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41673(M.F.S.)

**Small Arms Training**  
**Volume I—Pamphlet No. 7**  
**(India)**  
**.303 inch Machine Gun**  
**Part I—Mechanical Subjects**  
**1940**

(REPRINTED JANUARY 1941.)

PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, SIMLA.  
1941

*2nd Edition.*



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## SAFETY PRECAUTIONS.

On all occasions when the gun and dummy cartridges are used for instructional purposes, the instructor will carry out the following safety precautions:—

- (a) Inspect all locks to ensure that the striker does not protrude through the firing pin hole.
- (b) Inspect all ammunition to ensure that all cartridges are dummies.

NOTE.—When instruction is being given in mechanical subjects D. P. stores if available will always be used.

## SECTION I.—GENERAL DESCRIPTION OF GUN AND TRIPOD.

### Lesson I.—Stores and General Description.

*Instructor's Notes.*

(Plate I) (Plate X from Vickers Handbook).

*Stores.*—Gun, tripod, belt box, belt and dummy cartridges, spare parts case, condenser and tube, gun chest, spare barrel, cleaning rod. (Diagram if available.)

Do not expect the man to remember the names of all parts.

Only mention the names of the main parts of the gun and tripod, and point out those as they are named.

Strip the gun down and show the parts affected by recoil.

Emphasise the strength of all parts.

Use diagrams (if available) when explaining the water cooling system.

Strip the gun to show parts affected by recoil.

1. Name of gun.—The .303" Vickers Machine Gun.
2. Weight of gun.—About 40 lbs. (with water in the barrel casing).
3. Rates of fire.—About 600 rounds per minute.
4. Forces which work the gun.—The gun is worked by two forces:—
  - (a) The explosion of the charge which drives the recoiling portions back, and
  - (b) The fusee spring which forces the recoiling portions forward again; the action of the gun is therefore automatic.

5.—**Parts affected by recoil.**—The parts of the gun affected by recoil are :—

- Muzzle cup.
- Barrel.
- Right and left side plates.
- Crank and crank handle.
- Fuzee.
- Fuzee spring.
- Connecting rod.
- Lock.
- Feed block.

(Re-assemble the gun.)

6. **Barrel casing.**—On the outside of the barrel casing is fitted the muzzle attachment, the foresight, two screwed plugs for filling and emptying the water, adapter for condenser, tube and cork plug.

Inside the barrel casing is the barrel and steam tube. The barrel is surrounded by water for cooling purposes. When the gun is fired the barrel becomes hot, which in turn heats the water. After about 750 rounds the water boils and gives off steam.

Inside and at the top of the barrel casing is the steam tube which is fitted with a sliding valve. On the steam tube are three holes, one at the rear and two at the front.

When the gun is fired with elevation, the valve covers the rear hole and allows the steam to enter the front hole and pass out through the steam escape tube.

When the gun is fired with depression the valve covers the front hole, thereby allowing the steam to enter the rear hole and again pass out through the steam escape tube.

Fitted to the adapter is the condenser tube which carries the steam from the steam escape tube into the condenser. In order to condense the steam there must be sufficient water to cover the end of the condenser tube.

7. **Breech casing.**—The breech casing consists of two outside plates, bottom plate, front and rear covers, and rear cross-piece. On the left side of the breech casing is the fuzee spring and box, and left slide; on the right side the check lever and right slide. On the rear cover is the tangent sight; on the bottom plate, the sliding shutter and on the rear cross-piece are the traversing handles, safety catch and thumb-piece. The rear cross-piece is held in position by the "T" fixing pin.

8. **Feed.**—The gun is fed by a belt containing 250 rounds, which passes through the feed block from right to left.

9. **Tripod.**—The tripod consists of three legs with jamming handles, crosshead, traversing clamp, direction dial and elevating gear. Attached to the crosshead are the crosshead and elevating joint pins by means of which the gun is fixed to its tripod.

Elevation or depression is obtained by the elevating gear, direction by the traversing clamp.

The weight of the tripod is about 50 lbs.

10. **Gun chest.**—For the purpose of transit the gun is placed in the wooden chest provided, which also carries the cleaning rod and spare barrel.

#### 11. Capabilities—

(a) Sustained fire due to :—

1. Water cooling system.
2. Belt feed.
3. Strong mechanism.

(b) Accurate fire due to the gun being firmly fixed to heavy mounting.

Indirect fire.

Overhead fire.

Fire in darkness (provided preparations have been made in daylight).

#### 12. Demonstrate—

(a) To load.

(b) To fire.

(c) To unload.

## SECTION II.—MECHANISM.

## Lesson 1.—Stores for lessons 2—6.

*Instructor's Notes.*

*Stores.*—Gun, tripod, belt box, belt and dummy cartridges, empty case, spare lock and spare feed block, skeleton lock, diagrams.

This preparation paragraph affects the instructor only.

Imitation will not be carried out by the private soldier.

When explaining any mechanical movement, show it by means of demonstrations, combined with explanation.

Use diagrams to assist.

## Lesson 2.—Backward movement.

*Instructor's Notes.**Preparation.*

1. Remove outer casing muzzle attachment.
2. Place empty case between upper and lower projection of the gib.
3. Half load.
4. Press the thumb-piece.
5. Remove fuze box and spring.
6. Raise the rear cover.
7. Prepare spare feed block, by placing a dummy cartridge in front of the bottom pawls.
8. General sequence of instruction to be adopted:—
  - (a) Set up gun.
  - (b) Slow demonstration bringing out points by Q. & A.
  - (c) Demonstration with explanation.
  - (d) Interrogation.
  - (e) Setting up for INSTRUCTORS ONLY.

*Demonstration.*

1. Push recoiling portions back from the front, telling class to watch the following:—
  - (a) Recoiling portions moving to the rear.
  - (b) Feed block slide moving to the right.
2. With spare feed block—Action of the feed block.

*Explanation.*

3. On the gun being fired the recoiling portions are forced to the rear owing to recoil, assisted by gasses which strike the front cone and rebound on to the muzzle cup. This backward movement causes the feed block slide to move to the right, thereby allowing the top pawls to engage behind a round which is in position in front of the bottom pawls.

## Lesson 3.—Rotation of the Crank.

*Instructor's Notes.**Preparation.*

1. Remove the outer casing muzzle attachment.
2. Place an empty case between the top and bottom projections of the gib.
3. Half load.
4. Press the thumb-piece.
5. Remove the fuze box and spring.
6. Raise the rear cover.
7. Prepare spare feed block by placing dummy cartridge in front of the bottom pawls, and the slide over to the right.

*Demonstration.*

1. Push back the recoiling portions from the front until the crank handle is vertical. Complete the movement by pressure on the knob of the crank handle.

Tell the class to watch the following:—

- (a) Tail of crank handle rolling.
- (b) Extension of the fuze spring.
- (c) Further rotation of the crank handle sending recoiling portions forward, and feed block slide over to the left.

2. With spare feed block—Action of the feed block.

*Explanation.*

1. When the recoiling portions come to the rear, the tail of the crank handle strikes the roller thus causing the crank to rotate, which withdraws the lock.

This rotation winds the fuze chain round the fuze thus extending the fuze spring.

2. The continued rotation of the crank handle on the roller, assisted by the fuze spring, forces the barrel and side plates forward.

This forward movement forces the feed block slide over to the left, the top pawls placing a round in position ready to be gripped by the extractor the next round being drawn in front of the bottom pawls.

#### Lesson 4.—Backward movement of the lock.

##### *Instructor's Notes.*

##### *Preparation.*

1. Place an empty case between the upper and lower projections of the gib.
2. Half load.
3. Press the thumb-piece.
4. Remove fuze box and spring.
5. Raise rear cover.

##### *Demonstration.*

1. Pull the crank handle on to the roller.

##### *Class to watch:—*

- (a) Live round and empty case being withdrawn.
  - (b) Live round being brought in line with chamber.
  - (c) Rotation of the tumbler.
2. (With skeleton lock).

##### *Class to watch:—*

- (a) Rotation of tumbler.
- (b) Withdrawal of firing pin.
- (c) Compression of lock spring.
- (d) Action of sear.

##### *Explanation.*

As the lock comes to the rear it brings with it a live round from the feed block, and an empty case from the chamber. When the horns of the extractor reach the rear of the cams, the extractor is forced down by the ramps on the rear cover, thus bringing the live round in line with the chamber; the empty case probably falls off. During this movement the side lever head is raised and bears on the tail of the tumbler. This rotation of the tumbler withdraws the firing pin which compresses the lock spring. The firing pin is held back by the sear.

#### Lesson 5.—Forward movement of the lock.

##### *Instructor's Notes.*

##### *Preparation.*

1. Half load.
2. Disengage fuze box.
3. Pull the crank handle on to the roller and pull the belt.
4. Raise the rear cover.

##### *Demonstration.*

Force the crank handle on to the check lever by pulling the fuze spring. *Class to watch:—*

- Fuze chain unwinding.
- Lock going forward.

##### *Explanation.*

1. The fuze spring rotates the crank and forces the lock forward. The extractor places the live round in the chamber, and being forced to rise by the action of the side and extractor levers, thus grips the round in position in the feed block. The firing pin hole is now opposite the round in the chamber. If the empty case has not fallen out it will be forced off when the extractor rises.

#### Lesson 6.—Firing action.

##### *Instructor's Notes.*

##### *Preparation.*

1. Half load.
2. Raise the rear cover.
3. Pull the crank handle on to the roller and pull the belt.

##### *Demonstration.*

1. (a) Allow the lock to go forward showing the side lever head depressing the sear.
- (b) Press thumb-piece and show trigger bar pulling back the tail of the trigger.
- (c) Show pressure being released from thumb-piece and action of trigger bar.
2. With skeleton lock—repeat (a), (b) and (c) above.

##### *Explanation.*

1. Each time the lock goes forward the side lever head depresses the sear thus allowing the firing pin to move forward until checked by the nose of the trigger engaging in the bent of the tumbler. If the safety catch is raised and the thumb-piece pressed, the trigger bar is withdrawn, which in turn disengages the nose of the trigger from the bent of the tumbler. The firing pin is now driven forward by the lock spring.

2. When pressure on the thumb-piece is maintained continuous fire will result as the trigger will be kept out of action.

When this pressure is released, the nose of the trigger re-engages in the bent of the tumbler and prevents the firing pin from going forward.



