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A.C.I.s.
7th November,
1942



Small Arms Training

Volume I, Pamphlet No. 23

The 29-mm. Spigot Mortar

1942

(This pamphlet supersedes the 29-mm. Spigot Mortar (Blacker Bombard) Training Instruction (Provisional, 1941))

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By Command of the Army Council,

THE WAR OFFICE,
7th November, 1942.

Printed under the Authority of HIS MAJESTY'S STATIONERY OFFICE
by Keliber, Hudson & Kearns, Ltd., London, S.E.1.

DISTRIBUTION

Units with this Equipment	...	2 Copies per Weapon	
S.A.S. Netheravon	...	...	50

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SMALL ARMS TRAINING

Volume I, Pamphlet No. 23

THE 29-mm. SPIGOT MORTAR

SECTION 1.—GENERAL

1. The Spigot Mortar is a reasonably mobile weapon with a dual role :—

- i. As an anti-tank weapon it is capable of destroying heavily armoured fighting vehicles. This is its **PRIMARY ROLE**.
- ii. As an anti-personnel weapon it can fire a heavy bomb with great accuracy up to a maximum range of 785 yards.

2. Concealment

In all training with the Spigot Mortar, it is most important that adequate attention is paid to concealment. The reason should be obvious, namely that A.F.Vs. can open effective fire at considerably greater range than can the detachment of the mortar. On the other hand, it has been shown at trials that, with proper concealment, spectators in the open are not able to locate the mortar from 150 to 200 yards. It is, of course, far easier to conceal it from A.F.Vs.

3. The main characteristics of the mortar are :—

- i. It has no barrel (the barrel is incorporated in each bomb).
- ii. Its accuracy is great.
- iii. It is economical in man-power.
- iv. It is easy to conceal and inconspicuous in action.
- v. At short ranges the trajectory of the bomb is low and curved and is little affected by wind. As the range increases, the trajectory becomes higher, and the effect of the wind greater.
- vi. The number of bombs that can be made immediately available is limited by their size and weight. Mortars must be used sparingly and given definite tasks.

4. The rate of fire is as follows :—

- i. 20-lb. bomb : Maximum—12 rounds per minute.
Normal — 6 rounds per minute.

- ii. 14-lb. bomb : Maximum—15 rounds per minute.
Normal — 8 rounds per minute.

NOTE.—These rates are possible when the mortar is mounted in a prepared position.

5. The mortar has two mountings; one fixed and the other portable. On both it has a 360° traverse. See figures 1 and 2.

6. The mortar can be maintained in action by three men—detachment commander, Nos. 1 and 2. If mobility is required, a further two men are necessary—Nos. 3 and 4. Each member of the crew must be able to perform all duties, i.e. :—

- i. To prepare the mortar for action.
- ii. To maintain the mortar in action.
- iii. To fire up to the rate of fifteen bombs a minute with accuracy.
- iv. To recognize targets and bring fire to bear quickly.
- v. As detachment commander, to observe and control fire, and to estimate range and the speed of moving targets.
- vi. To mount and dismount the mortar speedily on the portable mounting, and to change to an alternative position when ordered without delay.
- vii. If necessary, to fire the mortar in the open.

7. Because of the low trajectory of the bomb at short ranges, the detachment commander must at all times ensure that the safety of his own troops in the vicinity is not endangered.

8. Training : Effective practice can be obtained by firing practice bombs at stationary or moving targets.

9. Danger areas : Details of these are given in Appendix I.

10. The anti-tank role

i. *The maximum range* is about 450 yards. Owing to the low muzzle velocity, which is 245 feet per second, fire should be withheld to the last moment. A moving tank will not, save in exceptional circumstances, be engaged at more than 150 yards range—the ideal range is 75–100 yards.

ii. *The anti-tank bomb* is designed for use against very hard surfaces. The fuze has a slight delay action, which makes the explosion go mainly forward fanwise. The bomb will penetrate very thick armour plate.

It may also be used against targets such as reinforced concrete, road-blocks, pill-boxes, etc., but it will not explode against thin metal sheet, sandbag emplacements, or other targets which have little resistance.

(A bomb which lands short and ricochets on to the target will not explode when it hits the ground, but will explode if it hits the target correctly after such a ricochet.)

The explosion is local and the bomb is unsuitable for use against personnel. Pieces of target, however, may fly up to 300 yards to the front and rear.

iii. In this role, the mortar should be sited to cover likely lines of approach for tanks at ranges not exceeding 200 yards.

Whenever possible, the mortar should be laid and ranged upon a small area through which a tank is forced to pass. The elevation should be recorded. The mortar should then be dug in and camouflaged. Fire should be withheld until the tank enters this area, with the object of ensuring a direct hit by the first round.

The following factors should be taken into consideration when siting the position :—

- (a) The number of mortars available to cover each line of approach. If possible, they should be sited with mutually supporting arcs of fire.
- (b) The necessity for good concealment, both from the air and on the ground.
- (c) The position of other anti-tank weapons and mine-fields in the vicinity.
- (d) An all-round field of fire.
- (e) The desirability of having covered lines of communication, to maintain the supply of bombs.
- (f) The necessity for having alternative positions.
- (g) The possible use of anti-personnel bombs on targets other than tanks when necessary.

11. The anti-personnel role

i. The mortar is extremely accurate up to a maximum range of 785 yards.

It has no pronounced flash and is therefore not easily located by the enemy, if it is properly concealed.

ii. The 14-lb. bomb has a killing effect within a circle of 100 yards radius from the point of impact.

iii. In an emergency the mortar can be fired by indirect means, but equipment is not at present issued for this purpose.

SECTION 2.—THE SPIGOT MORTAR AND BOMBS

LESSON 1.—GENERAL DESCRIPTION

Instructor's notes

Stores :—

Mortar complete on portable mounting, diagrams of figures 1 and 2.

Drill bomb.

The instructor will have the mortar mounted on the portable mounting with sights set for the anti-tank role.

SAFETY PRECAUTIONS

IT IS THE RESPONSIBILITY OF THE INSTRUCTOR AT ALL TIMES TO ENSURE THAT NO LIVE BOMBS, FUZES, OR CARTRIDGES ARE BROUGHT UPON ANY INSTRUCTIONAL PARADES.

1. *Explain*

The name.

It is a dual purpose weapon but PRIMARILY for use against tanks.

Ranges for both roles.

Effect of bombs on targets.

2. *Describe*

i. The mortar is a spigot gun. This means that the projectile fits on to a steel rod or spigot instead of into a barrel, as with normal guns and mortars.

ii. The mortar consists of the following parts from front to rear :—

- (a) Spigot casing.
- (b) Spigot, firing pin assembly, and main spring housing.
- (c) Traversing bracket.
- (d) Elevating arm and clamping handle.
- (e) Shield.
- (f) Firing gear.
- (g) Sights.

(a) The spigot casing is a thin metal tube which extends beyond the end of the spigot in order to protect the crew from blast. It is cut away to relieve the pressure, and to allow the spent cartridge-case to fall out.

(b) The spigot is a steel rod on to which the bomb is loaded. It gives the bomb its direction on firing, and contains the firing pin and rebound spring. The firing pin passes through the spigot. It is fitted with the firing pin block at the rear, against which the rebound spring acts to ensure withdrawal of the firing pin after firing.

(c) The main spring housing encloses the main spring, firing cable, and rear end of the firing pin.

(d) The traversing bracket consists of the bracket which encloses the traversing block, which is cylindrical to fit the bracket, and is bored to receive the pivot. Elevation is provided by the movement between the block and the bracket, and traverse by movement between the block and pivot, which is part of the mounting.

(e) The elevating arm fits into the bracket at the front, and slides over the front surface of the shield at the rear, where it is screwed to receive the clamping handle. By means of the latter the elevating arm can be fixed in the required position. Locking pins are provided for use in the primary anti-tank role; these obviate the chances of slipping or incorrect setting. It is provided with a screw adjustment and lock nut. Pointers are fixed to the clamping handle which are set against the appropriate elevation on the range scale.

(f) The shield is curved to conform to the movement of the rear of the elevating arm. It is slotted to allow the elevating arm to pass through it. Attached to the shield are the channel, handle grips, sight bracket, and the range scales, and spirit level bubble.

(g) The firing gear consists of the firing lever, the trigger, and the cable. The firing lever compresses the main spring by means of the cable. The cable is released by the trigger. This releases the main spring, which causes the firing pin to fly forward, overcoming the rebound spring, and firing the cartridge. The firing gear is fitted with a spring to re-engage the trigger.

(h) The sights consist of the sight bar, on the end of which is a fore-sight with three prongs on either side for use when aiming off for movement, and an aperture back-sight. In order to avoid the necessity of moving the clamping handle while engaging moving targets, an adjustment is provided in the sight whereby a range of less than 200 yards may be obtained. This adjustment consists of two drums, on each of which is a range scale.

iii. Weights.

(a) *Mortar*

Mortar	...	...	...	112-lb.
Pivot	...	...	...	56-lb.
4 legs each 44 lb.	...	...	...	176-lb.
4 pickets each 5 lb.	...	...	...	20-lb.
2 hammers each 8½ lb.	...	...	...	17 lb.
Tool box	...	...	...	26-lb.
Total weight	...	...	...	407-lb. = 5 man loads

(b) *Bombs*

Anti-tank bomb	...	...	19½-lb.
Anti-personnel bomb	...	...	14½-lb.

iv. *The portable mounting*

The portable mounting consists of the pivot and four legs, which fit into sockets in the former and are secured to it by steel pins, themselves provided with locking keys. The legs are provided with spades, on to which are welded plates to prevent damage to the legs when hammering them in. Pickets are provided for use in soft ground, and suitable holes are cut in the legs to receive them.

v. *The concrete pedestal mounting*

A fixed concrete pedestal 3 ft. 5 ins. in diameter provides an alternative form of mounting. It consists of a pivot and base-plate, to which are welded a number of reinforcing rods. These are embedded in the pedestal in a circular trench 3 ft. 10 ins. deep and 7 ft. 6 ins. diameter, so that the base-plate and pivot are just above the level of the surrounding earth. (See figure 2.)

