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Vol. XLV

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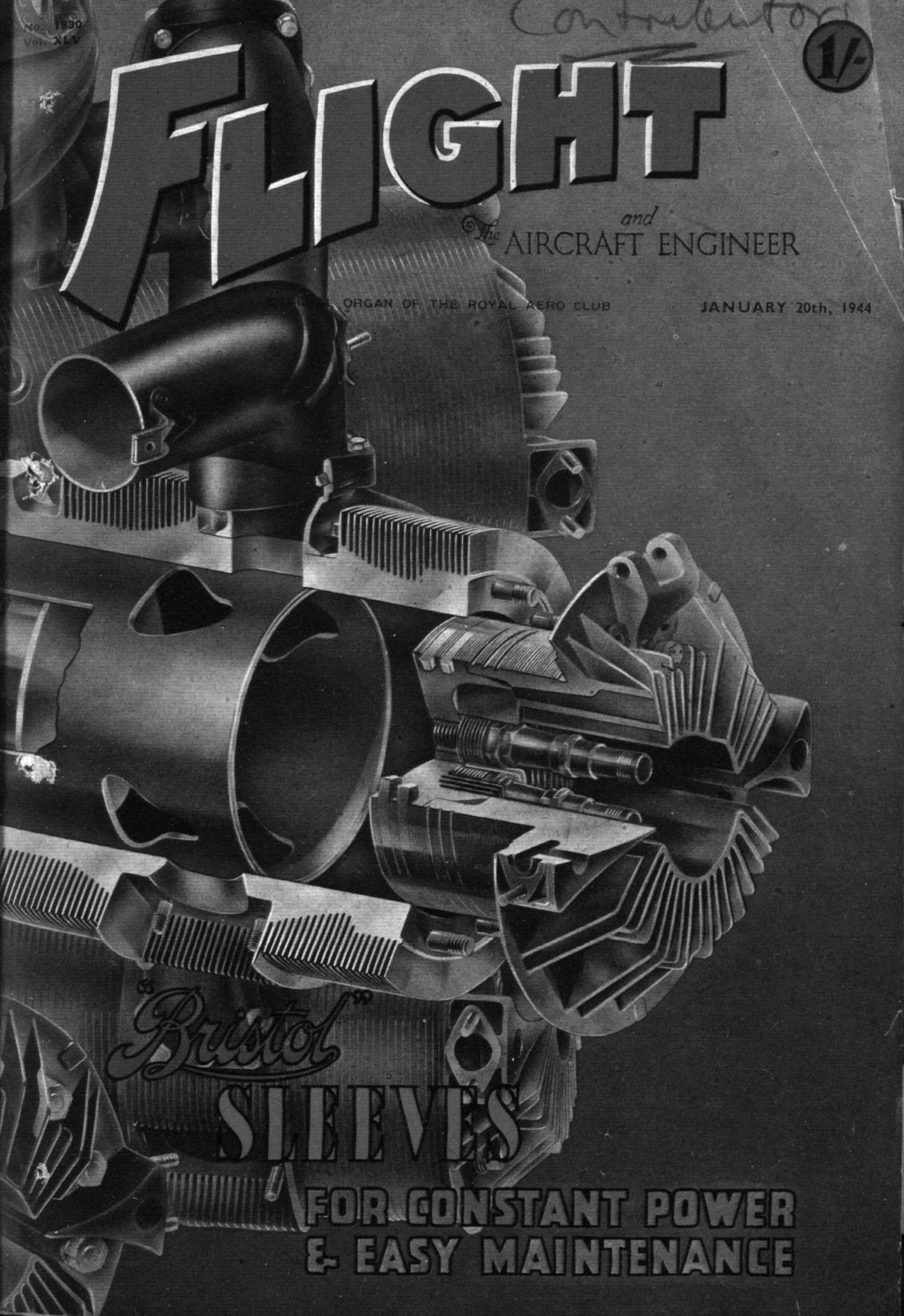
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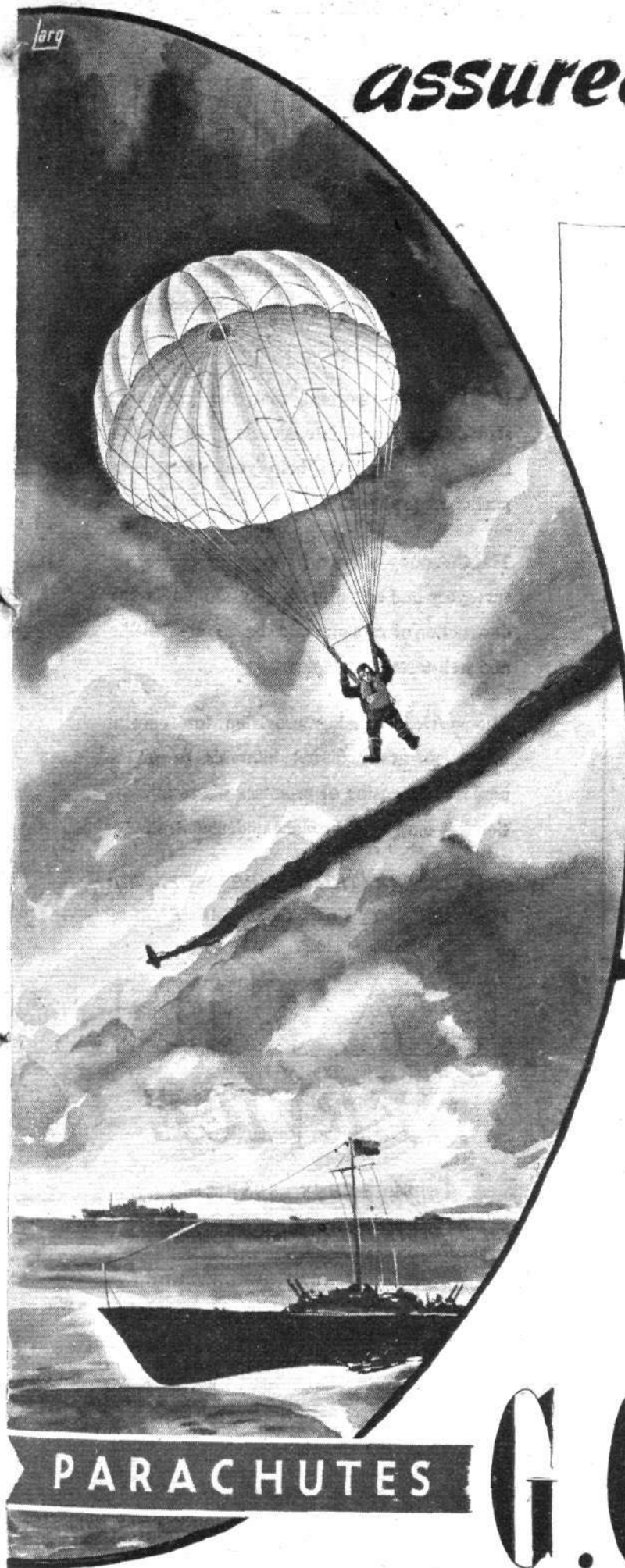
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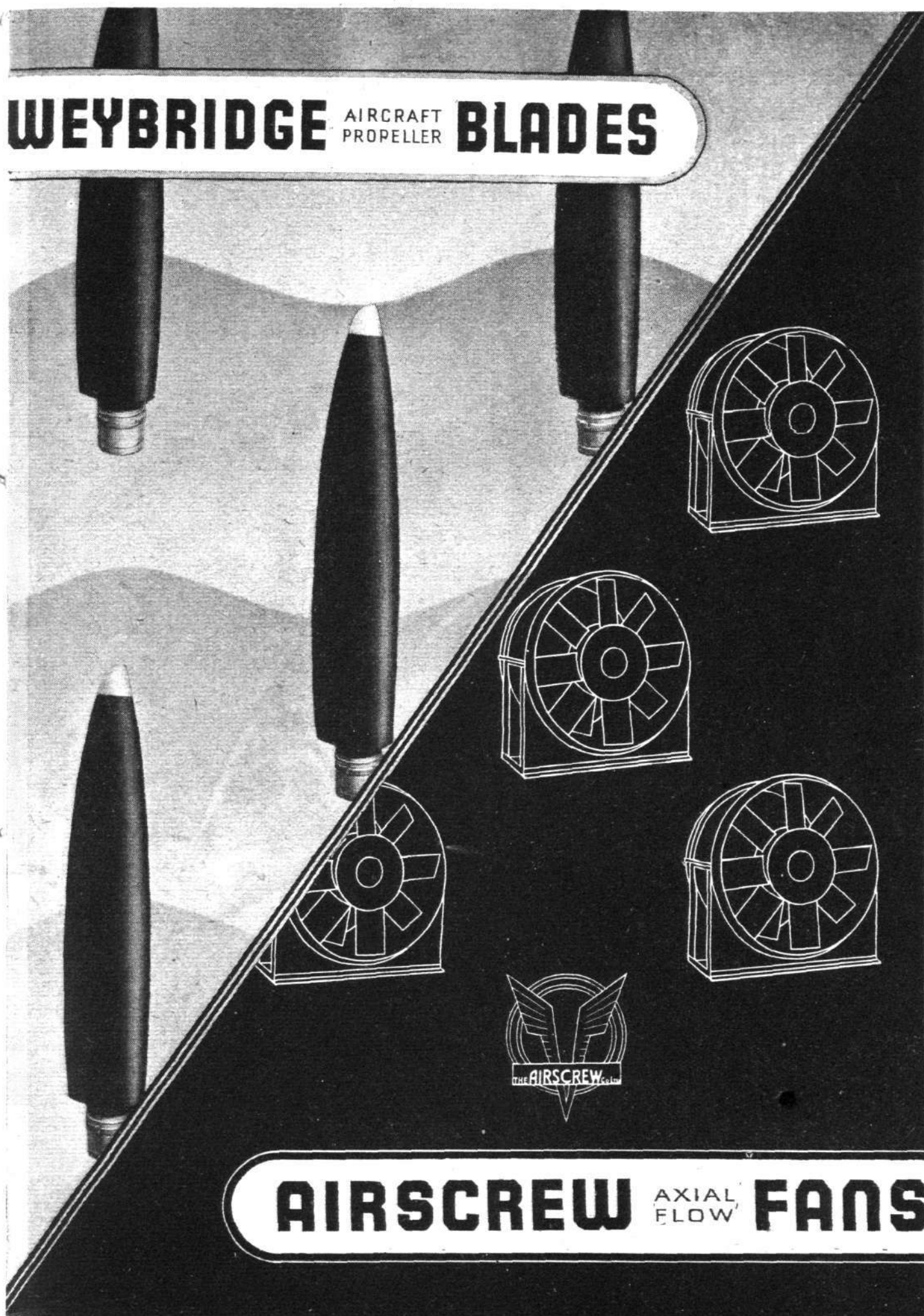
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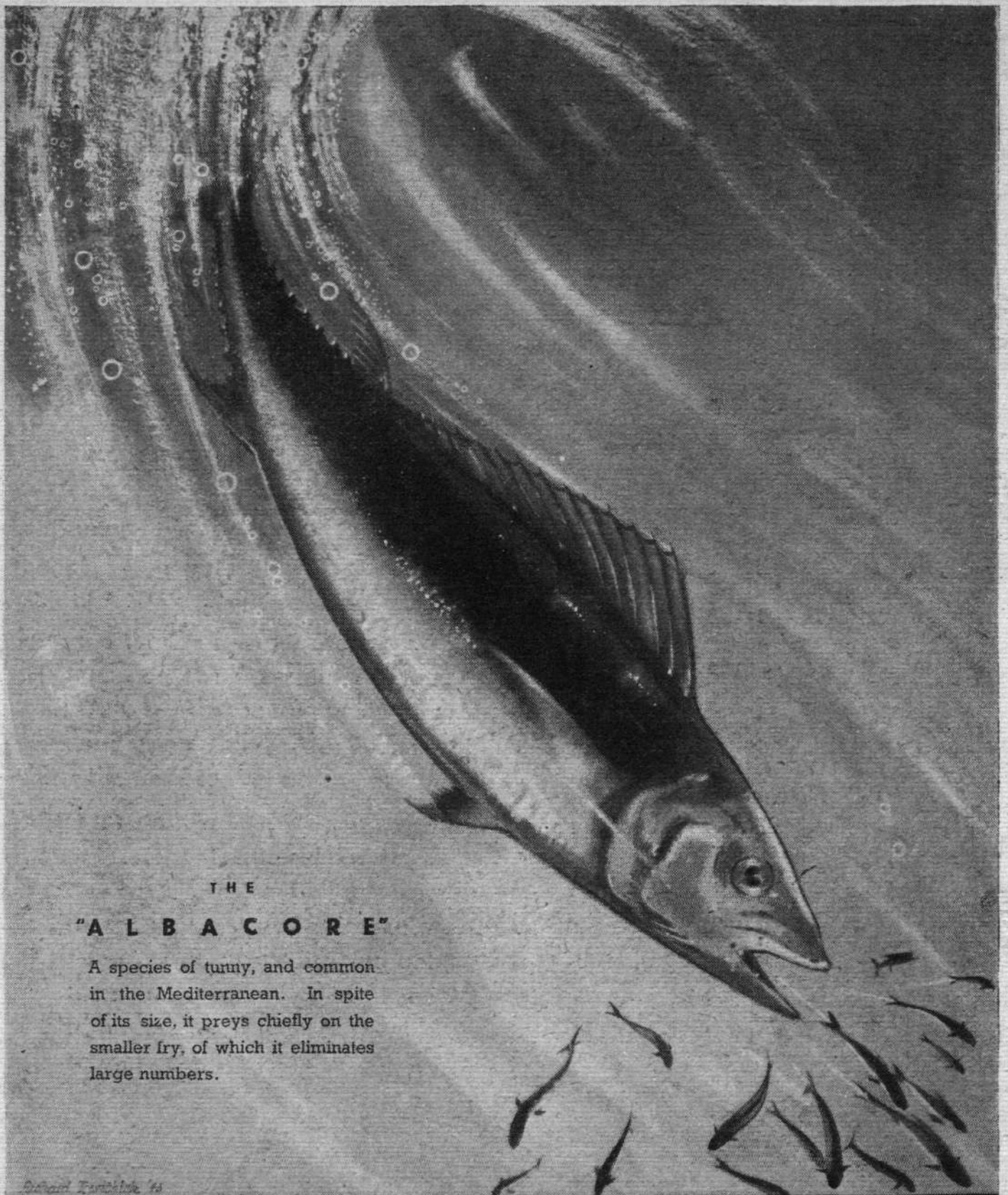
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and
The AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Managing Editor
G. GEOFFREY SMITH, M.B.E.

Chief Photographer
JOHN YOXALL

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Thursdays, One Shilling.

The Outlook

The Air Weapon in War

LAST week a war commentary by an Air Force officer, Squadron Leader Strachey, was broadcast by the B.B.C. It was a very interesting and thoughtful discourse, and it was chiefly concerned with the place of the air weapon in war—future wars as well as the present one.

Among the theories which the speaker advanced were these: that aircraft had not merely introduced a new weapon but had also ushered in a new form of warfare; that air defence was now stronger than air attack; and that the new form of war brought both an advantage and a disadvantage to the British Isles.

As regards the first point, the martial aircraft ought to be regarded in relation to each of the three fighting Services. To the Navy and to the Army it is certainly just a new weapon, sometimes supremely effective; sometimes of less importance than other weapons. Its value varies with the conditions of each engagement. At Taranto, at Matapan, in the *Bismarck* fight, at Alamein, and in several other battles fought by Montgomery and Alexander, it made victory possible. At the time of Auchinleck's attempted advance and in the storming of Appennine strongholds our air weapon, though superior to that of the enemy, was not able by itself to achieve the purpose of the Army.

When used independently by Bomber Command of the Royal Air Force, aircraft have certainly introduced a new form of war. As for the comparative ascendancy of air attack or air defence, the latter won in the Battle of Britain, but in the present attack on German production Squadron Leader Strachey is not in agreement with Air Chief Marshal Sir Philip Joubert, who, in a fairly recent broadcast, expressed the view that the attack was having the best of it. Without doubt the

German defence is not able to save the cities, despite the casualties suffered by the bombers.

This question affects the security of Great Britain. Squadron Leader Strachey rightly admitted that an enemy's power to fly across the Channel was a drawback for an island kingdom, but he found consolation by holding that British airmanship, design and power of production tipped the balance in our favour, and presumably would always do so. We should be the last to question British merit in these respects, but it is surely wishful thinking to put it forward as a certainty that the designers of France, Germany, Holland, Italy and the United States will never provide their airmen with craft which are superior to those of Britain. We should like to believe it, but prudence forbids us to feel an absolute assurance on such a point. The mere existence of such a doubt makes it doubly urgent for Britain in time of peace never to cease striving after the lead in the air—even if the Foreign Office does promise that no war is imminent for the next ten years.

German Fighter Factories Hit

SIGNS, though as yet rather slight signs, are becoming apparent that even the vast reserve of war material which Germany had amassed is beginning to peter out, and it is therefore a fair assumption that the bombing offensive from Great Britain has prevented its replenishment from the factories. German troops in Italy, for instance, have been found using a comparatively antiquated pattern of Bren machine gun, and there have been other suggestive facts noticed on the Russian front.

The most definite and dangerous shortage, however, is in fighter aircraft (and this is true despite the addition of 1,000 first-line fighters during 1943), and this seems

to have arisen mainly from German miscalculations about the part which fighters would play in this war. Hitherto Bomber Command have made very few claims that fighter factories figured among the main objectives in the night raids, though some general "area raids" doubtless included fighter factories.

Deliberate attacks on main fighter factories were initiated by United States bombers working from the Mediterranean area. They have now been taken up by the U.S. Army Eighth Air Force in Britain. The daylight raid of January 11th struck a heavy blow at three of the most important of these factories. It was a very well-judged attack, delivered at the right time, and hitting Germany just where the blow would hurt her most. Its importance was shown by the strength of the force which was sent out, and also by the fierceness of the German defence. Bringing out even some reserves, the German fighters held nothing back in their desperate attempt to weaken the blow aimed at their country's most tender spot. Bomber Command has followed up the blow.

To the *Luftwaffe* the loss of 100 or so of its fighters is no light misfortune, but that is as nothing to the loss of replacements and hoped-for increases which the damage to the factories will certainly mean.

"Achtung — Schpitfeuer!"

ONE of the gratifying features of the present air situation is the number of Spitfires now available for distribution. In the momentous Battle of Britain these redoubtable fighters were in rather short supply, and that great victory was won mainly by the Hurricane. The latter has since appeared in many roles, and has done remarkable service as a fighter-bomber, as a tank-buster, and as a ship's fighter. But now its name rarely appears in the news, though the later Hawker fighter, the Typhoon, is daily winning new laurels.

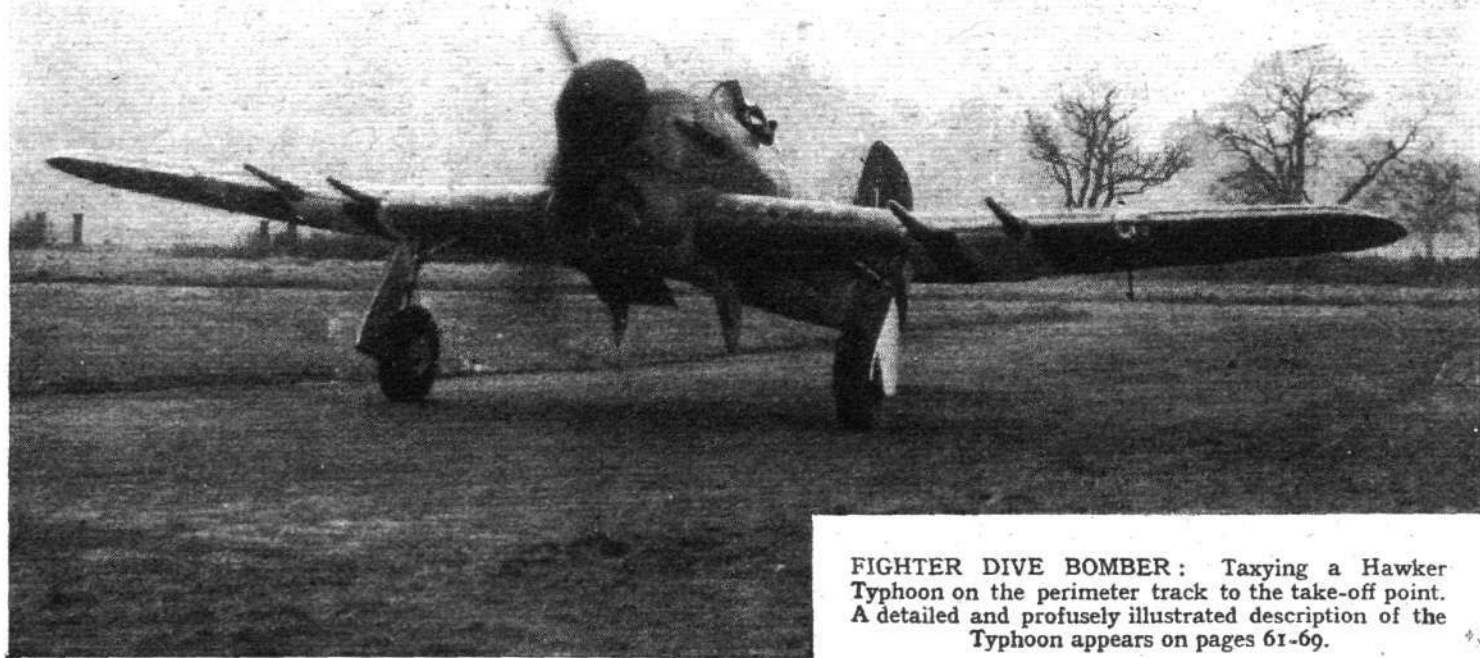
Despite the production of new types of fighter in both Britain and the United States, the improved versions of

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the Spitfire still hold their own wherever there has to be fighting for the command of the air. The naval version, the Seafire, is highly regarded, and its appearance on aircraft carriers shows that the R.A.F. is not short of the type. Moreover, in the conquest of Corsica a number of French pilots were equipped with Spitfires, again giving evidence that the R.A.F. can afford to spare some of them for our Allies. American squadrons are still flying Spitfires in Italy.

The latest appearance of Spitfires is in the fighting over Burma, where their arrival has been hailed with joy. We have been told by Admiral Halsey that of late Japanese aircraft have shown some improvement, though their pilots have on the whole deteriorated. For a long time past the Japanese have made little attempt to dispute the Allies' air superiority over Burma, but lately large numbers of them have ventured to take the air. The Spitfires had arrived in time, and they quickly showed their superiority to the Japanese fighters. They had done that before in the defence of Darwin, when the Japanese were raiding that port, but the performance of the yellow enemy's fighters has been improved since then. So has that of the Spitfire, which still rules the skies wherever it appears.



FIGHTER DIVE BOMBER: Taxying a Hawker Typhoon on the perimeter track to the take-off point. A detailed and profusely illustrated description of the Typhoon appears on pages 61-69.

Photo
News

A Coastal Command Fortress on an airfield in the Azores. With Newfoundland, Iceland and Great Britain, the Azores air bases complete the Atlantic U-boat box.

WAR in the AIR

Two Lines of Bombing Policy : Attack on Fighter Production and Attack on the Balkans : Sofia in Flames

TWO definite lines of bombing policy have lately become discernible. One is the singling out of German factories which make fighter aircraft, and these have been assailed by the Americans both from the area of the Mediterranean and from Great Britain. The other is a growing concentration on centres in the Balkans and the Aegean Sea. Both of these are additional to the Battle of Berlin and other more general bombing of production centres in Germany.

The raid on January 11th by U.S. Fortresses and Liberators on the Focke-Wulf factory at Oschersleben, the Junkers plant at Halberstadt, and the Messerschmitt works at Brunswick was carried out by 700 machines and was furiously attacked all the way by German fighters, whose pilots evidently knew what vital interests were at stake. The escort of American fighters kept with the raiders for a greater distance than ever before, but could not go the whole way. It would

seem from the first reports of losses on both sides that the escort fighters, with their long-range tanks, were not highly successful in holding the swarms of German fighters away from the bombers, though they fought hard so long as they were able to stay with the bombers. Over 60 of the heavy bombers did not return, while the losses of American fighters came out at less than half a dozen. These figures suggest that the problem of providing efficient escorts for bombing raids has not yet been satisfactorily solved.

Bombing Through Cloud

ON that raid some of the Americans used the new device for bombing blind through clouds, while others could see their targets clearly. Though the Americans have made public mention of the said device, while Bomber Command has maintained silence, it is obvious that British Pathfinders are no whit behind our Allies in the ability to find targets which are obscured by clouds. All the same,

nobody denies that it is an advantage to be able to see the target.

While the advancing Russian armies are beginning to think about crossing the frontier of Rumania—as they have crossed that of Poland—the Balkans have become the focus of Allied air attacks from both Italy and the Middle East. The latter Command, where Air Marshal Sir Keith Park has just succeeded Air Chief Marshal Sir Sholto Douglas, has been hammering away at Rhodes and the other Dodecanese Islands, while heavy bombers of the N.W. Africa Air Forces have been paying constant visits to the important airfields round Athens and the port of the Piræus, as well as crossing the Adriatic to bomb the Germans in Yugoslavia. The important railway centre of Sofia has also been subjected to a series of very heavy raids. On January 11th, while the U.S. Eighth Air Force was raiding the German fighter factories, Sofia also suffered severely. A correspondent there has reported that next day parts of the

WAR IN THE AIR

city were still under a sea of fire, and that the buildings damaged included the Parliament buildings, the Home Office, the G.P.O., and the main station. We should hardly imagine that Bulgarians are as clever as Germans at dealing with a situation of that sort, and the consequent dislocation must be felt far to the south. How comes it, we should like to know, that a country whose Capital is named "Wisdom" should twice be so very foolish in choosing its Allies in war?

These Balkan air raids must be keeping the German High Command guessing. The enemy is expecting an invasion somewhere in western or northern Europe, but he does not know where the landing will be made. The Germans must also be expecting another stroke at the "under-belly," and again they do not know where the blow will fall. There must be plenty of Allied troops in the Mediterranean area. Few people in this country know where the Seventh Army, which fought in Sicily, is waiting, but the Germans probably know. But they must still be wondering whether Sir Henry Maitland-Wilson will strike at South France or at the Balkans or both. The bombing of the Balkans may be a preparation or a feint. In either case it is having good results in helping the patriot risings.

Japanese Airmen

ADMIRAL HALSEY, who commands the American naval forces in the South Pacific, has made a statement that of late Japanese aircraft



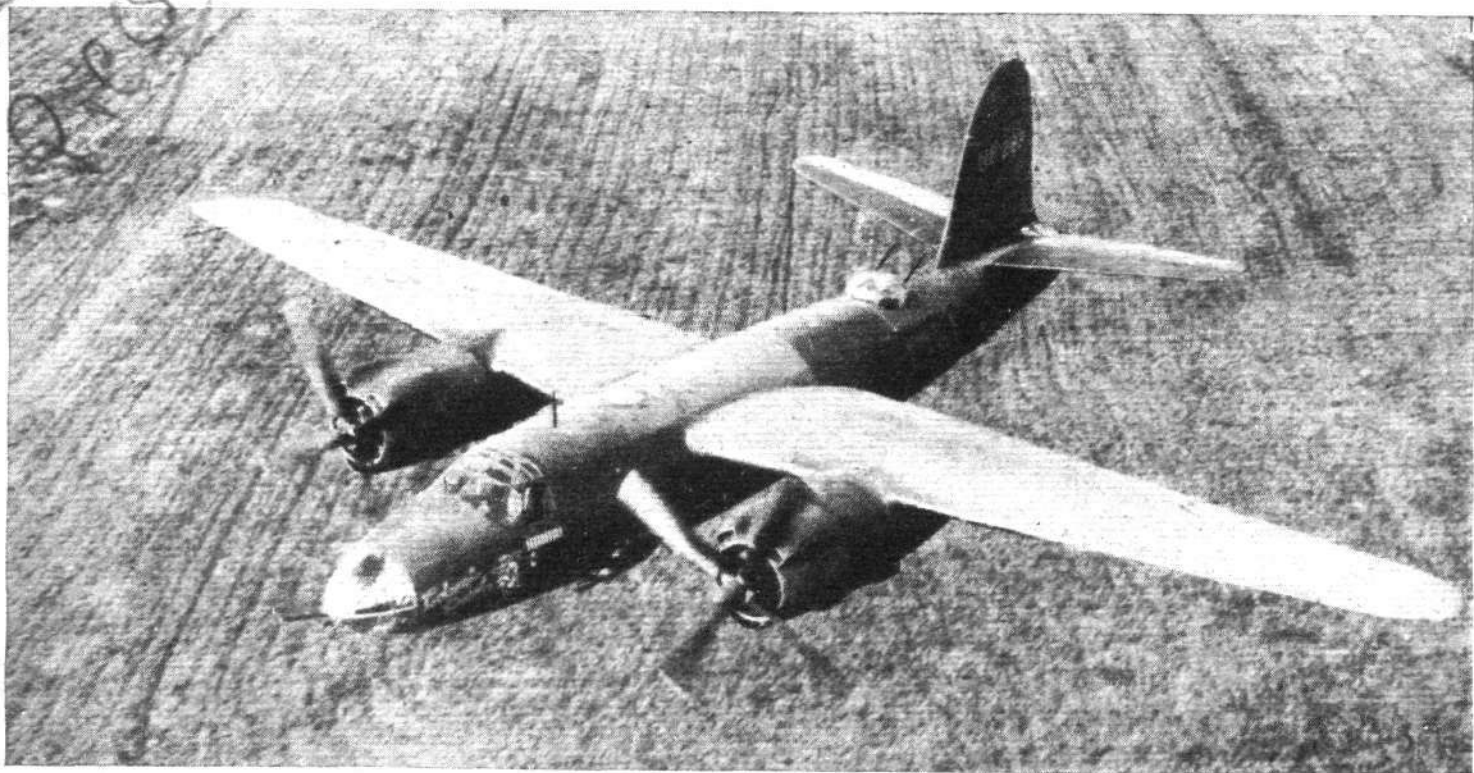
COUNCIL OF AIR WAR : (Left to right) ; Air Chief Marshal Sir Arthur Tedder, Air Vice-Marshal H. Broadhurst (back to camera), Marshal of the R.A.F. Sir Charles Portal and Air Marshal Sir Arthur Coningham conferring together on a forward airfield in Italy. In the background is a bomber Mosquito.

seem to have improved, but that Japanese pilots have deteriorated. The U.S. Navy, with its air arm, has lately been playing an increasing part in the offensive in the Pacific. Destroyers have been very active in shelling Japanese positions on many of the islands, and, of course, the Marines who seized Cape Gloucester are part of the U.S. Navy. Naval aircraft have also been to the fore, and recently nearly 200 of them raided Rabaul.

