

# FLIGHT

and  
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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## The Outlook

### The £ s. d. of Flying

AMID the many somewhat fantastic forecasts of cheap, fast air travel after the war which seem to be so popular just now, it is refreshing to come across a serious attempt at sober evaluation of the factors involved. Such an attempt has been made by Major R. H. Mayo, extracts from whose arguments we publish in this issue. It comes at a time when the shipping and railway interests are looking into the future and formulating their policies, and when the Royal Aeronautical Society is debating whether or not these interests should, as a part of national policy (if any), be permitted to operate air services.

The author states in the introductory remarks of the original article that his aim has been "to expose the fallacy that free enterprise, and the shipping industry in particular, is attempting to wrest from the State a prosperous business, and at the same time to increase profits by extorting handsome subsidies into the bargain." Major Mayo might, of course, be accused of having an axe to grind, since he is air adviser to some shipping firms, but his past record with Imperial Airways and B.O.A.C. should clear him of that suspicion.

Taking as his main factor in operating costs, although admitting that there are others almost equally important, the number of flying hours that can be got out of an aircraft in a year, Major Mayo arrives at the conclusion that the cost is not likely to be less than 2s. per ton-mile for stages of 500 miles, and 2s. 6d. for 1,000-mile stages. Since all his subsequent estimates are based on these two figures, it would have been more convincing if he had given a clearer indication of how he arrives at them. They are probably somewhere near correct, but weight would certainly have been lent to the argument if their derivation had been more specifically stated.

Major Mayo admits that his expenditure figures are only a rough approximation, but he points out that even if they are wrong by as much as 50 per cent., the single fare from London to Sydney would still have to be £233 to balance expenditure instead of the £350 of his estimate. Thus there seems to be room for plenty of error while still "debunking" the dream of fast, cheap air travel. We commend Major Mayo's examination of the problem to those optimistic souls who indulge in so much pleasurable but wishful thinking.

### Chicago

AT long last Lord Londonderry's perseverance has been rewarded. Instead of the evasive and wholly unsatisfactory answers which were all he had ever been able to obtain from Government spokesmen in the House of Lords, he obtained from Lord Swinton last week a statement which, even if not very satisfactory so far as achievements are concerned, was certainly not evasive. The country, although it does not generally realise it (taking not the slightest interest in civil aviation) owes much to Lord Swinton for the very full and frank report of the Chicago Conference which he gave the Lords, and to Lord Londonderry for the way he has continued to hammer away at the Government on this subject of civil aviation.

Much of Lord Swinton's Chicago report would be familiar to our readers from what has previously been published in this journal, but certain items in it added either new knowledge or amplified earlier reports, and they are given elsewhere in this issue.

"Divorces," Lord Swinton said, "are sedulously reported, while millions of happy marriages that last us all our lives pass unnoticed and unsung." He then proceeded to give the House a story of Chicago "happy marriages." Cynics might retort, keeping to the

simile, that even some of these may turn out to be less of marriages than the association of gangsters and their "molls," but that is by the way. Lord Swinton did quite right in stressing what had been achieved at Chicago rather than what was left undone. There is indeed quite a bit on the right side of the balance sheet.

Perhaps the greatest good that came out of Chicago on the political side was, as Lord Rothermere said, the way in which it brought members of the British Commonwealth of Nations together, even if the road travelled may be said to have been an unnecessarily tortuous one. The establishment of a Commonwealth Air Transport Council with a permanent secretariat is a good first step, and, as Lord Elibank very rightly pointed out, should ensure that there is continuity of policy.

## Flying Gear

IT is surprising that more dissatisfaction has not been expressed by aircrews with the out-of-date flying equipment they have to wear. The interiors of bombers are models of discomfort where passengers are concerned, but until one has done oneself up in flotation jacket, parachute harness, helmet with earphones and oxygen mask, and tried to move from one part of the aircraft to another, it is impossible to imagine just how inconvenient it all is.

Like so many things which are typically British, this outfit is the outcome of almost imperceptible change over a long period. As new designs and functions have arrived, so extra bits and pieces have been added.

To all intents and purposes, the present flying helmet is identical with the original headgear worn by the Royal Flying Corps thirty years ago. The ear rolls have been removed; earphones take their place, and there has been added the oxygen mask-cum-microphone. This arrangement was almost ideal when all military aircraft had open cockpits, but in the modern bomber, where cabin heating is obtainable at will, it is little short of an abomination. Even if a machine is flying at 2,500ft. on a hot summer's day, the crew have to wear the complete flying helmet and oxygen mask because there is no other means of listening to the R/T or even using the inter-communication system between members of the crew.