3. Question squad.

4. *Demonstrate.*

To convert from anti-tank role to anti-personnel role :—

- i. Separate two halves of the range drum rod.
- ii. Remove the locking pins engaged in the elevating arm.

5. *Explain range scales.*

i.e. Inside reading for anti-tank use.

Outside reading for anti-personnel use.

LESSON 2.—TYPES OF BOMBS, FUZES, AND CARTRIDGES.

Instructor's notes

Stores :—

1 *anti-tank drill 20-lb. bomb, complete with drill cartridge and drill fuze No. 283, Mark 1.*

1 *practice inert 15/20-lb. bomb.*

1 *Dummy H.E. 14-lb. anti-personnel bomb.*

Charts as in Plates 3 and 4.

1. Explain that there are three types of 20-lb. bomb, viz.:—

The anti-tank H.E. 20-lb. bomb.

The anti-tank practice inert 20-lb. bomb.

The anti-tank drill 20-lb. bomb.

(See Plate 4.)

2. The anti-tank H.E. 20-lb. bomb

i. Explain that this bomb is khaki-green in colour, and that the live bomb has either a series of red crosses and dashes round the top of the body, or a red band round the middle of the body. The body and the cup supporting body are sealed with a wide strip of adhesive tape.

ii. Explain that the propellant charge used with this bomb is a metal cartridge containing 270 grains of cordite. It is inserted by the manufacturer in the front end of the tail tube of the bomb and cannot be extracted. (See Plate 3.)

iii. Describe the bomb from front to rear, naming the parts. Explain that the bomb weighs 19½-lb. and contains 8½-lb. of H.E. It is 26 inches long and 6 inches in diameter.

iv. Explain that the nose cap of the bomb will never be removed. The body will be removed from the cup supporting body in order to insert the fuze. This is done by removing the adhesive tape and unscrewing the body. After the fuze has been inserted, the body is screwed back tight into the cup supporting body and the adhesive tape should be replaced. This work is done most easily by two men.

v. *Fuzing.* Explain that the fuze used with this bomb is the 283 Mk. 1. It is made of zinc alloy and is grey in colour, with a pad of rubber at the base. The fuze is ready for use as issued and will not be stripped. It is not dangerous with normal handling, but it should not be dropped or subjected to heat.

If for any reason the fuze has been armed the bomb will not be fired.

Explain and demonstrate that the fuze is inserted in the fuze container with the rubber pad outwards. Units will

fuze all bombs on receipt, and bombs will be unfuzed only for return to R.A.O.C. or for shipment overseas.

Care must be taken to prevent the cast exploder (see Plate 3) from falling out during fuzing. If for any reason the rubber pad has become detached from the fuze, the fuze will be inserted with the holes towards the tail.

Failure to do this may cause a premature explosion.

vi. The details of the working of the fuze are given in Handbook for the Spigot Mortar, 1941.

3. The anti-tank practice inert 20-lb. bomb

i. Explain that this bomb has a black body, with a khaki-green tail-tube and drum tail, and it may have a yellow band painted round the body. The body is filled with sand and inert substance and the bomb weighs 19½-lb. It is used for demonstration purposes and for sighting shots, and can be fired only once: it must thereafter be returned to ordnance as salvage.

The cartridge in this bomb is similar to that in the anti-tank H.E. 20-lb. bomb and is also inserted before issue. It is not necessary to fuze this bomb, as there is no explosive in it, and the body will not therefore be unscrewed from the cup supporting body.

N.B.—Although the bomb itself is inert the cartridge is the normal one and will propel the bomb forward in the normal way. This bomb will only be used on a firing range.

ii. Question squad.

4. The anti-tank drill 20-lb. bomb

i. Explain that this bomb weighs 20½ lb. It has the word "Drill" stencilled on the body and on the tail tube. This bomb will NOT be fired. It is fitted with a dummy cartridge, which has a soft metal cap acting as a firing pin stop, fixed in place at the front end of the tail-tube.

Explain and demonstrate that the dummy fuze can be used with this bomb to give practice in fuzing bombs.

ii. Question squad.

5. The practice inert 15/20-lb. bomb

i. Explain that the practice inert 15/20-lb. (alternative type) bomb is used for practice and can be fired as many as fifteen times, provided that the target used has no resistance and the ground and background are soft. It weighs 15 lb. and is smaller than the 20-lb. anti-tank bomb, but with the practice cartridge it has approximately the same trajectory

up to 200 yards as the 20-lb. anti-tank bomb with the standard cartridge. Beyond 200 yards, it ranges farther than the 20-lb. anti-tank bomb.

ii. Explain and demonstrate that this bomb, which is painted dark green, has a body of cast iron and is filled with concrete. The body is screwed into an adaptor, which is threaded internally to fit the tail tube; a drum tail is fitted to the end of the tail tube and held in position by a circlip which fits into a groove on the tail tube.

iii. Explain that this bomb will normally be issued assembled except for the drum tail. To assemble the drum tail, slide it over the bottom end of the tail tube and fix the circlip into the groove by means of the circlip pliers provided. Ensure that the sharper edge of the circlip is to the rear. If the groove is shallow or damaged, the circlip may be wired on.

iv. *Preparation of the 15/20-lb. bomb for firing*

(a) Explain that the cartridge used for firing this bomb has a black band painted round it and contains 185 grains of cordite.

(b) Explain and demonstrate that the cartridge is inserted in the screwed end of the tail tube of the bomb, capped end first. It may be forced into position flush with the screwed end of the tail tube by tapping it with a piece of wood. Metal will not be used for this. Screw back the tail tube on to the body and tighten it, using the tools provided or a pipe-wrench having a leverage of 12 inches.

(c) Practise squad.

v. *After firing*

(a) Explain that after firing, the drum tail (which will be damaged) will be removed. Then unscrew the tail tube from the adaptor, push out the cartridge case, and stand the tail tube in a bucket of hot water for a few minutes. Scour out the tail tube with a wire brush. (A Bren or Lewis gun wire brush may be used.)

Tail tubes sweat like the barrels of other small arms. They should be cleaned and re-oiled daily for a week after firing. Dry out the tail tube and test it on the spigot in case it is damaged. Brush out the circlip groove on the tail tube, insert a new cartridge, and screw the tail tube into the adaptor, ensuring that it is fully screwed home. Place on a new drum tail and circlip. The bomb is now ready for use.

The damaged drum tail may be used again if it can be straightened out. It is more important that sides of the drum tail are parallel to the tail tube than that they are completely circular.

NOTE.—This method saves the use of oil and cuts out expenditure. If tail tubes are to be stored, they should be treated with mineral jelly red.

- (b) Explain that damaged tail tubes and drum tails are often repairable by units, but if this is not possible they will be treated as salvage.

6. Question squad.

NOTE.—The 15/20-lb. bomb will not be kept in a store with the cartridge inserted. The cartridges will only be inserted when firing is about to take place. If it is desired to remove a cartridge after it has been fitted into place, this can be done by pushing it out with a long piece of wood. Care must be taken not to use any hard or metal object for this purpose, as it might detonate the cap in the base of the cartridge.

7. The H.E. 14-lb. bomb (anti-personnel)

i. Explain and demonstrate :—

The H.E. 14-lb. (anti-personnel) bomb differs from the anti-tank H.E. 20-lb. bomb in dimensions and in the fact that the fuze is fitted into the nose of the bomb, not inside the body (see Plate 4).

ii. Explain that the cartridge used with the 14-lb. bomb is of the same design as that used with the 20-lb. bomb, but that it contains 308 grains of cordite. It is inserted in the bomb before issue and will not be removed.

iii. Explain and demonstrate that the fuze used with the 14-lb. bomb is the 152 fuze, as used with the 3-in. mortar H.E. bomb. The fuze is inserted before issue and is fitted into the nose of the bomb. The fuze cap may be sealed to the body of the fuze by means of a strip of adhesive tape, and before the bomb is fired the adhesive tape must be torn off and the fuze cap unscrewed. The fuze will in no circumstances be removed from the bomb.

iv. The details of the working of the fuze are given in Handbook for the Spigot Mortar, 1941.

LESSON 3.—STRIPPING THE FIRING MECHANISM

Stores :—

Mortar complete on portable mounting.

Drill bomb.

Toolbox.

1. To strip the firing mechanism

Explain that it is essential to be able to strip and assemble the firing mechanism, for cleaning or replacement.

2. Explain and demonstrate :—

To strip for cleaning :—

- i. Remove the spigot casing, loosen the bolt securing the main spring housing, and draw out the spigot and the main spring housing complete.
- ii. Press back the main spring guide against the nose of the traversing bracket and allow the retaining pin to fall out. Draw out the firing pin, rebound spring and main spring. Remove the pin retaining block, firing pin and rebound spring.

To assemble :—

Assemble in reverse order, taking care to pull back the firing cable as the main spring housing is pushed fully home, and to tighten the bolt which secures the main spring.

Note that the retaining pin for the main spring guide is at the bottom when the housing is correctly inserted in the traversing bracket.

3. To change the firing cable

Strip the firing mechanism as in para. 2 above. Compress the main spring towards sheath and remove guide. Unscrew the sheath and remove the main spring. Withdraw the firing cable from the traversing bracket. Disengage the firing cable from the trigger bar, loosen the locking nut, and unscrew the adjusting screw of the firing cable.

Remove the rubber nipple surrounding the firing cable.

To replace with a new firing cable :—

Assemble in reverse order, ensuring that the rubber nipple is in a position where the firing cable enters the traversing bracket.

4. Practise squad.

LESSON 4.—CARE AND MAINTENANCE

*Instructor's notes**Stores :—*

Mortar complete on portable mounting, drill bomb, tool box, oil, clean rags or cotton waste.

1. Demonstrate the removal of the mortar from the portable mounting.

2. Explain that care is essential to avoid damage to the mortar when in transit. It will always be laid on its left side, when not mounted, to prevent dirt entering the socket which fits over the pivot.

