



This manual has been scanned by the
Vickers MG Collection & Research
Association

www.vickersmachinegun.org.uk

If it is of use, please make a donation at:

https://www.paypal.com/cgi-bin/webscr?cmd=s-xclick&hosted_button_id=NKSHEDAMHTJ3G

CSM

THE
VICKERS-BERTHIER
LIGHT MACHINE GUN

VICKERS-ARMSTRONGS
LIMITED

Sgt. Inot R. Lewis

S. A. S. (AW)

Ahmednagar

1931

This handbook of the Vickers-Berthier Light Machine Gun is a first proof and subject to amendment.

Corrections to this issue :—

PAGE 8, FIG. 4.—The last 300 rounds (of the 1000 fired from one light barrel) were fired in 1 minute 6 seconds. This firing was done from the Bipod Rest as a light automatic weapon.

This photograph includes all shots fired of which only 9 were outside the inner ring.

PAGE 12, FIG. 6.—Mounting is in its lowest position.

PAGE 16, "TO FIRE THE GUN"—The breech block lifting-cam in the Receiver imparts the first upward movement to the breech block and disengages it from the actuating lug on the piston. The locking cams are then free to commence the locking action.

PAGE 25, LAST PARAGRAPH.—Delete 90° elevation. About 82° at present obtainable, unless A.A. Mounting is tilted slightly.

Photographs and Load Tables of Mule and Horse Pack equipments will be included in further publications.

Such features as "Nomenclature of Parts", "Points Before, During and After Firing", "Stripping and Re-assembling" Etc. are also being considered for inclusion.

THE
VICKERS-BERTHIER
LIGHT MACHINE GUN



VICKERS-ARMSTRONGS
LIMITED

VICKERS HOUSE, BROADWAY, LONDON, S.W.1

Telegrams :
VICASTRONG, SOWEST
LONDON

Telephone :
VICTORIA
6900

Cablegrams :
VICASTRONG
LONDON



FIG. 1.
THE VICKERS-BERTHIER LIGHT MACHINE GUN.

THE VICKERS-BERTHIER LIGHT MACHINE GUN



INTRODUCTION

THE infantryman entered the war in 1914 as a mobile rifleman ; he emerged in 1919, armed with a complicated variety of weapons and with a greatly impaired mobility. The change may be ascribed to three main causes. The offensive and defensive power of the infantry armament of 1914 was inadequate. The machine gun, from the outbreak of war, proved its superiority over all other infantry weapons and, as the war continued, the number of automatic guns with the infantry was progressively increased. In the second place, the static condition of trench warfare made necessary the introduction of special weapons such as hand grenades, smoke grenades and trench mortars. Finally, the advent of the tank and the developments in the use of aeroplanes rendered essential further types of weapons to counter these new antagonists of the infantry.

In determining the organization and the armament of post-war infantry, the difficulty has been to disentangle from the complexities, left by the war, those elements which have permanent significance for the future. The main question to be answered is whether the static conditions of the last war are to be a permanent feature of future wars between civilized nations. The answer is surely given by the tank which, through its immunity from machine-gun fire and its capacity for movement over all kinds of ground, has broken the rigidity characteristic of the last war. If this is accepted, it follows that it is essential that infantry regain their mobility if they are to fulfil the tasks called for by moving warfare.

The problem since the war has been to restore to the infantryman his former simplicity of weapons and with it his mobility, while leaving to him an

armament adequate in fire-power and adapted to deal with the various targets of the modern battlefield.

While mobility depends in the main on the weight of infantry armament as a whole, it is not a purpose of these notes to attack the problem in its widest aspect, and the remarks that follow will be confined to the automatic gun which, by many authorities, is held to be the main infantry weapon of to-day.

It is true that mobility is largely dependent on weight and any reduction of the loads carried by the infantry will give a corresponding increase in their mobility. But this reduction cannot be made at the expense of fire-power. Of the two main elements of infantry action—movement and fire—fire is, at least, as important as movement. Any attempt to economize in weight by reducing the number of automatic weapons carried with infantry would be to disregard entirely the lessons of the war. If a reduction of weight is to be sought, it must be by reducing the weight of the individual weapons themselves rather than by a reduction in their number.

The rôle of the automatic gun is to supply fire-power in attack and defence, and to economize man-power. The characteristic of the weapon is its power to deliver a volume of accurate and sustained fire which, owing to the ease of control, can be directed quickly against any desired object. This volume of fire is obtained by a detachment small in comparison with the number of riflemen required to produce an equal fire effect, and the heavy casualties of the modern shell- and bullet-swept battlefield are thereby avoided.

It has hitherto been the practice to employ two types of automatic weapon—the light automatic employed in the forward area against fleeting targets and the heavy machine guns used from a rear position to supply covering fire. This duality of weapons has been due to the fact that, on the one hand, the existing types of light automatics are not suited to deliver covering fire, partly owing to their inaccuracy at the longer ranges and partly because they are incapable of sustained fire, and, on the other hand, because the weight of the heavy machine gun makes it too cumbersome for use in the front line. It has for some considerable time been the aim of the soldier to do away with this duality by finding a weapon light enough to fulfil the functions of a light automatic and, at the same time, sufficiently reliable in action and accurate in fire to replace the heavy machine gun.