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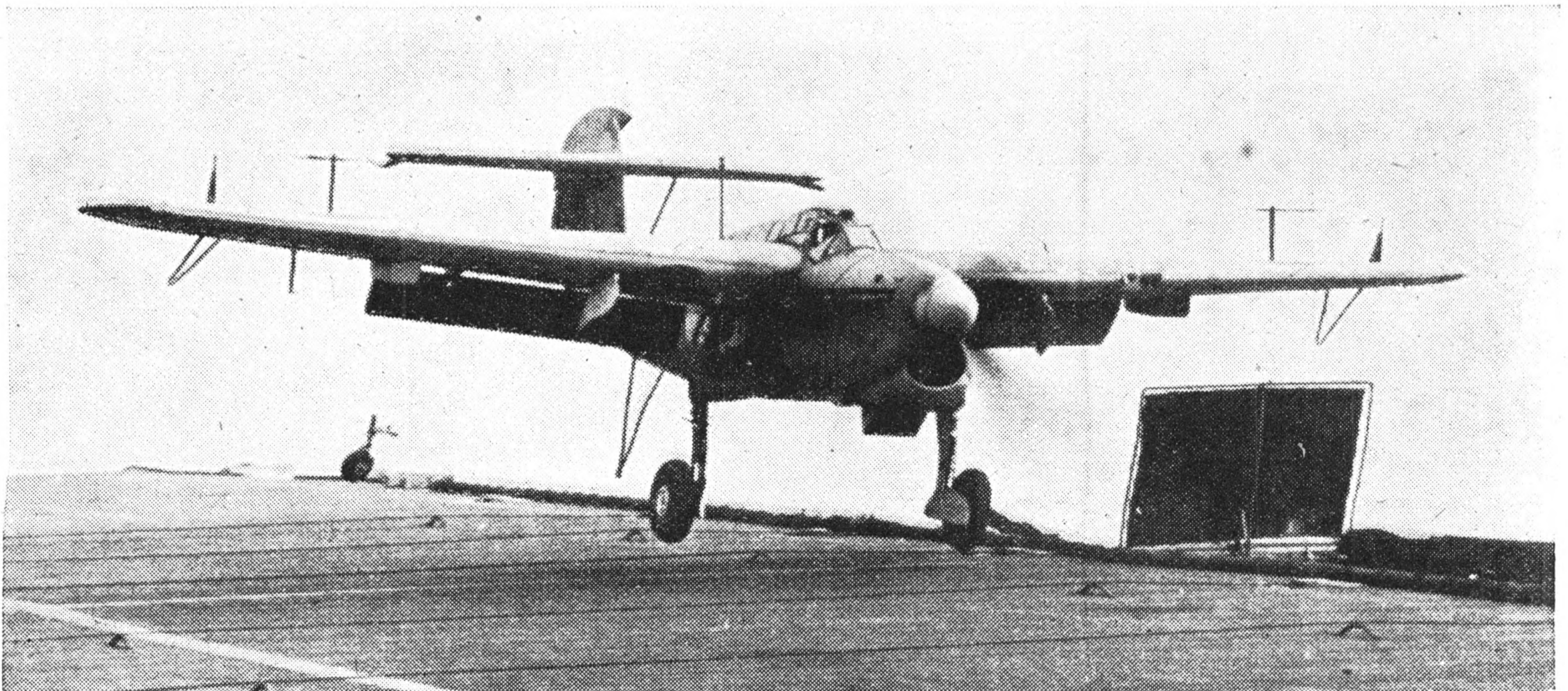
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Flying helmets must always be carried in the aircraft in case oxygen height or *flak* damage should make them necessary, but comfortable headphones and a throat-type microphone would be more suitable for much of the flying in modern enclosed aircraft. For Coastal Command, anyway, who seldom fly over 3,000ft., a separate oxygen mask would suffice on the rare occasions when they do fly high.

