SECTION I.

PRINCIPLES AND SYSTEM OF TRAINING.

GENERAL.

1. Skill in the use of weapons, individually by the soldier and in combination by leaders, is one of the first essentials for victory in battle. The various Manuals dealing with Small Arms Training provide a system of teaching which, if followed intelligently, will produce this skill.

2. In order that men may not be hampered in their training through badly fitting weapons, officers concerned will ensure at the time of issuing individual weapons that they are properly suited to each man. Rifle butts are made in three sizes and should be issued according to the size of the individual concerned. (See Manual of Riflemarksmanship).

3. Four conditions are essential to the production of effective fire from small arms in battle:
   a. A high standard of individual skill in the use of weapons and in judging distance or range-taking.
   b. The co-operation of skilled individuals to form an effective fire unit under a leader.
   c. Ability on the part of platoon and higher commanders to direct fire to the best advantage.
   d. Ability on the part of fire unit commanders to control the fire of their units and, on the part of the men, to recognise the target.

4. The object of weapon training, therefore, is:
   a. To make the man proficient in handling and firing his weapons so as to give him confidence in them and in his own ability to kill the enemy with them.
b. To train men to work together in a fire unit under a commander.

c. To ensure that commanders are competent to train their men and are themselves proficient in fire control.

d. To provide instructors who are capable of producing the above.

Note: Where applicable, read ‘Regiment,’ ‘Battery,’ ‘Squadron,’ for ‘Battalion’ or ‘Company,’ and ‘Section’ or ‘Troop’ for ‘Platoon.’

5. A fully qualified instructor should be able to:

a. To train recruits or men who possess little or no knowledge of a particular weapon.

b. To exercise trained men.

c. To train junior commanders in fire direction and control.

d. To train officers, N.C.Os., and potential N.C.Os. to be instructors.

6. No individual can be considered fully trained unless he is able to use efficiently any of the weapons with which he may be armed, and particularly when wearing a respirator. To ensure this, frequent practice is necessary, and weapon training of the leader and soldier should take place throughout the year.

7. Sufficient data on the mechanism required for the care and maintenance of each weapon is included in the appropriate manuals. Officers and N.C.Os. should have a good knowledge of the mechanism of the weapons with which their units are armed, in order that they may fully understand their capabilities and characteristics, and thus be fitted to instruct in their use and direct and control their fire in battle.

SAFETY PRECAUTIONS DURING TRAINING.

1. The detailed safety precautions necessary during training, especially when ammunition is being used, are laid down in this pamphlet. Any building that contains explosives should be considered as an explosive store and be dealt with in accordance with Magazine Regulations.

2. Drill cartridges are employed in training and are essential for efficiency. There is, however, a risk of accidents through their becoming mixed with live ammunition. To prevent accidents inspections will be carried out at the beginning of each lesson.

Instructors will:

a. Inspect all weapons to ensure that there is no live round in the breech or magazine.

b. Inspect all ammunition pouches, M.G. belts and boxes, magazines and carriers to ensure that no live ammunition is present.

c. Inspect all drill cartridges to ensure that no live round is present.

d. Show their own weapons and drill cartridges to the class under their instruction.

e. Inspect dummy drill grenades and igniter sets, and order the first safety precaution to be carried out in grenade training.

3. Drill cartridges will never be used in aiming at an aiming disc held to the eye.

4. When drill cartridges are used for setting up stoppages on the range, the officer in charge of the firing point will supervise their issue and subsequent collection.

5. Storage of live ammunition.—Live ammunition should be kept perfectly dry and clean, and should not be exposed to extremes of temperature. In no circumstances will drill cartridges be kept in, or issued from, the same store as that used for ball or blank ammunition.
6. No cartridges, other than those supplied by the Ordnance Corps, will be used in service weapons.

PRINCIPLES OF INSTRUCTION.

1. Instruction will be given, when practicable, in the following sequence:
   - EXPLANATION ... Instruction by the ear.
   - DEMONSTRATION ... Instruction by the eye.
   - EXECUTION ... Imitation of the demonstration and correcting mistakes.
   - REPETITION ... Practice to improve.

Execution should follow demonstration as soon as possible so that the lesson is more readily impressed on the mind of the soldier.

Accuracy and speed in execution should be obtained gradually by repetition until men are able to handle their weapons by sense of touch alone.

2. A good instructor requires the following:
   a. Common sense and enthusiasm.
   b. Sympathy with and interest in those under instruction and an understanding of their outlook.
   c. A good knowledge of his subject.
   d. A clear idea beforehand of the lessons to be taught and the method of teaching them.
   e. The ability to encourage by praise where praise is due and to avoid sarcasm.
   f. The ability to use his own words rather than a repetition of the words in the book.

3. Before the commencement of each lesson, instructors will satisfy themselves that the class understands the previous lesson in the same subject. This will be done by questioning. The class will also be interrogated on the subject taught at the conclusion of each lesson.

HINTS TO INSTRUCTORS.

1. No method of instruction will be effective unless it possesses simplicity and interest. The following are some general hints to instructors:
   a. However experienced he may be, preparation of the next day's work is essential and the necessary stores must be placed ready for use before the beginning of each lesson. He must have a thorough knowledge of what he is to teach. This includes knowing the reasons for things and the meaning of all technical terms.
   b. The interest of the men must be roused and maintained. Variety of subjects assists, but apart from this much depends on an instructor's manner. He should be brief and keep to the point, avoiding non-essentials. Competition stimulates keenness and team spirit, but the tendency to sacrifice accuracy for speed must be guarded against. The earlier a weapon can be fired as a demonstration the more interest will be aroused in subsequent lessons.
   c. He will be careful to avoid personal mannerisms which distract the attention of the class. He must learn to speak quietly, slowly and distinctly, and avoid either a monotonous tone of voice or shouting. Use simple everyday language and when a technical term must be used explain its meaning.
   d. In giving demonstrations, he must be accurate in his movements. If he makes a mistake he should point it out to the class and repeat the demonstration.
   e. Questions and answers develop quickness of thought, ease of expression and help to record the progress
of those under instruction. This applies particularly to subjects where only one weapon is available for the whole class. Questions should be addressed to the whole class and not to one particular individual; then, after a sufficient pause, one man should be asked for the answer. A regular sequence of questioning should be avoided. Thus the whole class will have to consider the answer and be kept on the alert.

f. Avoid crowding too much into a lesson. It is not how much is got through in a period that matters, but how much is remembered. Concentrate on essentials and avoid unnecessary corrections.

g. He must expect and look for mistakes. Encouragement should follow correction. In correcting faults he should make a man correct himself; a brief demonstration of the correct method and interrogation afterwards are valuable means of bringing the fault home to the man. Faults due to slackness or neglect should be dealt with firmly, but criticism after an honest effort must be such as will produce a further and better effort. Good work should always be acknowledged. Give praise where it is due and avoid sarcasm.

h. He will give a brief explanation of what he is about to teach at the beginning of each lesson and when a new subject is introduced. Many facts can be learned better by doing rather than by listening and watching. Therefore give plenty of practice in handling and working weapons and their parts.

i. Where a single weapon (i.e., M.G., L.M.G. and A.T. Rifle) is used, a table is desirable, and the class will be seated where they can best see the action of the weapon and demonstration by the instructor.

j. Men vary greatly in the speed and ease with which they can learn and understand mechanism. Therefore find opportunities for each man to study and handle weapons "on his own" and at his own pace.

l. Do not expect the learning to be evenly progressive. It is a normal thing to have periods when the learner, whatever his efforts, will seem to mark time or even get worse. Many men with good general intelligence may be clumsy in movement and slow at understanding mechanisms, or slow at learning names by heart. So do not assume that a man who seems to be intelligent is slackling off if he is slow in any of these things.

m. Some men learn better by seeing, others by hearing. Most do best when there is an appeal to both eye and ear. Therefore make full use of models, skeleton weapons, blackboards and diagrams.

n. Divide each lesson into suitable steps or phases, making sure each is mastered by the class before passing on to the next. If your class is backward and you cannot finish the lesson properly in the time laid down, make no attempt to rush through it, ask for extra time or have it included in the programme at a later stage.

o. Encourage questions so long as they do not anticipate material which is better kept to a later lesson. Allow and encourage individual questions when the class is dismissed.

p. The atmosphere of the class should not be one of rigid and severe discipline, which may be right at other times. Do not mix up exercises in discipline with instruction.

q. One of the most important duties is to be able to coach a firer on the range. For this work, a good knowledge of the subject, patience and practical experience are necessary, combined with a sympathetic study of each individual's abilities. Details of the method of coaching will be found in Section V.

r. Training Manuals and instructions are not meant to
be recited. The instructor's ideal should be clarity and simplicity of expression, not fluency.

2. Every officer, N.C.O. and man will be in possession of a scoring book. These books will be issued to recruits as soon as their weapon training begins. They must be carefully preserved by all ranks, and kept up-to-date. They will be brought on all weapon training parades or when firing on the range takes place. Platoon commanders will ensure that men are instructed how to complete these records, and that coaches enter them up correctly for those they are detailed to coach. In all cases the entries should be checked subsequently by the platoon commander. Unit commanders will ensure that these scoring books are compiled in accordance with the instructions contained therein.

PREPARATION OF PROGRAMMES.

1. Progressive instruction is ensured only by means of programmes, which require careful consideration in their preparation.

2. Programmes may be required with one of the following objects in view:—
   a. Recruit training.
   b. Continuation training of the recruit.
   c. Preliminary training prior to firing annual range practices.
   d. To exercise the trained soldier.
   e. To train instructors, or potential instructors.
   f. To refresh instructors.

3. The platoon commander is responsible without qualification for the training of his platoon. He should know exactly the training that each N.C.O. and man of his unit requires to fit him for his job, and his whole endeavour should be to train and weld these men into an efficient fighting platoon. He should stamp out the all too prevalent practice amongst N.C.O.s. of continuously repeating instruction with which the men are already familiar. Platoon commanders will prepare programmes for their own platoons; these will be approved by their respective company commanders.

4. When preparing a scheme of training, the officer concerned should consider the following:—
   a. The object of the instruction.
   b. The number of working days available, and whether the instruction will be continuous or interrupted; the hours of work each day and the time of the year.
   c. The number of periods required to carry out the instruction and the daily allocation of periods.
   d. The number of instructors available and the number of men under instruction. (The strength of classes should not exceed eight).
   e. The standard of knowledge of the men to be instructed. Examine records of T.O.E.T., results of latest range practices and inspection reports. If these are not available carry out T.O.E.T.
   f. The places of work and type of ground available. These must be considered from the point of view of both fine and wet weather.
   g. The equipment and stores available and required for the instruction.

5. The officer, having considered the above points, should:—
   a. Make a list of subjects to be taught, i.e., a syllabus.
   b. Allot the required number of periods for each subject.
   c. Arrange lessons in each subject in logical sequence.
   d. Allot time for practice, mutual instruction and classtaking in such subjects as require it.
   e. Allot time for tests.
6. Lessons should normally be taught in the sequence shown and should be clearly numbered in the programme so that it will be obvious to both instructor and student which lessons are to be taught.

7. The weekly programmes should be issued in sufficient time to enable instructors to prepare the work. The daily programme should, where practicable, be suitably arranged for both dry and wet weather; it will often be advisable to have alternative programmes.

8. Where it transpires that all, or any, of those under instruction have reached the required standard in a subject before the completion of the number of periods of instruction provided in the syllabus for that subject, the remaining periods will, in the case of the personnel concerned, be devoted to training of a more advanced nature, or, alternatively, the number of hours allotted will be reduced accordingly.

9. The following are a few general hints to be considered in making out the weekly programme:

a. Variation of the subject maintains interest and dispels monotony.
b. Arrange lessons so that difficult and easy periods alternate.
c. Start the day with a vigorous subject such as bayonet training.
d. Allow time for movement to and from places of work.
e. Arrange a short "break" during the morning's work.
f. If possible lectures should take place in the evening specially in the winter.

10. A N.C.O. should be made responsible for the preparation and arrangement of the equipment and apparatus required for the day's instruction. He should be provided with copies of all programmes and informed of any alterations.

11. A period of instruction should not normally exceed 45 minutes. All lessons have been so designed that they can be completed in this time, but, of course, many will require repetition. For trained men undergoing refresher training a period should be from 10 to 20 minutes depending on the standard and the phase of the subject in which instruction is being given.

**SYSTEM OF TRAINING.**

1. The recruit is taught weapon training initially.

2. The first lesson on any weapon should be a demonstration on the open range of its capabilities and limitations. Where this is not feasible, the demonstration should be given at an early stage in the recruit's training and certainly before open range or live practices commence.

3. When the elementary instruction in the principles of aiming, trigger pressing, holding and positions have been taught and learnt, the recruit must learn to apply these to battle conditions. There must be progression. The lessons must be carried out under more difficult conditions and be made as practical as possible.

4. When the recruit has been posted to his unit particular attention will be paid to the more advanced lessons of weapon training such as section handling with the light machine gun. Such lessons require repetition on different types of ground.

5. Instructors should be particularly alert that small points of elementary training are scrupulously observed; no fault no matter how small should pass unchecked.

6. In exercising the trained soldier, the method adopted for recruit instruction will be modified and the system employed will be that of practising the soldier in the use of his weapons rather than teaching him.
7. The officer concerned should ensure that the programmes are arranged so that all the men are being practised in subjects in which they require to maintain or improve their standard of efficiency. N.C.O.s. and men who have proved themselves efficient will be instructed in more advanced subjects. The instructor carrying out the programme should avoid detail and explanations; these are particularly boring to men who already know the subject.

8. The normal period of instruction (45 minutes) should, in the case of trained soldiers, be sub-divided into a number of shorter periods, and the men exercised in a different phase of training during each sub-period.

9. The following special points should be considered in preparing programmes for trained soldiers:

a. The object may be:
   
   (1.) Preparation for the passing of tests of elementary training prior to firing the annual range practices.
   
   (2.) Improving any weakness shown in tests of elementary training.
   
   (3.) Preparation for battle practices.
   
   (4.) Preparation for advancement to higher grade.

b. The individuals who are to be exercised are trained soldiers and, therefore, do not require detailed instruction; they need only to be practised and refreshed in those subjects which have a direct bearing on the object for which the programme is designed.

c. Maintain interest and avoid monotony by variation of the subjects.

d. Frame the programme so that exercises which require physical exertion alternate with those of a less strenuous nature.

10. Programmes intended for the training of instructors and potential instructors should, after allowing for refresher periods, provide mainly for instruction and practice in class-taking and supervision.

11. Officers must always bear in mind that the culmination of weapon training is battle practices.

TESTS OF ELEMENTARY TRAINING.

1. Advanced weapon training and range practices are a waste of time and ammunition unless those taking part have reached a certain standard of proficiency. The tests of elementary training give the required standard. They are designed:

   a. To ensure that recruits have reached an efficient standard before they begin range practices.
   
   b. To ensure that trained soldiers have maintained their efficiency and are fit to fire the annual range practices.
   
   c. To prevent any detail of elementary training being overlooked.
   
   d. To enable officers charged with the preparation of individual training programmes to determine what proportion of the time available should be allotted to the various subjects.

2. The platoon commander will keep a record in the L.A. 49/50 of all men in his platoon, showing the tests they have passed, and the dates on which they were carried out.

3. When a man is transferred from one unit or sub-unit to another, a copy of these records on A.F. 224 should be forwarded with his documents.

4. It is important that instruction should be clearly differentiated from testing. In the former the soldier is taught by demonstration and explanation, in the latter he is questioned or required to carry out a certain exercise.
without any explanation or assistance and be either passes the test or is sent back for further instruction.

5. Every officer, non-commissioned officer and man who fires an annual range course, must be put through the relevant tests before firing on the open range. No officer, non-commissioned officer or man will be permitted to fire open range practices until he has passed these tests.

6. Certain tests must be carried out individually, but, in order to save time, as many as possible should be carried out collectively.

7. In compiling the L.A. 49 or 50, each name should have at least two lines, which will give room for the entry of two tests, one on each line. The officer conducting the test will sign the register. The date on which each test is carried out should be shown. This can be done by inserting the date in each square beside the result, e.g. P. 22/2, F. 23/3. The company commander and commanding officer will enter their remarks on the appropriate page and sign it.

8. Officers, non-commissioned officers and men will not be tested together, and as far as is practicable, officers and non-commissioned officers employed as instructors should be tested before the commencement of training for the unit generally.

9. It is important that these tests should not be considered solely as competitions against time, for, although quickness is necessary, accuracy is the first essential. No man should, therefore, be passed as efficient unless all the points are correctly carried out even though he may complete them in the time allowed.

Whilst passing the test for accuracy, men who exceed the time limit by a small margin, should be tested once again before being put back for further instruction.

10. Where the sub-unit commander has only a limited period of time available for carrying out the tests, the unit commander may detail one or more officers to assist him, but the fundamental principle, that the sub-unit commander is responsible, must not be overlooked.