The substitution of one automatic gun of general use for two specialized weapons has solid advantages in the spheres of both training and supply.

Modern armies, in the majority of cases, consist of highly trained professional soldiers, who will form the nucleus of the national armies to be raised on the outbreak of war. The time available for the training of recruits, whether to replace the early casualties or to expand the armies, will be short. Any step to simplify training and to reduce the number of specialists will be in the right direction. A rapid and satisfactory training can only be given if it is of the simplest nature and concerned with a minimum of weapons.

The question of supply is of no less importance. The expanded armies will require equipping, and the manufacture of the weapons will be greatly facilitated and hastened if a single automatic gun of straightforward and simple design is to be supplied instead of several weapons of different types. Furthermore, uniformity in production reduces costs and saves money. The supply of spares to troops in the field will also become a simpler manufacturing and administrative problem. There can, in fact, be no doubt that uniformity in armament presents great advantages in the spheres of finance, manufacture and administration.

After a study of some years devoted to these questions, Messrs. Vickers-Armstrongs Limited, have now perfected an automatic weapon, the Vickers-Berthier Light Machine Gun, which, they believe, fulfils all the requirements of a modern army. The weapon is equally suitable for use as a light automatic gun, as a heavy machine gun, as an anti-aircraft weapon for use against low-flying aircraft, and as an aircraft observer's gun. It has a fire-power approximately the same as that of the existing types of heavy machine guns and its accuracy and reliability is at least equal to theirs. As regards the important factor of weight, the gun is lighter than the majority of light automatic guns now in use; together with its tripod it is approximately 50 per cent. lighter than the heavy machine gun and its mounting. The adoption of the weapon will, therefore, go an appreciable way towards reducing the load of the infantryman and machine gunner, and towards the restoration of their mobility. Apart from this, moreover, the lightness of the weapon, whether used as a light automatic or as a heavy machine gun, makes it much handier and quicker into and out of action than the existing types of these weapons.

In addition, the gun has other important advantages. Its construction and its service are extremely simple. This means not only economy in production, but ease in training. It is possible to teach any recruit its use in a



FIG. 2.

The Vickers-Berthier Light Machine Gun viewed from the left side with magazine detached.

very short space of time. It is so easy to shoot with that an adequate standard of accuracy can be reached very quickly by a man who has never before handled a gun.

A further advantage of the Vickers-Berthier Light Machine Gun is that it is air-cooled. Water cooling has no intrinsic merit and has only been employed hitherto because the existing air-cooled automatic guns have been unreliable in action and have overheated when called upon for sustained fire. The air-cooled gun is completely independent of water supplies and unaffected by temperatures; having no barrel-casing, it is less vulnerable; it develops no steam to betray its position; and, finally, it is much lighter than the water-cooled gun.

With small changes, the gun is adapted for use as an aircraft observer's automatic gun. The mechanism undergoes a slight modification, necessary to give the increase in the rate of fire demanded by the conditions of fighting in the air, and a new barrel and butt are provided. In all its essentials, however, the gun remains the same.

We thus have a weapon which is capable of use as a light automatic or a heavy machine gun on the ground, and as an observer's automatic gun in the air. In short, the weapon combines all the qualities demanded for a modern automatic gun. It is available for general use; it is light in weight; it is reliable in action and accurate in fire; and, finally, it is simple in design.

THE VICKERS-BERTHIER LIGHT MACHINE GUN



GENERAL CHARACTERISTICS

THE Vickers-Berthier Light Machine Gun is of the gas-operated type, in which a portion of the highly compressed gas, generated by the explosion of the charge, is used to operate the breech mechanism. The mechanism is strongly made and the rifle is reliable and capable of sustained fire for long periods without stoppage.

The feed is accomplished from a magazine, usually holding 30 rounds, which fits into an opening on top of the receiver. The magazine, which consists of a curved rectangular pressed steel case, is solidly made and will stand up to the rough usage of active service. The magazine can be changed in less than two seconds—the quickest change in the world.



FIG. 3.
Vickers-Berthier Light Machine Gun.

Left hand view showing gun as arranged for drum feed, with magazine feed adaptor removed.

If preferred, the gun can be manufactured to take a drum feed, the drum holding 60 rounds.

A special gun can also be supplied to accommodate either drum or magazine feed by means of an adaptor which slides over the magazine opening.

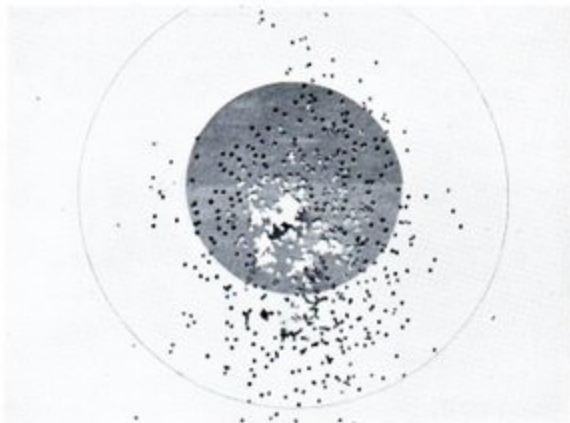


FIG. 4.

