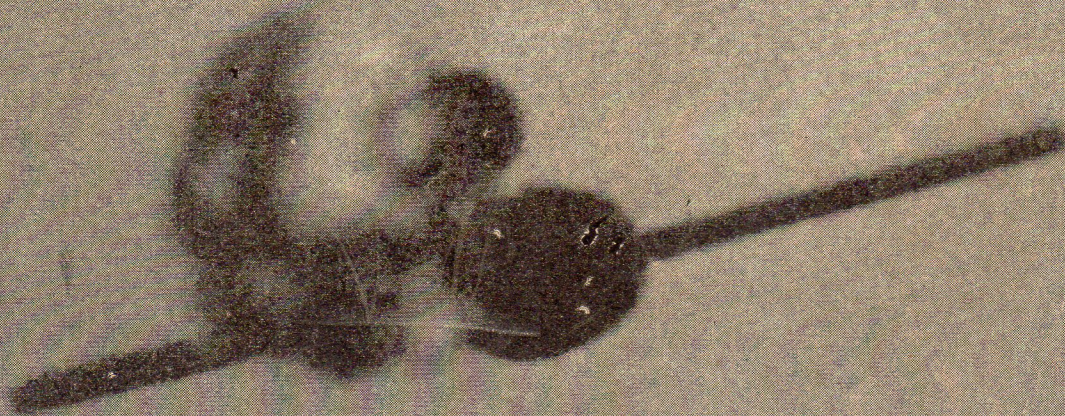


FLYING BOMBS



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Vergeltungswaffe-1

ONCE or twice every night the people of London still hear the sirens which precede the hoarse roar of the flying bombs and hold their breath during the sickening silence before the crash. Each night they go to bed not knowing whether a scientific robot will fall from the sky and destroy them.

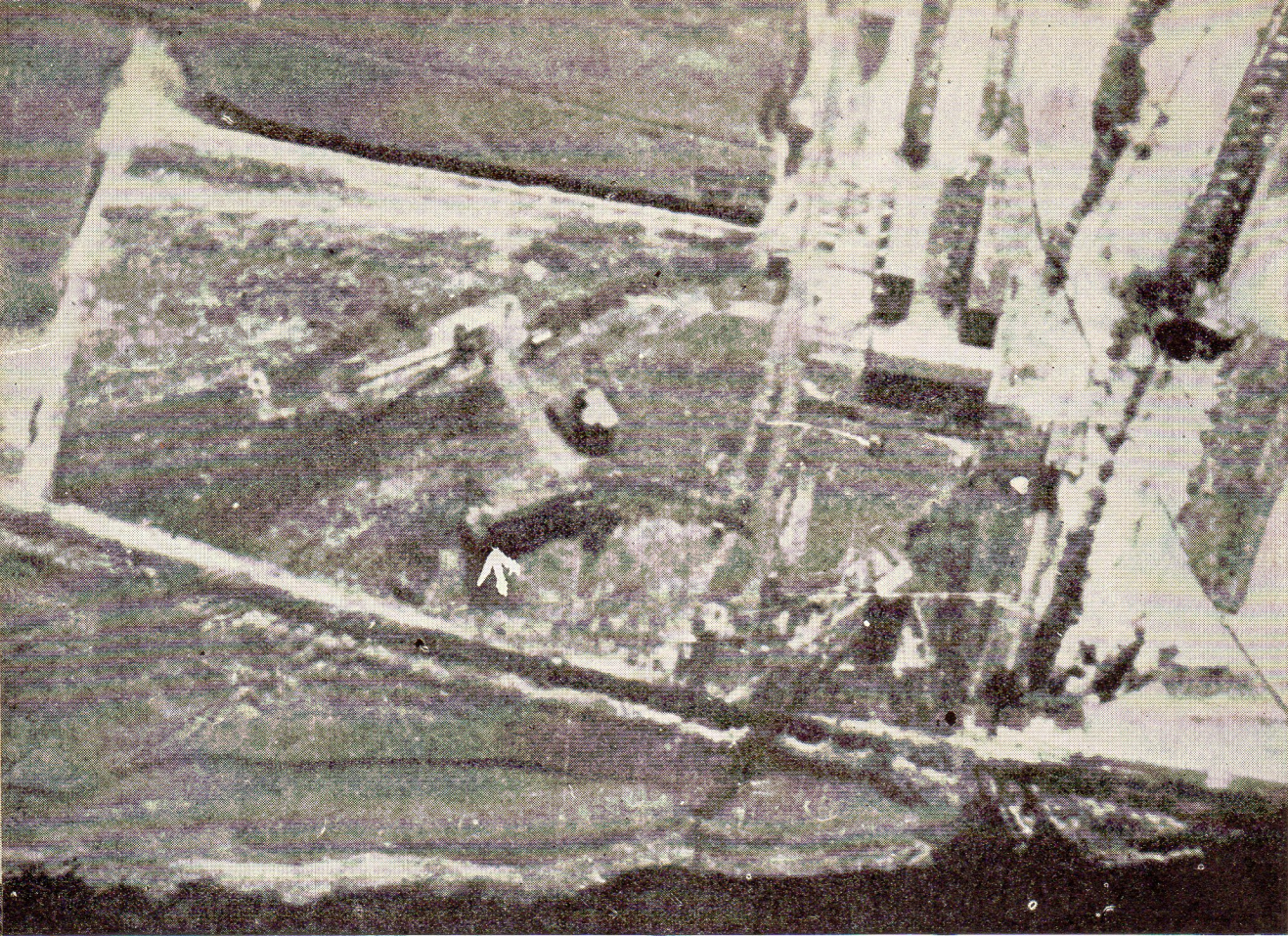
This monstrous machine that rides the skies beyond all human control seems to the people to have a power of evil greater than anything that has gone before.