3. Cleaning

Explain that the same procedure will be carried out for daily cleaning as for cleaning before and after firing :—

- i. Remove the spigot casing and wipe off loose fouling with a dry rag, leaving the inside dry.
- ii. Wipe down the spigot with an oily rag, leaving it slightly oiled.
- iii. Remove the firing pin hole bush, elevate the spigot to its highest angle, and oil the firing mechanism by allowing a little oil to run down the firing pin. Replace the firing pin hole bush, ensuring that it is fully screwed home—tighten it with the spanner provided.
- iv. Oil between the traversing bracket and side plates by working the elevating arm up and down—this allows the oil to work in.
- v. Remove the mortar and dry clean the pivot and the traversing bracket. Leave the pivot clean and dry and the traversing bracket slightly oiled. Oil the ends of the legs of the portable mounting and leave them clean and dry.
- vi. The remainder of the mortar may be oiled. The friction disc of the sight drums should not be oiled ; if not oiled, it will not slip when the mortar is fired.
- vii. Oil the clamping handle assembly.
- viii. Allow a little oil to enter the rubber bellows on the firing cable.
- ix. Replace the spigot casing, ensuring that the large hole is on top, and screw it on to the main spring housing as far as possible. Make sure that the locking nut is tight.

4. Bombs.

i. As in this weapon the barrel, or tail tube, is inside each round, it is important to keep it clean. Provision is made for this purpose in the lid of the carrying case, which has a plug fitting into the tail tube. The protector should not be removed until immediately prior to loading, and if a round is unloaded its tail protector should be replaced at once.

ii. As the accuracy of the weapon depends partly on the true flight of the bomb, and this in turn depends on the accuracy of the drum tail, the latter must be inspected for trueness as a daily routine in care of ammunition. If the drum becomes damaged it may, with care, be straightened, but it is important that the side of the drum shall be parallel to the axis of the tail tube. It is more important that this should be correct than that the drum should be circular.

The trigger will not be pressed unless a bomb is on the spigot, or the firing mechanism will be damaged.

5. Adjustments.

i. Explain and demonstrate :—

The following adjustments must be carried out occasionally :—

(a) *Clamping handle assembly.*—To adjust—loosen the lock nut, rotate the clamping handle until the point is nearest its bearing surface, tighten the adjusting collar by hand or spanner, and push the clamping handle to the right. The elevating arm will be clamped at 200 yards on the range scale. Tighten the lock nut and fix the elevation by inserting the pins through the holes in the range scale.

Explain that it is normal to set the elevating arm at 200 yards when the mortar is being used in its anti-tank role.

Practise squad.

(b) *Firing mechanism.*—To test and adjust the protrusion of the striker :—

- i. Dismantle the firing gear.
- ii. Insert the firing pin through the main spring housing until it enters the spigot.
- iii. Press the firing pin block firmly home in the main spring housing and apply the striker protrusion gauge to the face of the firing hole bush in order to ascertain whether the protrusion of the firing pin is between the approved limits.

- iv. If the firing pin fails to pass the test, replace it by the spare firing pin that is provided with the mortar.
- v. If there is no gauge available hold the capped end of a dummy cartridge or a piece of wood to the firing pin hole bush. Press the trigger and check the protrusion. If the protrusion is less than 1-16th of an inch, adjust the firing cable or change the firing pin.

Explain that if the firing cable is too loose there will be insufficient compression of the main spring and the mortar will not fire.

To adjust—loosen the lock nut and rotate the screw towards the shield, thus ensuring more compression of the main spring. Tighten the lock nut. The adjustment is best checked by pulling the outer casing away from the adjusting nut. It should be possible to pull it about $\frac{1}{16}$ in. clear, but not more.

Practise squad.

6. Explain and demonstrate the use of the various tools provided in the tool box and their uses.

7. Question squad.

TESTING AND ADJUSTMENT OF SIGHTS

8. The mortar is correctly zeroed before issue and only faulty handling will affect its accuracy. Accuracy can only be tested by firing.

If it is necessary to zero for direction, loosen the nut fixing foresight cross-bar and move the foresight to right or left as necessary; tighten nut.

Zeroing of sights for elevation can be done by R.A.O.C. workshops only. A group for zeroing purposes consists of five rounds, and correct adjustment of the sight bar for elevation can be obtained only by trial and error. If a group is being fired for zeroing purposes, care must be taken to ensure that the bombs and cartridges used are of the same weight and charge respectively as the standard bombs and cartridges.

SECTION 3.—DRILL

LESSON 5. FALL IN—TAKE POST—ACTION—CEASE FIRING

Instructor's notes :—

It will always be assumed that the mortar will be used in its primary role, i.e. as an anti-tank weapon.

The elevating arm will always be clamped at 200 yards unless otherwise ordered, and the pins put in.

SAFETY PRECAUTIONS.—It is the responsibility of the instructor to see that there is no live cartridge in any of the drill bombs.

Mortar and portable mounting complete.

5 bombs (drill).

2 sledge hammers.

Tool box.

Pick and shovel.

1. Laying out of stores

For drill purposes the mortar will be laid out as follows :—
From right to left.

Pivot.

The mortar, resting on its left side, spigot casing forward.

2 legs, spades to rear, with a hammer on right and left of each respectively.

2 legs, spades to rear, with 2 pickets on the right of each leg.

Toolbox.

Bombs, tails forward.

Pick and shovel, heads forward.

2. Fall in and take post.

A detachment commander and four men will be detailed. Remainder of the squad will be placed where they can best follow the instructions.

3. "Fall in"

The detachment will double to a position a short distance behind the mortar stores :—

Det. Comd. —behind the pivot. |

No. 1 —behind the mortar.

No. 2 —behind the legs with hammers.

No. 3 —behind the legs with pickets.

No. 4 —behind remaining bombs.

They pick up their dressing.

4. "Detachment number "

1, 2, 3, and 4 number as in squad drill.

5. "Take post "

The detachment will be responsible for the following :--

Det. Comd. —The pivot.

No. 1 —The mortar.

No. 2 and 3 —The legs and hammers.

No. 3 —The toolbox.

No. 4 (assisted if necessary by No. 3) —The bombs and the pick and shovel.

On the command "Take post" the detachment will rapidly examine their stores to see that they are serviceable and not damaged, and when satisfied will lie down behind them.

6. Coming into action

It is assumed that the mortar is to be brought into action to engage moving targets.

A spot, on which the mortar is to be mounted (normally about 10 yards forward), and the direction of the target, will be indicated by the instructor.

7. "Action "

i. The detachment commander will pick up the pivot with both hands, double forward, and place it on the spot indicated, seeing that the pins are not underneath the pivot and that the lifting handles are about parallel to the line of the direction given. He will site it according to the principal arc of fire, i.e. he will ensure that the legs are so mounted that the principal arc of fire will coincide with 90° angle between two legs.

ii. Nos. 1 and 2 will each carry a leg of the portable mounting and a sledge hammer to the position, going to the right front and right rear sockets respectively.

Nos. 3 and 4 will each carry a leg and two pickets, going to the left front and rear sockets respectively. All will then insert the legs in the pivot. The detachment commander assisting by raising the pivot, to allow the legs to be inserted horizontally. The detachment commander will assist Nos. 1 and 2 to insert the pins which clamp the legs to the pivot.

iii. Nos. 1 and 2 will wield the sledge hammer and drive in first the spades of the legs and then the pickets. The detachment commander will supervise.

NOTE.—To give a firm foundation to the mortar, it is essential that the pivot rests on the ground and that the spades are

driven right down into the ground as far as they will go.

iv. Nos. 3 and 4 will carry forward the mortar and toolbox and then return for the number of bombs ordered, and the pick and shovel. As soon as Nos. 1 and 2 have hammered in the pickets they will mount the mortar.

v. The detachment commander, Nos. 1 and 2 will then take up the positions shown in Plate 1. No. 1 will quickly examine the mortar, to see that it is in working order. No. 2 will adjust the bombs so that they are within reach. The detachment commander will test the remote control bar and range drum to ensure that the sights are in working order.

vi. Nos. 3 and 4 will place themselves a short distance behind the mortar, facing to the right rear and left rear respectively.

8. "Cease firing"

As soon as the mortar is clear :—

- i. Nos. 1 and 2 will remove the mortar from the pivot and place it down a short distance in rear, as in "Laying out stores."
- ii. Nos. 3 and 4 will remove 2 legs each and return them a short distance to the rear, as in "Laying out stores."
- iii. The detachment commander will assist in the removal of the leg pins by easing the pivot. He will then replace the pivot a short distance in rear and lie down behind it.

NOTE.—(i) All numbers will lie behind their stores.

(ii) Bombs are left on the position.

9. To replace stores,

Two journeys will be required and stores will be returned to the original position.

"Replace stores"

	1st journey	2nd journey
Det. comd.	... Pivot	2 bombs.
No. 1	... Mortar.	1 bomb, 1 hammer.
No. 2	... Mortar.	1 bomb, 1 hammer.
No. 3	... 1 leg and 2 pickets.	Toolbox, 1 bomb, 1 leg.
No. 4	... 1 leg and 2 pickets.	Pick, 1 leg, shovel.

Stores will be conditioned as in "Take post."

LESSON 6.—LOADING AND UNLOADING—HOLDING, AIMING AND FIRING AT STATIONARY TARGETS, IN ANTI-TANK ROLE

Instructor's notes

Stores :—

Mortar complete.

A.F.V. representative targets (head-on and crossing. With holes pierced in the centre, these targets can be used as aiming discs.)

2 drill bombs.

This lesson is best done in a prepared position, either with the fixed or the portable mounting. Drill bombs may be loaded on to the spigot when checking aims, provided that they have been tested for firing pin stops.