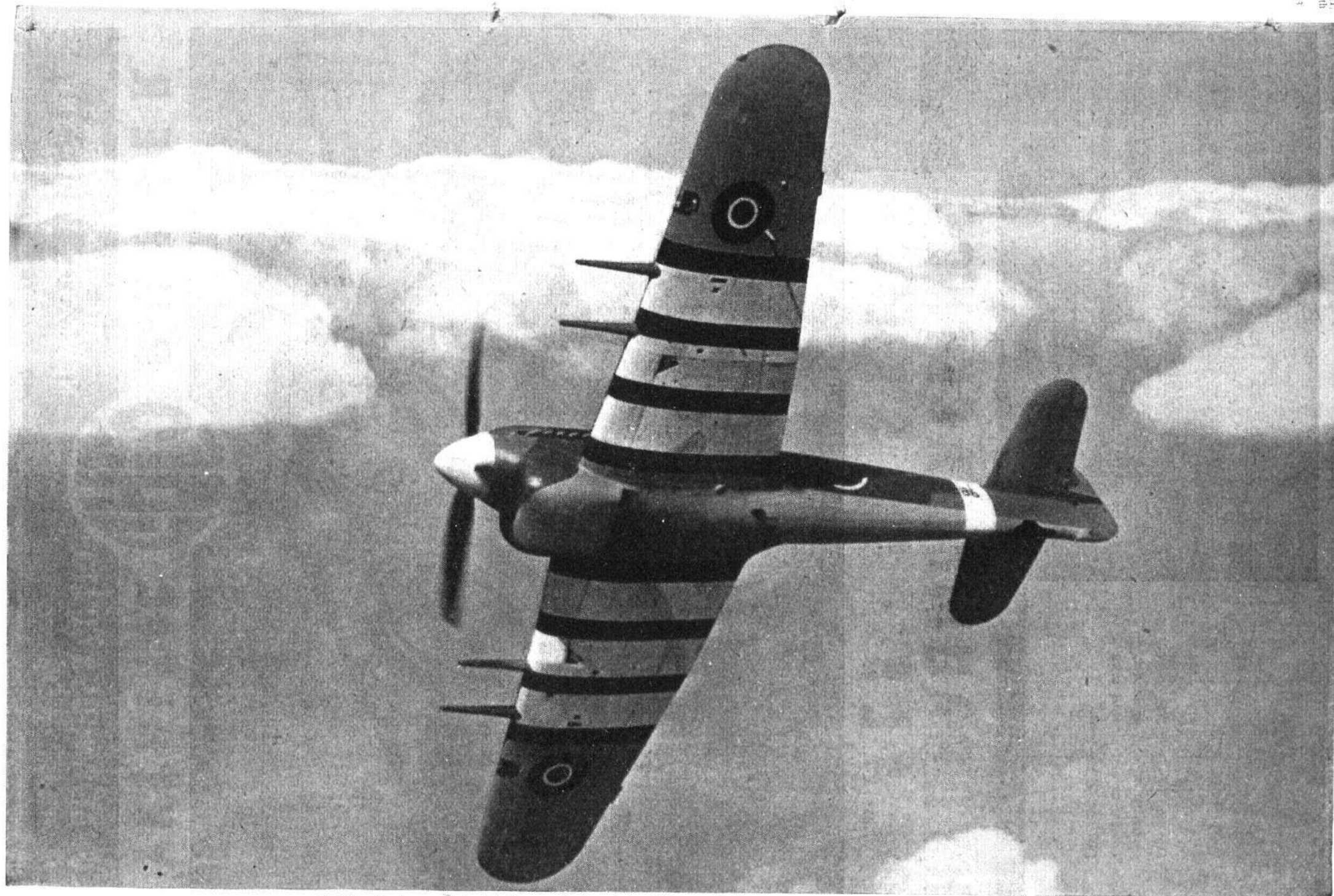
Evidently the time is not yet considered ripe for a full-scale attack on

Burma. One had hoped that the removal of all fears about the French and Italian warships in the Mediterranean would have enabled the Allies to assert complete mastery of the Bay of Bengal, and so make possible what must be an amphibious operation. But though there may be sufficient warships for the purpose, there may not be enough transports and landing craft available until after the invasion of Europe has become an accomplished fact.

Still, the Army from India has made some small but gratifying advances,



AT ZERO FEET : A Marauder coming in to land at an airfield in Great Britain after an operational trip over enemy occupied country.



Hawker Typhoon—Britain's fastest single engine fighter. Highly manœuvrable and armed with either four 20 mm. cannon or twelve 0.303 machine guns, it is the most formidable fighter in the world to-day

[Advt.]

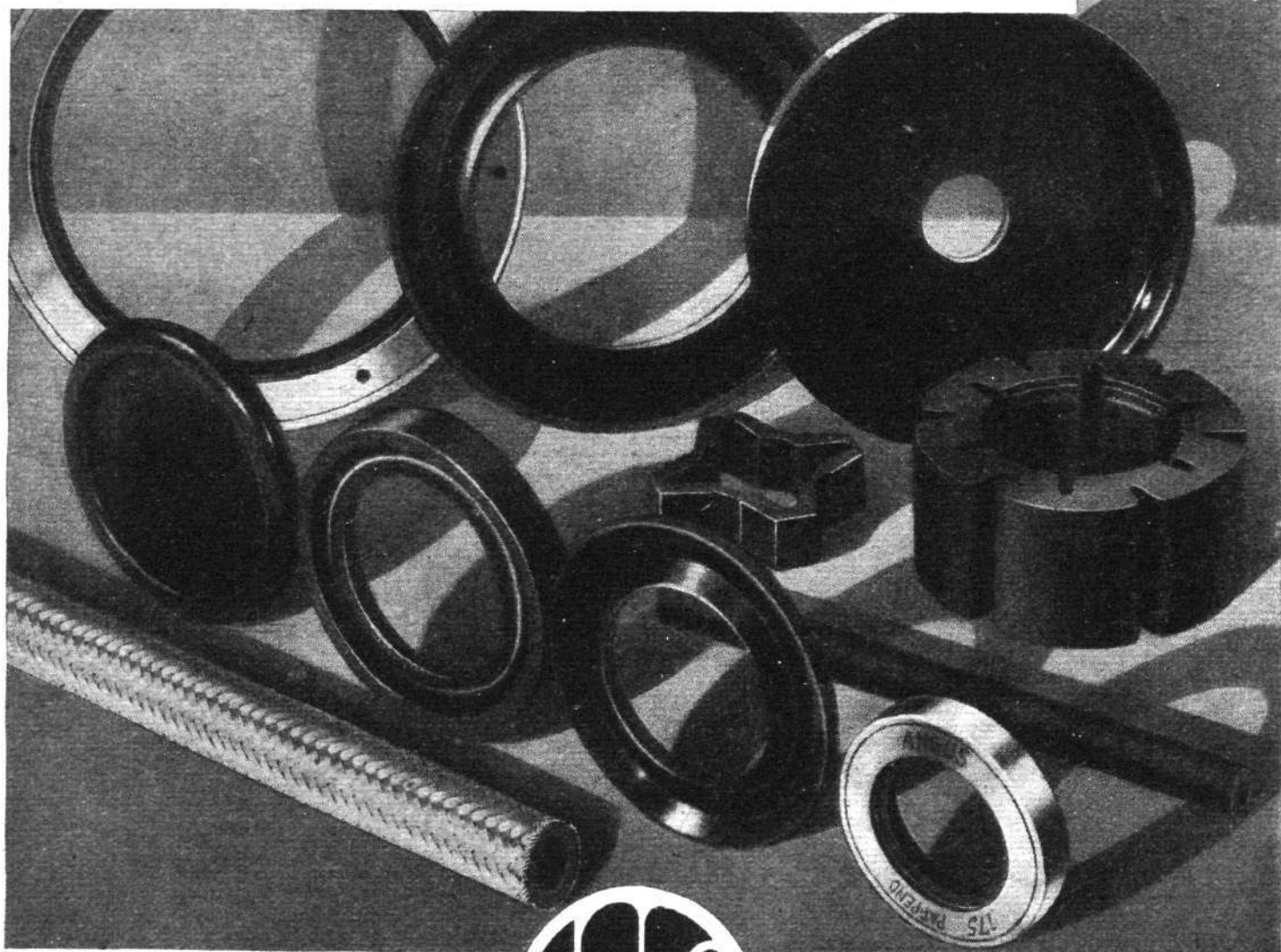
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WAR IN THE AIR

ENEMY AIR LOSSES TO JAN. 15th				
	Over G.B.	Continent	Middle East	N.W. Africa
Jan. 9 ...	0	0	0	1
" 10 ...	0	2	0	9
" 11 ...	0	0	0	11
" 12 ...	0	0	0	2
" 13 ...	1	8	0	29
" 14 ...	0	6	0	4
" 15 ...	1	0	0	0
	2	16	0	56
Totals : West, 7,872 ; Middle East, over 5,760 ; North-West Africa 3,973.				

and the aircraft continue to harry traffic on the Irrawadi and other rivers, while a contingent of West African troops, who are said to be natural jungle-fighters, has arrived.

Another, and a particularly welcome, accession to Allied strength in India consist of Spitfires. Though our airmen have suffered few losses from enemy action, still the improvement in Japanese aircraft which Admiral Halsey mentioned must be taken into account. Spitfires in sufficient numbers will give the Allies undoubted mastery of the air, and that is a necessary preliminary to all forward movement.

Rubbing It In

SOMETIMES the tactics of bombing demand that a target shall be given a rest after a heavy attack, to give the industrious Germans a chance of expending man-power and time on repairs, which are then wasted when the second visitation comes. On other occasions it is deemed advisable to let off the second barrel as promptly as possible after the first. The reasons for such different treatment cannot usually be known to the public, but they are doubtless sufficient.

Brunswick has been judged a case for a left and right from the Allied twelve-bore—to use a shooting metaphor. The Americans had



SERVING ITS TIME : Manhandling a Vickers Walrus in northern Australia. The Walrus first went to Australia as the Seagull V in 1937. An earlier, wooden version of the amphibian was bought by Australia in 1926.

bombed it by day, so the next thing was for Bomber Command to hit it by night. Ringing the changes is now one of the cardinal maxims of bombing policy. So on Friday night last week hundreds of Lancasters set off with the intention of flattening out any sections of the Messerschmitt works which had escaped the daylight bombing of the Americans.

The staff of Bomber Command has in recent months shown itself to have become expert in two other features of bombing tactics, namely, in foxing the enemy, by feint attacks, and by letting go a tremendous number and weight of bombs in a space of time which not long ago would have seemed fantastically short. In this case the Command's freedom of action was limited by the time of the moon's rising, and therefore the duration of the attack had to be reduced to the shortest possible time.

Not very long ago it was noted with approbation that the duration of a heavy bombing attack had been reduced from one hour to 50 minutes.

BRITISH & U.S. AIR LOSSES TO JAN. 15th

	Over G.B. A'cft.	Continent B'brs. F'ters.	Middle East A'cft.	N.W. Africa A'cft.
Jan. 9	0	0	1	1
10	0	0	3	3
11	0	59	5	7
12	0	0	0	3
13	0	1	1	5
14	0	44	10	5
15	0	0	0	2
	0	104	20	26

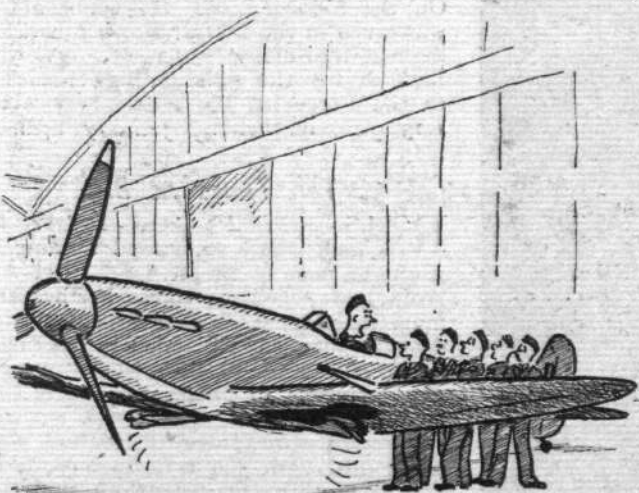
Totals : West, 9,250 ; Middle East, about 2,345 ; North-West Africa, 1,511.

Since then half an hour has become quite usual. But last Friday the whole business was got through in no more than 23 minutes, although in that time no less than 2,000 tons of bombs were released from the racks of the Lancasters. The first of them fell at 7.10 p.m. They continued to fall at an average rate of 90 tons a minute, and at the peak they were going down at a rate of 150 tons a minute. As a consequence, the bombers were well on their way home before moonrise.

Those of our readers who remember the last war will recollect how, in the days of Zeppelin raids, clear nights set hearts beating faster, and murky darkness was welcomed. Now things have changed, and clear weather is regarded as favouring the defence, while modern inventions have enabled the attack to defy clouds and fog.

On Friday night the German fighters, who had been depleted by the guns of the Fortresses and Liberators, and who had been driven by that great daylight raid to bring into action reserves which they would sooner have held back, were once again misled by diversionary attacks. Mosquitoes flew to Berlin and Magdeburg, and by doing so drew off a number of the German defenders. They were in action along the route, but they evidently could not make up their minds which way the real attack would go. The German rule seems to be: "When in doubt, defend Berlin." So numbers of them made for the capital, and spent what was probably an unprofitable time in hunting the speedy Mosquitoes. In consequence, most of them were late in getting to Brunswick. They used red and white flares to light up the route, and they made free use of rocket missiles, but they did not prevent the Lancasters from hitting a tremendous blow at Brunswick. All things considered, the loss of 38 bombers from all the operations of the night was a moderate price.

At the same time, far away in Russia, the shortage of German fighters has given the Stormoviks something like a free hand in helping the soldiers to gain their remarkable victories. The very modesty of the Russian claims of enemy aircraft destroyed shows that the air opposition there is far from formidable. In fact, the Germans are in a cleft stick, and their only guiding principle for using fighters is to defend Berlin.



"... and this is the undercarriage control."

HERE AND THERE

Civic Honour

LEAMINGTON Town Council have invited Group Capt. Frank Whittle, inventor of the jet propelled aircraft, to accept the Freedom of the Borough of Leamington. Group Capt. Whittle was educated at Leamington College.

To Join R.Ae.C. Committee

CAPTAIN K. J. G. BARTLETT and Colonel W. G. Devereux have been elected to fill vacancies on the committee of the Royal Aero Club.

R.A.F. Speaker

AIR VICE-MARSHAL SIR HAZELTON NICHOLL, C.B., C.B.E., will be the speaker at the Institute of Transport luncheon, to be held on Friday, February 4th.

From Malta to M.E.

AIR VICE-MARSHAL SIR KEITH PARK, Air Officer Commanding at Malta, is to succeed Air Chief Marshal Sir Sholto Douglas as Air Officer Commanding-in-Chief, Middle East.

Guild of Air Pilots

THE 14th annual general meeting of the Guild of Air Pilots will be held at the offices of the Royal Aeronautical Society, 4, Hamilton Place, W.1, on Friday, February 4th, at 3 p.m. Arrangements for a members' dinner in the evening are in hand.

Will those proposing to attend meeting and dinner communicate with the clerk at 61, Cheapside, E.C.2, as owing to changes of address the Guild's register is not in every case accurate. Tickets for the dinner can also be obtained at this address, or at the British Airline Pilots' Association at 7, Park Lane, W.1.

Lancs' Atlantic Record

A NEW flight record between Montreal and Great Britain was set up last week by two Lancasters carrying mail for Canadian troops overseas.

One aircraft made the journey in 11 hr. 14 min. and the other landed just two minutes later.

The previous record was 11 hr. 35 min.

New "Automotive" Directors

THREE new directors have been appointed to the board of the Lockheed Hydraulic Brake Co., Ltd., an associate company of the Automotive Products Co., Ltd.

They are Mr. Norman Spurgeon, Mr. A. C. Burdon and Mr. E. W. Swales.

Mr. Spurgeon has been secretary of the companies almost since their inception and has served them for more than 21 years. Mr. Burdon is the general manager and has put in 15 years' service, while Mr. Swales has been mainly responsible for building up their aircraft equipment production.

A Tale of Two Airports

SCHEMES for combined land and sea airports to serve post-war civil aviation have been put forward by both Southampton and Portsmouth, the former by the harbour board and the latter by the city council, and a paragraph in the brochure recently issued by Southampton Harbour Board indicates that these two schemes are likely to find themselves somewhat competitive.

"The distance from Southampton and Portsmouth is short and suitable labour could be obtained from these areas," says this paragraph, clearly indicating that the Southampton Harbour Board regards its own scheme as capable of satisfying Portsmouth's requirements too. But as part of the land required by Southampton for its own airport happens to be



General Sosnowski (right), C-in-C. of the Polish armed forces, about to board an aircraft of R.A.F. Transport Command in the Middle East. With him is Air Comdre. Whitney Straight.

under the jurisdiction of the City of Portsmouth Planning Authority, a decidedly intriguing situation immediately presents itself.

Both projected schemes will be briefly described in next week's issue of *Flight*.

Broadcasts on the Jet Job

IN addition to the broadcasts on the subject of jet propulsion over the Canadian B.C. and Trans-Canadian Network, mentioned last week, Mr. Geoffrey Smith broadcast a full-length commentary in the B.B.C. Overseas South Pacific Service at 8.45 a.m. on Thursday last, which was repeated during the day. On the following day the commentary was given in the B.B.C. North American Service, and many readers of *Flight* will have heard the culminating broadcast to the Forces in the Home Service at 1.15 p.m. on Friday, January 14th.

Ten Times as Big

ROLLS-ROYCE Aero-Instruction School, where specialised training is given to men of the R.A.F., Fleet Air Arm, and Allied air forces in the running, maintenance, and overhaul of aircraft engines, has expanded to ten times its original strength since it was opened five years ago in collaboration with the Air Ministry.

Starting with three instructors who could deal with 500 trainees a year, it now has nearly 30 instructors, and the annual intake of trainees has risen to 5,000.

Altogether more than 10,000 trainees have passed through the school, which it is hoped to carry on after the war in modified form.



GOOD JUDGE: Nearly 100 model aircraft made by cadets formed an interesting show at the "A.T.C. Calling" exhibition recently held in a West End store. Sir Frederick Handley Page and Air Chief Marshal Sir William Mitchell, the Corps' London Commandant, acted as judges.

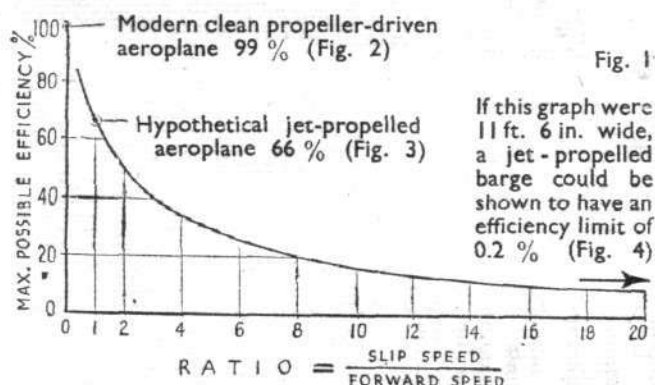
EVEN I CAN UNDERSTAND—16.

Q. What are the principal features of jet propulsion?

A. In the past few years there have appeared many descriptions of inventors' ideas or apparatus for making use of jet propulsion for aircraft, or perhaps it would be more correct to say for eliminating the ordinary propeller where it has already been shown that forward thrust in fluid-borne vehicles is obtained by throwing stuff (generally some of the fluid) backwards. Whether this is done by means of a propeller or a gas turbine (as proposed in these inventions) makes no difference in kind so far as the propulsion is concerned. It makes a difference only in the quantities involved, the efficiency obtainable, and so on.

It has already been said (No. 11 of this series of articles) that a better efficiency is got by squirting back a large mass of air slowly than a small mass quickly—remembering that the same thrust (mass \times velocity) can be obtained either way. It merely costs more in power to get the thrust from the small mass thrown back at high speed.

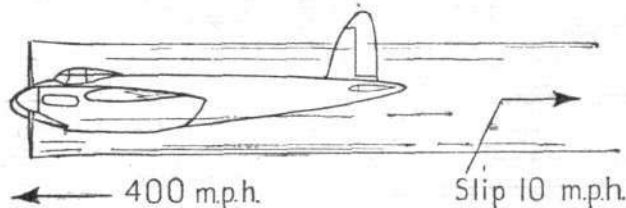
Talking of "high" and "low" speeds is good enough only for comparative purposes, but it must be explained what is meant by such terms. Is 15 m.p.h. a high or a low speed? It would be very high indeed for the slipstream of a marine propeller, but very low for that of a jet-propelled aircraft. The first thing is to fix a datum and a good one to take is the speed of the vehicle through the fluid. Using this, one can say that the efficiency of propulsion is limited by the ratio of the speed of the slipstream to the speed of the vehicle, both relative to the fluid, and thereby put a measure on "high" and "low." Thus the higher is the forward speed of the vehicle through the fluid in relation to the backward speed of its slipstream through the fluid the higher the efficiency. The limiting efficiency of propulsion may in fact be denoted by $\frac{2}{2+R}$ where R is the ratio of the speed of the slipstream backwards through the fluid to the speed of the vehicle forward through the fluid. A graph can thus be made, Fig. 1, which shows how the maximum possible efficiency of propulsion depends on this ratio.



An aeroplane making use of jet propulsion (taking this to mean a concentrated high-speed jet of air) must be very fast if it is to make good use of its jet. A modern aeroplane with propellers, with a very high limit to its efficiency—something like 99 per cent.—might be going 40 times as fast

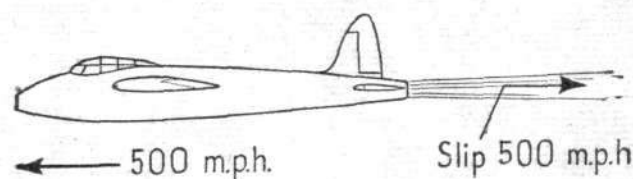
as its slipstream, Fig. 2. If a jet be imagined propelling an aeroplane at 500 m.p.h., Fig. 3, by ejecting air at 1,000 m.p.h. (i.e., 500 m.p.h. relative to the air) the ratio R is 1.0 and the limiting efficiency 66 per cent. This is rather low because the aeroplane is not going any faster than its slipstream. It is evident that very low drag and high speed are needed to get a good return from jet propulsion and bring it somewhere near the best end of the graph, Fig. 1.

Fig. 2—Modern clean propeller-driven aeroplane



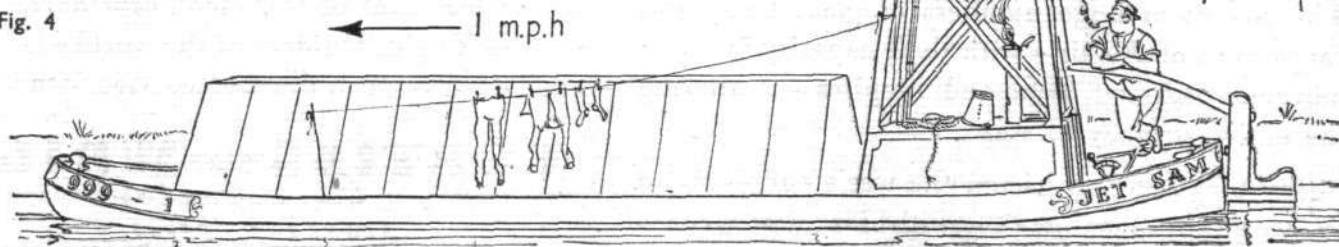
To go to the other extreme one might picture a canal barge, Fig. 4, being propelled at 1 m.p.h. by the thousand-miles-an-hour air jet. Here $R = \frac{999}{1}$ and efficiency = $\frac{2}{1001} = 0.002 = 0.2$ per cent. Not good.

Fig. 3—Hypothetical jet-driven aeroplane



A word of warning is necessary about the term efficiency as used above. Account is taken only of the fluid that is successfully projected straight back—none is taken of eddies, noise, air motions other than straight back, or heat thrown away in the jet or for that matter the ordinary engine exhaust. The business of making the jet may be quite a wasteful one. It is important to realise that the efficiency as defined above is not necessarily attainable. It is merely the limit beyond which it is impossible to go however economically the jet or slipstream is produced, unless the ratio of slip speed to forward speed can be reduced.

Fig. 4



This is one of a series of articles on technicalities sponsored by The de Havilland Aircraft Co., Ltd., in the belief that they will prove of interest and use to students and others in the Services and the aircraft industry.



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The Hawker Typhoon

Again the Hawker Designers "Pull One Out of the Bag" : Deceptive Appearance Disguises High Aerodynamic Efficiency

By C. M. POULSEN

Illustrated by
"Flight" Copyright Sketches
and Photographs

Mark 1A and 1B

2,200 h.p. Napier Sabre :
de Havilland Hydromatic
Airscrew

DIMENSIONS

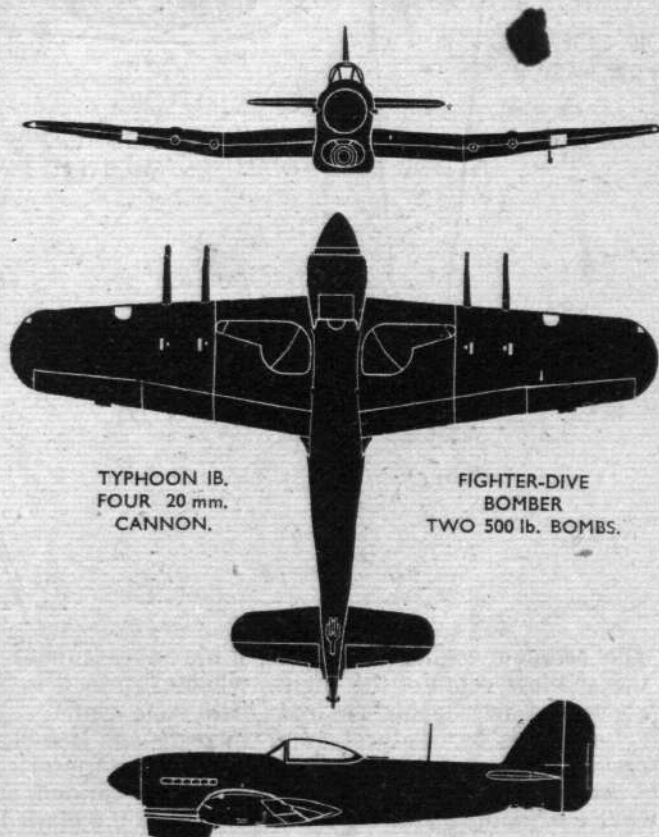
	ft.	in.
Length o.a. ..	31	11
Wing span ..	41	7
Tailplane span ..	13	0
Main planes (gross) ..	279.00	sq. ft.

INCREDIBLE as it seems, the Hawker Typhoon was designed in 1937. When one looks at the Mark 1B with its four Hispano cannon in the wings, it is difficult to carry one's mind back to the circumstances of those days, and to visualise the relative uncertainty with which the designers must have had to contend. For one thing, the Hispano cannon had not at that time been fully developed and proved in this country, and in any case there must have been considerable doubt as to which would be more likely to provide the best answer, four 20 mm. cannon or twelve machine guns. The Typhoon was designed for both alternatives (the 12-gun variant being known as the Mark 1A).

That, however, was not the only difficulty. Even more serious was the fact that at that time the Napier Sabre engine was a somewhat speculative proposition. It promised well, judging from preliminary test results, but it was far from being thoroughly developed and fully tried. At about the same time the Rolls-Royce Vulture engine was coming along, and Mr. Sydney Camm and his team had for a great many years produced extremely successful aircraft types powered by Rolls-Royce engines. It was therefore considered prudent to have a design for the Vulture in addition to that for the Sabre, and the Tornado was the result.