It has had an immeasurable effect upon their morale, but it is an effect quite different from that which the Germans intended. British people are frightened, but theirs are not present fears; they are for the future. The possible future — or the absence of it — which the flying bomb portends.

The first intimation of the next war may be an ultimatum or a threat that “some of our cities will be blasted next morning,” said General Sir Frederick Pile, chief of Britain’s Anti-Aircraft Command, recently. “That is what the flying bomb has brought us to. It is the beginning of a new type of war.”

That is what frightens the people of Britain — the beginning of a new type of war. It would indeed be a war to end all war, and possibly all human endeavor.

The real psychological effect of the flying bomb is to be found in the stiffening of an already relentless resolve, wrought of suffering. It is the resolve to crush now, once and for all, those who have cultivated the lust for war, and to enforce a peace in which such people are kept firmly under control.



Aerial photograph showing part of experimental station at Peenemünde; the arrow marks the flying bomb poised on the launching ramp.

I. DISCOVERY AT PEENEMÜNDE

BRITISH Secret Service agents first reported that the Germans were contriving a new long-range bombardment weapon in April, 1943. It was then that Britain first heard about V-1, the flying bomb. That was the beginning of the second Battle of London.

For the first six months it was a battle of wits; the wits of a handful of British agents against those of the German nation; of R.A.F. reconnaissance and aerial photography against German camouflage.

Aerial photographs taken in May, 1943,

showed a large experimental station at Peenemünde, on an island in the Baltic. This establishment was seen to possess some mysterious contrivances that the Intelligence Services were at that time quite unable to explain.

Peenemünde was photographed again and again. Eventually a photographic interpretation officer, Flight Officer Constance Babington-Smith, of the Women's Auxiliary Air Force, spotted a tiny blurred speck on one of the prints which, on enlargement, was found to be a miniature aeroplane sitting on a sloping ramp fitted with rails. A later photograph showed that the ground near the ramp was



R.A.F. bomber pilots studying a model of a flying-bomb-site target in preparation for a raid.

darkly streaked, as if seared by a very hot blast.

From these photographs and other evidence, it was concluded that the speck was a pilotless, jet-propelled aircraft; whether it was to be used as an offensive weapon or merely as a target plane could not then be decided. This was the secret V-1 — the *Vergeltungswaffe* — the “Vengeance Weapon.”

In August of 1943 a strong force of Lancasters, Halifaxes and Stirlings of the R.A.F. Bomber Command dropped over 1,500 tons of high explosives on Peenemünde. Thus the battle against the flying bomb began at the very source.

II. OFFENSIVE AGAINST THE LAUNCHING SITES

GERMANY’S intentions soon became clear. In November it was found that she was building a chain of concrete launching sites like those at Peenemünde all along the French coast, from Calais to Cherbourg. They were pointed in the direction of London.

The Royal Air Force and the U. S. Army Air Forces began their vast bombing operations against the V-1 launching sites in December, 1943.

Continuous air reconnaissances, made in all



A damaged flying-bomb runway at Belloy-sur-Somme near Amiens, captured by British forces in August, 1944.

weather throughout the winter, located each site as it sprang up.

A hundred of them were discovered and every one was destroyed by bombing. As soon as the Germans tried to repair them or to build elsewhere, they were bombed again.

The bombing offensive continued intensively all through the winter and spring. Besides launching sites, it struck supply dumps, bomb plants and experimental stations.

In March, 1944, the Germans gave up the struggle. They abandoned their original sites completely, and began to build a second series of much simpler design. The new sites took only six weeks instead of two or three months to build, but were less efficient in action. So thoroughly were they camouflaged that it was practically impossible to detect them until they had actually fired.

The bomber offensive dropped some 100,000 tons. It cost nearly 450 aircraft and 2,900 pilots and airmen.

But for these bombing operations, the flying-

bomb attacks might have started in January instead of June. If they had come in January, winter weather would have caused many additional hazards to the defenses.

By forcing a series of delays on the enemy the intensity and length of the attack, when it did come, was enormously reduced.

III. LONDON'S DEFENSE TAKES SHAPE

ENOUGH was known about the V-1 by this time to arrange for the defense of London.

Three lines of defense were established. First, a balloon barrage immediately surrounding the city. Next, an anti-aircraft gun belt, placed as near London as possible to shorten the length of the front and thus obtain the closest concentration of fire with the fewest guns. Then, outside that a fighter zone.

But preparations for the invasion of France were going on simultaneously, and every available gun and balloon was needed for the pro-

tection of embarkation ports. Since no one knew when the flying-bomb attack would start, these defenses had to be ready to switch, at a moment's notice, from the defense of the ports to the defense of London.

IV. THE SECOND BATTLE OF LONDON BEGINS

ON D-DAY plus six the long postponed attack at last began. The defenses were immediately moved into their prepared positions.

For the eighty days from June 12th until the end of August, an average of 100 flying bombs a day were launched against England — some 8,000 in all.

By day the small pilotless aircraft could be seen skimming the roof tops, or flying over the Kentish villages. At night their tails of flame lit up the blackout. London was a place of demoniacal noises — the sirens, the guns, the hideous roar as a flying bomb passed overhead, the sudden menacing silence when the bomb's motor cut off, and then the crash that

meant more shattered limbs, more crushed bodies.