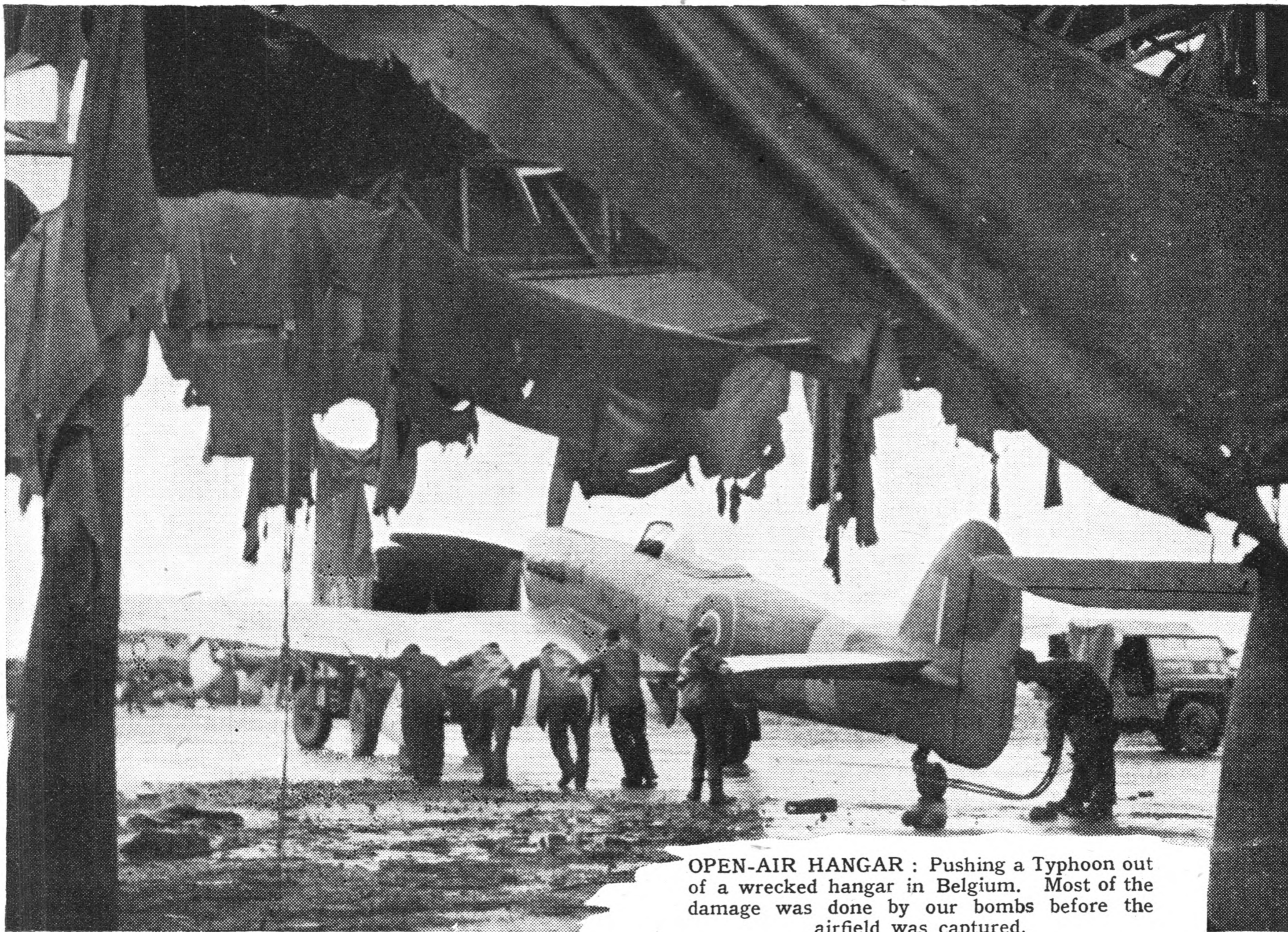
Air gunners sitting in draughty turrets still want flying helmets, and for the same reason still want fur-lined clothes, but it seems to us that the time has come to give each member of an aircrew a *tout ensemble* specially designed for the job he has to perform. The parachute harness should be incorporated in a special overall of material suited to the temperatures most likely to be met, and even the flotation jacket might with advantage be an integral part of it.

A few years ago the Royal Air Force issued some flying suits which were promptly dubbed "rompers" by the aircrews. They were an attempt to solve the problem. It is not clear why they came into disfavour. They were a combination suit with short legs and arms, and the parachute harness was sewn-in internally. The only parts of the harness carried externally were the breast clips for attaching the canopy.

At present aircrews spend their flying hours looking like pouter pigeons and feeling like trussed fowls.



ON THE RAJAH'S ROUND-DOWN: An amazing photograph of a Barracuda losing its tail wheel while attempting to alight on the escort carrier H.M.S. *Rajah*. The aircraft struck the round-down with its tail, broke off the wheel and could not land-on. The rudder jammed full on and the Barracuda could only fly in circles. The pilot was rescued unhurt after "ditching."



OPEN-AIR HANGAR : Pushing a Typhoon out of a wrecked hangar in Belgium. Most of the damage was done by our bombs before the airfield was captured.

# WAR in the AIR

*The Russian Offensive : Silesia Threatened :  
The Weather in Europe : Where is  
the Japanese Air Force?*

THE liberation of Warsaw by the Russians under Marshal Zhukov is news that would stir the most sluggish blood. It recalls that it was Hitler's attack on Poland which brought Britain into the war in 1939. The city suffered terribly from the shells and bombs of the Germans before it fell, and none of us knows the extremity of suffering which it has since undergone. Early this year the Germans were able to repulse the Russian attempts to relieve it; and the heroic but hopeless rising of the citizens against their oppressors stirred the admiration and pity of the world outside the borders of the Axis. Now, at length, Warsaw is free.