1. Explain that a crew of three can maintain the mortar in action.

2. Explain and demonstrate, using three members of the squad, the action positions of the crew of three, as follows (see Plate 5, also Plate 2) :—

- i. Detachment commander, whose position is on the left behind the shield. His tasks are—to observe and control fire, to estimate the range and the speed of moving targets, to set the sights when the range to target is 200 yards or less, and to control the actions of the detachment generally.
- ii. No. 1, whose position is on the right behind the shield. His task is to aim and fire.
- iii. No. 2, whose position is on the right in front of the shield. His task is to load.

3. Explain and demonstrate the actions of Nos. 1 and 2 on the following commands :—

- i. "Prepare . . . bombs" :—

No. 2 will undo the straps of the cases of the required number of bombs and remove the lids of the cases. The bombs will be removed from their cases but the lids of the cases will be used to protect the tails of the bombs. The lid will not be removed from the tail until immediately before loading.

When firing anti-personnel bombs the order will be "Prepare . . . anti-personnel bombs."

No. 2 will proceed as above, but will also pull off the strip of adhesive tape, and loosen safety cap from fuze.

ii. "Load" :—

This will mean an anti-tank bomb unless otherwise ordered.

No. 2 will withdraw a bomb from its lid, glance back to see that No. 1's hand is clear of the firing lever, and at the spigot to ensure that the firing pin is not protruding, and load the bomb on to the spigot. When his hands are clear, No. 2 will shout "In." He will then make ready another bomb.

In order to make clear to No. 2 that his right hand is clear of the firing lever when No. 2 is about to load, No. 1 will extend his hand to the right and down. If he delays to do so, No. 2 will shout "Hand clear."

iii. "Unload" :—

No. 1 will hold his hand clear and No. 2, having seen that it is clear, will draw the bomb off the spigot and replace it in its case.

iv. Practise squad.

4. Sighting

Explain and demonstrate :—

i. To engage targets up to 200 yards the elevating clamping handle will be clamped, and fixed with the pins provided, at 200 yards on the vertical range scale. Variations in sighting will then be obtained by using the sights provided on the right of the shield, which are controlled by the remote control handle and the range drum on the left of the shield. The range drum is graduated from 0 to 200 yards and the sights are set when the range required is opposite the zero mark.

ii. The sights will normally be set by the detachment commander, but there is also a range drum on the right side of the shield and, if the detachment commander is for any reason unable to set the sights, this may be done by No. 1.

iii. The sights will never be set at less than 75 yards, as at this range they act as battle sights.

iv. The sights must be checked after firing each round, as the firing of the round is apt to cause them to slip.

5. Holding

Explain that, although there is little shock of recoil when a round is fired, the firing handles should be held lightly. No. 1 will not use the rubber buffer as a head-rest: otherwise he may receive injury when the round is fired.

6. Aiming at stationary targets

i. *Explain and demonstrate :—*

On the command " Aim," No. 1, gripping the firing handles in his hands, will raise the shield and take up the full play on the firing lever with his right hand, making sure that the trigger is engaged. The forefinger of the right hand will be straight alongside, but not touching, the trigger.

No. 1 will then close the disengaged eye, keeping his head well back from the aperture backsight. Looking through the aperture at the target, he will align the top of the foresight at the ground line of the target, the point of contact thus made being in the centre of the field of view through the aperture. When his aim is correct, No. 1 will report " On."

ii. Show a diagram of a correct aim : as shown in Fig. 4A.

iii. Demonstrate a correct aim with the mortar and an A.F.V. representative target, a drill bomb being loaded on to the spigot for balance, and allow each member of the squad to see it.

iv. Practise squad in aiming, with target used as aiming disc, using a detachment of three and giving the commands " Load," " . . . Hundred," " A.F.V. approaching, aim." When each No. 1 has laid an Aim, give the command " Change round," whereupon No. 1 will release the firing lever gently and lower the shield, and No. 2 will unload. The crew will then change places.

7. Firing

Explain that there is only one trigger pressure and that it is very light.

Explain and demonstrate :—

i. On the command " Fire," No. 1 will press the trigger, immediately release the firing lever with a jerk, and hold the hand clear. During drill the trigger will not be pressed, unless there is a dummy cartridge in the drill bomb.

ii. Whenever the bomb has been fired, it is the duty of No. 2 to reload and to keep the mortar loaded until he receives the command " Cease firing " or " Unload."

iii. Emphasize again the necessity for the sights to be checked after each round is fired.

iv. Practise squad in teams of three, using a fourth member of the squad to pull the bomb off the spigot when the trigger has been pressed and replace it beside No. 2, who will meantime be loading with another bomb.

LESSON 7.—ENGAGING MOVING TARGETS

*Instructor's notes**Stores :—*

*As for Lesson 6, with a moving target which must have length.
A cyclist is suitable.*

1. Explain

i. The rake foresight on the mortar is used for aiming at moving targets and enables No. 1 to aim off while still taking a correct aim at the target. Compare this with aiming off at moving targets with the rifle, anti-tank rifle, aiming at crossing aircraft, etc.

ii. The rake foresight is in effect seven different foresights, the centre one of which is used against stationary targets, or against targets which approach "head on", or tanks retiring from the mortar positions. The others are used to engage targets moving at 10, 20, and 30 miles per hour across the front. Targets moving from right to left are engaged by the prongs on the right, those from left to right by the prongs on the left. No. 1 takes a correct aim on the target with the foresight indicated, and the bomb will be fired ahead of the target to hit it when it has moved forward to the spot where the bomb meets the line of movement of the target.

iii. If the target is a tank, the deflection provided by the rake foresight will suffice to hit the tank at any range up to 200 yards.

iv. Emphasize that it is essential to swing the mortar on its pivot when engaging moving targets, to conform with the even movement of the target. To allow the No. 1 plenty of room to do this the detachment commander should, if necessary, station himself in front of the shield (*see* Plate 6); in this case No. 1 is responsible for adjusting his own ranges.

2. Practise squad, and naming in the fire order the prong to be used. This will be done as follows :—

3. To engage a target

The order "**Load**" will be given.

Ranges between 75 and 200 yards will be used.

i. The detachment commander will estimate the range, set it on the sight arm extension, and shout out the range to assist No. 1 in recognition. He will indicate the target, give the necessary "lead," and order "**Engage.**"

e.g. "100

Quarter left, enemy tank
Left two prongs."

ii. No. 1 will follow the indication and lay at the centre of the target, on the ground line using the necessary prong or half prong, and will maintain this aim by swinging the mortar in the required direction. He will pull back the firing lever with his remaining fingers, keeping his forefinger off the trigger. He should do this immediately on receiving the order "**Engage**," to avoid disturbing his aim.

4. To fire

i. As soon as the vehicle presents a reasonable target the detachment commander will order "**Engage**." No. 1, when the aim is correct, will press the trigger and immediately allow the firing lever to fly forward.

ii. No. 2 will immediately reload and this procedure will be continued until the order "**Stop**" is given.

NOTE.—To give practice in loading, two men from the squad may be posted at the front of the mortar to remove the bomb from the spigot and pass it back to No. 2 each time the mortar is fired.

5. To stop firing

Detachment commander orders "**Stop**."

No. 1 releases the firing lever. Should the mortar have just fired when "**Stop**" is ordered, No. 2 will immediately reload.

6. Practise squad aiming at a moving target such as a truck, a cyclist, or, if these are not available, a man walking or running. Insist on a correct fire order by the detachment commander, use by the No. 1 of the prong indicated, and correct swinging of the mortar to conform with the movement of the target, without any check on pressing the trigger. The laying is best watched from immediately behind the weapon.

LESSON 8.—ACTION ON MISFIRE—CAUSES OF MISFIRE

Stores :—

Mortar complete on portable mounting.

4 drill bombs.

Toolbox.

1. *Explain and demonstrate :—*

Action on misfire.

Should the gun not fire when No. 1 presses the trigger, he will at once call "**Misfire**" and extend his right hand to the front. The detachment commander will order "**Reload**."

No. 2 will remove the bomb and reload with another bomb. If the second bomb fails to fire the fault lies in the firing mechanism.

2. Practise squad.

3. *Explain and demonstrate* :—

i. If after applying immediate action the mortar still fails to fire :—

No. 1 reports "**Stretched cable.**"

The detachment commander orders "**Unload.**"

No. 1 will screw up the firing cable adjusting screw on the shield as far as it will go, to give more compression of the main spring. Load, aim, and fire.

ii. If the mortar still fails to fire :—

No. 1 will order "**Check firing pin.**"

No. 2 will unload, remove spigot casing and firing pin hole bush, clean out the firing pin hole bush and examine the firing pin. If damaged, he will call for "**New firing pin**" and change it. Load, aim, and fire.

If not damaged, he will call for "**New cable**" and commence stripping the firing mechanism, while No. 1 strips the firing cable from the trigger and shield. Replace with new firing cable. Load, aim, and fire.

Practise squad. Instructor orders "**Stretched cable**" or "**Worn firing pin,**" as required.

iii. If, with the trigger connected, there is no weight on the firing lever when it is pulled back :—

(a) No. 1 will attempt to separate the firing cable by pulling gently on the slack behind the shield; if it comes apart he will report "**Broken cable**" and wait for No. 2 to unload. No. 1 will then strip the firing cable from the trigger and shield, while No. 2 strips the firing mechanism. Reassemble with new firing cable. Load, aim, and fire.

(b) If the firing cable does not come apart :—

No. 1 will report "**Separated mechanism.**" No. 2 will unload, strip, and reassemble firing mechanism. Load, aim, and fire.

Practise squad. Instructor orders "**Broken cable,**" etc., as necessary.

iv. *Explain and demonstrate* :—

If the firing lever will not work at all, No. 1 will report "**Change the firing cable**" and the crew will proceed as in para. iii (a).

Practise squad. Instructor orders "Firing lever not working."

Instructor's notes

1. The squad must be told that only neglect or faulty handling will lead to failure of the mechanism to work.

2. These breakages may be set up deliberately. e.g. assembling with cable not attached to sheath, or grossly incorrect adjustment on the cable. Advantage should be taken of any damaged parts to demonstrate the effect of neglect.

