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OFFICIAL ORGAN OF THE ROYAL AERO CLUB

JUNE 18th, 1942

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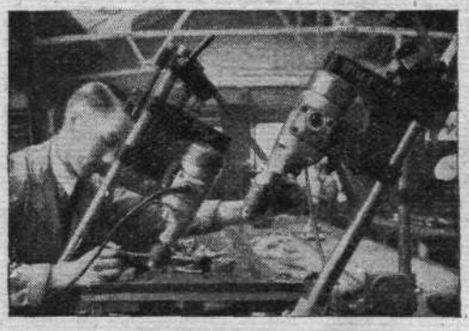

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FLIGHT
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The AIRCRAFT ENGINEER

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# The Outlook

## Tanks and Aircraft in Libya

A LINE in a despatch from the correspondent of *The Times* on the Libyan front may explain the long lull in Libya during the spring, and also why we permitted Rommel to attack us instead of once more attacking him. The correspondent writes that all the Axis tanks have a higher fire-power than any of ours, "except for the 'General Grants,' which rule the battlefield."

In the late autumn fighting, from Sidi Rezegh to Rommel's recovery and renewed advance, it has seemed probable to those who tried to read between the lines of the official bulletins from Cairo that the Empire forces were (to coin a phrase) out-tanked, and that the Empire's air superiority could not restore the balance. Consequently, Rommel had the best of things, though he postponed his great attack until he had built up his forces from overseas, while the *Luftwaffe* contingents in Sicily kept Malta comparatively quiet and prevented the bombers on the island from sinking too many of the Axis transports. Generals Auchinleck and Ritchie, on the other hand, must have been waiting for heavy tanks, i.e., the "General Grants," to arrive from America, as most British-made heavy tanks were being sent to Russia.

Rommel was ready first, and so attacked. If enough "General Grants" had arrived in time, there can be no doubt that General Ritchie would have started the attack himself, for aggression has always been the motto of all three Services in the Middle East. Perhaps, also, the British Generals were hoping for more "attack" aircraft from the United States, for the fighters and bombers now in the Middle East have not proved suitable for destroying German tanks (despite some recent vague statements that they have been attacking enemy "armoured" forces), and have found that the best help they could give was by harassing the enemy's supply columns. But in the series of battles which started with Sidi Rezegh, the German tanks were seldom, if ever, immobilised for want of fuel, despite the great havoc wrought by the Air Force among the supply columns. There has been nothing in recent reports to suggest that the position is now different, and that Rommel has not got up enough supplies in the recent desperate fighting, though the Empire Air Forces have used bomb and cannon with great effect.

## The Midway Mystery

THE battle of Midway Island seems to have followed the pattern of the battle of the Coral Sea, and that pattern is a new thing in naval warfare. So far as our present knowledge goes, and it is certainly very scrappy, in each case the opposing fleets did not come to close quarters, and there was little, if any, exchange of gunfire between the warships. They fought at long range with aircraft. In the case of Midway this is especially remarkable, for the American Admiral has been very definite in reporting that the Japanese had three or more battleships present, as well as at least five carriers. There has been no mention of the composition of the American naval force, but we must doubt if it included any battleships, for there has been no hint of U.S. battleships in the Pacific since the attack on Pearl Harbour. In any case, the Japanese were most probably stronger in ships, for it is never their way to send a boy to do a man's work.

In that case one wonders why the Japanese did not close with the American fleet, using the fighters from their own carriers as an "umbrella." It is true that the Americans had shore-based aircraft, probably including fighters, at their command, and that they would be superior in quality to the ship-borne machines of the enemy; but the latter had large numbers of aircraft, and it seems most unenterprising on the part of the Japanese Admiral not to have made every effort to bring his battleships within range of the American ships. Had he done so, then, according to all the laws of probability, he ought to have sunk the American fleet. Instead, he allowed himself to be heavily hammered at long range by the U.S. aircraft without ever bringing off a true naval engagement.

For the result we may all be profoundly thankful, and we are. It seems that Japan's great reputation as a naval power, founded on the one victory of Tsushima in the Russo-Japanese war, is a bubble which is being pricked.

At Tsushima Admiral Togo (formerly a cadet on the training ship H.M.S. *Worcester*) was opposed to a thoroughly inefficient Russian fleet which had steamed all the way round from the Baltic; but if he had not very much in the way of opposition he at least did his job very well. The Admiral of the Japanese fleet at Midway seems to have had all the odds in his favour and to have made a thorough mess of everything.

## Blasting Them ?

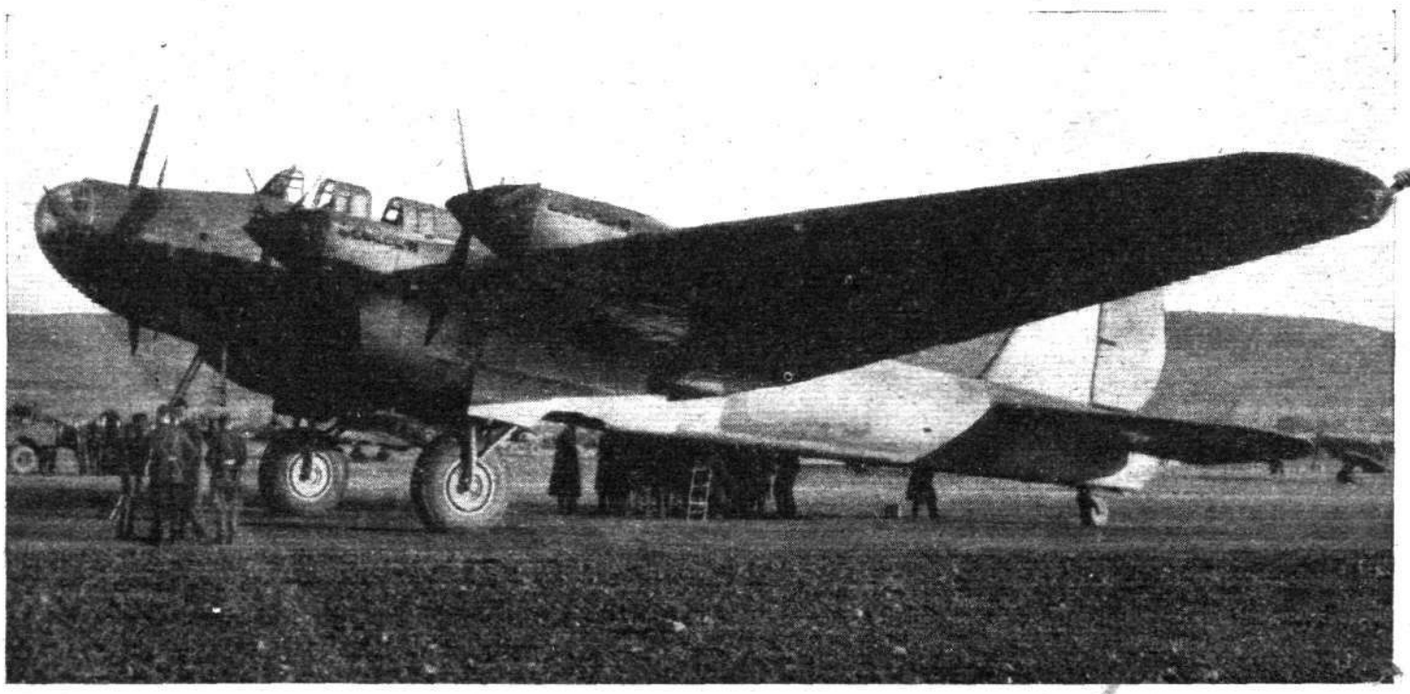
WRITING of the Airacobra and its armament (*Flight*, September 25th, 1941), Mr. Lawrence Bell, of the Bell Aircraft Corporation, said: "I am willing to concede that it might be possible to bring down a multi-motor bomber if you fired enough rice at it." He was arguing in favour of the 37 mm. shell-firing aircraft gun. In this issue a contributor argues that we are on the wrong track, as regards naval anti-aircraft defence, in placing so much reliance on such weapons as the multi-barrel pom-pom, and suggests that for defence against the dive bomber and the torpedo aircraft ships should be armed with a new type of weapon, something between a gun and a mortar.

Firing would be at point-blank range, and the fusing of the shells would appear to be the critical feature of this form of defence. It should, however, be possible to have, on large naval vessels, at any rate, several of the guns suggested, the shells for each gun being fused for a certain distance, different from that of the others. One may, for example, visualise three guns, of which No. 1 would begin the firing, No. 2 would take the "middle distance," and No. 3 the nearest range to which the dive bomber or torpedo plane would approach. Some such arrangement would probably have to be adopted, as there would scarcely be time for fusing the shells after the enemy aircraft were in sight.

## CONTENTS



## SOVIET BOMBER



The Russian bomber in which Mr. Molotov flew to this country and to America. It appears to be roughly of the same dimensions as the Halifax and is powered by four liquid-cooled engines, which are probably of the 1,000 h.p. M-100 type. Another photograph of this machine appears on page 607.

# War in the Air

## The Air-sea Fight for Midway : The R.A.A.F. Over New Guinea : Bir Hakeim Lost

HURRICANE FIGHTERS : Major Kondratyev (right), Lt. Krikunov (left), and 2nd Lt. Volkov who, while on patrol in their Hurricanes on the Murmansk front, shot down six out of ten Me 109s without loss to themselves.

WITH a great sea-air battle for Midway Island just over, a furious struggle raging in the Libyan desert, and a violent assault by the Germans on Sevastopol in progress, no lover of sensation can complain that the times are dull. Probably the dullest places in the war zone just now are Cologne and Essen, where little work can be going on.

One looks forward to the time when one will be able to read a full and authoritative account of the Midway battle, where it seems from present knowledge that American aircraft drove off and seriously crippled a powerful Japanese fleet. Taking the reports at their face value (and the Americans are wise not to tell the enemy too much), it rather looks as if Japan's reputation as a great naval power was of the soap-bubble variety, and that the bubble has been pricked. It is not as if the Japanese were without aircraft, as H.M.S. *Prince of Wales* and *Repulse* were when they were sunk. On the contrary, the Japanese fleet was strong in carriers, yet the American aircraft defeated it. The puzzle must await future elucidation. For the present we can merely put on record Admiral Nimitz's report of the damage done to the enemy. Three battleships were damaged, at least one badly. Two or three carriers were destroyed with all their aircraft, while one or two more were badly damaged, and most of their aircraft were lost. Four cruisers were damaged, two of them heavily. Three transport ships were damaged. The Admiral added that it was possible that some of these wounded ships would not be able to reach their bases. One American carrier was hit and some aircraft were lost, but American casualties were light. The battle is certainly a heavy blow to Japan's sea power.

There is reason to think that Japan's strategy has been considerably modified by the recent bombing of Nippon by Gen. Doolittle's squadrons, and since then her troops have been making strenuous efforts to occupy all places in China from which further raids could be made on her homeland. British and American aircraft have recently arrived in China, and President Roosevelt's warning that if the Japanese used poison gas in China the Americans would retaliate in kind cannot have been a sedative to Japanese nerves. It seems, from a remark by General Chiang Kai-shek, that gas has been used by the invaders during the past four years, and that the Chinese had no means of taking counter-action. Japan's own action has now provided the Chinese with powerful allies in place of mere sympathisers.

### R.A.A.F. Aggression

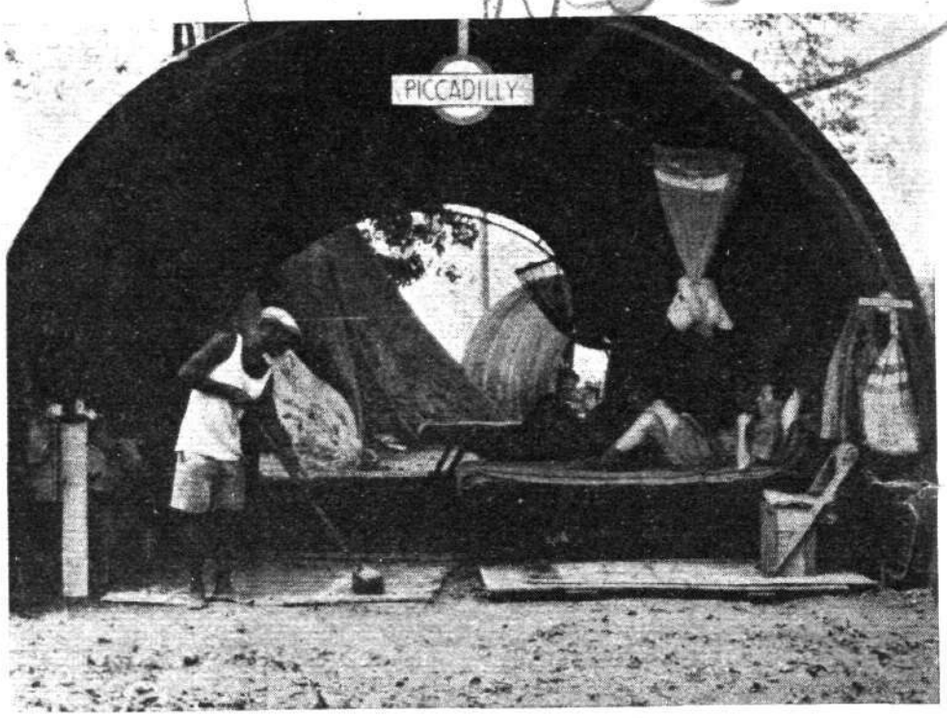
OF course, this battle has brought great relief to Australia and New Zealand, and after President Roosevelt had given an account of it to the Pacific War Council in Washington, Mr. Nash, the New Zealand Minister, said that it was "full of good news, as good as we have had and perhaps the best we have had." The Australians, with their American partners, have struck harder than ever at the Japanese in New Guinea, and on one day last week their raiders which were over Lae and Salamaua, had a fierce fight with

LEGLESS LANDING : Lt. Griffin making a "wheels up" landing in a Douglas A.20 attack bomber of the U.S. Army Air Forces. Only minor damage resulted. The A.20 is another variant of our Boston and Havoc.

## WAR IN THE AIR

Japanese "O" fighters. No fewer than thirteen of the latter were either shot down or damaged, while the loss on our side was only two machines.

The great battle in Libya is essentially a tank battle, though other arms, including infantry, artillery, and air forces, have been fighting hard in it. It has been reported that the Empire air squadrons have often disregarded the danger from Germans and Italians overhead and have come down low to attack ground targets, and have accordingly suffered higher losses than usual. There have been several allusions to their attacking enemy "armoured" forces, which presumably means the lighter classes of tanks. Among the supply columns they have played havoc, and in one day destroyed over 100 vehicles. Two novelties have been mentioned, namely, that Spitfires have been sent out there, and that Kittyhawks have been equipped as light bombers. But one duty the R.A.F. must never forget: it must protect our ground troops from the attacks of Ju 87s and 88s when they try to dive-bomb. A particular guard had always to be kept over the fortress of Bir Hakeim at the south of the British line. This has been held by the Free French, and they have put up a defence which has aroused the admiration of the whole of the Eighth Army. Gen. de Gaulle has sent a special message of congratulation to Gen. Koenig, the Commandant at Bir Hakeim, saying, "All France look to you in her pride." Mr. Churchill, too, congratulated Gen. de Gaulle on the fine stand made by the Free French in Bir Hakeim.




TUBULAR TERMINOLOGY: Airmen's quarters at an R.A.F. flying boat station in West Africa.

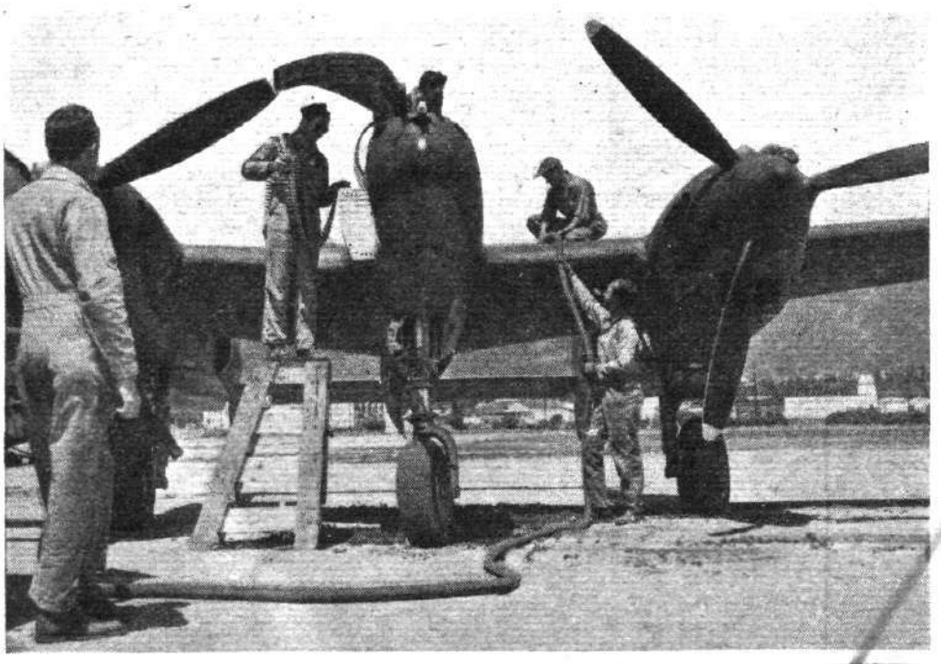
It is melancholy to have to record that all their gallantry could not withstand the overwhelming efforts which the Germans and Italians made to capture the position. The Germans got some of their heavy 88-mm. guns into position to the north and north-east of the position, practically encircling it, while one day no fewer than 100 dive-bombers made a concentrated attack on the place. This was described by a B.U.P. correspondent as the "greatest dive-bomber raid ever unleashed in the desert." The British contrived to get convoys of supplies through to the garrison, probably not without loss, and our fighters and bomb-carrying Kittyhawks assailed the encircling enemy. Some of the heavy American tanks named General Grant also moved up to help the defenders, but it seems that we have not nearly as many of these monsters as we really need. At last Gen. Ritchie gave orders for the garrison to withdraw and leave the place to the enemy.

### The Left Flank

THE great efforts made by the enemy show how important they knew Bir Hakeim to be. They were held in the centre, where they had contrived to clear a broad path through our minefields (there has been mention of a new British device called "iron boxes"), and it was necessary for their tactics that they should be able to move freely round our left flank. While Bir Hakeim was in Allied hands that route was long and dangerous, and for that reason the greatest efforts were made to capture it. The Free French have undoubtedly inflicted very heavy casualties on the enemy, and we must hope that they have not lost too heavily themselves. The glory of their fine stand will not be forgotten, and will rank with the defence of Verdun in the last war. The Germans claim that they carried Bir Hakeim by storm.

### In Europe

IN Russia the Germans have followed up their capture of the Kerch peninsula with a violent assault on Sevastopol. It is the way of the Russians not to say much about any one battle or group of operations until something definite has been accomplished; so at the moment we know little about how matters have been going there; but in the early stages at least the defences held, and the garrison made counter-attacks wher-



WEST COAST INTERCEPTOR COMMAND: Refuelling and rearming a Lockheed Lightning at a U.S. Army air base. From this picture it appears that the Lightning (or P.38) has a main armament in the nose of five .5in. machine guns. Lightnings are also being used by the American air forces in Australia.

# WAR IN THE AIR

**ENEMY AIR LOSSES TO JUNE 13th.**

| | Over G.B. | Over Continent | Middle East |
|---|---|---|---|
| June 7 | 1 | 0 | 7 |
| ,, 8 | 2 | 4 | 6 |
| ,, 9 | 0 | 0 | 6 |
| ,, 10 | 2 | 3 | 6 |
| ,, 11 | 1 | 0 | 3 |
| ,, 12 | 0 | 0 | 8 |
| ,, 13 | 0 | 0 | 13 |
| | 6 | 7 | 49 |

Totals: North, 5,986; Middle East, over 3,978.

ever such a step seemed to be worth while.

On the Kharkov front, too, the Germans have launched a heavy offensive, in which the opposing air forces are, without doubt, taking an active part. This may prove to be the most important struggle of the year in Russia.

Detailed examination of the photographs taken after the great R.A.F. raid on Cologne shows that over 250 factory buildings have been destroyed or seriously damaged. It is said that a quarter of a million people have left the place since the raid.

It has been officially announced that Whirlwind fighters have taken part in recent sweeps over Northern France.

## Later News of the Coral Sea

THE Navy Department in New York has issued further details of the action in the Coral Sea, which had been withheld until after the Midway battle. The U.S. Navy lost the 35,000-ton carrier *Lexington* in that fight, as well as a 25,000-ton tanker and a destroyer. Against this the Japanese had the following losses: sunk, the carrier *Ryukaku*, three heavy cruisers, one light cruiser, two destroyers and several transports and small supply ships; probably sunk: one cruiser and one destroyer; severely damaged, the carrier *Shokaku* (which was hit by bombs and torpedoes and was left ablaze), three cruisers, two aircraft tenders, three destroyers, and 11 or more other vessels. Both the Japanese carriers mentioned were new ships. In the subsequent Midway battle it is estimated that the Japanese must have lost over 10,000 men, as the four carriers believed sunk (that is the latest report) had each 1,500 men on board, and at least three transports were torpedoed.

In the Midway battle the Americans first used the Grumman Avenger, a torpedo aircraft said to have a top speed of 270 m.p.h., a range of 1,400 miles, and a ceiling of 20,000ft. This came as a great surprise to the enemy.

In the great Libyan battle the R.A.F. has been exerting itself to the utmost, and terrific air fights have been taking place. German Stukas are now there in great numbers, working under Messerschmitt protection, but our fighters have destroyed great numbers of them. Empire bombers and bomb-carrying fighters have also been fiercely attacking the enemy's armoured vehicles as well as his transport. Our bombers have also been raiding the enemy's ports, and there have been a number of sallies against bases in Sicily, Crete and Greece. Our own losses in aircraft have been light, and a substantial number of pilots have escaped from their damaged machines and made their way home.

Mr. Molotov being greeted on his arrival at an R.A.F. airfield. The strange outlines of a four-engined Russian bomber must have somewhat puzzled the Royal Observer Corps posts.

A close-up of the forepart of the Russian bomber which visited England. Points of interest are: Two pilots in tandem. Streamline gun turrets in the nose and tail (and probably also in the dorsal position). Radiators for each pair of engines are housed in the undercarriage fairing under the inboard engines. Despite winter conditions in Russia it is surprising to see external venturi tubes still in use.

**BRITISH AIR LOSSES TO JUNE 13th.**

| | Over G.B. A'crft. | Over Continent B'brs. | Over Continent Ftrs. | Middle East A'crft |
|---|---|---|---|---|
| June 7 | 0 | 9 | 1 | 3 |
| ,, 8 | 0 | 0 | 6 | 5 |
| ,, 9 | 0 | 0 | 0 | 9 |
| ,, 10 | 0 | 1 | 0 | 1 |
| ,, 11 | 0 | 0 | 0 | 3 |
| ,, 12 | 0 | 0 | 0 | 4 |
| ,, 13 | 0 | 0 | 0 | 10 |
| | 0 | 10 | 7 | 35 (10 pilots safe) |

Totals: North, 3,954; Middle East, about 1,250.

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Mr. C. R. Fairey, M.B.E., F.R.Ae.S., who receives a knighthood.

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Mr. F. Handley Page, C.B.E., F.R.Ae.S., becomes a Knight.

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Capt. D. Barclay, Chief Pilot of Scottish Airways; P. E. Davis, Senior Stores and Accounts Officer, Air Ministry; Healy, Officer-in-Charge of the R.A.F. Comforts Fund and Secretary of the R.A.F. Comforts Committee; P. C. Hinds, Works Manager, Sperry Gyroscope Company, Ltd.; A. G. Jacob, Controller of Accounts, Air Forces in India; H. A. Jowett, Obs. Group Officer, R.O.C.; W. H. Macrostie, Superintendent, Handley Page, Ltd.; R. E. Mills, Tech. Assistant, M.A.P.; Cdr. P. Mursell, Officer Commanding, No. 6 Ferry Pilot Pool, A.T.A., B.O.A.C.; H. S. Noyes, Dep. Area Commandant, Western Area Hq., R.O.C.; Miss M. K. Rathie, Senior Nurse, Standard Motor Company, Ltd. (Aero Engines), for services to Civil Defence; W. R. Snell, Controller of a Group Centre, R.O.C.; Miss H. L. Thomas, Chief Superintendent of Typists, M.A.P.; J. J. Unwin, Scientific Officer, M.A.P.