### SECTION III.—GENERAL MAINTENANCE OF GUN AND TRIPOD.

1. Care and cleaning of the gun is of the utmost importance in order that the gun may fulfil any task demanded of it.

Machine guns and equipment should be examined when first taken over. Further frequent examinations will also be necessary.

#### *Instructor's Notes.*

*Stores.*—Gun, tripod, belt boxes, dummy cartridges, spare parts box and case, cleaning rod, flannellette, old linen.

Materials issued in India.

#### Lesson 7.—Cleaning.

##### (a) *Daily cleaning.*

The outside of the gun will be cleaned daily, and all parts of the mechanism, which can be reached without stripping, will be wiped over with an oily rag. The inside of the barrel will be left oily. On completion of daily cleaning the gun will be inspected both for cleanliness and damage. In examining the barrel the mirror reflector will be used.

*To clean the barrel.*—Take out the lock, take off the muzzle attachment and muzzle cup. Place a piece of dry flannellette (4×2) in the eye of the cleaning rod and insert it into the muzzle end of the barrel. *Ensure that the bush is over the muzzle,* and move the rod backwards and forwards. Repeat with fresh pieces of flannellette until the barrel is clean.

Examine with Mirror reflector.

*To oil the barrel.*—Repeat the above with a smaller piece of flannellette well soaked in oil.

*To use the double pull-through.*—Before use it is essential to see that the weight is not bent, and that the cord is in good condition. Ensure that the gauze is thoroughly oiled, and that the muzzle protector is placed on the barrel. The barrel must be taken out for the purpose of cleaning.

When cleaning the barrel by means of the double pullthrough, it should be fixed in a Vice or held firmly by a man, the pullthrough is then pulled backwards and forwards through the barrel.

Care must be taken to keep the cord taut to prevent wear at the breech end of the barrel. (See I. A. O. 924 of 1936).

An effective means of cleaning the barrel is with boiling water. Having removed the barrel from the gun, adopt the same procedure as used in cleaning the rifle. (See pamphlet No. 3, page 15.)

##### (b) *Weekly cleaning.*

The gun will be stripped down and all parts cleaned and left dry for inspection. In cases where the bore has become rusty it should be wiped out with flannellette, boiling water should then be used, and finally, the barrel cleaned with the double pull-through.

After inspection the gun will be oiled before being put away. Spare parts and stores will also be examined and checked.

#### Lesson 8.—Examination, tests and adjustments.

*Stores Required.*—Gun, Tripod, Spare Parts complete, Spare Barrel, Service Lock, Skeleton Lock, Diagrams, Belt Box with Belt and Dummy Cartridges.

1. **Muzzle attachment.**—Free from fouling and burrs, disc cleaned, split pin and chain in good condition.
2. **Muzzle cup.**—Clean, threads neither damaged nor badly worn.
3. **Steam tube.**—Keeper screw in correct position, sliding valve working. (To test this take the gun off the tripod and give it a rocking movement. The movement of the valve should then be heard.)
4. **Foresight.**—Blade in good condition and firm on its bed.
5. **Front cover catch.**—Working correctly.
6. **Fuzee spring and Fuzee.**—Claws of spring, fuzee and chain in good condition. Vice pin not bent.

##### *Instructions for weighing and adjusting the fuzee spring.*

Take out the lock and place the loop of the spring balance over the knob of the crank handle. Pull the balance vertically upwards, resting the wrist on the breech casing. The reading indicated when the crank handle begins to move will be the weight of the fuzee spring. This weight should be between 7 & 9 lbs. If the spring is over, or not up to, weight, adjust by means of the vice-pin. Generally six clicks (three revolutions) make a difference of about 1 lb. Turning the vice-pin upwards decreases the weight and vice versa. The tension of the fuzee spring should always be kept as high as possible, consistent with maintaining the normal rate of fire of about 500 rounds per minute.

7. **Tangent sight.**—Aperture in good condition. Top and bottom screws secure. Slide moving freely, but secure when positioned.
8. **Rear cover lock.**—Automatic fastening of rear cover when down. Cover lock screwed axis—pin screwed fully home.
9. **Safety catch.**—Automatic action of spring.
10. **Firing lever.**—(a) Thumb-piece cannot be pressed in unless safety catch is raised.

(b) When safety catch is raised and thumb-piece pressed the lock is fired.

11. **Trigger bar and spring.**—No burrs and roughness on trigger bar. Spring forces trigger bar forward quickly.

12. **Recoiling portions.**—Remove fusee spring and work recoiling portions backwards and forwards. They should move freely.

*Instructions for weighing the recoiling portions.*

Remove the fusee spring. Place the crank handle nearly vertical. Place loop of spring balance over right end of the crankshaft & pull slowly to the rear. Immediately the recoiling portions begin to move read the weight shown on the spring balance. Weight should not exceed 4 lbs.

If the weight exceeds 4 lbs. it is probably due to tight packing. This can be reduced by well oiling the packing in the cannellure and gland, and moving the recoiling portions sharply backwards, and forwards. Re-weigh and repeat the above as necessary. If, however, it is found that the necessary reduction in weight cannot be achieved by this means, examine the gun for damaged breech casing or side plates.

13. **Connecting Rod.**—Adjusting nut tight.

14. **Lock.**—Instructions for testing the lock.

(1) *Side and extractor levers.*—Remove feed block and keep front cover raised. Draw back the crank handle and let it go slowly forward on to the check lever. If correct the extractor should now be in its highest position. Check that numbers on side levers and lock casing are the same.

(2) *Bent of sear and firing pin.*—Remove feed block. Pull crank handle on to roller, press thumb-piece and while maintaining pressure let crank handle go slowly forward on the check lever. The extractor should be kept up to its highest point before sear releases firing pin.

(3) *Extractor.*—Remove lock, examine face for burrs and flaws. Check that gib holds round horizontal.

(4) *Nose of trigger and bent of tumbler.*—Cock the lock, release sear; firing pin should now be held back.

(5) *Firing pin.*—See that the point is not broken. A broken firing pin can be recognised without stripping the lock by releasing the lock spring with the extractor up. If correct the firing pin will then protrude from the firing pin hole, and can be withdrawn by raising the tail of the tumbler. If it does not protrude, or, if protruding but point is not withdrawn when the tail of the tumbler is raised, some part of the firing pin is broken.

L. A. O. No. 679 of 1931, Paras. 1, 2 and 3.

*Instructions for testing the weight of the lock spring.*

Fully cock the lock. Place the bottom of the lock on a flat surface. Place the loop of the spring balance over the side lever head and left hand on the top of the lock. Draw side lever head upwards with the spring balance, immediately, the tumbler begins to rotate the balance should record from 12 to 14 lbs.

**Lesson 9.—Examination, tests and Adjustments—contd.**

*Stores Required.*—As for Lesson No. 8.

1. **Barrel.**—The barrel should be carefully examined for rust, cuts, erosion, cordwear, bulges and metallic fouling.

Proceed as follows:—

Remove the barrel from the gun. First with the eye close to the breech, then with the eye some inches back from the breech, examine the bore, rotating the barrel slowly. Carefully examine the lead to see if undue erosion has taken place. The barrel should now be reversed and examined carefully from the muzzle end in a similar manner. Inaccuracy in shooting may be due to the presence of metallic fouling.

*Instructions for the renewal of packing.*

(1) *To renew packing at the breech end of the barrel.*—Should the gun leak at the breech, empty the barrel casing. Draw out the recoiling portions. Wind a strand of asbestos in the cannellure of the barrel, pressing it together with a thin piece of wood or the point of a screw-driver or knife, until the cannellure is full. Then smooth the asbestos down flush with the barrel, oil it, and re-assemble the parts.

(2) *The renew packing at the muzzle end of the barrel.*—Should the gun leak at the muzzle, stand the gun on the rear cross-piece, remove the muzzle attachment and unscrew the gland. Re-pack, or if necessary replace the asbestos, having first oiled it, by winding it loosely round the barrel, and whilst winding push it in with a No. 3 punch, piece of wood, or any blunt ended instrument which will fit; screw on the gland as tightly as can be done by hand, return the gun to a horizontal position, remove fusee and spring, hang the lock and work the recoiling portions backwards to ensure that they move freely. If the packing is found to press too hard on the barrel, the gland should be removed and one or two strands of asbestos taken out. Finally see that the gland is screwed firmly home by means of the combination tool.

*To test packing.*—Fill the barrel casing with sufficient water to cover the barrel and work the recoiling portions backwards and forwards. There should be no leakage. Test the recoiling portions for correct weight.

2. **Feed block.**—Slide working freely; pawls and springs in good condition. Top and bottom levers tight at joint.

3. **Sliding shutter.**—Catch and spring working automatically. Sliding shutter working freely. If the movement of the sliding shutter is sticky, examine for:—

(a) Dirt or grit.

(b) Dented bottom plate due to connecting rod being dropped when no lock is in the gun.

4. **Axis and other pins.**—See that all pins are correct.

5. **Tripod.**—There are many places where slight play, caused by wear, may occur. Although the play in each particular part may be very slight, the accumulated effect may cause serious unsteadiness in the gun.

*Vertical play.*—Usually found in the elevating gear. This may be taken up by loosening the jamming bolt, screwing in the tumbler nut, and re-tightening the jamming bolt.

*Lateral play.*—Usually due to the jaws of the crosshead having become widened.

Further points for examination :—

1. Clutch plates free from grit.
2. Jamming handles not bent.
3. Chains correct.
4. Feathers and joint pins.
5. Examine leg joints.
6. Belts and belt boxes.

*Belts.*—Free from dirt ; brass strips correct, neither torn nor frayed.

*Belt boxes.*—Clean and undamaged.

#### Lesson 10.—Preparation of Gun and Tripod for firing.

*Stores Required.*—As for Lesson No. 7.

1. Strip the gun down.
2. Examine and clean all parts.
3. Oil the outside of the barrel.
4. Oil—
  - (a) Recoiling portions. Face of Extractor but not Muzzle Cup.
  - (b) Ramps.
  - (c) Trigger bar.
5. Re-assemble the gun.
6. Dry inside of barrel, muzzle cup and muzzle attachment.
7. Muzzle cup to be firmly screwed on.
8. Level the gun, fill barrel casing with water by removing the screwed plug at the breech end, and the cork plug.
9. Weigh—
  - (a) Fuze spring.
  - (b) Recoiling portions.
  - (c) Lock spring.
10. Traversing handle and can in spare parts case filled with oil.