LESSON 9.—ANTI-PERSONNEL ROLE—LOADING AND UNLOADING—SIGHT SETTING—FIRE ORDERS

Instructor's notes

Stores :—Mortar complete.

1. *Explain :—*

i. *The maximum effective range* is 785 yards. At long ranges the trajectory is high and the bomb has a steep angle of descent. Ricochets and blinds are likely to occur at ranges less than 350 yards.

ii. *The anti-personnel bomb* is filled with H.E. For range purposes it has a danger area of 300 yards from the point of burst. Its effective killing area is 100 yards from the point of burst.

The mortar is extremely accurate with this bomb. At the longer ranges it will fire 50 per cent. of its shots into an area five yards long by two yards wide.

iii. *Danger area for range practices.*—See Appendix 1.

iv. *Trajectory.*

Time of flight at 785 yards ... 12 seconds.

Height of trajectory at 785 yards ... 600 feet.

v. Owing to the wide danger area of the anti-personnel bomb, care must be taken to ensure that when in action it is never aimed to burst less than 300 yards from any friendly troops in the vicinity.

Explain and demonstrate :—

2. Loading and unloading with the 14-lb. bomb

i. *Loading :* On the command "Anti-personnel—load," No. 2 will remove the bomb from its lid, unscrew the fuze

cap, and proceed as above. He will keep the fuze cap handy, in case the bomb is not fired.

ii. *Unloading* : On the command "**Unload**," No. 2 will remove the bomb from the spigot, replace the fuze cap, and return the bomb to its lid.

iii. Practise squad.

3. Sight setting.

i. The detachment commander will ensure that—

At longer ranges than 200 yards the remote control bar of the sights is parted. No 1 will ensure that the range on the range drum is at 200 yards.

ii. The detachment commander will decide upon the range and include it in his fire order.

No. 1 will put the range on the mortar using the elevating arm and clamping handle.

4. Fire orders.

i. These will be kept as simple as possible and will take this form :—

Example

Range ... 400.

Indication ... Haystack—left 9 o'clock small black bush.

Lay ... Lay.

ii. No. 1 will set the elevation on the range scale, clamp the elevating arm and lay an aim as taught in Lesson 6, using the centre prong.

As soon as his aim is correct he will report "On."

iii. Detachment commander will order "**Fire**."

iv. No. 2 will immediately reload. No. 1 will relay and await the command "**Fire**."

v. When the detachment commander is satisfied that the correct elevation is on the bombard he may order :—

(a) "**... rounds—fire**."

No. 1 will then continue firing until that number of rounds is expended. He will check the elevation between rounds.

(b) "**Rapid fire**."

No. 1 will continue to fire until ordered to stop.

(c) "**Stop**."

No. 1 will stop firing and check elevation.

No. 2 will immediately reload.

5. Practise squad in giving fire orders and correct laying.

SECTION 4.—ADVANCED HANDLING

LESSON 10.—PACKING THE TRUCK—PREPARE FOR ACTION—ON TRUCK

*Instructor's notes**Stores :—*

*Mortar complete with portable mounting and all stores.
 24 practice bombs in cases. (These will represent 16—20-lb.,
 8—14-lb. bombs.) 15-cwt. truck.*

NOTE.—This lesson and Lesson 11 are written under the assumption that a 15-cwt. truck or similar vehicle will be used to carry the mortar. If a truck is not available, this lesson and Lesson 11 may be carried out by marking the dimensions on the ground.

1. Explain and demonstrate the truck packed, with diagram. (See Plate 7.)

2. Question squad.

3. Explain that, although the mortar can be maintained in action by three men, two further men are required for mobile handling of the mortar; Nos. 3 and 4 are responsible for maintaining the supply of bombs to the team and will also carry out local protective duties. If a truck is being used, No. 4 may be the driver, and in that event he is responsible for the safety of the truck.

4. Explain that, when packing and unpacking the truck, each member of the crew is responsible for the stores, as follows :—

Detachment commander	...	The pivot.
Nos. 1 and 2	...	The mortar.
No. 3	...	The tool box.
No. 4	...	Pick and shovel.
Nos. 1 and 2	...	1 leg, 1 picket and 1 sledge-hammer each.
Nos. 3 and 4	...	1 leg, 2 pickets each.

5. *Explain and demonstrate*, using a detachment of five of the squad :—

i. On the command "**Detachment fall in,**" the detachment falls in facing the tailboard of the truck at a distance of two feet, in the following order from left to right :—

- (a) Detachment commander.
- (b) No. 1.
- (c) No. 2.
- (d) No. 3.
- (e) No. 4.

ii. On the command "**Prepare for action**" :—

- (a) Detachment commander and No. 4 take down the tailboard of the truck.
- (b) The stores are taken off the truck and laid out as Drill Lesson 5, para. 1.

iii. On the command "**On truck**" :—

The stores will be replaced in their original positions.

6. Practise squad.

LESSON 11.—COMING INTO ACTION IN A WEAPON PIT

Instructor's notes

Stores :—

As for Lesson 10.

A prepared position.

NOTE.—See note to Lesson 10, *re* truck. This lesson will be carried out with an emplacement for the portable mounting, see Fig. 3, Plates 5 and 8. Squad will be numbered off in detachments of five.

1. *Explain and demonstrate*, using a detachment of five of the squad :—

i. On the command "**Prepare for action**," the detachment will act as in Lesson 10.

This order will be given when the detachment is still in the truck.

ii. On the command "**Action**," the following events will take place :—

- (a) Detachment commander lifts pivot and carries it to the emplacement at the double; he sites it there according to the principal arc of fire, i.e. he ensures that the legs will be so mounted that the principal arc of fire will coincide with 90 degrees angle between two legs.

NOTE.—For the purpose of this lesson, the truck may be quite close to the emplacement; but it should be realized that in action it will depend upon the tactical situation and the necessity for concealment how near the truck may approach the emplacement.

- (b) Nos. 1, 2, 3, and 4 will act as in Drill Lesson 5, except that Nos. 3 and 4 will return to the truck and prepare to carry out their duties as ammunition numbers and as local defence for the mortar.

No. 4, if he is the driver, will drive the truck under cover or carry out normal camouflage precautions.

2. *Explain* that the test of a trained crew in the above procedure, from the command "**Action**" until the first round is fired, is three minutes.

3. *Explain* :—On the command "**Cease firing**," the above procedure will be reversed, each member of the crew being responsible for the parts described in Lesson 10, para. 4. This command will be given when moving to a new or alternative position.

The detachment commander will ensure that all stores are reloaded on to the truck before leaving the position.

4. Practise squad by detachments. Ensure that each member of the squad is practised in the duties of each member of the crew by changing round the numbers in each detachment.

NOTE.—If a concrete emplacement and fixed mounting are available, the procedure for mounting the mortar will be much simpler, as the portable mounting will not be used.

On the command "**Action**," the detachment commander will double forward to the emplacement and remove the cap protecting the pivot. Nos. 1 and 2 will carry forward the mortar and place it on the pivot. Nos. 3 and 4 will carry forward six bombs each and then return to the truck to carry out duties as above. The mortar is now ready for firing, and further procedure is the same as described above.

On the command "**Cease firing**," the reverse procedure will be adopted.

LESSON 12.—SITING THE MORTAR AND CAMOUFLAGE

Instructor's notes

Stores :—

As for Lesson 10 with addition of Camouflage net.

1. *Explain* :—

The object is to knock out the tank with the first two shots. The principles to be adopted are as follows :—

Choose an area through which a tank is forced, or most likely to pass, because of the nature of the ground.

Site the mortar in the position which most lends itself for concealment within a radius of 100 yards from that area.

Dig the position and camouflage well.

Fire some ranging shots on a point in the area and record the aiming mark.

2. This lesson should be taught in two parts.

3. Part 1—T.E.W.T.

A piece of country should previously be selected and a very simple tactical situation painted.

The squad should be divided into syndicates of two or three. Each syndicate will represent the detachment commander.

The instructor must then give orders to his detachment commander, giving him the task of preventing tanks from entering a definite area.

Syndicates will then select suitable sites for the mortar within a definite time.

The instructor will criticize each site.

NOTE.—The ideal site is one from which fire can be brought to bear on tanks from a flank and at short range.

If concrete pedestals are available, and there is time available, it may be possible to site several alternative positions covering likely approaches. It would thus be possible to mount the mortar in some central site and move it by vehicle to a site in the threatened area.

Once a mortar is sited in a weapon pit, using the portable mounting, it is not easy to move it rapidly from one place to another.

If the mounting is moved it often breaks down the sides of the trench and makes it unsafe for further use.

4. Part 2—Occupation

The squad will be organized in a team, complete with a mortar and all stores.

One of the positions chosen in Part 1 will be occupied.

The team will dig a weapon pit, *see* Fig. 3, and will camouflage it from observation from ground and air.

NOTE.—If time is limited Parts 1 and 2 can be combined or camouflage can be practised by occupying a previously dug position.

It is not always necessary to dig the complete pit provided sections are big enough to contain the detachment commander, No. 1, and No. 2.

The first essential for concealment is that no one should have his head above height of the top of the shield.

This means that the No. 2 (the loader) MUST be in a trench. This trench will be in front of the mounting.

The loader must be able to load from it, for any direction within the arc of fire. If the position requires all-round fire, the trench must be the full circle.

The next essential is that camouflage must be considered wherever the mortar is to be put into action.

As a trench has to be dug, a plan for disposal of the spoil must be made *before* digging is started. Painting of the equipment may require attention to suit the background.

The loader and the commander should be provided with hoods of suitable colouring for the background; these break up the outline of the head and shoulders.

The appearance of the mortar in action should be checked by inspection from 150 yards, from which distance it should be almost invisible. The effect of the action of the lighting at different times of the day must be taken into account.

APPENDIX I

RANGE RULES AND SAFETY PRECAUTIONS

1. Red flags and look-out men will be posted in accordance with existing rules and the particular circumstances of the site. A red flag will also be used at the firing point in accordance with the ordinary rules for rifle ranges.