### IMPERIAL SERVICE ORDER

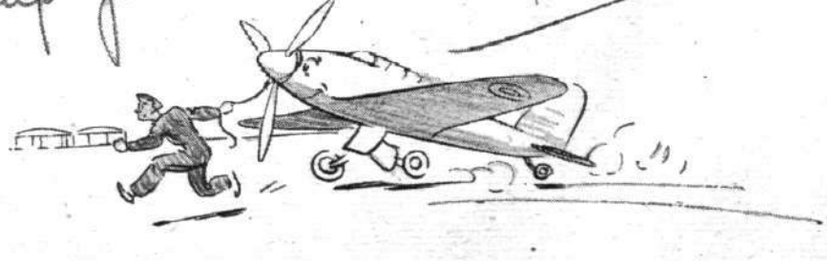
B. M. Robinson, Senior Staff Officer, Air Ministry, to be Companion of the Order.

*A further list will appear in our next issue.*

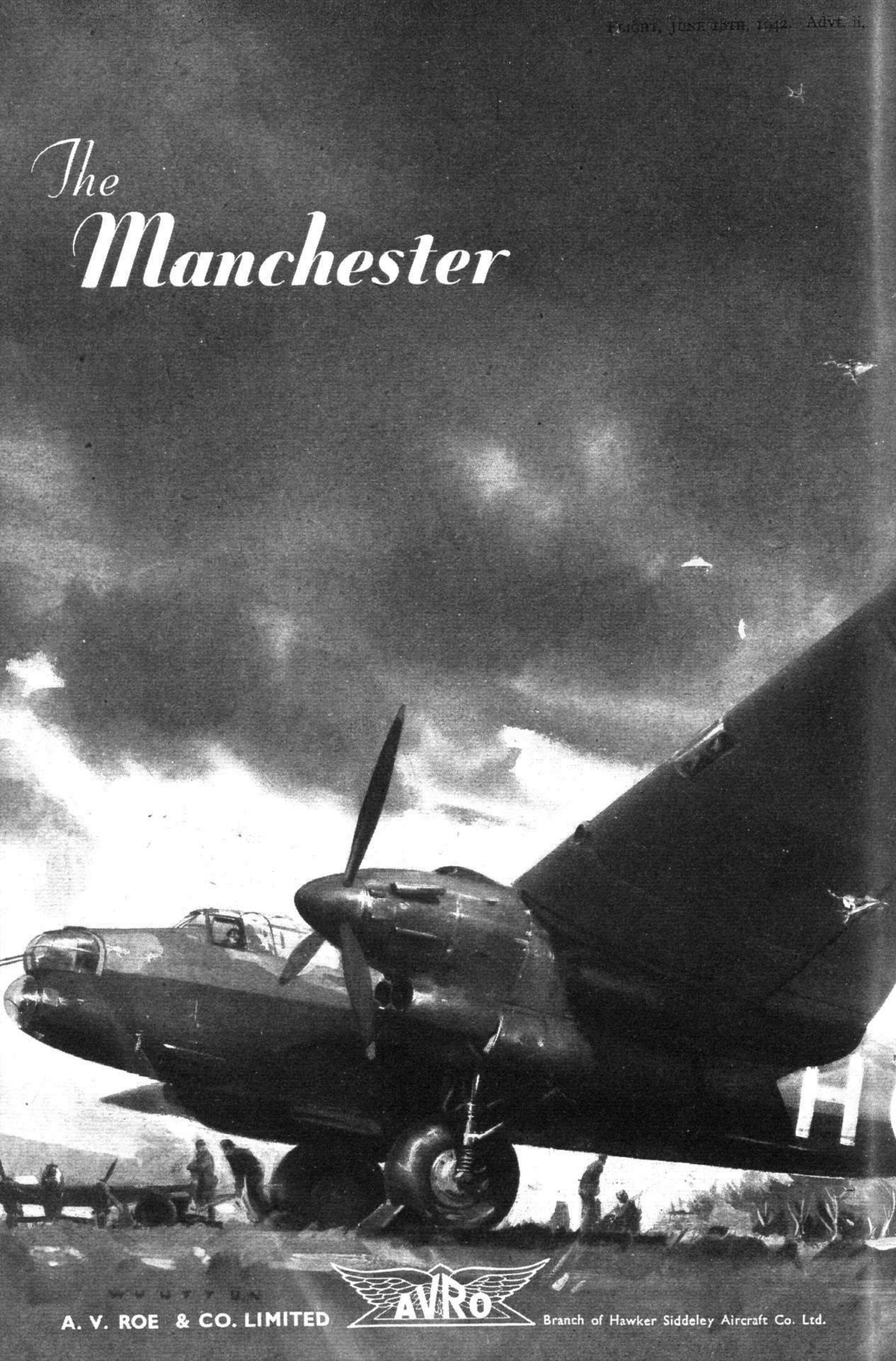
From a Pilot's Notebook

Don't unfeather with an open throttle — it always produces unexpected results — none of them pleasant


Don't forget to exercise the propeller before taking off. Trot it round the tarmac or canter it over to the canteen — it needs a 'run-up' just like the engine



# *The Manchester*



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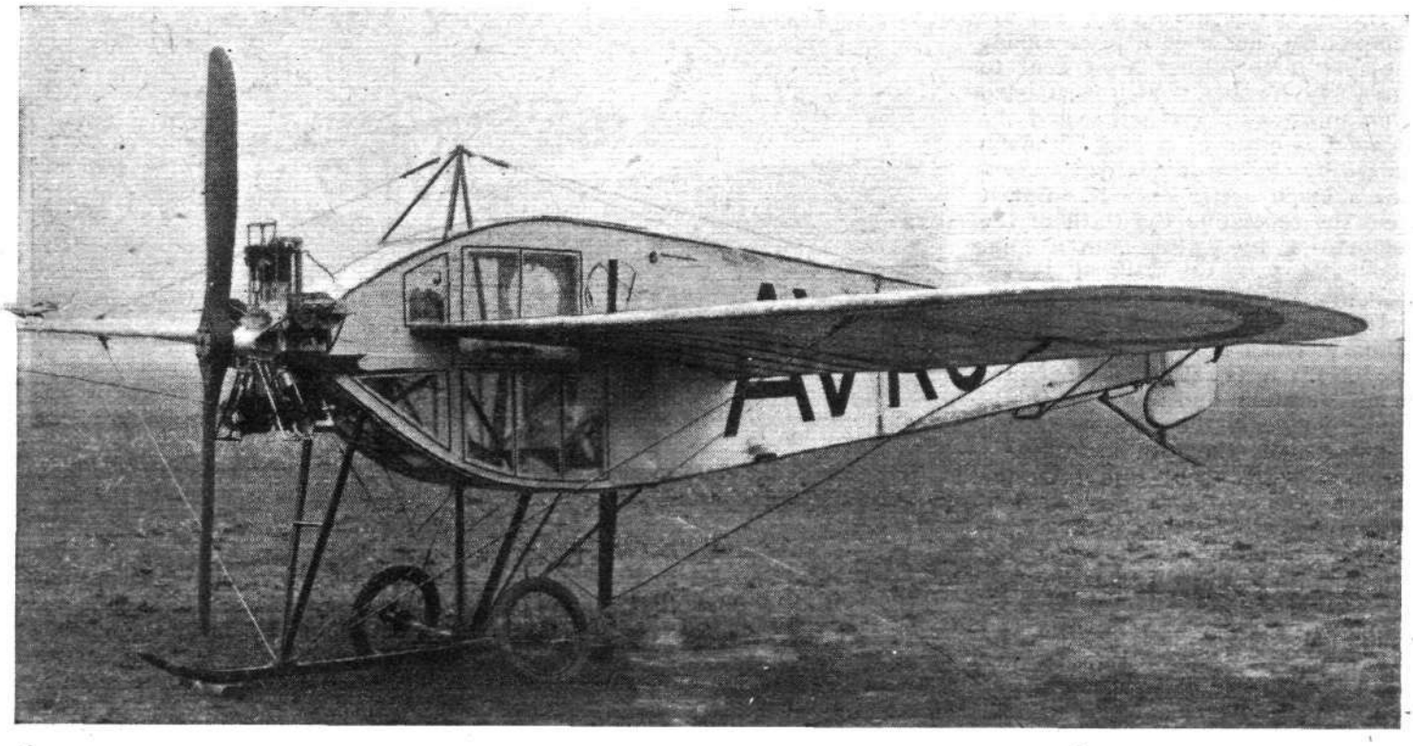
AHEAD OF THEIR TIME—5

# CABINS FOR CREWS



The Avro monoplane of 1912 was a single-seater fitted with 30 h.p. Viale engine. The undercarriage was typical of Avro machines of that period. Lateral control was by warping the wings.

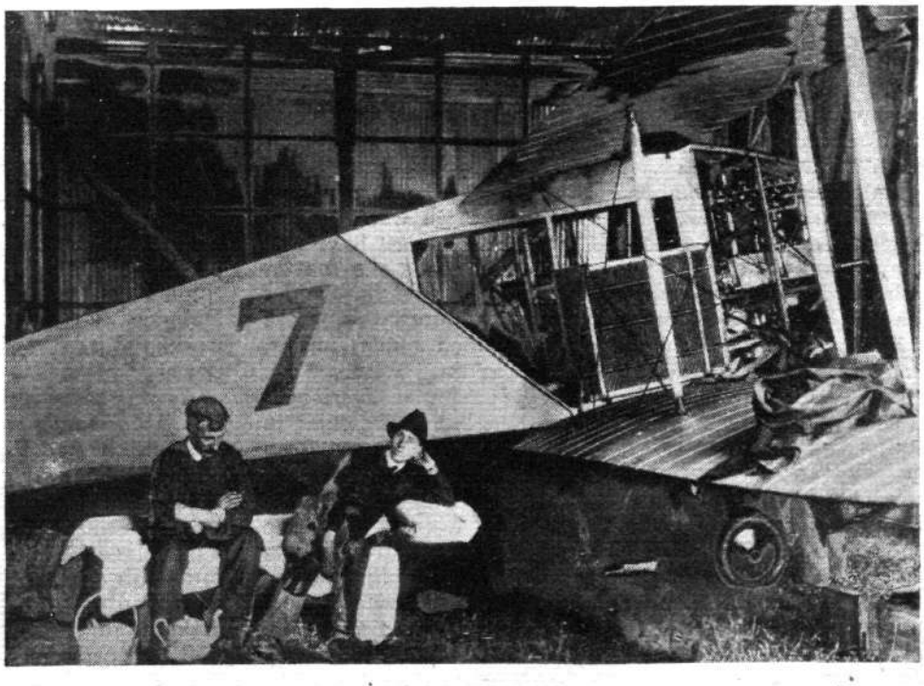
## *Two Early Avro Types Which Made History : The World's First Authentic Spin : "Opposite Rudder" the Remedy*

By THE EDITOR

THE enclosed type of aircraft is now so commonplace, and the open-cockpit machine so much the exception, that it must be difficult for the younger generation to visualise the time when the reverse was the case. I mentioned in a previous article in this series the Piggott monoplane exhibited at the Olympia Aero Show of 1911, but that machine was not a success, and little was heard of it after the show.

In a very different category were two Avro machines produced in 1912. Not only did both fly very well, but one of them had the distinction of being, so far as I am aware, the first aircraft in the world to get into a spin and out again without damage to itself or its crew.

Exactly what was in the minds of my old friends A. V. Roe (now Sir Alliott Verdon-Roe) and his chief designer, Roy Chadwick (who broadcast on Monday of last week in the "I am an Aircraft Designer" series) I do not know. They had produced quite successful tractor biplanes, but for the Government competition for military aircraft they produced a very special machine, a biplane with a cabin. The idea may have been to give comfort for the crew, out of the draught of the slipstream, or the main purpose may have been streamlining and a better performance. The biplane went into the competition, but the monoplane was a single-seater, and thus not eligible, although it did quite a lot of flying before and after the competition. Probably the lower wing loading of the biplane arrangement was deemed to




The Avro biplane in its hangar during the Military Trials of 1912. Note the triangular cabin door, and the radiator on the side of the fuselage.

# CABINS FOR CREWS

give it a better chance in the point-scoring rules of the trials.

The Avro biplane did not win the competition, nor even a place among the first three. First prize went to the Cody biplane, which completed every prescribed test and scored the greatest number of points, although judged by modern standards the Avro was a much better aircraft. But it gave the spectators the thrill of the competition by getting into a spin. The pilot was Lt. Wilfred Parke, who was killed later in a crash with a Handley Page monoplane. In the Military Trials Parke had completed one of his tests, the flight of three hours' duration, and was returning to land. Suddenly the machine started a spiral dive; the turn increased in tightness until, about 50ft. from the ground, the machine was righted, made a circuit and landed in a perfectly normal manner.

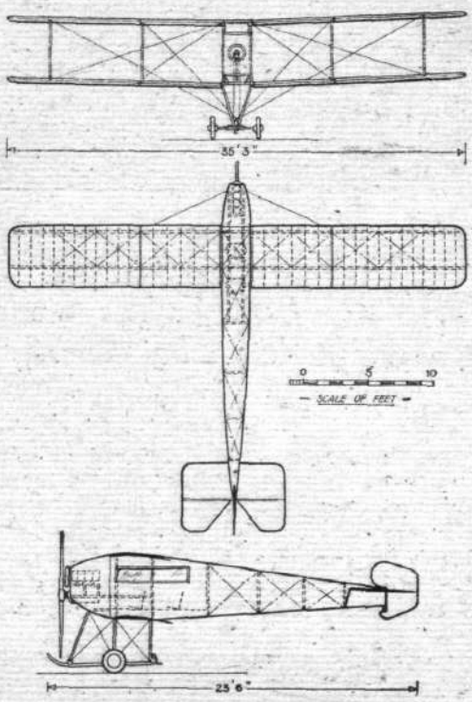

**This view of the Avro monoplane gives a good idea of the flat sides and top of the fuselage. Like so many other machines of the time, it had no fixed vertical tail fin.**

### Mistaken for a "Stunt"

Many of the spectators had thought that Parke had been stunting, but when he climbed out of the machine he had a very different story to tell. When he had wanted to bring the machine out of the turn it refused to respond. He put on elevator and rudder, but all that happened was that the turn became tighter and tighter. Finally, in sheer desperation, he put on "opposite rudder" and the machine came out of the turn instantly, although without any jerk. Lt. Parke said that, so far as he could remember, he did not use the wheel at all. (A wheel was used for warping the wings for lateral control; there were no ailerons.)

In those days it was not known that the spin is one of the stable motions of an aircraft, and all sorts of theories were advanced to account for the unusual behaviour of the Avro. But for the fact that Lt. Parke happened to apply the correct remedy there would have been a fatal crash, and we should have been at a loss to find an explanation. Capt. Geoffrey de Havilland, I remember, said that he would have given as his opinion that the controls had jammed. It all seems very elementary now, but at the time we were greatly puzzled, and I imagine that Roy Chadwick must have had many a sleepless night, wondering what was the matter with his design. The machine had no fin, and the rudder was not very large, but that was not unusual in those days, and no other aircraft had performed similar antics. Fins and larger rudders did not appear until a later date.

The two Avro machines had very similar fuselages; streamlined in plan and side elevation, but rectangular in section and with flat sides, top and bottom. Apart from the wing arrangement, the main difference was that the monoplane had a Viale radial air-cooled engine, while the biplane had a Green in-line water-cooled. In the biplane the view forward was none too good, as the engine cylinders reached nearly to the roof of the forward part of the cabin. The engine of the monoplane, having few cylinders and no cowling, did not obstruct view to quite the same extent, and transparent panels in the floor and sides helped a good deal. For landing, the pilot could lean his head out of an opening in the side windows. The biplane had a small triangular entrance door on each side, but the cabin of the monoplane was entered through a hatch in the roof.



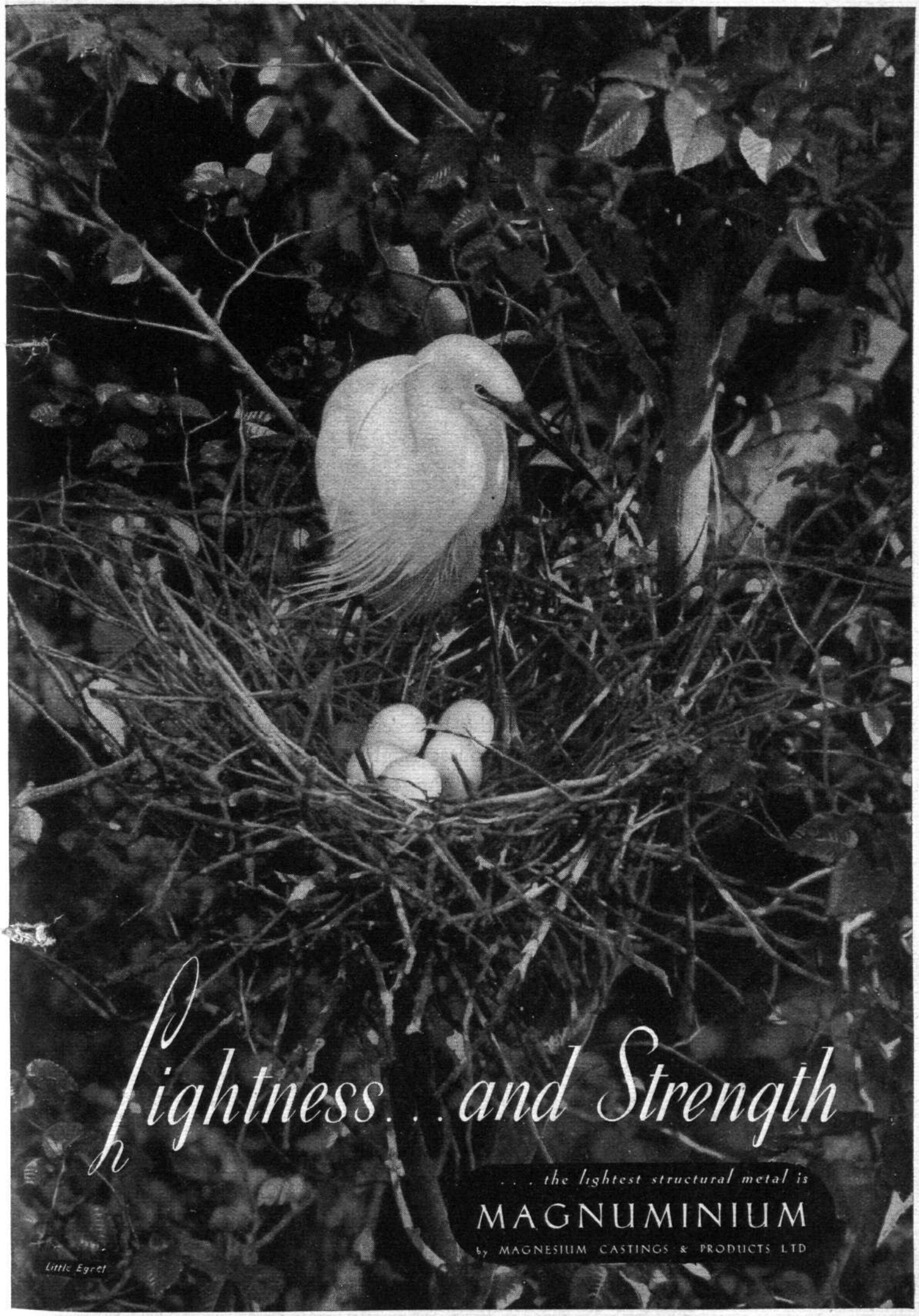

**General arrangement of the Avro military biplane of 1912.**

Nowadays one is inclined to smile at the idea of using these machines for military flying, but it should be remembered that in 1912 the question of mounting guns had not been raised, and aircraft were visualised merely as "scouts" in warfare. Their job, it was thought, was to go out and collect information for the army at the back.

In view of the fact that the machines took part in a *military* competition, it may be of interest to quote a few figures. The Avro biplane had a Green water-cooled engine of 65 h.p. The empty weight of the machine was 1,191 lb., and the loaded weight 1,762 lb. The wing area was 335 sq. ft., the power loading the heaviest in the competition at 27.2 lb./h.p. The wing loading was 5.28 lb./sq. ft., which was slightly lower than that of the other machines. (The lowest figure was that of a Maurice Farman biplane, which had the remarkably low loading of 2.9 lb./sq. ft..)

Owing to the fact that the Green engine had a high compression, the fuel economy was the best in the competition at 4.03 gall./hr. The 100 h.p. Gnome rotary engines used about 8.5 gall./hr., and the 120 h.p. Austro Daimler in Cody's winning machine 9 gall./hr., which worked out at about the same consumption per horse-power.

As was to be expected from such a high power loading, the performance was not spectacular. The top speed was 61.8 m.p.h. and the minimum speed 49.3 m.p.h. The low speed range was, of course, due to the high power loading. The Avro monoplane was flown a good deal by Lt. Parke during the summer of 1912. It was the first cabin light plane in the world, its engine being a five-cylinder radial air-cooled Viale of 30-35 h.p. Except for the enclosed cabin and the monoplane wing, the machine was little different from other Avros of that day. It flew quite well, but performance figures were not released. C. M. P.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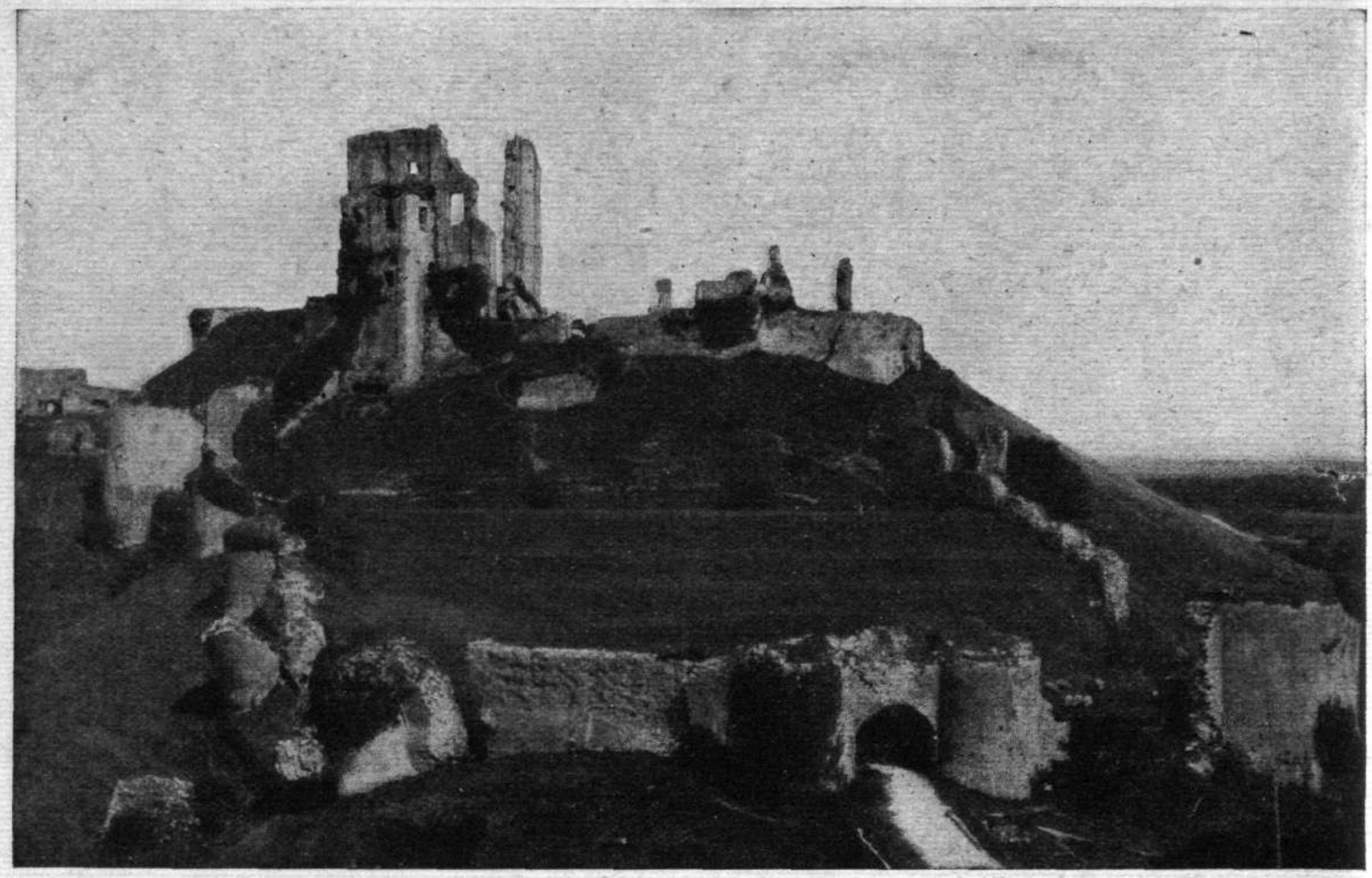


# *Corfe Castle . . . .*

For three years the gallant castellaine, Lady Bankes, held Corfe against the besiegers. And after the siege, from being one of the grandest English Castles—incidentally, on as fine a site as any in the country—it was reduced by Puritan vindictiveness to this pathetic ruin. "Slighted" is the term—but what an inadequate word this seems to be! They undermined the Keep, the semi-circular walls, towers and the Gatehouse—completely shattered the proud and impregnable fortress that had stood up to their cannon and constant assault for so long. This is much as they left it 300 years ago. The castle in those days was one building in thousands with any endurance; to-day most buildings are durable, but brick and concrete require the stability of form and permanent security of steelwork to give them the maximum strength and durability expected.