The Vickers-Berthier Light Machine Gun.

The target (12 in. — 30.4 cm. bull) after 1,000 rounds had been fired at 100 yards (91 metres) range in 6 mins. 30 secs. without change of barrel.

The characteristic features of the gun are its extreme simplicity and light recoil. The main parts can be mounted and dismantled without the use of tools; moreover, the parts are so constructed that incorrect assembly is impossible. Covers are provided, which completely protect the working parts from dirt during transport. The gun has clean lines and is without objectionable knobs or handles that fly backwards and forwards during firing. The recoil is so light that a large number of rounds can be fired by a man of small stature in one day without undue fatigue.

The barrel is easily detachable and, when overheated, can be changed in about five seconds without being handled and without the necessity of dismantling other parts of the gun. While it is advisable that barrels should be changed after firing 240 rounds rapid fire, in order to prevent unnecessary wear, a barrel is nevertheless capable, in case of emergency, of firing 1,000 rounds without cessation between change of magazines and without cooling.

In order to meet the requirements of more sustained firing from one barrel, a type of barrel, heavier than the standard, may be fitted to the gun. This



FIG. 5.
Automatic Accuracy Test of the Vickers-Berthier Light Machine Gun.
The target (12 in. — 30.4 cm. bull) after firing. Range, 100 yards (91 metres).
This series was fired immediately after the 1,000 round series shown in Fig. 4
with the same gun and barrel.

barrel has a massive aluminium sleeve, which is very effective in absorbing the heat generated in the bore.

The main parts can be dismantled in 15 seconds and assembled in 25 seconds.

The extractor and ejector can be replaced externally without stripping the gun.

By a simple movement of a lever near the trigger, the gun can be used either as an automatic weapon, or for single shots. The lever is also used to set the gun to "safe." Used automatically, 300 rounds can be fired at a target in one minute. Used as a single-shot gun, 90 aimed shots can be fired in one minute.

On cessation of fire, the breech remains open and the barrel chamber empty. There is consequently no possible danger of accidental discharge or of a premature explosion taking place if the temperature of the barrel is high.

The gun can be manufactured to take any size of rifle calibre ammunition. The component parts of any one gun may be used in any other gun.

Used with its two folding legs, the gun performs the functions of a light machine gun. When mounted on its tripod, the gun replaces the existing types of heavy machine guns.

The standard of accuracy is the same as that of the British Service Rifle.

DATA FOR VICKERS-BERTHIER LIGHT MACHINE GUN

GUN.

Weight of gun complete	20 lbs. 14 ozs.	9.4 kgs.
Weight of barrel with handle	6 lbs. 10 ozs.	3.0 kgs.
Weight of gun complete with heavy barrel	25 lbs. 9 ozs.	11.6 kgs.
Weight of heavy barrel	11 lbs. 4 ozs.	5.1 kgs.
Weight of rear support	1 lb. 4 ozs.	0.5 kgs.
Length of gun complete with flash eliminator	46.7 ins.	1186 mm.
Length of barrel with flash eliminator	23.9 ins.	607 mm.
Length of barrel without flash eliminator	22.0 ins.	559 mm.
Height of axis of bore above ground	12.0 ins.	304 mm.
Rate of fire	450-500 rounds per min.	
Practical rate of fire	300 rounds per min.	
Time required to strip main parts	15 secs.	
Time required to assemble main parts	25 secs.	
Time required to change magazine	2 secs.	
Time required to change drum	5 secs.	

MOUNTING.

Weight of mounting	29 lbs.	13.2 kgs.
Range of elevation	- 5° to + 7.5°	
Range of traverse	20° right and left	
Height of axis of gun above ground—High position	28 ins.	711 mm.
Normal position	23 ins.	584 mm.
Low position	18 ins.	457 mm.
Height of pivot of gun for A.A. fire	56 ins.	1422 mm.
Time required to fix gun on mounting	5 secs.	
Time required to remove gun from mounting	5 secs.	
Time required to change mounting from ground fire to A.A. fire	15 secs.	
Time required to change mounting from A.A. fire to ground fire	15 secs.	

ACCESSORIES.

Weight of magazine—Empty	12 ozs.	0.34 kgs.
Full (30 rounds)	2 lbs. 7 ozs.	1.10 kgs.
Weight of Drum—Empty	3 lbs. 14 ozs.	1.76 kgs.
Full (60 rounds)	7 lbs. 5 ozs.	3.31 kgs.

METHODS OF USE

AS A LIGHT MACHINE GUN.

The gun is usually fired with the gunner in the prone position. In this case, the barrel is supported at a convenient height on the folding legs. Used in this manner, the weapon is particularly handy for engaging targets for which short bursts of fire are suitable. While this method gives excellent accuracy, a rear support with elevating gear, which can be inserted under the butt, is supplied for additional accuracy at the longer ranges.

The lightness and handiness of the gun allows it to be fired from the shoulder or the hip by the gunner when in the standing or kneeling position.

AS A HEAVY MACHINE GUN.