11. Check contents of spare parts case and box.
12. (a) Examine condenser tube for damage.
- (b) Test fitting of condenser tube to gun.
13. Condenser to be two-thirds full of water.
14. Spare barrel packed, ready for firing, and cleaning rod placed in gun chest, or on carrier.
15. Examine tripod.
16. Ammunition dry and clean.
17. Belts—
  - (a) in good condition.
  - (b) correctly filled.
18. Examine belt boxes.

*Action in cold weather.*

Keep the friction of the recoiling portions as low as possible, i.e., between two and three lbs. and adjust the weight of the fuze spring to not more than seven lbs. at the start. Remove all old oil from the lock and keep the front face and slide of the extractor, also the extractor levers, free from oil. Wrap straw, sacking or blankets round the barrel casing. Work the recoiling portions by hand at frequent intervals.

Demonstrate how to pack gun and spare barrel in chest.

*Action in sandy countries.*

Ensure that only a small quantity of oil is used.

Working parts wiped over with a slightly oily rag will prevent rust through the night and will be sufficient lubrication for working the gun during firing.

#### Lesson 11.—Points during firing.

1. **Watch the water supply.**—(As soon as the water begins to boil, and so long as it continues to boil, about 1½ pints will be lost for every two belts fired.)
  2. **Ensure that the belt :—**
    - (a) Is kept in line with the feed block.
    - (b) Has free movement.
  3. **See that all repairs are carried out immediately.**
- Lock repairs.**—To replace any part of the lock the ordinary sequence for stripping the lock must be followed, until the required part is reached.
- In the case of a lock spring, where the broken portions fall clear a new lock spring may be assembled without stripping the lock.

MANCOSH(P)

#### 4 During temporary cessation of fire.

- (a) Oil up bearing parts of barrel ;  
recoiling portions (except muzzle cup) ;  
faces of extractor and lock ;  
ramps ;  
trigger bar ;
- (b) Ensure that the front cone, muzzle cup and jamming handles are tight, and that the end of the condenser tube is in the condenser below water level.

#### 5. Anti-gas measures.

See Pamphlet No. 3 Lesson 4.

#### Lesson 12.—Points after firing.

- (a) **On the range.**—(1) Unload, remove lock, muzzle attachment and muzzle cup.
- (2) Clean the barrel of superficial fouling with the cleaning rod and oiled flannelette, followed by dry flannelette.
- (3) Re-oil barrel with the cleaning rod.
- (4) Oil the muzzle cup, muzzle attachment and lock.
- (5) Re-assemble the gun.
- (6) Sort live rounds from empty cases.
- (b) **On return to barracks.**—(1) Strip the gun and thoroughly clean all parts.
- (2) Release tension from the fusee spring.
- (3) Pour boiling water through the barrel and then if necessary use the double pull-through.
- (4) In order to prevent the formation of rust on the exterior of the barrel due to condensation of moisture, completely empty the barrel casing, and remove the screwed and cork plugs to permit the free circulation of air through the casing. If the gun is likely to be so left for any length of time, remove the asbestos packing from the cannelure and gland.
- (5) Clean and overhaul tripod, belts and belt boxes, spare parts and ammunition.

*Belts.*—Dry wet belts.

If dirty or greasy, clean by soaking for two hours in a solution consisting of :—

One part soda.

Three parts soft soap.

Ten parts water.

After soaking scrub, and when dry, plug the belts with the belt plug. Care must be taken when using the belt plug, or loose pockets will result.

*Belt boxes.*—Remove all dirt and mud, and wipe over the outside with an oily rag.

## SECTION IV.—STRIPPING THE GUN.

*Instructor's Notes.*

*Stores.*—Gun, Tripod, spare parts case and box.

- (i) Lay emphasis on the "Points to be observed" section.
- (ii) The squad should be proficient in Lessons 13, 14, 15, 16 and 17 before going on to Lesson 18.

## Lesson 13.—Points to be observed.

1. Use correct tool, *e.g.*, screwdrivers according to the size of the screw, correct punches, etc.—If this rule is not observed screws get barred and can only be removed by an artificer.

2. Before attempting to withdraw screwed axis pins make certain that threads of screw are fully unscrewed.

3. When replacing screwed axis pins do not use force: the threads will engage without unnecessary pressure.

If this rule is not observed the threads (which are extremely fine) will become so barred that it will be impossible to replace the pin, *e.g.*, Cover lock, screwed axis pin.

4. When raising the rear cover, do not throw it upwards, but lift it. The hinges are liable to strain. Before lowering see that the lock is correctly in the gun. In both operations raise crank handle slightly from check lever.

5. Before closing down the front cover see that the feed block is correctly in position, and the front cover catch raised.

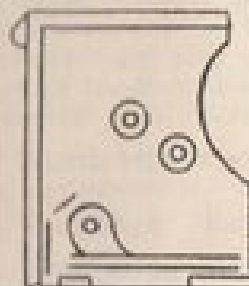
6. The firing pin should never be released unless the extractor is up against the top stop.

7. When removing parts secured by chains, do not tug on the chain, otherwise they get broken, and the part eventually is lost, *e.g.*, outer casing split pin, cork plug, screwed plugs, tripod pins.

8. With reasonable care defects and breakages in machine guns should be of extremely rare occurrence. They are simply due to neglect of ordinary precautions.

9. Direct hammer blows must never fall on any part of the gun. Wood must always be placed over the part to receive blows from a hammer or mallet.

10. In stripping examinations no time limit will be imposed, in order to avoid damage to the gun by careless handling.

*Names and parts of the lock.*

Lock casing.



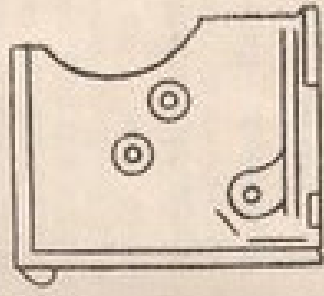
Tumbler.



Pin axis tumbler.



Names and parts of the lock in the order in which the lock will be assembled, reading from left to right.



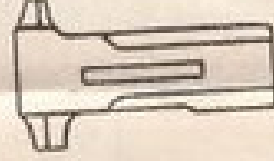
Lock casing.



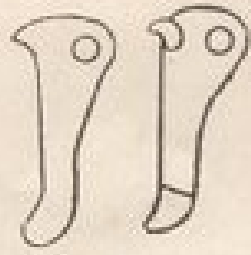
Firing pin.



Sear.



Extractor.



Extractor levers.



Tumbler.



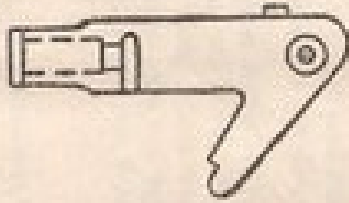
Trigger.



Pin axis trigger.



Pin axis tumbler.



Side levers.



Lock spring.



Bush axis.



Bush axis keeper pin.

Component parts of extractor.

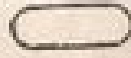


Gib.



Gib spring cover.

Plate 2.



Gib spring.

### Lesson 14.—The gun is stripped in the following order.

1. **Lock.**—Unload, pull the crank handle on to the roller, raise the rear cover, see that the extractor drops, place the finger between the extractor and stop and lift the lock—at the same time allowing the crank handle to move slowly forward until the lock is released from the side plate. Give the lock a slight turn and lift it out.

2. **Muzzle attachment.**—Withdraw the split pin, turn the outer casing and remove it. Unscrew and remove the muzzle cup.

3. **Feed Block.**—Raise the front cover and lift out.

4. **Fuzee spring box.**—With the right hand at the rear and the left at the front, press the box forward until clear of the studs and remove. Disconnect the fuzee chain and remove box and the spring.

5. **Fuzee.**—Turn the fuzee to the rear until the lugs on the stem are free to be withdrawn.

6. **Recoiling portions.**—Raise the rear cover, unscrew the  $\frac{1}{4}$ " fixing pin and lower the rear crosspiece; remove the right and left sides and draw out the barrel and side plates. Disconnect the side plates, removing the left one first.

#### *To Assemble the Gun.*

1. Reverse all the foregoing operations.

2. When assembling the barrel and side plates, ensure that the radial groove is uppermost, and that no force is used. If the side plates are not home on the barrel trunnions and crankshaft, the barrel must be withdrawn and the side plates properly assembled, otherwise burrs on the crankshaft may occur.

### Lesson 15.—Plate 2.

*To strip the lock.*—See that the lock is cocked; force out the side lever split pin and axis bush; remove the side levers, extractor levers and extractor. Push out tumbler axis pin and remove. Release lock spring, push out trigger axis pin. Remove the trigger, lock spring, firing pin, and sear with spring.

*To strip the extractor.*—Push out the gib spring cover and remove the spring and gib.

*To assemble the lock.*—Reverse the above except:—

(a) Replace the tumbler before the trigger.

(b) The lock spring must be forced home; the long arm towards the extractor, when the lock is in the fired position, and when all other parts are assembled.

**Lesson 16.—To Strip the Feed Block.—D. P. only by learners.**

(D. P. for Instructional Purposes only.)

Force out the split pin and separate the top and bottom levers. Take out the slide and remove the pawls and spring. Draw out the bottom pawl axis pin and remove spring and pawls.

To assemble.—Reverse the above.

To remove the sliding shutter.—Press in the catch and force the shutter to the front until it is against the stop, then press in the plunger with a No. 3 punch and force the shutter forward until it is clear of the breech casing.

**Lesson 17.—To change the Barrel without losing the water.**

The necessity of saving water in the barrel casing entirely depends upon the prevailing conditions. In tropical countries every drop of water is of value. Again, in action water may not be available and time may be of the utmost importance. On the other hand, if the gun has to be stripped in barracks or billets there is no necessity to save the water providing a further supply can easily be obtained.

Follow the normal sequence of stripping until the slides have been removed. Then remove the elevating joint pin and depress the gun. Great care must be taken to avoid damage to the direction dial.

To prevent damage a pad should be placed on the dial.

Order No. 2 to hold a rag or pad over the muzzle and when the recoiling portions are being withdrawn, to follow up the barrel with the pad, in order to close the hole in the front end of the barrel casing. Withdraw the recoiling portions.

When replacing the new barrel the above operations should be reversed.

The water may also be saved by allowing it to run from the barrel casing into a receptacle, when the barrel will be changed by the normal procedure.