# WINGS IN PALESTINE

## *Significance of the Holy Land in International Air Communications : Encouraging Hebrew Youth : An Empire-wide A.T.C. Suggested*

***By Our Haifa Correspondent***

EVER since the days of King Solomon, Palestine has been an important junction on the routes connecting the East with the West. The harbours and bays of Acre, Gaza and Aquaba bustle with the ships of many seafaring nations, and Marco Polo called twice at Acre on his mission from the Mongol Khan to the Holy See.

Indeed, the inherent value of Palestine was not in its natural wealth but in its geographical position at the cross-roads of two worlds. It is for this reason that right through its history the country has been the scene of many battles between rival empires.

Since those distant days wings have replaced camel caravans and the chariots of the Egyptian Pharaohs. The development of international aviation has, in fact, enhanced the role of this ancient country as a bridgehead between continents. Before this war the country was being drawn within the orbit of international air communications, and British, Dutch, Polish, Egyptian and Italian air routes plied to and from here regularly.

This importance of Palestine to international air and supply routes is clearly evident in the present war. For it is here that the supplies from and to the Middle East are focused and the vital route to Persia, Iraq and Russia centred.

(Above) An intensive course embracing practical and theoretical subjects is given to selected teachers of Hebrew elementary and secondary schools. (Below) Air Commodore D'Albiac inspecting a group of Palestinian Royal Air Force personnel. They are mostly skilled craftsmen or farmers in the Jewish settlements.

### Gliding Clubs

Fully alive to their country's share in the allied war effort are the young men and women of Palestine. Already some years before the war a group of flying enthusiasts began to make the local youth air-minded. With poor financial resources but plenty of drive, efforts were made to start gliding clubs. The response of the young people was more than magnificent. In Jerusalem, Haifa, Tel-Aviv, and in the farming settlements of the valley of Esdralon gliding became a most popular adventure. These clubs had rather an unusual aspect; they were mainly recruited from students, workers, young farmers, taxi-drivers and mechanics. Summer camps were organised in which intensive training, supervised by refugee gliding instructors from Austria and Germany, was given (up to International Licence standards).

With the growth of this movement it was possible to go a step farther and to establish the Aviron Palestine Aviation Company. The main object of this organisation was, and still is, to foster flying among the young generation and to establish facilities for their training. During the past few years quite a number of pupils have passed through a training centre and acquired the usual licences. Some of the more promising pupils were helped to go abroad, to Great Britain and the United States, to complete their training. But the main service rendered by these various groups of flying enthusiasts was to make flying familiar to the mind of the average young boy.

The fruits of these efforts have been shown since the outbreak of this war. Several thousands of

(Top) An air view of Nazareth. (Centre) School teachers learning to build models of gliders, which knowledge they are later on to impart to their pupils. (Bottom) Construction of glider models is a compulsory subject in all Hebrew schools in Palestine. Here is a group of schoolboys participating in a competition.

young people have volunteered for service with the R.A.F., and have rendered good account of themselves in Greece, East Africa and Libya. The majority of them are serving as maintenance personnel and a few have been accepted for flying duties. There is certainly no shortage of volunteers keen on operational flying, and it is understood that facilities for their acceptance are constantly extended. The value of these volunteers is not in their numbers, for although about 30 per cent. of the total number of the Hebrew population have signified their willingness to join some branch of His Majesty's Service, their figure is of but relative importance. The existence, however, of keen and largely trained young men in the very heart of the Middle East War theatre can be of great value to the Allied war effort.

That the desire to serve is close to their hearts is evident from the latest news in the Holy Land. To inspire even the very youngest with the idea of flying, the construction of models has been introduced as a regular subject in the curriculum of all Hebrew elementary schools. This, in itself, is not a complete innovation, for similar systems have been successfully introduced in schools in Russia, Italy and Germany.

### School Training

In this manner young boys acquire their first knowledge of elementary flying science and the simple principles of aviation during their most impressionable years, and grow up, as it were, in close familiarity with flying. At the age of sixteen they transfer to actual gliding instruction, and those especially keen can continue training on aircraft. The educational authorities are naturally giving their full support to this innovation. Since, for obvious financial reasons, it was found impracticable to employ special instructors at each school, selected elementary and secondary teachers gave up a good part of their summer holidays to undergo a special course in the construction of models. After qualifying, they returned to their urban, village and communal settlement schools and imparted their newly acquired knowledge to the youngsters, who eagerly absorbed it.

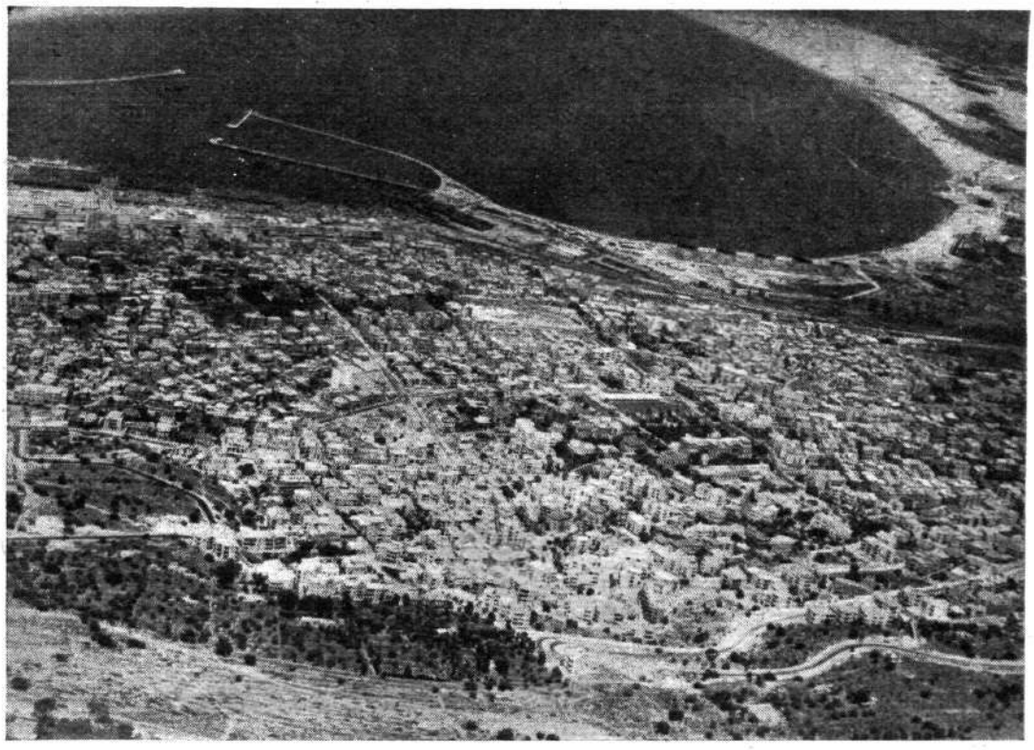
It is obvious that these attempts are not calculated to produce immediate results, and cannot produce an immediately available Air Force personnel. But coupled with the existing gliding and flying clubs they

## ALESTINE

form a very valuable nucleus for the expansion of Palestine's potential in flying personnel. It would perhaps be a good idea if this trend of interest among local schoolboys could be helped by the creation of some such suitable framework as the Air Training Corps in Great Britain. It would not indeed be a measure designed exclusively for the benefit of the youth of Palestine. The expansion of the A.T.C. organisation to Palestine and other parts of the Empire would, apart from its value as a pre-military training, have a most beneficial influence on the growing generation.

Flying is the language youth understands best. An Empire organisation which would use this as a medium of appeal could not only strengthen the human element of the Empire's air power, but also bring more cohesion between the growing generation of the peoples of the Commonwealth.

It may be said that far more urgent tasks have to be tackled, more immediate problems solved and more practical matters given a priority of public care and attention. But if deliberations on post-war reconstruction appear to be premature, the extension of an air training scheme to all parts of the Empire appears to be one of great urgency. Few who know the loyal and keen youth of Palestine and other parts of the Empire will doubt that such a scheme would not only be a great encouragement, but also a great help to intensifying their war effort.



AN AIR VIEW OF HAIFA : Palestine's main port and a vital junction in the Empire's supply strategy.

# CANADA'S AIR MINISTER CALLS FOR UNITY

A DRAMATIC appeal for unity at a time of internal crisis was made to the House of Commons at Ottawa by the Hon. C. G. Power, Air Minister, as he concluded an impressive story of the expansion of the R.C.A.F., the success of the Commonwealth Air Training Plan, and the importance of the international conference then about to open.

"At the very moment," declared Major Power, "when the United Nations are meeting here to discuss a project of our United Canadian nation, we are in the midst of an internal crisis the gravity and seriousness of which I would be the last to minimise.

"When one has campaigned and marched and bivouacked and fought for 25 years with friends, it is a sad wrench indeed to be separated from them, even temporarily," said the Air Minister, referring to the resignation of his Quebec cabinet partner, the Hon. P. J. A. Cardin.

"Our own country is apparently torn asunder," said Major Power, "not on the question of the war itself but on the methods to be employed by Canada in waging the war. There is, I am glad to say, no difference of opinion with respect to the air war, either as to the raising of men or money, or the spheres of action."

"I wonder," pleaded Major Power, "if, during the time the representatives of all our Allies are here, it would be possible to call a truce to our internal dissension and show by a united front, temporarily if you will, our determination to join with them in the defeat of the common enemy."

Indicating the rapid growth of R.C.A.F. personnel, the Air Minister told the House at the outset that while last November the total strength was about 90,000, it to-day exceeds 115,000, exclusive of about 3,000 in the Women's Division, and also exclusive of Australians, New Zealanders, Royal Air Force, and civilians. The man-power situation in the R.C.A.F. was, in commercial language, "easy." In July last year over 8,000 men were recruited, including ground and aircrew men, but the figure gradually decreased as the needs declined. The present monthly average of air recruiting was about 4,000.

"As time goes on," said Major Power, "the necessity for raising recruits, other than aircrews, will gradually be lessened. At the present time we have sufficient staff by way of ground crews and mechanics to man or nearly man all our training schools. We have also a fair proportion of the number needed to man our squadrons overseas or in the course of preparation. And unless we take on other responsibilities, either arising out of the international conference here or arising out of other demands to be made upon us by our partners in the training plan, it is not likely that it will be necessary for us to keep up this rate of recruiting, at least for ground crews."

Some of the recruits came from men called up for Army training, the Air Minister explained. The number was about 4,000, and about a quarter of these were aircrew, but the Minister did not think it would be necessary to draw upon Army recruits for air needs. Major Power said that to-day "we still have a six months' supply of potential recruits ahead of us, and the schools have not as yet graduated. Thousands of young men, matriculating from the high schools, will flock into the Air Force."

After paying a high tribute to the work done by the Canadian Legion Educational Service, the Air Minister pointed out there were university training corps arrangements with the universities. Squadrons had been formed at McGill, Toronto, Queens, Western and at the Ontario Agricultural College at Guelph. There was also the air cadet movement. To-day there were 130 squadrons with an enrolment of nearly 600 officers and 1,500 air cadets.

# HERE AND THERE

## Sir Charles Craven Retires

ACTING on medical advice, Sir Charles Craven, Controller-General at the Ministry of Aircraft Production, has tendered his resignation.

Sir Charles took up his appointment in June of last year at the request of Mr. Churchill, and the then Minister of Aircraft Production, Lt. Col. J. T. C. Moore-Brabazon (now Lord Brabazon), and after a period of convalescence he will, at Col. Llewellin's request, act on a part-time basis as Chief Industrial Advisor to the M.A.P.

## Exhibit "A"

CITIZENS of some of Britain's blitzed cities and "Baedekered" towns are to see specimens of the bombs with which the R.A.F. is now smashing at the German war machine.

A series of travelling exhibitions, organised by the Ministry of Information, will include several of the latest type British bombs.

Specimens to be exhibited include the 1,000 lb., 1,900 lb., and 2,000 lb. types frequently used in R.A.F. raids on enemy war centres.

First exhibition opened in Bristol this week.

## Ferry Pilots' Fund

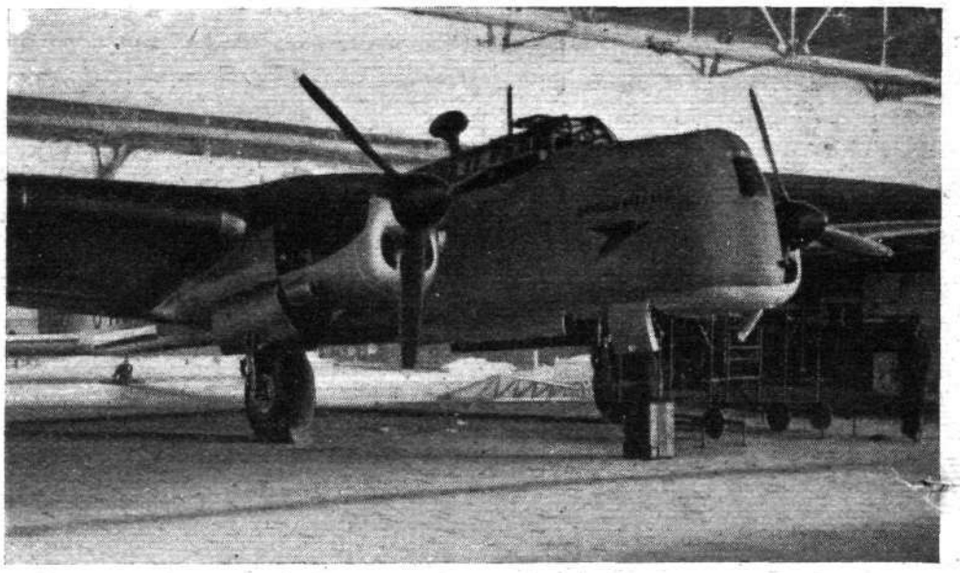
A FUND for the benefit of serving members of the Air Transport Auxiliary and their dependents has now been launched under the title of the A.T.A. Benevolent Fund.

Its objects embrace the making of grants to the dependents of those who lose their lives in the service of the A.T.A., and to any employee, or his or her dependents, who is incapacitated through an accident while on A.T.A. duty, and to provide a memorial tablet to those who lose their lives in the course of their A.T.A. duty.

Subscriptions may also be made from the fund to hospitals or other institutions which benefit A.T.A. or R.A.F. personnel.

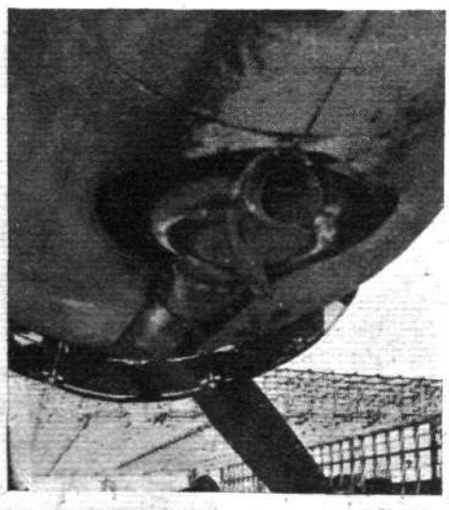
The first members of the committee are Comdre. G. d'Erlanger O/C. A.T.A., Cdr. the Hon. B. L. Bathurst, R. P. Collins, Esq., Cdr. F. Francis, Philip Frere, Esq., M.C., Cdr. Pauline Gower, M.B.E., Capt. C. J. Smith (U.S.A.), Cdr. G. Williamson, M.C., and Sen. Cdr. P. A. Wills.

Subscriptions to the fund should be sent to the Hon. Treasurer of the fund at the A.T.A., White Waltham, near Maidenhead, Berks.



STILL DELIVERING THE GOODS : One of the converted Whitleys acquired by B.O.A. for service as a freighter in Africa. The peaceful-looking nose is the most obvious modification.

The 1942 Medal of the Professional Institute of the Civil Service of Canada which was awarded to John Patterson, of Toronto, for his meteorological work for the R.C.A.F.



The exhaust-driven turbo-supercharger on the inner port Twin Wasp of a Consolidated Liberator. This photograph was taken at the new Ford factory which is said to have an ultimate output capacity of one Liberator an hour.

## They Couldn't Bring It With Them

AIRCREW members of R.C.A.F. squadrons in this country, we learn, have been given intensive ultra-violet ray treatments to compensate for lack of sunshine during the English winter and early spring.

Sun lamps have been installed at many stations where R.C.A.F. squadrons are located, and flying personnel have received concentrated treatment in eight-minute periods three times weekly. Intensity of the treatments is gradually stepped up as the fliers become accustomed to the rays.

One squadron medical officer said that by increasing Vitamin D in the men's systems the rays helped build their resistance to common colds.

Ray treatment is also to be continued in the summer for night-flying crews.

## Next President of R.Ae.S.

MR. A. GOUGE, B.Sc., F.R.Ae.S., chief designer to Short Bros., has been elected President of the Royal Aeronautical Society for the year 1942-43. Mr. Gouge recently broadcast in the series, "I am an Aircraft Designer."

Two new vice-presidents of the R.Ae.S. were also elected for next year, namely, Mr. E. F. Relf, F.R.S., A.R.C.Sc., F.R.Ae.S., who is superintendent of the aerodynamics department at the National Physical Laboratory, and Dr. H. Roxbee-Cox, F.R.Ae.S., who is deputy director of scientific research at the M.A.P.

All three take office on October 1st.

## Factory Blackouts

READERS of *Flight* will no doubt recall that in our issue of May 7th we reprinted a letter written by our Managing Editor, Mr. Geoffrey Smith, and published in the *Daily Telegraph* of May 1st, drawing attention to the wastage of fuel caused by the permanent blacking-out of many factories, and the attendant loss of beneficial daylight to those working under these conditions.

In the House of Commons a month later—on June 3rd to be precise—Mr. Wakefield asked the Minister of Aircraft Production, Col. Llewellin, if he was aware that his officers were still giving instructions to black-out daylight in factories, thereby causing unnecessary consumption of artificial light, and what action he proposed to take to stop this practice.

Col. Llewellin replied that he was taking steps to see that maximum use was made of natural light wherever possible.

# WINGS ARE THE WHEELS OF TO-MORROW

A.D.M. 373 (Issue 4) says that Serrated Rivets to G.A.L. drawings, Nos. D.15957 and D.15958 as approved in A.D.M. 275 may be used wherever there are production advantages in so doing.

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***Second of the New Series***

# AIRCRAFT TYPES AND

## *Kittyhawk and Whirlwind Fighters*

VERY little information has as yet been released for publication about the Curtiss Kittyhawk, known in the U.S. Army Air Forces as the Curtiss P-40D.

In point of fact, however, it differs but slightly from the Tomahawk, the P-40, of which it is a development, and many of the data available on the earlier type still apply to the Kittyhawk.

Both types are powered by the 1,000 h.p. Allison V-1710 engine, which is a 12-cylinder-in-line liquid-cooled unit and the only American engine of this kind developed to the production stage. It is known that the Kittyhawk, which has been in service for some time with the R.A.F., has a better performance than its predecessor, but just how much better is still a military secret; certainly both models from the famous house of Curtiss have given brilliant accounts of themselves, particularly in Libya, and although the Tomahawk did not prove to be quite as fast as was expected, its excellent manœuvrability was found to be a strong point in its favour. The Kittyhawk retains this high degree of manœuvrability, plus an enhanced performance, and is generally regarded as comparable with our own Spitfire.

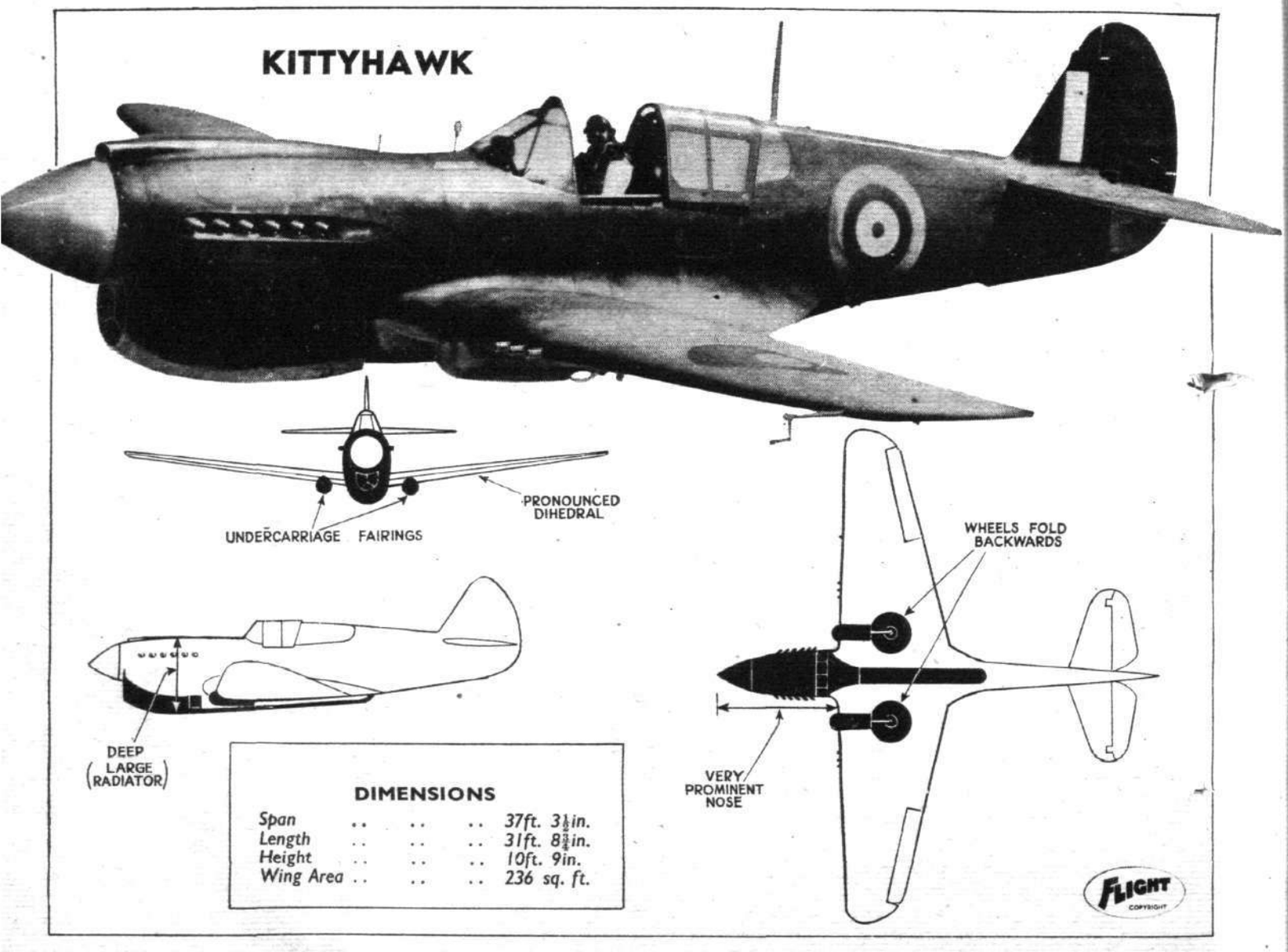
The most obvious differences between the Kittyhawk and the Tomahawk are its more massive radiator and larger spinner, but the nose has been "cleaned up" in that the guns are now all in the wings, leaving only the air intake to disturb the smooth line of the decking. The wings and tail group are identical, but the fuselage, aft of the cockpit, preserves a straighter line than did that of its predecessor, and it seems likely that, in spite of the larger radiator (necessitated by a higher power-output), no greater drag is created.

