

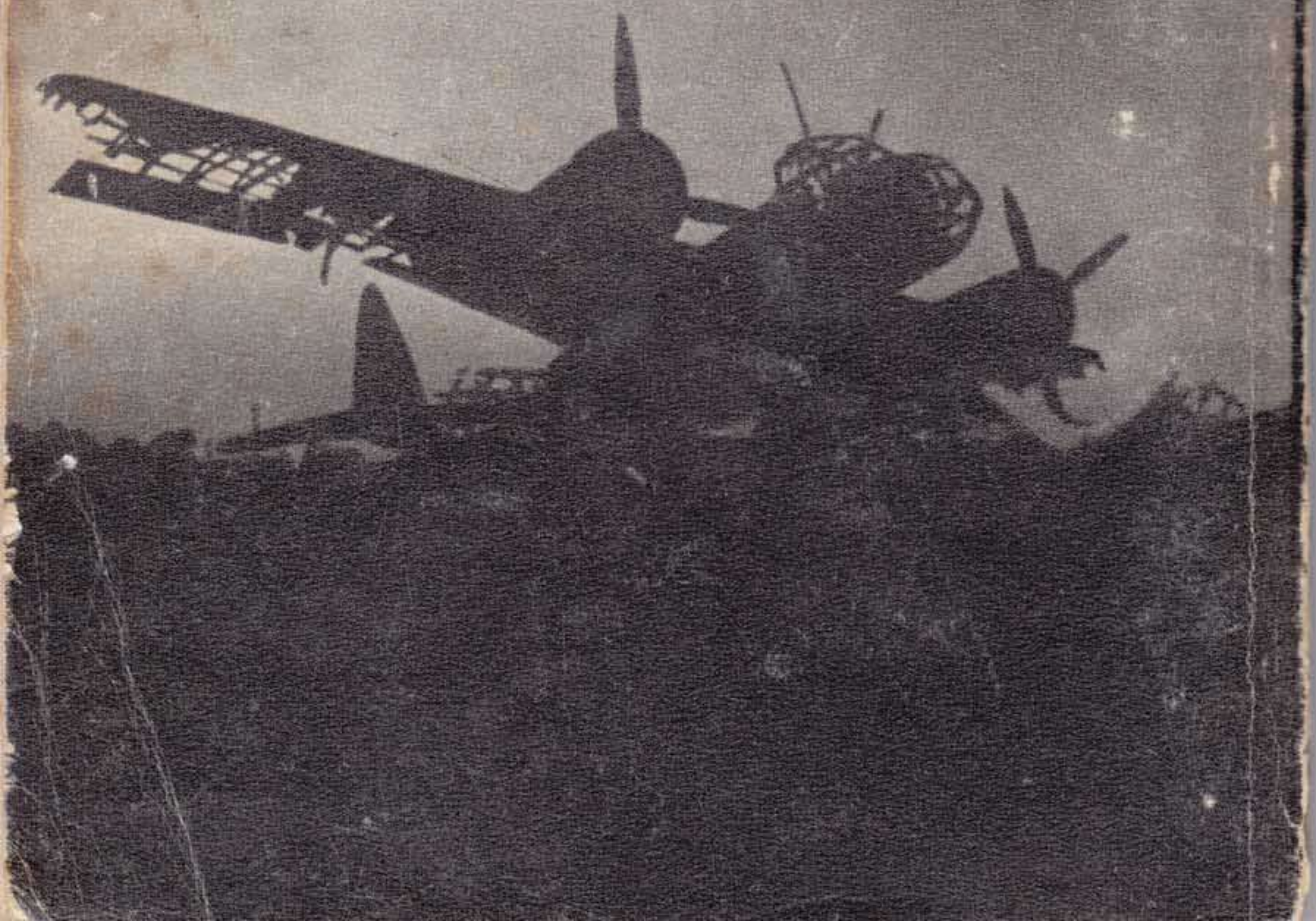
# ROOF OVER BRITAIN



THE OFFICIAL STORY OF THE A.A. DEFENCES, 1939-1942



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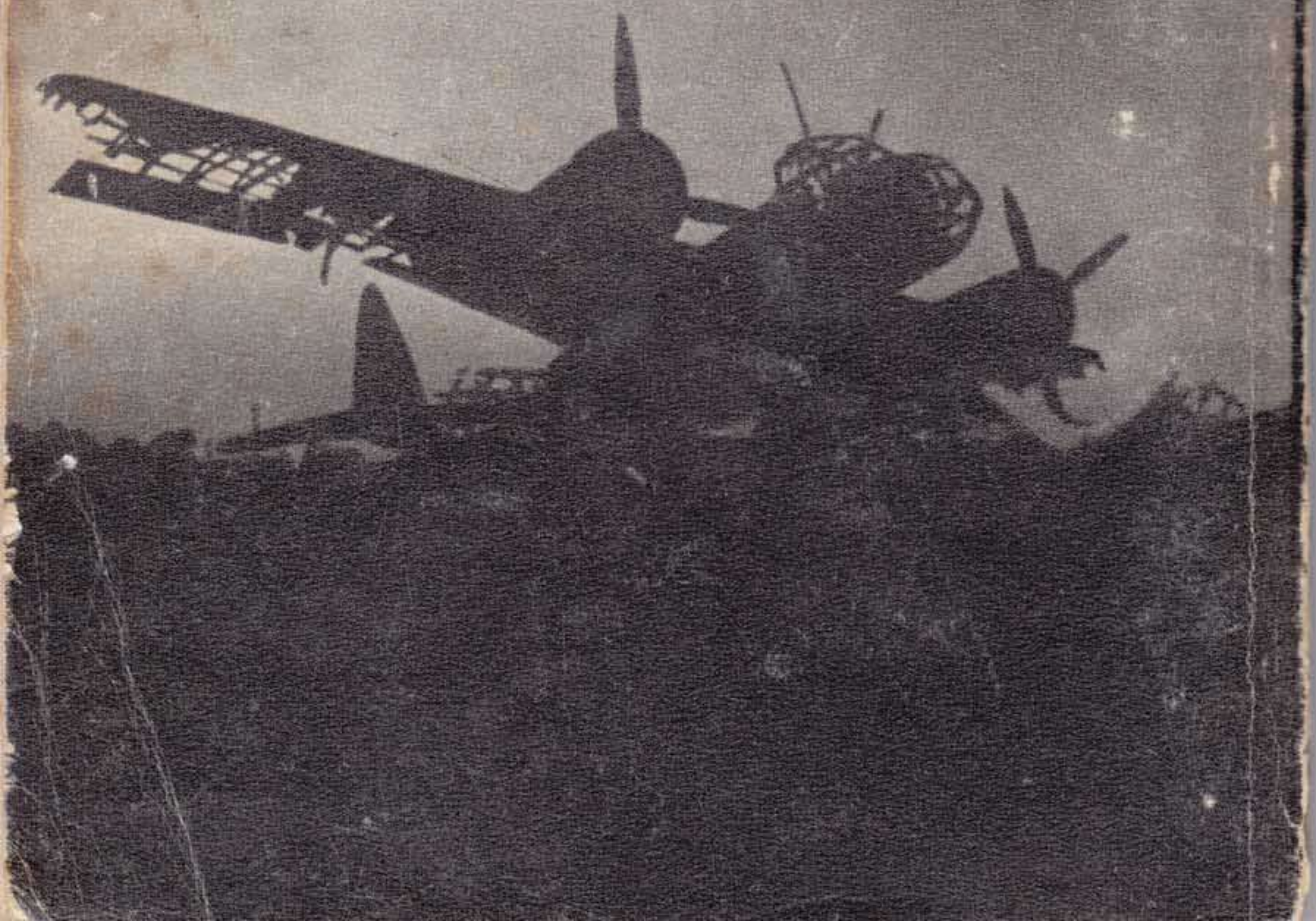
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HOSTILE  
AIRCRAFT