**ANNUAL RANGE PRACTICES—FIRING OF**

1. The period during which units will fire their annual range practices will be decided by Officers Commanding Commands, according to the range facilities available and other conditions prevailing in their respective commands. All range courses should however be fired before the commencement of field training. Weapon training should normally be completed by the 31st October and returns submitted before the 31st December, in each year.

2. In the case of men, who have commenced but not completed their annual course, being posted to another unit, the results of the practices already “fired” will be forwarded so that the practices can be completed and all the results included in the weapon training return of the new unit.

In the case of detached men, arrangements will be made to have such men exercised with the unit to which they are attached. The results of their course will be transmitted to their own unit for inclusion in the weapon training return.

The ammunition expended in exercising attached men will be accounted for by the unit exercising them.

3. Every endeavour must be made to ensure that all ranks fired the range practices with the sub-unit to which they belong.

4. All men not fully exercised with their companies may be attached to other companies to fire the practices omitted; or, if all companies have completed their practices, a party of casuals will be formed to ensure that all men not exempted are fully exercised.

5. If a man has commenced firing any particular practice and is prevented, through any reason, from completing it, the points scored will not count, and the whole practice will be fired again on resuming.
SECTION II.

THE THEORY OF SMALL ARMS FIRE.

GENERAL.

1. In order to obtain the full fire effect from the weapons with which they are armed, it is necessary for all ranks to have a working knowledge of the theory of small arms fire. This is necessary in the first place, because tactics are largely based upon and governed by the characteristics of weapons, and secondly because, without this knowledge, the soldier may have a false idea as to the capabilities of his weapon, and either expect too much from it or lose confidence in its powers.

2. This section has been divided into two parts, dealing in Part I with the elementary theory of the fire of a single rifle or a single shot from an automatic weapon, and in Part II with the theory of automatic or collective fire. The contents of Part II should be carefully studied by all officers and fire unit leaders.

3. The following demonstrations, using tracer, should where possible be given to the soldier in explanation of Part I:

   a. Demonstration showing the curved trajectory of the bullet at various ranges.
   
   b. Demonstration of the necessity for sight adjustment. This should take the form of firing at, say, 500 yards range, with the sights down, and then again at the same range, with the sights set correctly.
   
   c. Demonstration showing the effect of wind on the flight of the bullet.

DEFINITIONS.

4. Definitions (Fig. 1).

The axis of the barrel is an imaginary line following the centre of the bore from breech to muzzle.

The line of departure is the direction which the bullet takes on leaving the muzzle. Theoretically this is in prolongation of the axis of the barrel, but generally it differs from this by an amount depending on the jump.

The line of fire is the direction of the target from the muzzle of a weapon.

Fig. 1.

The line of sight is a straight line from the firer's eye, through the sights, to the point aimed at.

The trajectory is the curved path taken by a bullet during its flight (see Appendix II).

The culminating point is the greatest height above the line of sight to which the bullet rises in its flight; this occurs a little beyond half the distance which the bullet travels (see Appendix II).

The angle of descent is the angle which the tangent to the trajectory makes with the line of sight at the point of impact.

Ricochets.—Bullets which rebound after striking the ground or any other obstacle and continue their flight are said to ricochet. Ricochets may occur from any surface, but are less likely from soft ground than from hard, smooth surfaces; bullets ricochet freely from water, and from any surface may rise abruptly or deviate considerably to right or left from their original course.
The first catch is the point where the bullet has descended sufficiently to strike the top of the target.
The first graze is the point where the bullet if not interfered with will first strike the ground.
The dangerous space for any particular range is the distance between the first catch and the first graze. The extent of the dangerous space depends on:

(a) The range (Fig. 2).

This diagram shows height increased six times.

Range = 600 yards. Slope of fall = 1 in 90.
:. Dangerous space for prone man (1 ft. high) is approximately 30 yards.

Range = 1,000 yards. Slope = 1 in 30.
Dangerous space is approximately 10x.

(b) The height of the weapon above the ground level (Fig. 3).

(c) The height of the object fired at (Fig. 4).

(d) The flatness of the trajectory (Fig. 5).

(e) The conformation of the ground (Fig. 6).
The dangerous space therefore decreases:

- a. As the range increases.
- b. As the height of the object decreases.
- c. As the curve of the trajectory increases.
- d. When firing against ground which slopes upwards.
- e. As the height of the rifle is increased from the target level.

increases:

- a. As the range decreases.
- b. As the height of the object increases.
- c. The flatter the trajectory.
- d. As the slope of the ground conforms to the trajectory of the bullet.
- e. The nearer the weapon is to the ground.

The cone of fire is the pattern formed in the air by the trajectories of a number of bullets fired with the same aim whether from one or more weapons.

The beaten zone is the area of ground beaten by a cone of fire.

The dangerous zone is the area of the beaten zone, plus the area formed by the dangerous space for the lowest bullet.

The culminating point of a cone is the culminating point of the centre bullet of a cone.

The deflated zone is the area of ground that would be included in the beaten zone but for the fact that the bullets which would have fallen on it have been intercepted by an obstruction, usually a piece of high ground.

Ranging is the process of determining by observation of fire the direction and elevation required to hit the target.

Part I.—Elementary Theory (Single Shots).

5. Description of Mark VII ammunition, cartridge and bullet:

The cartridge case is of solid drawn brass and has a rim at the base by which the cartridge is positioned in the chamber and extracted.

- a. It contains the propellant charge.

b. It carries the means of ignition.

c. The expansion of gases due to the burning of the charge in the cartridge case causes the walls of the case to expand in all directions, thus sealing the chamber.

The bullet is pointed and has a lead core enclosed in a cupro-nickel envelope. The advantage of the elongated bullet is that it has greater weight in proportion to the surface directly opposed to the air, and is, therefore, better able to overcome the resistance of the air; thus, its velocity is assisted, and greater range and striking power obtained.

6. When a weapon is fired, certain factors, which are explained below, at once begin to act on the bullet:

a. Before the bullet leaves the barrel.

(1) Force of explosion. When a round of ammunition is fired, the gases formed by the burning of the charge push the bullet forward through the bore to the muzzle and out into the air. With Mark VII ammunition the velocity with which the bullet leaves the muzzle of a rifle is 2,440 feet a second. The muzzle velocity varies with different types of weapons and ammunition.

![Diagram](image_url)
(2) **Rifling.** A barrel is said to be rifled when it has spiral grooves cut down the bore (Fig. 7). The rifling of the Enfield service rifle is of five grooves, the twist being one turn in 10 inches left hand. The left handed twist was originally adopted to compensate for drift due to the rotation of the earth in the Northern Hemisphere. It has also the effect of twisting the butt of the rifle away from the firer's cheek, instead of against it.

When the charge is fired the bullet is forced along these grooves and consequently, when it leaves the muzzle it has acquired a spinning motion. This spinning tends to keep the nose foremost and to ensure steadiness in flight, with resultant accuracy, also it allows an elongated bullet to be used.

(3) **Symmetry of the bullet.** Of all manufacturing errors which affect the accuracy of shooting want of symmetry in the bullet is by far the most serious. This occurs, sometimes in shape, but more commonly in the thickness of the bullet envelope, and causes the bullets to oscillate in flight. Not only is a bullet which is oscillating during flight uncertain as to its point of impact on the target, but where the centre of gravity of the bullet is not truly central in the barrel, the bullet leaves the muzzle on a line of departure which is not strictly along the axis of the barrel.

(4) **Variation of the charges.** Variations in loading, either in the weight of the charge, or in the quality of the propellant, or in the loading of the cap, which in turn affects the rate of burning of the propellant, are liable to cause differences between round and round in the velocity of the bullet at the muzzle. Where variations in muzzle velocity occur the bullets have different trajectories, and their points of impact on the target vary accordingly.

(5) ** Fouling**, especially metallic fouling, are the cause of considerable trouble to users of small bore arms. Metallic fouling affects the shooting by the metallic deposit not allowing the bullet to bear evenly on the surface of the bore; therefore it probably will not leave the muzzle of the weapon on its true axis.

Metallic fouling may be caused by the bore having a rough surface, cuts or scratches in the bore, a tight band or other influence restraining the free expansion of a hot barrel, or to some defect in the bullet.

Metallic fouling if not treated may lead to a “bulged” barrel.

(6) **Movement due to recoil.** When the weapon is fired, the explosion, together with the bullet forcing its way through the barrel, sets up a vibratory movement which may result in a difference between the prolongation of the axis of the bore before firing and the line of departure of the bullet. This difference is known as “jump” and is compensated for by adjustment of the foresight before the weapon leaves the factory. No allowance, therefore, need be made for this movement.

(7) **Oily barrel.** If shots are fired with an oily barrel, abnormal vibration and, consequently, erratic shooting will occur until the oil is burned up.

(8) **Oily cartridge.** Should the chamber or cartridge be oily or wet, extra back-pressure will be developed on the bolt head, breech block or lock owing to the lack of friction between the
case and the chamber. This will affect vibration and erratic shooting will result.

(9) Stocking up of the rifle, i.e. the fitting of the fore-end to the barrel and body. This is most carefully done at the factory. Any warping of the fore-end or loosening of screws, or the presence of any foreign body between the fore-end and barrel may affect the jump and thereby affect the shooting of the rifle. Care should be taken, especially during tactical exercises, that dirt or grit does not get between the fore-end and the barrel. Any neglect in this respect may cause the rifle to be "wood-bound" (also referred to as having a "tight" barrel). This condition will cause erratic shooting because the rifle is now in a different condition from that in which it was tested and passed out of the factory. There should be a certain amount of "play" between the fore-end and barrel of each rifle.

(10) Effect of firing with the bayonet fixed. All rifles have their own peculiarities when firing with the bayonet fixed; some of them may shoot high but tests have shown that most rifles are not appreciably affected by the fixing of the bayonet at all. When, however, an upward throw is apparent, as a rough guide, this has been found to be approximately 1 foot above the point of aim, when firing at 300 yards with Mark VII ammunition.

In every case the man must ascertain for himself the shooting of his rifle with the bayonet fixed. Suitable adjustments can then be made.

(11) Resting the rifle. When firing over cover the rifle must be gripped by the right hand in the normal way and the wrist and back of the hand rested on the cover. When firing round cover the side of the forearm only should touch cover. In this manner the shooting of the rifle will be normal.

If, however, the rifle itself is rested on the cover, this will affect the jump, and as it is only the most experienced shots who can be trusted always to apply the same weight at the same part of the rifle as they rest it, inaccurate shooting will be the result for the average soldier. For this reason it is taught that no part of the rifle, either metal or woodwork, should be allowed to touch cover.

b. After the bullet leaves the barrel,

(1) Resistance of the air. This causes the velocity of the bullet to decrease rapidly and allows it to travel only about 600 yards in the first second, about 400 yards in the second second and about 300 yards in the third second and so on, gradually losing velocity until it is spent.

The maximum range of the Mark VII .303 bullet is about 3,500 yards when fired from a weapon held at an angle of 30 degrees.

(2) Gravity. The force of gravity pulls all unsupported objects towards the centre of the earth until stopped by the earth's surface. It acts on the bullet immediately it leaves the muzzle drawing it downwards with increasing speed.

These two factors, the force of gravity pulling the bullet down and resistance of the air, acting as a brake on the bullet and slowing its speed cause it to travel in a curved path, the fall becoming steeper as the range increases. This curved path of the bullet is known as the trajectory.
7. Elevation and necessity for sights on a weapon.—It is necessary to consider 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 the target, 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 to make it reach the desired spot.

8. Sighting of small arms weapons.—In sighting, an average elevation for each range has been adopted. This means that the sight graduations of each weapon give the average elevation required by many thousands of weapons. In addition each weapon is carefully tested for accuracy before leaving the factory at a range of 100 feet. This test, in the case of the rifle, is carried out from a mechanical rest designed to approximate as closely as possible to the conditions in which a rifle is ordinarily fired, as regards points of support and recoil. The laying of the weapon is done by means of handwheels, and a true regulation aim is obtained with the use of a special telescope attached to the rifle. After laying and before firing the telescope is removed. The standard required for each rifle is that four out of five shots come within a rectangle 1 inch broad by 11 inches high. Failing this the weapon is rejected.

In addition to this test, 10% of the rifles are fired at 600 yards, from a similar rest and with similar aids, when the standard required is that nine out of ten shots fired lie within a 2-foot circle.

There are, however, in each weapon small manufacturing variations which cannot be avoided in large scale production, further variations are produced by wear of parts, by the slackening or tightening of screws and in the packing of Vickers machine-gun barrels. These inequalities produce an individuality in each weapon which shows itself in a slight variation of the sighting elevation required; it is therefore necessary for each man to study the shooting peculiarities of the weapon with which he is armed.

9. Sight Graduations.—All weapons before firing, whether on the range or on active service should be correctly zeroed. This is usually done, with small arms weapons, at a range of 100 yards, with the sights set at 200, and if the weapon is in perfect condition, and the zeroing has been correctly carried out, this should result in the sighting being correct when firing at all ranges. As mentioned in Paragraph 8, however, variations may be produced in weapons for a number of reasons, and because of this each man must study the shooting of his own weapon, find out any error that may exist in the graduations up to 600 yards, and set his sights accordingly for each range as required.

This will, of course, only apply to the trained soldier who has had an opportunity of thoroughly familiarising himself with the weapon with which he is armed. A recruit, or a trained soldier when firing a particular weapon for the first time will not be allowed to alter his sights at will, but only with the permission of his coach. At the longer
ranges the graduations on the backsight should be regarded as the best possible guide under all conditions.

10. Wind.—The effect of a side wind on the path of a bullet is considerable at the longer ranges.

Head and rear winds. Below 1,500 yards no allowance is necessary.

As a guide:

For strong winds at 1,500 yards add 50 yards for a head wind. For strong winds at 2,000 yards deduct 50 yards for a rear wind.

11. Atmospheric conditions.—The effect of atmospheric conditions other than wind need not normally be considered on active service. It is sufficient if it is realised that, in fighting at high altitudes, less elevation may be necessary.

Alterations of temperature will not be taken into account, except that, when cartridges become heated in the sun, some rifles are liable to shoot high.

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

Part II.—Elementary Theory (Automatic or Collective Fire).

1. This Part deals with theory in respect of a series of shots fired from a light machine gun, or in collective fire.

2. When fire is delivered at a target the bullets pass through the air in the shape of a "cone of fire", which is the pattern formed by a series of shots fired with the same elevation and point of aim. This pattern is oval in shape, its density decreasing from the centre outwards. (Figs. 9 and 10).

Diagram of a cone of fire showing the pattern made by 120 rounds fired in service bursts from the bipod of a Bren Gun at 500 yards.

Dimensions:
- Horizontal: 6 1/2 feet.
- Vertical: 7 3/4 feet.
- Squares: 1 ft. sides.
When fire is correctly applied to a target the bullets of the cone on striking the ground form a beaten zone round the target.

3. The size of the beaten zone will vary with the range and slope of the ground in relation to the angle of descent of the bullets.

4. **Dangerous Zone:** For fire to be effective, the target must be included in the dangerous zone, which is the area of the beaten zone PLUS the dangerous space formed by the lowest bullets of the cone.

The bullets are densest in the middle of the beaten zone (Fig. 11).

**Fig. 10.**

Representative diagram of cone of fire showing the pattern made by 120 rounds fired in bursts of 30 rounds from the tripod of a Bren Gun at 500 yards.

Dimensions:
- Horizontal: 3½ feet.
- Vertical: 5½ feet.
- Squares: 1 ft. sides.

The cone of fire from a light machine gun or machine gun is smaller than that formed by the fire of a number of riflemen, since the skill and eyesight of the men and the shooting of the rifles vary.

**Fig. 11.**
As the range increases the depth of the beaten zone decreases (Fig. 12). This is due to the increased angle of descent of the bullets. Beyond 1,500 yards the beaten zone increases again, especially laterally, and at the same time the angle of descent becomes steeper and the dangerous space formed by the lowest bullets of the cone becomes less.

The above figures are based on 90% of rounds fired from the bipod of a Bren gun.

**Fig. 12.**

As a result, more bullets have to be fired to obtain fire effect at the longer ranges, and the range has to be more accurately known.

5. **Ranging:** Ranging is the process of determining by observation of fire the direction and elevation required to hit a given target. The permissible error in ranging is the term applied to the error which can be made in estimating the range while still keeping the target within the B.Z. The permissible error in ranging is, therefore, equal to half the depth of the B.Z. for any particular range (Fig. 13). For example, assume the target to be 500 yards distant. B.Z. of the light machine gun at that range is approximately 180 yards in depth. If the range obtained is accurate, half the B.Z. will be on one side of the target and half on the other. If an error of over 90 yards is made, i.e., half the depth of the B.Z. at this range, the whole of the B.Z. will miss the target.

**Fig. 13.**

Only a very general comparison of zones or cones obtained from the bipod or tripod is possible. This is due to the fact that individual skill plays a very large part in the size of the zone or cone obtained from the bipod.