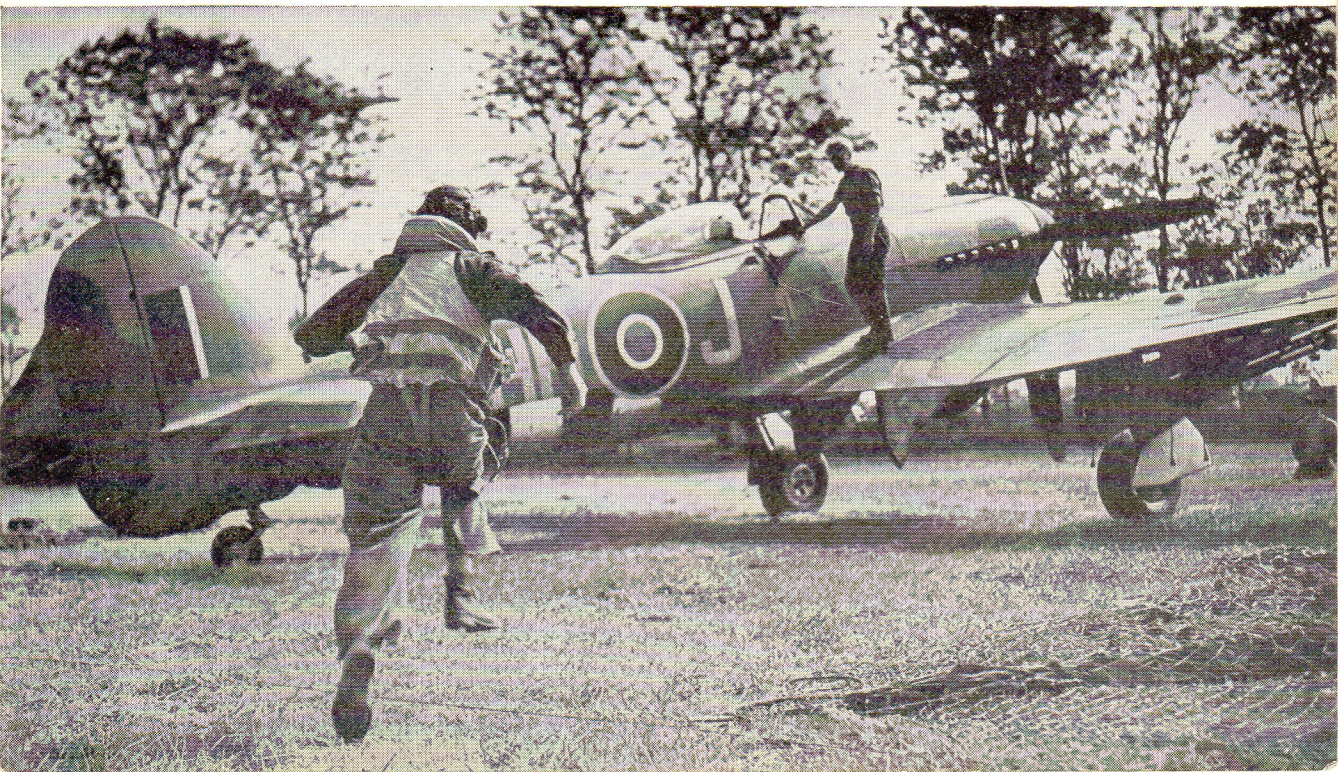
The bulk of the attack was aimed at London, where ninety-two per cent of the fatal casualties occurred. In the "Bomb Alley" region, comprising Kent, Sussex and Surrey, the damage was almost as serious. Portsmouth and Southampton were also attacked, but most of the bombs fell into the sea or went wide, proving that this was no precision weapon accurate enough for use against specific military targets.

V. EXPERIENCE PUT TO USE

MUCH was learned during the first month of the attack.

It was found that the flying bombs were immensely hard to shoot down; first, because they flew so fast — almost 400 miles an hour; and second, because their flying height of 2,300 feet or less was too low for the heavy guns and too high for the light guns.

A pilot scrambles to his Typhoon to take off on a flying-bomb hunt.





They came in droves, often in cloudy weather, when the fighters' visibility was low.

Forty per cent of the number launched was destroyed during the first month, but even so the number of civilian casualties reached front-line proportions.

On the knowledge gained in the first month it was decided to reorganize the defenses. Balloons, rushed from all parts of Britain to Southern England, increased the barrage to four times its original size, making it the greatest in the history of the R.A.F., totaling about 2,000.

Five hundred searchlights were set up, one every two miles. They needed 20,000 troops to keep them in operation.

The entire anti-aircraft belt was moved bodily from the outskirts of London down to

the coast, and enormously expanded with additional guns.

Experience had shown that, because of the high speed of the bombs, the guns must have an uninterrupted field of view that is not possible in built-up areas. On the coast the guns were able to use their full range.

One thousand one hundred guns had to be moved and resited, and yet they were out of action only two days.

At the same time it was decided to replace with static guns the mobile 3.7"s, which could not be traversed fast enough for such swift and low-flying targets. The concrete platforms normally needed for static guns would have taken months to build, but A.A. Command designed one made from railroad tracks and ties which could be laid down as fast as the

(Left) A.A. guns open up against a flying bomb. (Below) A.A. gunners carrying the remains of a kill.



guns arrived — at the rate of 100 a week. Thirty-five miles of railroad tracks and 22,500 ties were collected from twenty different railroad depots to make these platforms.

The anti-aircraft crews — nearly half of them A.T.S. women — were on the job twenty-four hours out of the twenty-four, seven days a week, during the eighty days' bombardment. They lived under canvas, over 3,000,000 sand bags being needed to protect them from blast and shell fragments.

One-eighth of the total number of heavy A.A. guns along the south coast were American batteries, and contributed their full share to the joint bag of bombs shot down. In addition, some of the very latest American equipment was used with heavy A.A. guns.

