and was not designed to, pierce the armour of heavy tanks.

The penetrative powers do not fall off to any great extent as the range increases. They do, however, fall off in a very marked degree when the angle of impact is far from normal.

Some of the most vulnerable portions of tanks have their armour set at an angle to normal, thereby increasing their immunity from piercing.

As a rough guide it can be said that, according to the penetrative powers of the weapon, normal penetration may be expected up to angles not greater than 20 degrees from the normal; at angles of impact greater than this, performance will fall off in a very marked manner.

Despite the accuracy of the anti-tank rifle, fire should always be withheld as long as possible. It is essential not only to hit but to do so in a vulnerable place if possible in order to stand the best chance of piercing the armour.

The flash and muzzle blast demand that the weapon is carefully concealed. Steps must be taken to ensure this, and by careful screening the flash and blast can be prevented from being seen from most points in the enemy's direction. Remember that the flash is so distinct that a compass bearing can be taken on it.

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