OBSERVER  
POST

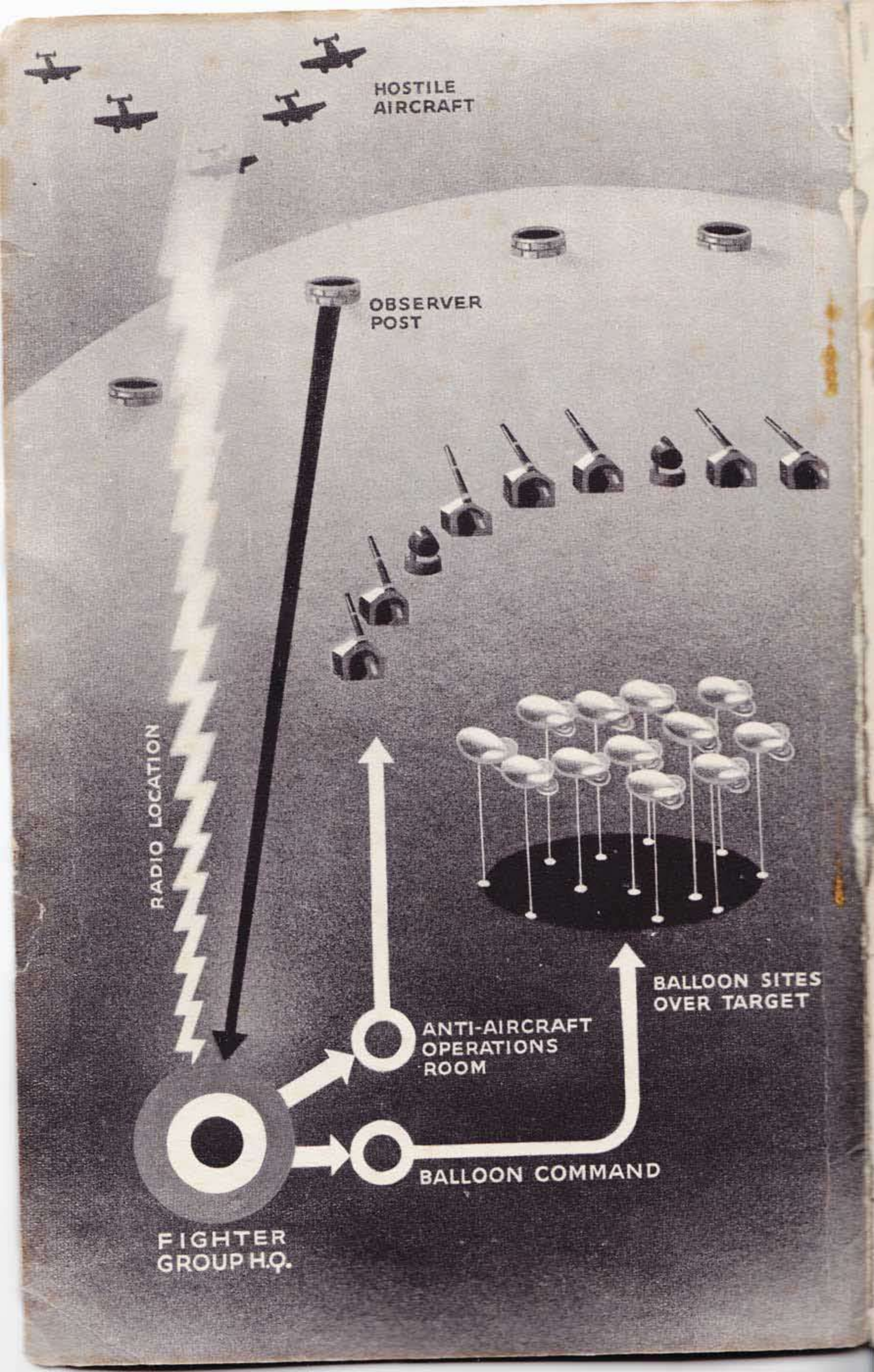
RADIO LOCATION

ANTI-AIRCRAFT  
OPERATIONS  
ROOM

BALLOON SITES  
OVER TARGET

BALLOON COMMAND

FIGHTER  
GROUP H.Q.





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# ROOF OVER BRITAIN

THE OFFICIAL STORY OF BRITAIN'S

ANTI-AIRCRAFT DEFENCES 1939-1942

*Prepared for*  
THE WAR OFFICE  
*and*  
THE AIR MINISTRY  
*by*  
THE MINISTRY OF INFORMATION

1943

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LONDON: HIS MAJESTY'S STATIONERY OFFICE



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## ILLUSTRATIONS

- |                              |   |
|------------------------------|---|
| <i>Inside front cover</i>    | The System of A.A. Defence  |
| <i>Between pp. 32 and 33</i> | A 3·7 gun detachment<br>A heavy battery of 4·5s<br>The machine that calculates<br>The ears that listen<br>“ Elephant’s Child ”  |
| <i>Between pp. 48 and 49</i> | Battle of Britain<br>Field watching-post<br>Plotting board<br>Hitting back at the Luftwaffe<br>Looking for trouble<br>“ There was an almighty explosion ”<br>Good shooting !<br>A Messerschmitt 109 shot down |
| <i>Between pp. 64 and 65</i> | Anti-aircraft women of the A.T.S.<br>Aircraft recognition<br>Filming the bursts<br>“ Women gunners are not trained for fun ”<br>“ The girls cannot be beaten in action ”                                      |
| <i>Between pp. 80 and 81</i> | Putting the balloons to bed<br>Messerschmitt shoots down balloon<br>A balloon is struck by lightning<br>The convoy flies its protective barrage<br>The W.A.A.F. takes over                                    |
| <i>Inside back cover</i>     | General Sir Frederick Pile  |

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There are many men and women in the Forces who would welcome a chance of reading this book. If you hand it in to the nearest Post Office, it will go to them.

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## Foreword

THIS BOOK supplements and continues the story of how the R.A.F. defeated the attack of the German Air Force during the autumn of 1940. Much of the air fighting has already been described in "The Battle of Britain." But the fighter squadrons never constituted the whole of our defensive system. It has therefore been thought worth-while to give some account of the other materials which went to the making of the "Roof over Britain"; and the War Office and Air Ministry have combined to tell the story of the static defences—A.A. guns, searchlights, balloons and the Royal Observer Corps. Captain Anthony Cotterell was kindly lent by the Army Bureau of Current Affairs to write the Army part of the story and the Air Ministry compiled the story of the balloons.

At the beginning of the war the roof was only a fairly tough framework. With the exception of Germany, no nation in the world at that time had an even approximately complete system of anti-aircraft defences; we were certainly, after—a long way after—Germany, the best prepared. Moreover, one of the most creditable parts of the story is the speed at which our defences were developed. The Prime Minister has well described the character of a munitions programme:—"The first year—nothing at all; the second year—very little; the third year—quite a lot; the fourth year—all you want." If September 1938, with its rather humiliating improvisations, be taken as the starting date, it will be seen that the development of our anti-aircraft defences has been better than scheduled. So this story is worth telling as a story of efficiency.

It is worth telling for another reason. Though their story is not dull, the life and the work of the men and women of the static defences very often contains every element of exasperation. They have had to fight the canker of armies, monotony—often in isolated stations far from their own homes and from anybody's home. Their victory over monotony is described in these pages.

The reader will observe that there are holes in the story, though not in the roof. Just as the static defences were complementary by day to our fighter squadrons, so by night they are complementary to our night-fighters. Some stories of the exploits of night-fighters have been published in the Press, and have told the enemy only what they already know—namely, that our night-fighters are as skilled and courageous as other sections of the R.A.F. But exactly



how night-fighters bring the enemy down would be most useful knowledge, and must be denied to him.