When mounted on the tripod, the gun can carry out all the functions of a heavy machine gun. For periods of sustained rapid fire, the practical rate of fire is 300 rounds per minute, which includes the time needed to change the magazines and the barrel. This is the same as the normal rate of rapid fire of a water-cooled machine gun. This rate can be sustained as long as the situation demands it.

It may here be mentioned that, in the case of a water-cooled gun, the water in the barrel-casing boils after about 600 rounds continuous fire and that the steam escaping from the jacket is liable to disclose to the enemy the position of the gun. Since this danger does not exist with the Vickers-Berthier Light Machine Gun, fire can be continued for an indefinite time.

The gun, mounted on the tripod, is excellent for indirect and overhead firing. For these purposes it is provided with a Dial Firing Sight and a Clinometer. If preferred, it can be fitted to take any of the modern sights of this type now in use.

It is essential in this class of firing that the mounting should be stable in order that a high degree of accuracy of fire should be attained. The tripod is, therefore, specially designed to give the necessary stability. In addition, the lightness of the recoil favours stability and makes the gun particularly suitable for this class of work.



FIG. 6.

The Vickers-Berthier Light Machine Gun converted for drum feed on light tripod mounting.
Left hand side view. Cradle in high position.

AS AN ANTI-AIRCRAFT MACHINE GUN.

For anti-aircraft fire, a special A.A. Sight is fitted to the gun, and an adjustment is made to the tripod which enables the gunner to aim comfortably in the standing position.

COMPARATIVE WEIGHTS.

In the following table the weights of typical heavy machine guns (water-cooled) are compared with the weight of the Vickers-Berthier:—

<i>Gun.</i>	<i>Weight of Gun.</i>	<i>Weight of Tripod.</i>	<i>Total.</i>
Vickers	19.0 kgs.	21.8 kgs.	40.8 kgs.
Browning	16.6 kgs.	25.4 kgs.	42.0 kgs.
Hotchkiss	23.6 kgs.	31.7 kgs.	55.3 kgs.
Vickers-Berthier	9.4 kgs.	13.2 kgs.	22.5 kgs.



FIG. 7.
The Vickers-Berthier dismounted to show the main parts.

GENERAL DESCRIPTION

The gun can be divided into five principal groups, viz. :—

- (i) Barrel with gas block, regulator, foresight, flash eliminator and carrying handle.
- (ii) Receiver with rear sight, ejector, cocking handle, barrel locking pin.
- (iii) The mechanism, consisting of bolt with extractor, feed piece and firing pin, and piston.
- (iv) Gas cylinder and bipod legs.
- (v) Butt with butt catch, pistol grip, trigger mechanism, return spring, and buffer spring.

GROUP I.

BARREL.

The barrel consists of the barrel proper with rifled bore, cartridge chamber and gas vent. It is secured to the receiver by radial lugs formed on the barrel itself, which engage in corresponding recesses cut in the receiver. The barrel is finally retained by an L-shaped lug, which engages with a similar lug formed on the gas cylinder. This guide is moved longitudinally to secure or release the barrel by turning the barrel locking-pin on the left side of the receiver. Each barrel is fitted with a carrying handle which is used primarily for removing and replacing the hot barrel. This handle turns freely on the barrel axis, and, in its uppermost position, may be used for carrying the gun. In its locked underside position it serves as a front handguard.

GAS REGULATOR.

The gas regulator offers a ready means of adjusting the gun to varying climatic conditions. By the aid of a special tool the regulator may be turned to any one of five positions, 0 to 4. This ensures a method of providing a variable outlet for surplus gas.

GROUP II.

RECEIVER.

The receiver forms the body of the gun and contains the recoiling mechanism and ejector. Its front end is arranged to receive the rear of the barrel and gas cylinder, whilst its rear end supports the butt and trigger mechanism.

GROUP III.

THE MECHANISM.

The mechanism is extremely simple and consists of only two main pieces—the bolt and the piston.

GROUP IV.

GAS CYLINDER.

The gas cylinder connects the back of the gas block to the receiver and serves to guide the piston during its backward and forward travel.

BIPOD LEGS.

The bipod legs consist of a bracket (turning freely on the gas cylinder) to which are hinged two legs, each fitted with a foot. Between the legs a helical spring is placed to retain them in the open or closed position.

When not required, they are unlocked by bringing them together and swung upwards to the closed locked position alongside the gas cylinder.

MAGAZINE.

The magazine consists of a curved rectangular pressed steel case which is usually constructed to hold 30 rounds. The cartridges are fed downward by a spring controlled platform which is provided with two short side extensions that travel in grooves formed in the side walls of the magazine. These extending pieces operate the breech catch at the moment when the last cartridge has been displaced from the magazine.

DRUM.

The magazine drum, holding 60 rounds, is pan shaped and is locked into position on top of the receiver by means of spring catches. Inside the pan a plate (containing the cartridge separators) revolves under the action of a powerful coiled flat spring. Each cartridge is fed down into the drum-mouth by a helical screw guide and, as each cartridge is pushed out and fed into the barrel chamber, another cartridge takes its position in the drum-mouth, until the drum has been emptied.

ACTION OF MECHANISM

TO LOAD THE GUN.