The R.A.F. fighter zone, split into two parts, was divided between the surveillance of the Channel from the A.A. gun belt on the coast

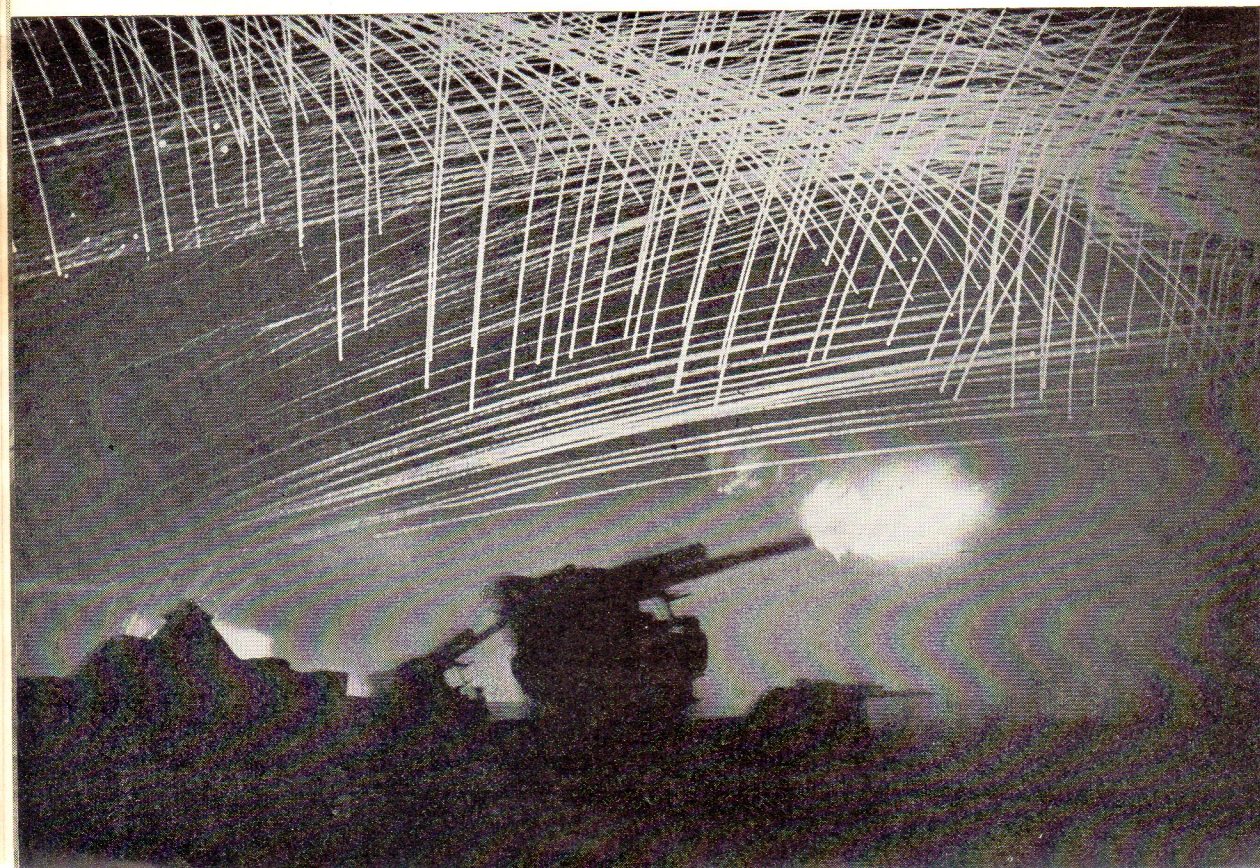
outwards, and from the gun belt inwards to the balloon barrage outside London.

The flying bomb, owing to its small size, tough construction, and high speed, is reckoned to be eight times as hard to bring down as a German bomber flying a straight course. Fighter pilots find great difficulty in seeing the bomb at all. Over land they can, to a certain extent, be informed from the ground of the position of the bomb in relation to various landmarks, and can be directed by A.A. fire; but at sea there can be no such identification.

So a flotilla of motor boats cruised about the Channel, cooperating with the fliers as spotters. The crews, by firing maroons and giving directions by radio telephone, helped the pilots to identify the approaching bombs.

Hunting of the flying bomb by night brought other problems. Although the flaming tail of a flying bomb is visible miles away, it is diffi-

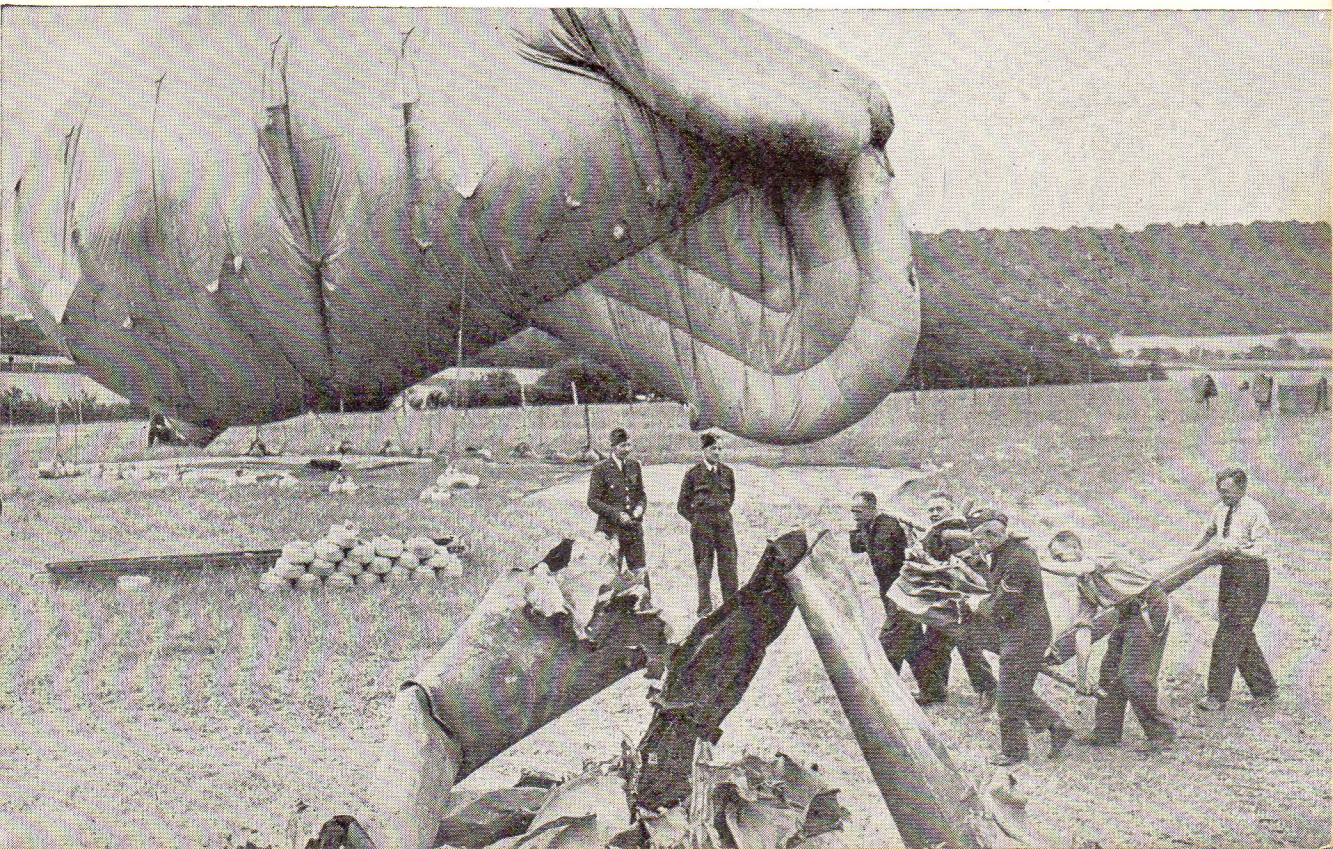
A.A. fire during a night action.