Again, since the book deals with the A.A. Defences of Great Britain, no mention has been made of the large numbers of trained A.A. regiments supplied by A.A. Command for service overseas. It is worth noting, however, that the roof over Britain was built simultaneously with roofs over many other places. Some of the strain has recently been taken by the Home Guard, whose progressively more valuable work must also be reserved for fuller and separate treatment.

Some readers may think there is another gap in the story, because it does not deal in any way with the Civil Defences. This gap has been deliberately left. The Civil Defences have their own story to tell, and a magnificent one it is—so magnificent that they have been left to tell it themselves.

## 1. "It isn't easy to shoot down a 'plane'"

ON A NIGHT in March, 1941, the Battery Commander responsible for the A.A. defence of the Widnes area made out the following incident report :—

" 21.25 hours—An aircraft blew up in the air, bearing 290.

" 21.30 hours—An aircraft was seen surrounded by a shell burst and lit up with an orange glow.

" 21.35 hours—An aircraft crashed in flames, bearing 240—distance about 3 miles."

The 'plane referred to in the last two extracts, a Heinkel III, pitched in a sports field on the town's outskirts. It burned luridly, consuming the pilot ; but three members of the crew who baled out were captured. The 'plane had first been hit by an anti-aircraft shell, causing loss of height and speed ; then a night-fighter had picked it up and fired from point-blank range ; and finally, when its fall had become a scream of punctured engines, the 'plane had struck a barrage balloon cable.

That is an example of the Air Defence of Great Britain—A.D.G.B.—in the full flower of co-operative function. Fighter Command is the main defence of Britain ; but Fighter Command could not survive without A.A. Command, and that is what we are concerned with here—the story of our anti-aircraft guns and searchlights.

It isn't easy to shoot down a 'plane with an anti-aircraft gun. With a field gun, sitting still, shooting at a fixed target, mathematically you only expect one hit in a hundred rounds. There are several



reasons why this should be so ; for instance, atmospheric conditions, such as a belt of moisture, deflect the shell in its flight ; and with each shot the charge burns a little differently.

The anti-aircraft problem is more complicated. Instead of sitting still, the target is moving at anything up to 300 m.p.h. with the ability to alter course left or right, up or down. If the target is flying high it may take 20 or 30 seconds for the shell to reach it, and the gun must be laid a corresponding distance ahead. Moreover the range must be determined so that the fuse can be set, and above all, this must be done continuously so that the gun is always laid in the right direction. When you are ready to fire, the 'plane, though its engines sound immediately overhead, is actually two miles away. And to hit it with a shell at that great height the gunners may have to aim at a point two miles farther still. Then, if the raider does not alter course or height, as it naturally does when under fire, the climbing shell and the bomber will meet. In other words the raider, which is heard apparently overhead at the Crystal Palace, is in fact at that moment over Dulwich ; and the shell which is fired at the Crystal Palace must go to Parliament Square to hit it. It is like shooting a pheasant with a rifle in the dark. Perfect team work is necessary. Any single man, from the man who sees the 'plane and decides it is hostile (a testingly responsible decision), to the man who pulls the firing lever, can wreck the shoot.

So it is not bad going that three times our A.A. gunners have shot down more than 50 German 'planes over this country in a week, and that during one week they shot down 70. During their most successful 24 hours, August 15th, 1940, they destroyed 23 enemy 'planes, this bag being contributed to by gun batteries in seven towns from Dundee to Dover. Eleven were brought down at Dover, seven on Tyneside and Teeside, and the rest at Southampton, Harwich and Dundee.

A fortnight later, on August 31st, 21 were shot down, 16 of them in 90 minutes during the evening blitz. During the whole of 1940, A.A. batteries in the British Isles shot down  $444\frac{1}{2}$  enemy aircraft. The odd half represents the A.A. gunners' share in an enemy bomber which was finished off by fighters after it had been winged by a near miss from a ground battery. These figures do not include the many probables which limp out over the coast and crash unwitnessed in the sea.

During the first two years of war just on 600 'planes were shot down by A.A. fire over this country, and during the same two years fighter 'planes destroyed 3,900. So, roughly speaking, the guns bring down one 'plane for every six shot down by fighters. The



ratio varies. In March and April, 1941, it was one to the guns and two to the fighters. Every third aircraft shot down was shot down by the guns.

*To disturb the aim and deter the faint-hearted*

A more important criterion of efficiency is how our A.A. fire compares with the German A.A. fire. This is a difficult question to answer.

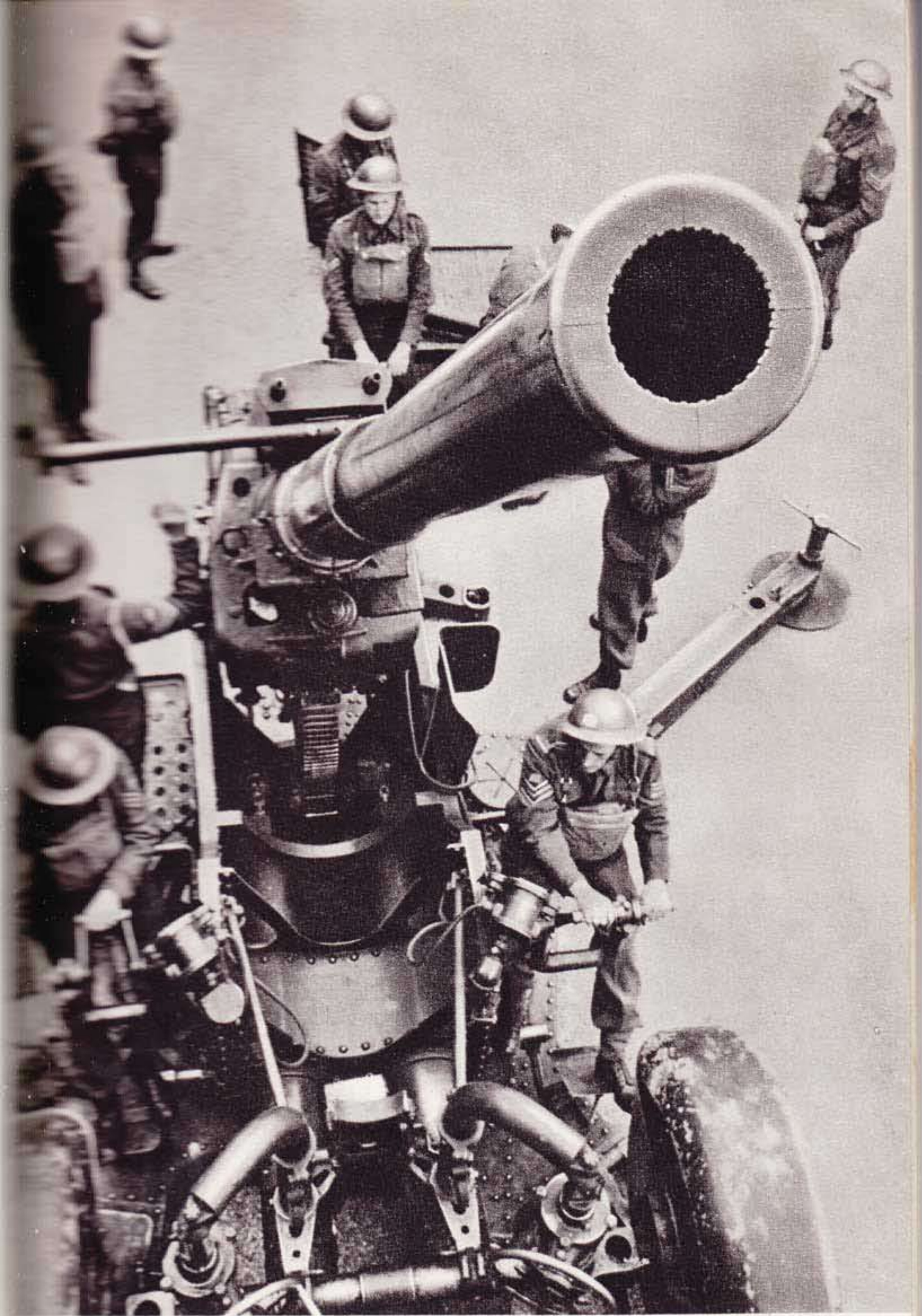
But certainly it is true that our bomber losses are lower than the enemy's *known* losses in proportion to the number of 'planes used. Let us take one example of our losses in man-power, for the loss of trained crews is in every way more serious than the loss of machines. In the big four-figure raid on Cologne, the target was attacked by about 6,000 men (slightly less than the bayonet strength of a Division of infantry). They suffered between 300 and 400 casualties only. This in spite of the fact that our bombers usually attack at lower heights than the enemy in order to ensure greater accuracy, and in consequence tend to provide better targets than the German bombers over here. In contrast, on the great day of September 15th, 1940, the Germans attacked with between 2,000 and 3,000 men, and lost between 600 and 700 of them.