DANGER AREAS

- i. 20-lb. anti-tank and 14-lb. H.E. (anti-personnel) bomb.

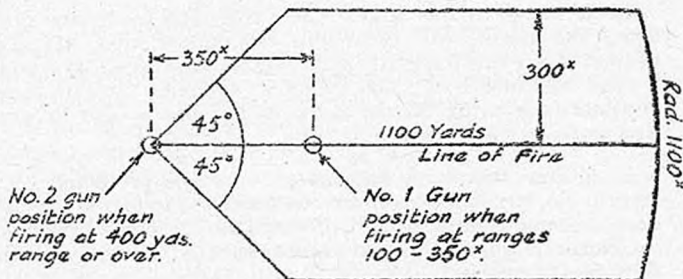


FIG. 5

NOTE.—No. 2 gun position must never be within 100 yards of any place to which the public has access and from which they cannot be excluded.

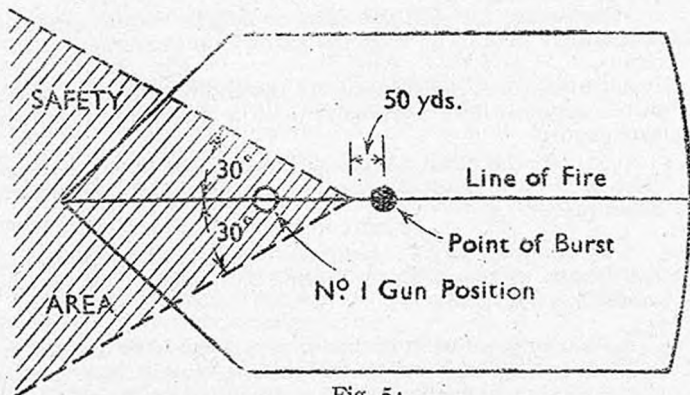


Fig. 5A.

NOTE.—No. 1 Gun Position.—When firing anti-tank bombs at ranges not exceeding 200 yds. there is a safe area for troops lying down and wearing steel helmets, inside an angle of 30 degrees on both sides of the line of fire, extending rearwards, from 50 yds. behind the point of burst. This area is indicated by hatching in the above sketch.

- When firing the 20-lb. bomb, the personnel firing the mortar must be dug in, while remaining details (and any spectators) must be at least 300 yards from the target, *and on the same side of the target as the mortar.*

ii. The danger area of the 14-lb. H.E. (anti-personnel) bomb is 300 yards all round the point of burst of the bomb, and is therefore included in the above illustrated danger area.

The immediate danger area is 100 yards all round, but pieces may fly up to 400 yards.

If the range to the target is less than 400 yards, the crew firing the mortar will be within the danger area. If it is desired to fire this bomb at its maximum range (i.e. 785 yards), a clear field of fire of 1,400 yards is required. At this range the mortar can fire 50 per cent. of its rounds into an area five yards by two yards.

2—i. The crew firing the mortar must be protected by a trench. A circular trench two feet wide, four feet six inches deep, with a circular island of earth in the centre two feet six inches in diameter, should be constructed, for use with the portable mounting.

ii. The crew must always wear steel helmets when firing.

iii. One instructor, detachment commander, and Nos. 1 and 2 of the crew only will be allowed at the firing point when firing is in progress.

When firing the 14-lb. bomb, remaining details (and any spectators) must be at least 400 yards from the target.

3. If the above precautions are taken, firing may be carried out in an open field. A quarry with a hill behind it is more satisfactory.

Whatever the place, all precautions will be taken to ensure that no persons, livestock, etc., are in the vicinity when firing takes place.

4. A stop-butt is an advantage owing to the tendency of the bombs to ricochet. A "blind" is unlikely to ricochet more than 400 yards.

5. When firing the 20-lb. bomb, it is essential to have a very solid target. The bomb is designed to smash thick armour plate or concrete emplacements; it will not normally explode when hitting the ground, unless it is fired at high elevation and is falling on to hard ground. A sandbag target or a steel plate less than 1-inch thick is useless, as is an old M.T. vehicle—the bomb will go straight through without

detonating. A quarry makes a good target, or upright railway sleepers sunk two feet into the ground, if backed up with about 200 sandbags (most of which will be destroyed).

The target should be at least six feet high and three feet to six feet wide for ranges of 100 yards. A live bomb is effective if it strikes the target at an angle of 45 degrees.

6. Destruction of "blinds."

i. The anti-tank H.J. 20-lb. bomb is filled with a very powerful gelatinous explosive. On impact with a target, the nose of the bomb flattens and bursts, and the explosive forms a large area of contact on the surface of the target. The fuze has a 1-300th part of a second delay action, which delays the explosion until the explosive has flattened out.

If the bomb fails to explode, the explosive will usually be found lying in pieces over a wide area of ground. The fuze will be destroyed, separately with a 1-oz. guncotton primer and safety fuze. The explosive should be collected into a pile and destroyed as described below. If the bomb has not burst, it should be destroyed in one piece by means of a 1-lb. slab of guncotton and safety fuze in the way described in S.A.T., Vol. 1, Pamphlet 13, Lesson 10. If this is done, it is essential to have good cover at least 50 yards away, as the explosion will be very powerful.

ii. A "blind" 14-lb. bomb will be destroyed as above. The fuze is highly dangerous when armed and should not be handled.

When searching for a 14-lb. "blind" it is easy to be misled. Tail units often protrude from the ground. If the tail unit is surrounded by a small crater the tail unit belongs to an exploded bomb. The presence of a tail unit without such a crater indicates the presence of a "blind."

7. A bomb must never be fired twice because it will probably burst prematurely on the second firing.

8. When firing with practice bombs, safety precautions may be considerably relaxed, as the bombs are made of concrete; only the cartridge is live.

At the firing point no person may, while firing is taking place, advance in front of a line drawn through the shield of the mortar at right angles to the line of flight.

When firing at a moving target, such as a bush towed behind a tank, carrier, or truck, every precaution will be taken to ensure that the firer aims at the target, and not at the vehicle towing it. The cable should be at least 30 yards long.

When carrying out this practice, the tank run should be about 150 yards from the firing point. At least 300 yards is required *behind* this, to allow for bombs ricocheting—say 400 yards radius from the firing point behind the full width of the tank run.

If firing at longer ranges is carried out with practice bombs, these will tend to bury themselves in the ground and not ricochet owing to their higher trajectory. Ground behind the target is therefore not so necessary.

When firing with practice bombs, the ground should be soft and reasonably level. This will reduce the chance of ricochets and will also reduce the wear and tear on the bombs, which will allow the bomb to be used many times.

APPENDIX II

APPROXIMATE TIMES OF FLIGHT, AND HEIGHTS
OF TRAJECTORY

20-lb. ANTI-TANK BOMB

Range yards	Time of flight seconds	Approximate maximum height of trajectory in feet
100	1.3	6½
200	2.7	26
300	4.0	72
400	5.7	130
485	8.4	285