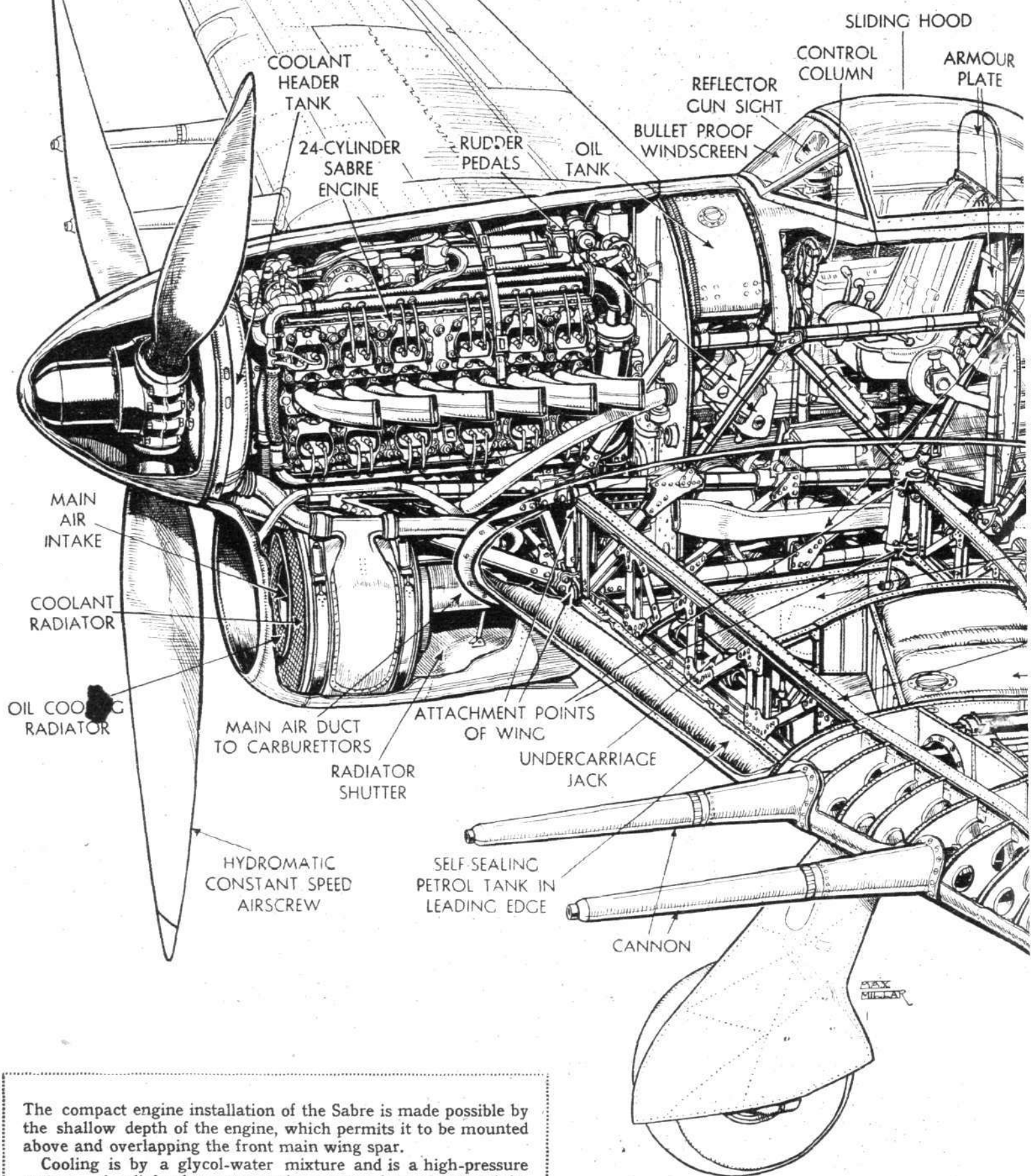
Readers will remember that the authorities decided to proceed with one of these engines only, the Sabre ; consequently, the Tornado was not put into production, and further work was confined to the Typhoon. We quote these facts in order to illustrate some of the difficulties with which the Hawker design office was beset at that time. Apart from the Tornado and Typhoon, there were several other types going through at the same time, including the Hurricane main type, sub-types and variations.

The surprising thing is that, in spite of these various handicaps, the machine was designed and a few "hand-made" specimens



The Hawkei

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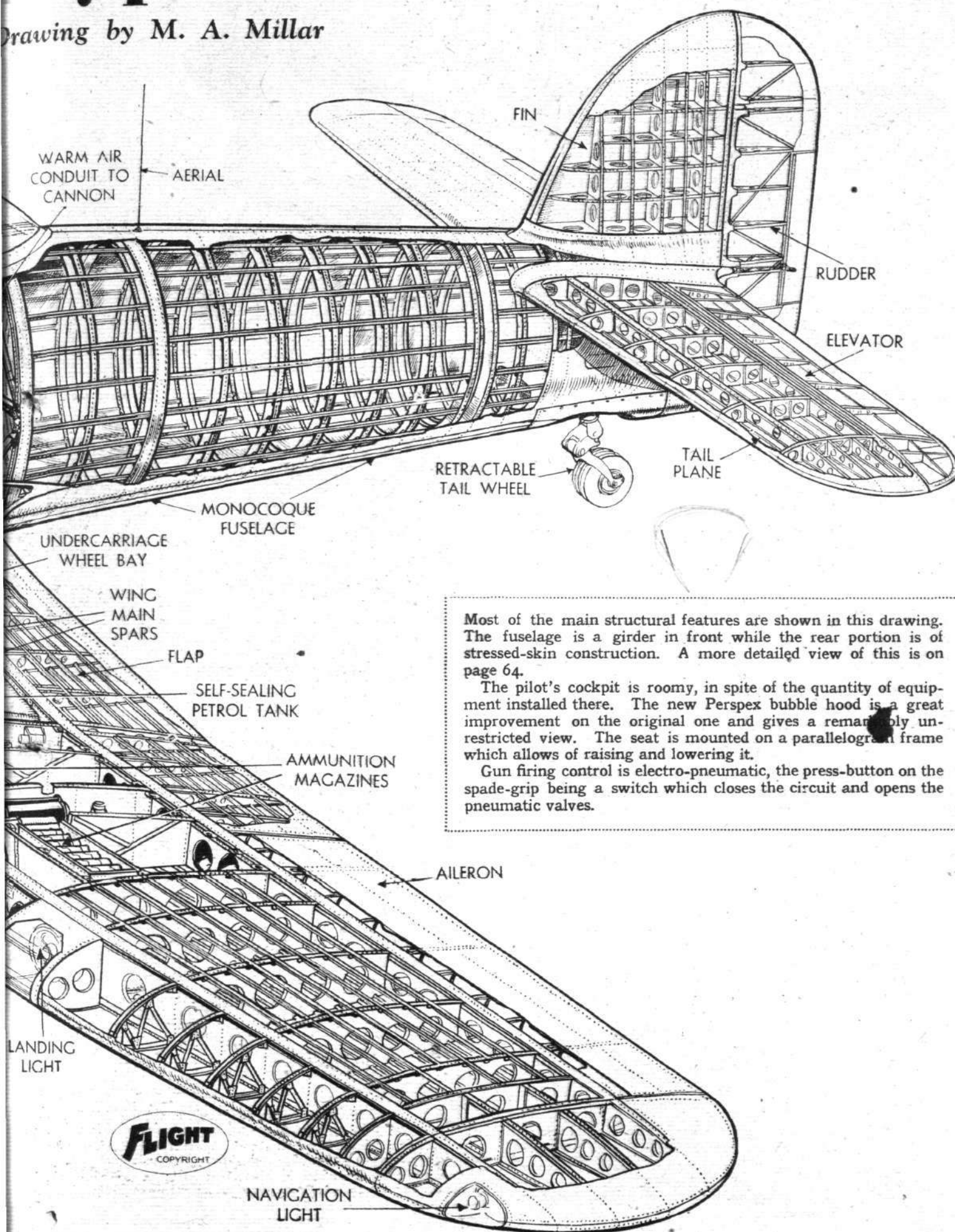
The compact engine installation of the Sabre is made possible by the shallow depth of the engine, which permits it to be mounted above and overlapping the front main wing spar.

Cooling is by a glycol-water mixture and is a high-pressure system. A relief valve prevents the pressure from rising unduly.

Armament comprises either four 20 mm. cannon, as above, or twelve 0.303in. Browning machine guns as the Mark IA.

Typhoon

Drawing by M. A. Millar



Most of the main structural features are shown in this drawing. The fuselage is a girder in front while the rear portion is of stressed-skin construction. A more detailed view of this is on page 64.

The pilot's cockpit is roomy, in spite of the quantity of equipment installed there. The new Perspex bubble hood is a great improvement on the original one and gives a remarkably unrestricted view. The seat is mounted on a parallelogram frame which allows of raising and lowering it.

Gun firing control is electro-pneumatic, the press-button on the spade-grip being a switch which closes the circuit and opens the pneumatic valves.

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THE HAWKER TYPHOON



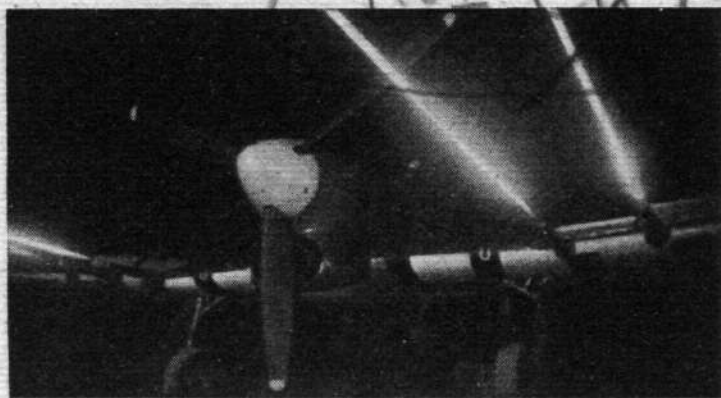
With the 2,200 h.p. Napier Sabre engine running, the "cleanness" of the nose become more apparent. The exhaust stubs each serve an upper and lower cylinder.

built. That the type was so long in going into production and into operational service was due to many causes. The Sabre had its "teething troubles," a fact which is scarcely surprising in view of its many original features. At one time (there is no harm in stating it now) it even began to look as if there might be a serious situation developing, with no powerfully armed single-engined fighter to supplement and ultimately supplant the Hurricane and Spitfire.

Aerodynamic Efficiency

One very surprising thing about the Typhoon is that, although it does not impress one on first sight as being a pretty aircraft, it is actually very efficient aerodynamically. Two things combine to disguise this efficiency: the very thick wings and the radiator under the nose. The former were chosen partly to house the Hispano cannon and partly to make sure of affording room for the large wheels. The radiator fairing houses a combined oil and coolant radiator, and is unsightly, but evidently offers far less drag than one would expect from looking at it. Careful tests and analyses, based on known performances and engine powers, indicate that actually the Typhoon has less drag than the Hurricane and not much more than that of the cleanest Spitfire. This in spite of its considerably greater size. Actual performance figures cannot be quoted, and, anyway, they would not be immediately comparable on account of the differences in engine powers and loaded weights. The comparison is on a basis of drag at 100ft./sec.

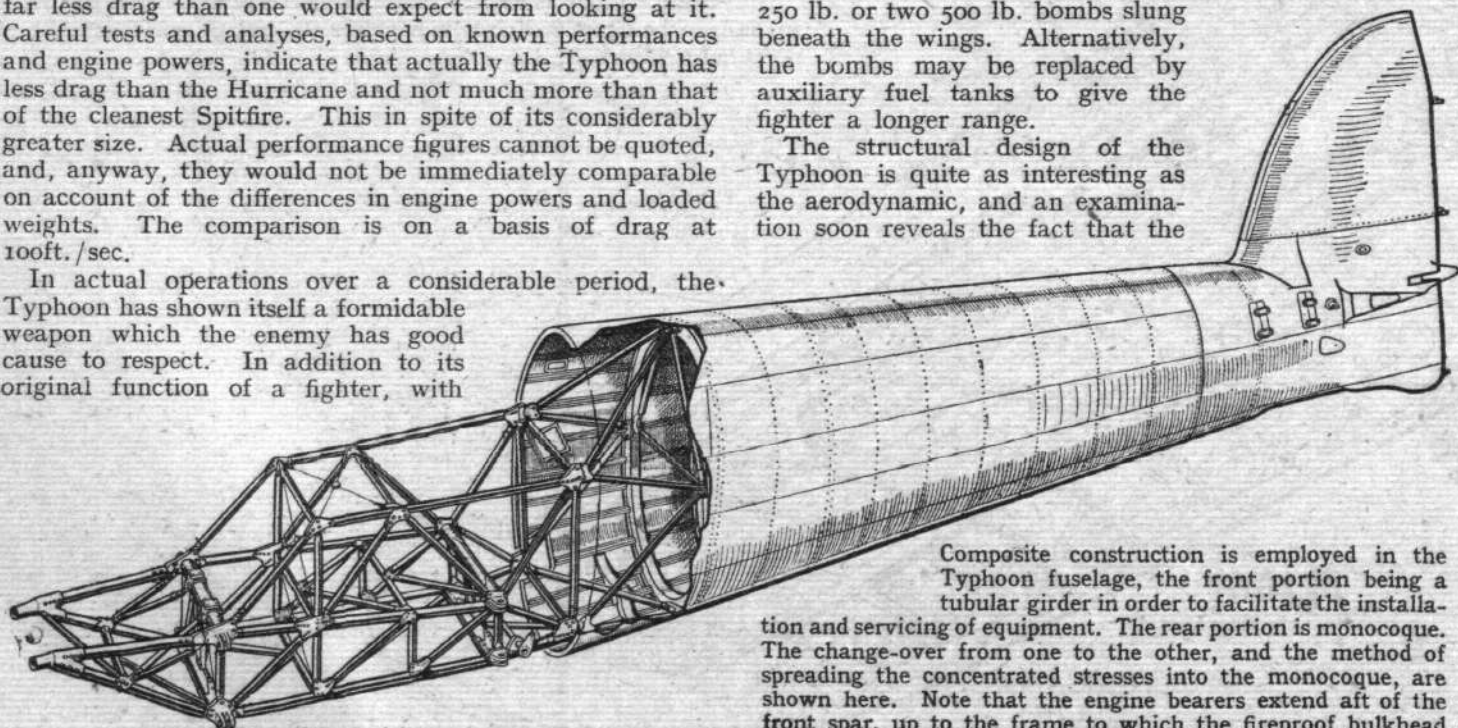
In actual operations over a considerable period, the Typhoon has shown itself a formidable weapon which the enemy has good cause to respect. In addition to its original function of a fighter, with



A demonstration of the muzzle horse power of a Typhoon firing into the stop butts at night.

either the twelve Browning guns or with the four cannon, it has won fame as a fighter-bomber, with either two 250 lb. or two 500 lb. bombs slung beneath the wings. Alternatively, the bombs may be replaced by auxiliary fuel tanks to give the fighter a longer range.

The structural design of the Typhoon is quite as interesting as the aerodynamic, and an examination soon reveals the fact that the



Composite construction is employed in the Typhoon fuselage, the front portion being a tubular girder in order to facilitate the installation and servicing of equipment. The rear portion is monocoque. The change-over from one to the other, and the method of spreading the concentrated stresses into the monocoque, are shown here. Note that the engine bearers extend aft of the front spar, up to the frame to which the fireproof bulkhead is attached.

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THE HAWKER TYPHOON

Hawker designers are not "wedded" to any one system of construction. Rather does one form the impression that any particular component part of the primary structure is of the type of construction best suited to its special function. There is thus what might appear superficially to be an apparent lack of homogeneity in the structure, but always, if one looks deep enough, there is a very good reason for every change in structural methods.

No better example of such design considerations could be found than the fuselage. The front portion, from engine bulkhead to behind the pilot, is of girder construction, while the rear portion of the fuselage is a stressed-skin shell with flush riveting and a smooth surface. Even the front portion, when covered, is as nearly smooth as possible, although some slight roughness is inevitably introduced by the removable panels which give access to the maze of equipment stowed inside.

Fuselage Accessibility

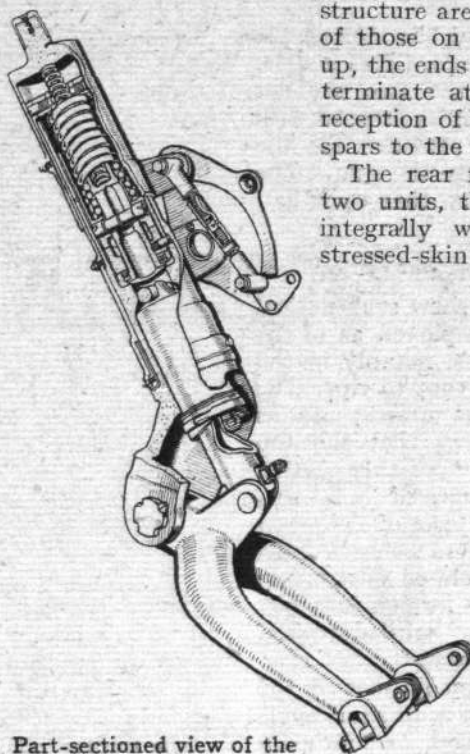
From the aerodynamic point of view the ideal would probably be stressed-skin construction throughout, but there are very excellent reasons for not using it in the front part of the fuselage, where all, or nearly all, the equipment is located. In an aircraft of the size of the Typhoon it would be well-nigh impossible to install all the "plumbing." There simply would not be room for the men to move. It might be argued that one of the several forms of "split" construction used in larger aircraft types would get over this difficulty. While that is probably true to some extent, during the process of manufacture and assembly in the shops there is the subsequent service life of the aircraft to be considered. Any defect in a piece of equipment, either through breakdown or through enemy action, would be exceedingly difficult, not to say impossible, to put right because of the inaccessibility of the part in question. Doubtless it was such considerations that led the designers to choose girder construction for the front part of the fuselage and to cover it, when all equipment has been installed, with sheet metal panels, some fixed and others detachable. During installation of equipment the men can reach through the girder work from the outside, and in service there is access by removing the detachable panels.

Use is made in the primary structure of the front part of the fuselage of steel and light-alloy tubes, some of cir-

cular section with flats formed where other structure members are attached to them (in the time-honoured Hawker way), and some of square section with rounded corners. The Typhoon is no light aircraft (the loaded weight goes up to somewhere in the neighbourhood of 12,000 lb. when two 500 lb. bombs are carried), and consequently the concentration of stresses in this part of the fuselage is considerable. Some of the main tubes of the structure are of about 3 in. diameter, and in the case of those on which the wing spar attachments pick up, the ends are housed in even larger forgings which terminate at their outer ends in fork ends for the reception of the tapered bolts which secure the wing spars to the fuselage.

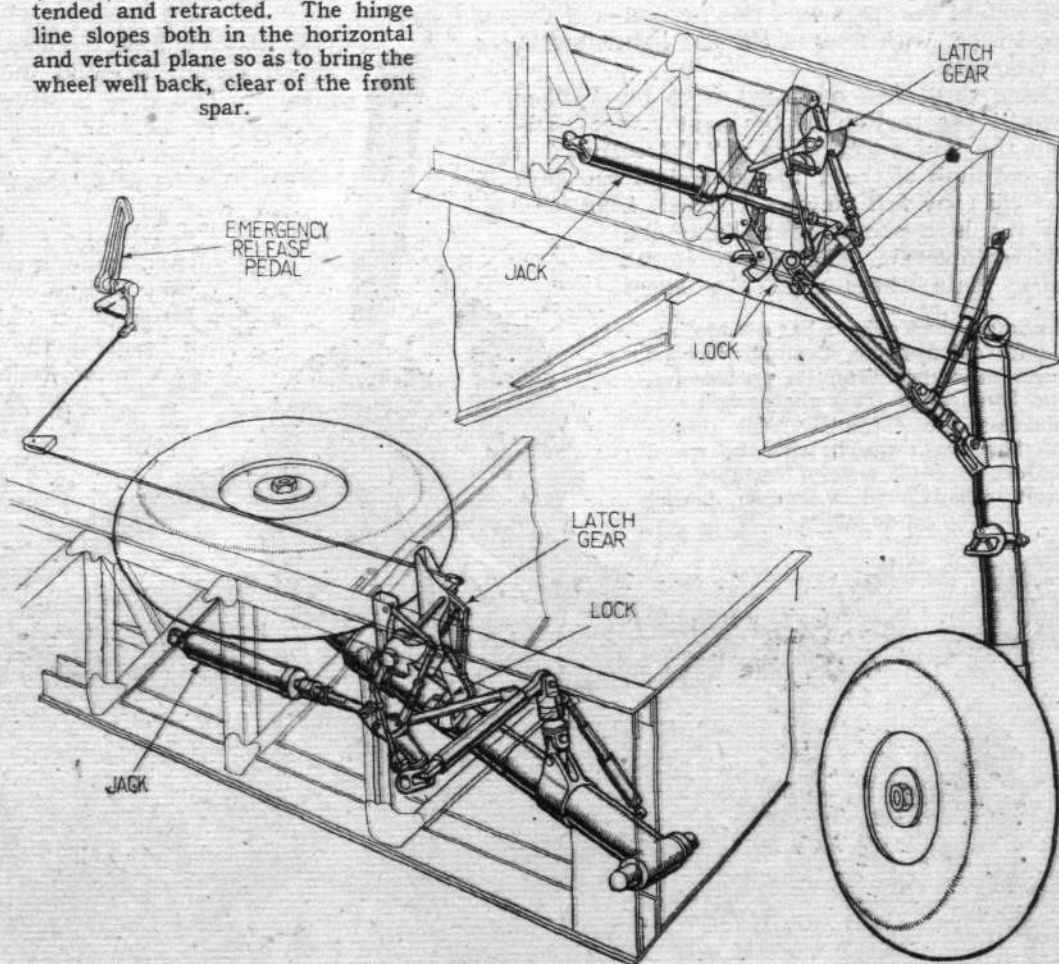
The rear fuselage portion (it is actually built in two units, the rearmost of which has the fin built integrally with it) is, as already mentioned, of stressed-skin construction. The main frames are of box section, with channel-section walls, a covering strip on the inside, and the skin forming the covering on the outside of the frame. Light intermediate frames are of "figure 2" section, with the foot of the "2" riveted to the skin. The stringers are of "rounded vee" section and are notched into the frames. An exception to this scheme is found in the main frame by which the concentrated loads from the girder portion are spread into the shell of the rear portion. This frame is not notched, the stringers being cut here.

A system of triangulating tubes, secured at their rear ends to points on the main monocoque frame, converges on four points, which pick up on the



(Above) Part-sectioned view of the Dowty tail-wheel strut.

(Below) The undercarriage extended and retracted. The hinge line slopes both in the horizontal and vertical plane so as to bring the wheel well back, clear of the front spar.



THE HAWKER TYPHOON

girder structure of the front portion of the fuselage. The main monocoque frame is situated some distance aft of the actual joint between the coverings of front and rear fuselage portions, and is in fact the beginning of the actual monocoque structure, the skin between it and the front portion being merely a fairing. In other words, the joint in the skin and that of the stress-bearing structure are separated by a fore-and-aft distance of a couple of feet or so.

Mention has been made of the fact that the monocoque portion of the fuselage is made in two units. This is done purely for ease of manufacture, and the two are not readily detached from each other. The fin is integral with the rear unit, and pick-up points are provided for the tailplane in the form of fittings external to the skin. The tailplane, by the way, is symmetrical, so that each half can be mounted on either side.

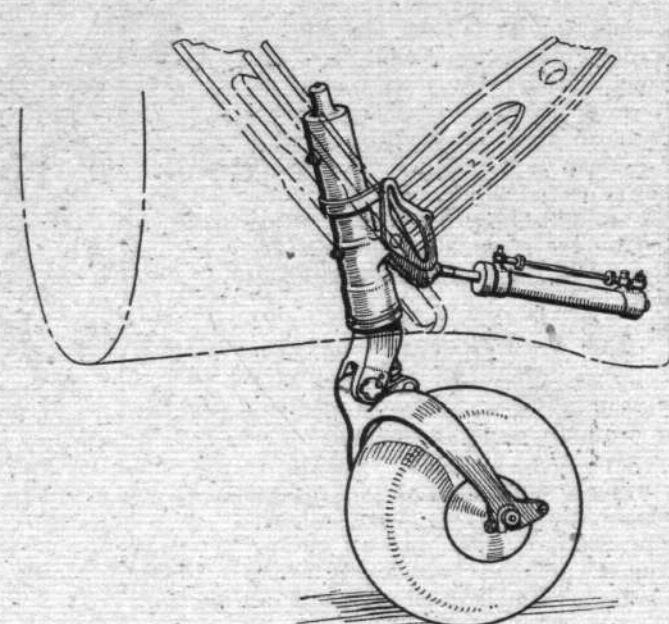
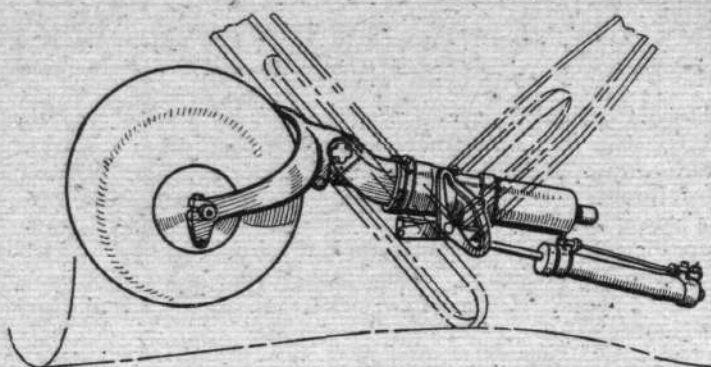
Wing Structure

Although the wing structure does not show such radical changes in the forms of construction employed as is the case with the fuselage, there are changes, notably in the spar construction, as one traces it from root to tip. The inner portion of the wing has a flat under surface, and, as the wing tapers in thickness, this means that the top surface has a negative dihedral angle. Over this portion of the wing the spars have extruded flanges of "pi" section. The web has struts and ties in the form of a Warren girder, the vertical and diagonal members being formed of two spaced channel sections with their closed sides facing outwards. The more highly stressed are formed into box sections by flat plates, while the more lightly stressed merely have small spacing plates at intervals.

The Warren girder form of construction finishes at the point where the outer wing portions form a dihedral angle with the inner, but the "pi" section flanges are continued outwards for another three feet or so, although the section is, of course, interrupted where the break in the line occurs. The web of the spars over this portion is of the solid sheet-metal type, with flanged circular lightening holes at intervals.

Some three feet outboard from the "dihedral break," the section of the spar flange changes from the "pi" section to a "T" section. The vertical limb of the T is attached to one limb of the "pi" by fish plates. The web from here to the tip is a sheet, with lightening holes at intervals. The ribs are, in the main, plain sheet with the edges

Although the Typhoon has a 2,200 h.p. liquid-cooled engine, it actually has less head resistance than its predecessor, the Hurricane. This photograph emphasises the extremely wide undercarriage track which, with the wheel brakes, makes it a very tractable aircraft to handle when landing, taking off or taxiing.



The Dunlop tail wheel is carried on a Dowty strut and retracts forward, as shown in the top sketch. The tyre is a Dunlop Ecta.

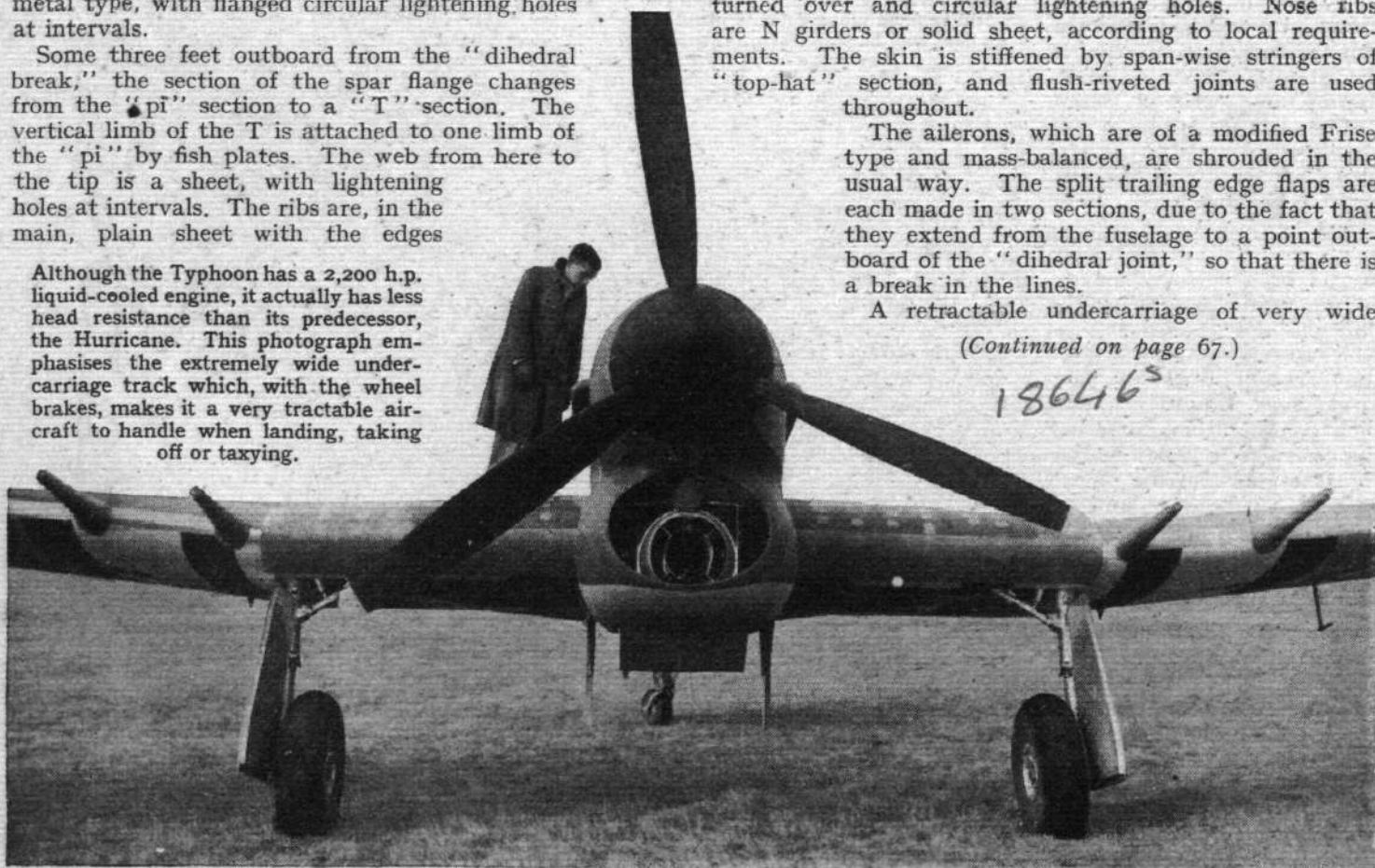
turned over and circular lightening holes. Nose ribs are N girders or solid sheet, according to local requirements. The skin is stiffened by span-wise stringers of "top-hat" section, and flush-riveted joints are used throughout.