German respect for our A.A. defences started low but has flourished and grown. The first-class enemy pilots keep on with their job, the others don't. If a man is wondering whether he has got to take avoiding action he is not going to concentrate on hitting Buckingham Palace or the War Office ; he is going to be jinking about, and his aim will be disturbed at a critical moment. That is one of the main functions of Anti-Aircraft Command—to disturb the aim and deter the faint-hearted. The number of planes shot down is by no means the only measure of anti-aircraft efficiency and value.

Life is easy when there are plenty of 'planes to shoot down ; it is not so obviously worth while to men who have had to wait months, perhaps years, for the opportunity to fire at an enemy 'plane at all. Months, or years, of the most demoralising dullness, during every hour of which it is necessary to behave as if the enemy were expected at any minute. And when, finally, the enemy 'plane does arrive, it may be only possible to fire at it for a few seconds ; or, perhaps, because our own 'planes are in the neighbourhood, they may not be allowed to fire at all.

Conditions of life in the A.A. Command are much more difficult than is generally imagined even by the rest of the Army. The men must be in constant and instant readiness, all through the day ;

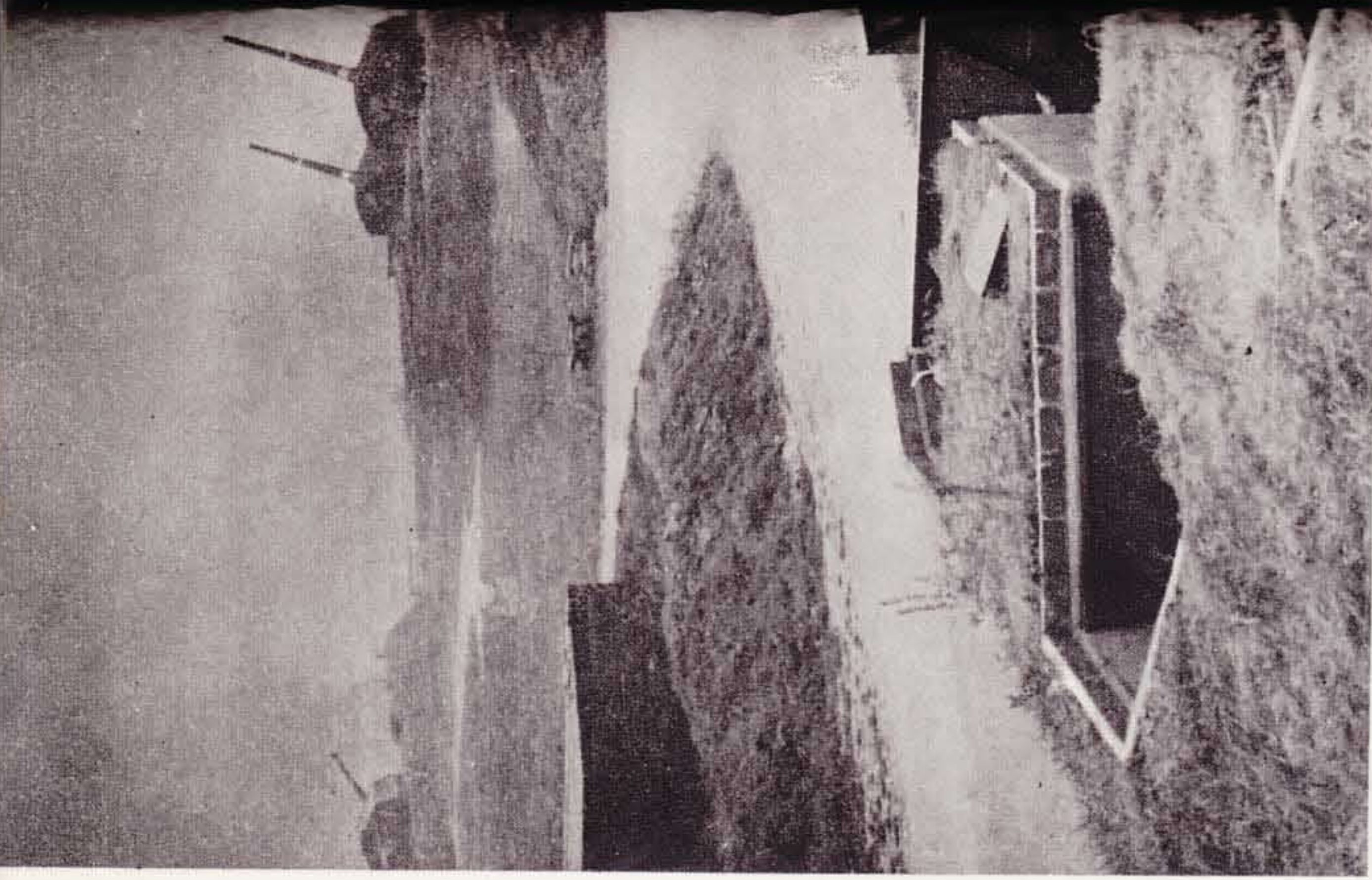




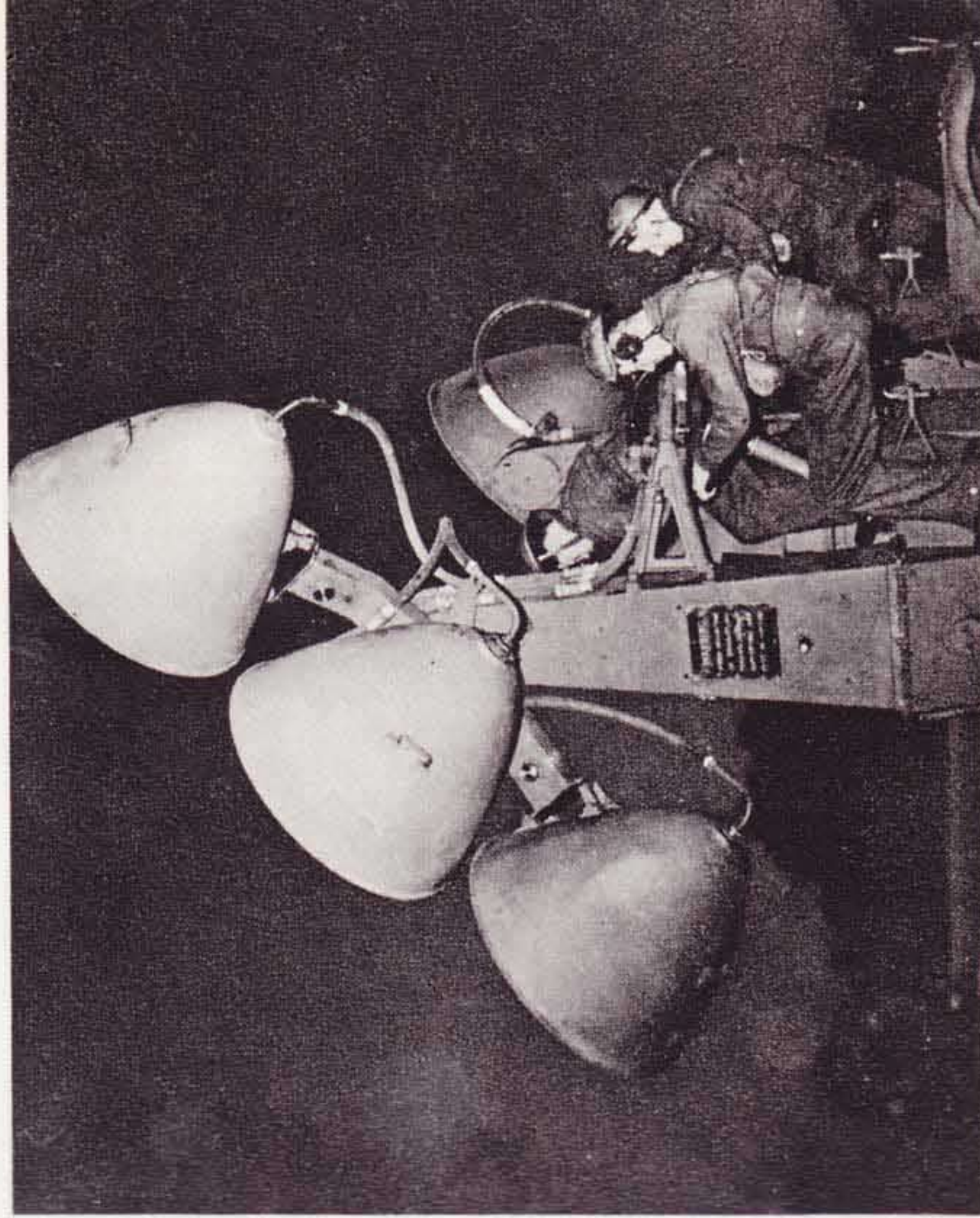
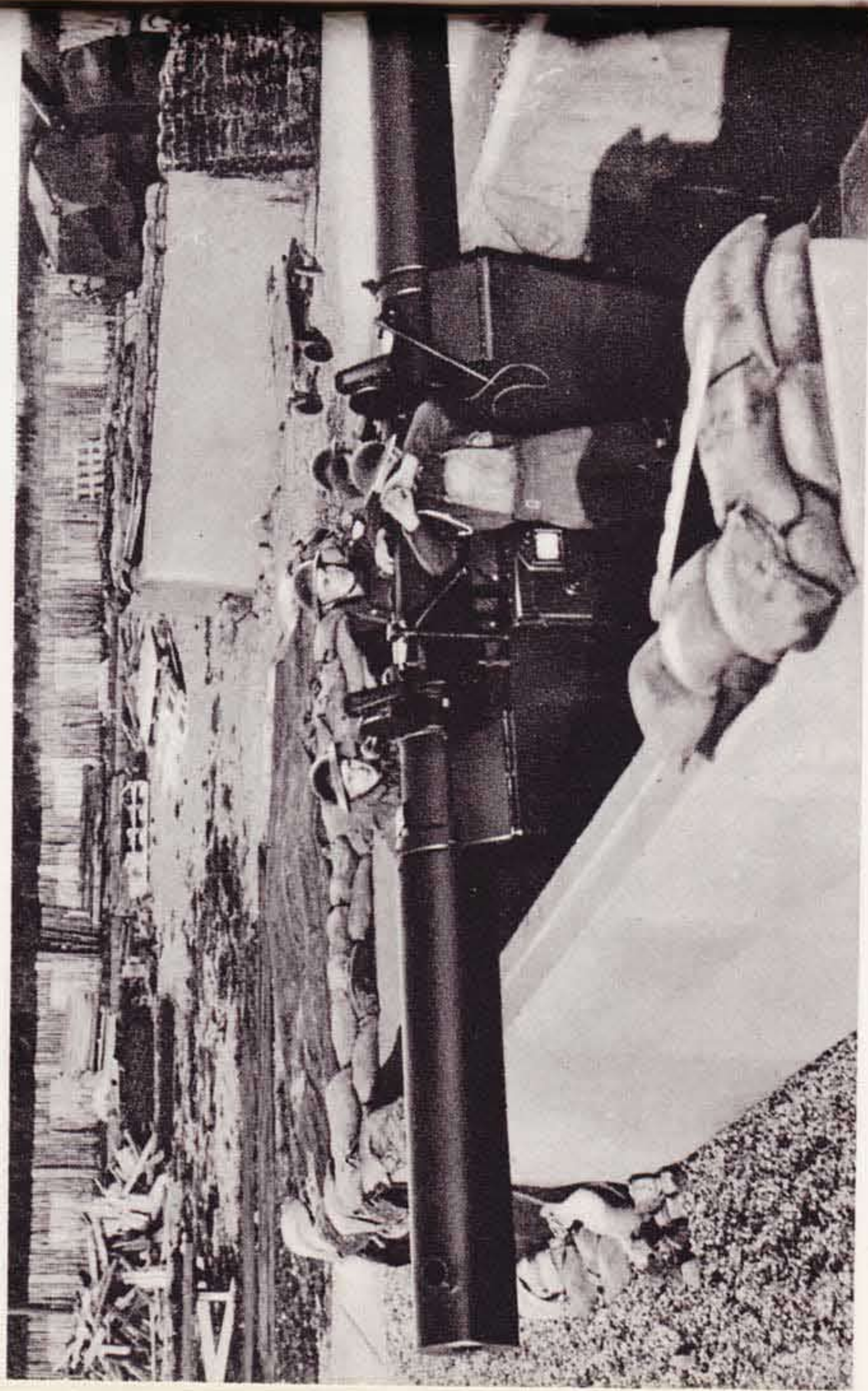
**On Target !** A 3.7 gun detachment at battle practice. In the foreground, two gunners adjust bearing and elevation as transmitted by the predictor. The Sergeant, back to camera, is ready to give the signal to fire.