With the latter a skilled shot, relaying after each service burst, may quite possibly have a slightly shorter zone or shallower cone than would be obtained from the tripod.

Relaying is not necessarily carried out after each burst when firing from a tripod. On the other hand control on the tripod is usually better for direction; the zone or cone obtained from the bipod may, therefore, be expected to be slightly greater in width than that obtained from the tripod.
With semi-skilled or inexpert firers, it is probable that the zones or cones obtained from the bipod will exceed those obtained from the tripod in depth as well as width.

7. Every opportunity should be taken of practising the observation of fire. The possibilities of observing fire will largely depend on the nature of the ground.

Full use should be made of opportunities for practice which occur in battle practices.

8. If observation is possible it is the best method of obtaining correct sighting elevation, since the errors in judging distance, caused by variation in light and ground are automatically overcome. (See Manual of Musketry, Pt. II).

9. The fire of the light machine gun, owing to its closer grouping, is easier to observe than that of riflemen, whose cone of fire is more widely dispersed, particularly in battle.

10. It must be remembered that a cone of fire, by whatever weapon it is produced, has a few wide shots around its edge.

The observation of the strike of single bullets must not, therefore, be taken as an indication of the centre of the beaten zone; rather the reverse, since, if the ground shows the strike of one bullet, it will show more if they are there.

11. If the fall of bullets, both short of and beyond the target, is observed, it is safe to assume that ranging is correct.

12. Ground has an important bearing on fire effect; therefore a study of the conformation of ground at the target is necessary as a preliminary to opening fire. For example:

a. A cone of fire (Fig. 14) striking a steep hillside will cover a very small area of ground and therefore produces a restricted beaten zone—A.B. Bold alteration in elevation (not less than 100 yards) should be made when correction is observed to be necessary.

Fig. 14.

b. The same cone of fire (Fig. 15) striking a gentler slope will cover a slightly larger area of ground—B.C.

Fig. 15.

c. In similar proportion on level ground—D.E.—(Fig. 16).

Fig. 16.

d. The greatest area swept by bullets will be where the fall of the ground conforms to the trajectory of the bullets, for example—a reverse slope (Fig. 17) in which case the whole area F.G. is a dangerous zone of which F.H. is the beaten zone. Troops, even though under cover from view at K., would be in danger from unaimed fire.
Section III.

Range Work.

General.

1. Range courses are devised as a means of determining periodically during the training of recruits what progress they have made in the various stages of their training (i.e., miniature—and 30-yards ranges), and whether they are fit for posting-out at the end of their recruit training period (open range—recruits' course); they may be regarded as the culmination of elementary training with small arms. In the case of trained personnel, these courses indicate to unit commanders whether the shooting efficiency of their unit is being maintained.

2. The courses to be fired by recruits and, annually, by trained soldiers are detailed in Annual Range Practices (Small Arms) and may be altered periodically in accordance with changes in tactical doctrine. These courses lead gradually from shooting at elementary targets under artificial conditions to battle shooting, designed to exercise leaders and individuals practically in lessons on the application of fire, fire discipline, and judging distance, in fire and movement, and in snapshooting and firing at moving targets.

3. To obtain the fullest value from the ammunition allotted for the annual courses, training to refresh the individual will be carried out before firing. This is termed "preliminary training."

4. Before the annual course is fired, it is essential that the sighting of weapons should be true for direction and elevation. The correction of errors of this nature is termed zeroing. (See Section IV).
5. Good coaching at the firing point is necessary in order to train the recruit to become an efficient shot and to improve the shooting of trained soldiers (see Section V). All officers and N.C.O.s. will receive instruction in this subject. Recruits will be coached in all practices, in order that they may obtain good results in their early training and thereby improve their shooting through confidence. Other personnel will be coached in accordance with the provisions of Annual Range Practices (Small Arms).

6. With mortars and machine guns only a limited amount of practice in "fire for effect" can be given owing to the large expenditure of ammunition involved; therefore, in M.G. companies the training of fire unit leaders and potential leaders is of particular importance. A high average standard must be the aim, rather than the training of a few experts.

7. Where practicable, opportunities should be given to personnel of other units not armed with the mortar or machine gun to watch the firing of the annual course. Similarly, demonstrations of all methods of indirect fire should be given to all machine-gun sub-units, and to other personnel as above.

8. Demonstrations with service and tracer ammunition may be usefully employed in all stages of weapon training. These are of two types:

   a. TECHNICAL: To show the limitations and powers of weapons and their effect on the application of fire. The following are some examples:

      (1) Elementary theory, showing trajectory, effect of wind, elevation, cones of fire, length of "beaten zone."

      (2) Penetration of the bullet into various substances which may be used as cover in the field.

      (3) System of application of fire. (This can also be carried out on miniature and 30-yard ranges).

   b. TACTICAL: To show the practical application of fire to a given tactical situation, illustrating methods of fire direction and control.

MINIATURE RANGES.

1. Miniature ranges are the most suitable for the early rifle training of the recruit, where elementary lessons in aiming, holding, trigger pressing and many of the main factors which make for accurate shooting can be practised. The difficulties of service shooting are not, however, present, as there is no shock of discharge or estimation of range or wind. Practice on this range should begin as soon as the recruit can adopt a good lying position, aim with accuracy and press the trigger correctly. Care should be taken to ensure that faulty holding is checked so that habits resulting in bad shooting on the open range are not developed.

2. The rifles used will be of service pattern .22 inch R.F. Each rifle should be periodically tested by a good shot and a record kept in the range, showing the exact elevation required. Before firing, the instructor will check this.
3. Rifles with varying sizes of butt will be kept available and care will be taken that every man fires with a rifle which fits him (see Sec. I., para. 2.).

4. Only .22-inch ammunition will be used on these ranges.

5. Various types of representative targets are provided for use in miniature ranges.

6. When recruits and young soldiers have mastered the elements of shooting they should be practised, as their training progresses, in its more difficult phases, i.e., snap-shooting, rapid firing and firing at moving targets. Practices should conform generally to those fired later with service ammunition.

7. Trained soldiers and fire unit leaders can also be given very useful instruction and practice on the miniature range, especially during the preliminary training period and in inclement weather. In the case of fire unit leaders, this range is admirably suited for practice in fire orders, since fire effect resulting from such orders can be determined. This involves the use of "Harmonised Sights." (See Appendix I).

8. Battle shooting can be carried out on miniature battle shooting ranges, which can be easily improvised where an ordinary miniature range already exists.

9. Fire discipline, range discipline and safety precautions will be strictly enforced, in order that men will not develop any careless habits at the early stage of their training. Such habits, if once acquired, will be very difficult to eradicate later on in a man's service. These precautions will conform, as far as possible, to those for a classification range.

10. Scoring will be similar to that laid down for classification ranges (see Sec. III., page 68). Groups will be measured with wire rings 1, 2 and 3 inches in diameter. Recruits must reach a 3-inch standard.

11. Targets should be examined after each detail has fired. The result of each shot can be noted from the firing point by means of field glasses.

**THIRTY YARDS RANGES**

1. Thirty yards ranges which are generally situated close to barracks provide a very useful means of weapon training. They have many advantages over miniature ranges. The recruit will experience for the first time the firing of ball ammunition; he uses his service rifle; becomes accustomed to the shock of discharge and the noise of ball firing; learns how to control his rifle by correct holding, thus overcoming any tendency to flinch when pressing the trigger. Similarly, elementary practice in firing the light machine gun and machine gun can be given on these ranges.

2. The targets used on these ranges will be representative targets, designed for the firing of .303 inch ammunition.

3. These ranges, where suitably located, can be put to very good use throughout the whole year. They are particularly suitable for the training of backward men, and for preliminary training prior to firing of annual courses. The practices should conform as closely as possible to those fired on the classification range. Where convenient, bayonet assault courses should be constructed behind the firing points.

4. As already stressed in para. 9, above, all points relating to fire discipline, range discipline and safety precautions will be strictly enforced.

5. Steel-plate targets will not be used on 30-yards ranges. If moving targets are used, the extent of the movement will be restricted so that the line of fire from any weapon used will not be directed at any point outside the limits of the stop-butt.

6. Groups will be measured as in paragraph 10, above.
Other scoring will be as for classification practices, unless where otherwise prescribed.

7. Details of the construction, safety areas, apparatus and targets of 30-yards and miniature ranges will be found in *Infantry Training, Vol. III, Pamphlet No. 33 (B.W.O.)*.

**CLASSIFICATION RANGES.**

1. Shooting at service distances is carried out on classification ranges. They will be used for the firing of range courses, including elementary battle shooting for the training of individuals, as a preliminary to exercising the fire unit in field firing.

2. In the case of recruits, who will be firing at actual service distances for the first time, very careful handling and instruction are necessary in order that all the points already taught them during elementary instruction and practised on the miniature and 30-yards ranges will be observed. To ensure this, a qualified coach (see Section V) will be detailed to each firer.

3. Practices should be fired in the order in which they appear in the tables. Rapid practices should be fired immediately after the deliberate practice at the same range. Ranging, application and distribution practices should be fired consecutively without leaving the firing point.

4. **Dress.**—In classification practices, battle order will be worn. Recruits at depots and in units will wear drill order. Field glasses will be carried by all officers and N.C.O.s. equipped with them. As many firing point instructors as possible should be provided with these glasses to assist them in coaching.

5. **Supervision.**—During instructional practices, an officer will supervise at all times at the firing point. In addition, an officer will be in charge of the butts.

6. Where practicable, during classification practices, officers, N.C.O.s. and men from sub-units other than that which is firing will be detailed for all duties of supervising and marking. Assistance generally and for the identification of firers will be provided by the officers and N.C.O.s. of the sub-unit firing.

7. Details of the construction, safety areas, apparatus and targets in use will be found in *Infantry Training, Vol. III, Pamphlet No. 33 (B.W.O.)*.

**REVOLVER RANGES.**

1. All practices on the revolver range should be framed to teach personnel to fire by sense of direction rather than by deliberate use of the sights. In preliminary training the use of the sights may, however, be permitted when firing the grouping practice. The quickness with which one or more shots can be fired is more important than the close grouping of the shots.

2. A short interval should be allowed between the instruction and the actual firing, during which individuals should practise holding and firing with an empty revolver. The object of this practice is to improve their ability to align the barrel of the revolver correctly when it is raised quickly to fire at a mark upon which the eye is fixed, and to avoid disturbing this alignment by faulty trigger release.

3. Revolver practices should, normally, be fired only on a standard revolver range. (For the construction of targets and appliances see *Infantry Training, Vol. III, Pamphlet No. 33 (B.W.O.*)). Certain practices may, however, be fired on a standard 30-yards range, provided that the firing of such practices is consistent with safety requirements. Practices involving the advance of the firer or the target will not be carried out, except where a standard revolver range is incorporated.
1.—ALLOWANCES AND PENALTIES.
   a. The use of the sling and wind guage is prohibited.
   b. No sighting shots are allowed in classification practices.
   c. The fine adjustment may be used in any practice.
   d. Allowance for jams and misfires:
      (1). If a jam or stoppage, due to breakage or a defect in mechanism, occurs, and is not caused
          by any fault of the firer, the time allowed for the practice will be increased to the extent
          of the delay so caused. Should a jam or stoppage occur in a rapid practice through a defect
          which cannot be quickly rectified, the whole practice will be repeated.
      (2). In the event of misfires, provided that the superintending officer is satisfied that the cap
          of each cartridge has been struck, extra rounds will be allowed equal to the number of misfires
          which occur in the practice concerned, a proportionate part of the time allowed for the whole
          practice being given for each extra round. In the case of the revolver the round will be tried in another weapon, and if it fires, no allowance will be made.
   (3). In fire with movement practices no allowance will be made for jams or misfires.
   e. Forfeiture of rounds.—Omission to fire the rounds allotted or failure to fire during an exposure will entail forfeiture of the rounds which should have been fired, and misses will be recorded for them.
   f. For every shot fired after the order or signal to cease fire has been given, the value of the highest hit obtainable by a single shot will be deducted.
   g. In Machine-gun and Light Machine Gun practices, belts and magazines will be filled by the firers who are to use them. Opportunity will be given to the firer, before he begins any practice, to inspect the gun and ammunition which he is to fire.

2.—INTERPRETATION OF TERMS.
The following is the interpretation of terms used in the detail of range practices:
   a. With rifle rested.
      Hand and forearm supported against the cover. The rest (usually sand-bags) may be adjusted to suit the firer.
   c. In the open.
      No support of any kind other than that provided by the firer's elbows is allowed for the weapon, forearm or wrist.
   e. Over or around cover. The cover must be used as taught, the firer adjusting his position to suit its particular type.

FIELD FIRING RANGES AND BATTLE PRACTICES.

1. Exercises with ball ammunition on the field firing range are the culmination of weapon training. The field firing range provides conditions most nearly akin to war, and all shooting on other ranges will be regarded merely as a means to obtain efficiency in this final test. The capabilities of platoons and companies may here be judged far better than by the results obtained in classification practices, or in competitions, where conditions are mainly artificial.

Officers responsible will visit the range and prepare the practices, having regard to the lessons to be taught, target facilities, safety precautions and ammunition available. The value of the exercise will depend on sound preparation, clear explanation to those taking part and a well-conducted criticism at the conclusion. Simple problems should be designed so that all actions of the fire unit are such as would be possible and likely in war.

2. The sitting and exposure of targets and methods of checking them will be arranged. Markers will always be
3. Officers and/or N.C.Os. will be detailed to each fire unit to watch its action and must conform to the movements of the section. They will be responsible to the officer superintending for safety precautions, but, apart from ensuring that these are observed, they will not interfere with the actions of firers or leaders. They must also have carried out a reconnaissance on the ground.

4. Targets will be provided for each firer or fire unit and will be checked after a practice. The percentage of hits to rounds fired on a target calling for concentrated fire, or the percentage of loss inflicted on the enemy or targets calling for distributed fire, will be recorded. Falling plates and collapsible targets add interest. Figure targets should be arranged to resemble formations likely to be used by the enemy.

5. Fire units will not be exercised in engaging targets at distances exceeding 1,000 yards except in the case of machine guns.

6. Where a field firing range is not available, it is sometimes possible, with ingenuity, to carry out useful practices on the flanks of the classification range, provided that the dangerous area permits.

7. A convenient method of discussion at the conclusion of the practice is as follows:
   a. The individual or fire unit commander states the information and orders which he received, his action and the reasons for it.
   b. The officer or N.C.O. watching the practice states his views.
   c. The superintending officer, in summing up, after stating the factors affecting the situation and the alternatives, gives his opinion as to the correct action to be taken, bringing out the chief points to be learned from the exercise.

8. Greater value for the ammunition expended will sometimes be obtained by a previous rehearsal without ammunition.

9. Owing to restrictions imposed by safety precautions, it will seldom be possible to carry out exercises for sub-units larger than a platoon. Unless freedom of action is possible after the opening situation, greater value may be obtained by demonstrations of platoon, and possibly company, actions.

10. Vickers machine gun units will normally train at areas where ample facilities for field firing exist. The nature of the practices to be carried out will be settled annually by the commanders concerned. As a general guide, fire control, fire discipline and observation practices should be carried out in all platoons by the personnel indicated below before tactical exercises are begun:

   **Nature of Exercise.**

   a. Fire control—direct ... All N.C.Os. and potential N.C.Os.
   b. Fire control—indirect, day and night. Officers and N.C.Os.
   c. Fire discipline—direct. Privates.
   d. Fire discipline — indirect, day and night. N.C.Os. and privates.
   e. Observation of strike (including use of field glasses, monoculars and range-finder). Officers, N.C.Os. and range-takers.
   f. Duties of range-takers (Range-takers during firing.
   g. Maintenance of sustained fire (stoppages should be included in all belts except for demonstrations). Privates.
11. Company commanders will keep records of all practices fired, with details of results.

12. Where facilities exist, combined exercises with ball ammunition may be carried out to practise the co-operation of all, or certain, arms in battle.

13. The following rules will be observed when live ammunition is fired in the vicinity of troops with a view to accustoming them to battle conditions:
   a. All firing of live ammunition will be controlled by an officer.
   b. Single rounds or short bursts only will be fired.
   c. The firer will only use:
      (1) A weapon he knows thoroughly.
      (2) A weapon that has been correctly zeroed on the day on which the firing is to take place.
   d. Before opening fire, the firer must appreciate both the ground at the selected point of impact of the bullet or bomb and the ground beyond the point of impact.
   e. The ground selected for the point of impact should be of a type unlikely to cause ricochets. In any case fire will never be put down between the firer and the troops. This minimizes the possibility of a ricochet. Ricochets may deviate 45 degrees or more from the point of impact.
   f. For the purpose of this training, bullets which pass five yards over the heads of the troops have the same psychological effect as if they only passed five feet overhead. Therefore a wide safety margin can be allowed without deterioration in the value of the training of men. The overhead safety margin will never be less than five yards; it should usually be more. The greater the range the wider the safety margin should be. Overhead fire will not be attempted for training purposes at ranges over 500 yards.
   g. Fire from the Bren gun will always be given from the tripod.
   h. If there is any doubt as to the safety of either troops or civilians do not fire.
   i. No person, other than those detailed to use live ammunition, will carry or use it.
   j. The firer must be completely in the picture as regards all possible methods of approach of the troops. This is of increasing importance in view of developments in individual camouflage. The firer will not fire if he cannot see the troops.
   k. Sentries must be posted to prevent people entering the danger area.