The Allison engine fitted to the Kittyhawk is also slightly different from the one that powers the Tomahawk. It is the V-1710-F, which has a somewhat different type of spur reduction gear, permitting a shorter nose. The Tomahawk has the V-1710-C15 model Allison.

Even the Kittyhawk has now been very slightly outmoded by a still later Curtiss production—the Warhawk—which is substantially the same aircraft, but equipped with the American-built Rolls-Royce Merlin engine.

A distinctive feature of the Curtiss range is the undercarriage design. This retracts backwards from the leading-edge of the wings and the wheels rotate through 90 degrees in order to lie in recesses in their under-surface. Fairings hinged to the wings enclose the retracted legs; in the earlier radial-engined Mohawk a similar undercarriage was employed except that the fairings were attached to the legs themselves.

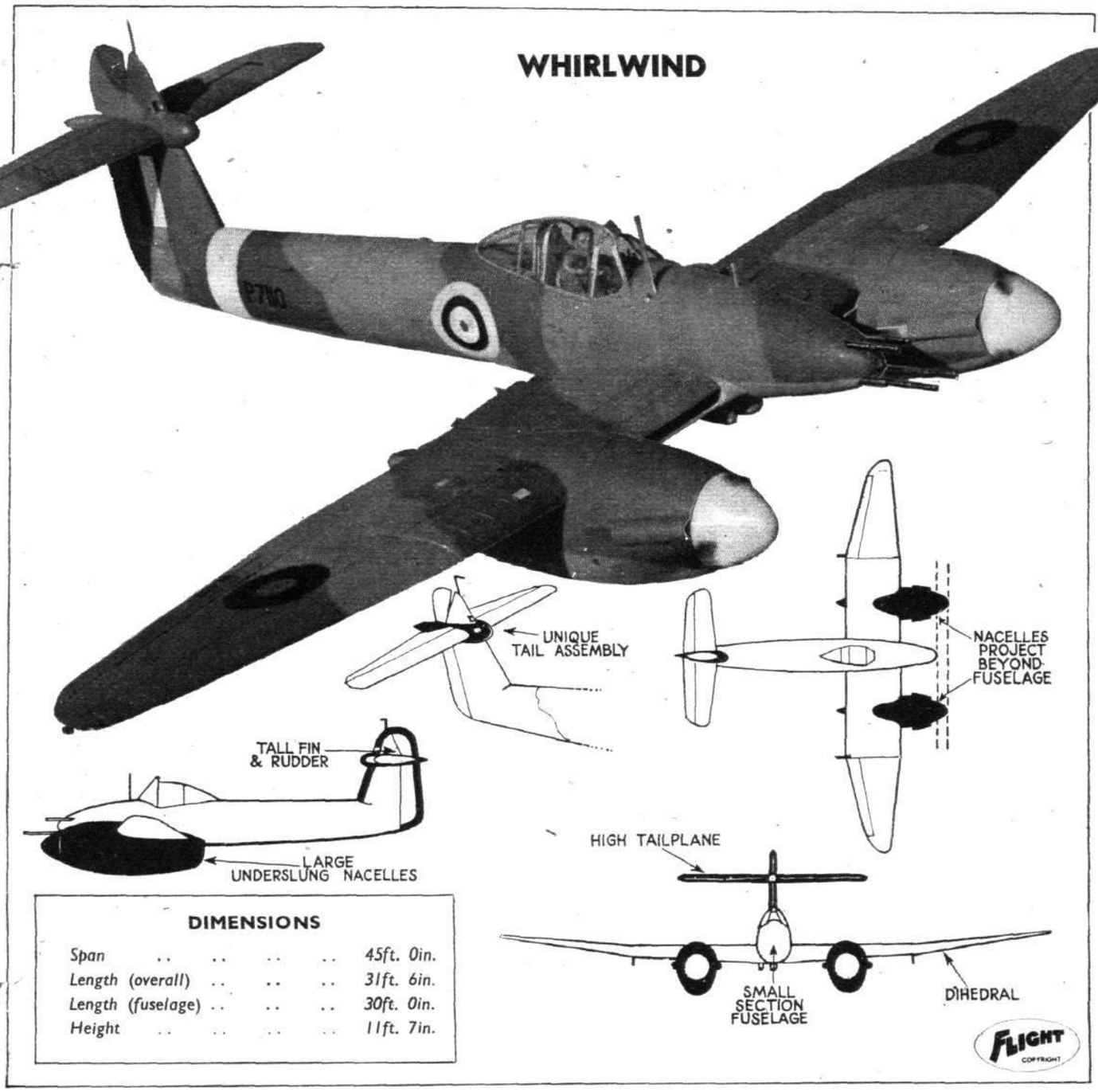
The fuselage of the Kittyhawk is an aluminium alloy monocoque structure with flush-riveted Alclad stressed-skin covering. The wings and tail unit are of similar construction except that ailerons, elevators and rudder are fabric covered. The tailwheel is also retractable and the undercarriage and flaps are operated electrically. The Curtiss fully feathering c.s. airscrew has steel blades.




**DIMENSIONS**

| | |
|---|---|
| Span | 37ft. 3½in. |
| Length | 31ft. 8¾in. |
| Height | 10ft. 9in. |
| Wing Area | 236 sq. ft. |

# [EIR CHARACTERISTICS




**DIMENSIONS**

| | |
|---|---|
| *Span* .. .. .. .. | *45ft. 0in.* |
| *Length (overall)* .. .. .. | *31ft. 6in.* |
| *Length (fuselage)* .. .. .. | *30ft. 0in.* |
| *Height* .. .. .. .. | *11ft. 7in.* |

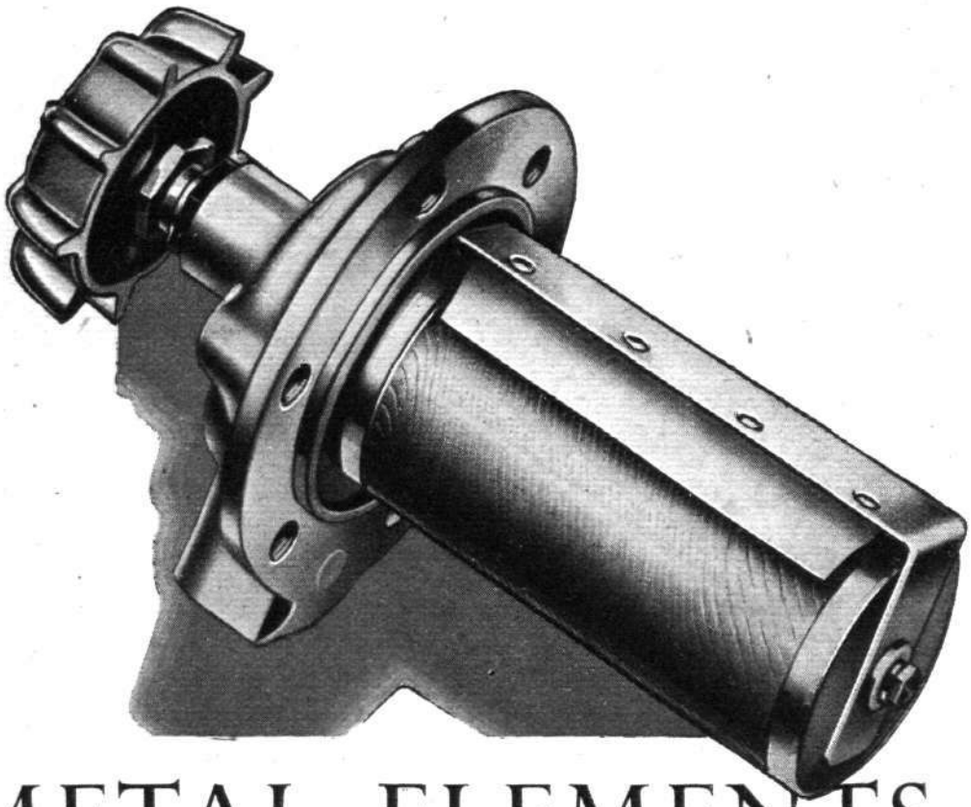
BEING one of the latest of our fighters, nothing approaching a full description of the Westland Whirlwind may yet be published. For example, no performance figures have as yet been issued, but it can be mentioned that enemy sources credit it with a top speed of 353 m.p.h. at 16,350ft.

Designed as a day and night fighter, this high-performance twin-engined aircraft has a striking appearance and is very easy to recognise by virtue of two outstanding characteristics, namely, the placing of the high-aspect ratio cantilever tailplane near the apex of the tall fin, and the comparative bulk of the two underslung engine nacelles compared with the extremely slim fuselage sitting on the wide, flat centre-section of the low wing.

Powered by two Rolls-Royce Peregrine engines, the Whirlwind mounts formidable armament in the rounded nose of the fuselage in the shape of four 20 mm. Hispano cannon, and the type has been used for some little time, with telling effect, to attack ground targets in France.

Flaps of the Fowler type are fitted, and the rear extremities of the engine nacelles, which project behind the trailing-edge, are hinged to move with the flaps to which they are attached. All wheels are fully retractable and, with its small-section fuselage, it presents as nearly perfect a streamlined shape as possible and, incidentally, an unusually small target from the head-on angle.

The Peregrine engine has a piston displacement of 1,297 cu. in. (which is the same as that of the Kestrel) and develops 885 h.p. at 15,000ft. at 3,000 r.p.m., its weight being 1,106 lb. It is, of course, fully supercharged and follows the usual Rolls-Royce pattern of the 12-cylinder V-type liquid-cooled unit. The two banks of cylinders are set at 60 degrees, and a feature of the installation is that the radiators are totally enclosed within the wing, the air entering through ducts in the leading-edge of the centre-section between the fuselage and the nacelles. De Havilland constant-speed airscrews are employed, having a diameter of 10ft. and a pitch range of 20 degrees. Muffs to damp the exhaust flames are an essential feature for night fighting.

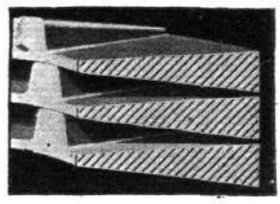


# METAL ELEMENTS *and easy cleaning*

Manufactured by a special process which gives unique precision of filter spacing, the Purolator patented metal filter element has a smooth cylindrical exterior forming the filter bed. In one type of Purolator, a simple hand-operated wiper blade cleans the filter element without in any way disturbing the filter or its pipe-connections.

*Fully patented.*

**AUTOMOTIVE PRODUCTS COMPANY LTD., LEAMINGTON SPA**



The sketch shows the key-stone section of element wire; non-choking, low flow resistance, no alteration of spacing due to wear.

*FEATURES :—*

1. *Small size and light weight.*
2. *High flow capacity with low pressure differential.*
3. *Any required degree of filtration down to as small as .0005" ensured without variation.*
4. *Perfect accuracy of the filtering slots.*
5. *Absolute rigidity and mechanical strength.*
6. *No danger of disintegration or puncturing of the filter surface.*
7. *Capacity for high pressures.*
8. *Proof against clogging.*
9. *Easily cleaned.*
10. *Unaffected by wear.*
11. *No replacements required.*
12. *Simplicity of construction and adaptability to new designs.*


**PUROLATOR**

REGD. TRADE MARK

METAL ELEMENT FILTERS

# BEHIND THE LINES

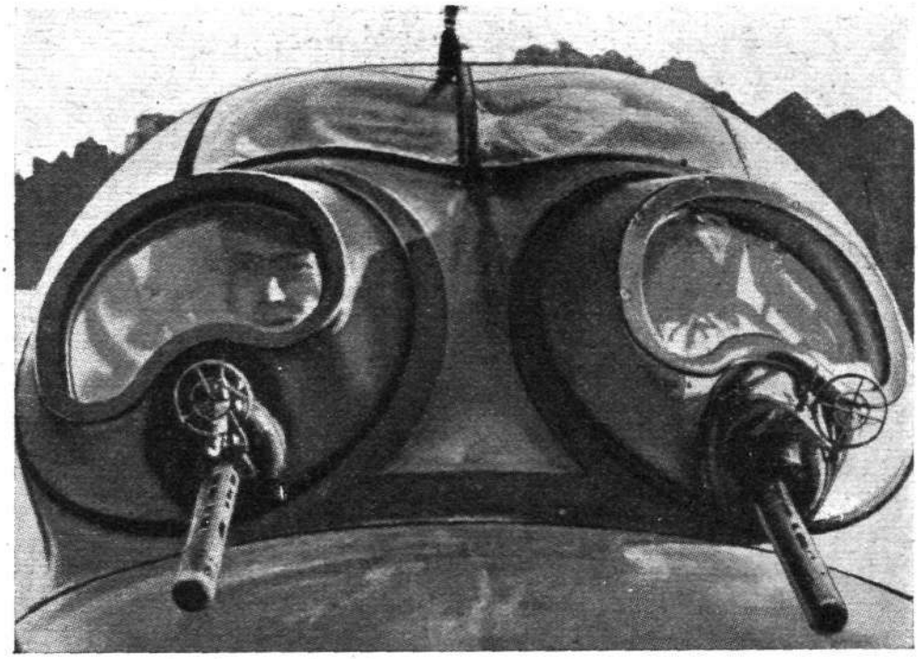
*Service and Industrial News from the Inside of Axis and Enemy-occupied Countries*

## The Spitfire in Germany

IT is always interesting, and sometimes instructive, to hear what the enemy thinks of one's efforts. The February issue of the German aviation journal *Luftwissen* devotes no less than eight pages to an illustrated description of the Spitfire, and this is followed by a three-page article on the Spitfire's undercarriage. The author of the first article, Dipl.-Ing. Theo. Kränzle, of Berlin-Aldershof, considers that for propaganda reasons the performance of the Spitfire was more or less exaggerated in English technical circles. Not until it became possible to test captured examples was it possible to get the true figures, he says. After these tests it is possible to say that the Spitfire, Mark II, with 1,100 h.p. Rolls-Royce Merlin III, has a top speed of about 550 km./h. (343 m.p.h.) at 5 km. (16,400 feet). The author does not believe, in spite of the installation of a Merlin XII and certain structural improvements, the English claim of 600 km./h. (375 m.p.h.).

## Performance Details

THE German engineer states that the ground-level speed of the Spitfire is 460 km./h. (286 m.p.h.) and gives the landing speed as 115 km./h. (93 m.p.h.).



**The twin rear turrets now fitted to the Junkers Ju 88. An advantage is that attacks from two quarters can be dealt with simultaneously. Vision through such small bullet-proof panels must be very restricted.**

**A new picture of the Focke Wulf F.W.190 which shows the fuselage and wing forms and also the semi-retracted tail wheel.**

His figure for rate of climb from ground level is 12 metres per second (2,360 ft./min.) and 10 metres per second (1,970 ft./min.) at 16,400 ft. A height of 4 km. (13,000 ft.) is reached in 5 minutes, and a height of 8 km. (26,000 ft.) in 14 minutes. The service ceiling he estimates at between 11 km. and 12 km. (36,000 ft. and 39,500 ft.). At a cruising speed of 480 km./h. (300 m.p.h.) the duration is 1.8 hours and the range 850 km. (525 miles).

## Comments

HERR KRÄNZLE admits that the low wing loading benefits the manœuvrability of the Spitfire but considers that the low "wing power" (horse-power per square foot of wing area) limits the top speed, although he admits that the service ceiling is good, and puts this down to the low wing loading and low span loading.

German pilots who have flown the Spitfire comment on the low fore-and-aft stability, but stress the excellent manœvrability of the machine.

The German writer sums up his impressions as follows: "After a thorough examination, the Spitfire shows much which is not common in German aircraft design. It must be pointed out that in the course of the war many modifications and improvements in performance have been carried out. Although in various respects many instructive design solutions are to be found, this fighter, which must certainly have been ahead of its time when it first appeared (1935-36), does not show, even in its latest form, anything revolutionary, it must nevertheless be regarded as an opponent to be taken seriously when flown by an experienced and determined pilot."

# NAVAL DEFENCE

## *Are We on the Right Lines? : Basic Principles Challenged : Aerial "Height Charges" Advocated*

By C. DUCKHAM

WHEN anti-aircraft guns first came into being in the last war the need was urgent and the adaption of the field gun obvious. The short-barrelled gun of about 3in. calibre was capable of reaching the normal heights at which aircraft then operated, and the shell velocities of that period were considered to be sufficient for the comparatively low speeds of 1914-18 military aircraft. These top speeds, by the way, were approximately the same as the present-day stalling speeds!

The last war can be considered as the "coming out" period of the machine gun (although in 1914 an infantry battalion of 1,200 men did have just a quarter of the number of machine guns now mounted on a Mark I Spitfire or Hurricane), and it is not surprising that the rifle-calibre machine gun came to be considered as the defence weapon *par excellence* against low-flying aircraft.

### Watchmaker's Shells

Hypnotised, as it were, by these original weapons, an attempt has been made to modify them, in order to keep up with increased aircraft performance, by improving their range, effective height, rate of fire, muzzle velocity and sighting. In this attempt the cannon and machine gun have each gone their own way and, in addition, met on common ground in the present-day shell-firing automatic cannons up to 40 mm. calibre. The classic example of this merging of the two types occurs, of course, in the famous multi-barrelled naval pom-pom, which squirts an incredible number of "watchmaker made" shells into the sky in an equally incredible short space of time.

Do we shoot rocketing pheasants with needle-calibre tommy guns? If not, why try to stop a Jap pilot of a torpedo bomber—who is of the opinion that dying in battle is a good idea—with a stream of projectiles varying from .303in. to 40mm. None of these is able to quash immediately a really determined attack because the damage done is insufficient to stop a machine in the last stages of an attack which may be made at a speed of 400ft. per sec.

What are the most feared forms of air attack at sea? There is mass or pattern bombing in daylight by a formation of aircraft; dive-bombing or low horizontal bombing attacks; and, finally, the air-launched torpedo which has served us so well and, in turn, punished us so severely.

### Make Air Untenable

How can all these forms of attack be rendered ineffective? It seems possible that the answer is to be found in the employment of "aerial height charges" in somewhat the same manner that we employ depth charges against submarines. What is visualised is a gun of maximum calibre (15, 18 or even 20in. if possible) for employment against high-flying aircraft and a short-barrelled cross-bred weapon, between a gun and a mortar, for use against dive- and torpedo-bombers. The extreme range in the latter case need not be more than 4,000 yards. The projectile in each case would have the thinnest walls possible, consistent with safety, to accommodate a maximum amount of high explosive.

Let us consider the effects of such weapons in action against these forms of attack. In daylight pattern-bombing by formations of bombers escorted by fighters we have the target most suited to the present A.A. system because a formation cannot jink in the same manner as can a single machine. Nevertheless, instead of shooting salvo after salvo of 3.7in. or 4.5in. shells into the air, why not plant 500 lb. of explosive in their midst? The formation must be fairly close to make the bombing effective, and the least result must be a loss of formation just at the moment when the attack is imminent. Good shooting should bag more than one machine at a time.

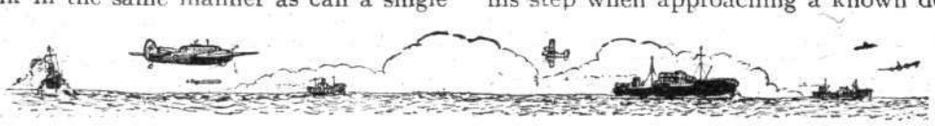
The essential of defence against any low-flying attack, which includes shooting-up with cannon-armed aircraft, horizontal bombing, dive-bombing, and torpedo-dropping, is that the *aim* of the attacker must be *instantly* destroyed. Whether the aircraft itself is destroyed as well is a secondary consideration since its purpose has been frustrated. There must have been hundreds of cases in this war in which an attacking pilot has been mortally wounded and/or his machine damaged, and yet they have carried on those last few necessary yards to make the attack which may cripple a battleship.

Any low-flying aircraft attacked by an aerial height charge is in exactly the same predicament as a bomber which has come down too low to drop instantaneous fuse bombs and blows itself up in consequence. This actually occurred several times in the earlier stages of the war. In other words, if the aim of the defence is bad, all that happens is that the violent shock waves from the explosion of the height charge puts the attacking machine off its aim.

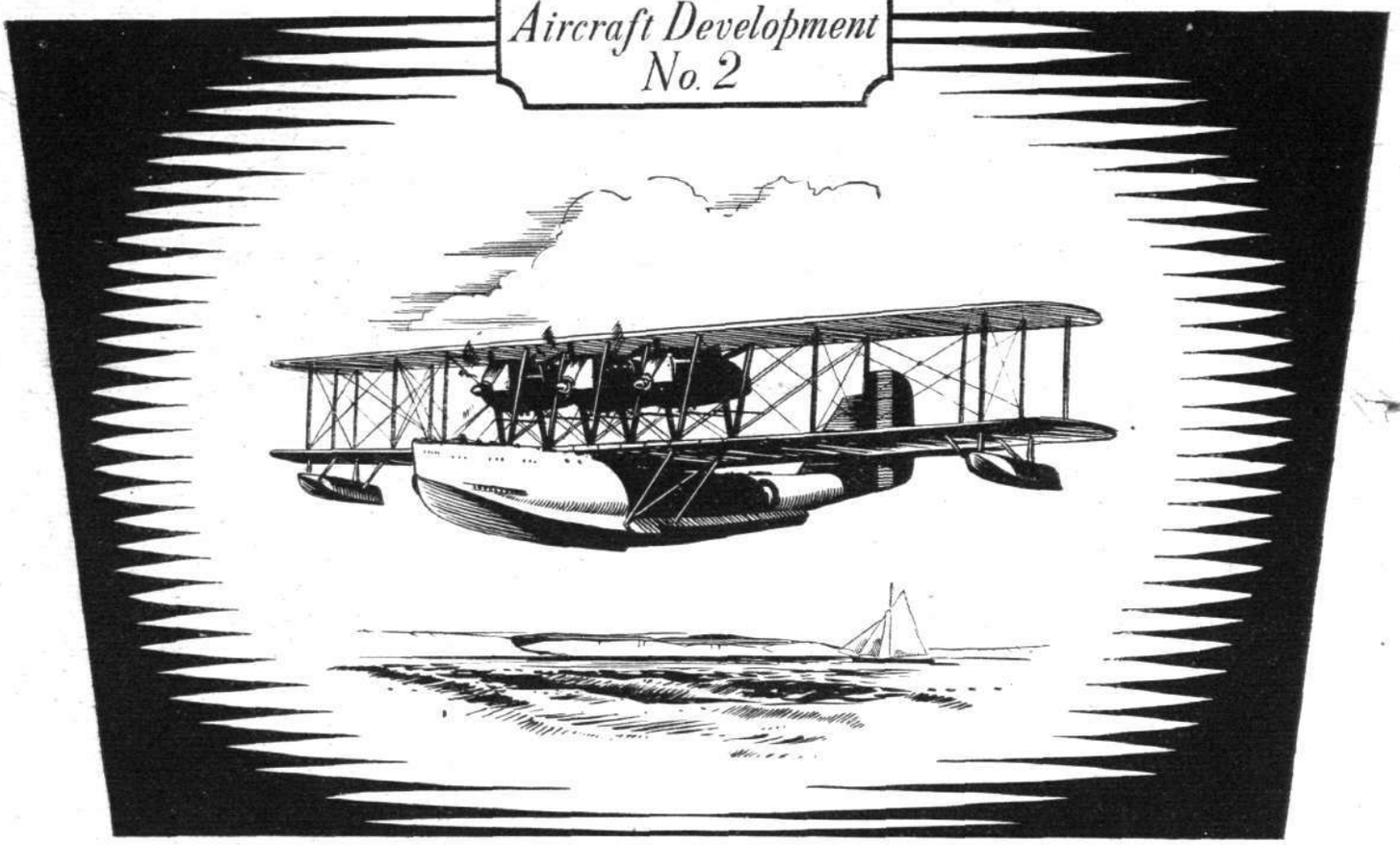
### Shock Wave Effect

Even very bad shooting should bring the target within an area where the intensity of the shock wave is in the region of 10 lb. per sq. in. In the case of a Junkers Ju 88 this means a load of nearly three-quarters of a million pounds over its wing area of 515 sq. ft. If the shooting is good and the height charge explodes slightly above the dive-bomber or torpedo-dropper, then the enemy will either disintegrate completely or will most certainly hit the water before any semblance of control can be recovered. The great point is, however, that the attacking pilot—be he super-fanatic Jap or super-heroic Hun—will at the very least be put off his target and must make another attempt; and super-heroics or super-fanaticism are seldom so super during second runs. Remember, a battle-mad man will still come on with half a dozen o.303 bullets in him, but a mortar bomb stops him instantly. It takes a lot of shell splinters or bullets to stop an aircraft from flying on for a last 1,000 yards, which in time means roughly seven seconds.