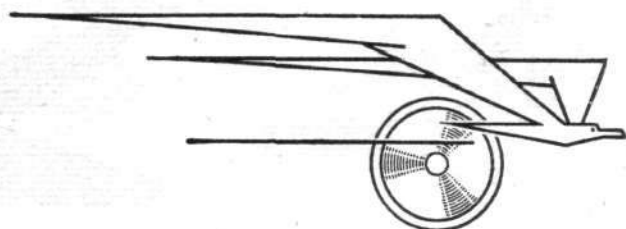
The ailerons, which are of a modified Frise type and mass-balanced, are shrouded in the usual way. The split trailing edge flaps are each made in two sections, due to the fact that they extend from the fuselage to a point outboard of the "dihedral joint," so that there is a break in the lines.

A retractable undercarriage of very wide

(Continued on page 67.)

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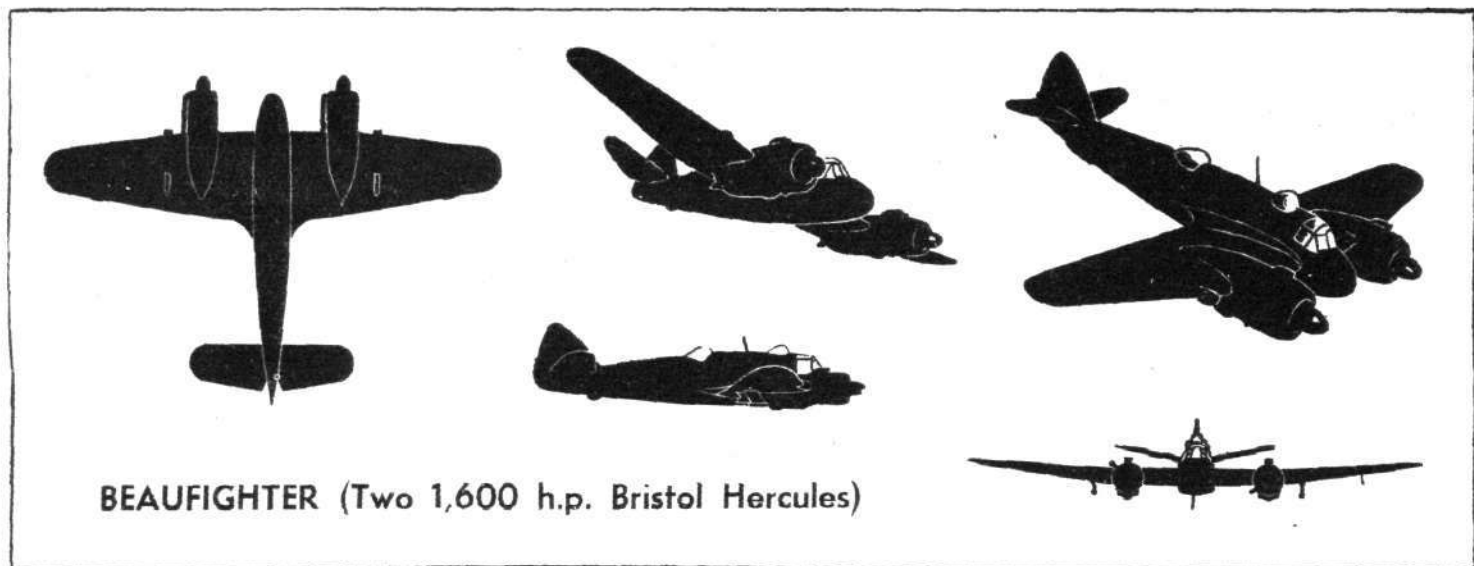
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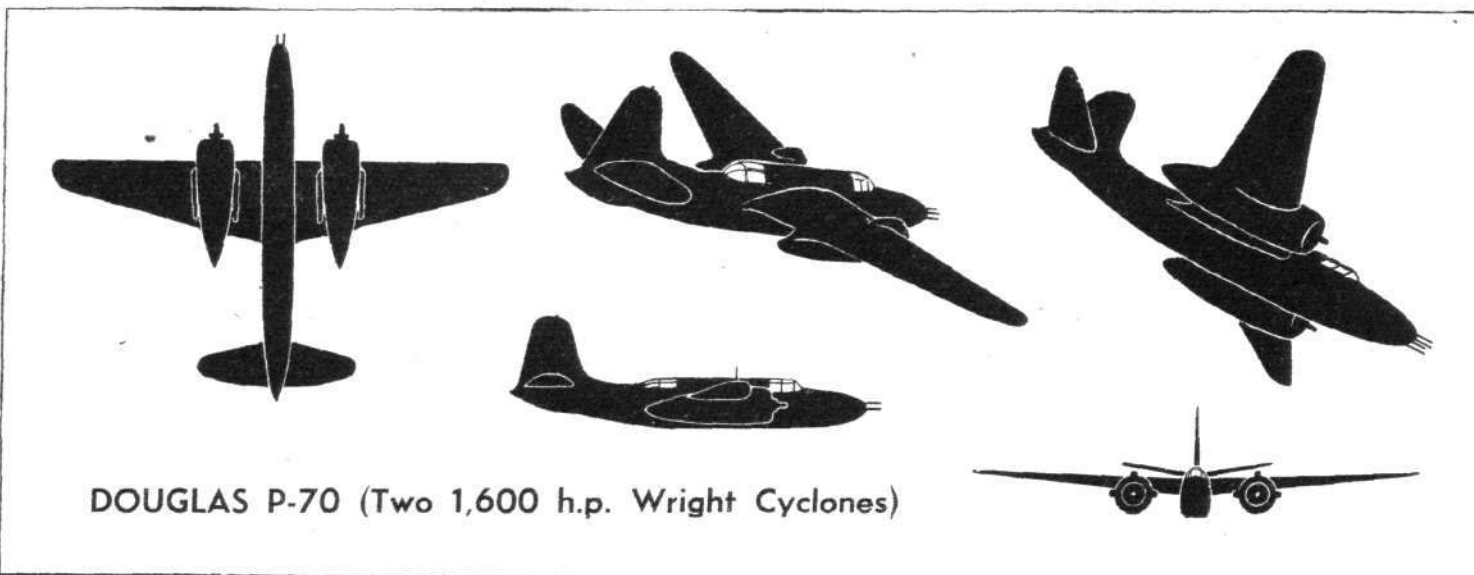
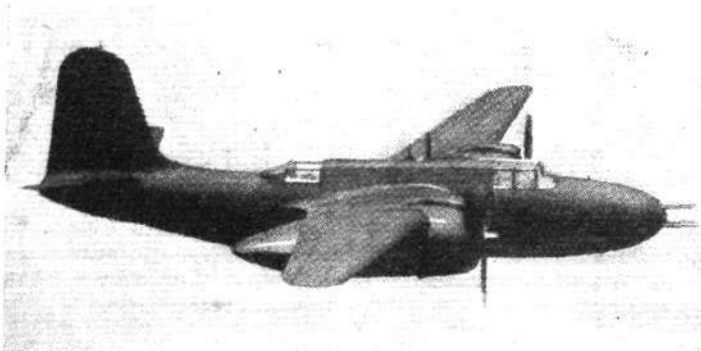
Aircraft in F

**BEAUFIGHTER (Two 1,600 h.p. Bristol Hercules)**

PRIMARILY a two-seater long-range day and night fighter, the "Beau" is also in service as a fighter-bomber and as a torpedo aircraft. With four 20 mm. cannon in the nose of the fuselage and six 0.303in. machine guns in the wings, there is no more heavily armed fighter in existence. The torpedo version is now fitted with Youngman "bellows" flaps in addition to the normal trailing-edge type.

Powered by two 1,600 h.p. Bristol Hercules sleeve-valve radial engines, its top speed is over 330 m.p.h., service ceiling 30,000ft., and range 1,500 miles.

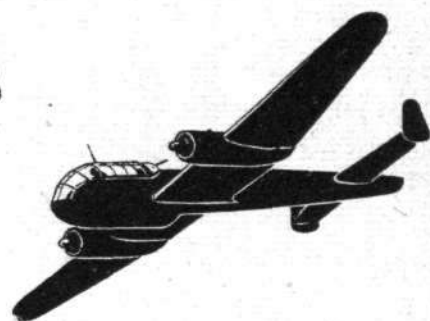
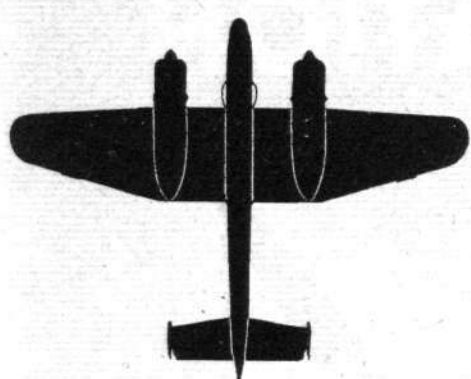
Recognition points include very short nose, mid-wing with flat-centre-section tapering in plan and thickness, dihedral and increased plan taper to outer panels, round tips. Tailplane has pronounced dihedral angle, tapers on trailing edge only, rounded tips. Fin and rudder characteristically Bristol. "Astrodome" amidships. Dimensions: Span 57ft. 10in., length 41ft. 4in., height 15ft. 10in., wing area 503 sq. ft.

**Bristol Beaufighter, Two-seater.****DOUGLAS P-70 (Two 1,600 h.p. Wright Cyclones)****Douglas P-70, Two-seater Night fighter.**

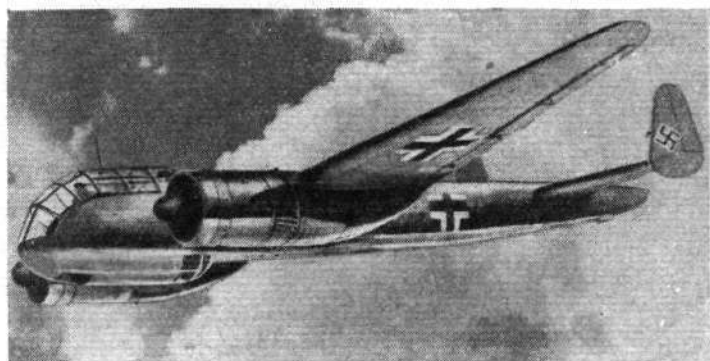
LATEST of the DB-7 series, the P-70 may be described as the U.S.A.A.F. version of the Havoc night fighter and its armament consists of four 20 mm. cannon grouped in the nose of the fuselage. A 37 mm. cannon has also been tried experimentally. Actually the name Havoc is not now used by the R.A.F. as this night-fighter version of the DB-7A is no longer in service, but it is applied by the U.S. Army to the A-20 attack-bomber. The British "intruder" version of the DB-7B, however, retains the name Boston III.

Powered by two 1,600 h.p. Wright Double Cyclones, the P-70 has a top speed of approximately 300 m.p.h. and a service ceiling of 30,000ft. Its recognition points include long blanked-in nose with four projecting cannon, deep narrow fuselage, shoulder-wings tapering sharply on the trailing edge, heavy underslung nacelles which extend behind the trailing edge, and dihedral tailplane. Dimensions: Span 61ft. 4in., length 47ft., height 15ft. 10in., wing area 465 sq. ft.

ving Attitudes

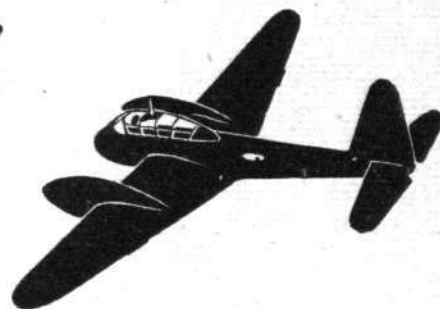


JU 283 (Two 1,600 h.p. B.M.W. 801D)



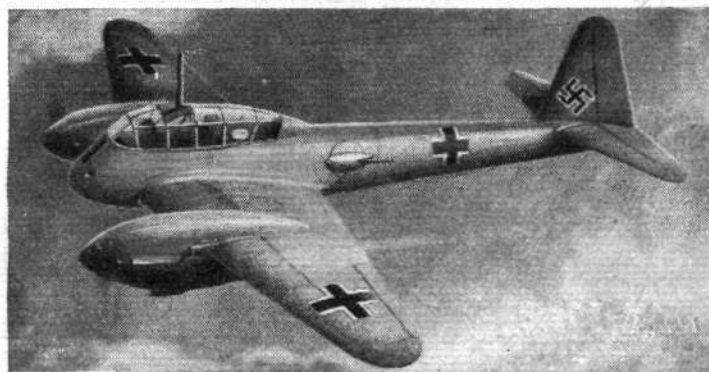
Junkers Ju 288 Fighter-bomber.

THE Ju 88 series has undergone a sequence of developments and modifications to fulfil various rôles. But the first substantial changes were seen in the Ju 88F when a mid-wing layout was adopted, B.M.W. radials replaced the in-line Jumos, and the nose was changed from the former "snake's-head" type into the completely transparent, streamlined pattern repeated in the Ju 288 fighter-bomber. This version, however, introduced yet another radical modification in the adoption of twin fins and rudders of almost triangular outline in place of the single tail unit always employed previously. The wing plan also assumed a shorter span and lower-aspect ratio, having for the first time an almost straight leading edge and the trailing edge swept sharply forward from a rectangular centre-section to bluntly rounded tips. Very few of this model have been seen in action. Top speed is about 310 m.p.h. Dimensions: Span 60ft., length 47ft., height 15ft. 5in., wing area 584 sq. ft.



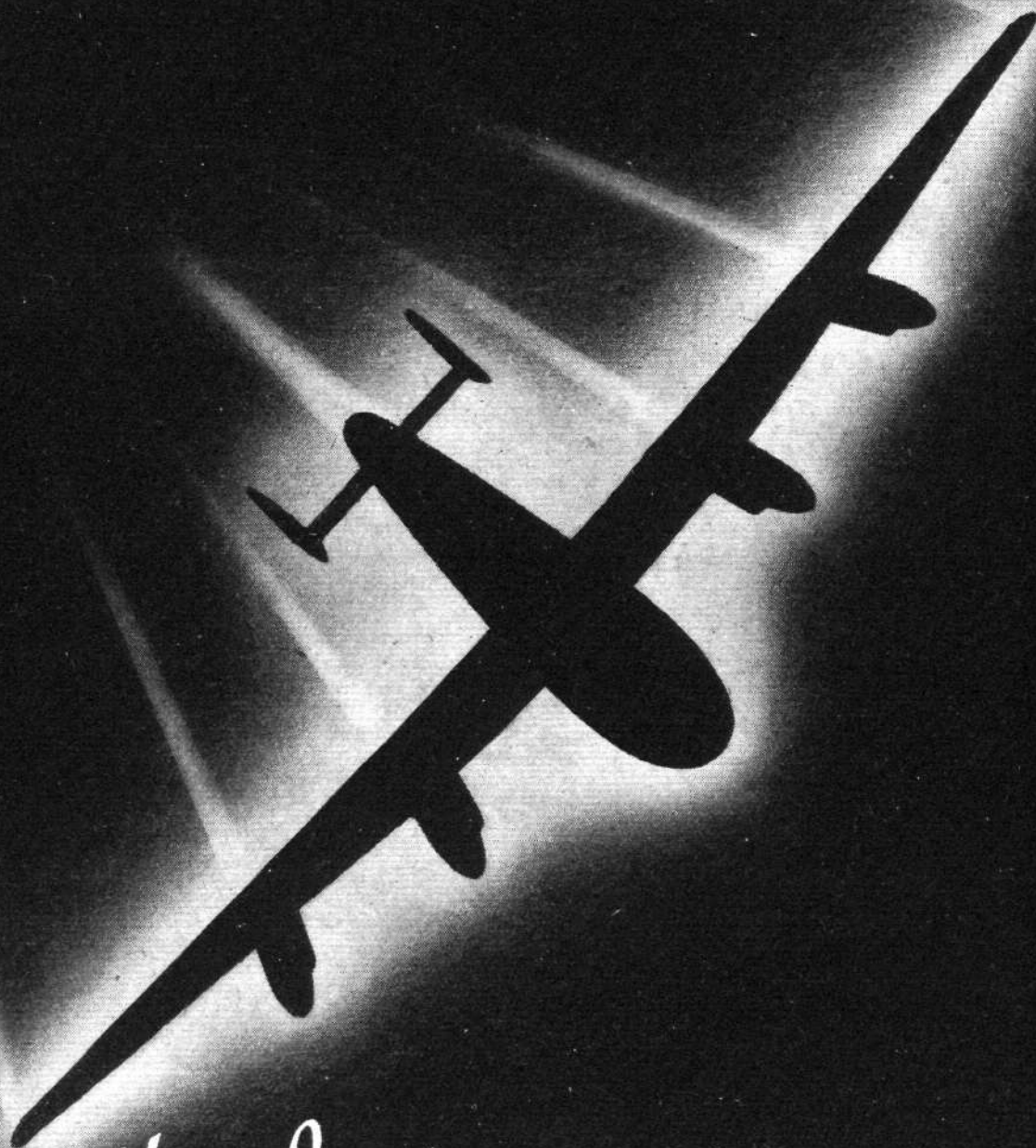
ME 210 (Two 1,350 h.p. DB605)

LARGELY replacing the Me 110, the Messerschmitt Me 210 fighter-bomber is powered by two Daimler-Benz DB 605 inverted "V" 12-cylinder liquid-cooled engines, each developing 1,350 h.p. at 18,500ft., and has a top speed of 365 m.p.h. A still later version of this aircraft, the Me 410, has 1,720 h.p. DB engines and a top speed of 390 m.p.h., but carries only about half the bomb-load (2,200lb.) carried by the Me 210. In external appearance the two versions are practically identical, as is their armament. This comprises two 20 mm. cannon and two 7.9 machine guns in the short nose of the fuselage, and a remotely controlled 13 mm. machine gun mounted in a barbettes on each side of the fuselage just aft of the trailing edge. Recognition points include uniformly tapered wings with small round tips, wide tapered tailplane and large single fin and rudder. Streamlined cockpit cover and slim fuselage. Dimensions: Span 53ft. 9in., length 40ft. 3in., height 13ft. 6in., wing area 355 sq. ft.

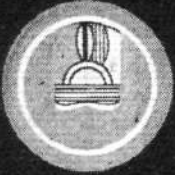


Messerschmitt Me 210 Fighter-bomber.

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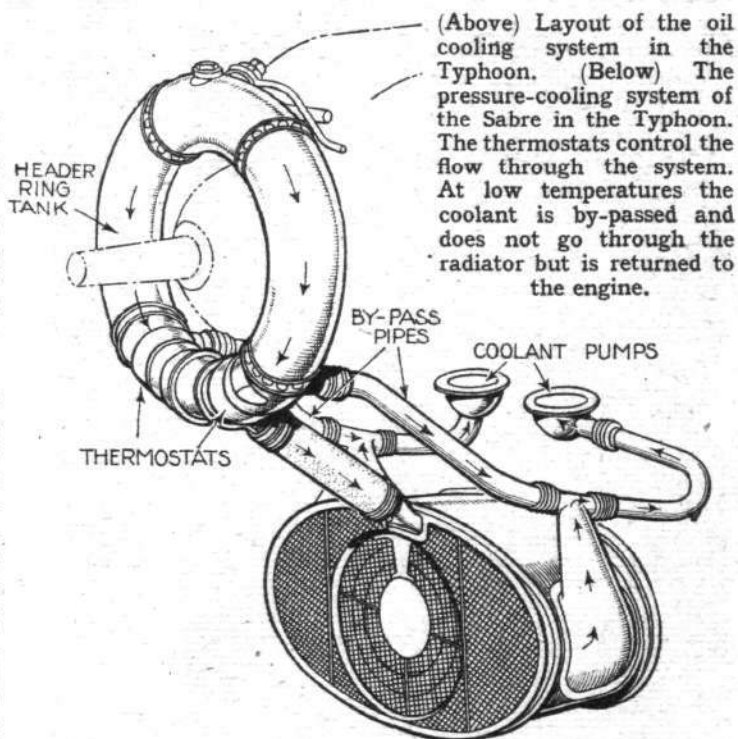
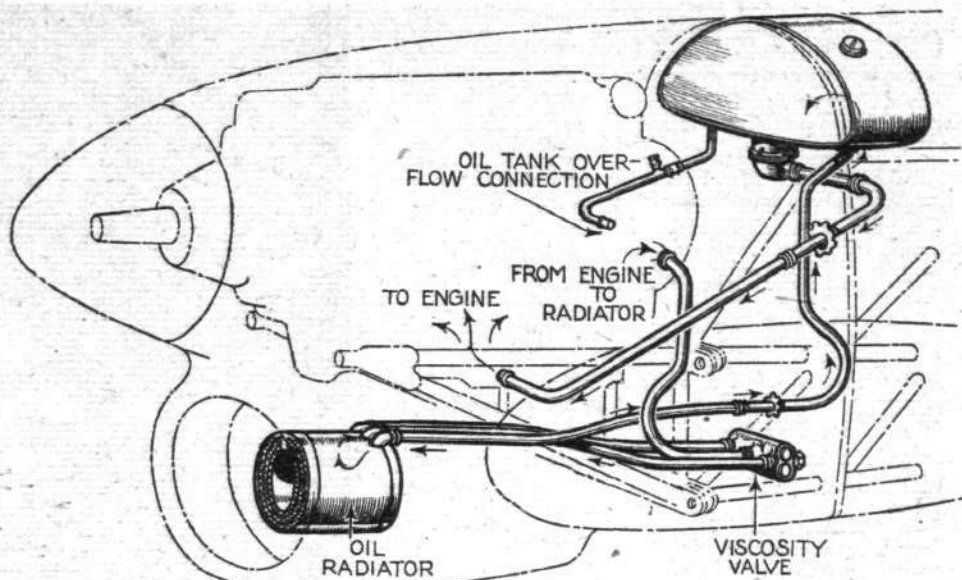
(Continued from page 66)

track (13ft. 7in.) is fitted. The wheels retract inwards and slightly backwards so as to bring them behind the front main spar. Dunlop or Palmer wheels and tyres are used, and are mounted on Vickers oleo-pneumatic struts of long travel. When retracted the wheels are covered by thick fairing plates, the operation of the retracting jack being by the Dowty "live-line" system, which also actuates the flaps and radiator shutter. The tailwheel retracts forward and is mounted on a Dowty oleo-pneumatic strut. The tailwheel is a Dunlop "Ecta."

One of the unusual features of the Typhoon is the very short nose. This results from the fact that the cylinder formation of the Sabre is such that there is room to place the engine *above* the front main wing spar, and, in fact, several cylinders and the whole of the supercharger housing, etc., are behind the spar. This remarkably compact installation, apart from other advantages, results in a low moment of inertia. Pilots have reported that they can "turn inside a FW 190," in spite of the fact that the Typhoon is a much larger and heavier aircraft. This manoeuvrability must, in part at least, be ascribed to the placing of heavy components close to the centre of gravity.

Engine Accessories

The engine is mounted on a tubular steel structure, the formation of which, and its attachment to the fuselage framework, is shown in one of our drawings. On the engine itself the oil, fuel and dual coolant pumps are all incorporated in the sump unit below the crank case. Accessories such as generator, ignition servo control unit, magnetos and distributors, hydraulic and vacuum pumps, air compressors and airscrew governor, are grouped in a very accessible unit on top of the crank case. The cooling system is interesting in that it is of the closed-circuit pressure type. The coolant, as in all modern liquid-cooled engines, is a mixture of water and glycol, in the ratio 70 and 30 per cent. After passing through the engine the coolant is forced by two centrifugal pumps, located under the engine, into the header tank located in front of the engine. It then passes through two thermostats at the

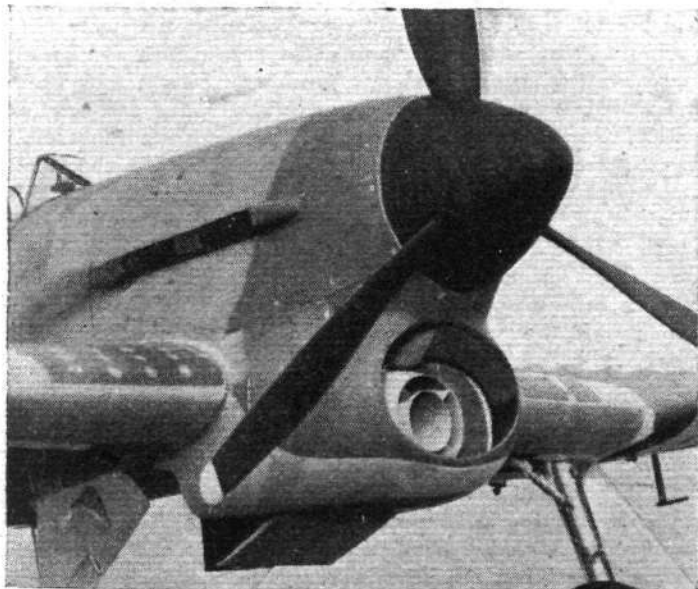


bottom of the header tank and into the outlet branch, which is connected by a hose to the radiator. After passing through the radiator the coolant returns through two pipes to the pumps. If the temperature of the coolant is below a certain point, the thermostats divert the coolant through by-pass pipes to the radiator outlet pipes and return it to the pumps until the temperature rises.

Of somewhat unusual shape is the circular header tank which is placed in front of the engine. Within the tank are two centrifuge pipes (the whole system is split into port and starboard halves, each serving the cylinder banks on that side), a portion of which is coiled, and escape holes for steam released by centrifugal action are drilled through the inner surface of the coiled portion. Mounted at the highest point of the header tank is a pressure relief valve.

Radiator and oil cooler are combined in one unit, the oil cooler forming the central portion and the radiator surrounding it. The tunnel-type fairing around the radiator unit has a flap at the rear (exit) end, hydraulically operated, for varying the amount of air passing through the radiator.

The fuel system of the Typhoon comprises four tanks, two of which are mounted between the wing spars, in the space left by the undercarriage wells, while the other two are leading-edge tanks. A three-way fuel cock allows fuel to be drawn simultaneously from both main tanks or from both leading-edge tanks, but not from main and leading-edge tanks at the same time. To avoid tail heaviness the



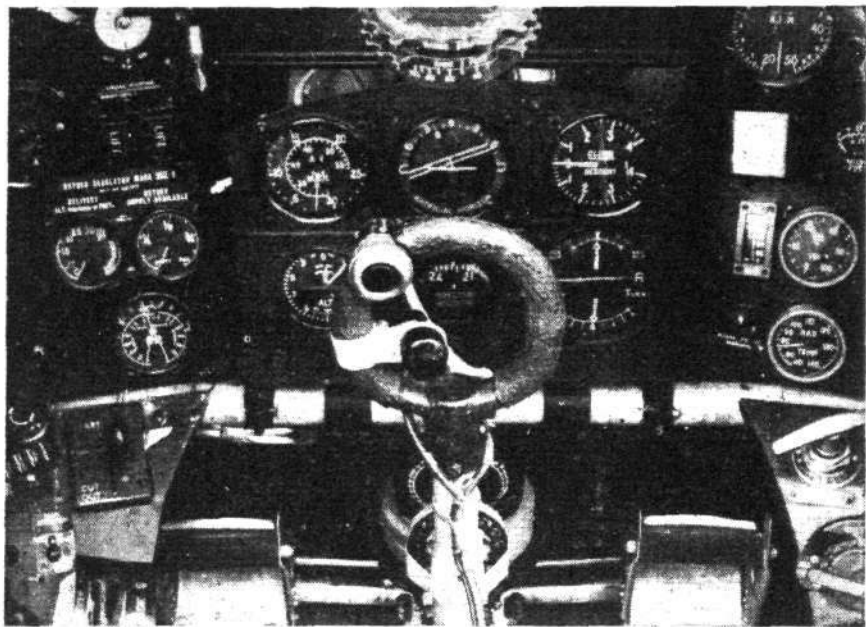
The cowed Sabre and its "chin" radiator unit. The cooling air exhaust control flap can be seen partly lowered.

THE HAWKER TYPHOON

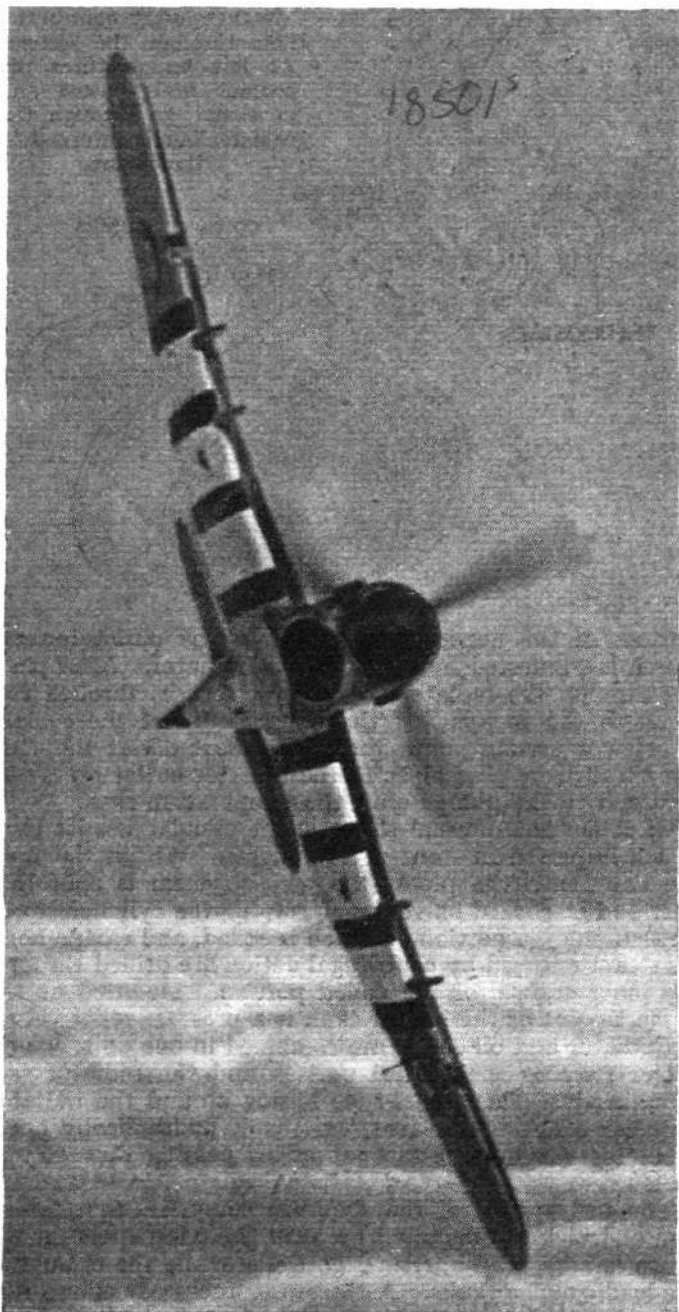
fuel should be drawn from the main tanks first. All tanks are, of course, of the self-sealing type. For long-range work auxiliary tanks can, as already mentioned, be fitted under the wings, slung from the bomb racks.