**CONDUCT OF RANGE PRACTICES.**

1. **Necessity for a system.**
   To get the maximum benefit from the time available on the ranges and from the range practices, there must be good and systematic organisation.
   An important object of range practices is to give men confidence. Instructional value will be lost if there is hustle and disorganisation.

2. **Reconnaissance.**
   Previous personal reconnaissance is necessary to ascertain the following among other matters:
   a. The number of target frames
   b. The number and types of targets available
   c. Whether the necessary appliances are available
   d. That telephones are available and are in working order
   e. Details of the range standing orders
   f. Local regulations regarding look-outs to be provided and limitations on firing
3. Preparation.

As a result of his reconnaissance the officer responsible will make his plan. This will include the following preparations:

a. Ammunition required should be drawn and transport arrangements made.

b. A small party in charge of a non-commissioned officer should be detailed to take charge of ammunition, being responsible for issue and collection. Sand bags will be used for the collection of empties.

c. Orderlies should be detailed for the telephone.

d. The necessary lookouts should be detailed and their duties explained to them.

e. Butt party. The butt party should be detailed and instructed in their duties. A complete rehearsal should be carried out on all targets under the officer in charge of the butts. The importance of this rehearsal cannot be over emphasised. Poor marking leads to waste of time and places unnecessary difficulties on the firers.

On the day practices are to commence the butt party should arrive in the butts at least half an hour before firing is due to commence. On arrival, the officer in charge should detail markers on the scale of two to each target frame. A non-commissioned officer should be detailed to supervise each group of four targets. The telephone orderly should be in his place of duty with the telephone connected to the firing point. The butt party will procure the necessary targets, erect them in the frames and ensure that they are clean and that all shot holes have been patched up.

The party will then be assembled and the practices to be fired explained to them. One man on each target frame should watch the bank behind his particular target, and call out whenever a shot arrives, thereby avoiding delay and unnecessary use of the telephone should any shot miss the target.

A well organised butt party should aim at never keeping the firing point waiting and reducing the use of the telephone to a minimum.

f. Firing point rolls and butt registers should be prepared and made available.

g. Scoring books should be in the possession of each man. Insist on full particulars being recorded by coaches in each man’s scoring book immediately after each practice and before the man leaves the firing point.

h. Arrange for the armourer to be on the range.

Have some spare rifles zeroed and kept ready so as to replace a rifle thrown out for inaccuracy or damage through an accident.

Ensure that sights of rifles that have become bright are “blackened” or “browned”.

j. Give a preliminary lecture to the men on everything connected with the practices.

k. Arrange for small prizes for a competition amongst the firers. (See page 70).

l. Forming up. The detail first to fire is formed up immediately behind the firing point and is issued with ammunition. The detail next to fire is formed up behind and well clear of the firing point ready to move forward.

Detail completes firing. The superintending officer orders “unload,” “right turn,” “for inspection port arms”. Superintending officer or his assistant superintending officers inspect arms and report in order from left to right. They can report by facing the superintending officer and holding the hand and arm in a horizontal position to the ground in such a way that he can see it.

Officer orders “details change”. The detail that has fired and the one that is waiting slope arms. The former moves off to a flank and hands in empty cases (and live rounds, if any) to the non-commissioned officer in charge of ammunition; the detail to fire moves on to firing point and orders arms.
The officer orders "adopt the prone position and adjust your cover," (or other instruction applicable). Coaches help. Take a lot of trouble over this as cover is usually too low. When all are ready they will stand at ease. Coaches will report each man ready by holding up his right arm to the full extent above his head and perpendicular to the ground.

The officer orders "load," gives particulars of the practice to be fired and the fire order.

The senior non-commissioned officer meanwhile forms up the next detail in accordance with his role; 10 yards in rear of the firing point, explains the practice to be fired to them and sees that the ammunition party issues the correct amount of ammunition to them.

Details other than the one firing and the one next to fire should receive useful instruction in subjects such as visual training, judging distance, fire orders, particulars of the practices to be fired and hints on shooting.

m. When waiting for rapid practices have ammunition issued early so that men can test the free working of the rounds in the chargers. Bolts properly oiled.

Explain to men that in rapid practices most men take less foresight owing to the fact that the foresight is seen quickly, and as the barrel becomes heated bullets tend to fall low. Each man should know what extra elevation (if any) he may need in a rapid practice. As a rough guide, an extra 50 yards on the backsight at 300 yards may suffice for the majority of the rifles.

In all rapid practices have the mean point of impact signalled afterwards.

n. For gas practices, have the men pay special attention to the top left hand corner of the right eyepiece with anti-dim and make waiting details put on their respirators ten minutes before firing.

o. Save time by making every man hold up his rifle vertically when he has finished in slow practices.

p. Insist on all officers, senior non-commissioned officers and coaches being in possession of the following whenever they come on to the range:—Whistle, watch with seconds hand, fountain pen, score book and a current copy of Annual Range Practices (Small Arms).

q. Have coaches report after each practice is completed the cases of failure to obtain the standard score, giving what they consider is the cause in each man's case.

r. Analyse the cause of bad shooting as follows:—
(1) Is the rifle accurate? Make sure of this.
(2) If so, test the man's aim with an aim corrector or other method,
(3) If the aim is correct, watch carefully for faulty trigger pressing. Test,
(4) If all above correct, have the eyesight tested.

SAFETY PRECAUTIONS (ALL RANGES) AND RANGE DISCIPLINE.

1. The safety precautions laid down herein will be observed on all ranges, and it is the responsibility of the officer in charge of the firing point to ensure that they are not disregarded by any personnel present on the ranges.

The officer in charge of the butts is, however, directly responsible for the observance by all ranks forming the butt party, of the precautions relating to the butts.

Additional precautions relating only to a particular type of range are set out under the appropriate heading.

The non-observance of these safety precautions by any individual will be regarded as a breach of regulations and will entail disciplinary action. Officers Commanding Commands will arrange to have published any additional orders or instructions which local conditions necessitate to ensure safety, and will ensure that copies are available for reference during the firing practices. These instructions should cover
such details as the location of distant danger flags, look out men and times at which firing may commence and cease.

The duties of range wardens should be detailed and published for the information of all; copies should be hung on the target shed in the butts.

2. Firing will not take place until the danger flags are hoisted and look out men posted according to the standing orders and bye-laws.

3. A red danger flag will be hoisted at the butts as a warning to cease fire, also, during a cessation of fire. The flag will be kept up until the whole of the butts party is under cover. No one will leave the butts until the cessation of fire has been notified from the firing point and the red flag is in position at the butts. When a cessation of fire is required the superintending officer at the firing point will give the order.

4. A red flag will be hoisted at the firing point when firing is not taking place. It will always be hoisted when the red flag is flying at the butts.

5. Weapons will be pointed towards the butts during inspection and when loading or unloading takes place.

6. No one, except the firers, the instructors and the officers on duty, will be allowed on the firing point.

7. No weapon will be loaded without orders from the superintending officer.

8. If firing is suspended during a practice, or whenever the danger flag is hoisted at the butts, safety catches will be applied and the rifles will be laid on their side, locks of Vickers machine guns will be removed from the lock guides, magazines will be removed from light and sub-machine guns. After the above precautions have been taken weapons on the firing range will not be touched during the time the danger flags are flying, and all firers will stand up.

9. No one will be in front of the magazine or feed block in light machine gun or machine gun practices.

10. The superintending officer or officers assisting him will inspect all weapons and magazines before they are removed from the firing point to ensure that they are unloaded. A further inspection will be carried out before the company or party leaves the range to ensure that magazines and weapons are unloaded and that men are not in possession of live ammunition.

11. After firing, live rounds will be separated from empty cases and collected under the supervision of the superintending officer.

12. Magazines for light machine guns will be loaded at least 20 yards in rear of the firing point, and no ammunition will be allowed near guns until the practice is about to begin. Empty and partially empty magazines will be removed from the firing point immediately after each firer has finished the practice.

13. Repairs and replacements will not be carried out until a gun is clear. No one except the gun numbers, authorised to be on the firing point by the conditions of the practice, will be permitted to touch the gun without the permission of the superintending officer when a stoppage occurs.

14. Drill cartridges will not be taken on the range for training on any occasion when live ammunition is being used, except to set up stoppages in light machine gun or machine gun practices when these are authorised.

15. No aiming or snapping will take place except from the firing point, and then only when men are in the firing position and the red flag has been lowered. This practice will only take place with the permission of the superintending officer or an instructor.

16. Unnecessary noise is not allowed. The movements of
coming to attention and sloping arms, when a change of
details is about to take place on the firing point, should be
performed by the detail next to fire, taking the time from
the detail on the firing point.

17. Weapons will be used as issued by the Ordnance Corps.
No additions or alterations will be permitted.

18. The use of the sling to steady the rifle is not allowed.

19. In grouping practices, details should fire and then
proceed to the targets to see their groups measured and
note the position of their M.P.I.

20. In snap-shooting practices, the timed exposures of the
targets will be controlled by the officer in charge of the butts.
The time will be reckoned from the time the targets are in
position and stationary. In rapid practices, the time will
normally be regulated from the butts. On these occasions
the actual fire order by the officer superintending at the firing
point will be in anticipation of the targets appearing. This
officer will inform the officer in the butts when the detail is
ready. Where the normal procedure cannot be adopted, the
targets will be exposed before the practice begins and the
timing will be carried out at the firing point.

21. Occasional shots to verify elevation, strength of wind,
or the accuracy of a weapon, may sometimes be fired by an
officer, non-commissioned officer or man with the permission
of the superintending officer. Notification of their beginning
and end will be made to the officer in charge of the butts.
The targets in use will be lowered and checked and a clean
one raised for the occasional shots. When they are completed,
it will be lowered and checked and the original target will be
raised for the firer to complete his rounds. A record of the
results of all such shots and of the ammunition expended will
be entered in the butt register and the ammunition record
book respectively.

22. When machine gun practices are being fired, all super-
intending officers at the firing point will be trained machine
gun officers. If sufficient machine gun officers are not avail-
able for butt duty a proportion of other officers may be
detailed for this duty.

23. In anti-aircraft practices, unless the danger area
extends to a depth of 3,500 yards behind the stop butt, the
siting of targets and weapons must be so fixed that all bullets
are caught in the stop butts. In traversing practices, targets
must be sited so that the line of fire is within the danger area.
(See Infantry Training, Vol. III, Pamphlet No. 33
(B.W.O.)).

24. When night firing takes place, special precautions for
safety must be taken. Firing will take place only from that
part of the range, which gives the greatest safety margin
against oblique fire. Only a target directly to the front of
the firer will be engaged. In firing on fixed lines, these will
be laid out in daylight. Fire should be from a trench or
weapon pit. No target over 200 yards distance should be
engaged, except in firing on fixed lines.

Stops should be erected on the firing point for each weapon
so as to obviate the possibilities of oblique fire. Two pegs
aligned longitudinally on to the target, against which the
weapon can be rested is a method to ensure this. A wire or
strut, fixed across the firing point at such a height as to
prevent the muzzles of weapons being raised and so permit-
ing bullets to pass over the stopbutt, should be used.

Red lamps will be used on the firing point and in the
butts or target pits in substitution for red flags. Before a
lamp is taken in or first exposed, it will be swung to and
fro to attract attention; this will also ensure that the lamp
has not been accidentally extinguished.

25. Revolvers will be kept in the case until actually required
for use. When out of the case, except for firing and cleaning
they will be carried in the "rest" position. They will never
be so pointed that, if discharged, they will endanger the firer
or others.
26. Before firing begins on the revolver range the superintending officer will see that everyone, except those firing, is at least five yards in rear of the firing point.

27. Snapping is forbidden on the revolver range.

28. After firing with the revolver the officer in charge will give the order "unload". He will inspect revolvers and order "return revolvers". No one will be allowed to move towards the targets until the officer in charge gives an order to that effect and until the red flag at the firing point is in the "raised" position.

ADDITIONAL PRECAUTIONS FOR MINIATURE AND 30-YARDS RANGES.

29. Miniature Range:—
   a. An officer will be in charge of the practices.
   b. On no account will any person be allowed to proceed in front of the firing point while the red flag is in the lowered position. Movement of personnel in front of the firing point will be controlled by the officer in charge.
   c. When it is necessary to examine targets, rifles will be unloaded and laid on the firing point with the bolts open. Firers will stand up.
   d. Loading Machine.—The loading machine will be inspected by the officer in charge, who will ensure that it is in good condition and securely fastened on the loading table. He will also ensure that the sand box is properly located beneath the loading machine.
   e. Adaptors.—Adaptors will only be loaded and unloaded by means of the loading machine. A N.C.O. will be detailed by the officer in charge for this duty, and to supervise the issue of ammunition. He may be assisted by one man. Loaded adaptors will be inspected by the officer in charge.

30. 30-Yards Range:—
   a. An officer will be in charge of all practices.
   b. Not more than six rifles or four machine guns, four light machine guns or four anti-tank rifles will be fired at the same time on a 30-yards range of standard width (24 feet).
   c. During the firing of practices, the superintending officer may make special arrangements to call those

Loaded adaptors will be issued to the firing point instructors, who, in turn, will issue them to the firers when they have adopted the loading position. Firing point instructors will be responsible for collecting the used adaptors and returning them for reloading.

f. Misfires.—Should a misfire occur, the round will be reloaded once and again fired on the instructions of the firing point instructor. If a misfire still occurs an additional round will be issued and the misfired round will be given to the N.C.O. in charge of loading machine, who will personally remove the round from the adaptor. All misfired rounds will be kept separate from empty cases and will be specially accounted for by the officer in charge when submitting his report on the practices.

g. Waiting Details.—Details waiting to fire will be kept well to the rear of the firing point, perfectly quiet and attentive, and clear of the loading machine. They will be in charge of a N.C.O. instructor, who will explain to them the nature of the practice being fired and discuss faults committed by the firers.

h. A N.C.O. will be detailed for duty at the door leading to the range to prevent personnel from leaving the range without permission from the officer in charge and to ensure that no persons enter the range whilst firing is in progress. Any entrances to the range other than the recognised one will be securely barred.
waiting to fire up to a position from which they can hear the instruction and criticism, but even then they must be at least five yards in the rear of the firers.

d. No target will be placed within four feet of the sides of the bullet catcher.

e. Representative targets and revolver targets will be placed at the bottom of the bullet catcher.

f. Landscape targets will be placed so that the sky-screen is at the bottom of the bullet catcher and the picture below it.

g. Anti-aircraft targets, .22-inch, will be placed so that the line of fire is directed into the bullet catcher.

h. Steel plates, moving targets and anti-aircraft targets, other than the approved .22-inch are not allowed.

j. Revolver practices involving the advance of the firer or the target will not be carried out, except where a standard revolver range is incorporated.

ACCIDENTS CAUSED BY EXPLOSIONS.

Should an explosion cause injury to personnel or damage to a weapon, the weapon and batch of ammunition concerned will be preserved intact and a report of the occurrence forwarded through the usual channels to the Director of Ordnance.

DUTIES OF SUPERINTENDING OFFICERS.

DUTIES OF THE OFFICER SUPERINTENDING AT THE FIRING POINT:

An officer will be appointed in charge of the firing point. He may be assisted by additional officers on the basis of one officer to every six firers.

The duties of the officer in charge at the firing point are:

1. To ensure that the regulations for safety and for the conduct of the practices are obeyed and, where ranges adjoin, that the minimum safety angle is observed according to local standing orders.

2. To identify the firer with the name given on the firing point roll and to detail the order of firing before the beginning of each practice. The order of firing should be varied from time to time.

3. To ensure that men fire with the weapon which has been issued to them. This does not apply to officers and others to whom a rifle has not been issued.

4. To inspect sights to ascertain that they are used as issued.

5. To ensure that not more than the authorised amount of ammunition is expended by each firer.

6. To ensure that only such coaching as permitted by regulations is allowed.

7. At his discretion, to allow each firer one or two "snaps" at the target before loading.

8. To ensure that, where applicable, service bursts of four or five rounds are fired in light machine gun practices and that the number of bursts does not exceed that prescribed.

9. To ensure that the various targets are visible from the firing point, and that they are properly exposed according to the practice being fired.

10. In battle shooting practices, when applicable, to see that the correct use is made of cover.

11. To see that the marking in the butts is carried out according to the regulations and that firers are given an opportunity to see the marking.
12. To collect, check and sign the registers and forward them, together with the firing point rolls, to the headquarters of the unit concerned.