The "aerial height charge" has been dealt with here entirely from a naval defence point of view, but in certain circumstances it could be used on land. In sparsely inhabited areas it could be employed against the night bomber. This, however, is a terrific problem because, despite modern aids to gun-laying, many seconds must elapse from the time a gun fires until the shell explodes. During this period the machine can slow down, accelerate, climb, dive, skid sideways or perform a combination of any of these. The "aerial height charge" visualised will score in that it will have the effect of putting any machine within 300 yards out of the pilot's control. To recover physically from the shock of the explosion and then regain control of an aircraft which is by that time probably doing 500 m.p.h. in a nose dive at night—if it has not already disintegrated—will, to say the least, make a pilot watch his step when approaching a known defended area again.



# Marine Aircraft Development No. 2



## SAUNDERS "VALKYRIE"

*This flying-boat was developed in* 1926 *for open sea reconnaissance and submarine spotting purposes. It weighed* 12 *tons and was, at the time, one of the largest machines built in Great Britain. The hull was constructed of Saunders "Consuta" copper-sewn plywood, and the wing structure was also of wood, covered with plywood and fabric. Powered by three* 650 *h.p. Rolls-Royce Condor* III A *water cooled engines, it carried sufficient fuel for* 10 *hours flying.*

During the War 1914-1918, Saunders workshops produced very many aircraft and much equipment for the Government. This wartime period, and the years immediately following, saw vast improvements in both the design and construction of marine aircraft. Much of this progress was encouraged by the engine manufacturers, who were able to build lighter engines with greater power output, but the firm of Saunders kept apace with these developments. Results have shown that the Saunders-Roe organisation has maintained the prominent position among marine aircraft builders which was established by its forerunners.

# SAUNDERS-ROE

LIMITED

SARO

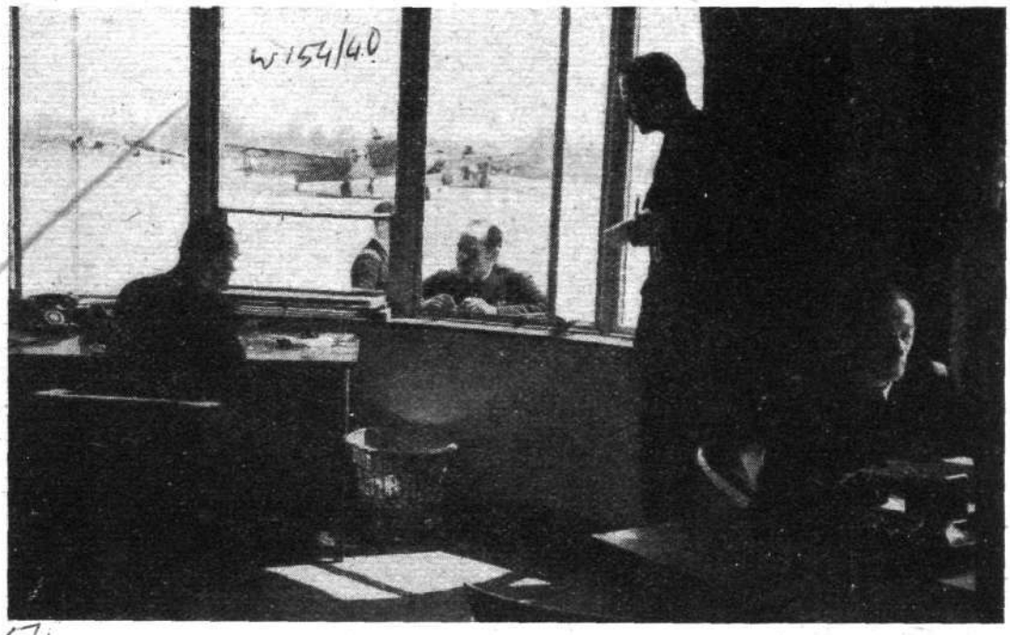
DESIGNERS AND CONSTRUCTORS OF MARINE AIRCRAFT FOR ALL PURPOSES

# AIR TRANSPORT AUXILIARY

## *Problems of the Home Ferry Organisation*

By GROUP CAPT. G. W. WILLIAMSON

*Illustrated by "Flight" photographs*



The "Operations Room" where all the incoming and outgoing air traffic is handled. It is in an advantageous position from which the whole of the landing area can be seen.

IN the last war, 450 pilots ferried 3,000 aircraft a month in the general direction of France. This involved far more than 3,000 flights, as the aircraft had to be collected from makers' works, delivered at an Acceptance Park, and then flown, when completely equipped, either to squadrons in England or across the Channel. The pilots were officers of the R.A.F., unsuitable temporarily or otherwise for operational flying. Some were not very proficient, and an occasional aircraft was delivered to Germany instead of to France; some were tired pilots, almost as likely to crash a new aircraft on its delivery flight as to arrive all in one piece.

The same problem exists to-day. Thousands of flights a month are made by the Air Transport Auxiliary at present responsible for home ferrying; up to the date of Dunkirk, A.T.A. ferried aircraft to France as well, and will undoubtedly do so again.

The safe delivery of thousands of aircraft involves problems of personnel and equipment far beyond those which existed previously for smaller numbers and less complex aircraft, and the regular supply of competent pilots already able to fly solo has not yet been satisfactorily overcome. Even on the maintenance side, A.T.A. must take its chance with other aircraft industries, and the percentage of fully skilled labour amongst its aircraft mechanics is low.

### Types of Aircraft

The aircraft flown by A.T.A. pilots fall into three classes:—

1. R.A.F. aircraft in transit.
2. School aircraft for the production of fully qualified pilots.
3. Taxi aircraft to carry pilots to the factories from which they will collect and bring them home.

Transit aircraft are of all Service types, and a Class V pilot must therefore be able to fly Spitfire or Stirling, Lysander or Liberator Fulmar or Fortress. The training of pilots is directed towards a gradual progression in proficiency from Moth and Magister through Tutor and Hart to Harvard and Hurricane, and so on to twin-engine and four-engine types. Medical and other tests determine the stage at which it is uneconomical to press the training of a pilot.

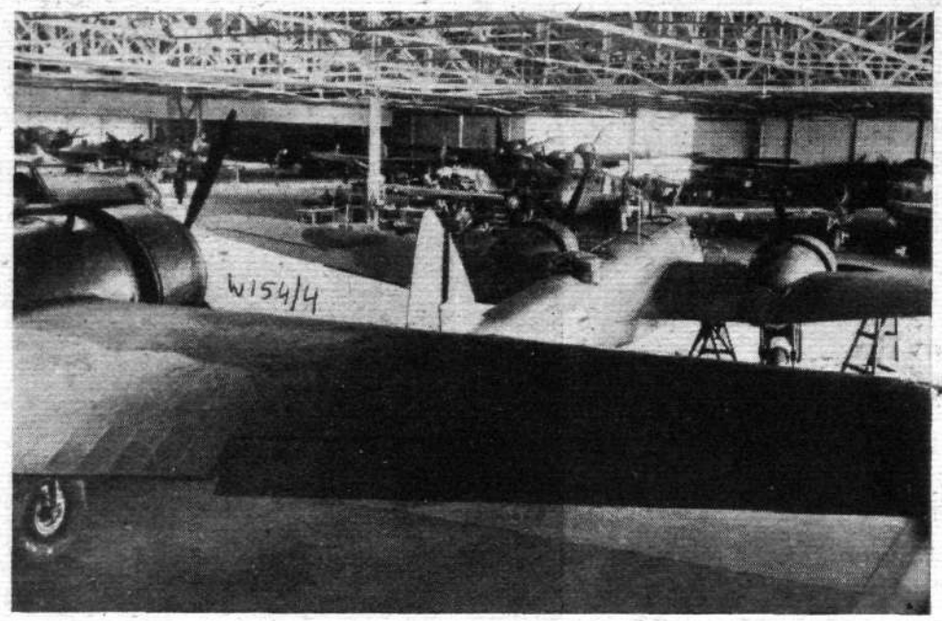
Aircraft in transit may be collected from the maker's works for delivery to an aircraft storage unit. When fully equipped the aircraft are flown to squadrons; from squadrons they may in time have to go to repair depots, and thence back to squadrons or aircraft storage units. In

A.T.A. always have a number of machines "in transit." Here is one of our latest Beauforts as seen from the cockpit of a Merlin-engined Whitley, which was also waiting delivery.

# AIR TRANSPORT AUXILIARY

addition there are far more urgent ferrying duties, such as those requiring flights to a Maintenance Unit which is packing aircraft for overseas, or to the nearest airfield to a carrier that is taking on fresh equipment in the few days prior to sailing.

When the war began, A.T.A. could draw upon a considerable reserve of civil flying enthusiasts who might not be fitted for operational flying with the R.A.F.: members of civil aircraft clubs and glider clubs, elderly pilots of airlines, girl pilots of light aircraft, and numbers of the allied nations in this country, either of the wrong age or otherwise unsuited to the needs of their own free air forces. But as this supply runs out, less suitable material has to be accepted, requiring an increased amount of instruction to fit them for even Class I Service types. To economise pilots as much as possible, it is also necessary to improve Class I pilots on the road to Class V+, necessitating a greatly increased amount of flying of the more advanced Service types.




**In the overhaul hangar there is always a variety of aircraft—from Puss Moths to Wellingtons—to be seen.**

There are two schools, one for the elementary flying, equipped with Moth, Magister, Fairchild, and Hart; and the advanced school, used almost entirely on conversion courses. This is equipped with Harvard, Master, Hurricane, Oxford, Blenheim, Wellington and Hudson.

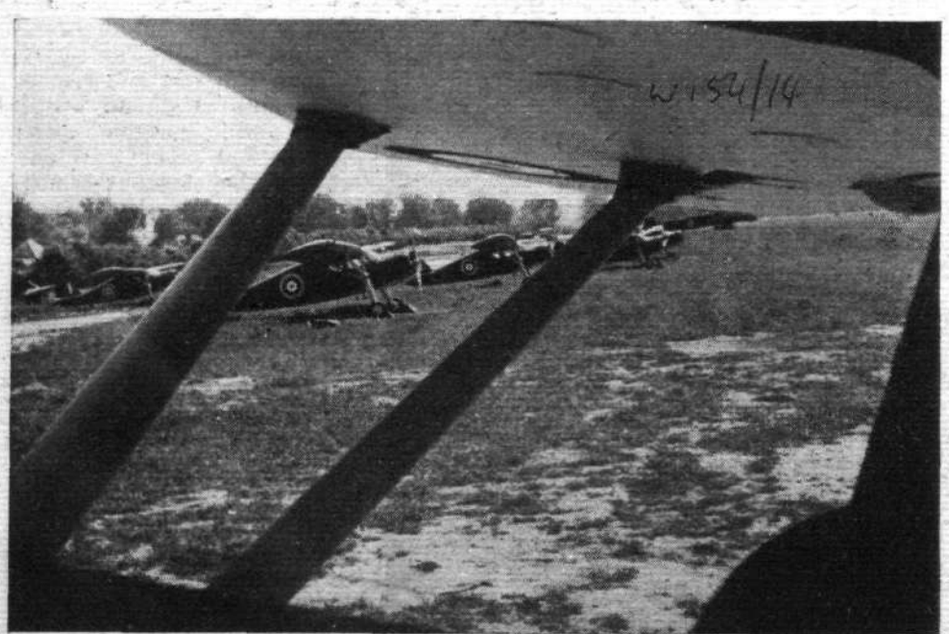
In the old days pilots ferrying aircraft to the front in France would land at Lympne to receive final instructions. They would then hop across the Channel to No. 1 Aircraft Depot, St. Omer, where operational pilots would collect for onward delivery. The ferry pilots would be picked up at St. Omer by an old Handley Page, which, with 25 or more pilots crammed into the fuselage, would wallow back to Lympne, whence pilots would return by train or car to their own pools.

Trains and motor cars are much too slow nowadays, and it would be uneconomical in pilots to move them about the country otherwise than in aircraft; the single Handley Page, the first taxi, has grown into a fleet of hundreds. At every one of the 15 A.T.A. pools pilots are picked up by taxis in the morning, 10 pilots at a time in Ansons, three or four in Fairchilds, and delivered to the scenes of their day's work.

It is possible to economise in flying time by close co-operation between the various ferry pools. If Wellingtons or Ansons are running from north to south, intermediate landings can be made as required; a feeder service can be run from pools so far off the direct line as not to warrant a call by the "main-line" machines.

## Personnel

A.T.A. was formed by British Overseas Airways Corporation, which, in turn, resulted from the union of Imperial Airways and British Airways. Its pilots are uniformed, as they are constantly dealing with R.A.F. personnel, and the uniform bears a close resemblance to that of the B.O.A.C. Supervisory engineers, especially those employed on airfields, are also included in the uniformed grades, so that any pilot arriving at an A.T.A. air station can instantly pick out the engineer in charge of the mechanics who will be responsible for the care and maintenance of his aircraft.

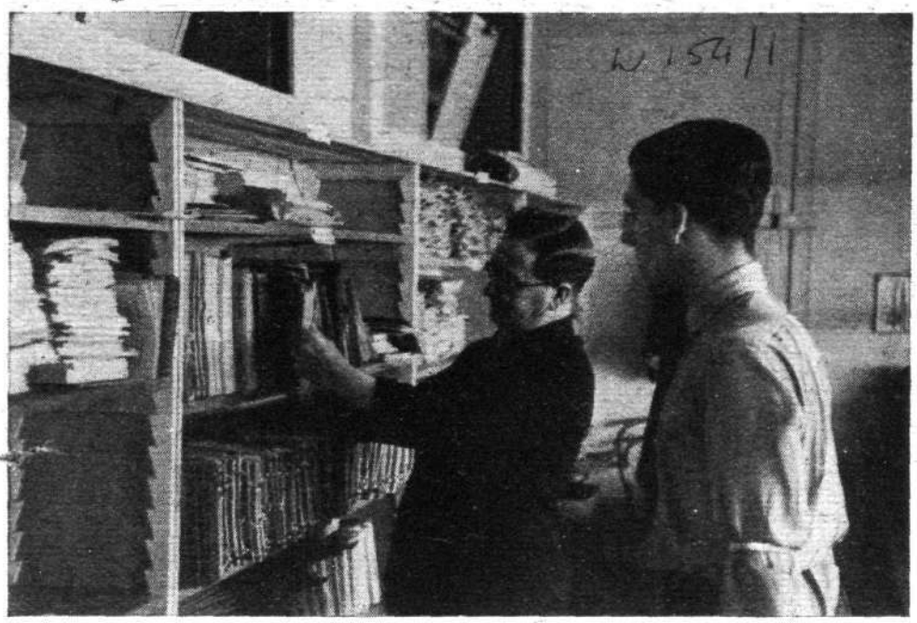



**Fairchild 24 W-40 four-seaters which are used to take pilots to and from delivery and acceptance airfields. The Fairchild has a Warner Scarab engine of 145 h.p.**

A.T.A. pools vary in size from three or four pilots up to 30 or 40. On the average throughout the organisation, there are three mechanics, labourers or clerks for every pilot, and the largest pool other than H.Q. has approximately 150 engineering personnel.

In theory, mechanics are employed on the handling of aircraft, which includes moving them about, cleaning, refuelling, picketing, engine starting and attention to tyres and oleo legs. But, in addition, the skilled personnel carry out also daily inspections; under supervision, they are responsible for 30-hour and 60-hour inspections, 240-hour inspections being carried out by hangar staff.

Just as the A.T.A. depends on girl pilots for a proportion of its ferrying, so engineers are supplemented by girl



An extensive technical library is maintained and our photograph shows an engineer officer receiving a book from the librarian.

labour, necessarily taken on unskilled. These girls are trained either as riggers or fitters, in either case passing through the improver stage. Girls are also employed for parachute packing and as fabric workers. They have proved apt in the repair of wooden aircraft.

The increasing proportion of unskilled labour necessitates closer supervision, although the percentage of what might be termed "commissioned officers" is no larger than on Service airfields. The senior rank is that of Commodore, who wears on his shoulder about two square inches of gold lace. He is followed by Senior Commander with four gold stripes similar to those of a Group Captain; then Commander with three stripes like those of a Wing Commander; Captain, with two stripes divided by two more narrow ones; Flight Captain, with a badge similar to that of Squadron Leader; First Officer, with two stripes like those of a Flight Lieutenant; Second and Third Officers, with one and a half stripes and one stripe respectively.

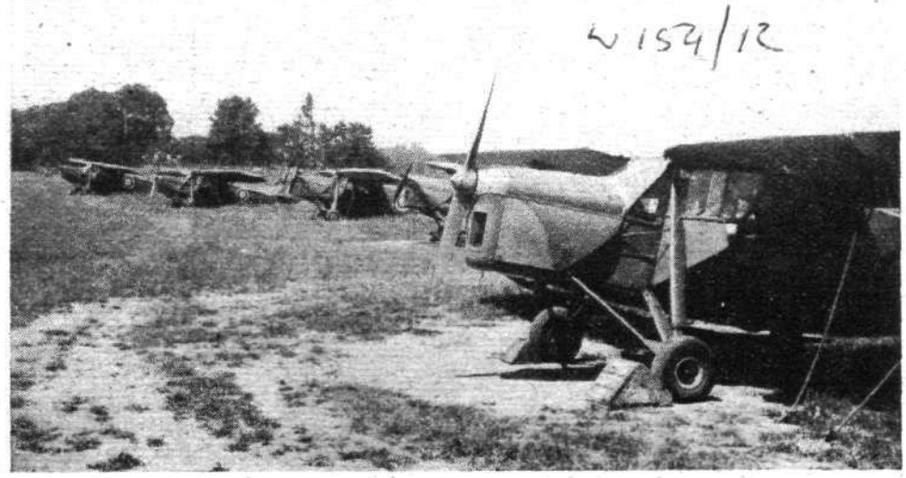
### Area Organisation

The British Isles are split up into four areas: Northern (including Scotland and Ireland), Southern, Midland and Headquarters. In each of these areas one station has been selected on account of its hangar accommodation, which can be used for repairs.

The major proportion of repairs carried out are those on school and taxi aircraft, since these are constantly in A.T.A. possession. Transit aircraft may land at pools with some minor unserviceability, and these must be put right at high priority. In either case, an arrangement has been made with the repair group of Maintenance Command that any aircraft beyond the capacity of A.T.A. will be taken over by the R.A.F., and handed back when the repairs are completed. This obviates the risk that high-priority Service aircraft might remain for a long period on A.T.A. airfields merely because the so-called handling parties are overwhelmed with other work.

At every Area Headquarters there is an Assistant Chief Engineer of the rank of Captain, assisted by a Service Engineer of Flight Captain rank. The senior officer at each pool is a Commander of long flying experience, who is responsible for the control of all the pilots as well as all the engineers. The senior engineer, responsible to the Commander, is usually a First Officer, and he may have under him one or two Second Officers and two or three Third Officers, depending on the size of the pool.

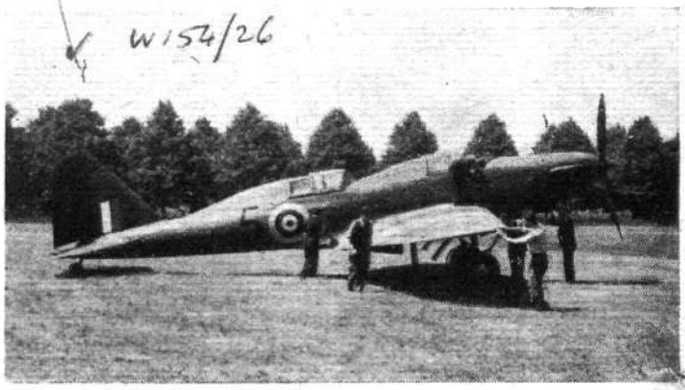
Inspection of so large a variety of aircraft presents special problems at H.Q. There is a Chief Inspector, with a senior representative in every Area, and a Second or Third Officer Inspector at every pool. As in civil practice, the inspection of the aircraft is carried out by the engineers themselves, supervised by their own charge hands. The function of uniformed inspectors is to check the condition of



(Above) A line of D.H. Puss Moths which have done such excellent work as taxies. (Below) An instructor of the A.T.A. flying school in the cockpit of his Blenheim.

# AIR TRANSPORT AUXILIARY

Four single-engined types of aircraft used by A.T.A. instructors to bring pupils up to scratch. Pupils must have at least 30 hours' solo flying before they are accepted by A.T.A. Reading from the top downwards the machines are: De Havilland Tiger Moth, a line of North American Harvards, Miles Master I, 585 h.p. Rolls-Royce Kestrel XXX engine (nearest camera), and Master III, 750 h.p. Pratt and Whitney Twin Wasp Junior S.B.4G. engine. Hawker Hurricanes which are used for the final training.



Another single-engined type which has given good service but is now going out of use is the Fairey Battle Trainer.

A proportion of the pilots have come from the United States to join A.T.A. Some of these are seen here with Commodore Gerald D'Erlanger (left). Left to right: First Officer Pieper; First Officer McGehee; First Officer K. W. Fogelberg and First Officer W. J. Ressegger.

selected aircraft, in addition to the more thorough inspections necessary on aircraft requiring repair, during repair, or on completion of overhaul. The so-called 60-hour or 240-hour inspections nearly always necessitate a certain amount of replacement or repair; and it is usual for inspectors to examine aircraft before they reach the 240-hour inspection to ensure that the spares likely to be required are placed on order before overhaul of that particular aircraft is begun.

## Maintenance

The maintenance of hundreds of aircraft a day comprises all the duties carried out by a handling party, as distinct from those falling upon hangar personnel when aircraft are brought in from dispersal sites. Dispersal difficulties produce a maintenance problem, particularly in winter, when access to parking grounds may be restricted by snow or mud; or what is perhaps worse than either, deep ruts frozen hard, which are not too good for the tail skids of small aircraft. Dispersal in winter requires larger handling parties than when the ground is firm and level, quite apart from the labour employed in putting on wing, cockpit, engine and airscrew covers.