The magazine is placed in position above the breech opening, where it is secured by a spring-operated catch. The cocking handle is withdrawn as far as possible and then pushed forward to its normal position, where it remains while the gun is firing. In case of a misfire, or if it is desired to extract a faulty round, the above movement of the cocking handle must be repeated.

TO FIRE THE GUN.

The fire change lever is set to "Automatic" or "Single" and the trigger pressed with a finger of the right hand. This action releases the piston (at the rear end of which is an actuating lug in engagement with the bolt containing the floating firing pin) which, under the energy of the recoil spring, drives home the bolt. At the forward end of the latter is a feed pawl, which engages with a cartridge in the magazine or drum mouthpiece and pushes it into the barrel chamber, the cartridge being guided by the bullet guide in the receiver body and forced down behind the extractor claw. As the bolt approaches the end of its forward movement, the rear end is deflected upwards by tenons on the piston post. This action disengages the bolt from the piston post and secures the bolt at its rear end; the piston, being free to go forward, strikes the floating firing pin and fires the round in the chamber.

RECOIL ACTION.

After the bullet has passed the gas vent hole in the barrel, the gases pass through the gas block and impinge on the piston, forcing it to the rear and thereby compressing the return spring.

The first rearward movement of the piston allows retraction of the floating firing pin from the empty cartridge case; the tenons on the piston post then force down the rear end of the bolt. This action unlocks the latter, which is driven rearward by the continued movement of the piston.

During the initial rearward movement, the empty cartridge case has been withdrawn from the barrel chamber by the extractor claws on the bolt and deflected through the breech opening by an ejector positioned inside the receiver.



FIG. 8.
The Barrel Change—First Stage.



FIG. 9.
The Barrel Change—Second Stage.

At the end of its maximum rearward stroke, the piston is stopped and is accelerated forward by a buffer spring fitted at the rear of the receiver, after which the cycle of movements previously described is repeated.

BARREL CHANGE.

Note.—The barrel cannot be put on or taken off with the mechanism in the forward position.

With the right hand, the handle is pushed forward and turned to its highest position (see Fig. 8).

The knob of the barrel key is pulled back with the left hand to disengage the catch and then raised to its highest position.

The barrel can now be removed from the receiver by an upward and backward lift on the handle (see Fig. 9).

TO REPLACE BARREL.

The barrel key knob must be in its highest position.

The breech end of the barrel is introduced into the receiver with the gas block downward and the muzzle is elevated so that the radial ribs and grooves can engage.

The muzzle is lowered into line with the gas cylinder.

The knob of the barrel key is turned down to the horizontal position and the catch is properly engaged.

The carrying handle is returned to its original position.

SIGHTS

FORESIGHT.

The foresight is fixed on the muzzle end of the barrel and is supported in a bracket, which is retained in position by a nut.

REAR SIGHT.

The rear sight is mounted at the rear of the receiver and hinges down on the top of the receiver, when not in use.

The sight (which is of the "peep-hole" type) is elevated by turning the milled head of a lead-screw at the top of the sight-stem and is graduated in yards or metres, as required.

Other types of sights can be fitted, if preferred.

SPECIAL SIGHTS—LAND SERVICE

A. INDIRECT DIAL SIGHT.

For the purpose of indirect firing, a special dial type sight is clipped into position in the magazine mouth of the gun.

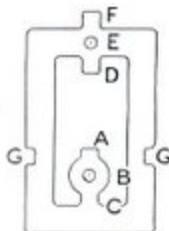
It consists of a ring carrying the sights proper, which can revolve on a centre plate attached to the gun. Graduated around the centre plate are divisions giving from 0° to 180° deflection each way. The plate itself is pivoted enabling it to be set horizontally when the gun is elevated or depressed. To facilitate this setting, a milled disc is fitted, which, when revolved in a clockwise fashion, tilts the plate upward and vice versa.

Clamping screws are provided to set the sight at any deflection, or level, and the sight arms are hinged, making the sight, in its closed position, very compact.

A clinometer, which fits into a bracket on the side of the receiver, is provided to give elevation.

B. NIGHT SIGHTS.

The Night Sights are in the form of plates which clip over the ordinary sights fitted to the gun. The rear plate has a "peep-hole" and is retained in position on the rear sight arm by a flat spring, enabling the night sight to be easily slipped on, or removed. The foresight plate is attached to the foresight bracket, in a similar way to the rear plate and, as shown in the diagram overleaf, gives correction for elevation, depression and deflection.



- Point A Normal sight.
- Point B Gives 30' elevation.
- Point C Gives 1° elevation.
- Point D Gives 1° depression.
- Point E Gives 1° 30' depression.
- Point F Gives 2° depression.
- Point G Gives 1° deflection (traverse).

The simplest method of night firing is to bring the gun into position and to lay it on the target by day; an aiming lamp is then put out on a target post at a suitable distance from the gun.

After dark, the sights are aligned on the lamp without altering the elevation of the gun. If the target is not visible, indirect means must be employed to lay the gun.

C. ANTI-AIRCRAFT SIGHT (FORWARD AREA TYPE).

This sight affords a simple means of obtaining effective fire against aircraft.