Marshal Stalin has described Warsaw as a most important strategic strongpoint in the enemy defences on the river Vistula. Stalin was taking the purely military point of view, in which Warsaw was not a symbol, but just one point on a line. The Russian

winter offensive, which recently opened, is on a gigantic scale, and has thoroughly frightened the German broadcasters. One of them called it "an offensive effort the like of which has never been seen." The bullies are now shaking in their shoes. The weather is evidently variable along the enormous front; for in places it seems that the aircraft are grounded; but when Zhukov began his drive Stalin mentioned that the 1st White Russian Army was supported by aircraft as well as by other arms. It is unusual for the air arm to get a special mention in a Russian order of the day.

It was gratifying to hear the Germans confess that the success of the Russian advance has been made possible by the Anglo-American pressure on the West Front. That has certainly tied down a number of German divisions, and in particular armour. They need armour on the East Front, and they are at a loss to know where to



BURMA WAY : Air Comdant the Earl of Bandon, who commands an R.A.F. Group operating against the Japanese, with his staff watching bombs falling.

## WAR IN THE AIR

find it. In addition, the bulk of the *Luftwaffe* air strength is also congregated on the West, or at least facing towards the West. It is being carefully conserved, and lately has not done very much; but in the East it might be more effective. Even if it did not defeat the Russian air arm, it might do something towards checking the Russian air reconnaissance, which must have been highly efficient.

One of the interesting possibilities of the Russian offensive is the threat to Silesia. This industrial area has not been heavily bombed, even from Italy; and there seems doubt as to how far it has taken the place of the shattered Ruhr. It must be helping the enemy a good deal, and its capture by the Russians would be a nasty knock for the enemy. One has often wondered how the Germans have kept up their supply of fighting materials after all the bombing which the R.A.F. and the Americans have done in the West. Oil has obviously been running short lately, and also fighter aircraft (or is it the fighter pilots?), but a shortage of oil at the front may be chiefly the result of cutting communications just behind. Of armour and ammunition there seems no evidence of shortage among Rundstedt's men, and one is inclined to ask if the answer to this mystery is not Silesia.

### Variable Weather

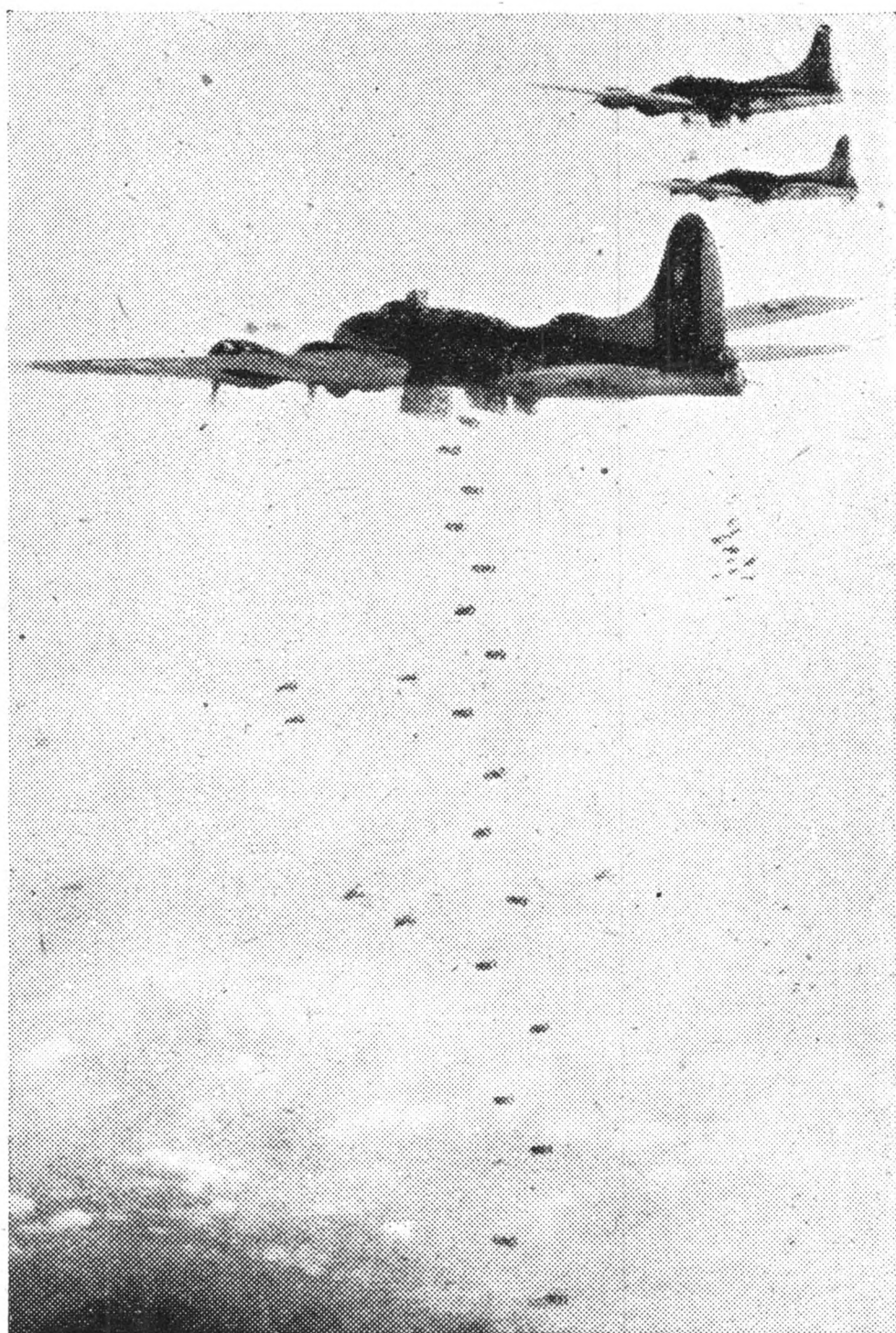
REPORTS from the Ardennes last week told of intermittent periods of fine weather which let the 2nd T.A.F. get into the air without doing much in the way of giving close support to the