13. To ensure that, at the conclusion of each practice, coaches enter in the scoring book the scores obtained by each man; that those who are not allowed a coach by regulations, enter their own scores and are given every assistance to do so.

Special to Machine-gun practices:

1. To see that belts are "spaced" according to orders.

2. Before each practice, to allow each firer time to attend to his gun and tripod and to examine his ammunition belt.

3. In timed practices, to record in the firing point roll the number of points to be deducted for any firer who fires after the time limit is up or after the signal "stop" has been given.

4. To see that no assistance, other than that allowed by regulations, is given to any firer.

5. To decide whether extra time should be allowed in the event of a stoppage occurring.

6. Before traversing practices are commenced to ensure that firers understand the direction in which they are to traverse the gun at the commencement of the practice, and that they have an opportunity of testing their clamps.

7. To ensure that, where applicable, no more than the prescribed number of bursts is fired in any practice.

DUTIES OF THE OFFICER SUPERINTENDING AT THE BUTTS.

An officer will be appointed in charge of the butts. He may be assisted by additional officers on the basis of one officer to every four targets. Each officer should be assisted by a non-commissioned officer. Two markers will be detailed to each target frame.

The duties of the officer in charge of the butts are:

1. To see that the targets are of the proper dimensions and sufficiently clean to enable shot holes to be easily distinguished, and that all old shot holes are properly patched before practice begins.

2. To see that the butts and appliances are in good order and to report any damage or deficiency.

3. To explain all regulations, safety precautions and local orders to the markers and to ensure their observance.

4. To explain to the markers the nature of the practices being fired and to give the necessary instructions regarding signalling, exposure of targets and patching of targets.

5. To allow no man to leave the butts without an order. This order will not be given until it has been ascertained personally that the red flag has been hoisted both at the butts and at the firing point. To prevent the red flag being lowered until satisfied that all markers are in the butts.

6. To detail markers to targets. In grouping practices, one marker at each target should be responsible for noting the order in which shots strike the target and, during other practices, for watching the bank.

7. To see that the targets for machine guns, if placed on the stop-butts, are erected to give the best facilities for observation of fire.

8. To ensure that no target is lowered without an order. In slow practices, the target will not be lowered until the officer is in front of it. In rapid practices, the target will be lowered to "half-mast" at the end of the time allowed and the makers ordered to stand as far back as possible until the officer is in front of it.
9. To cause all targets to be lowered during cessation of fire.

10. To regulate the exposure of targets according to the instructions laid down and to ensure that the "value of each hit" is correctly signalled. In snapshooting practices, to ensure that each target is correctly exposed so as to be clearly visible to the firer. Snapshooting targets should be put up straight and not swung sideways.

11. To check the target of each firer and enter in ink in the register the value of all hits; occasional shots will be entered in the columns provided for the purpose. No erasures will be made. If alteration is necessary a fine line will be drawn through the figure, the correct value written against it and the amendment vouched for by the officer’s initials.

12. If more hits are found on a target than rounds fired, to deduct from the score the value of the highest scoring hits. Only those hits which are to count will be entered on the register.

13. To mark off each hit on the target with a red pencil before entering its value in the register and to ensure that all shot holes are correctly patched.

14. In rapid practices, after each check, to cause the number of hits of each value and the M.P.I. to be signalled on each target.

15. On the conclusion of the practices or at the end of a day’s shooting to rule a line diagonally across the unused spaces in the register before dating and signing it.

16. On the conclusion of practices, to see that the butts are left in a clean condition and that all appliances are examined for damage that may have occurred during the practices. Marking discs, flags, patching paper, paste pots, measuring rings and targets will be safely stored away in the place provided.

**SIGNALLING AND SCORING.**

The standard of scoring which follows is given as a guide and will apply, unless otherwise stated, in Annual Range Practices (Small Arms). Shots cutting the edge of any ring, rectangle or figure will be counted to the benefit of the firer.

<table>
<thead>
<tr>
<th>Type of Target and Hits scored</th>
<th>Points for score</th>
<th>Method of Signalling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grouping and Application (Rifle, L.M.G. and M.G.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bull's eye</td>
<td>4</td>
<td>White disc placed with centre on shot hole or on centre of group.</td>
</tr>
<tr>
<td>4-inch group (200 yards)</td>
<td>25</td>
<td>Red disc placed with centre on shot hole or on centre of group.</td>
</tr>
<tr>
<td>Inner</td>
<td>25</td>
<td>Black disc with white cross placed with centre on shot hole or on centre of group.</td>
</tr>
<tr>
<td>8-inch group (100 yards)</td>
<td>30</td>
<td>Plain black disc placed with centre on shot hole.</td>
</tr>
<tr>
<td>3-inch</td>
<td>3</td>
<td>Red and white flag shown, indicating direction of missed shot. If direction cannot be determined, the flag will be waved across the face of the target.</td>
</tr>
<tr>
<td>8-inch group (200 yards)</td>
<td>15</td>
<td>Red and white flag shown, indicating direction of missed shot.</td>
</tr>
<tr>
<td>Outer</td>
<td>1</td>
<td>Red and white flag shown, indicating direction of missed shot.</td>
</tr>
</tbody>
</table>

**Ricochet, miss, or hit on remainder of target outside "outer" circle.**

**Snapshooting Target (Rifle):**

| Each hit | 3" | Target twirled above gallery. |

**Figure Targets:—**

| Rifle and L.M.G. | 3" |

**Revolver:—**

| Hits within 10" x 10" rectangle | 5 |
| Hits on remainder of target | 3 |

**Revolver Grouping target:—**

| Hits within 8" x 8" rectangle | 5 |
| Hits within 10" x 10" rectangle | 4 |
| Hits within 12" x 12" rectangle | 3 |

**Vickers Machine Gun:—**

| Application (4 ft. target). | 1 |
| Each hit on target within the outer ring | White disc indicates 10 points. |
| Traversing (5-6 ft. targets) | Black disc indicates 1 point. |

*Variable in battle practices.*
<table>
<thead>
<tr>
<th>Type of Targets and Hits scored</th>
<th>Points for score</th>
<th>Method of Signalling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gustav S.M.G.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bull's eye 25 yards</td>
<td>1</td>
<td>White disc placed with centre on shot hole or on centre of group.</td>
</tr>
<tr>
<td>100 yards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inners 25 yards</td>
<td>2</td>
<td>Red disc placed with centre on shot hole or on centre of group.</td>
</tr>
<tr>
<td>100 yards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magpie 25 yards</td>
<td>3</td>
<td>Black disc with white cross placed with centre on shot hole or on centre of group.</td>
</tr>
<tr>
<td>Outer 25 yards</td>
<td>4</td>
<td>Plain black disc placed with centre on shot hole.</td>
</tr>
<tr>
<td>Figure Targets</td>
<td></td>
<td>Target twisted above gallery.</td>
</tr>
</tbody>
</table>

**NOTES IN CONNECTION WITH SCORING.**

1. No points will be awarded to a group unless there are five shots on the target. If there are more than five shots there will be no score, and the practice will be repeated.

2. In rapid practices "bulls" and "inners" will score 3 points and will be signalled as "bulls".

3. Points allowed for hits on snapshots and figure targets may vary in battle practices.

4. In "timed" or "rapid" practices, the score will not be signalled until the practice is completed and the target has been checked by the supervising officer. When all the shots have been signalled the M.P.I. of the group of shots will be shown by placing the white disc on it.

**UNIT COMPETITIONS.**

1. The competition element is an incentive to weapon training efficiency, provided that it is not carried to excess. Competitions should be framed so as to lead to efficiency in battle shooting and to induce the entry of the largest number of entrants possible. Team competitions are preferable to individual events, as the attainment of a good average standard of proficiency by a large number of men is infinitely more important than phenomenal skill developed by a few fitters, or the obtaining of scores in excess of any previously recorded by competitors.

2. Competitors should be divided into classes according to their rank, experience and ability. A suggested division is as follows:—

**Individual Competitions:**—

a. Officers and N.C.O.s.
b. Trained soldiers.
c. Young soldiers with less than 12 months' service.

d. Team competitions:

f. Light machine gun competitions:—

A corporal and 2 men to represent the sub-unit or unit.

g. Machine gun competitions:—

A sergeant, two corporals and 6 men to represent the sub-unit or unit.

Individual competitions could be run in conjunction with team competitions.

3. In all team competitions the "packing" of teams will be prohibited.

4. Competition programmes should embrace all weapons
and, to prevent practice beforehand, they should not be published until a few days before the meeting.

5. Rules should never be framed to exclude difficulties such as are met with on active service, with the object of eliminating elements of chance. Such a course would eliminate what is of most value—the personal test of skill in meeting service difficulties. An element of chance is accepted and regarded as advantageous in competitions of a sporting nature, and will increase interest in military competitions, since it is always present in war.

6. Coaching should not be allowed.

7. The scope of all weapon training competitions will be based on the time and ammunition available.

8. The suggestions for carrying out competitions are given as a guide only and may be varied to suit local conditions.

SECTION IV.

ZEROING AND TESTING.

1. Immediately before firing the annual range courses, and at any other time when their accuracy is suspected, rifles, light machine guns and machine guns will be zeroed to ensure that the sighting is true for direction and elevation. They will also be zeroed before being used on battle inoculation courses and assault courses.

In order to determine the accuracy of the sighting of a weapon, a "group" or series of shots must be fired by a skilled shot, preferably a consistent four inch grouper. Provided that a group is obtained, (it should not be greater than an eight inch group), any adjustment which may be necessary to the sighting will be indicated by the mean point of impact (M.P.I.) in relation to the point of aim.

Vertical errors are corrected by fitting a foresight of different height and lateral errors by movement of the foresight on the block. The rule to remember is to alter into the error, for instance if the weapon is firing high, fit a higher foresight, if firing low, fit a lower foresight, if firing to the right move foresight to the right and if firing to the left move foresight to the left.

A weapon should never be left with a "remaining" lateral error.

All alterations will be made by the armourer who should be present on the range when zeroing or testing is in progress.

The officer in charge of zeroing should determine the amount of alteration to the sighting required for the particular weapon. He should enter his instructions on a slip of paper, insert it under the backsight leaf, and send the weapon to the armourer. In this way the alterations made by the armourer can be checked before the weapon is again fired.
The slip of paper should contain the following information:—

Number of weapon.
Height of foresight.
Weapon is firing (inches right, left, high, low).
Height of foresight required.
Name of firer.

The name of the firer is of particular importance, for, if one man fires the group for zero and another man fires a check group after sighting alterations have been carried out, the result of both groups may not be satisfactory owing to the varying standards of eyesight and marksmanship.

Records of zeroing will be made for the rifle in the soldier's scoring book; in addition a record will be kept in each company showing the adjustments (if any) carried out on each rifle. The record of zeroing and any adjustments carried out on light machine guns and machine guns will be entered on the history sheet of each gun, and in the section commander's scoring book. Any "remaining" vertical error, after adjustments have been made, will also be noted in the scoring book or history sheet as the case may be, so that allowances can be made by the firer at each distance.

2. The general conditions under which zeroing will be carried out, for all weapons, are:

a. Rifles will be zeroed immediately before the practices commence and each rifle should be zeroed in the presence of the owner.

b. Examination of the weapon before zeroing. Weapon must be examined by the armourer, to ensure that it is in a serviceable condition, that all screws are tight and, in the case of the rifle, that the barrel is not influenced by the fore-end.

c. Weather conditions.
   Good shooting light and the calmest weather conditions must be chosen.

d. The bore must be dry and clean and warmed by firing into the stop butts before making the group (rifles, 2 rounds, light machine guns, 5 rounds).

e. Sights will be set at 200 yards.

f. The range will always be 100 yards from the foresight to the target. In exceptional circumstances only 25 yards may be used as an alternative.

g. Position. The lying position will be adopted. Forearm and wrist but not the rifle, rested. The bipod of light machine guns will be on firm ground.

h. Targets. 4—foot grouping target.
   At 25 yards the target will be a (small 200/25) representative target which must be fixed upright; or a plain white screen with a 1 inch black aiming mark.

i. Sighters. Sighting shots may be fired as required in zeroing the .303 inch Vickers machine gun.

j. Stoppages. If a stoppage occurs with the Vickers machine gun the group will be repeated.

k. Wind allowances. No allowance will be made for wind. Normally a weapon should not be zeroed on a day when wind might interfere with the shots; however, if weapons have to be zeroed or tested on such a day, no allowance will be made for the wind, but the amount of deflection caused will be found by a known straight shooting weapon and this deflection will be taken into account later when making calculations for the other weapons.

m. Spare barrels for the light machine gun will be zeroed with the gun.

3. Conditions particular to the various weapons are as follows:

a. Rifle No. 4, Mk. II.
   The Leaf Backsight is graduated so as to give the
correct increases in elevation for longer Ranges provided that the Rifle is correctly sighted at 200 yds., i.e., the shot will strike the point of aim approximately at that Range.

A Group of five shots will be fired (with well known good Rifles, a group of three shots is sufficient to verify the zero of the Rifle) by a Marksman or a 1st class shot. The size of the Group must not exceed a circle of 8 inches diameter. A Regulation aim will be taken. The Rifle will not be rested on the Cover.

The firer will take the same point of aim for each shot. Groups will be repeated after any adjustment of the foresight in order to verify the corrections carried out on the Rifle by the Armourer.

The correct position of the Mean Point of Impact with reference to the aiming mark and the permissible vertical variation from that point are shown in the table below for Ranges of 100 yds. and 25 yds. The sight setting is 200 yds. for both ranges. Alteration to the position and/or size of the foresight will be made until the weapon groups to the standard specified in the table.

There are nine sizes of foresight available for the adjustment of vertical errors on the No. 4 Rifle. They are marked with their respective heights as follows:

- .000
- .075
- .000
- .045
- .030
- .015
- .0 (Normal)
- .015
- .030

The difference in height between any one sight and the next higher or lower is .015 inches. The height of the foresight blade is the same for all the sights.

It is the height of the platform of the foresight on which the blade rests that varies.

A change from one sight to the next highest or lowest gives the following changes on the target to the position of the Mean Point of Impact.

1. At 100 yds. Range, 1.88 inches or approx. 2" rise or drop on the target.
2. At 25 yds. Range, .47 inches or approx. .5" rise or drop on the target.

There are two types of foresight in use on No. 4 Rifles. A solid type and a split type—see Fig. 19. The solid type foresight must be used only on the screwed type block band, and the split type foresight must be used only on the solid type block band.
b. Rifle No. 4, Mk. I(T)—Sniper Rifle.

(1) GENERAL

This Rifle, which is used for sniping, is generally similar to Rifle No. 4, Mk. II. Metal pads are fitted to the body of the Rifle for the attachment of a telescopic sight. A cheek rest is attached to the butt and there is a large "T" swivel attached to the front trigger guard screw for the use of a sling. The Rifle is used with the No. 32, Mk. 3, Waterproofed Telescopic Sight.

The Sniper Rifle is a specially selected weapon and for that reason must be treated with particular care.

(2) CARE AND CLEANING

The Rifle, Telescopic Sight, Sling and Cleaning Cloth are kept in a wooden chest when not in use. The sight is always kept in a metal case in the chest unless it is in use on the Rifle. Protecting leather caps are provided for the lenses of the sight and these should be always in position unless the sight is in use for aiming. The sight is removed from its case by unscrewing the right hand milled screw from the bracket of the case. The left hand screw on the sight is already free.

Care will be taken at all times not to finger the glass surfaces nor breathe on them. Oil or grease must not come in contact with the glass surfaces.

To assemble the sight to the Rifle place the Rifle across the knees with the muzzle to the left and bolt downwards. Hold the sight with the bracket towards the rifle and the front lens (object glass) towards the muzzle. Place the sight on the pads and tighten the fixing screws simultaneously till hand tight. This avoids strain on the screws and bracket and ensures that the sight is put on in the same alignment each time. A final tightening to the maximum amount possible is now given;
always finishing with the rear screw. Removal of the sight is done by unscrewing the fixing screws simultaneously.

The Rifle and Sight are issued as a Unit and Sights are not interchangeable. The number of the Sight is stamped on the Sight and also on the small of the butt of the Rifle to which it belongs.

The Rifle number is stamped on the butt socket and on the sight bracket. The Rifle number is stencilled on the outside of the sight case lid. Both Rifle and Sight Numbers are stencilled on the inside of the sight case lid.

(a) Cleaning the Rifle

The cleaning of the Sniper Rifle follows the same lines as that of the ordinary service rifle. To maintain the very accurate qualities of the rifle and sight, greater care in cleaning and handling is however necessary.

The barrel should be frequently inspected and cleaned with flannelette. Special care should be taken when using the pull-through to avoid cord wear. A thoroughly clean chamber is essential for accurate shooting. The chamber should be inspected and cleaned with flannelette using sticks breech cleaning chamber.

The pads on the left side of the rifle, to which the sight is clamped, must be scrupulously clean and free from grit and oil since the presence of either would prevent the proper flush fitting of the sight and cause inaccurate shooting. They should be carefully wiped with a piece of dry flannelette before firing.