The balloon barrage.

The R.A.F. collects the pieces of flying bombs brought down by balloons.



cult for a fighter pilot to judge the exact distance accurately at close quarters.

Scientists went to work on the problem; one of them, Professor Sir Thomas Merton, produced a range-finder, so simple that the whole device costs little more than twenty cents, so ingenious that it answers the purpose completely.

VI. THE SCORE

THE REORGANIZATION of the defense brought swift results.

Balloon Command now showed its value as never before. Being the last line of defense, their chances were smaller than those of the other arms. But they spread their vast net around London, adding thousands of extra cables to the balloons, and waited.

At the end of the eighty days' bombardment

their cables had entangled 279 flying bombs.

The percentage of bombs shot down by the guns soared up from 17% in the first week to 24% in the second, 27% in the third, 40% in the fourth, 55% in the fifth, and 74% in the sixth week. The total number of flying bombs destroyed by the guns had reached 1,560 by the end of August. Many of these were shot down into the sea.

Fighter pilots of the R.A.F. have shot down over 1,900 flying bombs since the beginning of the bombardment. Some pilots made individual scores of fifty bombs.

Their methods are unorthodox, and sometimes suicidal; but they are effective.

They were evolved out of trial and tragic error. Pilots attacking from close quarters risked being blown up by the resultant explosion. If too far away, the bomb was likely to pass by unscathed. Hurling themselves

Civilian women roof-spotting.



at the bombs at 400 m.p.h. they shot them down from all angles and at all distances, until they discovered the minimum safety margin before the explosion.

The "nudging" method, discovered by a pilot who had run out of ammunition, calls for split-second timing. The pilot flies alongside the robot, slips the wing tip of the plane beneath it, and, with a flick of the control column, sends it spinning to earth; at high speeds the air cushion formed between the two machines is powerful enough to deflect the bomb, without actually touching it.

"Slipstreaming" was discovered by accident, when a Mustang pilot power-diving down on to a bomb overshot it. Looking back he saw his target spiralling down into the Channel — the slipstream of his aircraft had thrown it out of control.

One R.A.F. pilot destroyed four bombs by

three different methods in thirty minutes. He "slipstreamed" two, shot down one and, when his guns jammed, "nudged" a fourth, sending it crashing down onto the Germans in Boulogne.

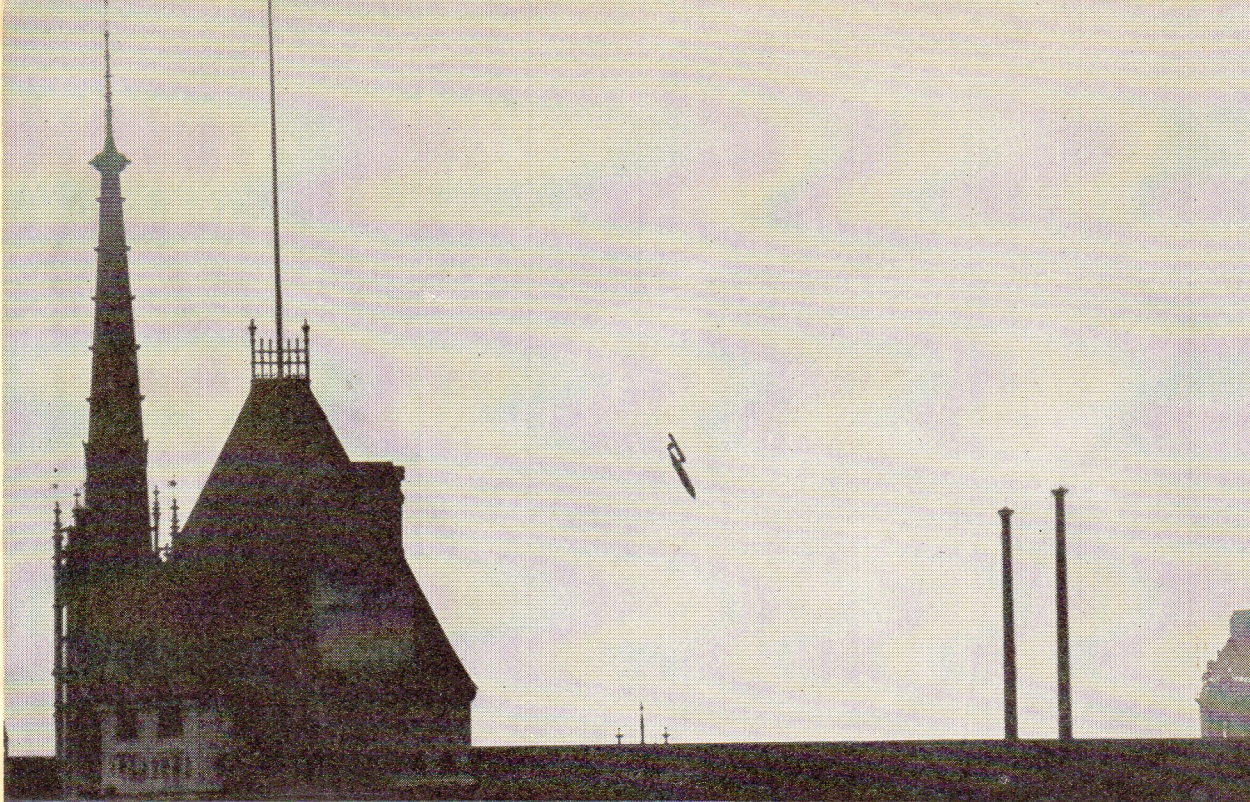
Sometimes the hunters are themselves hunted. Two R.A.F. Tempest pilots saw an American Lightning fighter cruising along peacefully not knowing that a flying bomb was on his tail and rapidly overtaking him. The Tempest pilots did not stop to warn him; they shot the bomb down into the sea.