**LEFT-RIGHT-LEFT :** Bombs dropping from 8th U.S. A.A.F. Fortresses on rail yards at Bingen in Germany. In the Fortress the bombs are stowed horizontally one above the other and, in a salvo, they drop alternately from the left and right halves of the bomb bay.

ground troops. But if those finer periods allowed reconnaissance to be carried out, they must have been invaluable. No worse thing can befall a staff than to be blinded and not know what the enemy is doing.

Fine periods also let the Spitfire squadrons get at the launching places for rocket bombs, and the squadrons which have specialised on this very tricky work never miss a chance of doing their stuff.

There have also been some fairer intervals in Italy, and the medium bombers went, as is now their usual practice, for the railways leading to the Brenner Pass. Probably Kesselring has now no real hope of getting reinforcements by that or any other way, but presumably he depends on that route for his ammunition. Above all, he must have his eye on it for his eventual withdrawal from Italy—though, of course, he may be obliged,



like von Arnim in Tunisia, to surrender unconditionally to Field Marshal Alexander. In that case the Brenner Pass will be of no use to him. Fighter-bombers used the fine period to attack the railway yards at Como, and there they destroyed no fewer than 200 wagons.

### In Luzon

THE American invasion of Luzon has continued to go well. As a battle it is comparable in importance to the great Russian advance across Poland and the struggle on the West Front. The Japanese on the island seem to be completely paralysed in the air. It is a mystery to observers why the enemy aircraft have made no attempt of any consequence to interfere with the American operations. There certainly are enemy machines in Luzon, for the other day the Americans destroyed 61 grounded bombers on Clark airfield and at other places in the northern part of the island, and these cannot be the whole of the Japanese air strength in the place.

Whatever the cause, the enemy has been doing nothing in the air. The Americans, on the other hand, have begun to use Lingayen airfield themselves for operations against the Japanese forces. At the same time the carriers of their Pacific Fleet have been striking far and wide at places from which the enemy might perhaps draw air reinforcements. Formosa has been attacked many times, but the Americans have gone still farther



**NIPPY NIGHT-WORK :** Armourers loading 1,000-lb. bombs into the bay of a 2nd T.A.F. Mitchell on an airfield in Belgium.