**Lesson 18.—Stripping of component parts.**

1. **Front cone, muzzle attachment.**—Using the combination tool unscrew the front cone from the outer casing muzzle attachment.

2. **Gland of the muzzle attachment.**—Using the combination tool unscrew the packing gland from the barrel casing. When assembling ensure that the gland is screwed fully home.

3. **Front cover catch.**—To remove the spring and plunger, force the plug inwards and give 1/4 turn by means of a screwdriver, when the plug will be forced out by the spring.

Before removing the plunger it must be turned so that the slides are free to pass the lugs in the catch.

4. **Tangent sight.**—Unscrew the axis pin and remove. Remove tangent sight piston and spring.

5. **Rear cover lock.**—Unscrew the axis pin and remove. Remove rear cover lock and spring.

6. **Trigger bar.**—Remove the rear cover lock and trigger bar spring and withdraw the trigger bar.

7. **Roller.**—Remove the split fixing pin, collar and roller.



## SECTION V.—SPARE PARTS—INSTRUCTIONS.

*Instructor's Notes.*

*Stores.*—Gun, tripod, spare parts case and box.

1. The importance of knowing what is and what is not carried spare should be impressed on all machine gunners. It is essential to know where to find any spare parts that may be required. All must be given their proper names. A list of deficiencies should be kept inside each box, and the necessity of checking spare parts whenever opportunity occurs must be emphasised. Breakages and losses must be reported immediately. Spare parts must be kept slightly oiled.

The sequence of instruction will be :—

Having laid the whole of the contents of the spare parts box, case and wallet, teach the squad as follows :—

Hold up each article (in accordance with the official list of spare parts) and call out the correct name given to it. The use of the spare part being dealt with will be explained.

**Lesson 19.**—Describe spare parts box, case and wallet, teach names and use of all spare parts.

**Lesson 20.**—Teach method of packing.

*Contents of Wallet.*

Cork . . . . .	1
Cup, muzzle . . . . .	1
Disc, muzzle attachment . . . . .	1
Fuzee, with chain . . . . .	1
Gib . . . . .	1
Pins—	
trigger . . . . .	1
tumbler . . . . .	1
firing . . . . .	1
split, keeper 1/8 × 2 1/2-ins. (for Mk. IV tripod mtg.) . . . . .	3
Pliers, cutting, pairs . . . . .	1
Protector, muzzle . . . . .	1
Pull-through, double . . . . .	1
Punches—	
No. 3 . . . . .	1
No. 5 . . . . .	1
Reflector, mirror . . . . .	1
Screwdrivers, small . . . . .	1
Scar, with spring . . . . .	1

Spring—	
gib . . . . .	1
lock . . . . .	2
Trigger . . . . .	1
Tumbler . . . . .	1
Washers, adjusting—	
No. 1 .003 . . . . .	3
No. 2 .005 . . . . .	3

*Contents of Spare parts case.*

Balance, spring . . . . .	1
Can, oil . . . . .	1
Flannelette for binding lutein pads, yards . . . . .	8
Lock . . . . .	1
Lutein, oza. . . . .	6
Plug, clearing . . . . .	1
Spring, fuzee . . . . .	1
Tool, combination . . . . .	1
Wallet . . . . .	1

*Contents of Spare Parts Box.*

Blocks, feed . . . . .	2
Boxes, tin, for small parts . . . . .	3
Bushes, axis, side levers . . . . .	1
Collars, roller . . . . .	1
Cork . . . . .	1
Cups, muzzle attachment . . . . .	1
Discs, muzzle attachment . . . . .	4
Eyelets, long, oza. . . . .	1
Fuzee, with chain . . . . .	1
Gib . . . . .	1
Gland, packing . . . . .	1
Hammer . . . . .	1
Lever, extractor—	
left . . . . .	1
right . . . . .	1
Packing, asbestos (5 yard pieces) . . . . .	4

<b>Pins—</b>		
trigger . . . . .	1	
tumbler . . . . .	1	
firing . . . . .	2	
fixing crank handle . . . . .	1	
split—		
collar, roller . . . . .	2	
keeper, 1/8 x 2 1/2-in. (for Mk. IV tripod mtg.) . . . . .	6	
bush, axis, side lever . . . . .	1	
Check nut, long . . . . .	3	
muzzle attachment . . . . .	1	
"T" fixing rear crosspiece . . . . .	2	
<b>Plugs—</b>		
belt . . . . .	1	
cork, complete . . . . .	1	
screwed . . . . .	1	
front cover catch . . . . .	2	
<b>Plungers, front cover catch . . . . .</b>	<b>2</b>	
<b>Roller . . . . .</b>	<b>1</b>	
<b>Screws, clamp, checking traverse . . . . .</b>	<b>1</b>	
<b>Screwdrivers, large . . . . .</b>	<b>1</b>	
<b>Sights—</b>		
night, back and fore, each . . . . .	1	
fore . . . . .	1	
Tangent . . . . .	1	
<b>Spanner, shifting . . . . .</b>	<b>1</b>	
<b>Springs—</b>		
bottom pawl . . . . .	1	
cover lock . . . . .	2	
front cover catch . . . . .	2	
gib . . . . .	1	
lock . . . . .	4	
safety catch with piston . . . . .	2	
sear . . . . .	2	
shutter, catch . . . . .	2	
tangent sight . . . . .	1	
top pawl . . . . .	2	
trigger bar . . . . .	2	

Strips, long . . . . .	25
Strips, short . . . . .	25
Tool, repairing belts . . . . .	1
Wire gauze (pieces) . . . . .	4
Washers, packing nut elevating (Tripod Mk. V) . . . . .	6

*Note.*—The foregoing tables are in accordance with the .303-in. Vickers Machine Gun Handbook, 1930, but the undermentioned differences occur when working in conjunction with Equipment Regulations, India.

*Contents of Wallet.*

<i>Add:</i>	
Full-throughs, Gauze A, piece . . . . .	2

*Contents of spare parts box.*

<i>Add:</i>	
Pins, split, spare, 1/16-in. x 1-in. . . . .	3
<i>Amend:</i>	
Screws, clamps, checking traverse . . . . .	3 per 6 boxes.
<i>Delete:</i>	
Pins, split, check nut, long . . . . .	3

## SECTION VI.—STOPPAGES AND IMMEDIATE ACTION.

### *Instructor's Notes.*

In order that the men may attain a high standard of training in dealing with stoppages, it is essential that the instructor should prepare the stoppages accurately in order that the correct immediate action may be applied by the No. 1.

Setting up stoppages will not be taught to the private soldier.

The following tables give the preparation, immediate action, etc., and will be taught to the various categories of machine gunners as under:—

- (a) *Columns 1, 3.*—To all machine gunners.  
 (b) *Columns 4 and 5.*—When the machine gunner is proficient in immediate action.  
 (c) *Columns 1, 2, 3, 4 and 5.*—All instructors. (c).

#### *Stores—*

Gun and tripod.

Belt and dummy cartridges.

Balged dummy.

Front portion of a separated case and telescoped separation.

Spare parts case.

Covering for crank handle.

An aiming mark.

The sequence for teaching I. A. will be:—

1. Set up.
2. Demonstration with explanation.
3. Interrogation.
4. Squad practice.

1. The squad will be seated on the right side of the gun; so that the crank handle is visible, and the actions of the instructor more clearly seen.

2. A target must always be indicated at the beginning of the lesson.

3. Whilst the stoppage is being set up the Nos. 1 and 2 will be at the "rest" position at the gun with their heads turned aside. The instructor will order "position" followed by "fire". He will then remove the covering from the crank handle when the I. A. will be performed.

4. The stoppage should be set up as described.

5. Immediate action is not complete until the gun has been correctly reloaded and fired.

6. The rear cover should never be opened nor closed with the lock loose or the tangent sight raised.

7. If the lock cannot be drawn back, open the front cover and force down the extractor.

8. The rear and front covers when lowered, must always be fastened correctly.

9. A lock must never be changed with cartridges on the face of the extractor.

10. Should it be necessary to release the lock spring with the lock-out of the gun, this should be done with the extractor held right up, so that the firing pin hole is opposite the firing pin.

11. When No. 2 takes an active part in I. A. his duties will be taught first.

12. As proficiency is attained, training should be carried out in darkness, or with Nos. 1 and 2 blind folded.

13. Finally, men should be practised in carrying out I. A. without the assistance of a No. 2.

Lesson 21.—First position stoppage. 3

Lesson 22.—Second position stoppage. 2

Lesson 23.—Third position stoppage. 4

Lesson 24.—Fourth position stoppage. 3

Lesson 25.—Special stoppages.

*Note.*—Proficiency in Lessons 21, 22, 23 and 24 should be attained before Lesson 25 (Special stoppages) is taught.

Lesson 26.—Causes of stoppage.

*Stores.*—As for I. A. also skeleton lock, spare feed block and instructional diagrams.

#### *Sequence—*

- (a) Set up. Nos. 1 and 2 perform I. A.
- (b) Re-set up.
- (c) Teach by Q. & A. how gun was affected mechanically.
- (d) Interrogation.

## (c) FOR INSTRUCTORS ONLY—

(i) Setting up for instructional purposes.

(ii) Setting up for range purposes.

Lesson 26 should not be taught until proficiency is attained in Lessons 21 to 25 inclusive.

1. Stoppages in the automatic section of the gun may be classed under two main headings.

(a) Temporary, which are due to :

(i) Neglect of points before or during firing.

(ii) Faulty ammunition.

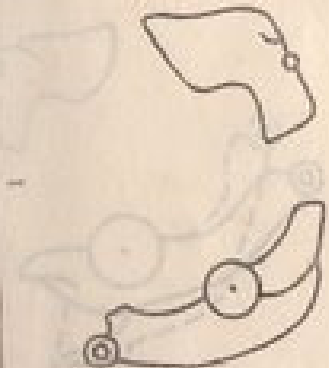
(iii) Ignorance on the part of the gun team.

(iv) Failure of some part of the gun of which a spare is carried.

(b) Prolonged, which are due to failure of some part which cannot, as a rule, be put right by the team under fire, or without skilled assistance. These necessarily put the gun out of action for a more or less prolonged period.