The record bag for all three defenses — balloons, guns, and fighter aircraft, was on August 28, 1944, when ninety-seven of the 101 flying bombs launched were destroyed, and only four reached London.

Out of every 100 flying bombs launched by the enemy in the eighty days of the second Battle of London, forty-six were destroyed by

Londoners carry their bundles of bedding to the air-raid shelter for the night.





The silent dive.

the combined efforts of all three defenses; twenty-five were inaccurate and dived into the sea, or exploded in France, doing considerable damage among the Germans; twenty-nine got through to the London Region — that is, a total of some 2,300.

At the beginning one person was killed for every bomb launched. At the end of the eighty days, it took three bombs to kill one person.

During this crucial time of invasion in France and grim defense in England, the bombing of the launching sites and bomb storage depots went on continuously.

Secret Service agents reported that tunnels and caves near Paris, formerly used for mushroom growing, had been turned into vast bomb storage depots. During July they were attacked three times by the R.A.F. Great

12,000-pounders crashed through into the caves. Everything inside was lost and many of the caves themselves were utterly destroyed.

The enemy's communications were constantly strafed. On one occasion a train loaded with flying bombs stopped at a marshalling yard in Northern France. Before it moved, information had been sent to England and R.A.F. bombers had time to reach the spot and blow up the train.

Bombing greatly weakened the attacks, but the one completely effective way of stopping them was to capture the firing sites. The first of them were taken by the American troops in the Cherbourg area at the end of July, and the main concentration of them in the Pas de Calais were taken by Canadian troops early in September.

VII. THOSE WHO WERE TARGETS

THE FLYING-BOMB launching sites in Northern France were captured in the ordinary course of military operations, the strategic objective of which was the defeat of the enemy. The sites were never an objective in themselves.

Not once, for all the horrors they were enduring, did the people of London or "Bomb Alley" demand a change of strategy to take the sites quickly and so end their ordeal.

And very terrible indeed was their ordeal. Between June 17th and the end of August their killed numbered 5,479 and their injured 15,934 — most of them women and children. The people of Kent and Sussex, bravely and without protest, accepted the R.A.F.'s diversion of many bombs from London which exploded instead in their own area, where they killed only one person for every twenty-two they would have killed in London.

The Civil Defense Services, by constant exercises through long, raid-free months, have become a splendidly coordinated machine.

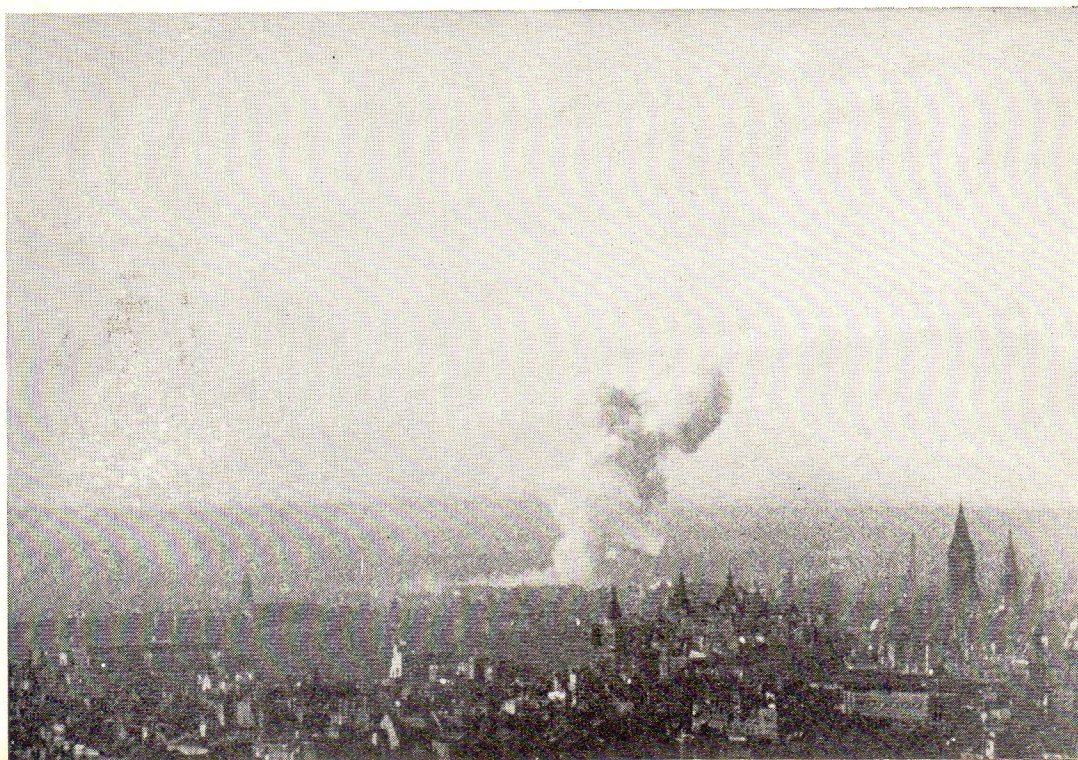
Trained civilian spotters watching from high places report the location of each bomb as it crashes; in a few minutes the National Fire Service, heavy rescue and medical people are there. Even after the worst incidents all victims are usually extricated within an hour.