29-MM. SPIGOT MORTAR

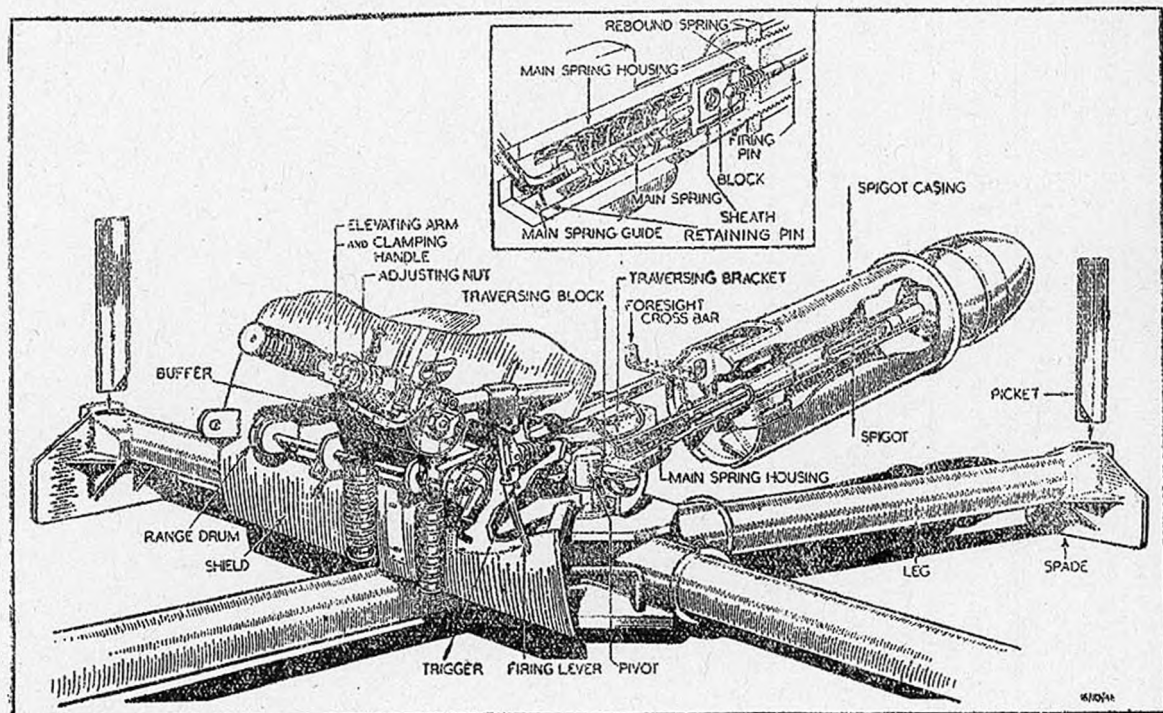


FIG. 1

PEDESTAL. 29-MM. SPIGOT MORTAR, Mk. I

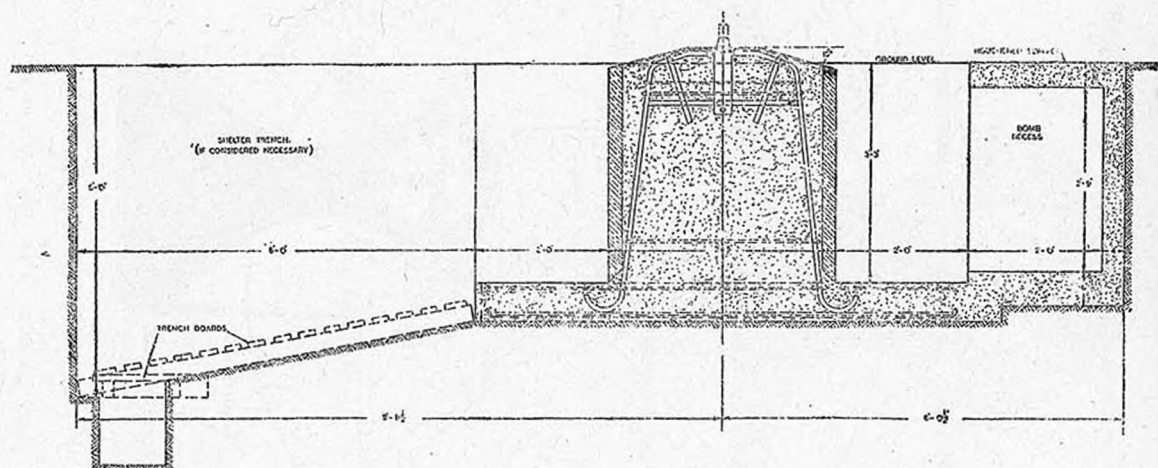


FIG. 2

NOTE.—The birdcage steelwork is an Ordnance supply. The reinforcement for the base slab is a R.E. supply. For the shuttering for the concrete pedestal a concrete pipe is suitable.

PLAN VIEW OF EMPLACEMENT AND PORTABLE MOUNTING



Principal arc of fire
approx. 90°

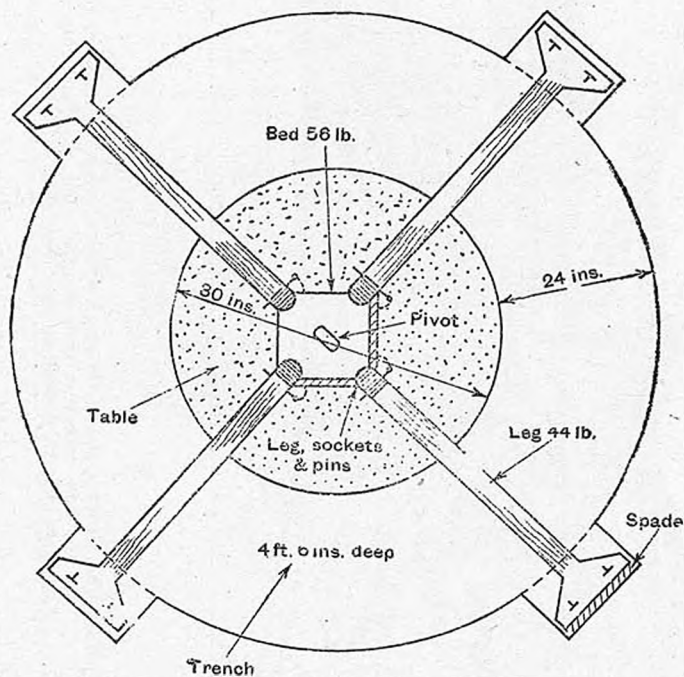


FIG. 3

Centre table countersunk 2 ins. (remove turf). Trench to be revetted if possible.

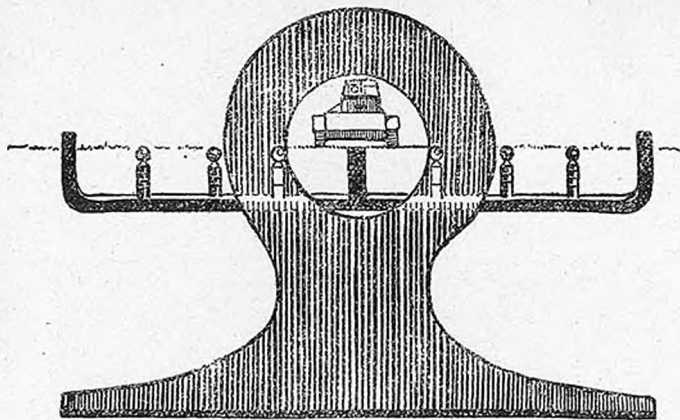
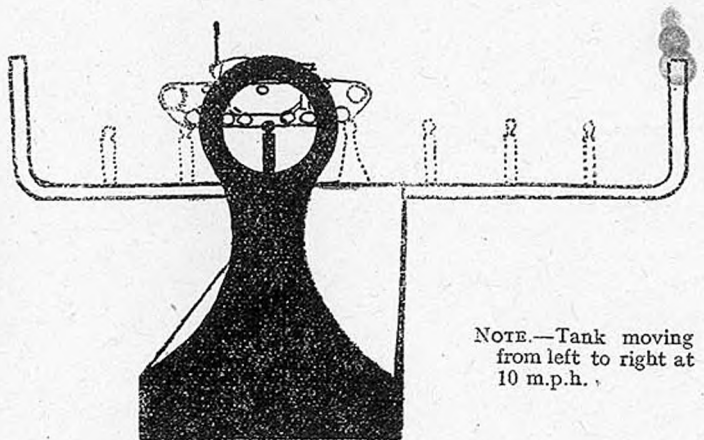


FIG. 4A

A correct aim at an approaching tank.

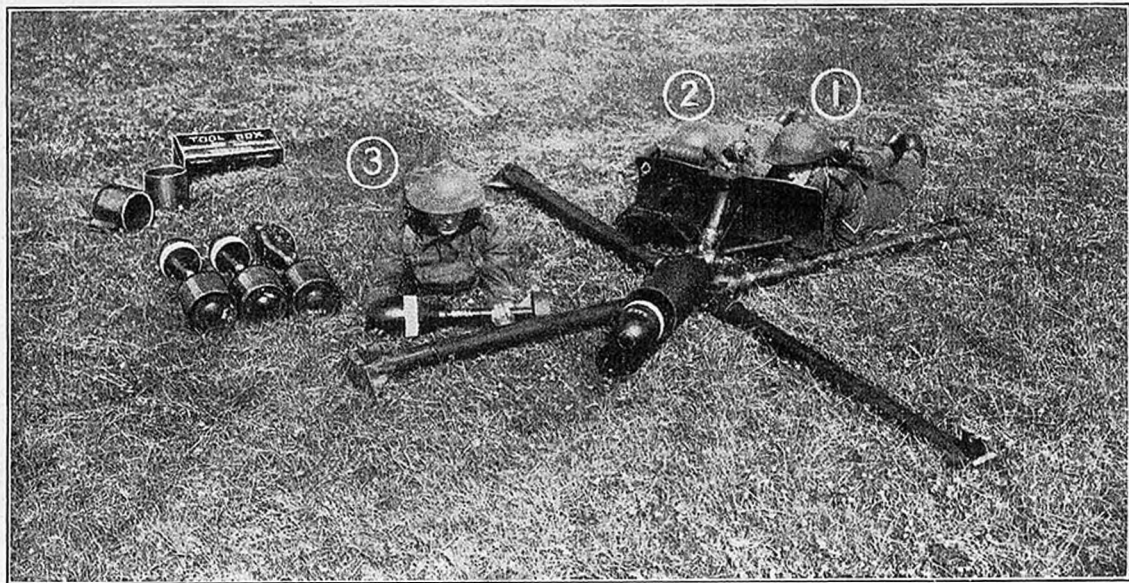


NOTE.—Tank moving
from left to right at
10 m.p.h.

FIG. 4B

A correct aim at a crossing tank.

DETACHMENT IN POSITION IN THE OPEN

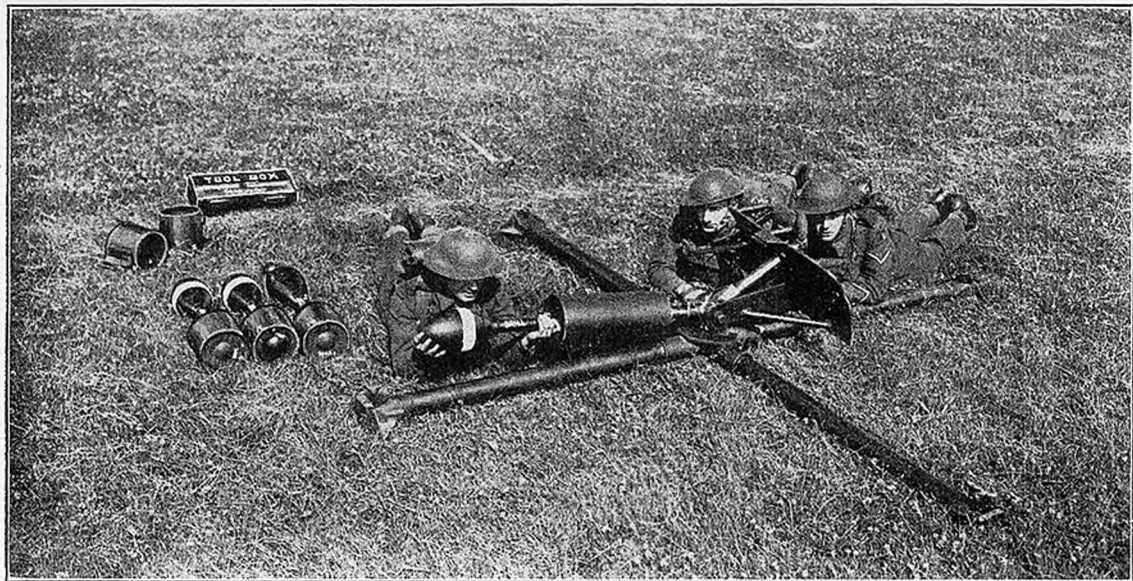


1. Detachment Commander.

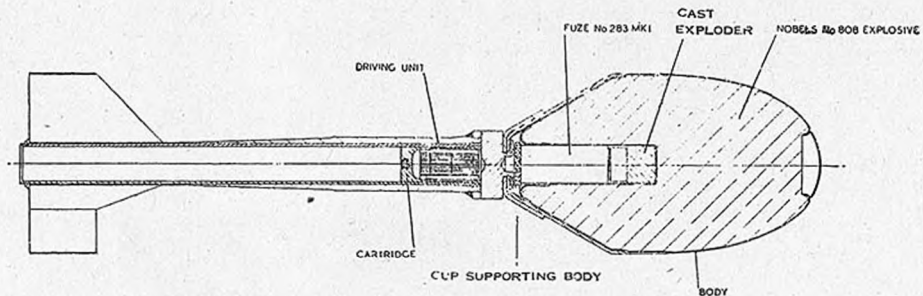
2. No. 1.