(b) Cleaning the Telescopic Sight

i Cleaning the Sight Bracket

The Sight Bracket must be scrupulously clean. Particular attention should be paid to the inner diameter of the front fixing. Any dirt on any of these surfaces will prevent flush fitting on the pads and cause inaccurate shooting.

ii Cleaning the Lenses

A square of linen cloth is issued with each sight for cleaning the lenses of the sight only. It should not be used for any other purpose and should be kept perfectly clean by frequent washing. Lenses are made of soft glass which if roughly rubbed with the cloth can easily become scratched by small particles of grit or dust that may be on the lens itself or on the cleaning cloth if dirty or even slightly soiled. Scratches reduce the useful life of lenses and may make them unserviceable.

Lenses should be cleaned only when absolutely necessary and not as a matter of routine. When necessary to remove dirt, dust or grit the lenses should be GENTLY WIPE with the cloth. The portion of the cloth which touches the hands should not be used to wipe the glass and a fresh portion of the cloth should be used for each wipe. Do not try to remove grease or oil with the cloth. This is not possible except with the use of suitable chemicals. The sight should in this case be returned to the O.C. Ord. Grn. Coy. for cleaning.

Sights stencilled “B” have the lenses “Bloomed”, i.e. the surfaces of the lenses are coated with a substance to reduce the scattering of light and so produce a clearer image. The less cleaning carried out on “Bloomed” lenses the longer will the coating last. Great care will be taken not to clean “Bloomed” lenses if wet or moist. Such lenses should be allowed to dry thoroughly before cleaning. Movement of the air in front of a lens surface will help to remove moisture quickly.
(3.) ZERoING

(a) Armourers Inspection
Before zeroing the Armourer should thoroughly inspect the Rifle and Sight to ensure that both are undamaged, that all screws are tight, particularly the pad screws, that the stocking is correct and the barrel free from metallic fouling.

(b) Zeroin without Telescopie Sight
The Rifle should first be zeroed in the same way as the Service Rifle—Rifle No. 4, Mk. 11. This ensures that if the telescopic sight is out of action or conditions of visibility very bad the firer will have an accurate rifle for use.

(c) Zeroin with the Telescopie Sight
i The Deflection Drum
Lateral deflection is got by rotating the deflection drum situated on the left side of the telescope. The scale is graduated in minutes of angle as follows:—
0 to 8, 4 to 8, etc., to a total of 10 minutes for a right deflection and 10 minutes for a left deflection. Each click of the deflection drum gives one minute of angular deflection. One minute deflection is equivalent to one inch (approx.) lateral displacement on the target at 100 yds. Range. There is a small graduation mid-way between the graduations 0 to 4, etc., giving 2 minutes.

ii The Range Drum
Elevation or depression is got by rotating the Range drum situated on top of the telescope. The scale is graduated in hundreds of yds. as follows:—0 to 1, 1 to 2, etc., to a total of 1000 yds. There is a small graduation mid-way between the graduations 0 to 1, etc., giving 50 yds. Each click of the Range drum gives one minute of angular elevation or depression. One minute of elevation or depression is equivalent to one inch (approx.) rise or drop on the target at 100 yds. Range.

iii Zeroing
The Telescopic Rifle will be zeroed at 100 yds. Range. Good shooting light and calm weather will be chosen. The left fore-arm and wrist will be rested. A suitable target with a 2-inch black or white aiming mark will be used. Two warning shots will be fired followed by a group of five on the target. The necessary standard of Grouping is 3 inches by 3 inches at 100 yds. Zeroing is correct when the Rifle Groups exactly on the point of aim. No lateral or vertical error is allowed.

NOTE:—A full field of view must always be obtained. If the eye is too near or too far from the sight a floating aperture will result.

iv Telescope Adjustment during Zeroing
When adjusting the telescope for correct direction and elevation remember that the same rule of altering into the error applies as in the case of the foresight of Rifles except that the pointer (in the telescope) replaces the foresight.

If the Telescopic Rifle is firing to the right move the pointer to the right. To do this rotate the deflection drum to the right (clockwise).

If the Rifle is firing to the left move the pointer to the left. To do this rotate the deflection drum to the left (anti-clockwise).

If the Rifle is firing low, lower the pointer. To do this rotate the Range Drum so as to increase the reading on the Range Scale Ring, i.e. clockwise.

If the Rifle is firing high, bring the pointer high. To do this rotate the Range Drum so as to reduce the reading on the Range Scale Ring, i.e. anti-clockwise.

Measure the lateral and vertical distances of the M.P.I. of the five rounds from the point of aim,
and rotate the deflection and range drums in the appropriate directions bearing in mind that each click on the deflection drum will give a lateral deflection of one minute of angle or one inch on the target at 100 yds. range, and that each click on the range drum will give a vertical displacement of one minute of angle or 1" on the target at 100 yds. range.

**Setting of the Scale Rings**

When the M.P.I. of the group coincides with the point of aim the scale rings may require resetting. To do this hold the top of either drum to prevent rotation of the drum and with the nose of a round inserted in the recess of the scale ring slip the ring with sideways pressure to read "0" in the case of the deflection scale and "1" in the case of the Range Scale. A check Group should then be fired.

(4.) It may happen at the commencement of a zeroing practice that a Rifle would fail to hit the target due to the scale rings being altered from the correct setting during training. Should this occur remove the bolt, roughly align the bore on the centre of the target and holding the Rifle firmly look through the sight and bring the pointer to the approx. centre of the target. This will ensure that the Rifle will hit the target and zeroing can then be proceeded with without delay. This adjustment can also be carried out by means of a rifle rest.

c. Rifle No. 2, Mk. IVx—(.22 Inch Rimfire)

(1) Assembly of Auxiliary Sight, Mk. I:

Before zeroing the Armourer should assemble the Auxiliary Sight to the bolt locking, making sure that the screw bolt locking is tight. In some cases it may be necessary to remove the cap and slide back-sight to obtain an unobstructed view of the target.

(2) Adjustment to Auxiliary Sight during Zeroing:

The auxiliary sight is an aperture sight adjustable both for direction and elevation. Alterations for direction and elevation are made on the auxiliary sight scales only, once a suitable size of foresight, suitably positioned, is on the rifle.

**Note:** It is advisable to select a size and position of foresight such that when the rifle is zeroed the aperture bracket is not at the extremities of either scales, otherwise different firers, when zeroing the rifle before practices, may not be able to do so without changing the foresight or its position on the block band.

It will be noted that the ordinary rule of altering into the error when zeroing, applies to foresights and not to backsights. Hence, when adjusting the aperture on the auxiliary sight, the following rules apply:

- If the rifle is firing to the right, move the aperture bracket to the left.
- If the rifle is firing to the left, move the aperture bracket to the right.
- If the rifle is firing high, lower the aperture bracket.
- If the rifle is firing low, move the aperture bracket upwards.

Care will be taken, when making adjustments, to keep the aperture bracket square on its seating. One sub-division on the vertical scale gives approx. 1¾ inches rise or fall on the target at 25 yds. range. One sub-division on the lateral scale gives approx. one inch right or left on the target at 25 yds. range.

(3) Zeroing:

The rifle will be zeroed at 25 yds. range. The left forearm and wrist will be rested.
Two warning rounds will be fired, followed by a group of 5 rounds on the target. The target will be a plain white screen with a 1" (black) circle as aiming mark or a representative target (200/25).

The correct position of the M.P.I. with reference to the aiming mark is the point of aim.

Sighting for a hit 1 inch above the point of aim and for harmonised shooting will have to be determined as required.

d. The Bren Light Machine Gun

(1) GENERAL

The Bren Light Machine Gun is a section weapon, unlike the Rifle which is a personal one. Accordingly the Gun is zeroed from the Tripod by the No. 1 of the Section and each member of the Section then fires a Group from the bipod to ascertain where his M.P.I. is and to note any necessary alteration to sights or point of aim. Each man must use the barrel that he is to fire with in future. Both barrels will be zeroed.

(2) METHOD OF FIRING

Zero the Gun from the tripod with its legs firmly bedded down with sandbags or sods. Ensure that the traversing arc is level from front to rear and from side to side. To aim, set the sights (at 200 yds.) and put the shoulder against the butt, loosen the traversing clamp, move the slide along the arc until the sights are pointing at the target and clamp it there. Turn the elevating nut (adjust the sleeve if necessary) and clamp up when the aim is correct.

NOTE: Aim with the eye exactly where it would be when firing from the bipod, but do not touch the gun except with the trigger hand when firing.

(3) ZEROING

A burst of ten rounds is fired into the butts to warm the barrel, followed by 5 single shots on the target. The aim will be checked before each shot.

There are eight sizes of foresight available for the adjustment of vertical errors on Bren Guns. They are marked with their respective heights as follows:

.25
.28
.31
.34
.37
.40
.43
.46

The difference in height between any one sight and the next higher or lower is .03 inches.

The correct position of the M.P.I. with reference to the aiming mark and the permissible vertical variation from that point are shown in the table below, for Ranges of 100 yds. and 25 yds. the sight setting is 200 yds., for both Ranges. Alteration to the position and/or size of the foresight will be made until the weapon groups to the standard specified in the table.
### The Vickers Machine Gun .303

1. The lateral adjustment of the foresight will only be carried out by an experienced N.C.O.

2. It will be carried out on a 30-yards range, the actual distance between the muzzle of the gun and target should be 25 yards.

3. The target will be any suitable target with a thick vertical line as an aiming mark, with a pencil line ⅛ of an inch to the right of the centre of the thick line. The latter will be invisible to the firer.

4. Settling bursts will first be fired. Then a burst of 10 rounds will be fired by inserting a punch between the firing lever and safety catch. If the gun is sighted correctly, the M.PI. of the group of shots will be on the thin pencil line i.e. ⅛th of an inch to the right of the point aimed at.

If there is any lateral error the foresight will be tapped in the same direction as the error using a No. 3 punch and hammer.

Another burst of 10 rounds will be fired after each adjustment until the sighting is correct. Adjustments are very fine and great care must be exercised in tapping the foresight.

5. When the foresight is very tight, the bracket should be supported to prevent it from jarring loose.

6. It is important that the socket of the tripod should be perfectly upright. After each group is fired, the aim must be carefully checked to see that the tripod has not moved.

### TESTING

1. Any weapon that fails to make a good group in the hands of a skilled firer will be tested. The standard group for a rifle and light machine gun will be:—

   - 8 inch group at 100 yards.
   - 2 ,, ,, ,, 25 yards.

One wide shot will be ignored if so declared.
2. The conditions for testing will, when applicable, be as for zeroing (see para. 2). The results of tests with all relevant details will be recorded and forwarded to the command ordnance officer, if the standards set out below are not reached.

3. A group of single shots will be fired in rifle tests, but in order to distinguish between inaccuracy due to the barrel and inaccuracy due to some defect in the gun, Vickers guns and light machine guns will be subjected first to a barrel test and then to a complete gun test.

4. Vickers .303-in. M.G. and light machine guns, barrel test:—A skilled shot will fire ten single shots, carefully relaying the gun and taking the same aim for each shot. In bringing the sights of the Vickers gun on to the mark, the gun will be elevated on each occasion so that any play in the elevating gear will always be taken up in the same direction.

   At 400 yards range all shots must fall within a square of 24-inch sides.

   Barrels will be exchanged if they fail to reach this standard, provided a satisfactory group is obtained with a known good barrel with the same gun and tripod.

5. General instructions:—

   a. The exact position of the shot holes will be measured to one place of decimals horizontally and vertically from the left and bottom edges of the target respectively, except for tests of the .22-inch rifle, when the targets used will be forwarded.

   b. When testing rifles, shots will be recorded in the order in which they are fired.

   c. If any shots are not on the target, groups will be repeated once, any suitable alteration of aim being made for direction and elevation. If the alteration fails to bring all the shots on to the target, the fact will be recorded.

d. A check group will be fired by the same firer and with ammunition from the same batch, from a weapon known to be reliable. The results will be recorded.

e. Tests of complete .303-in Vickers machine guns will be carried out with a known good barrel.

6. Details for individual weapons.

The details for the various weapons and the standard of grouping are given in the following table:

<table>
<thead>
<tr>
<th>Weapon</th>
<th>Number of rounds and method of firing</th>
<th>1st 2 in. Range</th>
<th>Size of rectangle containing the group measured horizontally and vertically</th>
<th>Permissible distance of M.P.I. from point of aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rifle</td>
<td>10</td>
<td>Yards 200</td>
<td>Inches</td>
<td>Inches</td>
</tr>
<tr>
<td>Light Machine Gun</td>
<td>3 groups each of 10 rounds, fired in service bursts</td>
<td>300</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>.303-inch Vickers Machine Gun</td>
<td>3 groups each of 10 rounds, fired in one burst</td>
<td>400*</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Rifle No. 2, .22 inch</td>
<td>2 groups, each of 5 rounds</td>
<td>25</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

* For convenience, the test and barrel test may be fired at 200 yards, the passing limits being reduced proportionately.
SECTION V.

COACHING.

1. In order to ensure that the soldier has every chance of being successful when he fires his range practices, a firing point instructor is provided whose duty it is to "coach" the firers so that by getting good results they acquire that self-confidence which leads to steady improvement in shooting. This confidence in his ability to make the best use of his weapon can only be gained by the soldier as a result of good shooting on the ranges.

2. Although a soldier may acquire a thorough knowledge of the rudiments of shooting during elementary instruction, coaching at the firing point is, however, essential to make him a good practical shot. Correct zeroing is a necessity if coaching is to be effective. Shooting capacity depends first on ability to group, secondly in understanding the effect of the grouping capacity at various ranges and thirdly on ability to apply the centre of the group to the aiming mark.

3. Grouping.

In grouping, the object of the firer is to hold and aim the rifle, and to press the trigger accurately without varying the point of aim, so that the shots form a small compact pattern. The group is measured with wire rings 4, 8 and 12 inches in diameter at 100 yards and proportionately at 250 yards. An expert shot should group within the 4-inch ring at 100 yards. Groups should be examined at the target and their sizes recorded in the firer's scoring book. As the range increases so will the spread of the bullets. A firer who can place his shots in a 4-inch ring at 100 yards will not be expected to get them into less than an 8-inch ring at 200 yards, a 12-inch ring at 300 yards and so on. Similarly, a firer whose grouping capacity at 100 yards is 8 inches, will not normally place his shots in a circle of less than 16 inches at 200 yards and 24 inches at 300 yards. Although the position of the centre of the group (M.P.I.) has no influence on the scoring value, it is the basis of subsequent coaching. The M.P.I. may indicate an error in direction or elevation, and the shape of the group may indicate faults such as an inaccurate centering, varying the amount of foresight or faulty trigger pressing.

4. Application.

In application practices, the object of the firer is to apply his group to a definite aiming mark by altering his sights as necessary. The firer will proceed to this stage when he has fired sufficient grouping practices for his grouping capacity to be assessed. Correct zeroing of the weapon and correct action on the part of the firer should obviate any necessity to alter sights. The ability to hit the aiming mark constantly depends on the grouping capacity of the individual. For example, if a soldier, whose grouping capacity at 100 yards is 8 inches, is firing at 300 yards, and his first shot, declared and observed correct, is found to be within the inner circle (24-inch), then, the position of this shot is within the man's grouping capacity and an alteration of sights or point of aim would be wrong and would not, necessarily, bring subsequent shots on to the aiming mark. Under similar conditions, if the initial shot is outside the 24 inch circle and, therefore, outside the grouping capacity of the individual an adjustment of sights is necessary to bring subsequent shots within the grouping capacity. Normally, this should not occur if the weapon has been zeroed and the shot fired correctly.

If, as a result of firing two or more shots, it appears that the group (although still within the grouping capacity of the firer) is forming high or low, the M.P.I. may, by alteration of the sights be lowered or raised accordingly provided that the coach from his knowledge of the firer's performance in previous practices considers this advisable.

5. In order to be able to coach successfully, an instructor must understand fully the capabilities of each weapon and the grouping capacity of each firer with whom he has to deal. It is helpful too if the instructor knows the men he is about to coach and for this reason it is desirable that men be handled in the first instance by the N.C.O. who instructed them during their elementary weapon training. This will make for better co-operation between instructor
and firer since the former will know the type of man with whom he is dealing and will understand how best to handle him and the firer will have more confidence in an instructor he knows.

6. No one can expect to be successful as a coach unless he possesses the requisite knowledge to enable him to cope with the various problems that will repeatedly confront him on the range. A knowledge of the following is essential:

a. Powers and limitation of the rifle and ammunition combined.

b. Powers and limitations of the rifle, ammunition and firer combined.

c. The necessity of studying each firer’s temperament so that the best may be got from each. There must be complete harmony between the coach and the firer. This is only possible when the coach knows and understands the man.

d. The great importance of encouragement. Nothing is more fatal to good shooting than an unsympathetic coach whose criticism is invariably adverse. A coach should always look for some good points in every man’s genuine attempts at shooting. Encouragement is the very essence of good coaching.

e. Possible causes of inaccurate shooting. These causes, for convenience, may be grouped under two headings:

(1) Those within the firer’s control.