One dauntless woman — a roof-top spotter — saw a flying bomb coming straight at her during one of the worst attacks. She went on reporting its progress into her telephone; it passed her by.

The Civil Defense Services evacuated over 14,000 patients from hospitals in the London area during the big bombardment, and first-aid posts with their mobile units attended to 40,000 minor cases.

The Government arranged for the billeting of no fewer than 228,000 mothers and expectant mothers, 537,000 children, and 53,000 aged, invalid and blind in safe areas.

Another flying bomb lands on London.





The Women's Voluntary Services were indefatigable. Nearly one million homeless and Civil Defense workers were fed after raids by W.V.S. mobile emergency feeding units and mobile canteens. They distributed clothing to the destitute, made house-to-house surveys after incidents recording casualties, checking sleeping arrangements, giving first aid and providing hot drinks. Many were killed and injured while on duty.

VIII. STRANGE BEHAVIOR

CHARACTERISTIC of the flying bomb's explosion is the unpredictability of its behavior. Every

Londoner has stories to tell about the oddities of blast — and not all of them are funny.

The sound of breaking glass invariably follows the explosion of a flying bomb. Its action on glass is often completely contradictory. Sometimes shards from splintered windows are hurled across the room and bury themselves like daggers, inches deep into the opposite wall. Flying glass is one of the chief causes of casualties.

At other times glass will crumple into millions of tiny pieces that fall harmlessly downwards. One woman who was standing in front of a plate-glass window when it was shattered by

(Left) *Home-coming.* (Below) *The remains of the Guards' Chapel.*



bomb blast, owes her life to this reaction.

Blast effects also are freakish. A flying bomb that fell six feet from a beech tree left the tree untouched, but shattered the roof and windows of a house fifty yards away. A man who was riding a bicycle at one end of Berkeley Square, London, when a bomb fell at the other end, was hurled to the ground—not away from the bomb, but many feet nearer to it.

Bombs that have been hit but not exploded by gun fire have been known to turn in their tracks and make for home again.

IX. REBUILDING

MORE than 1,104,000 houses have been destroyed or damaged by flying bombs. This number does not include the 149 schools, 111 churches and ninety-eight hospitals. In Croydon, the worst bombed borough of London, three out of every four houses were hit.

Hampton Court Palace, St. Thomas's Hospital, the Royal Lodge, Windsor, and the Guards' Chapel, are among the many well-known and well-loved buildings that have been damaged.





All available workmen in the London area have been mobilized, and all other building virtually stopped until repairs are made. Repairs to slightly damaged houses — often started within two hours of the fall of the bomb — are the immediate task.

Fifty-one thousand people have been rehoused in requisitioned property, 57,000 billeted, and 98,000 have passed through rest centers. The Government has in addition supplied several thousand huts for emergency use.

The flying bomb and the blitz of 1940-41 have left the British people with an enormous task of rebuilding. They have also left them with the determination to transform tragedy into opportunity. Plans are already well advanced. The Government post-war building project envisages that three to four million new houses will have to be built in the ten to twelve years following the war; at least a quarter of a million prefabricated factory-made houses will be provided as a temporary measure.

Meanwhile repairs and patching go on. During September a labor force of 83,000 was engaged on demolition and repairs to buildings. Millions of tiles and slates, millions of square feet of ceiling and wallboard and glass are being used. Felt or tarpaulin serve for temporary roofing, and translucent dressed linen to replace shattered window panes.

One mobile repair unit, known as the "Carpenters' Circus," has traveled thousands of miles accompanied by its traveling dormitories and collapsible kitchen. The sixty members — carpenters, plumbers, slaters and bricklayers — carry out first-aid repairs at top speed.

Normally they work a sixty to seventy hour week. Sometimes the Government has to intervene or they would do more. One work gang insisted on using their day off to repair the more or less roofless house of an old lady. "If she's going to live in the house, we're darn well going to repair it," they said.

X. BUT STILL THEY COME

EVEN now the attacks go on. A small number of flying bombs still reach Southern England from a due easterly direction.

These bombs are being launched, not from the ground, but from specially adapted German bombers flying over the North Sea. They were carrying the bombs pick-a-back — perhaps it would be more accurate to call them pick-a-belly as it has now been discovered that they are launched from under the fuselage.

R.A.F. Intruder squadrons are still always on watch, ready to intercept the pick-a-back bombers, and many have been shot down; attacks continue to be made upon their home aerodromes; extra guns, at the Thames Estuary, give added protection to London.

Nevertheless, pick-a-back attacks continue . . . and now *Vergeltungswaffe-II*. has begun.

XI. HOW IT WORKS

(See diagram on back cover)

THE FLYING BOMB is jet-propelled. In the front of the fuselage (as the diagram on the back cover of this pamphlet shows) is a fuel tank holding 130 gallons of gasoline and two globular bottles, closely wrapped with wire and filled with compressed air, which work the control system and feed the engine by applying pressure to the fuel tank.