It is designed to give correction for the displacement of fast-moving aircraft, at the normal height and speed at which modern aircraft operate when within the range of machine-gun fire, and compensates for an approximate speed of 170-230 m.p.h. (270-370 km.p.h.). (The calculation is based on the use of British .303 in. Mark VII ammunition.)

The rear sight consists of a "peep-hole" ring attached to the bracket, which clips on to the side of the receiver.

The foresight has a large oval-shaped frame around an inner oval frame and sight centre, the whole of which is attached to a bracket capable of sliding along the gas cylinder of the gun and of maintaining its upright position. The outer oval frame is used for altitudes from 500 to 3,000 feet (150 to 900 m.) whilst the inner is used for altitudes up to 500 feet (150 m.). The bracket may be clamped in a rear or fore position on the gas cylinder to give further compensation for the speed of the target. When the sight is clamped in its foremost position the compensation is for a target speed of 170 m.p.h. (270 km.p.h.) with the target at 50° elevation and at a height of 1,000 feet (305 m.) and a range of 435 yards (400 m.). In its rear position the compensated target speed is 230 m.p.h. (370 km.p.h.) at the same elevation, height and range.

Given the approximate altitude of the target by the observer, the gunner chooses the oval on the foresight which most closely approximates to this altitude.

He then sights so that the target appears to be just touching the edge of the chosen oval, and flying directly towards the centre of the foresight.

Immediately the gun is correctly aimed, he fires in as long bursts as practicable, ever changing the position of the gun to maintain the correct sighting position.



FIG. 10.
The Vickers-Berthier on Tripod Mounting—Normal Position.

TRIPOD MOUNTING



FIG. 11.

The mounting folded for carrying.

GENERAL DESCRIPTION.

The Mounting is constructed for rapid setting and secure clamping in any position throughout the whole of its training and elevating movements.

The principal parts are a built-up gun cradle secured to a pivot cradle fork, which sockets into a tripod crosshead, to which are secured an adjustable telescopic front leg and a rear frame forming a sector, on which is fixed the traversing arc. Two adjustable rear legs are securely attached to the rear frame. The rear end of the cradle is connected to the traversing arc by an elevating screw and an arc slide. The cradle, in which the gun is fastened, can be elevated through an angle of -5° to $+7.5^{\circ}$ and can be traversed through 20° on either side of the centre line of the mounting.

The full elevation and traverse can be given in all the positions of the tripod, viz. :—

- (1) In the prone position with the traversing arc near the ground.
- (2) In the kneeling or sitting position when the rear legs are in prolongation of the sector frame.
- (3) When the front leg is horizontal and resting, for example, on the breastwork of a trench.

The gun can be roughly traversed by sliding the arc slider to the approximate angle on the graduated arc, and then lightly tapping on the end of arc slider handle to make the fine adjustments. The arc slider is then firmly locked to the arc by the clamp handle attached.

The elevating screw is used to give the required elevation. The screw has a single and double thread to give rapid or fine adjustment, and the handwheel can be firmly locked with a wing nut to prevent running back.

The graduations on the traversing arc allow the mounting to be used for indirect fire.

The legs and their fastenings to the sector frame are so made that the mounting can be adjusted for a sitting, kneeling or prone position of the gunner. The legs can also be adjusted separately so that the gun can be levelled on uneven ground.

The gun is attached at the front end of the cradle by a trunnion pivot and sliding slipper having a double spring buffer. This allows the gun to recoil and run out with added steadiness, thus improving the accuracy of the firing.

To fire the gun the gunner operates a firing gear, attached to the arc slider, by gripping the firing lever and handle together. This action pulls the Bowden cable, which, in turn, pulls the trigger rod passing round the trigger.

The tripod legs fold together closely for convenience of carrying.



FIG. 12.
The Vickers-Berthier on Tripod Mounting—Low Position.



FIG. 13.
The Vickers-Berthier in position for indirect firing. Note the dial sight and clinometer.



FIG. 14.

The Vickers-Berthier fitted with A.A. sights, on Tripod Mounting arranged for anti-aircraft use.

THE TRIPOD ARRANGED FOR ANTI-AIRCRAFT FIRE.

To use the mounting for anti-aircraft fire, the quick release pin is pulled out of the trunnion pivot attached to the slipper at the front end of the cradle, and the spring catch at the rear end of the cradle is pressed to release the butt from the butt pillar. The gun is then lifted from the cradle.

The mounting is now raised on its two rear legs, and the folding leg on the side of cradle is opened out and secured with a spring locking catch ; a new tripod is then formed.

The front leg clamp handle is now slackened and the leg is swung round into a vertical position. At the same time the lower handle is slackened and the leg is extended to the marked distance.

The trunnion spring pin is next withdrawn from the spade socket. This allows the spade to swing round and slide down the leg, leaving the trunnion pivot clear, ready to receive the gun, which is then put in position and secured with the trunnion spring pin.

The mounting and gun are now ready for anti-aircraft use.

90° elevation and 360° traverse are allowed for when the mounting is used for anti-aircraft fire.