2. On the knowledge and training of the team depends the rapidity with which "temporary" stoppages can be overcome.

## 1st Position Stoppage.

Position of crank handle.	Method of preparation.	Immediate action.	Prevention of recurrence.	Probable cause.
 <p>Indication.—The lock is unable to come back far enough to allow the extractor or to drop.</p>	<p>Perform half the loading motions; pull the crank handle slowly back until the horns of the extractor have engaged with the steps of the cams; let go crank handle and pull the belt to the left front.</p> <p>Note.—In all cases except where the stoppage is caused by a weak change the preparation must be repeated. For recurring stoppages instructor will say "Gun fires a few rds. and stops again".</p> <p>To set up a stoppage caused by a weak or broken gih spring, perform half the loading motions; open the rear cover, withdraw and lift up the lock. Slide the cartridge on the face of the extractor half way down the lower projection of the gih, replace the lock and pull the belt to the left front.</p> <p>For range purposes (recoring stoppages) increase the weight of the fusee spring.</p>	<p>(i) Pull the crank handle on to the roller, pull the belt to the left front, and let go the crank handle.</p> <p>(ii) If failure recurs, repeat (i) and listen for "clicks".</p> <p>(iii) If, after carrying out (i) the crank handle stays in the same position when going forward, pull crank handle on to roller, open the rear cover, clear the face of the extractor, change the lock, oil up and reload.</p>	<p>(i) Attended to points before and during firing.</p>	<p>The extractor has not dropped. This may be due to—</p> <p>(i) Weak change.</p> <p>(ii) (a) Too heavy fusee spring.</p> <p>(b) Want of oil in working parts.</p> <p>(c) Gih in working parts.</p> <p>(d) Excessive packing.</p> <p>(e) Worn barrel.</p> <p>(f) Tight pockets.</p> <p>(g) Friction due to frozen oil or water.</p> <p>(ii) Weak or broken gih spring.</p>

**2nd Position Stoppage.**

Before teaching the second position stoppage the use of the clearing plug will be taught as follows :—  
To remove a separated case. Insert the tapered portion of the clearing plug with the centre pin pushed back, into the chamber. Push the pin well home by allowing the lock to go forward. Then keeping a firm pressure on the crank handle, give the clearing plug handle a rocking motion, pull back the crank handle, knock back the handle of the plug and withdraw the tapered portion of the plug from the chamber. The front portion of the separated case will be found adhering to it. Knock the centre pin back and remove the separated case.

Position of crank handle.



Indication—The lock is unable to go fully home after recoil.

Method of preparation.	Immediate action.	Prevention of recurrence.	Probable causes.
(a) (1) Insert a bulged dummy cartridge as the first cartridge in the belt, and load. For range purposes—place a bulged dummy cartridge in the belt. (2) Perform half the loading motions. Open the rear cover, withdraw and lift up the lock. Place the front portion of a separated case securely over the bullet of the cartridge on the extractor. Replace the lock, close rear cover, pull the belt and let crank handle go slowly forward.	(1) Force the crank handle to the rear and call out "Clearing plug", open the rear cover, lift up lock, and examine the cartridge on the face of extractor. If a damaged cartridge or an undamaged cartridge with the front portion of a separated case adhering to it is found, call out "Don't want it", clear the face of the extractor and reload.	(1) (b) & (4) If a series of separated cases occurs change the lock. If, after changing the lock, they still occur, remove the lock and place a No. 1 and No. 2 washer in front of the adjusting nut at the first opportunity the washers will be placed behind the adjusting nut. Note.—This will be reported to the armourer.	(1) (a) Damaged cartridge. (b) Separated case with front portion withdrawn telescoped on undamaged cartridge.

The following method is to use a dummy with the front portion of a separated case withdrawn as in 1.

(1) Perform half the loading motions, raise rear cover and lift out the lock. Place the front portion of a separated case lightly over the bullet of the round on the extractor and allow the lock to go slowly forward, ensuring that the separation will remain in the chamber. Close rear cover and pull belt to the left front.



(2) If an undamaged cartridge, with no front portion of separated case adhering to it is found on the extractor, clear the face of the extractor by the lock, keeping the crank handle on the roller. Use the clearing plug and reload.

(3) Separated case front portion remaining in chamber.

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### 2nd Position Stoppage.

Before teaching this stage in the third position stoppage when the extractor requires forcing down, the correct method of using the clearing plug will be explained. Grip the clearing plug with the left hand at the top of the handle, tapered portion resting on the top of the clenched hand. Place the end of the handle on the top of the extractor, and with the right hand give the clearing plug a sharp blow downwards.

Position of crank handle.	Method of preparation.	Immediate action.	Prevention of reversions.	Probable cause.
<p>3</p>  <p>Indication.—The extractor is unable to rise to its highest position. If the feed block slide is jammed, there is a fault in feed.</p>	<p>(i) Perform half the loading motions, then pull up the crank handle on to roller, and raise the rear cover; pull the belt just sufficient to move the cartridge half way into the face of the feed block. Allow the crank handle to go slowly forward so that it will remain in the third position, and the lower rear cover.</p> <p>(ii) Proceed to load, but crank handle must be eased forward the second time in order that it may remain in the third position.</p> <p>Note.—In the case of a stoppage due to friction, the preparation must be repeated.</p>	<p>(i) Slightly raise the crank handle, pull the belt to the left front, let go the crank handle and then strike it down on the check lever.</p> <p>(ii) If the stoppage recurs—repeat the immediate action unaltered (without reinserting the belt), oil the working parts and reload.</p>	<p>(i) Examine cartridges in belt.</p> <p>(ii) Attend to points during firing.</p>	<p>(i) A cartridge is set up slightly awry.</p> <p>(ii) Friction in lock, etc.</p>

(iii) Pull out the fourth cartridge in the belt about half an inch. Perform half the loading motions; pull the crank handle slowly back until the horns of the extractor have engaged with the stops on the cam. Draw to the rear by forcing the knob of the crank handle forward, and the tail to the rear, at the same time pulling the belt to the left. Bring the crank handle on to the roller and ease forward.

For range purposes—  
Fill a belt badly, or bend a long brass strip, or place the box at an angle to the feed block.

(iv) If (i) fails, examine feed block slide. If jammed, No. 1 calls out, "Feed block" pulls the crank handle on to the roller in order to do this it may sometimes be necessary for No. 2 to force down the horns of the extractor) raises the rear cover and hangs the lock. No. 1 then draws back the receding portions.

While No. 2 depresses the pawls and withdraws belt, No. 1 then allows the receding portions to go forward, thus allowing the feed block slide to go over to the left. No. 2 then straightens the horns in the belt. No. 1 will then lower the rear cover, pull the crank handle on to the roller, pull the belt to the left front and let go the crank handle.


(v) Attend to points before and during firing. Note.—Badly filled belts are the chief cause of stoppages in the third position.

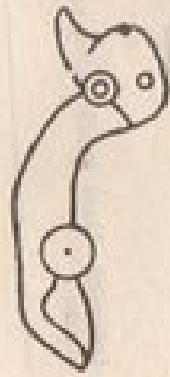
(vi) (a) Belt of damaged brass strip.  
(b) Badly filled belt.  
(c) Worn or loose belt pockets.  
(d) Belt box not in line with the feed block.

3rd Position Stoppage—contd.

Position of crank handle.	Method of preparation.	Immediate action.	Prevention of recurrence.	Probable cause.
	<p>(iv) Place a dummy with a damaged rim as second cartridge in the belt. Proceed to load using crank handle forward second time.</p> <p>To avoid damage to extractor grooves (during instructional periods) a dummy cartridge bulged near the base may be used, in this case it will be placed as the first round in the belt before proceeding to load.</p> <p>Note.—This stoppage must not be practised on the range, since the damaged rim may damage the grooves of the extractor.</p>	<p>(iv) If slide is free, No. 1 calls out "Extract or" and opens the front cover, No. 2 forces down the horns of the extractor, No. 1 clears the face of the extractor, No. 2 depresses the notch, withdraws the belt and removes the first cartridge in the belt and then No. 1 closes and locks the front cover and re-loads.</p>		<p>(iv) Damaged rimmed cartridges.</p>


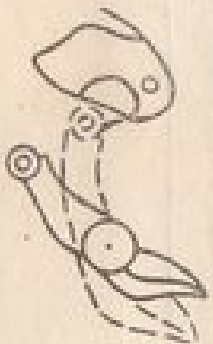
4th Position Stoppage.

Position of crank handle.	Method of preparation.	Immediate action.	Prevention of recurrence.	Probable cause.
	<p>(i) Load. Press thumb-piece as the crank handle goes forward.</p> <p>For range purposes—Insert a dummy in the belt.</p> <p>(ii) Load and press thumb-piece as the crank handle goes forward and on No. 1 applying the immediate action instructor says "Gun will not fire".</p> <p>For range purposes—Insert two dummies in the belt.</p> <p>(iii) Press thumb-piece as the crank handle goes forward. Insert belt in load-block until first cartridge is in line with finger-piece of bottom pawl.</p> <p>For range purposes—Leave a space in the belt.</p>	<p>(i) Pull the crank handle on to the roller, pull the belt to the left front and let go the crank handle.</p> <p>(ii) If (i) fails, unload (without removing the belt) change lock and reload.</p> <p>(iii) If when performing (i) No. 1 notices that more belt than usual comes through to the left, he performs the second half of the loading motions.</p>	<p>(ii) Inspect belts.</p>	<p>(i) Malfire.</p> <p>(ii) (a) Broken or damaged firing pin. (b) Broken lock spring.</p> <p>(iii) Empty pocket in the belt.</p>



Inspection.—There has been an explosion, or, if any, there has been little or no recoil, the lock remaining in its forward position.

Special Stoppage.