Cannon Mountings

Reference has already been made to the armament of the Typhoon, which may be twelve 0.303in. Browning machine guns or four 20 mm. Hispano cannon. In the cannon version (Mark IB) the front mounting takes the form of a cone-shaped forging having a wide, thick, curved base to fit over the leading-edge of the wing, the skin of which is specially reinforced at this point. All lining-up of the guns is done on the rear mounting inside the wing, threaded vertical and horizontal tubes being provided here for adjusting elevation and lateral alignment. Ammunition boxes, cart-ridge and link chutes are located beside the



The Typhoon cockpit, showing the standard blind flying instrument panel and the gun and bomb controls on the joy stick spade grip.



A Typhoon in the hands of Mr. J. Crosby Warren, one of the Hawker Siddeley test pilots.



Flt. Lt. Wheldon, another of the Hawker Siddeley pool of test pilots. Note the new tear drop cockpit covering which replaces the earlier built up structure.

guns, and the entire gun bay is heated from the radiator and lagged to retain the heat. The guns are fired by a combined electrical and pneumatic system, air being supplied from a compressed-air cylinder, which also supplies the wheel brakes. The gun-firing button on the spade grip of the control column is an electrical switch which, when pressed, completes the circuit and opens the pneumatic valves in the gun bays. A "safe" position is provided by a milled sleeve which surrounds the button, and, when rotated, prevents movement of the button. As a safeguard there is an interconnection between the gun-firing control and the undercarriage system so that the guns cannot be accidentally fired on the ground unless the undercarriage control lever is in the "UP" position.

Provision is made for fitting a camera gun, controlled electrically, but the camera gun is not installed on all machines. When it is carried, it is located in the radiator fairing, on the starboard side.

It is scarcely necessary to add that a very complete electrical equipment is carried. Power supply is provided by an engine-driven generator which charges two accumulators. Two-way radio is, of course, provided, and electric current is used, in addition, for navigation lights, panel lighting, landing lights, various indicators, and for operating the pneumatic valves of the gun-firing system.

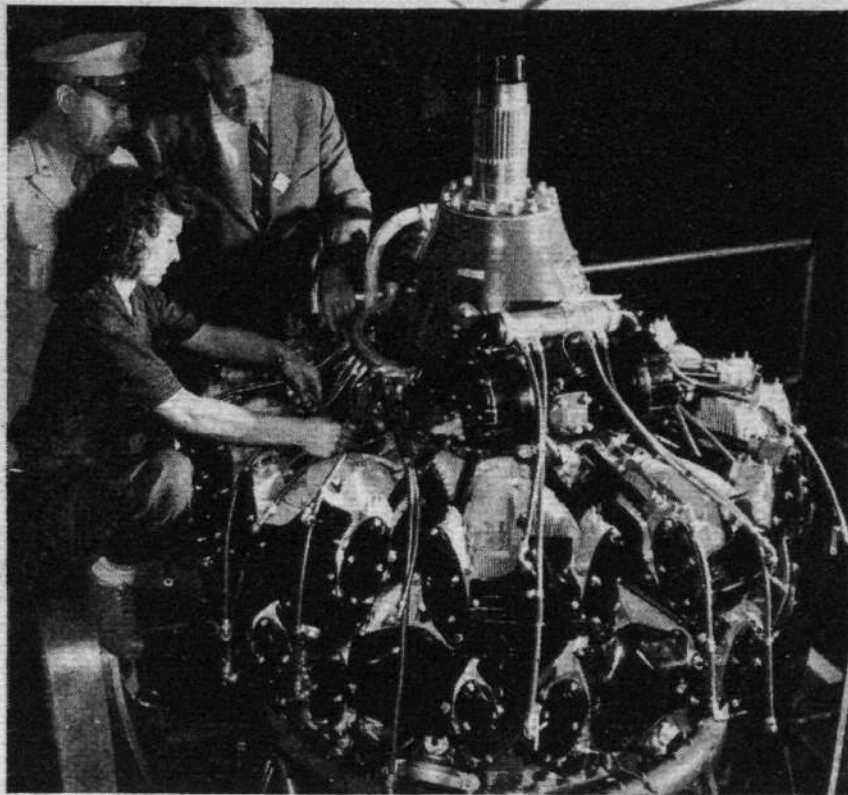
The 2,200 h.p. Cyclone

New Wright Engine Passes Ground and Flight Tests

BRIEF particulars of the latest development of the 18-cylinder Wright Cyclone engine were given in *Flight* of January 6th, and here is a picture of the unit, the compact proportions of which can be gauged from the girl worker and the figures of a U.S.A.A.F. resident inspector and an official of the Wright Aircraft Corporation. Actually, its diameter remains at 55 in., which was the overall diameter of the first nine-cylinder 525 h.p. Cyclone produced in 1927.

Rated at 2,200 h.p.—the highest figure which the U.S. War Department has ever permitted to be published on any American engine—the new Cyclone has successfully passed all its ground tests, including the rigid requirements of a special 150-hour run specified by the Army as a model test. It was also put through extensive flight tests before going into quantity production at a new Wright plant built specifically for the job. A leading firm of motor car manufacturers is also said to be producing this engine under licence from the Wright concern.

Constructional features of the new Cyclone include aluminium alloy cylinder heads and nitralloy steel cylinder barrels, steel crankcase, and the use of lightweight magnesium in the supercharger housing and the nose section. Incidentally, the nose section is designed to permit of a close-fitting low-drag cowl.



CYCLONIC POWER: The extremely compact design of the 2,200 h.p. Wright Cyclone, and the neatly arranged ignition harness are evident in this picture.

SHORT BROS.' INCREASED OUTPUT

THE Minister of Aircraft Production (Sir Stafford Cripps), the P.A. understands, has received a report on the progress of the reorganisation of Short Bros. under the new management from an industrial panel appointed at his request by the Minister of Production and consisting of two industrialists and two trade unionists.

The report points out that the present management was brought in to administer an exceedingly complicated business distributed throughout the country whose affairs were in a state of great confusion, and that they have during the eight months in office approached their problems in an energetic and efficient manner.

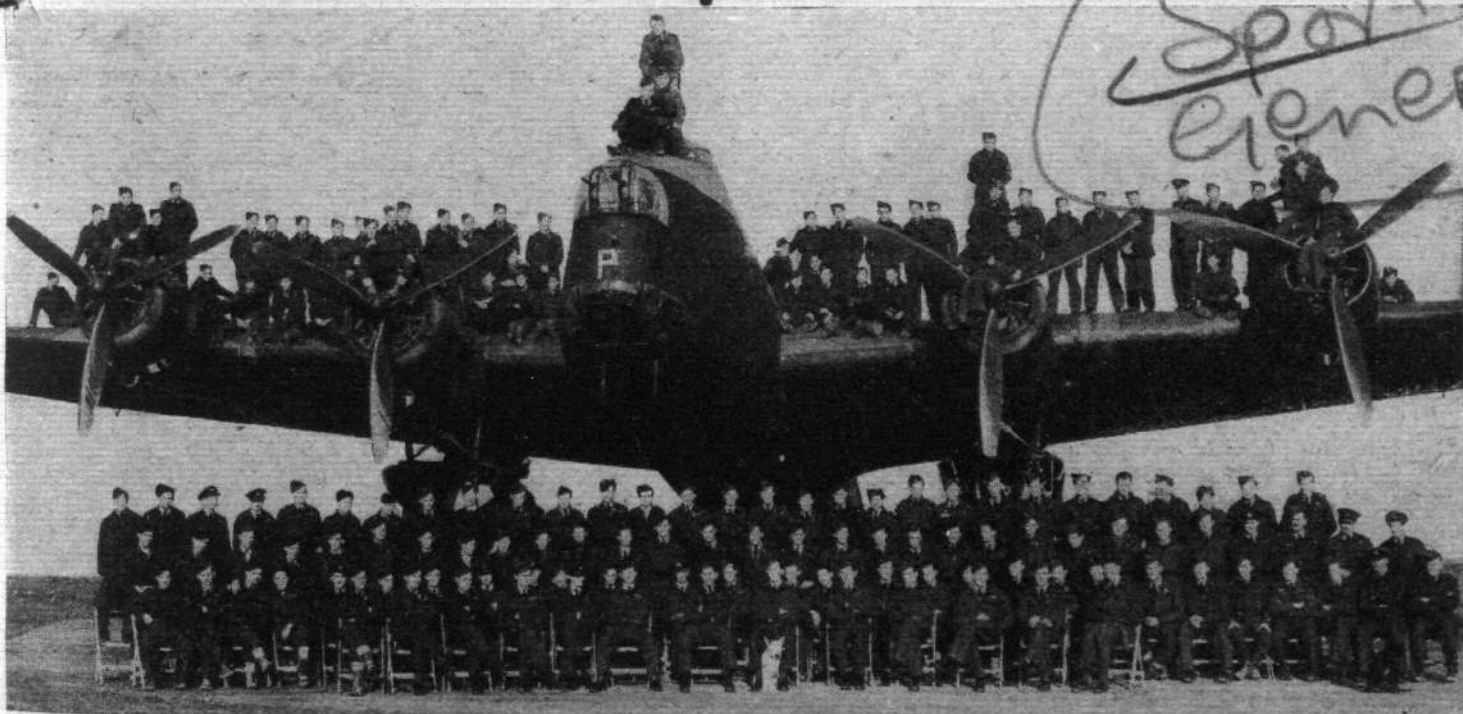
It is pointed out that there has been a lack of understanding between the management and the workers, and various steps

for bringing about an improvement are suggested, including the appointment of a fully qualified personnel manager. Various detailed improvements in accommodation are also suggested.

It is further suggested that a more adequate scheme for training women workers should be installed. It is understood that the Minister of Aircraft Production had approved the recommendations.

M.A.P. PROMOTION

GROUP CAPT. RODWELL BANKS, well known in the piping days of peace as "Ethyl Banks," has been appointed Director of Engine Development to succeed Major Bulman, who has held the post for a number of years. Coincident with his new appointment Group Capt. Banks has been promoted to the rank of Air Commodore.



ON TOP OF THEIR JOB: The personnel of No. 75 New Zealand Bomber Squadron, posing for their photograph on and below the wings of one of their Stirlings, gives an unusually good idea of the imposing proportions of the Stirling.

A Third of a Century

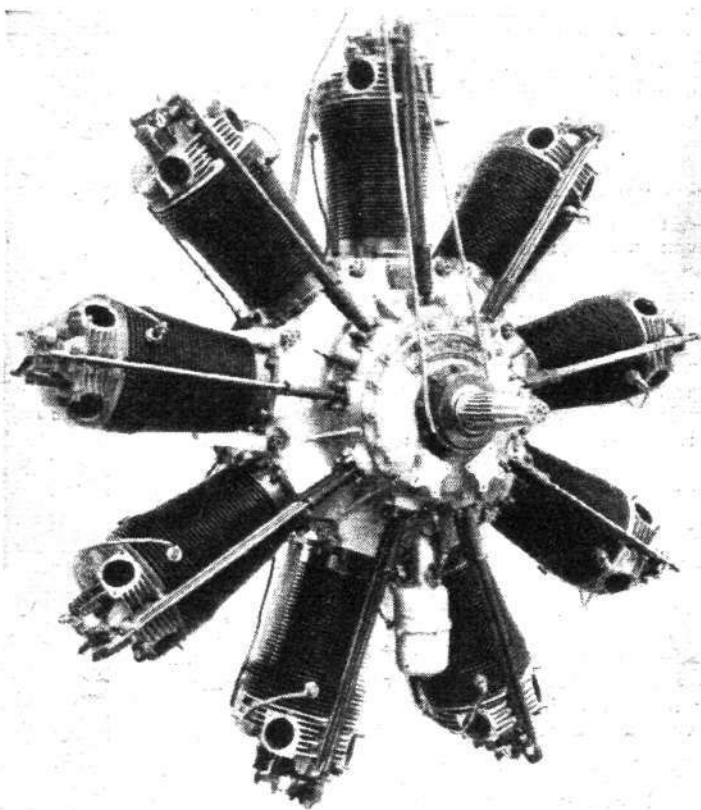
**Outstanding Success in Aviation :
Herculean Power : Sleeve-valve
Simplicity Aids War Production**

FROM "Brisfit" to Beaufighter is a far cry, but from the air warfare of to-day back to the "Bristol" Box-kite which was the first aircraft to fly at the Army manoeuvres on Salisbury Plain in 1910 is still further—just over a third of a century.

Bristol is famous for its Merchant Venturers, and Sir George White, who founded the Bristol Aeroplane Company in 1910 was in the true apostolic succession. Many outstanding successes in the history of aviation have been won by this firm. Though perhaps not so spectacular in appeal to the popular imagination as the Schneider Trophy Race or the World Speed Record, nevertheless it is to them that we owe the World Height Records of 1936 and 1937, and it was engines of the same make that first enabled man to fly over Mt. Everest.

It is perhaps in the more solid commercial field that their successes have been more marked; for instance, the entire fleet of Empire flying boats was powered with Pegasus engines. The services rendered by Blenheims, Beauforts and Beaufighters in this war have, together with the many other types of aircraft fitted with "Bristol" engines, formed one of the greatest individual contributions to the national effort. The first power-driven gun turrets to be fitted in British military aircraft were "Bristol" designed.

Throughout the 1920s the name Jupiter stood for the most efficient and reliable commercial aircraft engine in the world, and it was in the early '30s that the long and patient research work of the company's engineers at last produced a successful engine having single sleeve valves. We ourselves referred to this at the time as "the greatest

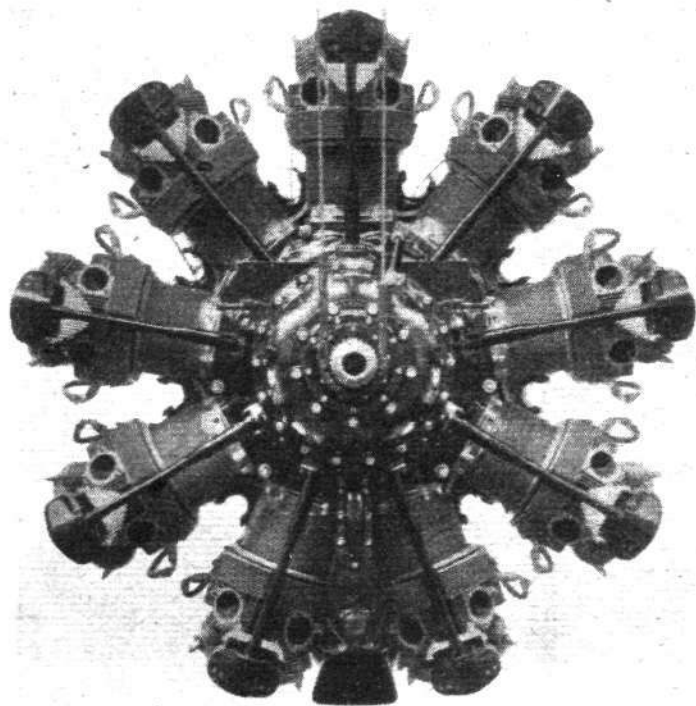


The 400 h.p. Jupiter of 1920 vintage.

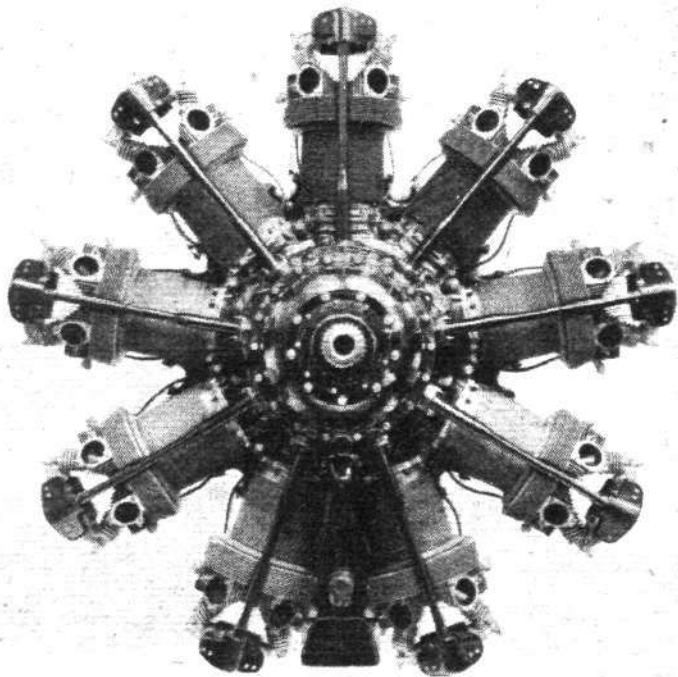
contribution to the problem of power for flight," and whatever may be in view for future developments this still holds good at present. The American and even the German Press has referred to a "Bristol" sleeve valve engine of well over 2,000 h.p. being in production, but we are officially still only allowed to say that the Hercules, which now powers a proportion of all the big British bomber types, develops over 1,650 h.p.!

Eighteen Years Development

The story that lies behind that development, however, is one of many years of toil and endless experiments from the first single sleeve unit of 1926 to the first successful type-tested nine-cylinder radial of 1932. This was the Perseus, which was developed to give over 900 h.p. and which powered many aircraft, including the Transatlantic



The supercharged Mercury first appeared in 1926. Later models of this engine developed over 800 h.p.



Pegasus history goes back to 1930, when the Mark I developed a modest 580 h.p. It is now rated at over 1,000 h.p.



*Everything
depends on
Accuracy*

SMITH'S
AIRCRAFT
INSTRUMENTS



AIRCRAFT as well as surface craft have used the Schermuly Pistol Rocket Apparatus to rescue life at sea. The utility and exceptional accuracy of this device in numerous emergencies warrant its inclusion in the equipment of flying-boats and other sea patrol aircraft; while the compact arrangement and comparatively light weight allows it to be stowed in confined space ready to hand at a moment's notice. The time factor, literally a matter of seconds, and the ease with which an inexperienced operator can achieve accuracy were recognised by the Air Registration Board in approving the apparatus for use on civil aircraft



THE SCHERMULY PISTOL ROCKET APPARATUS LIMITED, SURREY

A THIRD OF A CENTURY



Bristol's first sleeve-valve research started in 1927 and resulted in the 580 h.p. Perseus of 1932.

Empire Flying Boats, the Flamingo, the Skua, the Botha, Roc, and Lysander, etc. A double-row, sleeve-valve radial soon followed; one a very compact engine of 1,000 h.p. known as the Taurus, which is fitted in the Beaufort and the Albacore, and the other a larger 14-cylinder engine, the well-known Hercules, which is possibly in larger production than any other type of aircraft engine, being adopted by the Shadow industry all over the country.

Sub-contracting

As was recently remarked, there is hardly a town in the country which is not making its contribution to the output of Hercules engines to meet the demands of the R.A.F., the simplicity of the sleeve-valve design and components making it possible to utilise the services of a multitude of small engineering shops and garages everywhere for this work.

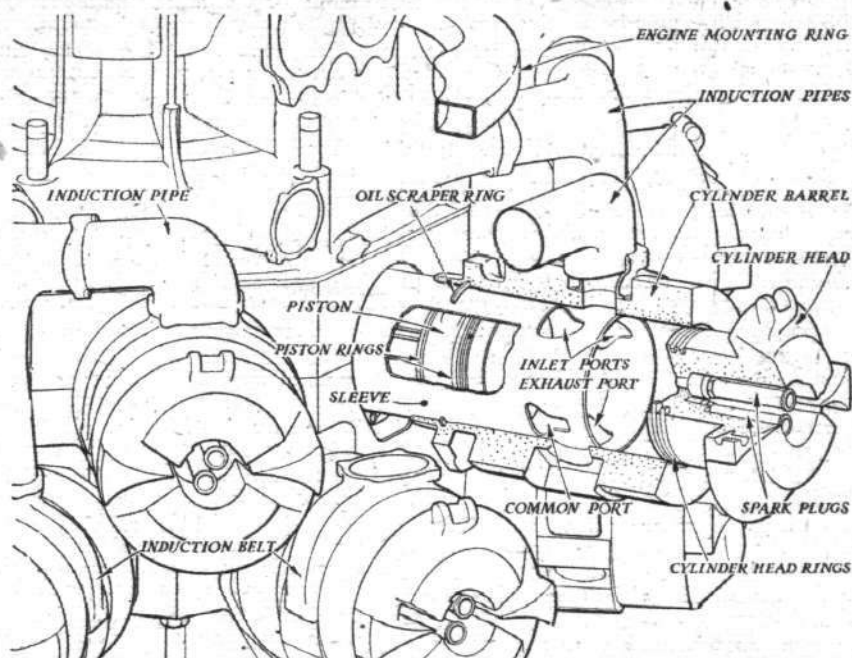
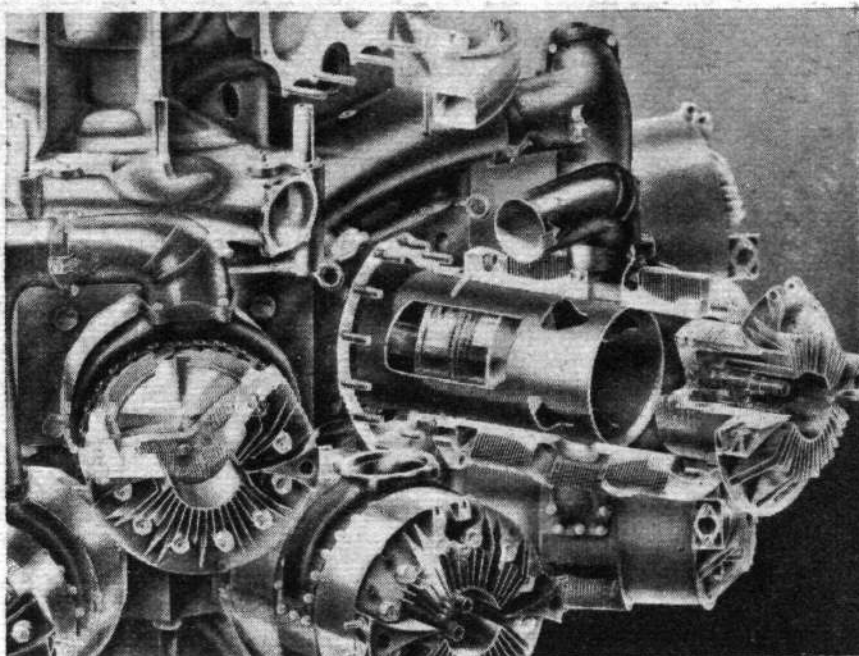
The extreme simplicity of the sleeve-valve engine is of the greatest importance, and the reliability of this engine is consequently extremely high. Furthermore, its exceptional economy will make it of great value to post-war civil aircraft. We feel that the sectioned drawing of this engine, appearing on our covers this week, is of such instructional interest that we have also published a key to the main components, which will explain the various features to even the least experienced.

What of the future? Information leads us to suppose

GROUND STAFF OF CITY OF LONDON SQUADRON

BETWEEN 50 and 60 members of the ground staff of the City of London Auxiliary Squadron have been with the unit uninterruptedly for more than five years. Now serving in Italy, the men have been through the Battle of Britain and have also seen fighting in North Africa, Malta and Sicily.

Before the war the men were given technical lectures on two evenings a week and spent their week-ends gaining practical experience with the squadron. In the 1938 crisis, they were placed on a war footing and were again mobilised on August 24th, 1939. In the early days of the war the squadron was



Sectioned cylinder and annotated guide sketch of the Hercules showing the operation of the sleeve valve. The Hercules is now in its eighth year of development.

that we are by no means at the end of the development of the reciprocating, sleeve-valve aircraft engine, and we hope the day will not be far distant when we are allowed to tell the story in full. There are, however, other developments, and we may be sure that the Bristol Company has not been blind to them; but in what direction they will lead we must not, of course, suggest at the present time.

Many changes have taken place in the organisation and the leadership of the Services for modern war. The same thing has applied in industry at home, and we hope that the infusion of new blood which has come to the Bristol Aeroplane Company will prove as successful in the future as their history has been in the past.

equipped with Blenheim bombers. Later the men took up night fighting and, flying Beaufighters—as they still do—took part in the defence of London and the Thames Estuary during the Battle of Britain. It was in November, 1942, that the squadron was sent to North Africa. It was transferred to Malta in preparation for the invasion of Sicily and is now in Italy.

The veteran auxiliary airman with the squadron is Cpl. G. Nunn, of Clapton, London. He joined in 1934 and has been with the squadron ever since.

Behind the Lines

Preparing

THE construction of a new *Luftwaffe* airfield at Funen is reported from Denmark. About 70 Danish families have been evicted from the neighbourhood and the airfield is to have a size of 1,000 acres.

Jap Nuts

LUBRICATING oil for aircraft engines is being produced in Japan from coconuts. The Japanese economic journal *Nippon Sangyo Keizei* reports that 31 Japanese firms produce this type of lubricant by a secret process based on evaporation and pressing and points out that the product is highly efficient.

I.A.R. 80

THE Rumanian single-seater fighter aircraft, the I.A.R. 80, which has been in quantity production since 1939, is now armed with cannon. The range of the aircraft has now been increased up to 620 miles, and the German military experts consider it to be the best type produced by the Rumanian aircraft industry.

Morale

ONLY four things interest the Berliners—eating, drinking, sleeping and their longing for reprisals, reports the Berlin correspondent of the *Neuchatel Feuille d'Avis*. They believe ardently in those famous reprisals and that the new weapons will have a decisive effect on the evolution of the war. The less optimistic hope that they will at least succeed in diminishing the night raids on Germany.

Figures Can't Lie—

THE German Navy claims, in a communiqué issued by the Official German News Agency, to have destroyed 1,174 Allied aircraft in 1943. Light naval craft, escort and patrol vessels, minesweepers, submarine craft and A.A. units on merchantmen are credited with this total; the communiqué adds that among aircraft shot down were numerous four-engined bombers heading towards the mainland. The importance of naval A.A. batteries situated near important harbour installations which are subjected to heavy bomber attacks is specially emphasised.

The reliability of this—as of many other German figures—may be gauged by a statement included in the report, which explains that the number of aircraft shot down without their destruction must be very high because S O S calls are almost daily heard from British and American pilots shot down in the sea. "Thus in January," the report says, "eight such reports have been received, increasing by eight the official number of aircraft shot down because each aircraft carries only one transmitter which can be used by aircraft shot down into the sea." Such additions of each intercepted SOS call obviously add to the score list of the German Navy, which is on the look-out for some badly needed advertising.

Russian Lesson

IN a summary of Hungarian experience in air operations against Russia, published by the Hungarian Military Re-

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

view, it said: "Each Air Force unit which does not take precautions against partisans must resign itself to the fact that one day it will be put out of action or annihilated within a few minutes. The partisans have no difficulty in ascertaining the position of the airfield, which is continuously betrayed by starting and landing aircraft.

From Poland

ESKILSTUNA KURIEREN quotes a report from Berlin on the establishment of German armament factories in Poland. It presumes that the district to which reference is being made in the German Press is the Sandomierz triangle, in Southern Poland, where the Polish State laid the foundations of a large heavy industrial centre some years before the war.

Hit

THE almost complete destruction of the important naval shipyards, the arsenal and *Deutsche Werke* at Kiel during the recent American daylight raid is reported by *Aftontidningen*, quoted by Reuter.

The *Deutsche Werke* turned out, among others, the 10,000-ton pocket battleship "Luetzow," the 26,000-ton battle-cruiser "Gneisenau" and the 19,200-ton aircraft carrier "Graf Zeppelin."

Jap Effort

SINCE the creation of an Armaments Ministry in Japan the whole structure of the industry is being completely reorganised and switched over in an increased degree to war production.

The main object of this reorganisation is to increase the output of aircraft.

According to information from Tokyo the programme is carried out in close collaboration with the three Japanese monster concerns, the Mitsui, Mitsubishi and the Sumitomo.

The Mitsui concern is to emulate the Sumitomo and Mitsubishi houses in creating a Mitsui-Honsha, in which all commercial and industrial enterprises of the firm are to be represented.

It is significant that the Mitsubishi have adopted a programme providing for a transformation of a number of their companies from private undertakings into State organisations. It is not clear whether the Government is to acquire control or whether this merely means the granting of new monopolies.

A further far-reaching step in the organisation for war efficiency is the reported closing down of a number of banking and trading branches of the Mitsubishi and the complete concentration on the expansion of the Mitsubishi Jukogyo, the heavy industry company. The Mitsubishi Jukogyo, which is also the largest producer of aircraft in Japan, is to establish a uniform two-shift system in all its industrial plants.