THE VICKERS-BERTHIER AIRCRAFT OBSERVER'S AUTOMATIC GUN

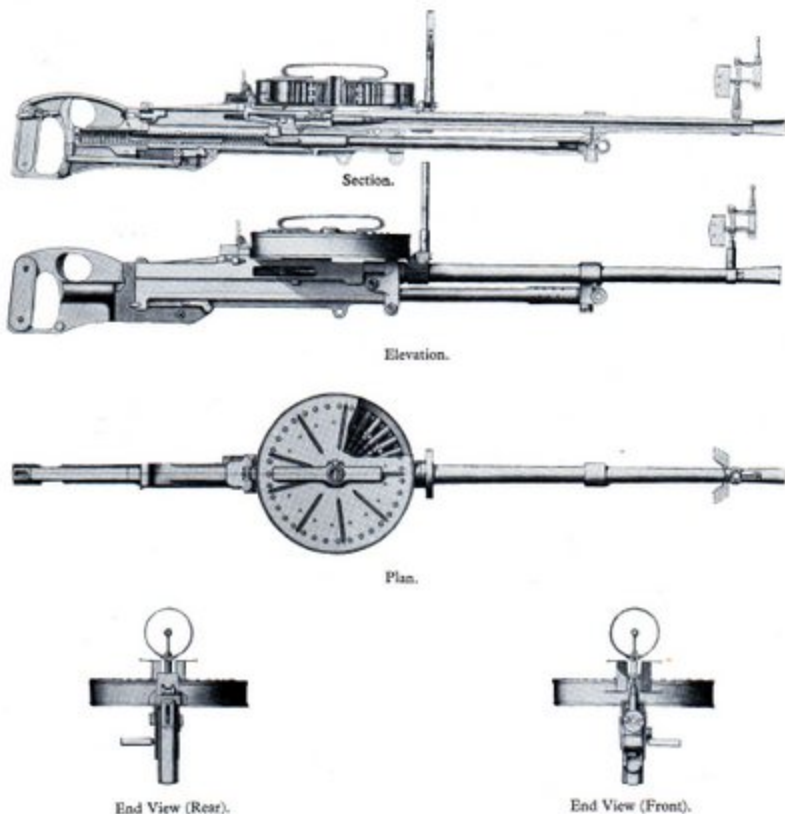


FIG. 15.
The Vickers-Berthier as an aircraft (observer's) automatic gun.

THE VICKERS-BERTHIER AIRCRAFT OBSERVER'S AUTOMATIC GUN

GENERAL DESCRIPTION

This gun, which is of rifle calibre, has been specially designed for the use of the observer in modern high-speed aircraft. Owing to its special characteristics, it can be fired from a light and compact type of mounting, thereby fulfilling an essential requirement of an observer's gun.

It represents an important advance in the design of an aircraft observer's gun. Although it is the smallest and lightest gun of this nature at present made, it is of robust and sturdy construction. It has a minimum of surface exposed to air pressure, is extremely simple in construction, while the number of its component parts is very small. It has the high rate of fire of approximately 900 rounds per minute, and a particularly smooth action which, combined with a very low pull of recoil, makes it easy to control and to aim with accuracy.

Like the Land Service Gun it can be assembled or dismantled for cleaning, or for other purposes, without the aid of any special tools.

A safety arrangement, positioned close to the trigger in the spade-shaped handle grip, is provided to prevent any possibility of accidental firing of the gun.

The receiver and mechanism of this gun are similar to the corresponding parts of the Land Service Gun, and many of the component parts of these portions of the two types are interchangeable.

SIGHT : AIR SERVICE.

Because the observer's gun must be capable of firing in all directions, some means of compensating for the speed of the aircraft is necessary when firing at an angle to the line of flight.

The Norman Vane Foresight fitted to this gun automatically gives the compensation necessary. It consists of a bead and a vane mounted one on

each side of a central rotating pillar which has gimbals to allow for vertical and lateral movement. The vane is acted upon by the air pressures so that the axis of the vane sight is always parallel to the line of flight. A ring sight, interposed between the gunner's eye and the foresight, gives correction for the enemy's speed.

DATA OF THE VICKERS-BERTHIER AIRCRAFT OBSERVER'S AUTOMATIC GUN.

Weight of gun complete with cartridge bag, but without magazine	18 lbs. 4 ozs.	8.38 kgs.
Weight of drum—Empty (100 rounds type)	5 lbs. 3 ozs.	2.3 kgs.
Empty (60 rounds type)	3 lbs. 14 ozs.	1.76 kgs.
Full (100 rounds type)	10 lbs. 13 ozs.	4.9 kgs.
Full (60 rounds type)	7 lbs. 5 ozs.	3.3 kgs.
Rate of fire	approximately 900 rounds per minute.	



FIG. 16.
Two Vickers-Berthier Aircraft (observer's) automatic guns on twin mounting.

TRANSPORT

The methods of carriage are :—

- (1) On the men (infantry).
- (2) On pack saddle (infantry).
- (3) On saddles (cavalry).
- (4) On light armoured vehicles such as the Carden-Loyd, Mark VI.

In method (4) the gun can be fired from the vehicle or brought into action quickly and easily on the ground.