Position of crank handle.	Method of preparation.	Immediate action.	Prevention of recurrence.	Probable cause.
 <p>Indication—Crank handle resting on roller.</p>	<p>Perform half loading motions. Remove fuse spring box and spring. Pull the crank handle on to the roller. Pull the belt to the left front. Replace fuse spring box with the spring detached from the frame.</p>	<p>Remove fuse spring box. Pull belt to left front and return crank handle to check lever. Replace broken fuse or spring. If the spring is broken adjust to correct weight.</p>	<p>..</p>	<p>Broken fuse or fuse spring.</p>
 <p>Indication—The extensometer is unable to rise to its highest position.</p>	<p>Place two dummy cartridges bulged near the base as the 1st and 3rd rounds in the belt. Proceed to load, easing the crank handle forward the second time. When resistance is met, give the crank handle a light tap downwards.</p>	<p>If after applying the immediate action the stoppage occurs on reloading, repeat the immediate action and change the lock.</p>	<p>..</p>	<p>(a) Damaged extensometer groove. (b) Broken gibs spring. (c) Broken gibs.</p>

	<p>(a) (b) (c). Unload and release the lock spring. Pull the belt until the first round is in the front of the bottom Pawls. The man must now apply the I. A. as for broken lock spring. When the man has completed this I. A. he should be told that the gun only fired two rounds and stopped again, in the same position. (This should lead him to inspect the feed block where the breakage will be found.)</p> <p>(d) Set up as for empty pocket in the belt. When the man has completed the correct I. A. for the above, he will be told that the gun fired only two rounds and stopped again in the same position.</p> <p>1. Give the order "Load" and as soon as the crank handle touches the check lever for the second time say "Gun firing".</p>	<p>(a) (b) (c). Apply the immediate action for the fourth position stopping the lock the gun fires two rounds and then stops in the same position. The feed block will be changed.</p> <p>(d) Apply immediate action as for empty pocket in the belt. The gun will fire two rounds and stop in the same position. The feed block will then be changed.</p>	<p>..</p>	<p>Broken. (a) Upper lever. (b) Lower lever. (c) Top pawls or spring.</p>
	<p>1. No. 1 will remove around from the belt.</p>	<p>..</p>	<p>..</p>	<p>(d) Bottom Pawls or spring.</p>
	<p>..</p>	<p>..</p>	<p>..</p>	<p>(a) Broken or worn nose of trigger or bent of tumbler.</p>



Position of crank handle.	Method of preparation.	Immediate action.	Prevention of recurrence.	Probable cause.
	<p>2. Order "Load and fire" followed by "Step". Directly No. 1 releases pressure from the thumb-piece, say "Can still fire."</p>	<p>2. When the gun stops firing he will pull the crank handle on to the roller. 3. No. 2 will remove the belt. 4. No. 1 will release the crank handle. The lock can then be changed with safety.</p>		<p>(b) Broken short arm of the lock spring above the trigger axis pin.</p>

**NOTE.**—Should a stoppage occur in any position when the gun cannot be stopped by releasing the thumb-piece, the I. A. will advance to (1) Crank handle on to the roller and remove belt. In the case of a second position stoppage, extreme care must be taken that the extractor is kept down whilst the round is being removed.

## SECTION VII.—REPAIRS.

*Instructor's Notes.*

**Stores.**—Gun, Tripod, Belt box and belt with dummy cartridges, Spare parts case and box, parts of an old belt, sufficient flannelette and luting.

The lateral adjustment of the foresight will not be taught to private soldiers.

If luting is not available, any suitable substance, e.g., Plasticine Putty, may be used for instructional purposes.

**Lesson 27.—Fitting and repairs.***(a) Fitting spare discs for the muzzle attachment.*

4. Unscrew the front cone, cut the edge of the disc driving sufficient metal up to provide a hold for the pliers. Remove the disc and replace it with a new one.

In replacing it may be necessary to tap the disc on to the front cone.

*(b) Fitting auxiliary packing gland.*

4. In the event of the packing gland being damaged by bullets, etc. it can be replaced by the auxiliary packing gland as follows:—

Remove the outer casing muzzle attachment, muzzle cup and damaged packing gland, screw in the auxiliary packing gland, using the combination tool, and lighten the fuze spring by about three lbs.

*(c) Lateral adjustment of the foresight. (N. C. O.'s only).*

If the foresight has become damaged or displaced, re-adjustment will be necessary. This will only be carried out by an experienced N. C. O.

It will be carried out on the 30 yards range.

**Target.**—Any target with a thick vertical line as an aiming mark, with a pencil line  $5/8$ " to the right of the middle of the thick line, the pencil line being invisible to the firer.

Settling bursts will first be fired.

Then a group of ten rounds will be fired by inserting a punch between the firing lever and the safety catch.

If the gun is sighted correctly the mean point of impact will be on the thin pencil line, i.e.,  $5/8$ " 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 ten 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. When the foresight

is very tight the bracket should be supported to prevent it from jarring loose. 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.

*(d) Perforation of the barrel casing.*

In the event of the barrel casing being pierced by bullets, etc., repairs will be carried out locally as follows:—

A pad of luting preferably wrapped in a piece of flannelette or cloth to prevent it from being squeezed through the hole or holes, is pressed over the latter and covered with an oiled pad of flannelette the whole is then bound round with flannelette. This, whilst not preventing leakage entirely, should do so sufficiently to enable the gun to be kept fit for action.

*(e) Use of the tool for repairing belts.*

Remove the damaged strips and eyelets. If a long strip requires fitting, first join the two faces of the strip as follows:—

Place the eyelet in the hole of the dished end, insert the punch of the tool into the unopened end of the eyelet, the open end should rest on the die and gently press the handles together, then put the punch in the other end of the eyelet and press the handles. Keep the strip horizontal, move the handles of the tool backwards and forwards in a circular direction, with the punch of the tool as the centre, so as to shape the head of the eyelet.

Put the strips into position on the belt, insert the eyelet and repeat the above operation.

Short strips are fitted in a similar manner, except that they do not require to be joined at one end previous to their being placed on the belt.

Care must be taken to press the eyelets as far through the strips as possible before using the tool.

*(f) To repair a torn belt.*

If badly torn, cut out the torn portion and sew or rivet together the cut ends and cover with the brass strips. The cutting of the belt should be done in such a manner as to ensure that the repair to the top portion of the webbing does not coincide with the repair to the bottom portion.

## SECTION VIII.—BLANK FIRING ATTACHMENT.

*Instructor's Note.*

*Stores—*

Service gun and tripod, Belt Box and Belt, Spare Parts case and box.  
Barrel, Mk. II "D. P. B." (drill purposes, blank).  
Cone, front, muzzle attachment, blank.  
Cup, muzzle attachment, blank.  
Nut, adjusting, muzzle attachment, blank.  
Screw, adjusting, muzzle attachment, blank.  
Spanner, muzzle attachment, blank.

**Lesson 28.—Adjusting gun.**

1. The barrel is specially choked at the breech and is marked "D. P. B." on the trunion block.

The adjusting screw is screwed into the front cone from the rear, so that its large end may engage in the muzzle cup.

The front cone with adjusting screw assembles into the outer casing of the muzzle attachment in place of the existing front cone.

The adjusting nut screws on to the projecting end of the adjusting screw and locks against the face of the front cone.

The spanner is suitably arranged for the muzzle cup, adjusting screw and nut.

2. Adjustment of the gun when assembled with the special parts—The weight required to withdraw the recoiling parts of the gun to the rear when tested by the pull of a spring balance applied to the boss of the crank handle should not exceed 2 lbs. (fuzee spring removed).

The weight of the fuzee spring when tested by the pull on the crank handle should be between 7 and 9 lbs.

The adjusting screw of the muzzle attachment should first be screwed inward until it just touches the muzzle cup. The feed block should be removed during the operation so as to be able to see that the recoiling portions are not forced to the rear. The adjusting screw should then be unscrewed  $2\frac{1}{2}$  turns and secured in position by the nut; it is important that the fuzee spring should be properly assembled to the gun during this adjustment. No further adjustment of the adjusting screw should be made and any adjustment found necessary during firing should be carried out on the fuzee spring as in the service gun.

*Notes.*—(a) Service guns only will be used for firing.

(b) A belt, preferably part-worn as regards size of pockets should be employed. The blank ammunition should be inserted, crimped end flush with front edge of belt, in groups of 10 rounds each. This number is sufficient for the purpose of locating machine gun fire and also ensures a longer life of choke in the barrel.

(c) When firing becomes noticeably irregular, the barrel should be set aside for examination by an armourer.

(d) The barrel casing will be filled with water as for ball ammunition.

(e) When the gun is fitted with the blank firing attachment, it cannot be placed in its chest unless the outer casing of the muzzle attachment with its fittings, is first removed.

(f) On completion of blank firing the guns will immediately be restored to their normal condition for firing ball ammunition.

(g) The gun will be cleaned in the normal way (*i.e.*, as if ball ammunition had been fired), except no attempt will be made to clean the inside of the barrel in front of the choke.

## SECTION IX.—INSTRUMENTS AND AIMING GENERAL.

1. (i) All ranks must be proficient in the use of the following :—  
Aiming Post.  
Zero Post.  
Direction Dial.  
Elevating Wheel.  
Clinometer.  
Bar foresight.
- (ii) Officers and N. C. Os. must be proficient in the use of the Slide Rule. The former and full rank N. C. Os. will also be trained to use :—  
Director.
- (iii) In addition to the above, those officers and N. C. Os. who are trained in the use of the director should be able to test the instrument for accuracy and also determine whether a clinometer is in adjustment.
- (iv) For the standard to be reached see T. O. E. D.

### Lesson 29.—Tangent sight and Fixed sight.

*Stores.*—Gun, Tripod, Belt Box, Landscape target.

#### *Instructor's Notes.*

#### 1. Setting of sights.—Explain and Demonstrate :—

- i. The use of sights to obtain direction and elevation.
- ii. The method of adjusting the sights. Fifty yards will be taught as the smallest adjustment.
- iii. That the correct line on the graduated plate or any particular range is the one under the figures indicating that range.
- iv. The fixed sight will be used up to 400 yards inclusive. The men should be required to make several adjustments.

#### 2. Rules of Aiming—Explain :—

- i. Sights must be upright. This is ensured by correct mounting of the Tripod.
  - ii. The eye should be as close to the aperture as possible.
  - iii. The firer must look through and not at the aperture.
- Demonstrate the common faults of aiming (*vide* Lesson 6, pamphlet No. 3).

Explain that when aiming at a Bullseye for instructional purposes or at aiming post, the aim must be taken at the lowest central portions as the foresight will not show up clearly if laid on the centre.

#### 3. Methods and sequence of instruction in laying an aim.

- i. Lay a correct aim at the aiming post *without* "holding". Whilst laying, the chin must be supported on the hand. A belt box may be placed across the knees and the elbows rested on the box, or the box may be placed on the ground resting on end, and the arms rested on top. Explain that direction is obtained by tapping the traversing handles and elevation by turning the wheel.

ii. Every man should view the aim, and in turn lay the gun, without holding.

Should any faults be detected, explain their effects, and ensure that such faults are remedied.