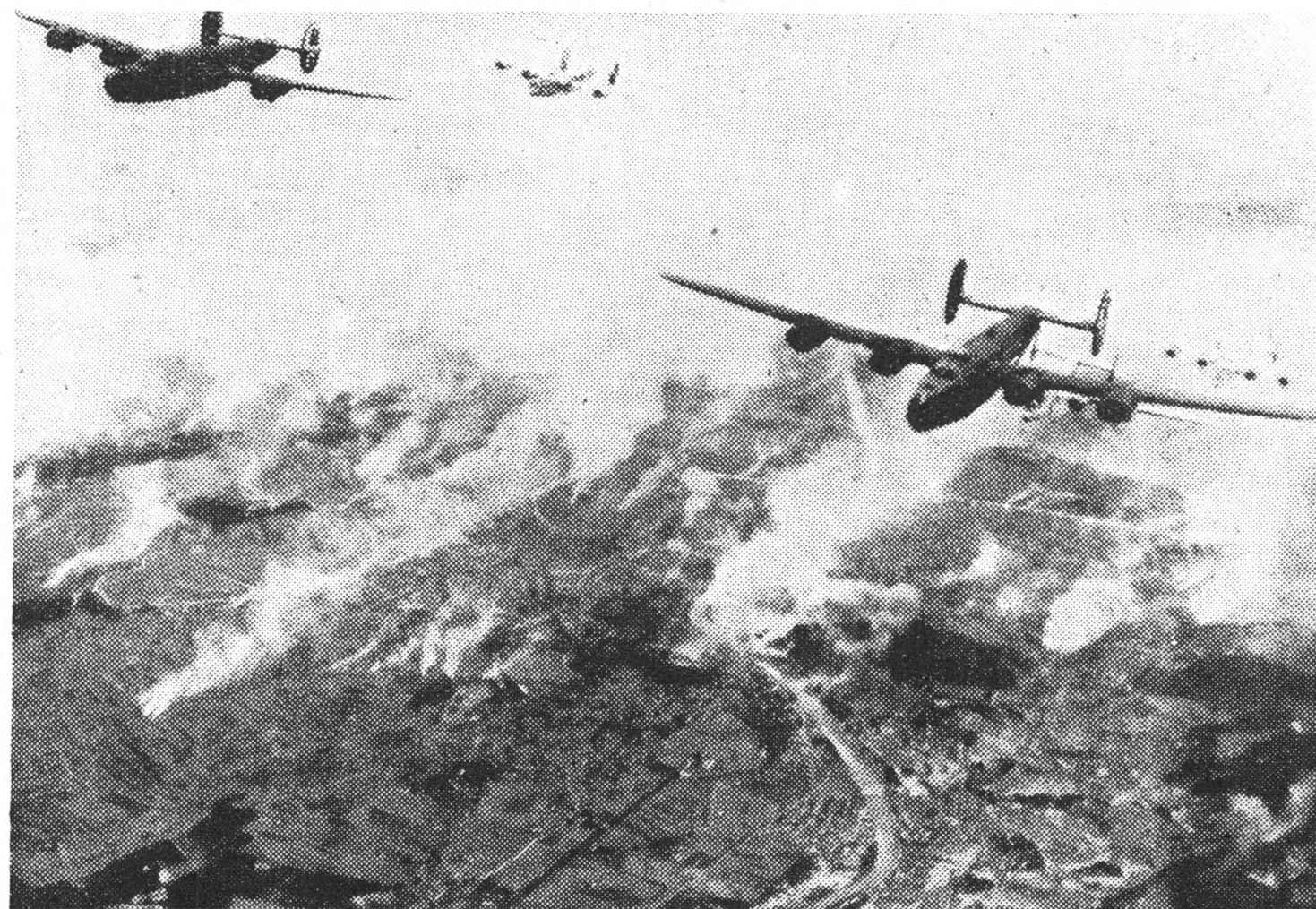
## WAR IN THE AIR

afield and their carrier aircraft have visited Indo-China, Hong Kong, Swatow, and Amoy. The seaplane base at Tokyo has also suffered. That reminds us that the R.N.A.S. (which, of course, had become part of the R.A.F.) sent a mission to Japan soon after the last war, headed by Col. the Master of Sempill (now Lord Sempill), to organise the Fleet Air Arm.

Undisturbed by enemy air efforts, Gen. MacArthur's men are able to push ahead, primed with knowledge of where the enemy is and what he is doing; while their own aircraft are able to give them tactical support when the enemy is encountered. That must immensely simplify the task of the ground troops and the staff which directs their movements. Luzon, in fact, sounds like a General's paradise. However, everyone must feel anxious as to whether Gen. MacArthur's forecast will be verified, namely, that the final battle which would settle the fate of Manila and the Philippines would be fought on the central plain. The Japanese may not be so obliging. They are reported to be retiring towards the mountains—but that sort of movement will not enable them to hold Luzon and eject the Americans.

### The Russian Steamroller

**I**N the early stages of the first world war, the Western Allies commonly spoke of "the Russian steamroller." That was before the battle of Tannenberg, where Hindenburg smashed the main Army of the Tsar and set free East Prussia. None the less, the Russian advance had done a great service to France and Britain by holding such a strong German force in the East, and so contributed to the



FROM ITALIAN BASES: Liberators of the U.S. 15th A.F. bombing the railway yards at Salzburg in Austria. Smoke from the bombs is mingled with that from smudge pots used by the Germans to veil the target.

victory of the Marne. Now the Soviet forces have wiped out that defeat, and have once more occupied the town of Tannenberg.