3. No. 2.

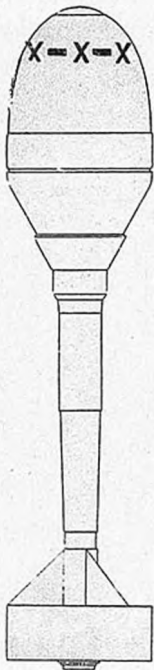
DETACHMENT IN THE OPEN, RELOADING IN ELEMENTARY MORTAR DRILL



BOMB, ANTI-TANK 20-LB. Mk. I/L/



ANTI-TANK H.E. 20 LB.



ANTI-TANK PRACTICE
INERT. 20 LB.



ANTI-TANK DRILL 20 LB.

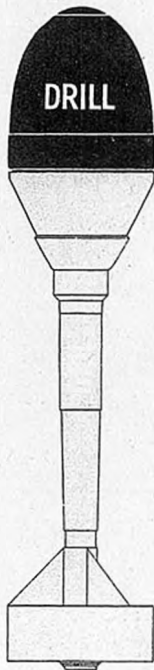
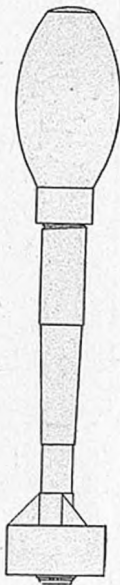
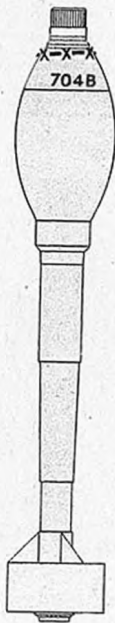


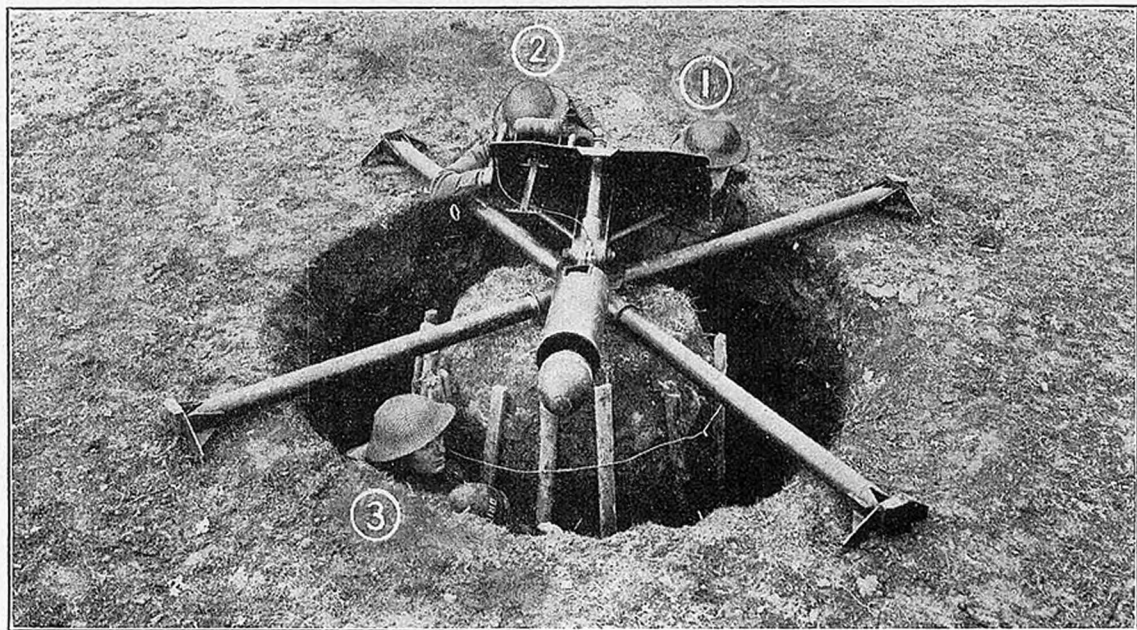
PLATE 4

H.E. 14 LB.

PRACTICE INERT. 15/20 LB.
(ALTERNATIVE TYPES)



DETACHMENT IN POSITION IN A WEAPON PIT

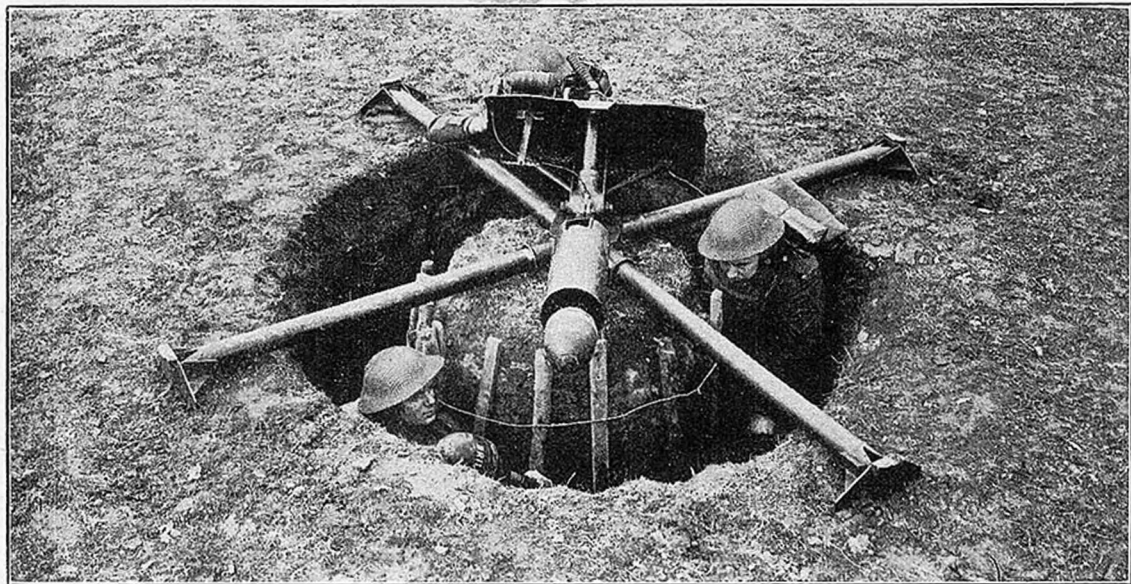


1. Detachment Commander.

2. No. 1.

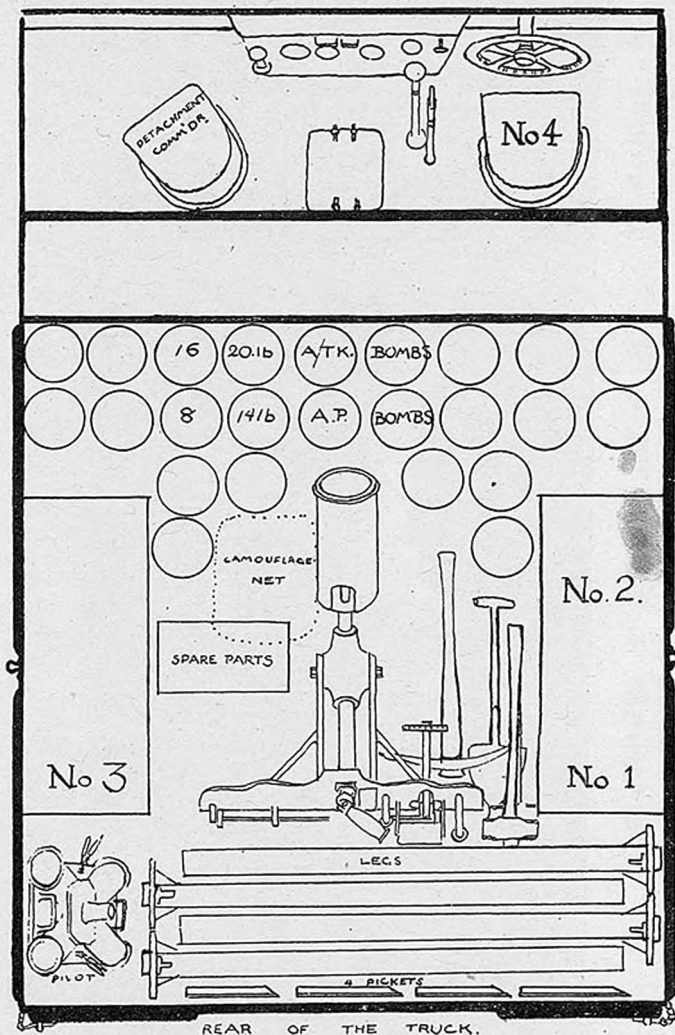
3. No. 2.

DETACHMENT IN POSITION IN A WEAPON PIT



NOTE.—The Detachment Commander has moved in front of the shield to allow No. 1 more liberty of movement.

A 15-CWT. TRUCK LOADED WITH ONE MORTAR AND STORES



DETACHMENT IN POSITION USING PEDESTAL MOUNTING