Foiled

CAPT. SCHWOER, German fighter ace and holder of many decorations, including the coveted "Oakleaves to the Knight's Cross," praised Allied bombing strategy during a talk on the Berlin radio, quoted by Reuter. He said: "Formations of Allied bombers completely upset my fighter plans yesterday. I thought the bombers would keep on a straight course direct into the heart of Germany and got ready to go in for a frontal attack. But they foiled my plans and altered course to the south-west and we missed them."

Precautions

REPORTS from Vienna show a growing interest of the authorities in preparations for air raids. Local newspapers are publishing appeals and regulations to be observed in the event of air attacks, and the city's A.R.P. installations were recently inspected by Baldur von Schirach.

Viennese parks have been dug up for trench shelters and water reservoirs, the work being done exclusively by Russian women. The Viennese themselves are asked to spend their evening hours of leisure digging trenches outside their houses.

Escape

A REMARKABLE story of an American airman's escape from Germany is told by a Swiss in a Zurich newspaper. The American, a captain of a bomber, had his aircraft badly smashed by flak and ultimately put out of control over Berlin. He seized a right moment and baled out. The parachute, although damaged by small-calibre flak ammunition or splinters, opened, and thirty seconds later the American saw the houses of Berlin and came down in an empty street. He disentangled himself quickly and hid behind a house corner to collect his wits and take his bearings. He noticed a sign "*Leipziger Strasse*" and, having a plan of Berlin on him, he made his decision to walk to Switzerland, via Holland, Belgium and France. This he thought would be safer than the direct cut, with more chances to meet friendly people in occupied countries.

Wounded in his arm, suffering from cold, hunger and fatigue, he marched on at nights, feeding on beetroot and field crops. At times his sufferings became unbearable and he thought of giving himself up. Once, his resistance gone, he resigned himself to capitulation. That night he heard overhead a huge formation of R.A.F. bombers heading towards Germany—he continued to march on.

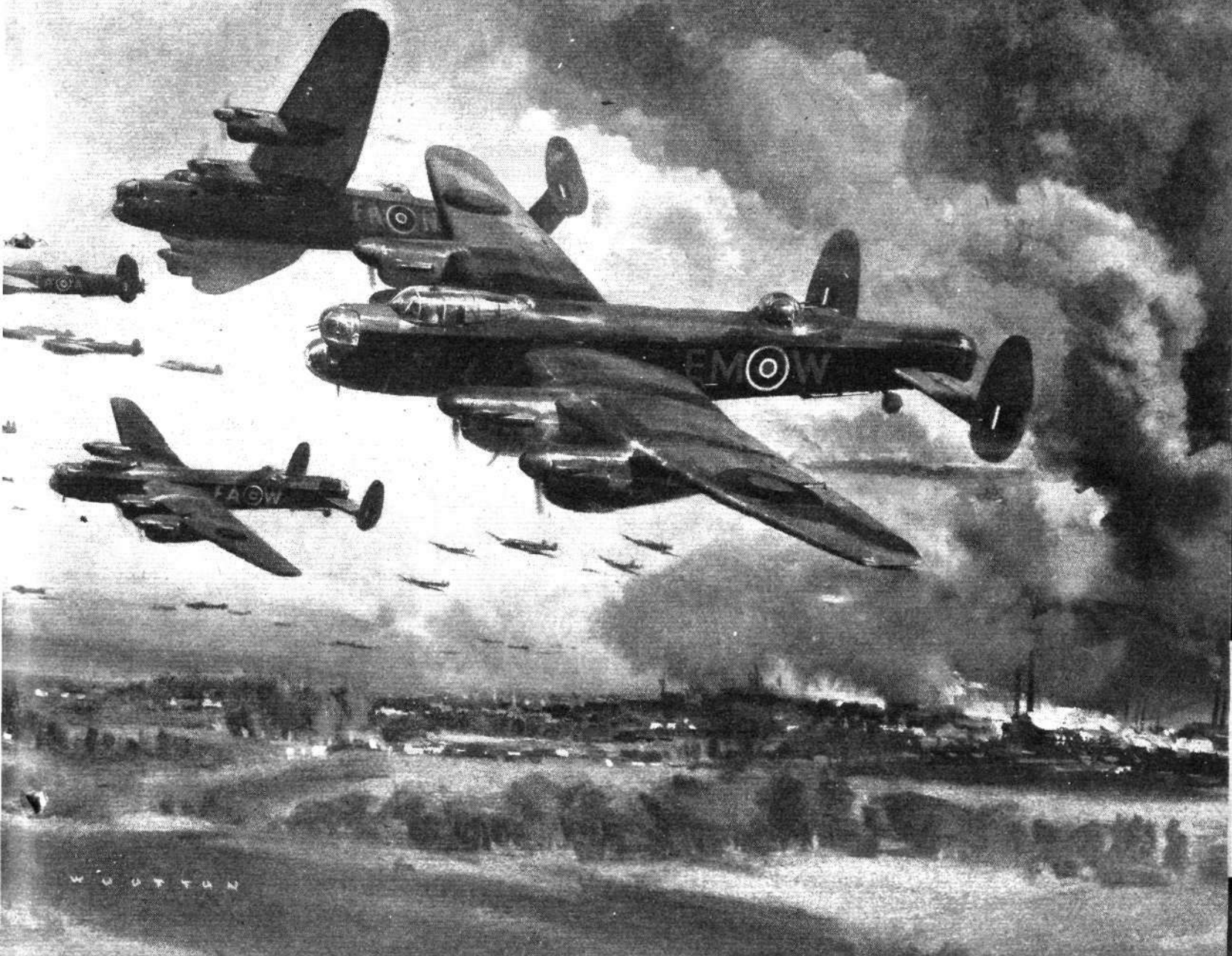
When the Swiss met the American airman, he had covered over 620 miles. He was then 18 miles outside the Swiss frontier, but he had no doubts that he would make it.

Review

LIEUTENANT FRITZ WESTMANN, of the *Luftwaffe*, speaking over the German radio, quoted by Reuter, compared the present Allied air offensive to a huge steamroller, and its psychological effect with that of the first British tanks when they appeared on the Western Front in 1917.

Raid on Le Creusot

by Lancaster Heavy Bombers





*Highest
development
in
hydraulics*

Lockheed

ENGINE DRIVEN PUMP

AUTOMOTIVE PRODUCTS COMPANY LTD., ENGLAND

Airfield Saturation

Growing Difficulty of Finding Suitable Sites : Limitations and Hazards Involved : All Needs Met

WRITING of his wartime impressions of flying in Great Britain, an American pilot described the many airfields as "thicker than fleas on a dog's back." Ignoring the implication against American dogs, the phrase was hardly an exaggeration, as is proved by a certain secret map at the Air Ministry—a map which will stay secret until after the war.

This map is covered with more red spots than a bad case of measles, and each one indicates an airfield, yet as recently as 1938 there were only just over 100 Service airfields in the whole country. Even that modest number, however, was high compared with 1924, when Great Britain possessed only 27 Service and 17 civil airfields.

Now it is officially stated by the Air Ministry that the rapid increase of airfields, in size as well as number, has almost reached the limit of suitable ground.

"It is still possible to increase the present number of full-sized and rather smaller Service airfields," says the official statement, "but only by a small fraction. When, however, those still in course of construction are completed, all our needs in that direction and those of our American Allies will have been met."

Intensive Development

This intensive development is all the more remarkable when one takes into account the requirements to be met by a modern airfield, which may occupy anything up to 600 acres, as compared with some 200 acres before the war, an increase in ground space brought about by the need for much longer runways, and by the necessity for dispersal, not only of the aircraft themselves, but of fuel, bombs, living accommodation and technical facilities. Incidentally, all this has had to be achieved, says the Air Ministry, while still conserving an adequate acreage of agricultural land for food production.

The initial difficulty in this great airfield development has, of course, been in the selection of sites. Britain is not over-blessed with wide open spaces, and even where the requisite space has been available, surrounding built-up areas have either ruled it out altogether or called for drastic clearance and demolition. Unsuitable soil, too, has limited the use of otherwise available spaces. The Fen district, for example, embraces large tracts of absolutely

flat land, but most of it lies below sea-level and is intersected with dykes and "water tables" close to the surface. Vast drainage and pumping schemes would be necessary to make it suitable for airfields, and anyway, such areas are extremely liable to mist at night. There are also many flat areas of peat in this country, where the soil is light and spongy and tends to move up and down in wet and dry weather; this also is quite unsuitable for any kind of airfield construction.

Where the ground is not flat, the slope obviously has to be within a certain limit. Before the war a gradient of 1 in 60 was the recognised maximum, but from early in 1942 a gradient of 1 in 80 with a cross fall of 1 in 60 has been the ruling maximum for all bomber stations.

Restrictive Factors

Approach angle is another important consideration, and the steadily increasing wing-loading of Service aircraft has caused this to be increased from the 1939 figure of 1 in 15 to that of 1 in 50, thus multiplying the cleared area beyond the end of the runways. Local fog tendencies and other prevailing weather conditions also play a big part in the siting of an airfield, and a detailed meteorological report is always obtained before a site is accepted. But even so, tactical considerations have been known to lead to the acceptance of sites in spite of the known hazards of industrial haze, sea fog, or similar "ropey" features.

Other restrictive factors in site selection may also be mentioned. Balloon barrages and lofty wireless masts (many over 300ft. tall and on high ground at that!) and high tension pylons up to about 80ft. tall are among the hazards to be given a wide berth, while the fact that an airfield is a potential air-raid target makes it advisable to have it a safe distance from explosives and other war factories, hospitals which cannot easily be moved, and prisoner-of-war camps. And that by no means exhausts the list.

It is not surprising, therefore, that the difficulty of finding sites has been steadily growing during the last year or two until we are now approaching the saturation point. It is good to hear, therefore, that this point has not actually been reached before all the needs of the R.A.F. and U.S.A.A.F. in Britain could be met.

BOOK REVIEW

Now or Never. By Howard Williams. Alliance Press. 3s. 6d.

"BACK from the Mediterranean, an airman speaks his mind," is the sub-title to this 80-page "cocktail of air and travel," whose author, Air Commodore E. L. Howard Williams, M.C., was one of the party of Air Correspondents which recently made a tour of North Africa, Malta, Sicily and the Italian front.

Howard Williams speaks his mind about a number of things, beginning with the incredible array of forms he had to fill in and sign in spite of the journey being under the official wing of the Air Ministry, and ending with some speculations on, and suggestions for the future, the last line of which gives the whole book its title. On the "red tape" aspect, he comments: "... when the war is over we simply must do something to stop this nonsense."

The booklet contains much that is informative about the actual job being done by the air forces in that theatre, and about the lives lived and thoughts expressed by some of the men he met, from "Ike" Eisenhower and "Chief" Tedder down to "those whose job it is to do their bidding." Expressing the opinion that history will place Air Chief Marshal Sir Arthur Tedder even above General Montgomery, "whose far more popular appeal to the common man is legendary," he pointedly adds, "Indeed there are those who say Tedder has in effect won Monty's battles, although both of them would

be the last to claim that!" That "both" is really delicious!

His own personal experiences crop up here and there and are mostly treated light-heartedly, but the reader will detect a certain peevishness at having sometimes to hump his own kit and make his own bed, and will note, on the other hand, his glowing praise for a certain Spitfire wing where "black servants waited upon us." There, one feels, speaks the air commodore rather than the air correspondent. Similarly, a contrast is drawn between the comparative comfort of flying with the B.O.A.C. and the "rough and ready stuff which followed" when they changed over to Air Transport Command. Conceding that the purely flying side was well done, the author says he was "depressed by the haphazard methods I had perforce to endure. It showed up the difference between service for the State and that for a private or public company."

But Howard Williams very rightly draws attention to the astounding fact that although there were Army and Naval correspondents in this theatre of war, there was not one Air Force correspondent. In consequence, the public has had an inadequate, and often inaccurate, picture of the role played by the air; he instances the battle of Foggia, broadcast by the B.B.C., but which never happened, and the unwarranted allegation of lack of air cover in the grim days of Salerno. "Never was so much nonsense told so often by so many," is his fitting observation on this sort of news service, a reasonable remedy for which he helpfully suggests.



Avro York Transport

Fast, Comfortable, Roomy Pioneer of Post-war British Commercial Aviation

THE Avro York is designed specifically to meet the immediate need for a passenger/freight transport aircraft. A condition of the specification was that the machine must be completely convertible from passenger aircraft to freighter, or vice versa, inside 24 hours, and this condition has been unobtrusively fulfilled by the exercise of great ingenuity on the part of the designing team.

The maximum payload is 10.5 tons for a range of 500 miles, diminishing to a load of 4.2 tons for a range of 3,000 miles. Maximum speed is in excess of 300 m.p.h., maximum cruising speed is 275 m.p.h., and the economical cruising speed, from the point of view of fuel consumption, is approximately 220 m.p.h., although, naturally, optimum cruising speed is dependent upon the requirements of range. As with the Lancaster, the York can be equipped with either Rolls-Royce Merlin or Bristol Hercules engines.

As a freighter the aircraft is valuable for its great weight-carrying capacity as well as the unobstructed roominess of its interior. The illustrations provide ample indications of the type of cargo the York is ably fitted to handle. This is, of course, governed at present by war needs, and the space occupied by four Jeeps or 15 Lancaster wheels and tyres, could well be used for the less spectacular, but more comfortable, occupation of three grand pianos or a houseful of furniture. Single-seater fighter airframes, crates of airscrew blades, machine tools and power-eggs are all capable of transportation by the York.

Loading Ramps

For the carrying of power-eggs Avros have evolved a special trolley and ramp, carried in the aircraft to facilitate unloading. The main ramp for loading and unloading freight is a conveniently handled piece of equipment, being mounted on wheels which can be jacked up when the ramp is in use, and lowered so that the ramp can be wheeled away after use. Jeeps are

driven up the ramp and partly into the fuselage where they are then man-handled into a fore and aft stowage position. It is surprisingly easy, and four Jeeps can be stowed complete in about eight minutes.

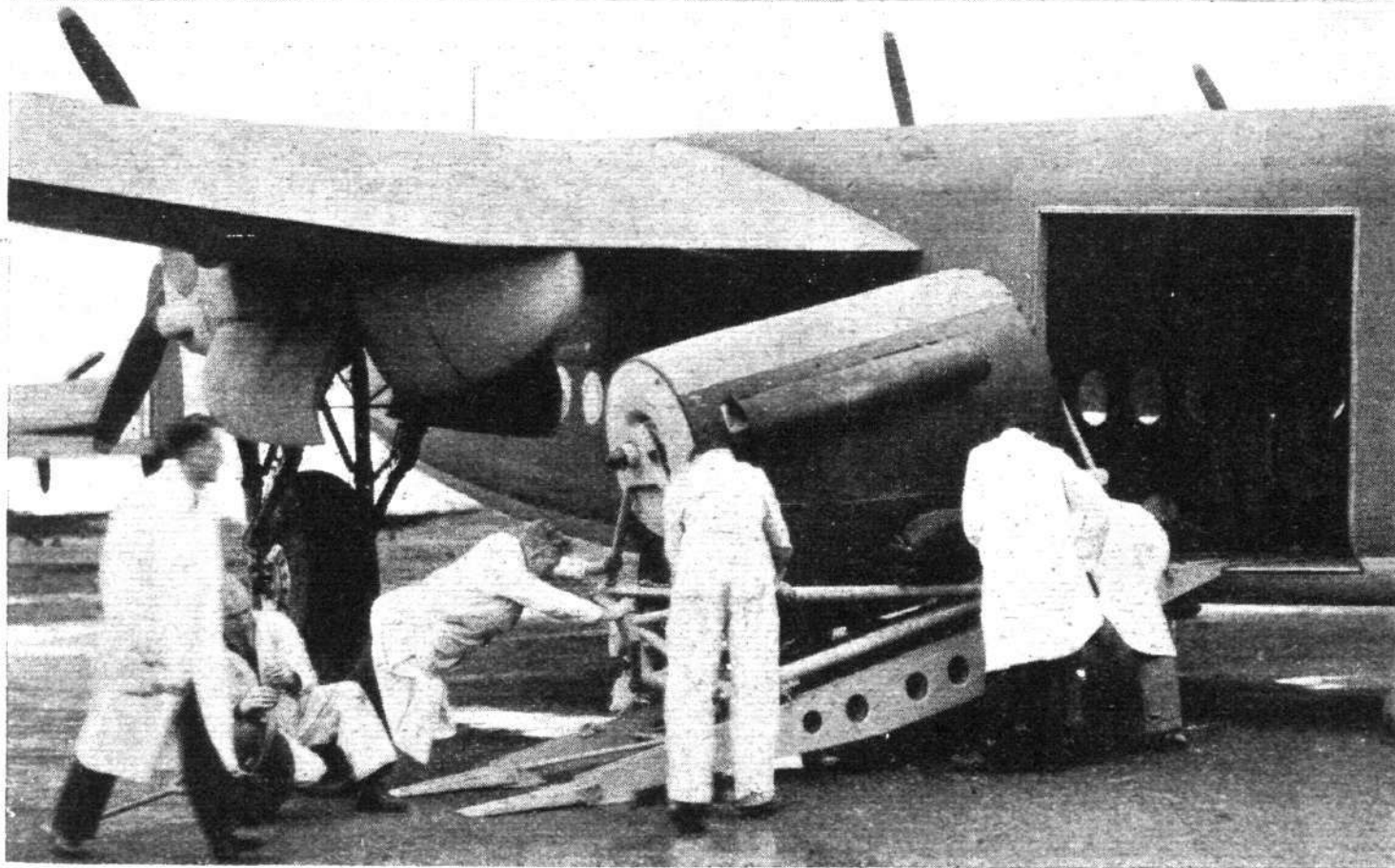
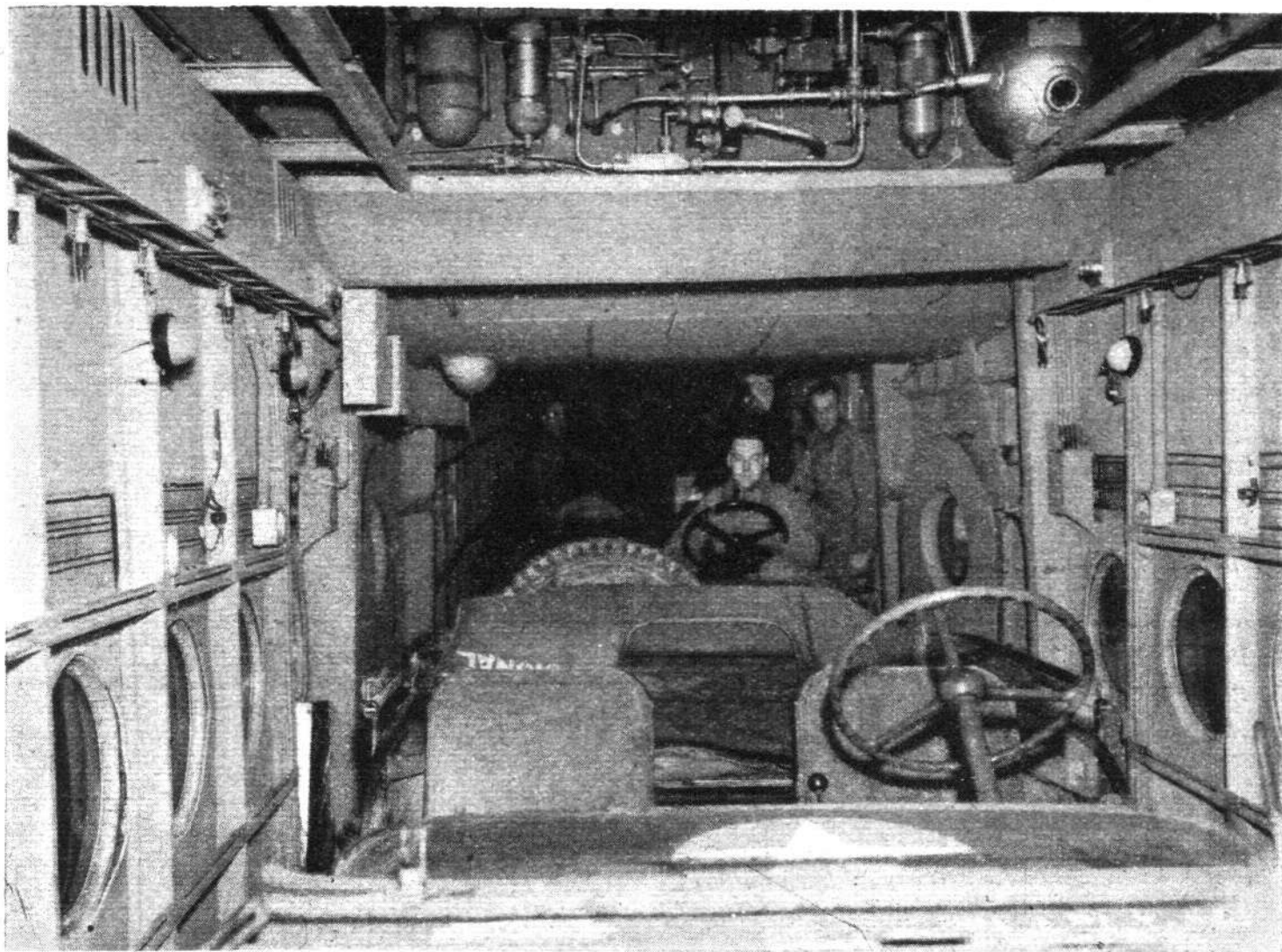
Office Furnishing

The business end of the York is beautifully laid out and is characterised by first-class visibility for both pilots, and absolute convenience of all controls. The pilot and second pilot sit side-by-side on either side of the cockpit and have duplicated controls and instruments. Engine instruments and ancillary service instruments are grouped centrally, and the engine, airscrew, flaps and undercarriage controls are mounted centrally overhead. Rudder, elevator and aileron trimming is controlled from a compound box which is fitted to the starboard side of the chief pilot's seat structure where it is easy of access to both pilots. The wireless operator is stationed behind the chief pilot, but about four feet below him, whilst the navigator is seated behind the second pilot on the same level. The navigator's astro-dome is immediately above his head, and the dimensions of his plotting table are more than generous. In addition to the orthodox P.4 type magnetic compass, which is mounted below the engine instruments, both pilots and the navigator have a direct-reading instrument operated electrically from the gyro-stabilised master-compass located in the after part of the fuselage.

The run of control linkages, electrical conduits, heating ducts, etc., are all accommodated above the fuselage ceiling. The heating for the cabin is supplied from an auxiliary source tapped into the engine coolant circuit, and in the passenger version of the York each passenger has a fitting, adjustable for direction and aperture, by which a stream of warm or cool air can be directed where required. This adjustment in connection with the master control gives a degree of temperature regulation that is as perfectly balanced as anyone could desire.



Four jeeps awaiting their turn for stowage. Each vehicle is driven up the ramp and into the fuselage where it is man-handled into position. The freight entrance is about 8ft. wide by 6ft. high.



(Top) Interior looking aft. The roominess of the stowage space can be appreciated from this picture. Note the hydraulic system units on the front of the main spar. The objects looking like sparking plugs along each wall are individual passenger oxygen points.

(Bottom) Loading a Merlin power-egg. The special lightweight ramp is carried in the aircraft, and the trolley supporting the engine is wound up into the fuselage by means of a winch built in the ramp.

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.

JET PROPULSION

On the Broadcast

I LISTENED! It was an entertaining explanation leading the hearer step by step to the logical conclusion—a lecture digestible even by Mr. Everyman, and certainly more enjoyable than other broadcast lectures.

A. F. C.

From Scotland

CONGRATULATIONS! I have just been listening-in to your most interesting broadcast on jet propulsion, and it came through to the "wide open spaces" away north here as clearly as if you had been in the same room.

Forfar.

Another Example of Progress

DURING the last few days I have constantly thought of *Flight*—you really must have been pleased about the announcement concerning the jet-propulsion engine. What a vindication of your ideas and belief! It is indeed a pleasure to know that here is another example of progress in which this country has taken the lead.

T. G.

Canada Looks Ahead

I HAVE been reading *Flight* and thought I'd like to offer much-deserved congratulations on all your efforts re jet propulsion. Your book is in keen demand here now—the Canadian boys want to see what they may be flying some day. Again, heartiest congratulations on your foresight and industry regarding the latest British triumph.

Flt. Lt., R.C.A.F.

"And Those Who Came to Scoff . . ."

PLEASE accept my congratulations for the part you have played in development of the jet-propulsion aircraft.

I well remember reading your first article on the subject in *Flight* three years ago. It affords me a certain amount of quiet amusement to recall that some friends of mine at the time rather scoffed at the practical development.

ARMY CAPTAIN.

(The above are typical of dozens of similar appreciations from correspondents all over the country.—Ed.)

Air Compressors and Pulverised Coal

THE question has arisen as to whether an internal combustion engine should drive the impeller, whether the impeller air compressor should be driven by passing the jet gases through a turbine on the same axis, or whether a combination of the two should be used, as the power that is ultimately exerted by the jet on the air behind the aircraft (and by suction) is the product of compressing and heating the air.

It occurs to me that the air-compressing part of the business may eventually be effected in practice by utilising the very old principle of the hot-air engine in which an oil burner jet heats a cylinder containing air, thereby causing the air to expand and drive the piston.

The combination of such an air-compressor system with pulverised coal as the fuel would offer exceptional opportunities for the utilisation of home-produced fuel on a large scale.

I should like to hear the views of anyone interested.

W. R. DAINITY (Hon. Capt., R.A.F. (R.N.).

Consulting Engineer).

TYPHOONS v. JUNGMANNS

Sordid Necessity is Not Sport

THE widespread publicity given to the recently reported incident in which a number of Typhoons attacked some Jungmann trainers disporting themselves near the Eiffel Tower and shot one of them down seems to me to display the poorest possible taste.

It is realised that a total war means killing all enemy personnel who are, or who may be, in a position to further hostilities, and there is some justification in this for shooting down trainers.

However, it is surely superfluous to represent one of the

more sordid sides of the air war as an amusing escapade, bolstering up the sporting aspect of the engagement by talking about the manoeuvrability of low-powered biplanes and the relative speed of a Typhoon.

This myth of the ultra-slow, ultra-maneuvrable machines being almost immune from the attacks of high-speed fighters became obsolete during the Spanish Civil War. There is only one safe position for a Jungmann when a Typhoon is about and that is in front of it! Then there is a definite possibility that a pilot, used to chasing aircraft with a speed comparable to his own, will overshoot a target that suddenly goes into a semi-stall.

For all other positions, a Typhoon opening fire at a maximum range of 1,000 yd. can certainly deflect sufficiently in the five or so seconds available before it overshoots to cover any gyration of a Jungmann with its top speed of 120 m.p.h. and climb of 800 ft./min. It is true that Taylorcraft Austers successfully evaded the attacks of Me 109s in the early days of the war, but it was reliably reported in those days that German pilots had a strong dislike for hedge-hopping tactics, and that zero altitude alone spelt safety for almost any British aircraft.

In conclusion, while not trying to draw hairline distinctions between the ethics and barbarities of warfare, it appears that this outworn and disproved theory has been used, rather shamefacedly perhaps, to nullify the grimmer side of what was otherwise a nice little story for the newspapers.

IAN S. ALEXANDER, Stud.R.Ae.S.

MORE MISCONCEPTIONS

Weathercocking and Wind Effect

SOME months ago (I received my copy of *Flight* very late, and my first letter met some misfortune) "Indicator" wrote on "More Misconceptions," with particular reference to the phenomenon of "weathercocking," which he dismissed as improbable, stating that in any case an aircraft had no axis about which it could weathercock.

Consider the case of an aircraft flying across wind. Any increase in wind velocity will, until conditions are again stabilised, result in a lateral movement of air relative to aircraft, causing the aircraft to swing round according to its effective fin area. The axis round which it will swing is the C.G. Assuming that the onset of a gust is more marked than its dying down, and that an aircraft has a preponderance of fin area aft of its C.G., the foregoing would explain the tendency of a slow-flying aircraft to turn into wind while flying in the gusty air of a strong cross-wind close to the ground. I have observed the phenomenon very clearly while soaring a primary-type glider in a strong wind over an escarpment. In this case it was scarcely necessary to use the rudder, for each gust caused the glider to turn into wind sufficiently to maintain the straight path of resultant flight along the escarpment.

In spite of "Indicator's" gentle sarcasm at the expense of sailplane pilots, it would appear that flying without an engine leads to clearer understanding of certain problems. In a letter in your issue of November 4th, "Pilot R.A.F." states that "wind effect does not enter into the problem" (of covering the maximum distance with a dead engine). This is absurd. Take the case of an aircraft gliding at best gliding angle at, say, 70 m.p.h. into a headwind of 70 m.p.h. Clearly it is not going to get anywhere at all unless it increases its flying speed even to the detriment of gliding angle. The plight of an aircraft pilot whose engine has died over the sea, though much less enviable, is similar to that of the sailplane pilot who has been hill-soaring and has wandered too far, his only hope of getting back being to dive pretty fast if he has to make way upwind, or to hold back to reduce sinking speed if his course is downwind. There are, in fact, three optimum gliding speeds, giving respectively minimum rate of sink, best gliding angle, and maximum ground distance covered. The first two depend on the characteristics of the aircraft, variable as they are by aerodynamic controls and by jettison of ballast (sailplanes have been equipped for carrying liquid ballast for this purpose). The third optimum speed depends in addition on the speed and direction of the wind. This is obviously the speed to be chosen by anyone under the necessity of getting as far as he can: its estimation—a matter of mathematics in any particular case—must be of the utmost importance to a pilot in the plight mentioned.

R. E. PEARS, Capt., R. Signals.



TODAYS PROJECT..