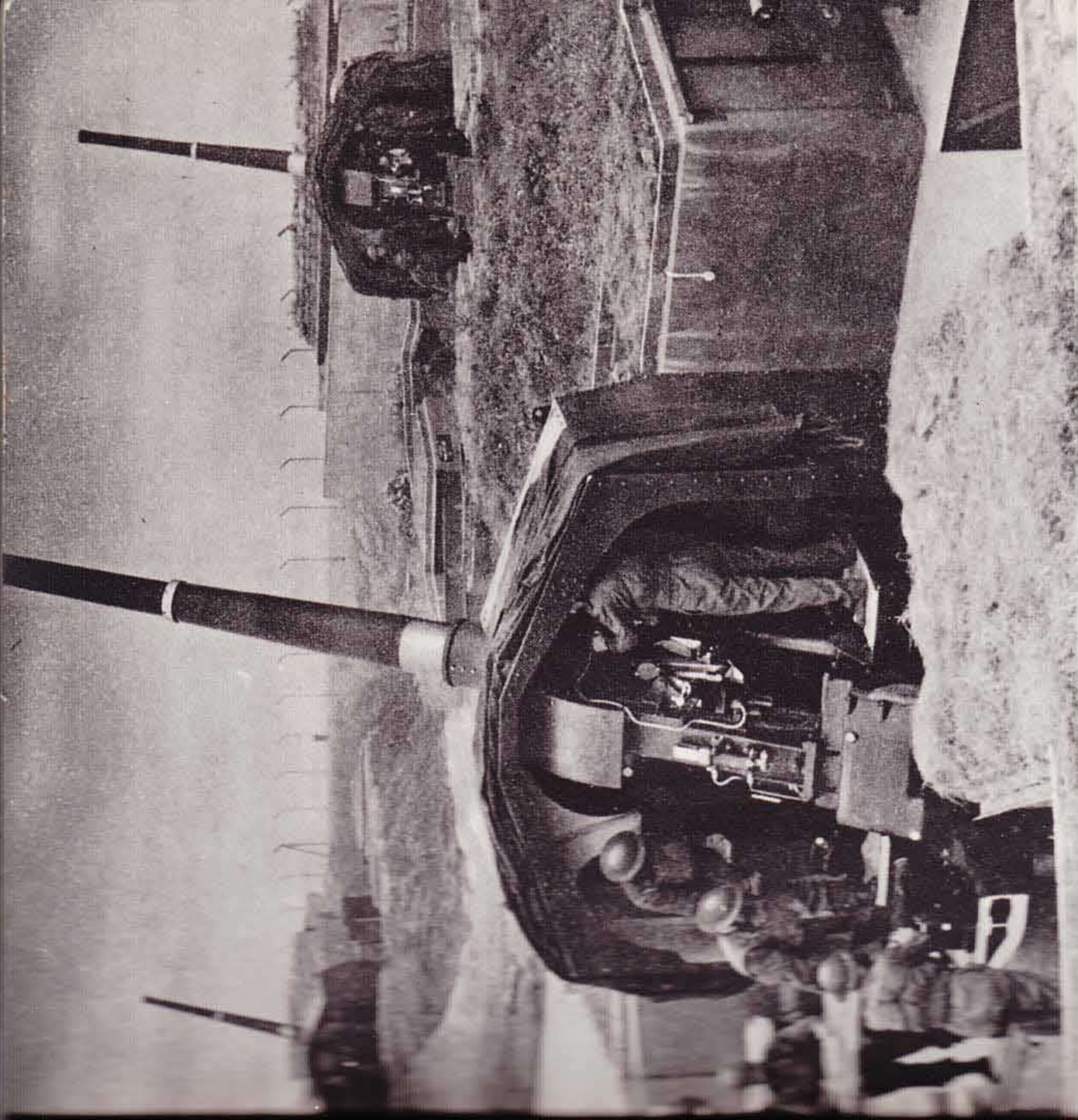
A heavy battery of 4.5's in the London area. Gun sites are desolate places; the life of the gunners is lonely and monotonous.



The machine that calculates. Range-finder on a heavy-gun site.



ears that listen. A sound locator in action.