Minor repairs can be carried out at any pool; those of 240-hour magnitude, or those due to an accident, are


1,000
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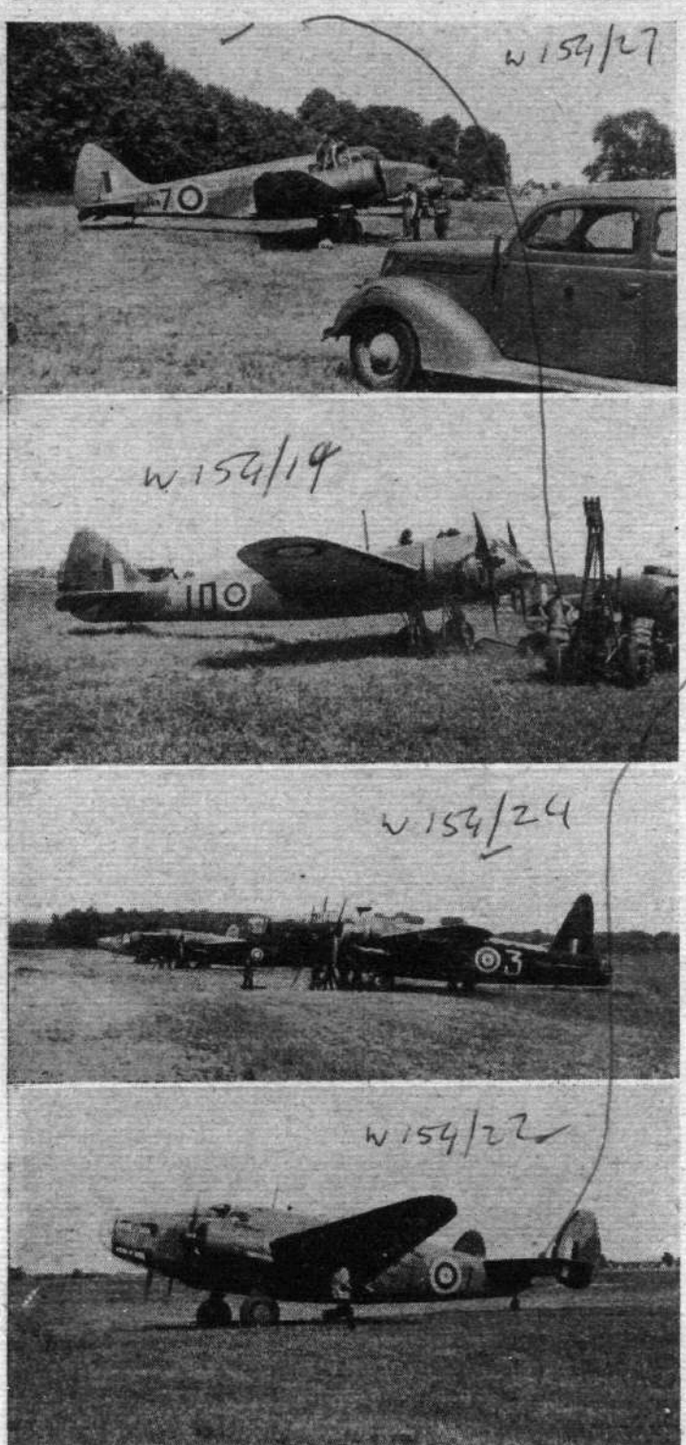
RA-87

# AIR TRANSPORT AUXILIARY



Four types for twin-engined instruction. From the top downwards: Airspeed Oxford, Mark I (short-nosed) Blenheim, Vickers Wellingtons Mark I and IC, and Lockheed Hudsons.

dealt with either by working parties or by being placed in hangars if it is convenient to deal with them at the A.T.A. repair units. A good proportion of skilled engineers possess pre-war ground licences, and arrangements are being made for instruction of the remainder on lines which would improve their qualifications up to a standard to be set by a form of A.T.A. ground licence, carrying additional pay.

In addition to the engineers who are employed on the airfield and in hangars, there is a special class of flight engineers who accompany four-engined aircraft on their journeys, even when these journeys are overseas. The duties of a flight engineer correspond to those of similar men in the R.A.F., including the operation of controls at the engineer's station and the recording of gauge readings where these are not visible to the pilot. Fuel, oil, and

(Left) Comdr. Pauline Gower, who is in charge of the women pilots' section, and Capt. Jacqueline Cochran, who has brought over a number of American women pilots to serve with A.T.A.

cooling systems are the responsibility of the flight engineer, and both in the air and after landing he will find plenty of scope for the use of engine experience.

Just as with skilled ground mechanics, the supply of flight engineers never meets the demand. Industry does not produce the type of man who is immediately suited to flight engineer work, and courses of instruction are constantly running at H.Q. and A.T.A. Pools. This instruction includes periods at the works of the aircraft and engine manufacturers, a maintenance course in A.T.A. hangars, and a certain amount of flying instruction and flying experience, before a flight engineer is provided with his uniform and the coveted single wing.

## Instruction

In these circumstances a large part of the work of A.T.A. is instruction of various kinds. Pilots with only a few hours solo are given further experience; when satisfactory on two or three types, they are "converted" into twin-engined or four-engined pilots over a prolonged period. This process must necessarily be accompanied by lectures and demonstrations on the ground, including navigation and engineering instruction.

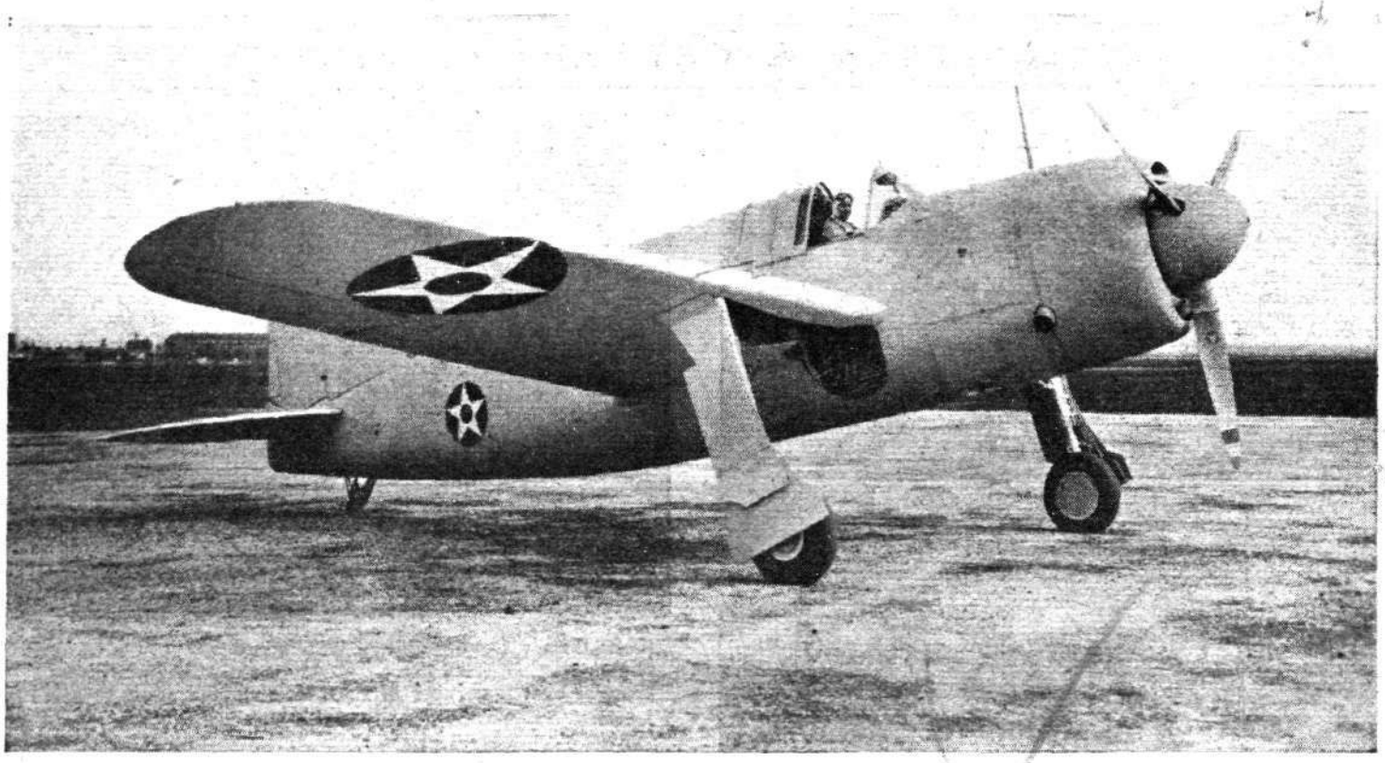
Flight engineers are produced by being passed through the workshops, by visits to the works of the aircraft and engine manufacturers, and finally by prolonged flight experience.

Mechanics are only semi-skilled when they arrive, as it is impossible to obtain sufficient of the right type from industry. Courses at the works of the aircraft manufacturers are running continuously; there are lectures and demonstrations in working hours, chiefly in winter when the number of overhauls required is at a minimum; and in winter or summer study circles meet in the hangar out of hours.

Application to the various methods of acquiring knowledge reaps its own reward in the shape of increased interest in the technical work, greater use for the purposes of the war effort, the A.T.A. Ground Licence now being developed, and a financial addition for competent personnel.

. . . . . .

It will be seen that there are wide interests and the prospects of a good career for all types of A.T.A. personnel —pilot, mechanic or flight engineer. There is plenty of flying; every type in use by the R.A.F. is handled, and the maintenance of taxi and school aircraft is on lines exactly similar to those current in civil aircraft operating companies. Such experience will undoubtedly be valuable in the aircraft operating boom which is bound to follow the termination of the war.



# BERMUDA — BUCCANEER

## *New Dive-bomber Carries 1,000 lb. Bomb Internally Stowed*

LARGE numbers of a new and most formidable dive-bomber, developed for the U.S. Navy, were due to go into production at the beginning of spring for the Royal Air Forces of Great Britain and the Netherlands East Indies, in addition to the American Navy. This new machine, the Buccaneer, is designed and built by the Brewster Aeronautical Corp. for operation from the decks of aircraft carriers, but the export version, named the Brewster Bermuda by the Royal Air Force, is designed for operation from land bases.

As part of a programme of exhaustive flight testing, the new dive-bomber was demonstrated late last March at the Newark Airport in New Jersey to William S. Knudsen, Director-General of the Office of Production Management, and Rear-Admiral John H. Towers, Chief of the Bureau of Aeronautics of the U.S. Navy, who, by the way, is at present in England with the United States War Mission. Other observers of the demonstration flights were the general inspector of naval aircraft for the Eastern District, the inspector of naval aircraft for the Brewster factories, and the highest officials of the company.

A notable feature of the design is the provision for carrying a 1,000 lb. bomb entirely within the fuselage, which gives the craft as clean appearance as that of a fighter and eliminates the high drag of an exposed rack and bomb. Consequently, the craft is said to be 100 m.p.h. faster than the Stuka or American dive-bombers now in use, and to have double the load-carrying capacity and range of the German type. It is stated to be capable of flying non-stop from the United States to England, but this probably entails the fitting of extra fuel tanks in addition to those carried for normal operations. Presumably a large tank could be carried in place of the 1,000-lb. bomb.

The model, designated SB2A-1 and named the Buccaneer for the U.S. Navy, is an all-metal, midwing monoplane powered with a Wright double-row 14-cylinder engine rated at 1,700 h.p. and equipped with a Curtiss electric airscrew fitted with cuffs and a spinner. Special trailing-edge split flaps reduce speed when diving on an objective and when landing. An operational crew of two are carried—a pilot and a gunner—the latter occupying a power-operated turret in the rear. Both are protected by armour plate, and the fuel and oil tanks are of latest bullet-proof, or leak-proof, type. Details of fire power and of flight performance are not yet available for publication.

Arrangements were being made during the winter for starting quantity production on the orders this spring in a new assembly plant in Pennsylvania covering nearly half a million square feet. Parts of the bomber were being fabricated at two Brewster factories in the New York metropolitan area, and sub-contractors will make about 35 per cent. of the component parts.

## BELGIAN LEADS R.A.F. SQUADRON

A BELGIAN, one of the finest aerobatic pilots in Fighter Command, has now assumed command of a British fighter squadron operating regularly in the offensive on Germany's western front. He is the second Belgian to lead a British fighter squadron, and he destroyed an F.W.190 on one of his first sweeps as leader of the squadron a few days ago.

His promotion stresses the international nature of the forces marshalled against Germany. His squadron, though British, has been adopted by the city of Bombay and includes English, Canadian, New Zealand and Belgian pilots.

The new Squadron Leader, who is 26, has flown for eight years. He joined the Belgian Air Force in May, 1934, and was trained as pilot, observer and instructor because of his natural aptitude for aerobatics. He served as a sergeant and was commissioned on the outbreak of war in Belgium, when he was posted to duties in France. On the collapse he escaped to French Morocco and thence to England.

In October, 1940, whilst serving with Coastal Command he shot down the first Heinkel 60 (a single-engine biplane) to be destroyed over the Channel, a feat for which he received the Croix de Guerre.

Fellow pilots, who are the severest critics, are unstinting in praise of the Belgian's flying. "A perfect master of his aircraft," was the tribute of a group watching him in the air performing slow-rolls, half-rolls off the top of a loop, and inverted flying.

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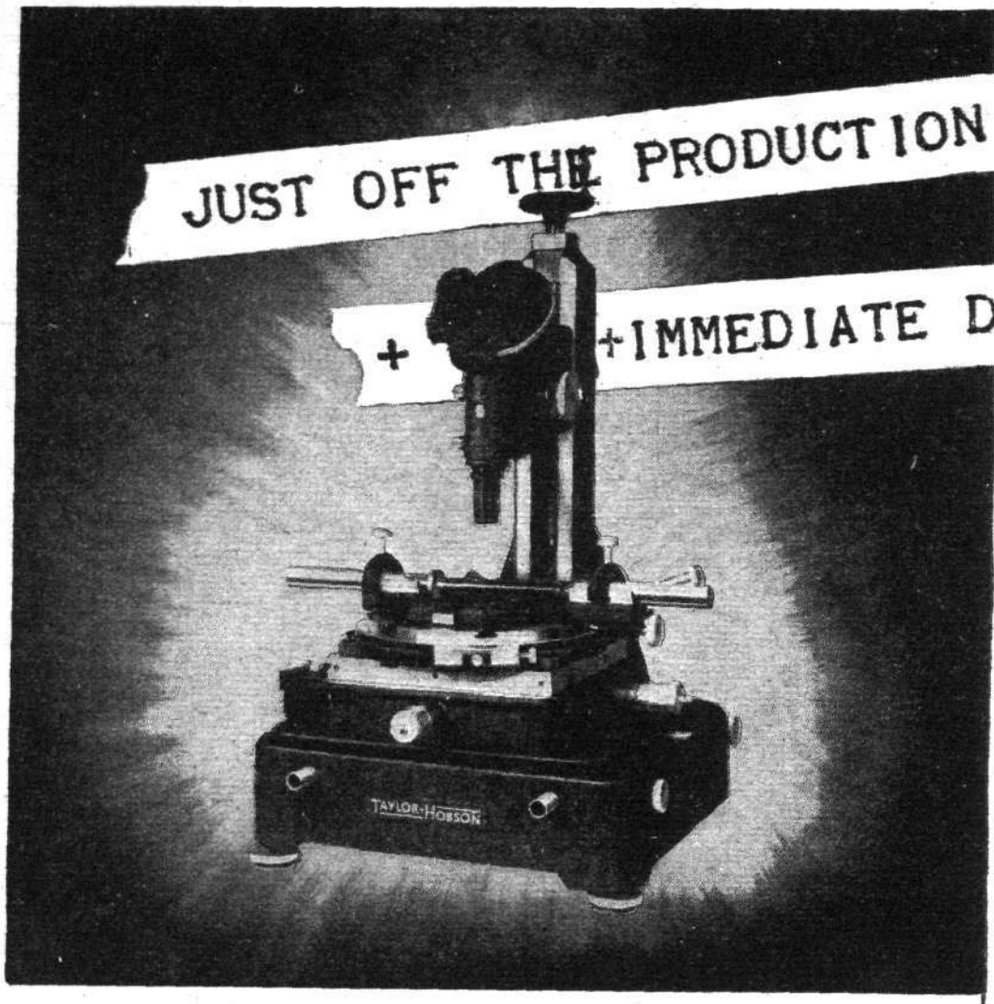
+ +IMMEDIATE DELIVERY ++

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# Correspondence

*The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## FUTURE OF THE AIRCRAFT ENGINEER

### *Existing Apprenticeship Schemes*

I WAS very interested in the article by G. H. Garbett in the issue of May 28th.

I took particular note of the last paragraph in which he says that if only six young men from each aircraft factory were selected for training, there would be a body of highly trained specialists for post-war work.

Might I suggest that the existing apprenticeship schemes, with their practical and theoretical training, which are employed in most of our leading aircraft firms will supply the six per factory and probably many more. P. C. WALLEN.

## AIR POLICY

### *Attack Aircraft for Invasion*

MAY I take this opportunity of replying to the letter of J. Levy which was published in *Flight* of May 28th?

If Mr. Levy had read my letter correctly he would have seen that I proposed we stop building large bombers only for a time until we could have overwhelming fighter superiority over the enemy. As it is, when we send a large force of bombers over Germany we lose a considerable number of them and also many valuable lives. No doubt the R.A.F. will put a factory out of action for a period, but the Germans most probably will, instead of repairing the factory, move it further afield to be out of range of all but the heaviest of bombers.

When we invade France or some other occupied country (as I am sure we shall do) we shall need more fighters and fight attack aircraft than ever before.

Because I criticise our policy of building large bombers, please do not think I am sorry for the German people; I am not. They deserve every bomb they get, but I am thinking of winning the war more quickly and with less loss of life and material. R. J. BROOKES.

## IDENTIFICATION FOR H.G.

### *Another Practical Offer of Help*

REGARDING the letter of your correspondent "Surrey" in the issue of May 28th on the above subject, I have had the privilege of lecturing a number of units of Home Guard on aircraft recognition, and although I am bound to agree that, generally, this subject has been neglected, this appears to have been due to the difficulty on the part of the officers commanding in obtaining the services of lecturers. From my own experience I have formed the opinion that, after five or six hours of intensive instruction, the average Home Guardsman can identify about 30 different types of aircraft from all angles, which for a start at any rate is all that he needs (they, of course, being the aircraft which would come within the sphere of his activities). It should, therefore, not be difficult to find quite a large number of lecturers from amongst the officers attached to the A.T.C., and members of the Royal Observer Corps who have a much wider knowledge of the subject than that required by the Home Guard, and who would be glad, if given the opportunity, to help in this very important connection. The need for lecturers appears to be urgent, and I shall be very pleased to pass on the benefit of my own experience to those interested and who have the necessary qualifications.

T. DUNN.

## INTERNATIONAL AIR POLICE

### *Lord Brabazon's Post-war Suggestion*

LORD BRABAZON, one of our most far-seeing and practical flying authorities, gave a remarkable picture of the post-war period, when delivering the Wilbur Wright Memorial Lecture to the Royal Aeronautical Society on May 28th. He advocated that the Allied Nations should control all flying throughout the world; this force would see that nowhere in the world shall a nation secretly build up an air force for mischief; it would guarantee all states against aggression and would undertake the policing of the world. Here is a picture of a force of transcending power to support the International Authority instead of a debating chamber that has no force at its command. The lecturer, with real vision of a more co-operative world, added that at the right time our present enemies might be expected to come into the general scheme.

Clearly there must be some development on these lines if we are to establish a more secure world. When views like these are expressed by such a well-informed and practical authority as Lord Brabazon, we can rest assured that the scheme itself is practical. The real difficulty, if there is one, is unquestionably the political one. There is no reason to suppose that international control of aviation should in any way be contrary to the best interest of British aviation.

War is a disease, which can be banished if we are prepared to pay the cost; but many hesitate to make the sacrifice involved, since international control involves some loss of sovereignty. The American view was recently expressed by Mr. Cordell Hull, who said: "Our war effort will be immensely strengthened if we make sure that one of the principal things we are fighting for is the establishment of a new and better system of international and economic relations."

AD ASTRA.

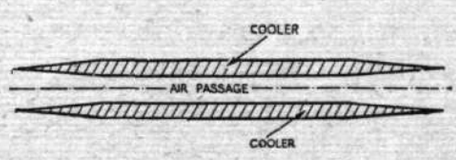
## POINTS TO PONDER

### *Queries on Injection and Other Matters*

THERE were some questions raised in a couple of issues of *Flight*, either in articles or in "Correspondence," which necessitate some correction or additional explanation.

In *Flight* of April 16th we read in Mr. Geoffrey Smith's very interesting article about Mercedes-Benz D.B. 601N engine as follows: On page 368—"Fuel is injected at 15-20 lb. per sq. in. into combustion chambers."

On page 369, however—"In the case of the D.B., air only is conveyed direct to the combustion chambers, where it meets the fuel sprayed from the injector nozzles just before the ignition point." According to compression ratio figures the pressure after compression and just before ignition is about 200 lb. per sq. in. and it is hard to understand how an injection may take place. With reference to the correspondence of Mr. S. W. Crofts on the subject of radiator drag (*Flight*, May 14th) I think that he is trying to create conditions which are practically non-existent. In the case of a parallel straight tube, the energy of radiated heat is obviously lost. If, however, we take into consideration the actual shape of radiator passages, illustrated in the accompanying sketch in a slightly exaggerated form, we need have no doubt that the principles of a heat engine in its simplest form may be applied to explain the phenomenon.




Mr. N. Nicholas's device for "Ground Flying" (*Flight*, May 14th) has a disadvantage caused by lack of directional control. As a glider pilot of experience (International standard of qualification) I should like to submit that even the simplest device must include directional control because this plays its part in any combined movement of an aircraft (including aerobatics). Without knowledge of the simple combined movements no pupil can be passed to the actual flight training in gliders or in power aircraft.

Studying the picture of the Blohm and Voss 141 asymmetrical aircraft in *Flight* of May 21st, page 496, I notice that the tail-plane and elevator are on the left side of the fuselage, that is to say, on the side of the short port wing.

This is contradictory to the four patented variants by the Hamburger Flugzeugbau and to the suggested type by an R.A.F. officer, the pictures of which are on page 517 of the same issue.

As these latter seem to be more logical and correct ones from stability viewpoint, any explanation, if available, on this matter would be of interest. W. JAWORSKI.

# Service Aviation

Army Co-operation Command pilots are being intensively trained in close contact work on Curtiss Tomahawks. The official designation of the Tomahawk is now fighter-reconnaissance.

## Royal Air Force and Fleet Air Arm News and Announcements

### New Commandant for R.O.C.

GROUP CAPTAIN G. H. AMBLER has been appointed Commandant of the Royal Observer Corps with effect from June 25, in succession to Air Commodore A. D. Warrington-Morris (retired).

Group Captain Ambler will hold the acting rank of Air Commodore in his new appointment. He has been serving as sector commander at a R.A.F. station in Fighter Command and is being temporarily seconded from the active list to take up his new appointment.

### R.A.F. Commands Aid Benevolent Fund

SERVING officers, airmen and airwomen of R.A.F. Commands at home and overseas have directly subscribed nearly £15,000 to the R.A.F. Benevolent Fund during the first three months of 1942. With about £9,400 which has been contributed by R.A.F. stations by way of special donations, proceeds from entertainments and church service collections, the Air Force has provided over £24,000 already this year. Last year's total from the R.A.F. amounted to nearly £65,000.

The largest single contribution, £2,800, came from Bomber Command. Fighter Command raised £1,700; Coastal £1,400; Balloon Command, £1,300; whilst the two Training Commands, Flying and Technical, contributed £2,100 and £2,600 respectively. A big overseas contribution was £1,130 made by Empire Air Training Centres; the Middle East raised nearly £600, India £200, Ferry Command £108, and Iraq £127. Contributions also came from R.A.F. units as far away as Iceland, West Africa and the Far East.

### Awards

#### Further Augsburg Decorations

DISTINGUISHED FLYING CROSS.

F/O. A. J. GARWELL, R.A.F.V.R., No. 44 (Rhodesia) Sqn.

Flt. Sgt. F. S. KIRKE, D.F.M., R.N.Z.A.F., No. 44 (Rhodesia) Sqn.

DISTINGUISHED FLYING MEDAL.

Sgt. L. DANDO, No. 44 (Rhodesia) Sqn.

Sgt. J. WATSON, No. 44 (Rhodesia) Sqn.—*On* April 17th, 1942, F/O. Garwell, Flt. Sgt. Kirke and Sgts. Dando and Watson were members of the crew of a Lancaster aircraft which took part in the daring daylight attack on Augsburg, involving a flight of some 1,000 miles across enemy territory. Soon after crossing the enemy's coast their aircraft was damaged in a running fight with 25 to 30 enemy fighters. Despite this they pressed on until the target area was reached. In the face of fierce and accurate anti-aircraft fire which further damaged the bomber and set it on fire the bombs were released on the objective.


Wing Cdr. D. S. Scott-Malden who has been awarded a Bar to his D.F.C.

The task accomplished, it was necessary to make a forced landing in a field some two miles from the target. In the most harassing circumstances this very gallant crew displayed great fortitude and skill which have set a magnificent example.