If a man's aim is incorrect, he must be convinced that it is so.

iii. The men will be taught to lay an aim with " Holding ". The Tripod must be in good condition, otherwise there will be considerable difference in aim with and without holding.

There should be no difference.

iv. Show how to lay an aim at points on a landscape target, and finally on natural objects.

v. Show how to note a point of aim to the right or to the left of the original mark.

Tap the gun off and ask the man to describe where the gun is laid.

vi. Demonstrate how to select and note a point of aim immediately above or below the target by moving the Tangent Slide up or down.

#### Lesson 30.—Bar Foresight.

*Stores.*—Bar Foresight, Gun, Tripod, and Aiming Post.

*Explain and Demonstrate.*

##### I.—DESCRIPTION.

The sight is of steel and consists of :—

(i) A bar about ten inches in length, graduated in intervals of ten minutes and degrees up to seven degrees right and left of the centre line.

(ii) An inverted U-shaped bracket to which the bar is a fixture and which is arranged to assemble over the projecting wings of the ordinary gun foresight, where it is secured by a screw in the left side of the bracket and a spring stud in the right, the former engaging in the hole in the left wing and the latter in the opening in the right wing.

The upper surface of the bracket is graduated in ten minute intervals, in continuation of the graduations on the bar, the centre line being indicated as zero.

(iii) the sliding sight with clamp screw for fixing in any desired position on the bar.

The sight has a central blade and protecting wings, and is arranged to take night sights when required for night firing.

Two pointers are provided on the slide to register with the scales.

When assembling the sight, care must be taken that excessive pressure is not applied to the screw, as such will distort the sight protecting wings of the gun, and thereby affect the level of the bar.

*To affix the bar foresight.*

Gun mounted, No. 2 kneeling on right of gun with bar foresight in pouch, slung over left shoulder.

No. 2 will remove the bar foresight from the pouch, seeing that it is set at zero. He will place it over the foresight protecting wings of the gun, and, being careful that the spring stud engages in the opening on the right wing, will tighten up the clamp screw of the bracket.

iii. *To lay off an angle of direction by means of the bar foresight.*

Gun mounted, with bar foresight affixed, and laid on an aiming mark. No. 2 at the gun.

No. 2 will adjust the bar foresight in accordance with the deflection given.

It should be noted that the sight is moved in the opposite direction to that ordered, i.e., if right is ordered the foresight is moved to the left.

Adjustments to be made to within two minutes, but to be ordered to nearest five minutes.

When the bar foresight is replaced in its pouch, it will be set at zero.

##### II.—PRACTISE SQUAD.

Lesson 31.—(a) Aiming Post. M. G. Mk. I. (b) Zero Post. M. G. Mk. I.

*Stores.*—Aiming Post, Gun, Tripod, and Bar Foresight and Zero Post.

*Explain and Demonstrate.*

##### I.—DESCRIPTION.

*Post, aiming, M. G., Mark I.*

The aiming post consists of a single telescopic stand, the top half of which can be raised or lowered.

The base of the stand is a metal plate with three spikes. The plate enables the spikes to be pushed into the ground by means of the feet, and also prevents the stand sinking too far in soft ground.

The lower half, or tube, of the aiming post has a clamping screw at the top which allows the top half to be fixed at the required extension.

The top half, or inner rod, is surmounted by a bracket, to one side of which a day aiming mark (black bullseye on a white background) is permanently fixed. The other side of the bracket provides a support for the night aiming lamp when in use. On the inner rod is a collar and clamping screw which allows this rod to be maintained at a given height when rotated.

By this means the aiming lamp can be set at the same height as the day aiming mark if desired.

(i) *To plant the aiming post.*

The gun will be mounted and laid, with any quadrant angle. The bar foresight will be affixed. No. 1 at gun, No. 3 a few yards in rear with aiming post. The instructor may act as No. 1.

No. 1, without moving the gun, runs the tangent sight slide to 2500 yards. No. 3 moves up to the gun and looks over the sights, to ascertain the approximate position for the aiming mark. He will then plant the post not less than five yards in front. No. 1 will direct No. 3 by signal to move the post until the line of sight is at 6 o'clock on the aiming mark.

No. 3 should place the aiming mark on the ground or plant the post vertically. If this is not feasible, the foot of the post should be driven firmly into the ground sufficiently far to one side to admit of full use being made of the telescopic portion.

This should be practised with and without bar foresight affixed.

#### II.—PRACTISE SQUAD.

#### B. Post Zero M.G. Mk. I.

##### I.—EXPLAIN AND DEMONSTRATE.

*Post, zero, M. G., Mark I.*

The zero post is of iron, 3 feet long. The upper end is formed as a ring 4 inches in diameter, the lower end being pointed.

(ii) *To plant the zero post.*

Gun mounted and laid with any quadrant angle, bar foresight affixed. No. 1 at gun, No. 3 a few yards in rear with zero post. The instructor may act as No. 1.

Nos. 1 and 3 act in the same manner as when planting the aiming post.

The zero post will be planted so that the line of sight is on the point where the ring joins the stem. If it cannot be planted upright it will be planted leaning sideways.

Care must be taken not to bend the zero post, and that it is planted in such a way that it will not be struck by fire from any gun in the fire unit.

#### II.—PRACTISE SQUAD.

#### Lesson 32.—Direction Dial Mk. I.

##### *Instructor's Note.*

*Stores—Gun and Tripod.*

1. Explain and demonstrate:—

The Graduations.

The Markings "R" and "L".

The Pointer.

The Clamping Screw.

i. *Description.*

The direction dial is graduated from 0 to 180 degrees RIGHT AND LEFT 0 is marked by a screw. The scale can be rotated round the socket, and can be fixed in any position by a Clamping screw. A pointer is fitted to the right hand side of the Crosshead for use in connection with the dial.

ii. *To set the Dial at Zero.*

No. 2 loosens the clamping screw, rotates the dial until 0 is opposite the pointer and then screws up the clamping screw.

iii. *To lay off an angle of direction by the Dial.*

Gun mounted and direction dial set at Zero.

No. 1 at the Gun No. 2 loosens the Traversing Clamp and swings the gun so that the pointer moves towards "R" or "L" as ordered. He adjusts the pointer to the number of degrees or minutes ordered and tightens up the traversing clamp. Switches should be given out in multiples of 10 minutes, and adjustments made to within 10 minutes.

2. Squad Practice.

#### Lesson 33.—Elevating Wheel.

##### *Instructor's Note.*

*Stores—Gun and Tripod.*

1. Explain and demonstrate.

i. *Description.*

The elevating wheel is marked by wide notches for degrees, thin notches for 10 minutes, and dots for 5 minutes.

A pointer is attached to the elevating gear for use with the wheel. The graduations on the wheel will be explained to the men.

ii. *To elevate or depress the gun.*

Gun mounted and laid on an aiming mark. No. 1 at the gun. No. 1 will elevate or depress the gun the necessary amount by means of the wheel. On completion No. 1 will re-align his sights on the aiming mark.

2. Practise squad.

#### Lesson 34.—Clinometer Vickers .303 in. M. G. Mk. I.

##### *Instructor's Note.*

*Stores—Gun, Tripod and Clinometer.*

Explain and Demonstrate.

*Description.*

This instrument consists of a manganese bronze casting called the "cradle". The upper surface is cut to form the arc of a circle in which the arc can slide, and to the lower surface is attached a cast steel base

adapted to rest between the side plates of the gun when the rear cover is raised.

A scale of degrees from zero to 20 degrees elevation and depression is engraved on one face and is read from an arrow on the arc. The graduations for elevation and depression are filled in with black and are numbered every 5 degrees and followed by the letters "E" and "D" respectively.

A worm spindle is fitted in two bearings in the cradle, one end being on a pivot. This allows the worm to be put out of gear with the arc, for quick setting, by pressing downwards on the other end of the worm spindle.

A spring is provided to keep the worm spindle and arc in gear.

Two micrometer collars are fixed to the worm spindle, one for reading depression in minutes, the other for reading elevation in minutes.

The micrometer collars are divided every five minutes and numbered every ten minutes, and are coloured the same as the degree scale. The figures on the micrometer collars have the letters "E" and "D" engraved underneath to indicate elevation and depression respectively.

At one end of the worm spindle a milled head is firmly attached; one turn of this milled head represents one degree.

The arc is shaped to slide in the cradle. On its under surface are teeth into which the worm gears. Attached to it by two screws is an adjustable reader for the degree scale. On its upper surface is attached a spirit-level.

Engraved on the base is an arrow and the word "Target". This is to indicate the correct direction in which to place the clinometer on the gun.

ii. *To place elevation or depression on the gun by means of the clinometer.*

Gun mounted approximately level No. 2 kneeling on the right side of gun, clinometer in its case, set at zero, slung over the left shoulder.

No. 2 removes the clinometer from the case and sets it at the angle ordered. He places it with the arrow to the front, on the side plates of the breech casing of the gun. It should be placed so as not to foul either the trigger bar lever, or the trail of the trigger. By moving the elevating wheel No. 2 centralizes the spirit bubble.

The clinometer will be set at zero when it is no longer required. At other times it will be left at the setting ordered.

Order to be given to nearest five minutes. Adjustments will be made to nearest two minutes.

iii. *To ascertain the quadrant elevation on the gun.*

Gun mounted and laid at any angle of elevation or depression, No. 2 kneeling on right side, with the clinometer set at zero, in the case slung over the left shoulder.

No. 2 takes clinometer from case and places it on the side plates of the breech casing of the gun, arrow pointing to the front. He turns

the milled head until the bubble is central, removes the clinometer and takes the reading.

Clinometer to be read to nearest five minutes.

iv. *Practise Squad.*

Lesson 35.—To test the clinometer.

*Instructor's Notes.*

*Stores.—Gun, Tripod, and Clinometer.*

Explain and Demonstrate.

i. *To test the clinometer.*

(i) Set the scale to zero.

(ii) Place the clinometer on the gun, elevate or depress until the bubble is in the centre of its run.

(iii) Reverse clinometer and note position of the bubble.

(a) If *central*, the clinometer is in adjustment, but confirm at, say ten degrees depression and ten degrees elevation.

(b) If *displaced*, this indicates that an error is present.

(iv) In the case of (b) leave the clinometer on the gun and rotate the minute scale until the bubble is again central then note the scale reading.

(v) Having noted the variation from zero, halve it and set the scale to this point, e.g., suppose that reader points to twenty minutes E, remove clinometer and set scale to ten minutes E.