**"Elephant's Child."** A searchlight of 210,000,000 candle-power probes the night sky with its beam.

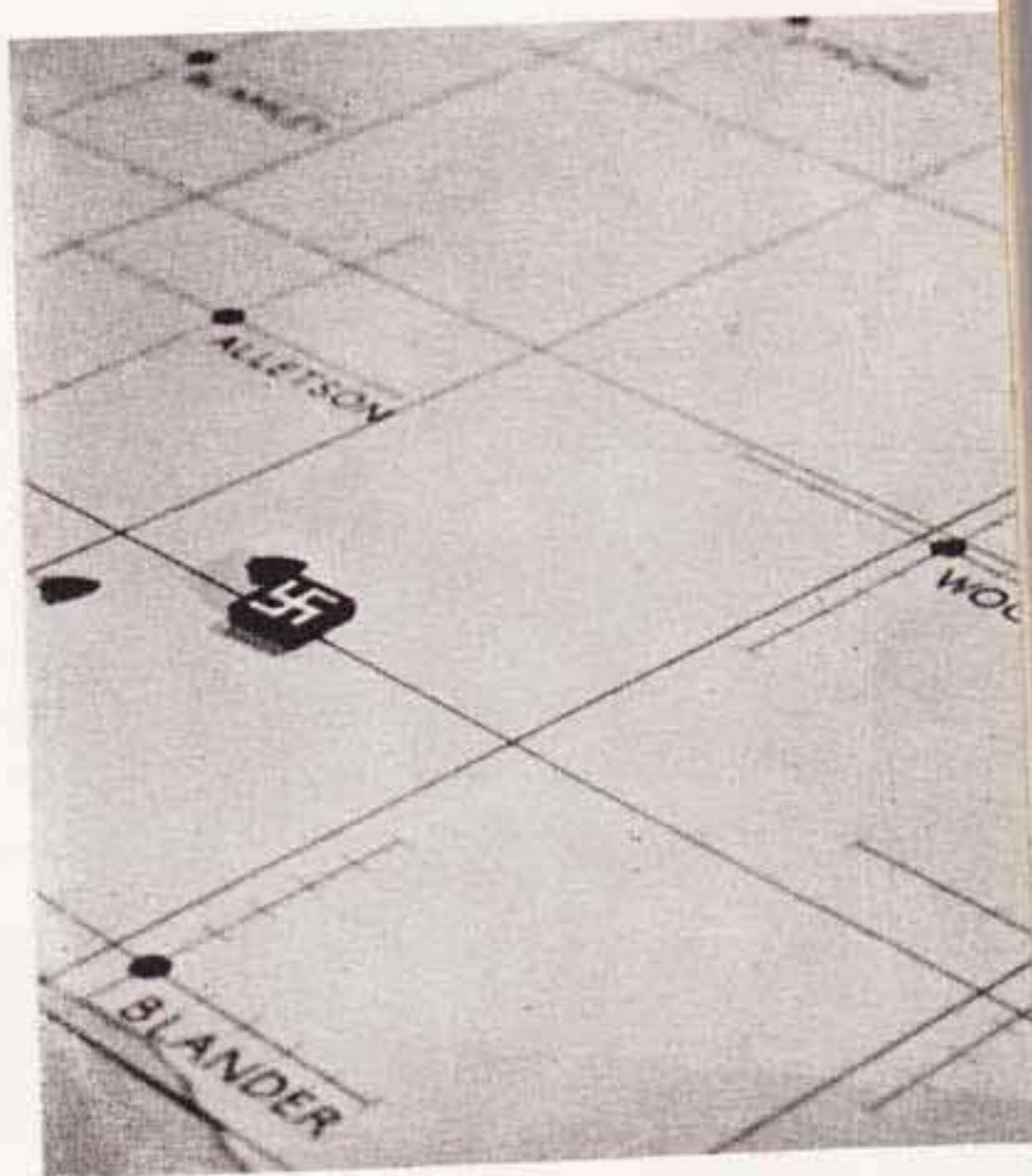




**Battle of Britain.** Vapour trails in the sky, as a hundred enemy aircraft streamed towards London in August, 1940.

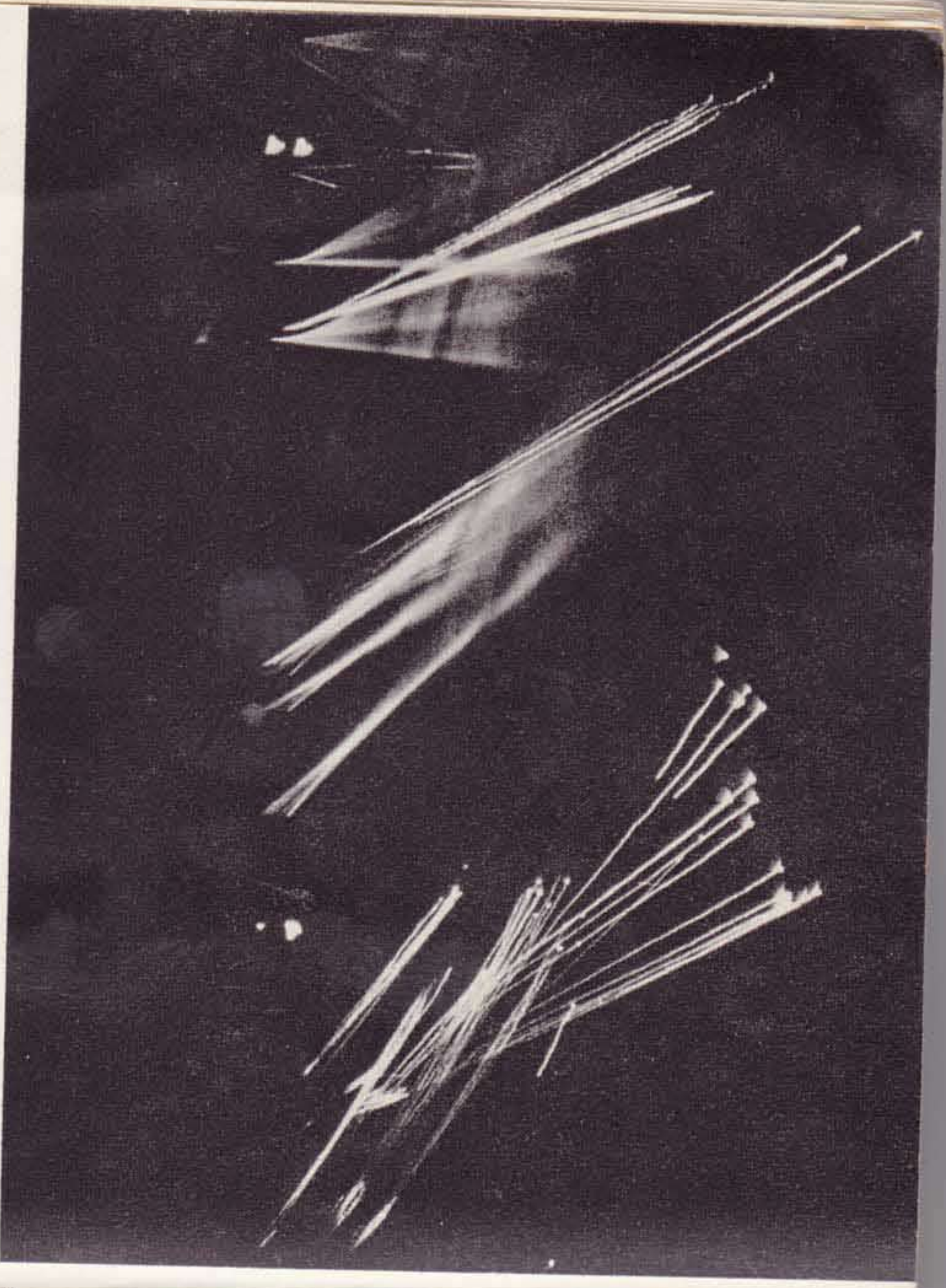


**Coastal watching-post.** Men of the Observer Corps detect and track the course of an enemy raider.



**Plotting board.** At an Observer Corps centre, coloured counters follow the movements of hostile aircraft on a huge plot of the area.

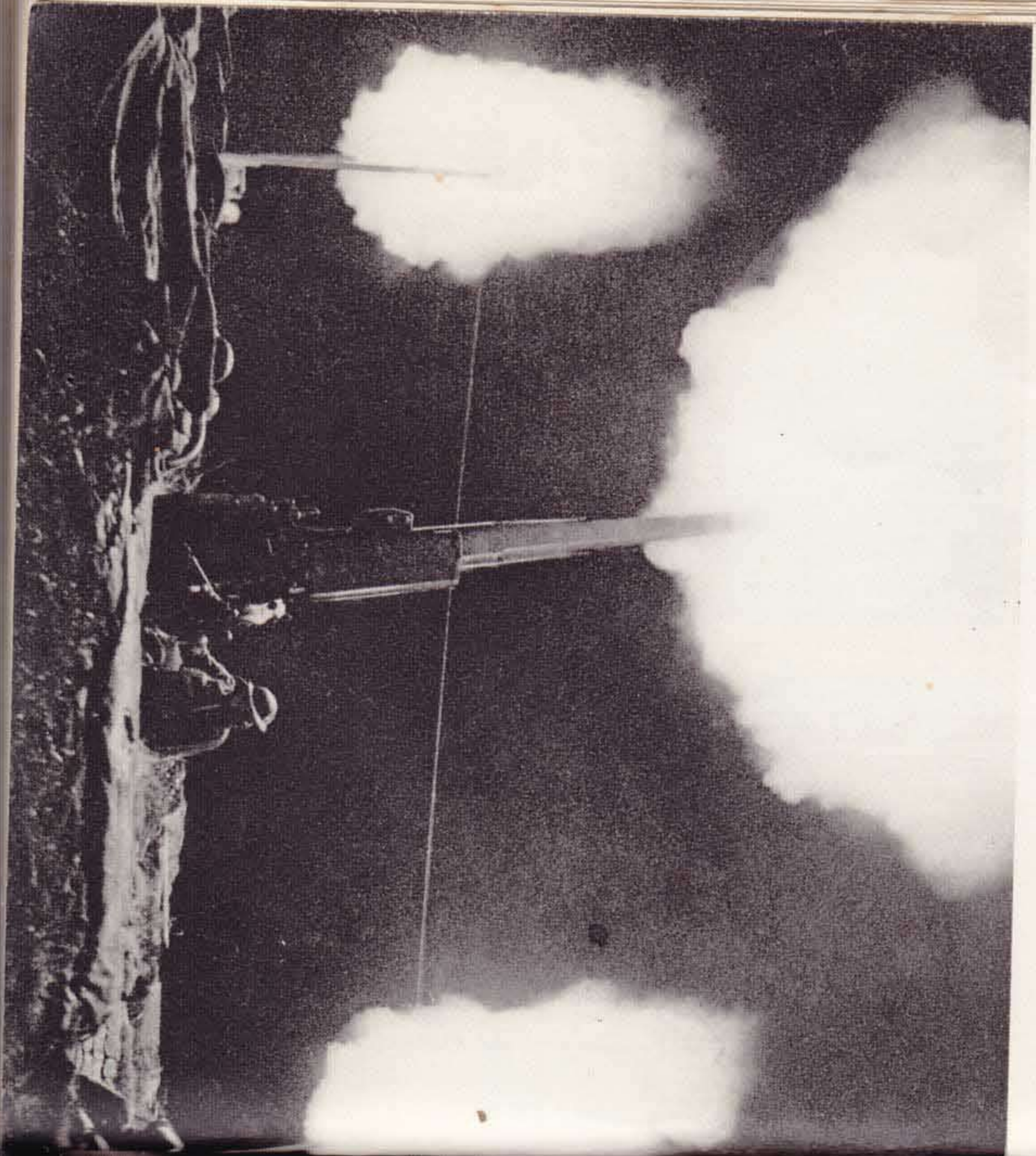




Hitting back at the Luftwaffe. Searchlights and tracer shells over a South Coast town.



Looking for trouble. Cones of concentrated searchlight beams during a raid on London.