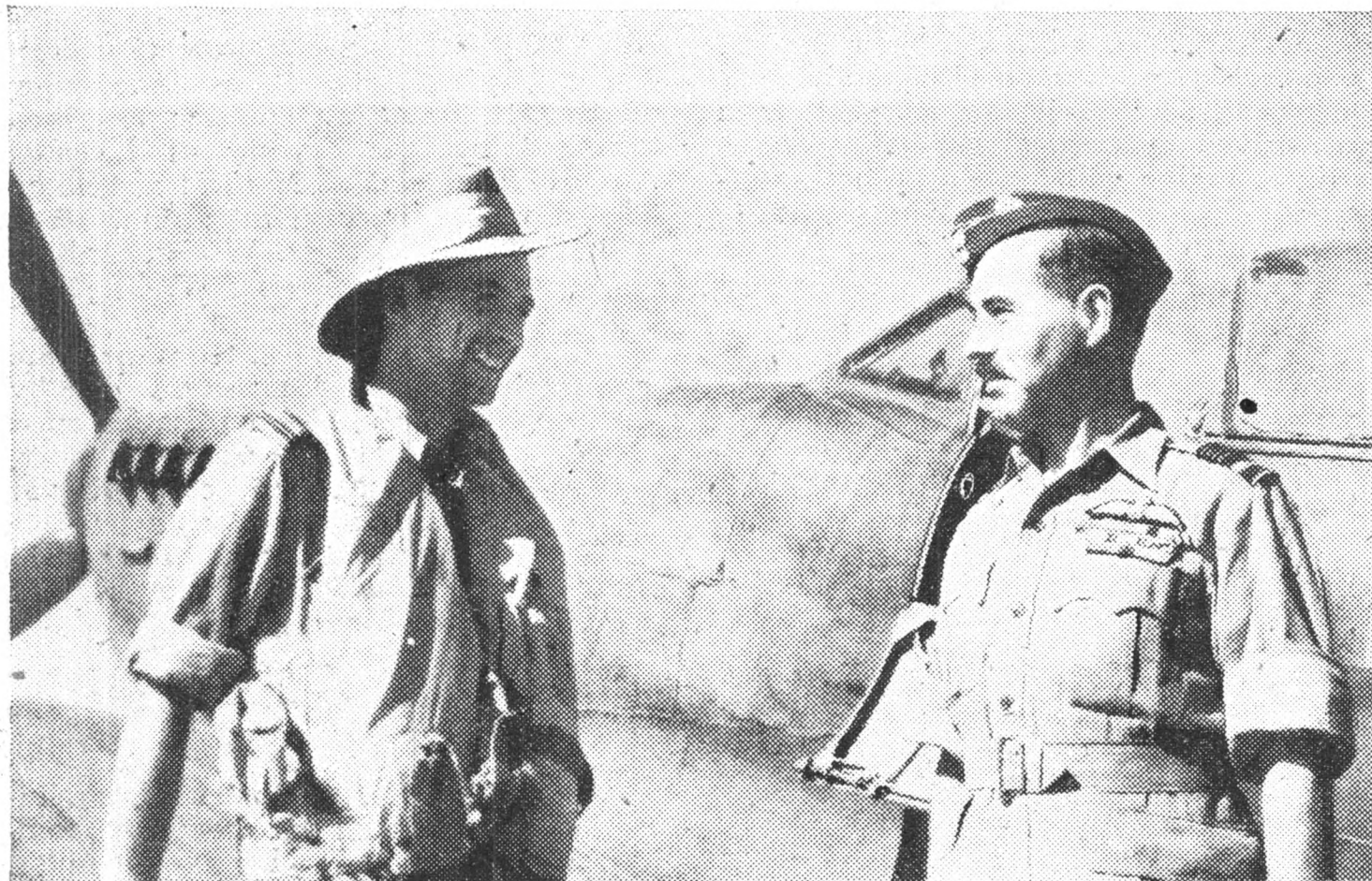
The recent advance of the Russian armies is staggering in its immensity. Hungary has submitted, and its interim Government has declared war on Germany, as the other Satellite countries had already done. The Russian Generals who have shared in this advance have covered themselves with even more glory. Marshal Zhukov (once the defender of Moscow) is perhaps the most brilliant of them, and he has shown his perspicacity by the use he has made of his aircraft. His dive-bombers were

recently active over the Lodz marshalling yards, and since then they have destroyed bridges over two rivers behind the routed Germans; besides making violent attacks on retreating German columns.

### The Alsace Battle

**I**F only the weather would give similar opportunities to the British and Americans, the fighting in the West might soon assume a new aspect. As it is, reports say that Runstedt has been profiting by the snowstorms to withdraw his best troops and armour from the Ardennes and send them south, to join in the offensive round Strasbourg. The American 7th Army in that area has had a hard time; but the spirited offensive launched by the French 1st Army under Gen. de Lattre de Tassigny against the "pocket" round Colmar began well. There has been little mention of air activity on that southern section of the West Front, at least since the Allies got beyond the range of the carrier-borne aircraft which covered their landing.