The dispositions of the loads and the weights in methods (1), (2) and (3) are as follows :—

INFANTRY LOADS

GUN LOAD.		<i>lbs.</i>	<i>kgs.</i>
Web equipment with 2 breast pouches for one magazine each, haversack and water-bottle (empty)	4.2	1.9	
Two magazines with 60 rounds	5.0	2.3	
Gun	20.8	9.4	
Tool wallet	2.0	0.9	
	<hr/>	<hr/>	
	32.0	14.5	
SPARE BARREL LOAD.			
Web equipment with 2 breast pouches for one magazine, haversack, water-bottle (empty), and one haversack for 6 magazines	6.0	2.7	
Eight magazines with 240 rounds	19.5	8.8	
Spare barrel with rear support in leather case with sling	10.1	4.5	
	<hr/>	<hr/>	
	35.6	16.0	
AMMUNITION LOAD.			
Web equipment (including 2 breast pouches for one magazine each), haversack, water-bottle (empty), and 2 haversacks holding 6 magazines each	7.2	3.3	
Fourteen magazines with 420 rounds	34.3	15.5	
	<hr/>	<hr/>	
	41.5	18.8	

PACK SADDLE LOADS (INFANTRY).

LOAD 1.

<i>Near Side.</i>	<i>lbs.</i>	<i>kgs.</i>	<i>Off Side.</i>	<i>lbs.</i>	<i>kgs.</i>
Gun in case with tool wallet	27.0	12.2	One spare barrel in case with rear support	11.2	5.1
One metal magazine case (to hold 20 magazines in two removable metal trays) ...	28.2	12.7	One metal magazine case (to hold 20 magazines in two removable metal trays) ...	28.2	12.7
20 magazines filled with 600 cartridges	48.8	22.1	20 magazines filled with 600 cartridges	48.8	22.1
Two metal trays (carried in magazine case)	4.0	1.8	Two metal trays (carried in magazine case)	4.0	1.8
	<hr/>	<hr/>		<hr/>	<hr/>
	108.0	48.8		92.2	41.7
Total weight, exclusive of pack saddlery	200.2 lbs.		90.5 kgs.		

INFANTRY LOADS



FIG. 17.
The Gun Load.

Note.—The barrel illustrated is not
the standard pattern.



FIG. 18.
The Spare Barrel Load.



FIG. 19.
The Ammunition Load.

PACK SADDLE LOADS (INFANTRY)—*continued*

LOAD 2.

On Top Tripod				...	...	...	...	26.5 lbs.	11.9 kgs.
<i>Near Side.</i>								<i>Off Side.</i>	
	<i>lbs.</i>	<i>kgs.</i>						<i>lbs.</i>	<i>kgs.</i>
One metal magazine case (to hold 20 magazines) ...	28.2	12.7		One metal magazine case (to hold 20 magazines in two removable metal trays) ...	28.2	12.7			
20 magazines filled with 600 cartridges ...	48.8	22.1		20 magazines filled with 600 cartridges ...	48.8	22.1			
Two metal trays (carried in magazine case) ...	4.0	1.8		Two metal trays (carried in magazine case) ...	4.0	1.8			
	<u>81.0</u>	<u>36.6</u>			<u>81.0</u>	<u>36.6</u>			
Total weight, exclusive of pack saddlery ...				...	...	...	...	188.5 lbs.	85.1 kgs.

CAVALRY LOADS

LOAD 1—GUN LOAD.

<i>Near Side.</i>								<i>Off Side.</i>	
	<i>lbs.</i>	<i>kgs.</i>						<i>lbs.</i>	<i>kgs.</i>
Spare barrel with handle ...	6.6	3.0		Gun with barrel ...	20.8	9.4			
Spare barrel case ...	2.3	1.0		Leather gun bucket ...	3.5	1.6			
Ammunition pouch to hold two magazines ...	0.7	0.3		One ammunition pouch to hold two magazines ...	0.7	0.3			
Two magazines filled with 60 cartridges ...	5.0	2.3		Two magazines filled with 60 cartridges ...	5.0	2.3			
Sword and kit ...	14.0	6.2							
	<u>28.6</u>	<u>12.8</u>			<u>30.0</u>	<u>13.6</u>			
Total weight, exclusive of saddlery ...				...	...	...	...	58.6 lbs.	26.4 kgs.

LOAD 2—AMMUNITION LOAD.

<i>Near Side.</i>								<i>Off Side.</i>	
	<i>lbs.</i>	<i>kgs.</i>						<i>lbs.</i>	<i>kgs.</i>
One front pouch (to hold two magazines) ...	0.7	0.3		One front pouch (to hold two magazines) ...	0.7	0.3			
One ammunition case (to hold six magazines) ...	2.8	1.3		One ammunition case (to hold six magazines) ...	2.8	1.3			
Eight magazines filled with 240 cartridges ...	19.5	8.8		Eight magazines filled with 240 cartridges ...	19.5	8.8			
	<u>23.0</u>	<u>10.4</u>			<u>23.0</u>	<u>10.4</u>			
Total weight, exclusive of saddlery ...				...	...	...	...	46.0 lbs.	20.8 kgs.

Note.—The above arrangements of loads are given as examples, and can be varied to suit individual requirements.

CAVALRY LOADS



FIG. 20. The Gun Load.



FIG. 21. The Ammunition Load.

Printed in England by
Gale & Polden, Ltd.,
Wellington Works,
Aldershot.