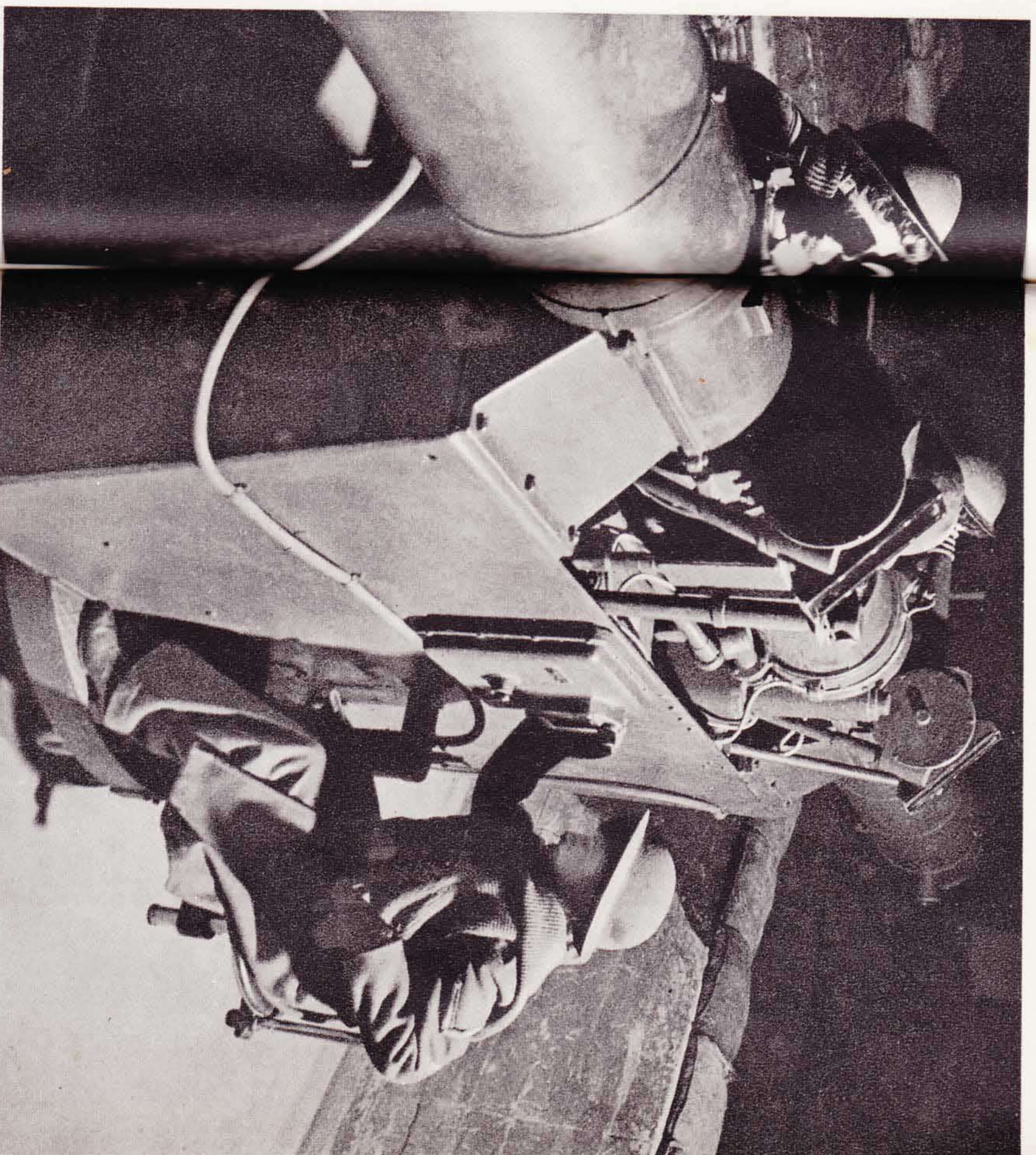


"There was an almighty explosion." The first picture of A.A. fire at night (cf. p. 44). This salvo jerked the camera several feet into the air, knocked out one of the photographer's teeth, and shot off the tail of the enemy aircraft.





Aircraft recognition is an important feature in the training of A.T.S. girls for mixed batteries.



"Women gunners are not trained for fun." Their work, which demands great skill and endurance, releases a large number of men for front-line service. These girls are manning a range-finder.

Filming the bursts. A.T.S. check the accuracy of the firing with the Kine-Theodolite.





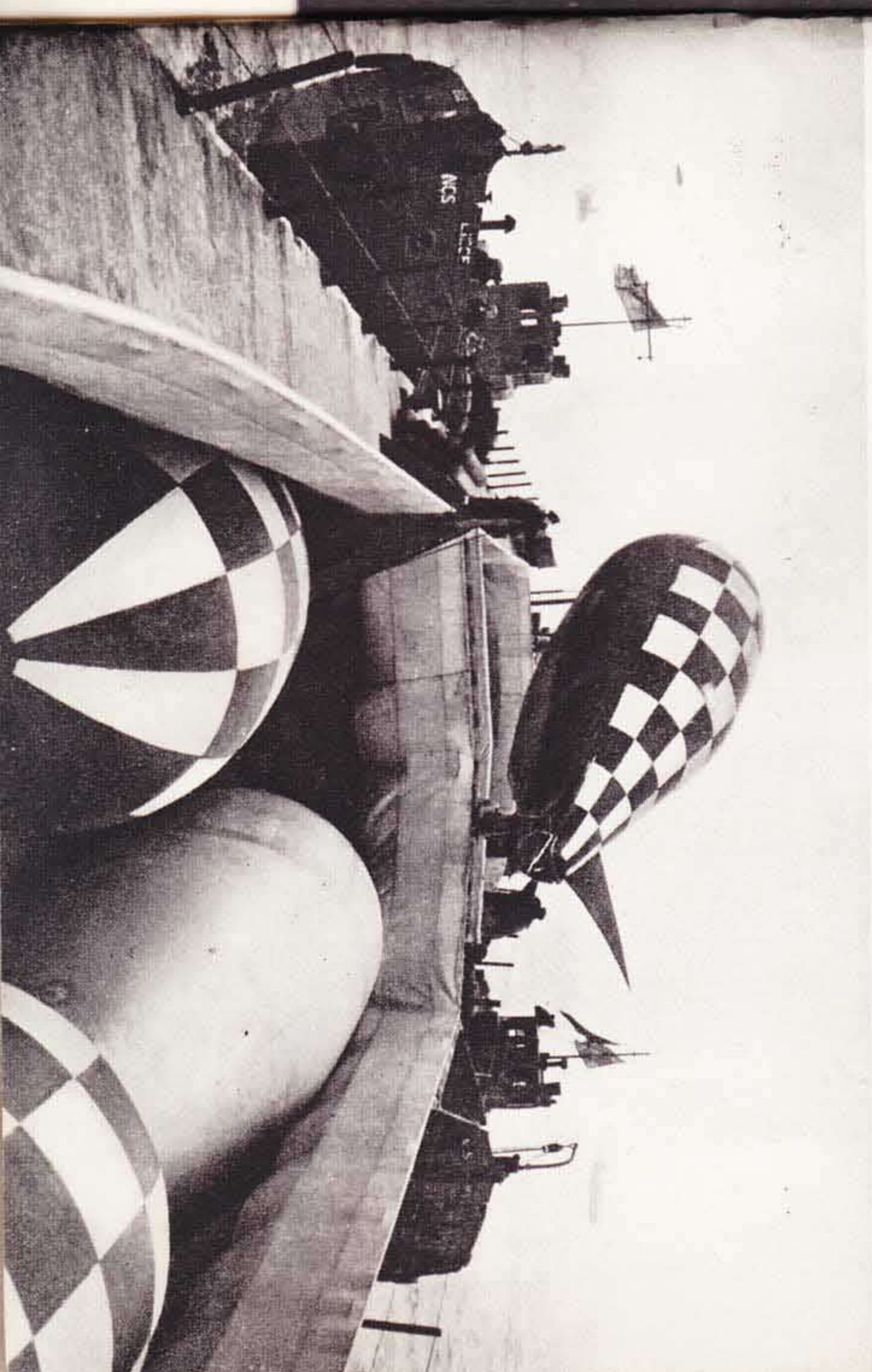
Messerschmitt shoots down balloon.



A balloon is struck by lightning.



The convoy flies its protecting barrage. These balloons, manned by R.A.F. crews, offer a serious obstacle to the dive-bomber. They are smaller and easier to handle than those of our land defences. *Below*—A depot barge of the Kite Balloon Section. Sea-going balloons were at one time painted in a diced pattern for camouflage purposes.







The W.A.A.F. takes over. The handling of barrage balloons requires skill, teamwork and considerable physical strength.





GENERAL SIR FREDERIC PILE, C.-IN-C., A.A. COMMAND