(2) Those outside the firer’s control.

Under the first heading there are some faults which if committed by a firer, cannot be detected by a coach. Their existence may be ascertained later when the results of the shooting are analysed. There are, however, several which can and should be detected by a coach and it is essential that coaches should detect these mistakes when they are made. This does not mean that a coach must always declare any particular fault to have been made just because he considers the result of a shot justifies that assumption.

Coaches must be most particular to be quite sure, before telling the firer, that a mistake has been made. The correct procedure, when in doubt, is to say that no fault was observed and watch with still more care the firing of the next shot.

(1). Causes within the firer’s control.

(a) Faults in aiming such as, inclined sights; inaccurate centring of the foresight in the backsight aperture; focussing the foresight instead of the aiming mark; failure to maintain elevation when aiming off for wind; dwelling too long on the aim.

(b) Faults in trigger pressing. Not taking the first pressure correctly; pulling with the forefinger instead of squeezing with the thumb and remaining fingers.

(c) Faults in position; such as, body and elbows in an incorrect position; eye too close to the cocking piece; left wrist and/or forearm incorrectly rested; constant variation in holding and in the position of elbows.

(d) Faults in the rifle; use of wrong bolt or bayonet; cord wear; loose butt or screws due to carelessness or unauthorised stripping; oil in the breech or bore, on the face of the bolt or on the magazine platform.

(e) Faults in the firer such as incorrect breathing, gun shyness, overkeenness, nervousness, lack of determination, untruthful declarations, preventable physical unfitness.

(2). Causes outside the firer’s control.

(a) Atmospheric conditions; bad light; sudden change of light; mirage; strong or variable winds.

(b) Faults in the rifle; not zeroed or incorrectly zeroed; sights in need of browning; butt not fitting the firer; worn chamber or barrel; nickeling in the bore; loose screws due to vibration in firing; lack of correct clearance for
the barrel due to dirt, tight nosecap or warped fore-end.

c. Faults in the firer; defective eyesight; unavoidable illness; inadequate preliminary instruction.

d. Faults in coaching; lack of experience or impatience on the part of the coach.

f. That coaching is an art. There are no fixed rules in firing point instruction. A non-commissioned officer will only become efficient as a coach as a result of experience gained on the firing point. It requires knowledge, steady perseverance, patience and plenty of practice before a non-commissioned officer can become a really efficient coach.

g. That grouping is the foundation of all shooting. It is on a man’s capacity to group his shots around a mark that his ability to apply his fire to any given target will depend.

7. Powers and limitations of the rifle and ammunition combined.

All rifles are tested at the factory under conditions which ensure the greatest accuracy. The rifle is fired from a mechanical rest at a target at 100 feet from the muzzle of the rifle. It is aimed by telescopic sights and must put 4 shots out of 5 into a rectangle 1\(\frac{1}{2}\) inches by 1 inch which is equal to 4\(\frac{1}{2}\) inches by 3 inches at 100 yards. Ten percent of rifles are also tested at 600 yards at which range 9 out of a group of 10 shots fired by each rifle must fall within a 2-foot circle. Diagrams of the dimensions given above should be studied.

8. Coaches must know what is meant by a group and that the group mentioned in paragraph 7 is the measure of the capacity of the rifle and ammunition combined.

9. Powers and limitations of rifle, ammunition and firer combined.

a. When the rifle is fired by a man alone it will be appreciated that the resulting group is unlikely to be smaller, if as small, as that obtained at the factory when fired under mechanical control and aimed by telescopic sights.

b. Therefore, with the S.M.L.E. rifle and Mark VII ammunition and fired by the man alone the smallest area that will contain all his shots is taken to be a 4-inch circle at 100 yards provided that all his shots are fired accurately.

c. It follows that the area that will contain all the shots fired by a man will increase as the skill of the firer decreases.

d. In this case the group is the measure of capacity of the rifle, ammunition and firer combined.

e. Coaches must be familiar with the group measuring rings (4-inch, 8-inch and 12-inch) which are used for measuring the grouping capacity of firers at 100 yards.

10. There are other factors which affect accurate shooting in so far as the rifle and ammunition are concerned. It is not necessary to memorise them. They are included so as to emphasise the danger of advising a man to change his point of aim in order to improve his score.

a. Symmetry of the bullet. Want of symmetry in the bullet sometimes in shape but more often in the thickness of the bullet envelope causes the bullet to oscillate in flight and is probably the principal cause of inaccuracy. Not only is a bullet which is oscillating during flight uncertain as to its point of impact on the target, but, where the centre of gravity of the bullet is not truly central in the barrel the bullet leaves the barrel on a line of departure which is not strictly along the axis of the barrel.

b. Variations in the propellant charge. Variations in loading either in the weight of the charge or in the quantity of the propellant or in the loading of the cap, which, in turn, affects the rate of burning of the propellant are liable to cause differences in the velocity of different bullets at the muzzle. Where these variations in velocity occur,
the bullets have different trajectories and their points of impact on the target vary accordingly. (See Manual of Rifle Marksmanship.)

e. ** Fouling.** Particular attention should be paid to metallic fouling, which is difficult to detect and causes the bullet to deviate from its true course when leaving the muzzle.

d. **Heating of the barrel.** This causes the barrel to expand with the result that the bullet fits it less tightly and therefore tends to fall short.

e. **Bolt wear.** This causes extra back pressure on the bolt head.

f. **Oily cartridge or oily bore.** (See Section II.) Both are causes of inaccurate shooting.

11. **Necessity for coach studying the groups obtained by a man.**

a. With the aid of group measuring rings the coach should study the grouping capacities of 4-inch, 8-inch and 12-inch groupers at 100 yards when firing at 200, 300, 400 and 500 yards.

b. The main object of preliminary instruction before firing the annual course is to improve a man's grouping capacity.

c. The average size of a man's group obtained in preliminary instruction provides his coach with valuable information when coaching him on the open range. For instance:—A recruit's scoring book may show that on the miniature range his first group was a 3-inch and his second a 2-inch group. On the 30 yards range his first group was a 3-inch and his second was a 2-inch group. The coach learns, therefore, that the firer's average group is 2½ inches which at 100 yards would be 10 inches. He will accordingly coach him for a 12-inch group. The man may improve sufficiently to get an 8-inch group, but he is shooting up to his standard if he gets a 12-inch.

d. It is obvious therefore that all such groups should be carefully recorded in the firer's scoring book.

e. Men who fail to reach a 12-inch grouping standard at 100 yards are not fit to fire application practices and will not be allowed to do so.

f. Once the size of the man's average group is known the area at any range which should contain all his shots is also known. For instance:—The shots of a 4-inch grouper when firing at 200 and 300 yards will be contained in 8-inch and 12-inch circles respectively.

An 8-inch grouper firing at 200 and 300 yards should get his shots within 16-inch and 24-inch circles respectively.

Similarly a 12-inch grouper firing at 200 and 300 yards should get his shots within 24-inch and 36-inch circles respectively.

A light machine gunner who can group to 4 inches with the rifle at 100 yards would find when firing service bursts with the L.M.G. that his group at 100 yards would be about 8 inches. When firing single shots from a L.M.G. he should obtain a 4-inch group. It may be taken that a group fired in service bursts from a L.M.G. is greater than a group fired by a rifleman. This is due to the vibration of the gun when firing.

g. In addition to knowing a man's normal group, the coach must know the position of the centre, or M.P.I. of the group. This position he can obtain from the scoring book or by observing the position of the group on the target.

h. If a rifle or L.M.G. is correctly sighted and fired accurately with the sights set at 200 the correct position of the M.P.I. of the group will be:

- At 200 yards ... central to the point of aim.
- At 100 ... 3 inches high of the point of aim.
- At 25 ... 1 inch high of the point of aim.
There is a slight difference in the position of the M.P.I., for light machine guns at 25 yards. This is shown in Section IV.

12. **Sequence for Coaching.**

So that no important point be missed the following sequence should be adopted by coaches.

**Before the practice commences:**

a. Inspect the weapon to be fired. In the case of the rifle the inspection will take the form of lesson 20 Manual of R.M., (Examination of the Rifle). Particular attention should be paid to the breech, bore, face of bolt and magazine platform. These parts should be free from oil. Ensure that the sights are not loose, deformed or broken; that there is "play" between the barrel and the fore-end and that the trigger has two pressures. In the case of light machine guns the coach will make sure that the firer has carried out his examination before firing.

b. Ensure the weapon has been zeroed and study the record of zeroing.

c. Examine firer's scoring book, noting his previous grouping capacity, position of M.P.I.'s and results of previous practices.

d. Where cover is allowed make sure it suits the firer by testing him behind it, before firing. Adjust the cover where necessary.

e. Make sure firer understands the particular practice to be fired.

f. Point out the target to be engaged and have the firer's scoring book beside you.

**During the practice:**

- Take up a position beside the firer, where practicable at right angles to him and where actions can easily be seen and faults noticed. Do not get in the firer's way.

- Watch the firer, not the target, until the shot is fired paying particular attention to holding, breathing, trigger-pressing, flinching and lack of determination. Check faults as firer rests. Check backsight after each shot to ensure it has not shifted.

- Note the firer's declaration on a representative target and check later when examining the group or with the signals in application practices.

- If firer is not shooting within his grouping capacity the coach should be able to tell the firer where the fault lies.

- Do not lose patience with a firer on any pretext whatsoever. Remember that your duty is to assist the firer.

- Mark up the firer's scoring book after each practice. Remember to mark in the position of each shot as it was signalled. If in doubt as to any shot ask for the signal to be repeated.

13. In those practices which are not timed the firer will always declare his shot "correct" or otherwise immediately it has been fired. When a grouping practice has been fired, the coach and the firer will examine the group and discuss it. The coach will point out any faults in shooting which are apparent from the group and he will compare the order of arrival of the shots with the firer's declaration. The coach will point out the M.P.I. of the group and discuss it as regards direction and elevation. He will then mark in on the firer's scoring book the exact position of the group and fill in the other information required.

14. **EXAMPLES.**

The following are two examples where valuable information can be obtained by the coach from the pattern of the groups:

- Diagram No. 1 shows the result of not getting the foresight in the centre of the backsight aperture. The coach can tell with a glance at the group what mistake the firer is making. It is obvious that if
the foresight is not correctly centred each time the shots will form a sort of horizontal pattern on the target.

Diagram No. 1.

b. Diagram No. 2 shows the result of taking too much or too little foresight. It is obvious that if the amount of foresight taken is varied the elevation will be varied and the shots will form a sort of vertical line on the target.

Diagram No. 2.

15. The following is a guide to coaches regarding the scores to be expected from men of different grouping capacities.

A 4-inch grouper would be expected to get from 17 to 20 points in application at 300 yards. An 8-inch grouper would be expected to get from 14 to 17 and a 12-inch grouper 10 to 14 points. If they reach those scores they are shooting up to their grouping capacity and that is all that can be expected of them.

16. The following examples are given to illustrate the principles of coaching and show that good results can be obtained only when information given by grouping practices is intelligently used in application practices.

a. The Wrong Way (Diagram No. 3).

The firer is a 12-inch grouper firing an application practice at 300 yards.

Diagram No. 3.

1st Shot:—A magpie 6 o’clock about 14 inches below the point of aim. The firer declared it “correct” and from the coach’s observation it was fired correctly.
The coach is rather disappointed. He had hoped for a bull. He tells the firer that he is 14 inches low and to put his sights at 450.

2nd Shot:—An outer 11 o'clock about 20 inches above the level of the point of aim. The firer declared it "correct" and the coach observed it to be fired correctly.

Coach is still more disappointed. He expresses doubt in the truth of the firer's declaration. He warns him to be more careful with the next shot and orders the sights to be put to 300 yards.

3rd Shot:—A magpie 3 o'clock about 15 inches from the point of aim. The firer declares shot "correct" and the coach is satisfied that it has been fired correctly.

The coach is quite pleased. He tells the firer that his elevation is now correct but that he must make allowance for the wind that must have blown his shot to the right. He advises the firer to aim midway between the edge of the bull and the edge of the target.

4th Shot:—Is a "miss" off the target. Both the coach and the firer are satisfied that the shot was fired correctly.

The coach now becomes annoyed. He accuses the firer of careless declaration, inaccurate centring and loose holding. He again warns the firer to be more careful with the next shot and not to mind the wind.

5th Shot:—A bull. The shot was declared "correct" by the firer and observed by the coach to be correctly fired.

The coach now accuses the firer of not having listened to his advice for the other shots. The firer protests that he did everything he was told. The coach tells him not to answer back.

With the aid of measuring rings it can be easily seen how the centre of the firer's group was moved and the effect on the position of shots as a result of advice given by the coach. As a result of the efforts of this coach the firer got a total score of 9 points and probably lost confidence in himself, his rifle and the coach.

b. The Right Way (Diagram No. 4).

In this example the same firer has a good coach who understands the principle of applying the M.P.I. of the group to the centre of the target.

![Diagram No. 4](image)

1st Shot:—A magpie 6 o'clock about 14 inches below the point of aim. The shot is declared "correct" by the firer and observed by the coach to be correctly fired.

The firer is disappointed at the result and immediately suggests more elevation. The coach, however, re-assures him and tells him to fire again with the same elevation.

2nd Shot:—An inner 10 o'clock about 10 inches from the point of aim. The shot is declared "correct" by the firer and observed by the coach to have been fired correctly.

The firer is well satisfied with the result and so is the coach. He orders the firer to shoot again.

3rd Shot:—A magpie 3 o'clock about 15 inches from the point of aim. The firer declares the shot "correct" and the coach is satisfied that the firer made no mistake.

The firer says that the wind has probably thrown the shot to the right and suggests that he aim off. The coach tells him not to worry about the wind and to take the same point of aim.

4th Shot:—A magpie 8 o'clock about 16 inches from the
point of aim. The shot was declared "correct" and appeared to the coach to have been correctly fired.

The firer sees that the coach was right in not permitting him to aim off for wind and decides to trust his judgment. The coach is satisfied also and tells the firer he is doing quite well and to be just as careful with the last shot.

5th Shot:—A bull.

The firer is very pleased. He has got a good score and has confidence in himself and his rifle. He sees that what the coach advised was best and consequently he has confidence in the coach. The coach congratulates the firer on his good score and encourages him to maintain his standard and assures him that he will be an 8 inch grouper the next time.

In the example given above all five shots were within the firer's grouping capacity i.e. within the magpie circle. Therefore, the coach would have been very wrong in ordering an alteration in elevation or point of aim at any time during the practice.

c. Other Examples (Diagram No. 5).

The firer in this case is an 8-inch grouper firing an application practice at 300 yards. It is, therefore, reasonable to expect that all his shots should strike within the inner circle.

It is obvious that his first shot is not within his grouping capacity. The firer declares the shot correct and the coach did not see any fault in the firing of the shot. He therefore orders that the sights be put up from 300 yards to 400 yards. This will give a rise on the target of 12 inches. The first shot is a magpie 6 o'clock about 14 inches below the point aimed at so that the alteration should bring the shots in to the bull.

d. (Diagram No. 6). The firer in this example is a 4-inch grouper. The majority of his shots, when firing at 300 yards, should therefore be bulls.

The first shot which the firer declares "correct" and which the coach considered correctly fired is an inner 6 o'clock about 7 inches from the point of aim. There is no reason, at this stage, to change the elevation. It is reasonable to expect that even 4-inch groupers may get a few inners. This one is very near the bull and an alteration now might do more harm than good.

The second shot which was fired correctly and declared "correct" is a bull 6 o'clock. It has now become obvious that no change in elevation is required.
c. (Diagram No. 7). This is an 8-inch grouper firing an application practice at 300 yards.

Diagram No. 7

The first shot fired is declared "correct" and observed by the coach to be correctly fired. It is an inner 11 o'clock about 10 inches from the point of aim. There is obviously no reason to alter the elevation.

The second shot is an inner 12 o'clock about 11 inches from the point of aim. The firer declares it "correct" and it was observed by the coach to have been correctly fired.

In order to apply the principles already given no alteration should be made. But it must be remembered that these are only guiding principles and not rules. In this instance the coach's knowledge of the firer and his own experience may influence him in suggesting an alteration in sighting elevation to lower the firer's group on the target. This might give better results.

The coach must decide if these two shots are central shots of a group forming high or high shots of a group forming in the correct place. With an 8-inch grouper it is impossible to predict where in the 24-inch circle his shots will strike. It might be coincidence that these two shots are together.

b. (Diagram No. 8). This is a recruit who is a 4-inch grouper.

Diagram No. 8

The first two shots are bulls. Both shots are declared by the firer to be correct and the coach observes them to be correctly fired.

The third shot is a magpie 6 o'clock, 17 inches low. It is declared "correct" and the coach observes it to be correctly fired. The coach would be very wrong in ordering a change in elevation. It may be a shot aimed low which the recruit from inexperience did not know he had aimed so low.

g. (Diagram No. 9). This is an 8-inch grouper.