(vi) Replace on the gun and proceed as in (ii) and (iii); if the bubble does not come central repeat the process.

NOTES.—1. When rotating the minute drum always turn to the *left* last, i.e., anti-clockwise. Should an error be found, it will be seen that when the clinometer is truly horizontal there will be a variation in the zero reading. This error will be noted and the instrument adjusted as soon as possible.

3. If a gun is levelled with a clinometer known to be correct, then any number of clinometers can be tested by placing them on the gun in the ordinary way and noting if there is any error.

4. *To adjust the clinometer.*—Set the clinometer at the error noted. With a spanner loosen the "nuts securing micrometer collar", set the scale to zero and tighten up.

If the variation is large, it may be necessary to reset the degree reader. This is done by loosening the two securing screws and sliding the reader to right or left, as may be necessary, and then clamping up.

NOTE.—Adjustments will be carried out only by armourers.

ii. *Practise Squad.*

## Lesson 36.—Director, No. 4 Mk. II.

*Instructor's Note.**Stores.—Directors.*

## 1. Explain and demonstrate:—

The focussing of the telescope.

The pointer.

The degree scale on the director.

The clinometer level and elevating gear.

The degree scale plate.

How to clamp the index plate, and the functioning of the clamping screw.

Use of spirit level on stand; and

Hook attached to the base plate.

(5) *Description—*

The instrument consists of:—

A telescope with vertical pointer contained in the box. The telescope can be focussed by means of the eyepiece.

On the left of the box is clinometer level, consisting of, a bubble arm, degree scale, and micrometer heads marked in 5s. of minutes. The top half of the degree scale and the top drum for elevation, the bottom half of the scale and the bottom drum for depression.

On the underside is a slider and spring for attaching to the director stand.

The director stand consists of three hinged legs, between which is a hook for use with a plumb line. The legs are attached to a circular plate, to which is attached the clamping socket.

The clamping socket rotates, and has a clamping screw for clamping the socket to the base.

The degree scale plate is attached to the top of the clamping socket, and is marked in degrees from 0 to 180 right and left (R and L).

Above this is the index plate, which has an arrow inserted on the outer edge. On this plate is a milled nut for clamping the plate to the degree scale plate, and a spirit level for getting the director stand upright, and a compass.

The carrier to which the director slider is attached is elevated or depressed by means of the slow motion elevating gear.

The springs on the carrier and slider are for taking up play.

(ii) *To set up the director.—*

Remove the director from the case, and the director stand.

Fit the base of the director into the carrier.

Splay out the legs of the stand so that the director is at a convenient height. It will be found that the kneeling position is the most suitable,

but a lower position may have to be adopted. Press the legs firmly into the ground. Make sure that the degree scale plate is approximately level.

(iii) *To take an angle of sight.—*

Focus the telescope. Unloosen the clamping screw. By means of the elevating gear and milled portion of the clamping socket lay the tip of the pointer on the target.

By means of the milled head below the depression micrometer head level the bubble. Read the angle of sight by means of the degree scale and micrometer heads. Once the bubble has been levelled, the reading of the angle of sight may be taken later at any convenient time. Readings to be to the nearest minute.

When finished with, the arrows will be set at zero.

(iv) *To measure the lateral angle between two points.—*

Set the pointer on the index plate opposite "zero" on the degree scale.

Tighten up the clamping nut. By means of the elevating gear and milled portion of the clamping socket, lay the pointer on the first point. Tighten up the clamping screw.

Loosen the clamping nut and lay the pointer on the second point. Read off the number of degrees and minutes, direction right or left, from the degree scale to the nearest 10 minutes. Ensure that the degree scale plate does not slip when the index plate is moved. Always move the index plate by holding the carrier bracket, and not the director.

Before putting the director stand in its case, set the slide horizontal, clamp the compass, and set the pointer on the index plate at 180 degrees.

## 2. Practise squad.

## Lesson 37.—To test the Director for Angle of Sight.

*Instructor's Note.**Stores.—Director.*1. *To test the director for angle of sight.—*

This is done as follows:—

(i) Select a position where there are two walls or upright posts about 200 yards apart, and as far as possible in the same horizontal plane.

Take the instrument to one wall (A), if possible at the corner of a house. If testing a No. 4, Mark II, director, set the degree and minute scales to zero. (This should not be necessary with a later pattern director.) Now lay the instrument on the other wall, and by means of the elevating gear centralize the bubble.

(ii) Look through the telescope and direct some one to mark the point aimed at on a distant wall (B). Mark the wall where you are standing at (A) at the same height as the objective glass of the instrument.

(iii) Take the instrument to the distant wall (B), and place the object glass against a mark (B) made on the wall. In the case of the No. 4, Mark II, director, keep the degree scale to zero. Bring the bubble to the centre of its run by means of the elevating gear.

If the instrument is now found to be laid on the mark (A), it is in adjustment.

(iv) If it is desired to test more than one instrument it is necessary to obtain a horizontal line.

If, as in sub-para. (iii), above the instrument is found to be laid on the mark (A), the line joining (B) and (A) is a horizontal line, and it may be used to test other instruments.

If the instrument is found not to be laid on (A), the bubble being central, direct some one to mark the spot on which it is laid (C).

Now make a third mark (D) on the first wall, exactly halfway between (A) and (C). This mark (D) in conjunction with the mark (B) will form a horizontal line.

To prove accuracy it is advisable to place the instrument at (D) and check back on (B).

When the horizontal line has been obtained the other instruments can be checked and adjusted on it.

(v) Having laid out a horizontal line, proceed to test the instrument.

In the case of the No. 4 Mark II, director, set the degree and minute scales to zero. (This is not necessary with later patterns).

Place the object glass at one end of the horizontal line and lay on the point with the elevating gear at the other end of the line laid out. The bubble should then be central; if it is not, turn the micrometer head until it is so and note the error.

In the case of directors of later pattern than the No. 4, Mark II, it is necessary to lay on the opposite mark and note that the bubble is central. If the bubble is not central, elevate or depress the telescope until it is so and note the error through the eyepiece.

NOTE.—Where adjustment is necessary, it will be carried out by an armourer.

II.—*Practice squad.*

### Lesson 33.—Rules. Slide M. G. Mk. I.

*Instructor's Notes.*

*Stores.*—Slide rules, blackboard.

Explain and demonstrate.

I.—*Rule, slide, M. G., Mark I.*

The following scales, etc., are engraved on the slide rule:—

- (a) Safety angle scale.
- (b) Degree scale—graticule cord.

(c) V. I. and H. E. scale.

(d) Wind scale.

(e) Barometer and temperature scales.

(f) 1 in 20,000 scales, showing yards.

(g) 1 inch to 1 mile scale, showing yards.

(h) Degree scale similar to that on the service protractor.

(i) Range Tables.

(a) *Safety angle scale.*—Engraved on the rule is a Range to Target scale marked in hundreds of yards from 600 to 2,800, and opposite to this on the slide is a Range to Troops scale marked in black from 600 to 2,000 yards and in red from 500 to 100 yards.

The safety angle scale is used in accordance with the instructions laid down, for which purpose a cord 24 inches in length is attached to the top of the slide rule.

Care must be taken that this cord does not become knotted and is exactly the correct length.

(b) *Degree scale—graticule cord.*—The slide is marked with a degree scale opposite the top of the slide, and an arrow on the slide which can be used for graticule purposes in conjunction with the cord attached to the slide rule.

(c) *V. I. and H. E. scale.*—A V. I. scale marked in hundreds of yards from 300 to 10. In conjunction with this is an H. E. scale marked in hundreds of yards 3,000 to 100, and a degree scale marked from 0° to 10°.

An arrow marked on the slide enables angles to be read off in conjunction with the V. I. and H. E. scales.

(d) *Wind scale.*—On the reverse side of the slide are marked allowances for a 20 m. p. h. wind. The allowance for a side wind is shown on one side and marked from 115 minutes to 10 minutes, and on the other side is the allowance for head or rear winds marked from 90 minutes to 5 minutes.

A wind pointer is provided in the centre of the top cut-away portion on the back of the rule.

(e) *Barometer and temperature scales.*—On the reverse side of the slide is also marked the allowance for 1 inch of barometer from 5 minutes to 25 minutes.

Allowances for 20° of temperature is also marked from 5 minutes to 35 minutes.

A pointer is provided in the centre of the bottom cut-away portion on the back of the rule.

(f) *1/20,000 scale.*—This scale is shown in divisions of 50 yards, and larger divisions mark the hundred, five hundred and thousand yards. The thousand marks are numbered in full.

(g) *1-in. to 1 mile scale.*—This scale is marked in divisions of one hundred yards each and the larger divisions are one thousand yards.



(h) *Degree scale—protractor.*—In the centre of the sloping side is a protractor degree scale marked from  $0^{\circ}$  to  $90^{\circ}$  and used in conjunction with the 0 on the other sloping side of the rule.

(i) *Range Tables.*—On the back of the slide are marked the following extracts from the Range Tables:—

Tangent angles.

Angles of descent.

Length of beaten zones and cones.

Position of lowest shot below centre of cone.

2. *Practise Squad.*

### Lesson 39.—Night Sights.

#### *Instructor's Notes.*

*Stores required.*—Gun, tripod, night sights, pegs, and torch.

Explain and demonstrate.

#### I. *Sights, night, Vickers, .303-in. M.G.*

i. The *foresight* consists of a vertical, rectangular, sheet steel plate, mounted upon a steel body with spring arms, by means of which it is attached to the protecting wings of the sliding sight of the deflection bar foresight. It can also be attached to the foresight bracket of the gun if required.

The foresight is assembled to the sliding sight of the deflection bar foresight by being sprung on to the protecting wings from the side which faces the breech of the gun.

ii. The *backsight* consists of a vertical rectangular steel plate.

The plate is secured to a small steel body, to which is attached a spring clip for engagement with the tangent sight slide of the gun.

The backsight is assembled to the slide by pressing it on to the projecting blade portion from the left, care being taken to see that the horizontal ledge of the body rests on the upper edge of the blade, and that the bent lip on the right side of the spring engages over the inner edge of the slide.

II. (a) *Instructor demonstrates a correct aim on to the direction peg, using the night sights.*

(b) *Practise squad.*

(c) *Practise squad in darkness, the instructor illuminating the direction peg by means of a torch.*