### Middle and Far East

THE KING has been graciously pleased to approve the following awards:—

M.B.E. (MIL.)

W/O. E. G. RISEBOROUGH.—W/O. Riseborough has supervised the preparation and serving of meals in the face of almost continuous air attacks on his aerodrome in Malta. His courage and determination have been outstanding and the effect on his staff has been that meals have always been served despite the many serious difficulties. On one occasion when the airmen's dining hall was destroyed during a raid, W/O. Riseborough, who had been in a shelter nearby, began salvaging equipment whilst the raid was still in progress. He showed no regard for his own safety and, although he was badly shaken, it was largely due to his untiring work that a meal was served in alternative accommodation a short time later.

GEORGE MEDAL

Act. Sqn. Ldr. R. HILL, M.B., Ch.B., R.A.F.V.R.
Act. Flt. Lt. E. L. WILLIAMS.
L.A/C. C. J. BOARMAN.
L.A/C. H. SUMRAY.

One night in March, 1942, aircraft carrying bombs collided on an airfield in Malta and burst into flames. Sqn. Ldr. Hill (the station medical officer), Flt. Lt. Williams and L.A/C.s Boarman and Sumray immediately proceeded to the scene. Shortly afterwards the bombs began to explode and enemy aircraft began to bomb the area. Despite the great danger, Sqn. Ldr. Hill, assisted by Flt. Lt. Williams and the two airmen, successfully extricated four members of the crews from the wreckage. The prompt and gallant action of these officers and airmen undoubtedly saved four lives.

Sqn. Ldr. Hill has invariably performed exemplary work in dealing with casualties during heavy bombing raids and both he and Flt. Lt. Williams have set a magnificent example which has done much to maintain a high standard of morale on the station. The bravery shown by L.A/C.s Boarman and Sumray has been an inspiration to others.

Sgt. J. F. WAITE, R.A.F.V.R.—*One night in* February, 1942, an aircraft loaded for an operational sortie crashed during the take-off. Sgt. Waite, a member of the crew, was thrown clear

## SERVICE AVIATION

some 20 yards in front of the aircraft, which was on fire. He was told by another survivor to run from the scene as fast as he could as the high explosives on board the aircraft were likely to detonate at any moment.

Sgt. Waite, although injured about the face, back and leg, ignored this advice and, with complete disregard of danger, went to the blazing wreckage and extricated the observer, who was lying on the floor of the aircraft in the flames. Having extricated the observer, Sgt. Waite carried him for about 100 yards, then got him through a barbed wire fence, and finally behind the shelter of a ditch, just as the explosives blew up. In circumstances of exceptional danger this airman, although himself seriously wounded, displayed great bravery. Unfortunately the observer whom he had so courageously rescued died some three days later.

Cpl. H. CLAWSON.
L.A/C. E. M. MITCHISON.

One day in April, 1942, a considerable force of enemy aircraft attacked an airfield in Malta with heavy bombs. An aircraft, which had been damaged by enemy fighters, crashed and burst into flames when attempting to land. Cpl. Clawson and L.A/C. Mitchison, despite the danger from enemy aircraft which were diving to attack and dropping sticks of bombs which were falling across their path, drove across the airfield to the scene of the crash. Enemy fighters commenced to attack the burning aircraft with cannon fire, but Cpl. Clawson and L.A/C. Mitchison assisted the pilot to safety, although their efforts to subdue the fire were not successful. The courage and determination displayed by these airmen undoubtedly saved the pilot's life. They set an example which has been the admiration of all on the station.

### B.E.M. (MIL.)

*Flt. Sgt. L. BASTABLE.—This airman has been* senior N.C.O. in a flight in Malta for a considerable time and has been responsible for the refuelling and despatch of aircraft as well as for their inspection and dispersal. He has completed this work under heavy and prolonged enemy air attacks, refusing to take cover during the raids when our own aircraft have been on the airfield or approaching to land. The magnificent example he has set and the keen devotion to duty he has displayed have contributed largely to the smooth running of the flight.

Flt. Sgt. J. BATTERSBY, R.A.F.V.R.—Shortly after taking off one day in January, 1942, an aircraft crashed in a pool of mud. On impact the port engine caught fire and flames spread from the pilot's cockpit down the port side of the fuselage, including the door of the cabin. Flt. Sgt. Battersby, the observer, left his position beside the pilot and entered the cabin where there were two passengers; shortly afterwards the starboard petrol tank exploded and at the same time the ammunition from the front guns began to explode. As a result, the whole area became enveloped in flames.

Flt. Sgt. Battersby and the pilot extricated the passengers and rolled them in the mud and water to extinguish the flames on their clothing. In so dealing with the passengers both Flt. Sgt. Battersby and the pilot were severely burned as they paid no attention to their own condition. The action of Flt. Sgt Battersby was largely instrumental in saving the lives of the two passengers.

Flt. Sgt. (now W/O.) F. HANFORD.—One day in August, 1941, Flt. Sgt. Hanford was in charge of a bomb disposal squad which was sent to a landing ground following a report that a number of unexploded enemy time bombs had been located there. On arrival he found eleven bombs lying partially buried in the ground, spaced across a gun post and dispersal points.

Flt. Sgt. Hanford immediately issued orders for the gun post to be evacuated. Although fully aware that casualties had occurred during a recent attempt to deal with this type of bomb elsewhere, Flt. Sgt. Hanford refused to allow other members of his party to accept danger and continued alone to deal with them.

Three he exploded *in situ*, placing a small detonating charge in contact with them, though they were dangerous to touch. The remaining bombs appeared to be safer, and these he rendered harmless. Displaying great devotion to duty, this airman risked serious injury, if not his life, to make the area safe for others.

Flt. Sgt. J. J. TOWNSEND.—One evening in December, 1941, an aircraft, when nearing an airfield, hit the top of a belt of trees and ploughed its way through them. In the process, the wings were torn away and the engine became detached; the Perspex from the pilot's cockpit cover and the turret cupola were also torn away. The aircraft was finally stopped by an almost head-on crash into a large tree, which was demolished, and the fuselage came to rest ten yards beyond the tree, lying on its starboard side with the engine a few feet ahead. The engine and the fuselage caught fire, the flames rising to ten or twelve feet. The flames did not last long as the petrol tanks had fallen out in the wood.

Although suffering from severe shock and in a collapsing condition, Flt. Sgt. Townsend (the air gunner) at once crawled from his turret and assisted his pilot, who, though conscious, was suffering from severe head injuries. The rescuer released the pilot's harness and, with some difficulty, as the pilot's legs were jammed in the rudder pedals, he managed to extricate him. In his dazed condition, Flt. Sgt. Townsend did not know that the petrol tanks had fallen out, and his anxiety was therefore increased because of the fire near the aircraft's bulkhead. He had just dragged the pilot clear when a civilian arrived who assisted him to carry the injured pilot from the aircraft.

**Indian soldiers are being trained as paratroops. The photograph shows a Pathan N.C.O. in jumping kit.**

With great forethought, Flt. Sgt. Townsend inflated and inverted the dinghy to serve as a bed for the injured pilot and wrapped him in his parachute for warmth. Securing the first-aid kit from the fuselage, he administered morphia to the pilot, who was suffering acutely, and applied bandages to his head wounds. He then ensured that the guns, which were apparently undamaged, were made safe. Throughout, this airman, without any thought for his own welfare, although suffering from cuts over the eye and severe shock, displayed most praiseworthy conduct.

Act. Flt. Sgt. J. J. H. HARDING.—Flt. Sgt. Harding is employed in the equipment section at a R.A.F. Station in Malta. During heavy and almost continuous air attacks on the airfield he has displayed courage and fortitude of a high standard by continuing on duty until the enemy were practically overhead. During a recent attack the equipment section was destroyed, and Flt. Sgt. Harding, who was sheltering in a trench a very short distance away, immediately proceeded to organise the salving of valuable equipment. He had narrowly escaped injury whilst in the trench, and was badly shaken, but this did not deter him. The continuous devotion to duty displayed by Flt. Sgt. Harding has inspired others and has contributed largely to the high standard of morale maintained in the section.

Act. Flt. Sgt. H. S. STAMMWITZ.
Cpl. T. BARKAS.

One evening in March, 1942, an airfield in Malta was attacked and heavily bombed by about 50 enemy bombers and fires were started, including those on a petrol bowser, an aircraft and an ammunition lorry which were close together. Flt. Sgt. Stammwitz and Cpl. Barkas immediately went to the scene and dealt with the fires, continuing to do so despite the heavy bombing, until all the fire extinguishers were empty. Cpl. Barkas, with other members of the fire party, then proceeded to a site where a large number of incendiary bombs were burning (some of them were of the explosive type) and extinguished many. The leadership and courage displayed by these airmen set an excellent example.

Sgt. (now P/O.) I. G. FADDEN, R.A.F.V.R.—In October, 1941, fire occurred in the port engine of the aircraft in which this airman was flying over the desert. The aircraft was becoming uncontrollable, and Sgt. Fadden, who had more experience, took over the controls. Although the aircraft was in a semi-stalled position, he succeeded in obtaining partial control, but was unable to prevent it from crashing.

On impact, the starboard engine caught fire. Sgt. Fadden coolly remained in the pilot's seat until he thought everyone was safely clear, but when informed that the pilot was still in the aircraft, he went to him and found that he had both legs broken and was unconscious. With the assistance of two members of the crew, Sgt. Fadden dragged the injured pilot clear. The aircraft was now burning fiercely, and in a short time was burnt out completely. This airman displayed great gallantry and presence of mind in an extremely trying and dangerous situation.

L.A/C. R. BODDY.—During recent heavy bombing attacks on an airfield in Malta this airman, who is employed on airfield duties, has set a magnificent example by his complete disregard of danger. Whilst intensive and prolonged air attacks have been in progress, he has continued his work and refused to take cover. He has been wounded twice, and on both occasions returned to his work with the same courage and keenness after discharge from hospital.

One evening in April, 1942, during an enemy air attack on the airfield, our aircraft, which were then landing, had to be dispersed. L.A/C. Boddy remained on the airfield and assisted the crew out of the last aircraft and directed them to cover only a few seconds before it received a direct hit. Had it not been for the courage and devotion to duty displayed by this airman the crew would most likely have been seriously injured or killed.

L.A/C. H. B. VENN.—One day in March, 1942, L.A/C. Venn, as a member of a fire tender party, assisted in extinguishing a fire in an aircraft, which had been caused by an enemy raider, and he was instrumental in saving a considerable part of the aircraft. On three occasions, on one day in March, 1942, the airfield was attacked and heavily bombed. Fires were caused in petrol bowsers and aircraft, and, while the raids were in process, L.A/C. Venn, with complete disregard of danger, again assisted in extinguishing the fires. The courage and devotion to duty displayed by this airman have been outstanding.

L.A/C. J. H. WHITEHORN.—L.A/C. Whitehorn, a despatch rider, has shown complete disregard for his own safety during a long period of persistent enemy attacks on Malta, and, although injured on two occasions when delivering messages, he has continued and completed his missions. The courage and devotion to duty displayed by L.A/C. Whitehorn have contributed largely to the high standard of morale maintained by his fellow airmen. He has shown a willingness to undertake any job.

L.A/C. A. WILLIAMSON.
L.A/C. E. J. CLARKE.

One day in February, 1942, an aircraft crashed and caught fire on impact. L.A/Cs Williamson and Clarke immediately attempted to render assistance. Pulling their scarves over their faces and their balaclavas over their hands, both these airmen entered the blazing wreckage and dragged out a member of the crew. Small arms ammunition and flares were exploding all around, but L.A/Cs Williamson and Clarke re-entered the aircraft and attempted to remove other members of the crew. Both these airmen displayed great courage and disregard of danger.

Sgt. F. G. HIGGS, R.A.A.F.—Sgt. Higgs was N.C.O. in charge of operations and the maintenance of R/T fighter control in the locality of enemy attacks upon New Britain. In this capacity his duty was to remain at the post throughout the many enemy attacks on the airfield. Notwithstanding the exposed nature of the position he remained at the post throughout the attacks, displaying great resolution and courage in the performance of duty. His consistent bravery under fire gained him the admiration of his commanding officer and fellow-airmen.

## *Other Fronts*

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy.

### DISTINGUISHED FLYING CROSS.

Act. Flt. Lt. R. S. RADLEY, R.A.F.V.R., No. 144 Sqn.—Flt. Lt. Radley has completed many successful raids against targets at Mannheim, Brest, Kiel and Cologne, and has displayed gallantry and devotion to duty throughout. He has completed long spells of duty in his capacity as deputy flight commander and these duties, whether in the air or on the ground, have been completed cheerfully and have been an inspiration to those under him.

Act. Flt. Lt. A. B. WHEELER, R.C.A.F., No. 226 Sqn.—In April, 1942, Flt. Lt. Wheeler was the leader of the second section of a formation of Boston aircraft detailed to attack the docks at Le Havre. Despite very intense and accurate anti-aircraft fire, by which his aircraft was repeatedly hit, Flt. Lt. Wheeler pressed home his attack.

Immediately after releasing his bombs the port engine failed through damage by anti-aircraft fire, and he was forced to leave the formation and follow behind. Steadily losing height, Flt. Lt. Wheeler skilfully flew his damaged aircraft back to base. His skill and perseverance contributed largely to the safe return of a valuable aircraft and crew.

In September, 1941, at low level and in the face of intense anti-aircraft fire, he attacked and sank a flak ship of between 800 and 1,000 tons, which was escorting a convoy. Flt. Lt. Wheeler has displayed courage, keenness and devotion to duty which have contributed largely to the successes achieved. He has set a fine example.

F/O. E. H. BADCOCK (R.A.F.V.R.), No. 226 Sqn.—In April, 1942, this officer was the navigator and bomb-aimer in the leading aircraft of a formation of six which attacked the power station at Le Havre. Before the target was reached intense and accurate anti-aircraft fire was encountered.

Shell splinters damaged the air-speed indicator and other instruments in the pilot's cockpit, and also smashed through the observer's window, injuring F/O. Badcock. This did not prevent him from continuing to direct his pilot to the target and delivering his attack. F/O. Badcock has participated in many other successful sorties, in which he has shown outstanding ability as a navigator. His calmness and quiet efficiency in the face of danger have set an excellent example.

P/O. R. W. MCNAIR, R.C.A.F., No. 249 Sqn.—This officer is a skilful and courageous pilot. He invariably presses home his attacks with the greatest determination irrespective of the odds.

Air Marshal Sir Sholto Douglas, K.C.B., D.F.C., M.C., A-O-C. in C. Fighter Command.

He has destroyed at least five and damaged seven enemy aircraft; four of these he damaged in one combat.

P/O. A. F. TAYLOR (R.A.F.V.R.), No. 9 Sqn.—One night in April, 1942, this officer captained an aircraft which attacked Rostock successfully. On the return journey his aircraft was attacked by an enemy fighter, fire from which killed the rear gunner and inflicted much damage to the aircraft, causing the rear turret to catch fire. At this time the second pilot was at the controls, but P/O. Taylor, although wounded in the back, immediately occupied his seat and regained control of the aircraft, which was diving towards the sea.

Skilfully evading a further attack from the enemy, who then broke off the engagement, P/O. Taylor set course for base, although a fire was blazing fiercely at the stern of the fuselage. Despite the efforts of other members of the crew, the flames could not be entirely subdued, but P/O. Taylor continued his course, and, displaying great skill, he finally flew his almost uncontrollable aircraft back to this country, where he landed safely with the undercarriage retracted.

In the face of extremely difficult and harassing circumstances, this officer, despite physical pain due to his wounds, displayed great skill and gallantry. He has completed numerous sorties, and he has always shown great thoroughness and determination to complete his tasks.

P/O. F. W. WALKER, No. 608 Sqn.—This officer has completed numerous sorties, including attacks on the enemy's shipping, ports and airfields. Undeterred by the heaviest opposition, he has invariably pressed home his attacks with vigour. During recent attacks he has scored hits on destroyers, an armed ship, and on supply vessels. In May, 1942, during a patrol off the Norwegian coast, he observed a destroyer and four minesweepers. Skilfully approaching the destroyer, he made a low-level attack on it, releasing his bombs from a height of only 100 feet. It is believed that three hits were obtained. This officer has at all times shown outstanding courage and keenness.

P/O. J. R. N. MOLESWORTH, R.A.A.F., No. 114 Sqn., and P/O. E. F. K. DENNY, R.A.F.V.R., No. 114 Sqn.—One night in April, 1942, P/Os Molesworth and Denny were the pilot and observer respectively of an aircraft detailed to attack Eindhoven airdrome. On the outward journey the air gunner reported that his guns would not fire. Nevertheless, despite the danger of interception by enemy fighters, P/O. Molesworth flew on to his allotted target, which he bombed from 2,000 feet.

On the return journey his aircraft was attacked by an enemy fighter and sustained much damage. The instrument panel was shot away, the wireless rendered unserviceable, and the hydraulics put out of action, while a large hole was torn in the floor of the cockpit and the aircraft was riddled with holes.

Nevertheless, P/O. Molesworth, ably assisted by P/O. Denny, who gave a running commentary on the attacker's movements, finally shook off the attacker and headed for this country. Immediately following the action, P/O. Denny, despite the holes in the floor of the aircraft, climbed through the bomb well to make contact with the air gunner. P/O. Molesworth flew the damaged aircraft back to this country but, shortly after crossing the coast at 700 feet, the starboard engine failed. Displaying great skill, however, he force-landed in the darkness, with the undercarriage retracted.

On impact the aircraft caught fire, but, with complete disregard for danger, P/O. Denny entered the rear cockpit and rescued the trapped air gunner. Throughout the operation these officers showed great courage and set an example worthy of high praise.

Act. Flt. Lt. A. W. RAW, R.A.F.V.R., No. 144 Sqn.—Flt. Lt. Raw has completed many successful raids, and despite adverse weather has shown great perseverance in locating and attacking his target. He has displayed gallantry and devotion to duty during raids into enemy territory.

F/O. R. B. MILBURN, R.A.F.V.R., No. 148 Sqn.—This officer has completed several hundred operational flying hours. He participated in attacks against targets in Germany and German-occupied territory and in the Middle East. F/O. Milburn has invariably displayed high courage and devotion to duty. One night in November, 1941, whilst forcelanding his aircraft in foggy weather, he was injured about the head and face. His keenness was such that, on being discharged from hospital, he insisted on immediately returning to operational flying.

Flt. Lt. V. A. RICKETTS, R.A.F.V.R.—On the morning of March 4th, 1942, as pilot and observer respectively, Flt. Lt. Ricketts and Sgt. Lukhmanoff were detailed to take photographs of the Renault works near Paris, which had been attacked by our bombers on the previous night. The weather was extremely bad, and necessitated the aircraft flying in clouds and by instruments until Paris was reached. Here cloud was about 500 feet and visibility poor.

On reaching the target area, about 35 minutes were spent in locating the works and taking photographs; the results obtained proved extremely valuable. On a previous occasion Flt. Lt. Ricketts, accompanied by Sgt. Lukhmanoff, obtained valuable photographs. This operation was also undertaken despite fog and poor visibility at their base aerodrome. As pilot and observer, they have shown outstanding courage and ability.

Lt. P. V. LONG-INNES, S.A.A.F., No. 21 (S.A.A.F.) Sqn.—This officer is an outstanding bomber pilot. His tireless efforts, brilliant flying and complete disregard of danger have had a marked effect on the morale of the members of his squadron during the present campaign. On one occasion, whilst on patrol over the sea, he observed four Junkers 52s which he attacked and damaged. During the engagement his aircraft sustained damage, causing it to lose height rapidly. Nevertheless, flying on one engine, Lt. Long-Innes reached the coast and, flying low, he passed over strong enemy forces who opened fire. He finally flew on until near base where he successfully crash-landed with the undercarriage retracted. Throughout, he showed great skill and endurance.

P/O. D. M. CROSSLEY, R.A.F.V.R., No. 148 Sqn.—This officer has completed numerous sorties involving a large number of hours of flying. Throughout, he has displayed a high standard of courage and ability. One night in March, 1942, owing to engine trouble he was compelled to return to an advanced landing ground and later he was forced to alight on the sea when within sight of the Egyptian coast. He accomplished this without any of the crew sustaining injury and all were able to embark safely in the dinghy. They were rescued after a few hours.

Some nights later, during an operation against Benghazi, P/O. Crossley succeeded in flying to an advanced landing ground, some 450 miles distant, on one engine, and in making a safe landing in the darkness.

Act. Flt. Lt. G. R. WATSON, R.A.F.V.R., No. 57 Sqn.—Flt. Lt. Watson has participated in many bombing raids, including targets at Bremen, Kiel, Mannheim, Hamburg and Cologne. As an air gunner he has shown outstanding ability.

F/O. D. A. GREEN, R.A.F.V.R., No. 207 Sqn.—This officer has shown great perseverance in locating and bombing his target accurately. He is a keen, conscientious and efficient captain of aircraft.

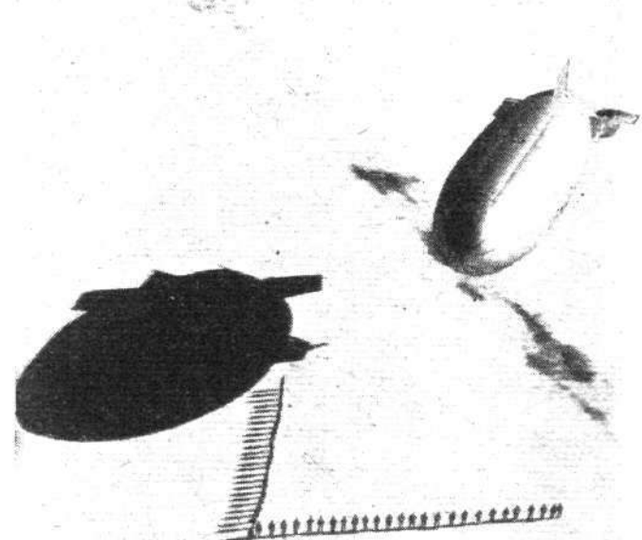
F/O. E. M. C. GUEST, No. 200 Sqn.—This officer has now completed over 1,000 hours operational flying. His qualities of endurance are phenomenal, his ability as a pilot is exceptional, and his devotion to duty is of the highest order. All his work has been done quietly and efficiently. He has set an excellent example to the younger pilots of the Squadron.

W/O. E. C. WAVELL.—W/O. Wavell is an extremely efficient navigator. During the past five months he has participated in operations which have resulted in damage being inflicted on at least ten of the enemy's convoys. The majority of his sorties have necessitated a high degree of navigational skill whilst flying over the sea. W/O. Wavell has displayed great devotion to duty and he has undoubtedly contributed in a large measure to the high standard of efficiency of his crew.

W/O. W. J. HEMMING, No. 61 Sqn.—W/O. Hemming has completed eleven operational sorties prior to joining his present unit. His skill as an observer, combined with a fine offensive spirit, keenness and devotion to duty, have contributed largely to the successes achieved.

W/O. R. LAMBERT, D.F.M., No. 15 Sqn.—W/O. Lambert has participated in numerous sorties, including attacks on Berlin, Wilhelmshaven and the Ruhr. He has shown outstanding ability as a navigator and bomb aimer.

W/O. H. V. PETERSON, R.C.A.F., No. 35 Sqn.—W/O. Peterson has completed many operational sorties, of which 13 have been as captain of aircraft. One night in April, 1942, he was detailed to attack the German naval base at Trondheim. On arrival over the target, despite the intense barrage of anti-aircraft fire which he encountered, he dived to a very low altitude and pressed home his attack. On the following night he carried



The ground crew prepare to handle a U.S. Navy blimp at Lakehurst, New Jersey. The Vee formation is by way of correctness, not sentiment.

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out another low-level attack on the same target. His aircraft sustained severe damage, and one engine was put out of action. With great skill and judgment, W/O. Peterson succeeded in flying his aircraft to an emergency landing ground where he made a safe landing.

### BAR TO THE DISTINGUISHED FLYING MEDAL.

Flt. Sgt. R. B. HESSELYN, D.F.M., No. 249 Sqn.—During a period of four days' operations in May, 1942, this airman destroyed five enemy aircraft, bringing his victories to ten. Although fighting at great odds in the heavy raids on Malta, Flt. Sgt. Hesselyn never hesitates in his efforts to destroy the enemy. His courage and devotion to duty are outstanding.