TOMORROWS ACHIEVEMENT

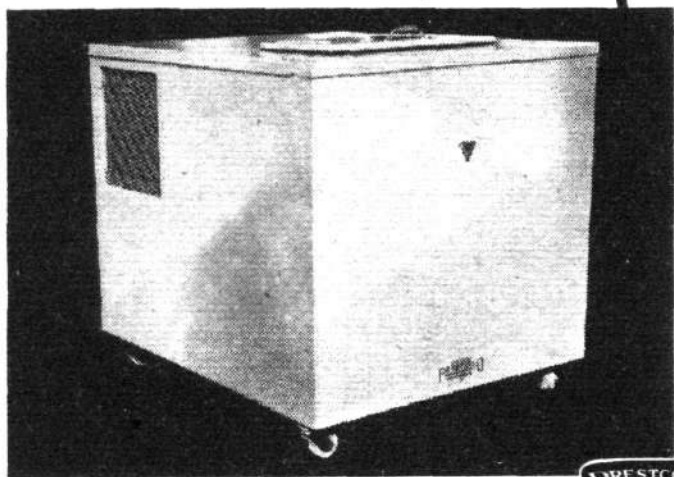
AIR TRANSPORT ROUND THE GLOBE

QATES PHOTO

OSBORNE-BELT

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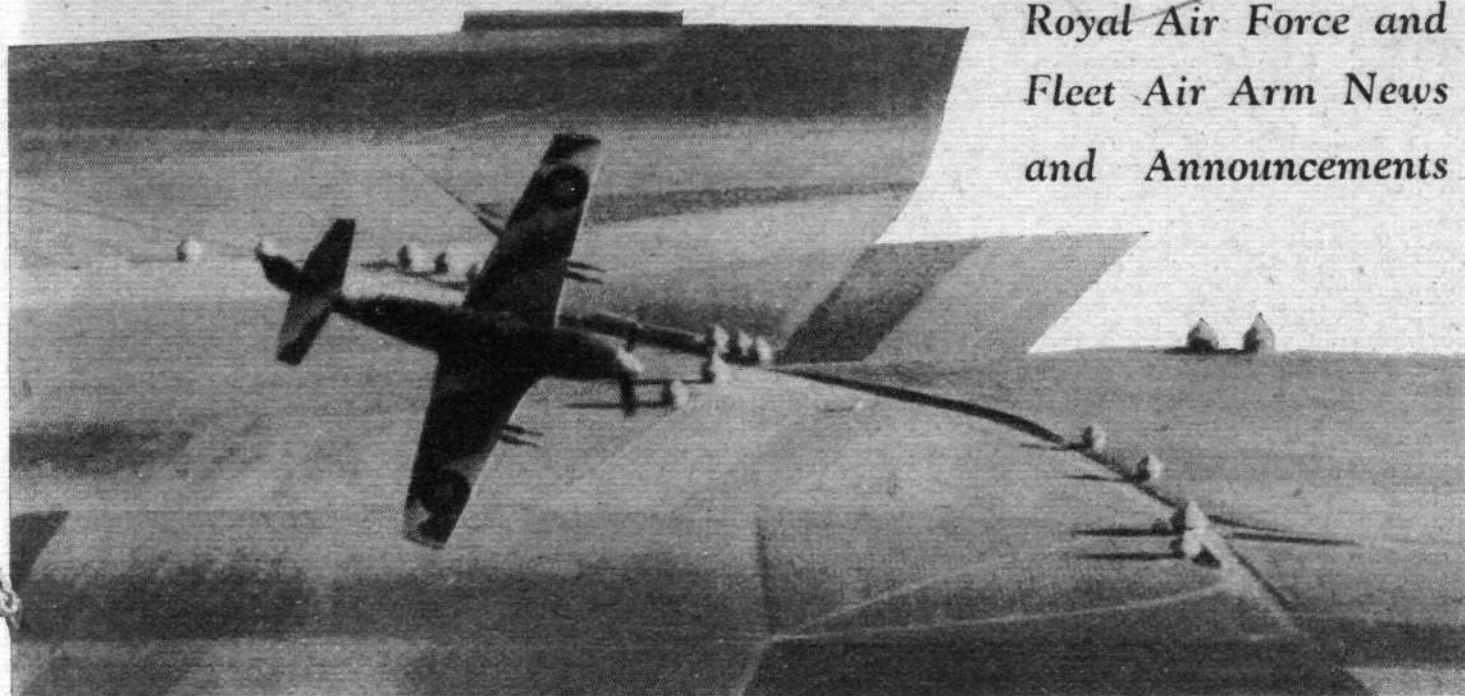
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SERVICE AVIATION



Royal Air Force and
Fleet Air Arm News
and Announcements



A cannon-armed Mustang disports itself over the English countryside.

Appointments

AIR COMDRE. J. W. CORDINGLEY, C.B., has been appointed to the new post of Director General of Manning at the Air Ministry and appointed to the acting rank of Air Vice-Marshal. He was previously Director of Manning.

Act. Air Comdre. W. H. PRIMROSE, C.B.E., D.F.C., has been appointed A.O.C., R.A.F. in Northern Ireland, having previously been Air Officer Commanding a wing.

Promotions

GENERAL DUTIES BRANCH.

Air Commodores are granted the rank of Act. Air Vice-Marshal:—

J. W. CORDINGLEY, C.B., C.B.E., November 30th, 1943.

A. O. BROWN, C.B.E., D.S.C., A.F.C., June 1st, 1943.

A. L. PAXTON, C.B.E., D.F.C., September 5th, 1943.

Wing Cdr. (Act. Air Comdre.) D. C. T. BENNETT, C.B.E., D.S.O., is granted the rank of Act. Air Vice-Marshal, December 6th, 1943.

Awards

Fleet Air Arm

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

For gallantry in air operations during the landings at Salerno, while operating from, or serving in, H.M. Ships *Battler* and *Hunter*:—

Bar to Distinguished Service Cross

Temp. Lt. (A) F. A. J. PENNINGTON, D.S.C., R.N.Z.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Distinguished Service Order

P/O. R. C. DUNSTAN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—This officer previously served with the Australian Imperial Forces during the first campaign in the Western desert, and during the siege of Tobruk was wounded and had his left leg amputated. He has completed a tour of duty as air gunner despite the handicap, going to his aircraft on crutches and crawling aft to his turret on one leg. P/O. Dunstan is one of the coolest and most skilful air gunners in the squadron. He has completed many important missions, and has invariably displayed great courage and devotion to duty.

Act. Sqn. Ldr. J. M. CHECKETTS, D.F.C., R.N.Z.A.F., No. 485 (N.Z.) Sqn.—In air operations this officer has displayed courage, fortitude and skill of a high order. He has taken part in a very large number of sorties, and has proved his skill

in many combats, having destroyed at least eleven enemy aircraft; he has also caused the destruction of two boats.

Distinguished Flying Cross

Act. Sqn. Ldr. P. G. WEEDON, R.C.A.F., No. 419 (R.C.A.F.) Sqn.

Flt. Lt. H. C. S. ARMSTRONG, R.A.F., No. 228 Sqn.

Flt. Lt. A. W. MARTIN, R.A.F.V.R., No. 502 Sqn.

Flt. Lt. D. J. McQUOID, R.C.A.F., No. 58 Sqn.

Flt. Lt. J. MUSGRAVE, R.A.F.V.R., No. 423 (R.C.A.F.) Sqn.

Flt. Lt. L. L. WHITAKER, R.A.F.V.R., No. 542 Sqn.

Act. Flt. Lt. E. G. APPLEBY, R.A.F.V.R., No. 90 Sqn.

Act. Flt. Lt. K. D. BATSON, R.A.F.V.R., No. 622 Sqn.

Act. Flt. Lt. J. BURKHARDT, R.A.A.F., No. 12 Sqn.

Act. Flt. Lt. J. L. CAUSTON, R.A.F.V.R., No. 102 Sqn.

Act. Flt. Lt. J. B. CLEVELAND, R.C.A.F., No. 426 (R.C.A.F.) Sqn.

Act. Flt. Lt. C. P. C. DE WESSELOW, R.A.F.V.R., No. 97 Sqn.



Sqn. Ldr. D. M. Balme, D.F.C., who has now been awarded the D.S.O.

Act. Flt. Lt. W. A. FORBES, R.A.A.F., No. 467 (R.A.A.F.) Sqn.

Act. Flt. Lt. A. GIBSON, R.A.F.V.R., No. 102 Sqn.

Act. Flt. Lt. R. C. SWETMAN, D.F.M., R.A.F.V.R., No. 97 Sqn.

Act. Flt. Lt. L. S. THORPE, D.F.M., R.A.F.V.R., No. 35 Sqn.

Act. Flt. Lt. A. C. WALTERS, R.A.A.F., No. 102 Sqn.

Act. Flt. Lt. J. H. WATERFIELD, R.A.F.V.R., No. 199 Sqn.

F/O. D. W. BALE, D.F.M., R.A.F., No. 619 Sqn.

F/O. D. BROWN, R.A.F.V.R., No. 37 Sqn.

F/O. R. J. CALVERT, R.A.F., No. 156 Sqn.

F/O. W. J. CAMERON, R.A.A.F., No. 460 (R.A.A.F.) Sqn.

F/O. W. T. CARROLL, R.A.A.F., No. 102 Sqn.

F/O. J. P. CURTIN, R.C.A.F., No. 138 Sqn.

F/O. A. F. DAVIDSON, R.A.F.V.R., No. 192 Sqn.

F/O. T. W. FAGG, R.A.F.V.R., No. 101 Sqn.

F/O. C. W. J. FARRINDER, R.A.A.F., No. 109 Sqn.

F/O. G. E. D. GERRARD, R.C.A.F., No. 12 Sqn.

F/O. T. C. GRAHAM, R.A.F.V.R., No. 75 (N.Z.) Sqn.

F/O. C. W. HAILSTONE, R.A.F.V.R., No. 158 Sqn.

F/O. G. G. HALESTRAP, R.A.F.V.R., No. 192 Sqn.

F/O. D. R. HARRISON, R.A.F.V.R., No. 161 Sqn.

F/O. C. S. HODGSON, R.A.F.V.R., No. 101 Sqn.

F/O. C. S. JOHNSTON, R.A.A.F., No. 51 Sqn.

F/O. D. MACINTOSH, R.A.A.F., No. 109 Sqn.

F/O. H. F. MACINTOSH, R.C.A.F., No. 429 Sqn.

F/O. G. A. MARTIN, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.

F/O. D. L. MAYES, R.A.F.V.R., No. 102 Sqn.

F/O. R. G. MCCADDEN, R.A.F.V.R., No. 76 Sqn.

F/O. B. P. MCGONAGLE, R.A.F.V.R., No. 57 Sqn.

F/O. W. A. C. PATTERSON, R.A.F.V.R., No. 78 Sqn.

F/O. E. PARSONS, R.A.F.V.R., No. 50 Sqn.

F/O. F. N. ROBINSON, R.A.A.F., No. 460 (R.A.A.F.) Sqn.

F/O. G. RUSSELL, R.A.F.V.R., No. 102 Sqn.

F/O. J. A. G. STEPHENS, R.A.F.V.R., No. 207 Sqn.

F/O. J. E. TIPTON, R.A.F.V.R., No. 109 Sqn.

F/O. T. V. WATTS, R.A.A.F., No. 460 (R.A.A.F.) Sqn.

F/O. M. D. WEDSTER, R.C.A.F., No. 50 Sqn.

F/O. W. WELLS, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.

F/O. E. WILLIAMS, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.

P/O. W. M. ADDISON, R.A.F.V.R., No. 51 Sqn.

P/O. J. T. AGNEW, R.A.F.V.R., No. 57 Sqn.

P/O. J. G. BARKER, R.A.F.V.R., No. 106 Sqn.

P/O. A. O. J. BISHOP, R.A.F.V.R., No. 78 Sqn.

P/O. L. I. BRISBIN, R.C.A.F., No. 101 Sqn.

P/O. E. L. BROWN, R.C.A.F., No. 427 (R.C.A.F.) Sqn.

P/O. H. C. BROWN, R.A.F.V.R., No. 138 Sqn.

P/O. E. F. CHRISTOPHER, R.A.F.V.R., No. 199 Sqn.

P/O. B. W. CULPIN, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.

P/O. E. DAVIES, R.A.F.V.R., No. 78 Sqn.

P/O. R. A. H. DUBE, R.C.A.F., No. 102 Sqn.

P/O. G. C. DUNN, R.A.F.V., No. 76 Sqn.

P/O. C. J. ENNIS, R.A.F.V.R., No. 78 Sqn.

P/O. D. W. FINDLAY, R.N.Z.A.F., No. 75 (N.Z.) Sqn.

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 P/O. G. W. HESELTON, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
 P/O. W. K. HYNAM, D.F.M., R.A.F.V.R., No. 100 Sqn.
 P/O. B. P. JACKSON, R.A.F.V.R., No. 431 Sqn.
 P/O. R. A. V. JAMES, R.A.F.V.R., No. 106 Sqn.
 P/O. E. E. KITCHEN, R.A.F.V.R., No. 78 Sqn.
 P/O. H. V. LAMBOURNE, R.A.F.V.R., No. 12 Sqn.
 P/O. J. LISTON, R.A.F.V.R., No. 106 Sqn.
 P/O. F. W. R. LITSON, R.A.F.V.R., No. 429 Sqn.
 P/O. J. N. LOVE, R.C.A.F., No. 207 Sqn.
 P/O. J. H. S. LYON, R.A.A.F., No. 9 Sqn.
 P/O. J. H. MASON, R.C.A.F., No. 50 Sqn.
 P/O. A. MATTHEW, R.A.F.V.R., No. 199 Sqn.
 P/O. N. M. MCCLELLAND, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
 P/O. C. L. MOREY, R.C.A.F., No. 106 Sqn.
 P/O. J. R. D. MORGAN, R.A.F.V.R., No. 158 Sqn.
 P/O. K. A. MYERS, R.A.A.F., No. 76 Sqn.
 P/O. R. M. NELSON, R.A.F.V.R., No. 97 Sqn.
 P/O. D. J. PARRY, R.A.F.V.R., No. 12 Sqn.
 P/O. J. H. PETRIE, R.N.Z.A.F., No. 7 Sqn.
 P/O. H. T. PETTIS, R.A.F.V.R., No. 61 Sqn.
 P/O. J. R. RHODES, R.N.Z.A.F., No. 196 Sqn.
 P/O. P. J. S. ROBERTS, R.A.F., No. 97 Sqn.
 P/O. M. D. SEALE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 P/O. J. G. SHARPE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 P/O. O. STEINBERG, R.C.A.F., No. 100 Sqn.
 P/O. R. K. W. TASKER, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 P/O. D. W. THOMPSON, R.A.F.V.R., No. 51 Sqn.
 P/O. G. L. VOGAN, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
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 P/O. A. P. WHITFORD, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
 P/O. D. K. WILLIAMS, R.A.F.V.R., No. 76 Sqn.
 P/O. A. C. WISHART, R.A.A.F., No. 156 Sqn.
 P/O. W. G. WISHART, R.A.F.V.R., No. 97 Sqn.
 P/O. E. N. WRIGHT, R.A.F.V.R., No. 76 Sqn.
 W/O. J. U. GORDON, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
 W/O. J. A. C. LOVIS, R.A.F.V.R., No. 156 Sqn.
 W/O. R. A. MCLEOD, R.C.A.F., No. 76 Sqn.
 W/O. B. F. SPARK, R.A.F., No. 51 Sqn.
 W/O. L. G. SANTOS, R.A.F.V.R., No. 7 Sqn.
 W/O. S. T. STACEY, R.A.F.V.R., No. 83 Sqn.
 W/O. C. A. WALSH, R.C.A.F., No. 77 Sqn.
 W/O. B. WELER, R.A.F.V.R., No. 12 Sqn.
 Act. W/O. A. W. BENNETT, R.A.F.V.R., No. 35 Sqn.
 Act. W/O. G. H. BULLOCK, R.A.F.V.R., No. 7 Sqn.
 Act. W/O. G. DALE, R.A.F.V.R., No. 35 Sqn.
 Act. W/O. D. G. EDWARDS, R.A.F., No. 100 Sqn.
 Act. W/O. M. REES, R.A.F.V.R., No. 35 Sqn.
 Act. W/O. J. D. WARREN, R.A.F.V.R., No. 103 Sqn.

Distinguished Flying Medal

Flt. Sgt. S. R. ARTER, R.A.F.V.R., No. 97 Sqn.
 Flt. Sgt. E. W. G. BIRCH, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
 Flt. Sgt. (now P/O.) R. G. BOWDEN, R.A.A.F., No. 100 Sqn.
 Flt. Sgt. N. R. BURY, R.A.F.V.R., No. 207 Sqn.
 Flt. Sgt. L. BUTLER, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
 Flt. Sgt. D. B. CLAXTON, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
 Flt. Sgt. L. R. COOK, R.A.F.V.R., No. 50 Sqn.
 Flt. Sgt. G. H. CROSS, R.A.F.V.R., No. 35 Sqn.
 Flt. Sgt. G. W. GLENCROSS, R.A.F.V.R., No. 57 Sqn.
 Flt. Sgt. A. T. MCDAVITT, R.A.F.V.R., No. 207 Sqn.
 Flt. Sgt. G. MILBURN, R.A.F., No. 156 Sqn.
 Flt. Sgt. J. MULDOON, R.A.F.V.R., No. 102 Sqn.
 Sgt. P. B. McDONNELL, R.A.F., No. 423 (R.C.A.F.) Sqn.
 Flt. Sgt. T. SAYER, R.A.F.V.R., No. 102 Sqn.
 Flt. Sgt. S. A. R. TAYLOR, R.A.F.V.R., No. 83 Sqn.
 Act. Flt. Sgt. S. D. COY, R.A.F.V.R., No. 156 Sqn.
 Act. Flt. Sgt. H. A. C. HAMMOND, R.A.F.V.R., No. 156 Sqn.
 Flt. Sgt. (now P/O.) R. B. REID, R.A.A.F., No. 101 Sqn.
 Flt. Sgt. F. G. ROBERTS, R.A.F.V.R., No. 100 Sqn.
 Flt. Sgt. (now P/O.) F. J. ROBERTS, R.C.A.F., No. 103 Sqn.
 Flt. Sgt. K. W. SMITH, R.A.F.V.R., No. 431 Sqn.
 Flt. Sgt. N. STOTT, R.A.F.V.R., No. 50 Sqn.
 Flt. Sgt. M. B. SUTHERLAND, R.A.A.F., No. 156 Sqn.
 Flt. Sgt. E. SUTTON, R.A.F.V.R., No. 83 Sqn.
 Flt. Sgt. A. J. V. THOMAS, R.A.F.V.R., No. 50 Sqn.
 Flt. Sgt. (now P/O.) B. M. TREACY, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 Flt. Sgt. P. A. WALKER, R.A.F.V.R., No. 97 Sqn.
 Flt. Sgt. H. C. WARREN, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
 Flt. Sgt. F. T. WATSON, R.A.F.V.R., No. 9 Sqn.
 Flt. Sgt. F. T. WILLIAMS, R.A.F.V.R., No. 97 Sqn.
 Flt. Sgt. H. A. WORICK, R.C.A.F., No. 78 Sqn.
 Flt. Sgt. G. WOODCOCK, R.A.F.V.R., No. 7 Sqn.
 Sgt. S. W. BARRETT, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
 Sgt. E. L. BAUMANN, R.A.F.V.R., No. 76 Sqn.
 Sgt. F. T. BELLINGER, R.A.F.V.R., No. 156 Sqn.
 Sgt. R. F. BOOTH, R.A.F.V.R., No. 101 Sqn.
 Sgt. E. BROOKS, R.A.F.V.R., No. 12 Sqn.
 Sgt. F. B. J. BURTON, R.A.F.V.R., No. 101 Sqn.
 Sgt. O. E. BURGER, R.A.F.V.R., No. 77 Sqn.
 Sgt. R. CHERLY, R.A.F.V.R., No. 78 Sqn.
 Sgt. E. J. CLARK, R.A.F., No. 100 Sqn.
 Sgt. L. W. DORRICOFT, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.

SERVICE AVIATION

Sgt. H. W. FELTON, R.A.F.V.R., No. 50 Sqn.
 Sgt. W. E. J. GILES (since deceased), R.A.F.V.R., No. 100 Sqn.
 Sgt. D. HANSLOW, R.A.F.V.R., No. 101 Sqn.
 Sgt. H. W. E. JEFFREY, R.A.F.V.R., No. 9 Sqn.
 Sgt. L. H. J. KING, R.A.F.V.R., No. 101 Sqn.
 Sgt. F. LAMBERT, R.A.F.V.R., No. 78 Sqn.
 Sgt. R. L. MARSHALL, R.A.F.V.R., No. 101 Sqn.
 Sgt. J. A. T. NOBLE, R.A.F., No. 78 Sqn.
 Sgt. J. P. OLIVIER, R.A.F.V.R., No. 78 Sqn.
 Sgt. F. PARR, R.A.F., No. 101 Sqn.
 Sgt. W. A. E. PEAKE, R.A.F.V.R., No. 100 Sqn.
 Sgt. T. A. PEARSE, R.A.F.V.R., No. 100 Sqn.
 Sgt. A. RENTON, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
 Sgt. R. SCHOFIELD, R.A.F.V.R., No. 101 Sqn.
 Sgt. R. SIDWELL, R.A.F.V.R., No. 101 Sqn.
 Sgt. E. P. TOLAN, R.A.F.V.R., No. 78 Sqn.
 Sgt. R. TOWNSEND, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
 Sgt. T. L. WALKLEY, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
 Sgt. H. E. M. WATSON, R.A.F.V.R., No. 78 Sqn.
 Sgt. H. G. B. WEEKS, R.A.F., No. 100 Sqn.

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

O.B.E. (Mil.)

Act. Group Capt. M. B. EDWARDS, R.A.F.—One morning in September, 1943, a Beaufighter aircraft crashed on an airfield and immediately



Air Marshal Sir Richard Peck, K.C.B., O.B.E., Assistant Chief of Air Staff.
 Sir Richard is an official spokesman on air-war matters.

burst into flames. Group Capt. Edwards, the station commander, proceeded to the scene of the accident and, ignoring the danger from exploding ammunition and air bottles, entered the aircraft to rescue the trapped pilot. He released the pilot's harness and then led him out of the aircraft, at the same time giving directions and inspiration to others who had come to assist. Thirty seconds after the pilot had been dragged clear of the wreckage the oil tanks exploded. Group Capt. Edwards showed courage of a high order and set a fine example to all personnel at the station. His action was all the more commendable as, during the night, two other aircraft had crashed and caught fire within sight of the airfield and Group Capt. Edwards had had a disturbed and trying time as a result.

M.B.E. (Mil.)

Flt. Lt. S. T. WINTER, M.B. CHB, R.A.F.V.R., No. 7 Sqn.—When returning from an operational sortie one night in July, 1943, a Stirling aircraft crashed whilst attempting an emergency landing. The bomber burst into flames. Flt. Lt. Winter, who was the medical officer on duty, immediately proceeded to the scene. Regardless of his own safety, he assisted the crew to escape and entered the burning fuselage in a vain endeavour to release the mid-upper gunner, who was trapped upside down in his turret. Despite burns to his head and face, Flt. Lt. Winter then attended to the needs of the injured members of the crew.

F/O. H. TAYLOR, R.A.F.V.R.—This officer, a Seafire pilot on a merchant ship, was sailing in convoy in North Africa in May, 1943, when the ship in which he was travelling was torpedoed and sunk. The starboard accommodation was wrecked by the explosion of the torpedo and F/O. Taylor, missing a brother officer, went to his cabin. He found the cabin door jammed by

debris, but broke it open and saw the officer lying unconscious. F/O. Taylor, with complete disregard for his own safety, attempted to drag him on deck, but was unable to do so owing to his weight. He obtained the assistance of one of the crew and between them they were able to take the unconscious officer on deck. This gallant action, undertaken with the knowledge that the ship was sinking, undoubtedly saved the life of his companion.

George Medal

Sqn. Ldr. S. L. THOMPSON, R.A.F., and L.A./C. D. W. SETCHELL, R.A.F.V.R.—At 02.00 hours on June 26th, 1943, a 250lb. bomb exploded in a bomb dump and set fire to a store containing target illuminators. Sqn. Ldr. Thompson, an armament officer, immediately proceeded to the scene. The steel doors of the store containing the target illuminators, which were exploding and burning furiously, were partially closed. Although the heat was intense and a number of fused bombs were lying nearby, Sqn. Ldr. Thompson and L.A./C. Setchell, who worked under the officer's instructions, forced open the doors sufficiently to enable water to be played on the fire, which was eventually got under control. It was then necessary to move the unexploded bombs to a place of safety. Three of the bombs were fused; they had sufficient severe jar from the first explosion, and there was a grave risk of detonation. Nevertheless, this officer and airman, ignoring the danger, loaded the bombs on a trolley and moved them to a safe area. Their prompt and courageous action prevented further very severe damage being caused.

B.E.M. (Mil.)

Flt. Sgt. R. M. SIMPSON, R.N.Z.A.F., No. 104 Sqn.—In September, 1943, Flt. Sgt. Simpson was captain of an aircraft detailed to attack enemy targets in Italy. While taking off a tyre burst, causing the bomber to swing and turn through a complete circle. It finally crashed and caught fire. The aircraft had full petrol tanks and carried eighteen 250lb. bombs. The crew left the aircraft safely and Flt. Sgt. Simpson then saw another bomber within 150 yards. Realising the probability that, on his own aircraft exploding, the second bomber would be destroyed, and with full knowledge of the extreme danger and personal risk involved, he decided to taxi the latter aircraft to a safe distance. He was in the act of priming the engines when the crashed bomber exploded, scattering bomb splinters and fragments in all directions. Flt. Sgt. Simpson, with cool determination, continued his efforts and taxied the other bomber away undamaged.

Flt. Sgt. E. H. SPEIGHT, R.A.F., Act. Cpl. E. S. WEATHERLEY, R.A.F.V.R., and L.A./C. J. D. B. FIDLER, R.A.F.V.R.—A Baltimore aircraft, loaded for a long-distance flight and carrying a very large quantity of petrol, crashed whilst taking off and burst into flames. The pilot and wireless operator were killed instantly and a third member of the crew was pinned beneath the burning wreckage. Flt. Sgt. Speight, Cpl. Weatherley and L.A./C. Fidler, displaying complete disregard for their own safety, immediately endeavoured to rescue the trapped airman. After a considerable time and under great difficulties they succeeded in extricating him. The courage and devotion to duty displayed by rescuers undoubtedly saved their comrade's life.

Cpl. D. FITZPATRICK, R.A.F., No. 262 Sqn.—In August, 1943, a Spitfire aircraft crashed on a landing ground and immediately burst into flames. Cpl. Fitzpatrick, who was in a truck nearby, immediately jumped out and, without hesitation, went to the burning aircraft. Regardless of personal safety, he extricated the pilot even though, while so doing, more petrol ignited and the fire raged furiously. In effecting the rescue Cpl. Fitzpatrick sustained burns but, nevertheless, having got the pilot clear of the aircraft, he persisted in removing his comrade's burning clothes.

Cpl. T. H. KING, R.A.F.V.R., No. 75 (N.Z.) Sqn.—In September 1943, an aircraft, which was taking off with a load of bombs, crashed into two houses on the edge of an airfield and burst into flames. Cpl. King hurried to the scene and, although fully aware that high explosive bombs were likely to explode at any moment, he went to the cottages a few yards from the burning aircraft to warn the occupants of their imminent danger and render assistance. An injured man was found and while Cpl. King, with the help of a civilian, was taking him to safety a bomb exploded. The bravery shown by Cpl. King was instrumental in saving a life, and many more lives might have been lost had it not been for his prompt action in helping to warn occupants of the nearby houses.

Cpl. A. REILLY, R.A.F.V.R.—In May, 1943, an aircraft crashed and burst into flames while landing. Four of the crew were trapped in the burning wreckage, and Cpl. Reilly, on arrival at the scene of the accident, immediately dashed into the flames and dragged one of the crew clear. He then did all in his power to extinguish the flames that enveloped the airman, himself sustaining severe burns to his face, hands and arms. Although his gallant action failed to save the life of the airman, Cpl. Reilly showed complete contempt for danger and disregard of his own safety.

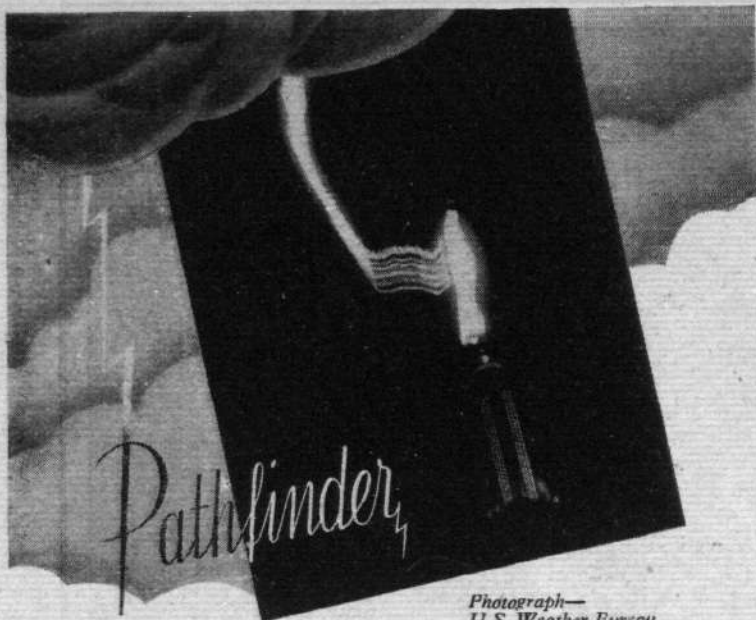
L.A./CW. L. S. ELLIS, W.A.A.F., No. 953 Sqn.—In May, 1943, L.A./CW. Ellis was in charge of a Balloon Site when an enemy air attack developed. Despite the intensity of the raid this airwoman supervised the balloon operation and ensured its completion. At the same time she took every precaution for the safety of the personnel not engaged in flying the balloon. When the operation was complete the site was hit by a bomb which killed three and wounded four of the air



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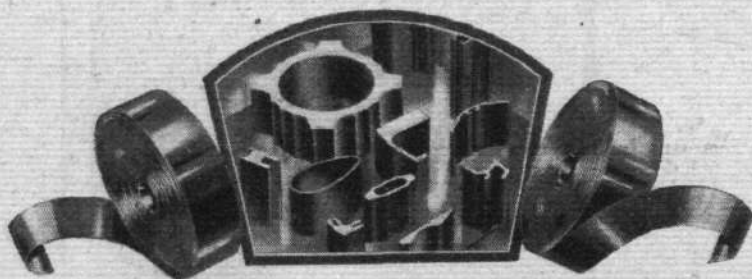


Photograph—
U.S. Weather Bureau.