The rear of the fuselage contains an automatic pilot, and carries a tail plane and fin.

The engine is a long tube of mild steel, open behind, but closed in front by a grille with holes covered by small spring shutters. Gasoline is injected into the tube and there ignites; the resulting hot gases are blown out of the rear end of the tube to supply the thrust.

At a speed of 360 m.p.h. the power unit is equivalent to an ordinary aero engine of about 600 horsepower. The flying bomb is infinitely cheaper to build than an aircraft, but extremely expensive to run, since it consumes eight times the fuel of a normal aero engine.



American Servicemen and Civil Defense workers digging out a victim.

The distance it travels is controlled by a small windmill in the nose, the revolutions of which are set in such a way that when the bomb has traveled a definite distance it is pushed over into a steep dive. This is caused by locking the controls and lowering small tabs under the tail of the plane. The diving throws the fuel to the top of the gasoline tank, so that the engine is starved of gas and stops.

The flying bomb is aimed by setting the auto pilot before launching. The gyroscope's tendency to wander eventually from its initial

setting is corrected by a magnetic compass in the nose.

The flying height is also set on the auto pilot, which is governed by an aneroid barometer. Heights of over 10,000 feet are possible for the flying bomb, but few have been seen at over 5,000, and the usual operating height is 2,000.

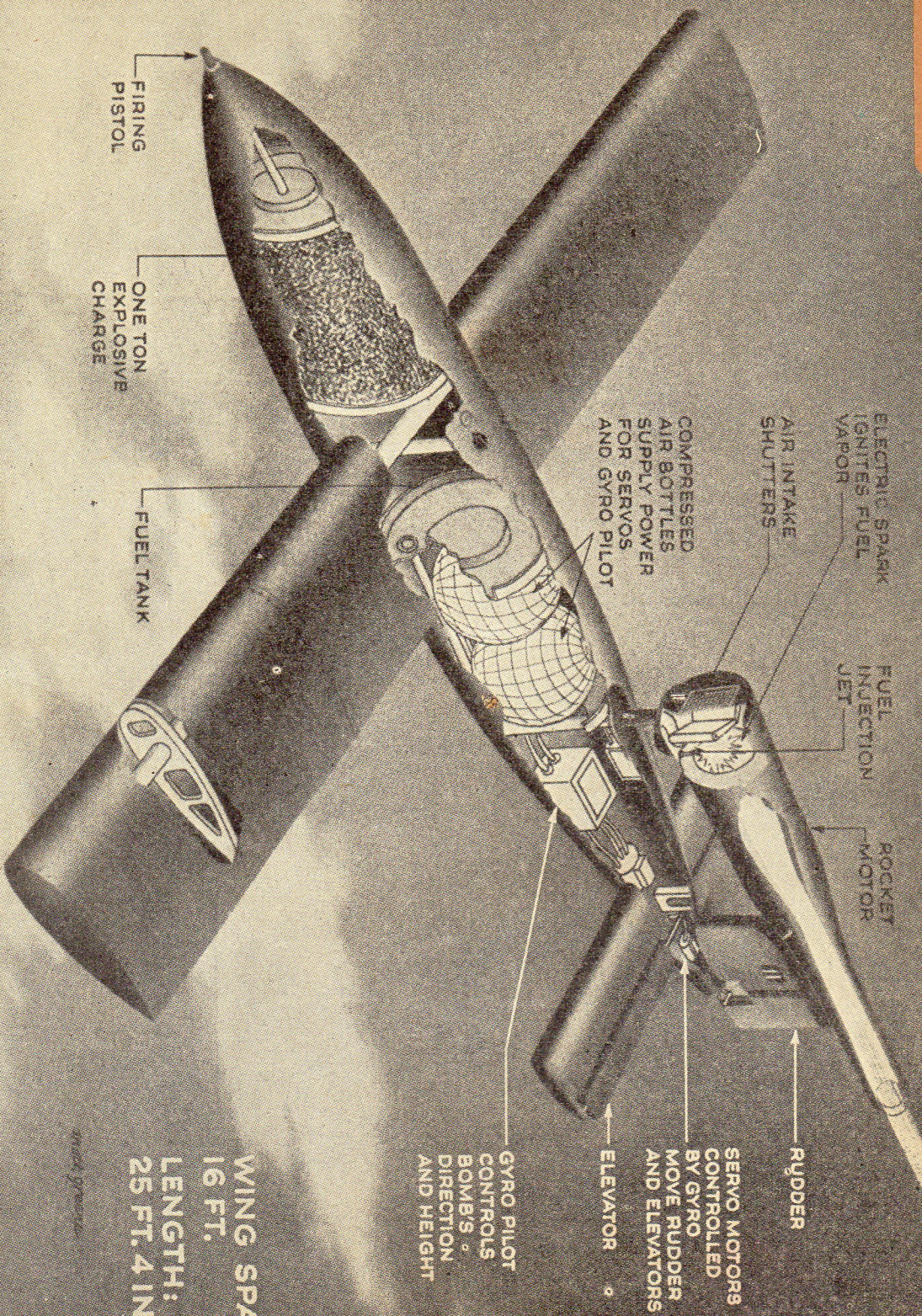
The bomb weighs about 4,700 pounds when full of fuel and ready to take off; this weight includes the warhead of nearly 2,000 pounds, composed almost wholly of explosive in a thin-walled case.

PICTURE CREDITS: Acme Newspictures, pgs. 8, 17, 19; British Combine, pgs. 9, 10; British Official, front cover and pgs. 4, 5, 6, 7, 11, 13, 16, 22, 23; International Newsphotos, pg. 18; Press Association, pgs. 2, 12, 14, 21; Scene from "V-1," the robot bomb film, pg. 15.

Rebuilding begins at once.







WING SPAN:
16 FT.
LENGTH:
25 FT. 4 IN.

HOW THE FLYING BOMB WORKS (See descriptive text, pages 20-22)