Diagram No. 9
The first shot is an inner 6 o'clock, 10 inches low. The firer declares it "correct" and it is observed by the coach to be well fired. The second shot is a magpie 7 o'clock, 14 inches low. It is declared "correct" and observed to have been correctly fired.

The coach should order an increase in elevation of 100 yards.

h. (Diagram No. 10). This is an 8-inch grouper.

![Diagram No. 10](image)

The first shot is an inner 11 inches low, at 6 o'clock. The second shot is an inner 9 inches low at 7 o'clock. The third shot is an inner 11 inches low at 5 o'clock.

The coach would be justified in ordering an increase of 100 yards. It is obvious that this group is forming low and the position of the shots indicate that they are well fired.

j. (Diagram No. 11). This is a 12-inch grouper.

![Diagram No. 11](image)

The first shot is a magpie 4 o'clock 16 inches from the point of aim. The second shot is a magpie 8 o'clock, 17 inches from the point of aim. Both shots are declared "correct" and observed to have been correctly fired.

The third shot also declared "correct" and observed to be correctly fired is an outer 6 o'clock, 20 inches low. It is now obvious that the group is forming low. The coach should therefore order an increase in elevation of 150 yards.

It is clear, from the examples given above, that truthful declaration by the firer is essential and that the coach must watch the firing of each shot very carefully. Shots which are declared "incorrect" or which have been fired in a doubtful manner must be ignored as far as the coach is concerned. These shots give no indication of a man's true capacity.

When a coach is satisfied that an alteration of sights is necessary he should make that alteration boldly. He should look for the best possible score and should not be satisfied with bringing a man's shots within his grouping capacity. Example VIII illustrates this point.
It must be understood that the examples given above are not rules governing a coach’s actions. All that a coach can be given are guiding principles and he must be prepared to use his own discretion and make decisions himself. Coaching is an art. A Non-Commissioned Officer can only become a good coach by practice and perseverance and it must be remembered that only a good coach is any use on the firing point.

Coaching—LMG.

General.

1. The principles of coaching riflemen and LMG gunners are similar. However, there are extra points which the LMG coach will need to know.

Grouping.

2. An LMG gunner firing five rounds in slow time should obtain a group as small as with the rifle. If he is firing single rounds at the rate of 28 rounds per minute his group will probably be half as large again. If he is firing bursts, the group will be twice or three times as large as with the rifle.

Common faults.

3. The coach should be able to deduce from the pattern of the group what the faults of the firer are. The 25 yds. range would be ideal in this respect as the coach should be able to see the order in which the shots arrive.

The following are common faults:—

a. The shots almost in a vertical line—pulling the gun back or pushing the shoulder forward after starting to fire.

b. The shots almost in a lateral line—the left or right hand producing the “master” grip.

c. Scattered group—loose holding.

d. The first shot accurate and the rest in a group somewhere else—suddenly tightening the grip after the first shot.

Hints for Coaches.

4. The primary aim of a coach is to improve a man’s grouping capacity.

5. As the LMG is NOT zeroed for each man, the coach should be prepared to advise the man to alter his sights or point of aim, rather than assume that he is taking an incorrect aim.

6. A loose fitting barrel causes the shots to scatter. This can be remedied temporarily by an Armourer but for a satisfactory repair the gun would have to be overhauled in an Ordnance Garrison Company Workshops.

7. The firer should push his shoulder forward into the butt, and then pull the butt back to lock it.

8. By having the left elbow in front of the left hand, the firer is less inclined to push the right shoulder forward as he fires.

9. The bipod should be absolutely square to the target. If NOT, the gun will NOT be central in the bipod and will tend to move to the centre when the gun vibrates. This is a common cause of scattered shooting.

10. To prevent disturbing the aim while pressing the trigger, the web between the right thumb and forefinger should be high up on the pistol grip and directly behind it, the forefinger should be on the bottom of the trigger and pressure should be exerted straight back.

11. The left hand should be as far forward on the small of the butt as is comfortable.

12. The hold is locked by turning the wrists towards each other without shifting the grip.

13. The head should be rested on the left hand or butt in the same place each time.

14. The body and legs should be straight behind the gun.
15. The gas regulator should be set at the smallest hole at which the gun works reliably.

16. The right eye should be kept open throughout a burst. In this way the foresight can be observed moving about the aiming mark, enabling the firer to declare how the burst went.

17. By getting a man to fire a few "dry" shots before he loads, the coach is enabled to spot errors of holding before the actual practice commences.

APPENDIX 1.

USE OF LANDSCAPE TARGETS AND HARMONIZED SIGHTS.

(MINIATURE AND 30-YARDS RANGES).

1. Landscape Targets. The frame for these is 10 feet long and 5 feet high. Landscape targets 5 feet by 2 feet are pasted on to the lower portion leaving 3 feet of blank sky screen above to receive the shots. Units should paste two landscape targets on to the canvas and wooden screens in order to make a picture 10 feet long.

2. In order to save expense when shooting at these targets the sights of the rifles should be so harmonized that the bullets will hit a white and brown paper screen 5 feet wide by 3 feet high placed immediately above the landscape target. These screens should be so constructed that they are separate from the picture landscape targets and consequently the latter can be changed as required. Fig. 20 shows this sky screen and detachable landscape screen below it.

3. The bottom portion of the sky screen should be of brown paper 28 to 30 inches high; white paper should be used for the top portion about 6 inches high.

The brown paper is to prevent the firers from seeing the shot holes and aiming at a group of shots instead of at the correct object on the landscape target.

The white paper is used so that the shot holes can be seen when harmonizing the rifles.

In the case of outdoor ranges where the sun is usually behind the targets, it may be found that the shot holes can be more easily seen in the brown paper than in the white.
paper. In this case the brown paper should be used at the top of the screen for harmonizing and the white paper at the bottom for the practice shooting.

4. Harmonization of sights. In firing at landscape targets, weapons should be given extra elevation, so that the bullets will strike the blank sky-screen, even if the aim is taken at an object at the bottom of the landscape target; this necessitates the weapons being harmonized, so that they will all shoot to the same height above the point aimed at. This is carried out as follows:

   a. Put aiming marks at intervals of about 12 inches on a horizontal line near the bottom of the blank sky-screen. (Fig. 20.)

   b. Draw two horizontal lines 26 inches and 28 inches above the aiming marks. These lines must be visible from the firing point. Set the sights to 1,400 yards. The weapons should then be fired, aim being taken at the aiming marks, and the sights adjusted until every rifle places the shots between the two lines.

   The elevation for every weapon harmonized should be entered on the elevation board in the miniature range.

   The above method of harmonization can be carried out equally well on the 30-yards range, the men using their own rifles and .303-inch ammunition at a distance of 25 yards from the firing point to the target.

5. Apparatus and method of scoring:

   a. Target requiring concentrated fire:—A measuring rod 27 inches long is required. When fire has been concentrated on any point on the landscape target, the rod is held vertically, the bottom of it on the point of aim. A mark is then made on the blank sky-screen at the top of the rod; this mark shows where the centre of the group should be.

   For competitions, two concentric wire rectangles, 5 inches by 4 inches, and 2½ inches by 2 inches, will be used to determine the score. The centre of the rectangle is placed on the mark with the longest sides of the rectangle vertical; every shot in the inner rectangle counts two points; every shot in the remainder of the larger rectangle counts one point.

   b. Target requiring distributed fire:—When fire has been distributed between two points on the landscape, a mark is made 27 inches vertically above each, as already described; these two marks are joined by a line parallel to that along which fire has been distributed.

   The line is then produced 1½ inches beyond the marks at either end. A line 1½ inches above and another 1½ inches below are drawn parallel to the first line. The ends of these are joined by vertical lines passing 1½ inches outside the two marks and the parallelogram thus made is again subdivided into equal spaces, one for each firer (Fig. 20). The extra 1½ inches at each end is to allow for the width of the cone of fire of the two flank men of the section.

   All shots in the rectangle opposite the particular firer (up to the number of rounds given in the fire control order) count one point each to the total score of the section; any shot in a rectangle over and above the number ordered will not count. Shots on the dividing lines count in one rectangle only.

   c. A miniature replica of the landscape target in use should be available on the firing point. The instructor will mark by means of pins the position or the extent of the target on the replica. The section...
leader, having identified the target on the landscape, will give the section a fire control order.

The section leader should give his indication from a firing position in the section, without further reference to the replica.

Fig. 20.

<table>
<thead>
<tr>
<th>Range in Yards</th>
<th>Height of Trajectory (in feet)</th>
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<tbody>
<tr>
<td>200</td>
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<tr>
<td>1,500</td>
<td>8.6</td>
</tr>
</tbody>
</table>

**APPENDIX II**

**TRAJECTORY TABLE.**

5 Rounds Ordered:
4 Fire:
Score = 03.

5 Rounds Ordered:
4 Fire:
Score = 18.

Aiming Marks for Harmonization

LANDSCAPE TARGET

BLANK SKY SCREEN
APPENDIX III.

RANGE TABLE.

For weapons firing S.A.A., .303-inch, Mark VII, with a muzzle velocity of 2440 F.S.

<table>
<thead>
<tr>
<th>Range</th>
<th>Angle of tangent elevation</th>
<th>Angle of descent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yards</td>
<td>deg.</td>
<td>min.</td>
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<tr>
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<td>0</td>
<td>7</td>
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<tr>
<td>300</td>
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<td>0</td>
<td>52</td>
</tr>
<tr>
<td>1,000</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

For data beyond these distances, see .303-inch Vickers Machine Gun tables.

APPENDIX IV.

ARMY FORMS, BOOKS AND REGISTERS USED FOR WEAPON TRAINING RECORDS.

1. Forms as listed below will be used in connection with weapon training in units. Consolidated requisitions for training forms in use will be submitted by commands to an Priomh-Charlann, An Roinn Cosanta by I Mi na Nodhlaig each year.

All requisitions will be based upon minimum requirements or in accordance with scales of issue, where such are laid down. Where applicable, indenting officers, when furnishing requisitions, will keep in mind the number of personnel for whom entries can be made on each form.

2. These forms will be regarded as unit and sub-unit records and will be available for inspection when required.

- 75 — Memorandum of examination and inspection of light machine guns (Lewis) .303 inch.
- 216 — Recruits training report—Permanent Force.
- 217 — Reservists' training report.
- 218 — Annual weapon training return—M.G. company.
- 220 — Company (or equivalent unit) annual weapon training return.
- 220A — Company (or equivalent unit) annual weapon training return, (An Fórsa Cosanta Aithilí). For data beyond these distances, see .303-inch Vickers Machine Gun tables.
- 223 — Annual weapon training return for recruits.
- 224 — Training report on transfer or posting Permanent Force.
- 225 — Register for judging distance tests.
- 226 — Butt register for range practices—rifle and revolver.
- 227 — Company commander's roll for range practices—rifle and revolver.
- 230 — Unit weapon training return—Permanent Force and Reserve.
- 233 — Machine gun course—butt register.
- 234 — Machine gun course—firing point roll.
- 426 — Butt register for range practices—light machine gun.
- 427 — Company commander's roll for range practices—light machine gun.
A.F. 438 — Range card— for rifle, light machine gun and 
machine gun fire unit.

    7A — Scoring and judging distance book (An 
Fórsa Cosanta Aiteáil).
    18 — Scoring book—annual range practices—rifle 
and light machine gun.
    49 — Tests of Elementary Training (sub-units of 
support companies and cavalry squadrons).
    50 — Tests of Elementary Training (Rifle Platoons).

APPENDIX V.

TARGETS IN GENERAL USE.

In this appendix are given diagrams and descriptions of 
targets in general use to assist officers and non-commissioned 
officers in knowing what the various targets represent and 
how they should be employed.

1. 4-Foot Target (Diagram No. 1).

The 4-foot target is used in aiming instruction and for 
numerous practices on the range. The target is 4-ft. square 
and is made of wood, canvas and paper. The frame is made 
of wood the sides of which are elongated to raise the target 
from the ground and to facilitate its erection on a frame 
for range practices. A sheet of canvas is stretched tightly 
across the frame to form a support or backing for the paper. 
The paper or target proper is pasted on to the canvas. The 
upper half of the paper is coloured grey and the lower half 
ochre. The dimensions of the circles on the target are shown 

The names of the four concentric circles are, 
from the centre, bull, inner, magpie and outer. The upper 
half of the bull is always coloured black.

DIAGRAM N° 1

The 4-foot target, as shown in Diagram No. 1, is the one 
used in application practices. A similar target bearing a 
white patch 4 inches by 3 inches, as shown in Diagram No. 2, 
is used for grouping practices.

GROUPING TARGET

DIAGRAM N° 2
2. 6-Foot Target (Diagram No. 3).

The 6-foot target is used in aiming instruction and for range practices. The target is 6-feet square and is similar in construction to the 4-foot target. It is coloured in the same way as the 4-foot target and the circles bear the same names. The dimensions of the target are shown in diagram.

3. Figure Targets.

Some of these targets are used in preliminary training and some for range practices. There are five figure targets in general use at present, i.e., Figures 2 to 6 inclusive. Each figure represents a man in some position such as kneeling or lying. All these targets are made of veneer (3 ply) wood. They can, however, be made locally out of ¼-inch boarding. All figure targets are painted ochre.

a. ¾ Figure, No. 2 (Diagram No. 4).

As the name indicates this figure is ¾ the size of a man. It is usually attached to a length of timber on which it is erected. The area of the figure is 600 sq. ins. It is used principally in revolver and Gustav practices. When used for the revolver it is marked with a rectangle 16 inches vertically and 12 inches horizontally, the top of the rectangle being 18 inches below the top of the target. The waist line is marked with a one inch black patch in the centre of the rectangle.
b. Kneeling Figure, No. 3 (Diagram No. 5).

Figure No. 3 represents a man in the kneeling position aiming a rifle. The area of the target is 400 sq. ins. It is used chiefly for snap-shooting practises on the range.

KNEELING FIGURE (No. 3)

c. Lying Figures No. 4 and No. 4A, and Covered Figure, No. 5 (Diagrams Nos. 6, 6A and 7).

Figures No. 4 and No. 4A represent a man lying in the open and Figure No. 5 represents a man lying behind cover. Area of No. 4—200 sq. ins., No. 5—100 sq. ins.
d. Crossing Figure, No. 6 (Diagram No. 8).

This figure represents a soldier crossing, in front, at right-angles to the observer. The area of the target is 665 sq. inches. Diagram No. 8 gives details of how it may be constructed from an 8' 8" run of 9" x ½" boarding, or made of veneer (3 ply) wood.
4. Machine Gun Instructional Target (Diagram No. 9).

This target is similar in construction to the 4-foot target. The target surface is white and the bulls or aiming marks are black.

The target is used in training to teach horizontal and oblique traversing and controlled corrections. On the range it is used for controlled corrections, grouping and horizontal traversing.

5. Machine Gun Oblique Traversing Target (Diagram No. 10).

This target is also similar in construction to the 4-foot target. The target surface is white and the bulls and line are black.

![Diagram No. 9 and No. 10]

Vickers MG Collection & Research Association - www.vickersmachinegun.org.uk
6. Machine Gun Stoppages Target (Diagram No. 11).

This target is similar in construction to the other M.G. targets. It is 2 feet square and has five black aiming marks on a white background. It is erected on a single length of timber.

M.G. STOPPAGES TARGET

![Diagram of M.G. Stoppages Target]

DIAGRAM NO. 11

7. Machine Gun Screen Target (Diagram No. 12).

Note:—This target, described hereunder, is improvised from the old Light Automatic Grouping Screen and may be used as an alternative to the Machine Gun Screen Traversing Target shown in Diagram No. 13.

This target is similar in construction to the other M.G. targets. The target is 10 feet long by 3 feet high and has a white background. Aiming marks which are 4" high and 3" wide are spaced 16" from centre to centre horizontally across the centre of the target.

M.G. SCREEN TARGET

![Diagram of M.G. Screen Target]

DIAGRAM NO. 12
8. Machine Gun Screen Traversing Target (Diagram No. 13).

It is made of wood, with a canvas and paper covering. It is 12"6" long by 3' high, covered with brown or other dark coloured paper with ten (10) aiming marks (4" x 3") placed—five at the top left of target and five at the bottom right of target for left and right hands respectively. The distance between aiming marks will be 16 inches centre to centre. The edges of all aiming marks will clear the target edges by at least six (6) inches. This target is used for traversing at 100 yards.

9. Revolver Grouping Target (Diagram No. 14).

This is made of wood and canvas and has a white background. It is 4 feet square and is divided by a black line running vertically through its centre. In the centre of each rectangle thus formed is a 2" square black aiming mark. This target is used for grouping practices with the revolver.
10. Representative Targets for Miniature and 30-yards Ranges.

These targets are similar to those used on classification and battle practices ranges reduced to the correct scale and modified for use with .308 ammunition.