### DISTINGUISHED FLYING MEDAL.

Sgt. G. B. LUKHMANOFF.—For citation see Flt. Lt. Ricketts.

Flt. Sgt. S. A. W. COOK, R.A.F.V.R.—Whilst carrying out a sortie over Benghazi, this airman's aircraft was attacked by six enemy fighters. Although his gun was rendered useless by icing conditions and he was in grave danger from bullets entering the cockpit, Flt. Sgt. Cook gave cool and skilful directions to the pilot and endeavoured to obtain photographs of the enemy aircraft. During the many operational flights carried out by this airman from England and in the Middle East, he has at all times displayed extreme coolness and devotion to duty.

Flt. Sgt. H. T. HAGGAR, No. 201 Sqn.—This airman has been a member of an air crew of London and Sunderland aircraft since September, 1939, and has completed 1,520 operational flying hours by day and 161 hours by night. He has displayed great energy and resource and has set a high standard to his colleagues. When on an anti-submarine patrol in August, 1940, his aircraft was attacked by a Dornier 215. Flt. Sgt. Haggar manned the bow turret gun and after a running fight the enemy was driven off in flames and appeared to be losing height. Several members of Flt. Sgt. Haggar's crew were wounded.

Flt. Sgt. D. R. TERRINGTON, R.A.F.V.R.—This airman has completed over 600 hours operational flying. As wireless operator-air gunner, he contributed materially to the successes achieved in attacks on some ten enemy convoys. Flt. Sgt. Terrington has taken part in many hazardous enterprises and, on one occasion in bad weather, his skill was largely responsible for the safe return of his aircraft.

Flt. Sgt. (now P/O.) E. A. TETT, No. 240 Sqn.—As a Flt. Sgt. this member of air crew was employed as wireless operator-air gunner, and has completed 1,154 operational flying hours since the outbreak of hostilities. Throughout the period of sustained operations over the North Sea and the Western approaches he set a very fine example of devotion to duty. In addition to his duties as wireless operator he has shown leadership and has displayed a fine general knowledge of flying boats, thus materially assisting various captains in building up the best crew in the squadron.

Sgt. A. D. BRISBANE, No. 148 Sqn.—This airman was the wireless operator in an aircraft involved in difficulties while over Greece. It became necessary to return to an advanced landing ground, with only one engine functioning in the aircraft. The landing ground was covered by fog. The coolness and efficiency displayed by Sgt. Brisbane contributed largely to the safe landing effected.

Sgt. E. L. JONES, R.A.A.F.—On one occasion when his aircraft was attacked by enemy aircraft and the cockpit was being riddled with bullets, Sgt. Jones displayed great devotion to duty by continuing to take photographs and making notes. He has carried out many reconnaissance flights and on all occasions he has displayed outstanding ability, skill and devotion to duty.

Sgt. D. H. PHELAN, S.A.A.F., No. 21 (S.A.A.F.) Sqn.—This airman is an outstanding wireless operator-air gunner. Throughout the numerous sorties in which he has participated, he has displayed a high standard of skill and determination. In December, 1941, during a patrol over the sea near Derna, his pilot intercepted four Junkers 52s. In the ensuing engagement, Sgt. Phelan, assisted by his co-gunner, destroyed one and damaged two of the enemy's aircraft. He has displayed great courage and rendered most valuable service.

Sgt. H. A. BROWN, No. 35 Sqn.—Sgt. Brown has completed many operational sorties. One night in April, 1942, as captain of an aircraft, he was detailed to attack the German Naval base at Trondheim. Throughout this flight he displayed the greatest skill and airmanship. Sgt. Brown pressed home his attack in the face of intense opposition. He displayed bravery and cool determination.

Flt. Sgt. K. A. CLACK, No. 76 Sqn.—This airman has completed many successful sorties, including attacks on targets at Berlin, Mannheim, Stuttgart and Stettin. One night in April, 1942, he was the captain of an aircraft detailed to attack the German naval base at Trondheim. After releasing the bombs his aircraft was hit by anti-aircraft fire, which caused one engine to fail and the bomb doors could not be closed. He succeeded in returning to base and landed safely with the bomb doors still open.

The following night, as his former aircraft was not serviceable, Flt. Sgt. Clack volunteered to fly another aircraft to attack the naval base again. He delivered his bombs successfully and machine-gunned gun emplacements. His courage and determination have been outstanding.

Work in the bomb dump of a day bomber station. Here the tail fins are attached and the appropriate fuses—delayed or instantaneous—are fitted.

Air Marshal A. T. Harris, C.B., O.B.E., A.F.C., A-O-C. in C. Bomber Command. Air Marshal Harris has been promoted to the rank of Knight Commander in the Order of the Bath in this year's Birthday Honours.

Flt. Sgt. W. J. PORRITT, R.C.A.F., No. 10 Sqn.—As an air gunner, Flt. Sgt. Porritt has displayed great skill and coolness in combat. During a daylight attack on the German battle cruisers *Scharnhorst* and *Gneisenau*, his aircraft was attacked by four Messerschmitt 109's. Using his guns most effectively, Flt. Sgt. Porritt shot down one of the attackers in flames, probably destroyed another, and warded off the remaining two until fighter assistance arrived. In the encounter, Flt. Sgt. Porritt was wounded in the face and arms.

One morning in May, 1942, whilst returning from an operation over Germany, he engaged a Messerschmitt 109 from close range. Following a well-directed burst of fire, the enemy aircraft was observed to plunge vertically towards the ground, where, a few seconds later, it apparently burst into flames. On both these occasions this airman undoubtedly saved his aircraft from destruction.

Flt. Sgt. G. P. ROCHFORD, R.A.F.V.R., No. 10 Sqn.—One night in April, 1942, Flt. Sgt. Rochford was detailed to attack the German naval base at Trondheim. On arriving over the target he encountered fierce anti-aircraft fire. Flt. Sgt. Rochford dived down to a very low level and pressed home his attack. His aircraft sustained severe damage, but he succeeded in returning to base.

On the following night he was again detailed to attack the naval base. On the outward journey the rear gunner reported that the guns in the rear turret were unserviceable and beyond his repair. Flt. Sgt. Rochford continued on his mission and pressed home his attack from a low level. His second pilot and first wireless operator were seriously wounded and his aircraft was holed in many places. Flt. Sgt. Rochford has displayed great courage, perseverance and devotion to duty.

Sgt. M. D. GRIBBIN, No. 10 Sqn.—Sgt. Gribbin has completed many sorties, of which the last nine have been as captain of aircraft. One night in April, 1942 he was detailed to attack the German naval base at Trondheim. On arrival over the target area he encountered intense anti-aircraft fire. Despite this, he dived through the barrage to a low level and dropped his bombs. The following night he repeated the attack with similar determination. He has displayed courage and gallantry of a high standard.

Sgt. F. S. HILEY, R.C.A.F., No. 420 (R.C.A.F.) Sqn.—One night in May, 1942, this airman was the pilot of an aircraft which attacked Stuttgart. On the return journey the aircraft was hit by anti-aircraft fire. Shortly afterwards, it was engaged by a Messerschmitt 110, the fire from which killed the rear gunner and damaged the aircraft. The enemy fighter was driven off and, it is believed, destroyed. Although one of the engines of his aircraft was put out of action, the electrical system destroyed and both the pilot's and navigator's compasses damaged, Sgt. Hiley skilfully flew his damaged aircraft back to this country and landed safely in a field. He displayed great skill, courage and determination.

Sgt. W. J. MAITLAND, R.C.A.F., No. 420 (R.C.A.F.) Sqn.—Sgt. Maitland was the captain of an aircraft which attacked Stuttgart one night in May, 1942. Whilst crossing the enemy's coast on his return his aircraft was caught in a cone of searchlights and hit by anti-aircraft fire. One engine was set on fire and Sgt. Maitland was wounded on the right side of the chest. Despite this, he kept his aircraft well under control and, by the appropriate use of the fire extinguisher,

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prevented the fire from spreading. Although one engine was useless, he skilfully flew his aircraft to an airfield in this country. Throughout, this airman showed great presence of mind and courage.

Flt. Sgt. S. W. LEE, No. 148 Sqn.—This airman has completed numerous sorties against targets in Germany and German occupied territory, and in the Middle East where he has completed many daylight sorties as well as numerous night operations against targets in Cyrenaica. This airman has at all times shown the greatest keenness and ability combined with a strong sense of duty. His complete disregard of danger has set a fine example.

Flt. Sgt. (now P/O.) R. G. MULLEN, R.C.A.F., No. 407 (R.C.A.F.) Sqn.—Flt. Sgt. Mullen has flown on many operational flights. Disregarding danger, he has pressed home his attacks against enemy ships, at mast head height, in the face of heavy anti-aircraft fire from the vessels and shore batteries. The successes he has achieved have been gained by his undaunted keenness.

## Roll of Honour

*Casualty Communiqué No.* 136.

THE Air Ministry regrets to announce the following casualties on various dates. The next-of-kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

### Royal Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. R. B. Adams; Sgt. E. S. Ayton; Sgt. H. Baker; Sgt. J. W. Cadman; Sgt. A. W. Deere; Sgt. A. H. Higgs; Sgt. P. A. Ingram; Flt. Sgt. L. W. Jaggard; Sgt. R. W. Jenkins; P/O. D. S. Martin; P/O. H. J. Parker; Sqn. Ldr. L. H. W. Parkin; Sgt. F. Pearson; Sgt. W. J. Poulton; W/O. T. Purdy; F/O. C. B. Randall; P/O. J. H. Rodgers; Flt. Sgt. S. R. Samways; Sgt. D. J. Sandlin; F/O. J. M. H. Sargent; Act. Wing Cdr. D. R. Scott; P/O. R. G. Scott; Sgt. A. D. E. St. C. Smithe; Sgt. C. H. Stokell; Sgt. P. F. Swain; Flt. Sgt. J. D. Timms; Sgt. A. Waterworth; Sgt. W. Whittam; Sgt. G. E. Wilkinson; Sgt. S. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. W. Allen; Sgt. J. J. Ashurst; Sgt. H. R. Barnett; Sgt. J. W. Bell; Sgt. R. Boucher; Sgt. D. C. Cameron; Act. Sqn. Ldr. F. R. H. Charney, D.F.C.; Sgt. G. D. Colville; P/O. P. Farragut; P/O. H. S. Fenlaw; Sgt. R. L. Fitzell; P/O. W. F. W. Foster; Sgt. R. P. S. Grenfell; Sgt. G. E. Hann; Sgt. D. R. Harris; Sgt. F. S. R. Heard; Sgt. M. C. Hind; Sgt. S. C. Hodge; Sgt. S. Jones; Sgt. G. G. King; P/O. L. P. Kolitz; P/O. G. M. McCombe; Sgt. S. A. Maguire; Sgt. B. D. Meagher; Flt. Sgt. H. Menary; Sgt. J. Nightingale; Sgt. C. H. B. Page; Flt. Sgt. E. R. Palmer; Sgt. D. G. Peppler; Sgt. A. Pont; Sgt. S. Porteous; Flt. Sgt. R. L. Robinson; Sgt. T. W. Robson; Sgt. A. W. Rowan; Sgt. E. K. Saul; Sgt. K. C. Shearing; P/O. M. H. Sherley-Price; Sgt. H. B. B. T. Smith, Sgt. I. A. Spence-Ross; Sgt. T. V. Steele; Sgt. M. A. Stratton; Sgt. H. F. Tomkins; P/O. G. S. Turner; F/O. N. W. Walders; Sgt. G. T. Webb, Sgt. C. E. White; Flt. Sgt. K. J. Wilkie; Sgt. F. H. Worlledge.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Sgt. G. McIntyre.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. W. Duncan; Act. Flt. Lt. J. A. Harries.

WOUNDED OR INJURED IN ACTION.—F/O. T. H. C. Allison; Cpl. P. J. Sadd; Sgt. C. J. Saul.

MISSING, BELIEVED KILLED IN ACTION.—Act. Wing Cdr. S. McC. Boal, D.F.C.; P/O. R. E. Bush; P/O. G. C. Day; Sgt. K. C. May; Sgt. R. G. A. Richards; Act. Sqn. Ldr. F. D. Webster, D.F.C.

MISSING.—Sgt. S. R. J. Ainger; F/O. J. B. Ayer; P/O. J. H. A. Baker; Sgt. J. C. L. Banks; Sgt. R. W. B. Brown; Sgt. C. F. Bryant; Sgt. R. P. Cale; Sgt. H. Cartwright; Sgt. K. R. Clark; Sgt. J. S. Clarke; Sgt. H. E. Cruze; Sgt. C. F. Curtis; P/O. R. W. Dargavel; Flt. Sgt. L. Davis; Sgt. J. R. Dodd; Sgt. L. K. Eagle; Sgt. W. B. Eastwood; Flt. Lt. J. H. Edwards; P/O. G. Featherstone; Flt. Sgt. T. Flanagan; Sgt. P. A. Foster; Sgt. H. I. Fraser; F/O. B. J. Fyson; F/O. G. M. Gee; P/O. D. Geffene; Sgt. R. G. Giddings; Flt. Sgt. J. T. Graham; Sgt. M. Griffiths; Sgt. R. Grisdale; Sgt. A. Hague; Sgt. E. A. Hall; Sgt. W. Hall; Sgt. A. A. S. F. Harris; Sgt. D. Henderson; Sgt. G. Jackson; Flt. Sgt. M. A. Jones; Flt. Sgt. S. Jones; P/O. R. Langley; Sgt. A. Lees; P/O. S. R. Leney; P/O. B. F. Mays; Sgt. F. H. Miller; P/O. C. Newell Jones; Sgt. L. R. M. Norris; Sgt. M. O'Brien; Sgt. H. F. Pocock; Sgt. B. T. Randall; Sgt. R. C. Roberts; Act. Wing Cdr. M. L. Robinson, D.S.O., D.F.C.; Act. Flt. Lt. A. C. Stevens-Fox; Sgt. D. E. S. Sydney-Smith; Flt. Sgt. D. S. Thomas; Flt. Lt. T. H. Tozer; Flt. Sgt. R. A. J. Trevillan; Flt. Sgt. A. R. Vint; Sgt. J. Waddell; Sgt. D. P. Walmsley; P/O. J. E. Ward; Flt. Sgt. T. Watson; Act. Flt. Sgt. H. S. Wheatley; Sgt. E. P. Wright.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—A/C.1 G. Baines; A/C.1 W. Fisher; A/C.1 R. Grierson Cpl. H. Kin; A/C.1 E. J. Lee; L.A/C. G. H. R. Leverington; A/C.1 A. R. Manchip; L.A/C L. H. Quinn; A/C.1 W. G. Titherington; A/C.1 H. Whatmore; Cpl. A. T. Woodman.

KILLED ON ACTIVE SERVICE.—F/O. H. C. Babington; Sgt. G. Cant; Sgt. R. J. Coates; P/O. J. P. Considine; Sgt. E. G. Cooke; P/O. J. P. N. Findlay; P/O. G. C. Giras; Sgt. E. Hunter; F/O. D. H. Jeffery; P/O. J. C. Jones; L.A/C. G. Mallam; Sgt. A. S. Moggach.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. D. A. F. Allmond; A/C.2 G. Kidd; A/C.1 J. K. Kidd; Act. Sqn. Ldr. P. C. Rolt; A/C.2 S. O. Wainwright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. N. F. T. Brown.

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. R. H. Orlebar.

PREVIOUSLY REPORTED WOUNDED OR INJURED ON ACTIVE SERVICE, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Cpl. R. Peters.

DIED ON ACTIVE SERVICE.—A/C.2 M. P. Belcher; A/C.1 F. S. H. Bullen; A/C.1 J. Casey; L.A/C. W. C. Chambers; L.A/C. T. Croft; A/C.2 R. Gee; Cpl. W. H. Gilbert; A/C.2 E. A. Green; A/C.2 R. H. Hadley; L.A/C. J. McDonald; Sgt. W. R. Mullett; A/C.1 J. F. Read; Cpl. B. C. Roper; L.A/C. L. F. Sparks; A/C.2 H. F. G. Whatley; A/C.2 G. L. S. Whichello; Cpl. W. J. Wisedale.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. P. W. Lowe.

### Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. D. E. Smith; A/CW.2 D. S. Winter.

### Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. I. M. Ince; Sgt. J. H. Pott; P/O. D. A. Ray.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. J. L. Asprey; P/O. J. W. Greening.

MISSING.—Sgt. A. B. Burgess; Sgt. S. L. Green; Sgt. C. A. V. Hartley; Sgt. J. E. Maloney; Sgt. R. Marshall; Sgt. H. E. Rowley; Sgt. R. E. Waters; Sgt. C. F. Woodburn; P/O. H. N. Young.

A sing-song round the piano at "Little Norway" air training camp near Toronto, Canada. The Norwegians are operating one seaplane squadron in Iceland and two Spitfire squadrons under Fighter Command.

### Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. K. S. Davies; P/O. R. D. Fairbairn; P/O. W. F. Hull.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. W. H. Davidson; Sgt. W. K. Hunting; Sgt. J. L. B. Martin; Sgt. S. E. Rowed; Sgt. W. Turley; F/O. C. A. B. Wallace; Sgt. J. F. Wolff.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—P/O. T. G. Cottier.

MISSING, BELIEVED KILLED IN ACTION.—P/O. W. F. McCarthy.

MISSING.—Sgt. A. A. Bussell; P/O. J. D. A. Foley; Flt. Sgt. H. R. Franklin; Flt. Sgt. W. M. Fraser; Flt. Sgt. G. G. Giroux; Sgt. A. R. Henman; Sgt. N. A. Leckie; P/O. H. M. Lowry; Flt. Sgt. H. W. Lundy; W/O. D. A. McCann; Flt. Sgt. J. O. H. Nevill; P/O. H. R. Strouts.

KILLED ON ACTIVE SERVICE.—Sgt. R. T. Edwards; P/O. R. L. Keniston.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. G. D. Gilmour.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—P/O. R. N. Wycherley.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. H. J. Cossentine.

### Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. K. C. M. Miller.

MISSING.—P/O. N. R. Blunden; P/O. E. F. Chandler; P/O. T. T. Fox; Sgt. D. A. S. Hamilton; Flt. Sgt. R. E. Knoblock; Sgt. W. J. Paterson.

KILLED ON ACTIVE SERVICE.—Sgt. B. A. Neill.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. J. A. Johnston.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. J. D. Ackerman.

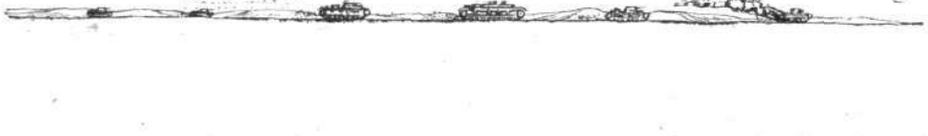
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. B. W. Spence.

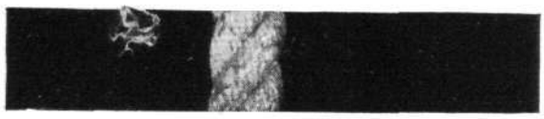
### South African Air Force

WOUNDED OR INJURED IN ACTION.—Lt. W. Langerman.

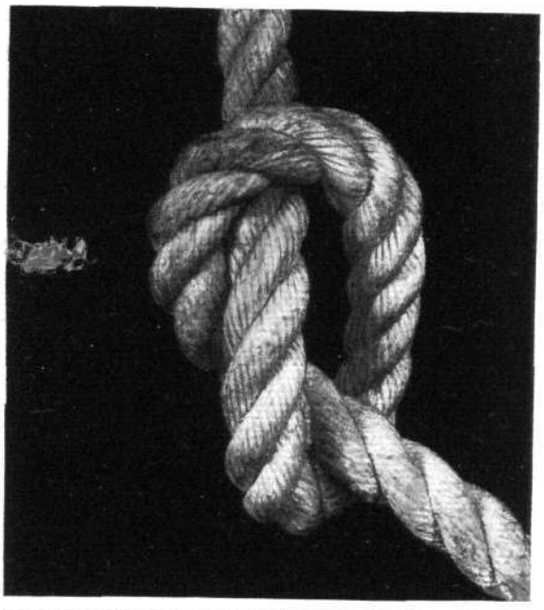
MISSING.—2/Lt. G. Donaldson; Lt. J. W. Van Niererk.

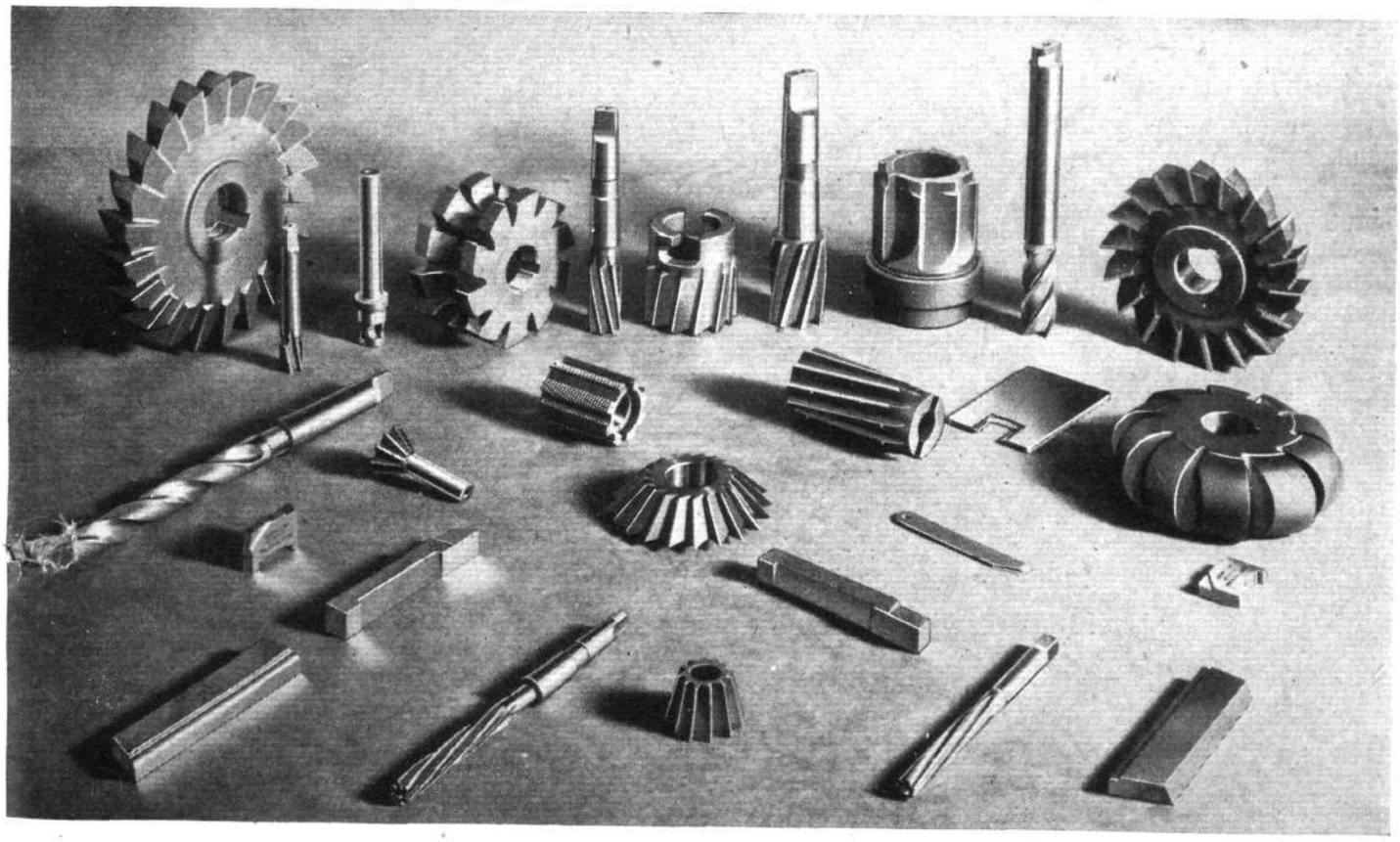
WOUNDED OR INJURED ON ACTIVE SERVICE.—Air Mech. U. Sacks.





# untie your production knots ! with Hydra





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