Nature has HER Pathfinders as well as Man.

Strange as it may seem, the main flash of Lightning ascends from (not descends to) the Earth—and follows the track of the "pathfinder"—a small "dart" descending from the cloud and establishing a track along which the flash can speed upward.

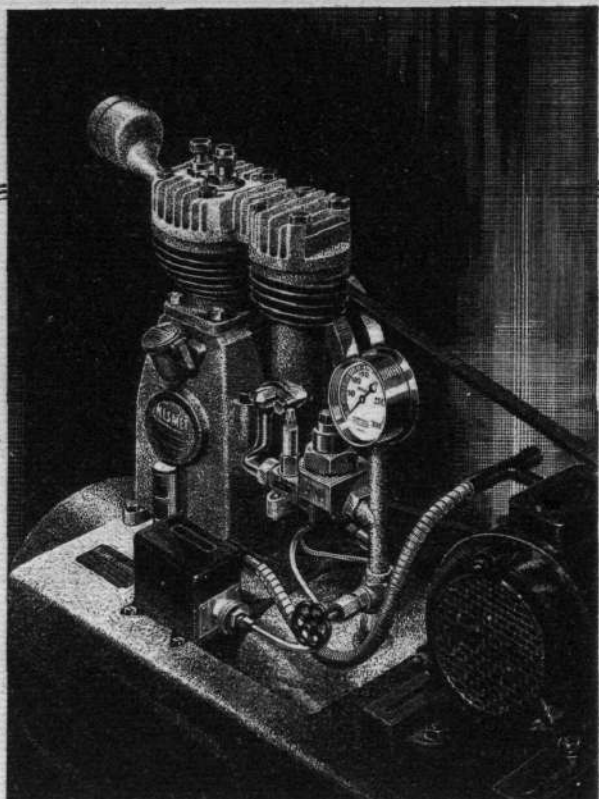
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SERVICE AVIATION

F/O. J. Walton; Sqn. Ldr. H. A. A. Webster; P/O. D. G. Williams.

MISSING.—Sgt. W. H. Adams; Sgt. E. F. M. Barham; Sgt. A. T. Bateman; P/O. S. J. Bell; Sgt. H. J. Bird; Sgt. E. J. Boardman; Sgt. F. W. Bundy; Sgt. E. Carter; Sgt. J. Chance; Sgt. L. Cohen; Sgt. P. R. Cowling; F/O. W. D. Crew; Sgt. H. R. Crust; Sgt. J. W. Diddle; Flt. Sgt. G. K. M. Elliott; Flt. Sgt. W. H. Foot; Sgt. C. W. Gibb; Sgt. G. J. Godeff; Flt. Sgt. K. Gore; W/O. S. G. W. Hall; Sgt. J. H. Hawkins; Flt. Sgt. W. H. Hedley; Sgt. P. G. Higham; Sgt. T. Leckey; Sgt. J. H. Lovelock; Sgt. A. W. N. Lower; F/O. A. R. MacDonald; Sgt. C. R. McGregor; Sgt. J. Manderson; Sgt. R. B. J. March; Flt. Sgt. T. A. Martin; F/O. W. F. Mellor; Sgt. A. S. Moore; Sgt. R. Morgan; Sgt. E. C. Pocknell; Sgt. F. A. Porter; F/O. C. Ramsay; Flt. Sgt. L. L. Richards; Sgt. L. W. Searle; P/O. T. L. Simpson; W/O. F. J. Spencer; Sgt. E. A. Steele; Flt. Sgt. D. M. Watson; Sgt. F. E. White; Sgt. L. Wild; F/O. H. P. Willson; Sgt. D. S. Wilson; W/O. B. C. N. Wright.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. A. McN. Davidson.

KILLED ON ACTIVE SERVICE.—A/C.2 H. C. Broad; Sgt. J. G. S. Browne; Sgt. D. G. Codrington; L.A./C. A. McD. Dickson; P/O. N. G. Donald; Sgt. T. Edwards; L.A./C. K. S. Elliott; Sgt. S. Fairhurst; Cpl. B. J. Ford-Smith; L.A./C. J. A. Gaugan; L.A./C. A. P. Gray; L.A./C. C. Greasley; F/O. A. A. Green; Sgt. R. A. Harris; Sgt. W. E. Hawksworth; Sgt. B. Hewson; Sgt. K. Irvin; Flt. Sgt. W. E. Jones; Sgt. E. W. Knox; Sgt. L. T. MacSwaine; Sgt. L. Mortimer; Flt. Sgt. T. H. Mullan; A/C.1 J. Oates; Sgt. R. W. Patch; Sgt. C. D. Peary; Cpl. I. S. Phillips; F/O. M. G. Rendall; Sgt. T. R. M. Robertson; Sgt. W. H. Southgate; A/C.2 R. Stewart; L.A./C. J. H. Tait; L.A./C. H. E. Wilkinson; Flt. Sgt. J. Wood; Sgt. G. A. Yates.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A./C. S. G. Cook; L.A./C. E. N. Davies; Sgt. T. E. Martinson.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A./C. F. S. Harper; P/O. R. Hooper.

DIED ON ACTIVE SERVICE.—L.A./C. M. Baker; L.A./C. J. Bell; Sgt. E. G. Berry; L.A./C. A. Beverley; Cpl. G. P. Bridger; F/O. H. Cartledge; L.A./C. R. G. Cassell; L.A./C. J. H. Cornish; L.A./C. A. R. Cowell; Cpl. E. J. Davies; L.A./C. L. S. Gauntlett; Flt. Sgt. R. Harper; Act. Cpl. R. Hunt; A/C.1 E. G. Martin; F/O. N. W. Monk; Sgt. G. L. Newton; Cpl. A. T. Smith; L.A./C. F. B. Smith; F/O. E. G. H. Stevenson; L.A./C. E. J. Welch; L.A./C. J. Wilkinson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. L. C. Baker; Sqn. Ldr. C. O. Bastian; D.F.C.; F/O. W. T. Batson; D.F.M.; F/O. J. J. Carrie; F/O. S. W. J. Coventry; Sgt. A. W. Edgley; Sgt. L. E. Ellingham.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A./CW. L. F. Kirby.

Royal Australian Air Force

KILLED IN ACTION.—P/O. G. L. L. Hay; Flt. Sgt. R. T. Pound.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. H. G. Brownjohn; F/O. F. S. Davenport; MISSING.—F/O. N. H. Knight-Brown; F/O. K. R. Wood.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. H. R. Morton; Flt. Sgt. L. T. Newton; Flt. Sgt. E. G. Reading.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. J. F. McEwen. PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. M. J. Dean; Sgt. R. E. Noble; Flt. Lt. J. A. Rae; Flt. Sgt. A. M. Reynolds; Sgt. G. E. Somerville; Sgt. C. E. Wilde.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. R. Bailey; P/O. C. J. Bennett; Sgt. L. A. Bernick; Sgt. R. J. Blenkarn; P/O. E. G. K. Bullen; Sgt. F. Burrill; F/O. B. W. Carmichael; F/O. L. B. Carson; Sgt. L. J. Conway; Flt. Sgt. R. J. Cowan; P/O. E. T. Cox; P/O. R. J. S. Dawson; Sgt. H. McK. Duke; P/O. I. D. Fountain; Sgt. S. Franchuk; Flt. Sgt. I. Fraser; Sgt. J. E. Galbraith; Sgt. G. L. Harrison; Sgt. W. H. Hawthorne; Sgt. G. R. Hoyt; Sgt. C. E. Jamieson; W/O. V. R. Long; Sgt. L. McL. Lymburner; P/O. C. A. McArdle; Sgt. J. R. G. McFarland; Sgt. J. D. McIntyre; Flt. Sgt. H. R. McKay; Sgt. A. F. W. McLeod; F/O. G. Milne; Flt. Lt. P. T. O'Leary; Sgt. A. G. Olson; Flt. Sgt. S. A. P. Palmer; F/O. J. M. Patterson; F/O. W. N. Pleasance; F/O. J. S. Renouil; Flt. Sgt. J. DeF. Russell; Sgt. C. J. Smith; Sgt. M. B. St. John; P/O. D. G. Thompson; Sgt. G. R. Titus; Sgt. C. C. Trudell; Flt. Sgt. J. H. Ward; Flt. Sgt. F. A. Webb; Flt. Sgt. R. H. Welsh; P/O. R. J. Westgate; Sgt. L. H. Williams; F/O. F. L. S. Wismer; F/O. T. C. S. Wood.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Flt. Sgt. R. H. Halliday.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. G. R. A. Walkem.

MISSING.—P/O. M. W. H. Askey; Flt. Sgt. J. R. Baxter; Flt. Sgt. E. C. Brunet; F/O. W. P. Cameron; F/O. A. W. Dunagate; Flt. Sgt. I. R. Forster; Flt. Sgt. E. B. Gillespie; F/O. C. W. Hamann; P/O. C. W. McFarlane; Flt. Sgt. E. K. Maden; F/O. W. H. Offer; P/O. J. N. R. Redpath; F/O. A. V. Snook; Flt. Sgt. D. S. Storey; W/O. M. E. Varney; F/O. W. A. Wallace; Sgt. J. I. Wilson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. M. Antiaev; P/O. M. E. O'Donoghue.

KILLED ON ACTIVE SERVICE.—Sgt. B. W. Burke; Sgt. J. L. Campbell; Sgt. W. J. Christie; W/O. W. H. Howson; Flt. Sgt. R. M. McEachern; Flt. Sgt. J. H. McMaster; Sgt. W. Paterson; Sgt. K. W. Pollitt; Sgt. L. H. Ramage; Act. Flt. Lt. G. S. Richards; Flt. Lt. W. R. P. Sewell; Flt. Sgt. H. R. Simmons; Flt. Sgt. H. O. Spence; Flt. Sgt. A. B. White; W/O. F. Zayezierski.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. G. E. Walker.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. Ash; F/O. J. J. Earls.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. S. H. Martin; Sgt. E. E. Spencer.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. A. T. H. Cullum.



On parade when No. 85 Squadron received its crest. (Left to right) Wing Cdr. John Cunningham, D.S.O. and Bar, D.F.C. and Bar; Flt. Lt. Molony; Sqn. Ldr. W. P. Green and Sqn. Ldr. E. A. Crew, D.F.C. and Bar.

women. Although L.A./CW. Ellis was one who was severely hurt she took charge of the situation and maintained the balloon in its operational position until assistance arrived. She also organised relief parties, and by so doing undoubtedly saved the life of at least one airwoman who might have died without first aid treatment. Throughout the raid, L.A./CW Ellis displayed outstanding leadership, coolness and courage.

A/C.2 R. FRAZER, R.A.F.—This airman was one of a draft of R.A.F. personnel which left Singapore, in one of two small steamships, at dusk one evening in February, 1942. The next day the ships were sighted by Japanese aircraft, and, after being bombed and set on fire, they eventually sank off Pompong Island. After swimming ashore this airman, although wounded in the head, voluntarily assisted in manning a lifeboat in which it was intended to return to one of the stricken ships, which was then fully ablaze and sinking, in order to rescue women and children on board. The strong tide prevented the lifeboat from reaching the ship, which drifted into an area crowded with drowning and wounded people. A/C.2 Frazer, still bleeding from the wound to his head, dived into the shark-infested water time and again and assisted some 20 women and children to safety in the lifeboat. A landing was eventually made on the island of Kebat. This airman, displaying great courage and fortitude, continued to assist in making others comfortable until the party was picked up three days later.

THE KING has been graciously pleased to approve the following awards in recognition of distinguished services:—

Military Cross

Sqn. Ldr. H. N. FOWLER, R.A.F.

Distinguished Conduct Medal

Sgt. (now P/O.) P. T. WAREING, R.A.F.V.R.

Military Medal

(now P/O.) C. E. McDONALD, R.C.A.F., No. 3 Sqn.

Royal Canadian Air Force

THE KING has been graciously pleased, on the advice of His Majesty's Canadian Ministers, to approve the following posthumous award:—

George Cross

L.A./C. K. G. SPOONER, R.C.A.F.

Award of a Foreign Decoration

THE KING has granted unrestricted permission for wearing of the undistinguished decoration, conferred upon the officer indicated, in recognition of valuable services rendered in connection with the war:—

Conferred by the Belgian Government

Croix de Guerre, First Class

Col. H. J. MARTIN, C.B.E., D.F.C., S.A.A.F.

Roll of Honour

Casualty Communiqué No. 333.

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.

Of the names in this list, 98 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. D. N. Carter; Sgt. E. W. P. Coates; Sgt. J. H. Leach; W/O. D. R. C. Mace; Sgt. H. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. J. H. Atkinson; F/O. B. G. Evans; D.F.M.; Act. Sqn. Ldr. J. T. Hanafy; Sgt. E. W. Matthews; Sgt. V. S. Platt; Flt. Lt. W. A. Tetley; D.F.C.; Sgt. F. M. Traynor.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. H. W. Astin; F/O. F. W. Bartlett; Act. Flt. Lt. P. Brennan; F/O. R. H. Carr; Sgt. J. C. Clarke; P/O. G. Cook; F/O. S. J. Cornes; Sgt. C. N. Goodchild; Sgt. G. E. Green; Sgt. F. W. Heaton; Sgt. E. H. Hooper; Sgt. L. E. James; Sgt. K. V. Jones; Flt. Lt. W. J. King; Sgt. E. W. Oxenbridge; Sgt. R. McM. Pace; Sgt. J. L. Richardson; F/O. A. H. Stanley; Sgt. J. B. Stephens; P/O. F. A. S. Wallis; Sgt. R. G. Watson; Sgt. C. F. White; P/O. P. P. Whitley; Sgt. B. W. Willbourn.

WOUNDED OR INJURED IN ACTION.—P/O. C. G. Pearce; D.F.C.; Sqn. Ldr. J. B. Selway; Flt. Lt. D. R. Turley-George.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. A. F. W. N. Croft.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. V. J. Barnes; Sgt. D. Bartley; Sgt. F. G. Beardwell; P/O. D. W. Brookes; Flt. Lt. A. M. Cameron; Flt. Sgt. A. B. Christie; Sgt. T. J. Clark; Sgt. J. C. Cole; F/O. J. R. Fisher; F/O. P. R. Flyte; F/O. W. R. Forester; Sgt. A. W. Franklin; F/O. G. Ingram; Sgt. J. L. Killan; Sgt. A. I. Leslie; Flt. Sgt. J. S. McKay; Sgt. C. A. Maskell; F/O. E. F. Myers; Sgt. F. G. Norman; F/O. A. J. Palmer; F/O. W. T. Potter; Flt. Sgt. C. V. Proud; Sgt. G. Read; Flt. Sgt. S. A. Richardson; Sgt. K. G. Sewell; Flt. Sgt. W. E. A. Spencer; Sgt. R. Sykes; Sgt. P. Twiddy;

SERVICE AVIATION

Royal New Zealand Air Force

MISSING, BELIEVED KILLED IN ACTION.—F/O. F. J. Hunter.
MISSING.—Flt. Sgt. R. J. Wright, D.F.M.
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. W. H. Hickson.

South African Air Force

MISSING.—Lt. H. M. Taylor.
KILLED ON ACTIVE SERVICE.—Capt. H. Barnard; 2/Lt. A. Steyn.

Casualty Communique No. 334

Of the names in this list, 99 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. A. G. Hall; Sgt. C. H. Robbins.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. J. G. Campbell; Sgt. C. Field; F/O. M. J. French; F/O. R. J. C. W. Giles; Sgt. B. F. Goldsmith; Act. Sqn. Ldr. W. R. Greenslade, D.F.C., A.F.C.; Sgt. F. L. Hughes; Flt. Sgt. R. W. Lane; Sgt. E. McKim; Sgt. I. L. MacLean; Sgt. E. H. S. Marsh; Sgt. E. L. Moore; Flt. Sgt. W. Orange; Sgt. E. J. Smith; Sgt. M. K. Smith; F/O. D. R. Tuft.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. E. J. Ablewhite; Sgt. F. Barratt; Sgt. D. A. Booth; P/O. M. K. Brett; Sgt. T. Chalmers; Sgt. A. W. Clark; Sgt. T. L. Gray; P/O. K. C. Hammond; Sgt. R. Haslam; Sgt. J. McKee; F/O. P. B. Martell; Sgt. H. B. Moorshead; Sgt. H. Reddy; Sgt. J. H. Sheppard; Sgt. R. Sinden; Flt. Sgt. A. K. Smith; Flt. Sgt. J. F. Smith; Sgt. L. C. Smith; Sgt. J. Stoneley; Sgt. H. B. Vine; Sgt. W. A. Wainwright; Sgt. K. Westthorp; P/O. S. H. J. White; P/O. R. A. Williams; Sgt. K. E. Winsor; Sgt. S. A. Woodrow.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. T. F. C. A. Hickie.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. H. F. Bryson; Flt. Sgt. W. J. Dowle; Sgt. J. P. King; F/O. M. Passmore; F/O. W. Seaman, A.F.C.; P/O. P. A. Tavernier; Flt. Sgt. E. F. Taylor.

MISSING.—Flt. Sgt. D. Adams; Sgt. F. H. Andrews; F/O. J. S. Barber; Sgt. G. P. Baylis; Flt. Lt. P. J. Blurton, D.F.C.; F/O. D. R. B. Brown; Sqn. Ldr. E. W. Brown; Sgt. J. F. Challis; Sgt. P. Coxell; Sgt. J. V. P. Daly; Sgt. A. H. Denton; Sgt. E. H. Edmonds; Sgt. J. C. Ellis; Flt. Sgt. E. Fairfield; Sgt. W. M. C. Fuller; Flt. Sgt. K. Garvey; Sgt. H. W. Gay; Sgt. R. C. Graham; Sgt. C. W. Gray; P/O. E. A. Hackshaw; Sgt. R. O. Hand; Sgt. C. Harlington; F/O. F. D. Hill; Flt. Sgt. V. E. Horn; Sgt. L. Ivory; P/O. E. L. Jackson; Sgt. E. Jenkinson; Sgt. R. Jobson; Sgt. W. Jones; Sgt. G. C. King; P/O. J. E. Kirkup; Act. W/O. K. R. Lee; Act. Sqn. Ldr. W. J. Lewis, D.F.C.; Sgt. D. J. McCarthy; Sqn. Ldr. A. L. McDowell; Sgt. J. A. MacNish-Porter; Flt. Sgt. J. H. Mallin; P/O. B. F. H. Miller; Sgt. R. C. Morley; Sgt. E. A. Murray; Sgt. B. O'Connell; Sgt. R. E. Pedder; Sgt. A. Richmond; Flt. Sgt. J. C. Robertson; Sgt. H. G. Rogers; Sgt. J. L. Roll; Sgt. J. Pretsell; F/O. E. R. Price; Sgt. H. Priestley; P/O. A. J. Scott; Sgt. M. Sheedy; Sgt. F. E. Skinner; Sgt. I. M. Smith; Sgt. V. J. Southgate; Sgt. C. L. Spink; Sgt. H. T. Spurrey; F/O. K. Stakes; Act. Wing Cdr. S. G. Stilling, D.F.C.; Sgt. D. W. Stribley; Flt. Lt. R. M. Walsley; F/O. D. C. Welch; F/O. R. P. Wissler; F/O. P. M. Wroath.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—L.A./C. A. W. Adams; L.A./C. J. P. Goates; L.A./C. D. O. Hedges; L.A./C. W. Hetherington; Sgt. G. J. McFadyean; Flt. Sgt. P. News.

KILLED ON ACTIVE SERVICE.—L.A./C. R. A. S. Crabb; Sgt. M. A. Crimmins; Sgt. S. J. Day; Sgt. S. Edmondson; Sgt. H. J. Ford; Sgt. G. A. Hall; Sgt. F. W. Hunt; Sgt. R. C. Mitchell; L.A./C. P. J. Nicholls; Flt. Sgt. R. J. Pebody; Sgt. V. G. Penny.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. G. Wylie.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. C. G. Hirst; L.A./C. A. L. Nutter.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. R. McD. Ronaldson; P/O. T. Walker.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 C. J. Whiting.

DIED ON ACTIVE SERVICE.—L.A./C. J. E. Argent; A/C.2 R. E. Eales; L.A./C. P. Kirwin; A/C.1 H. Lee; Act. Flt. Lt. A. W. J. Norkett; W/O. G. F. Staples.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. D. E. Burrows;



FIRESIDE REFLECTIONS: A discussion group in session at a Scottish fighter station of the R.A.F.

Sgt. T. E. F. Carr; Flt. Sgt. R. L. Davies; Sgt. R. G. Goodenough; Sgt. S. K. Gordon-Powell; Flt. Sgt. T. Jefferson; Sgt. P. Norris; Sgt. J. F. Primmitt; P/O. R. B. Smith, D.F.C.; F/O. D. G. Spencer; Flt. Sgt. R. Wilkinson.

Women's Auxiliary Air Force

KILLED ON ACTIVE SERVICE.—Assist. S/O. K. I. Hughes.

Royal Australian Air Force

KILLED IN ACTION.—F/O. D. G. Howie.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. H. Baker; P/O. W. E. K. Charlton; Sgt. B. Knillands; F/O. H. A. McLennan; Flt. Sgt. F. W. Morgan; P/O. A. K. Parker; Flt. Sgt. J. M. Parsons; P/O. W. C. Salmon; Flt. Sgt. J. S. Stewart; Flt. Sgt. E. C. Turner; Flt. Sgt. F. H. Ward; P/O. D. E. White.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. W. R. Minter; Flt. Sgt. E. E. Parker.

MISSING.—F/O. F. A. Beyer; Flt. Sgt. J. W. Evans; F/O. R. O. MacLean; Flt. Sgt. D. Menere; P/O. D. F. Moore; Flt. Sgt. K. McR. Smith.

KILLED ON ACTIVE SERVICE.—Sgt. A. H. Anderson; P/O. C. G. Finch; Flt. Sgt. J. F. Parker; P/O. L. J. Quaite; Flt. Sgt. J. J. Walsh.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Group Capt. P. G. Heffernan; F/O. B. McFadden. DIED ON ACTIVE SERVICE.—Flt. Sgt. G. J. Talbot.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. W. Roberts; F/O. L. M. Sullivan.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. E. H. Hill; Sgt. T. Lafontaine; Sgt. H. McQueen; Sgt. H. J. Salisbury.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. C. M. S. Awad; W/O. D. L. Beatty; Sgt. M. R. Dixon; F/O. G. W. Elliott; Sgt. J. A. Farrel; Sgt. L. T. Fulcher; F/O. B. W. Glickman; Sgt. W. S. Harris; F/O. E. E. Kennedy; P/O. J. W. Lennox; Flt. Sgt. F. G. McCordle; Sgt. J. W. McIntosh; Sgt. C. D. Menzies; F/O. H. M. Metcalfe; Sgt. A. D. Monaghan; P/O. S. Pennington; P/O. N. C. Swan; Sgt. R. E. Talman; P/O. J. K. Watson.

WOUNDED OR INJURED IN ACTION.—F/O. G. Bird.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—W/O. E. H. Robinson.

MISSING, BELIEVED KILLED IN ACTION.—W/O. E. C. Champion; Flt. Lt. E. B. Elliott; F/O. J. H. Harrison; Flt. Sgt. R. E. Hawken; Flt. Lt. A. Novick; Flt. Sgt. J. E. Paquet; Flt. Sgt. J. L. Perrin; Sgt. P. L. J. M. Quenet; Flt. Sgt. R. Ranger; Sgt. H. Russell; Flt. Sgt. E. A. Teole; Sgt. R. A. Wells.

MISSING.—P/O. J. H. Balloch; Flt. Lt. J. M. Barnes; W/O. W. Beckthold; Flt. Sgt. C. M. Berg; F/O. A. E. Beyak; Flt. Sgt. W. Burns; P/O. A. Chorneyko; W/O. J. H. Cowieson; F/O. D. W. Ditzler; Sgt. R. G. Dunn; Flt. Sgt. C. E. Flewin; Sgt. F. W. Forster; Sgt. R. M. Fournier; Sgt. J. Galloway; W/O. G. A. Gauley; Sgt. M. E.

Gee; Flt. Sgt. J. A. Grenier; Flt. Sgt. W. Howard; Flt. Lt. J. L. J. Kennedy; Sgt. H. S. McCartney; Flt. Sgt. N. S. McLeod; F/O. A. P. Mazur; Flt. Sgt. S. A. Minter; Sgt. A. Mitchell; W/O. G. T. Mutton; Act. Sqn. Ldr. H. P. Peters, D.F.C.; F/O. L. J. Roberts; Flt. Sgt. L. B. Russell; F/O. I. Schilansky; Sgt. C. C. Smith; Flt. Lt. H. J. Southwood; Sgt. A. E. Spencer; Flt. Sgt. G. G. Sveinson; Flt. Sgt. T. R. H. Todhunter; Sgt. J. H. Upton; F/O. J. R. Wardrope; Flt. Sgt. P. Watson; Flt. Sgt. H. A. Weber; Sgt. W. J. Whitney; F/O. W. Yurchison.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. S. M. Craig.

KILLED ON ACTIVE SERVICE.—P/O. A. D. Blackman; F/O. S. MacK. Flett; Sgt. R. L. Green; Sgt. J. E. Holbeck; Sgt. P. E. Krotz; Sgt. L. W. Lehman; Flt. Sgt. A. H. MacDonald; Sgt. A. B. McVean; Sgt. R. F. Mechin; Sgt. J. E. O'Grady; P/O. D. Potts; Flt. Sgt. C. A. Turner.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. W. J. K. Dickson; P/O. O. H. Mennie.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. R. A. Davis; Sgt. A. Follett.

DIED ON ACTIVE SERVICE.—A/C.1 H. O. Olson; L.A./C. I. Padveen, L.A./C. J. G. A. Poudrette.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. L. Chapman; F/O. G. M. Parkinson.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. R. B. Verbazoni.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. E. Outhbert; P/O. M. Lord; Flt. Sgt. D. Wellington.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. H. I. Crawford.

MISSING.—F/O. I. M. Godby.

South African Air Force

KILLED IN ACTION.—Lt. A. T. Ell; 2/Lt. G. B. Janssens; Act. Flt. Sgt. L. Morland; Lt. D. C. Morrison; Lt. M. Schadwellmwt.

MISSING, BELIEVED KILLED IN ACTION.—Lt. D. N. Campbell; Flt. Sgt. A. G. Lamb.

KILLED ON ACTIVE SERVICE.—Lt. H. Thompson.

Official Corrections

Casualty Communique No. 324.

R.C.A.F.—It is regretted that F/O. W. H. Hamilton was erroneously reported "MISSING, BELIEVED KILLED IN ACTION." His name should have appeared under "MISSING."

Casualty Communique No. 331.

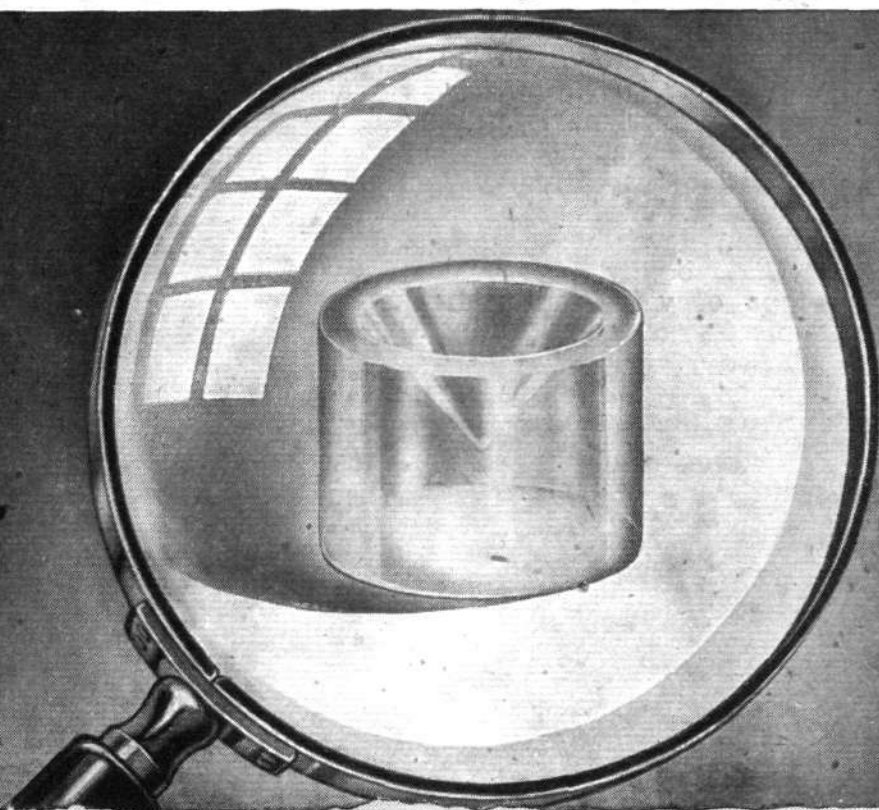
R.C.A.F.—Under "MISSING, BELIEVED KILLED ON ACTIVE SERVICE" Sgt. M. P. Loyst should have appeared under "KILLED ON ACTIVE SERVICE."

Casualty Communique No. 332.

Under "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION," for Flt. Lt. F. D. J. Thompson read Flt. Lt. F. D. J. Thompson, D.F.C. Under "MISSING," delete Sgt. F. J. Smith, P/O. D. H. Spencer and F/O. P. W. B. Timms.



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