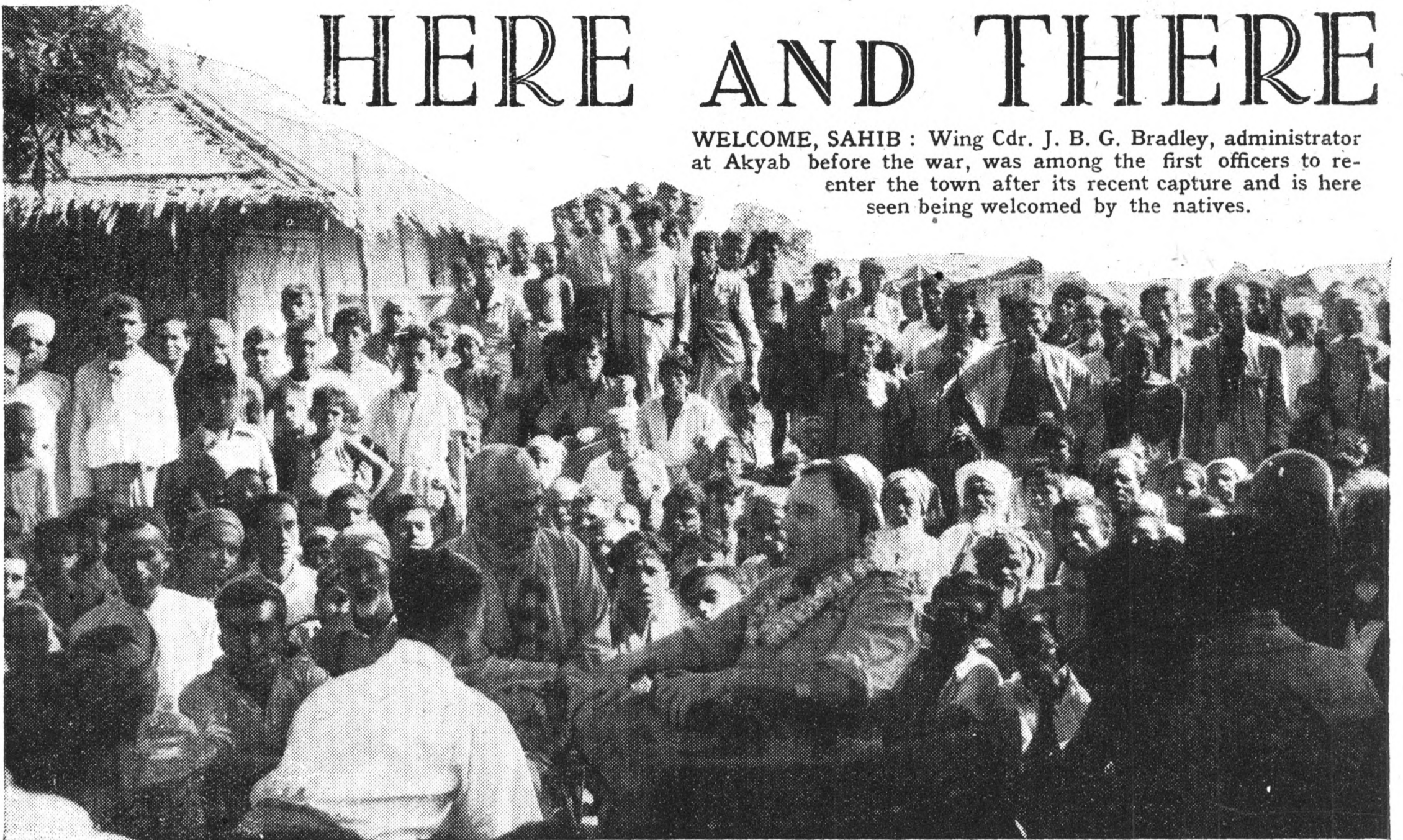
In the Far East, however, the weather is now ideal for flying, and when the British-Indian force landed on Ramree Island, to the south of Akyab, bombers were able to play their part in softening the defences. Warships of the British, Australian, and Indian Navies shelled the defences, and then Liberators flew over at a low altitude and bombed them. This was the first time in the Burma campaign that Liberators had indulged in low-level bombing. Ramree can be made into a very useful air base after some necessary clearing and reconstruction work has been carried out.



ON THE ARAKAN FRONT: Air Marshal Sir A. Guy Garrod, K.C.B., O.B.E., M.C., D.F.C., Deputy Air C.-in-C., S.E.A.C., chatting to Sqn. Ldr. Hayes during a visit to fighter squadrons in Burma.

# HERE AND THERE

**WELCOME, SAHIB :** Wing Cdr. J. B. G. Bradley, administrator at Akyab before the war, was among the first officers to re-enter the town after its recent capture and is here seen being welcomed by the natives.



## Mr. Berle's New Post

**MR. ADOLF BERLE**, who acted as chairman of the American delegation to the international air conference at Chicago, has been appointed Ambassador to Brazil by President Roosevelt. He recently resigned from his former post as Assistant Secretary of State just before the reorganisation of the State Department.

## Models at "Aviation Corner"

**AN** exhibition of models is being staged by the Society of Model Aircraft Engineers at the Bristol Showrooms, Piccadilly, from Monday next, January 29th, until February 10th inclusive.

The comprehensive range of exhibits will include a special section for "Bristol" models, for the best of which the company is presenting a cup.

## American Rockets

**THE** December issue of *Air Tech* reveals some hitherto unpublished facts about American rocket-projectile equipment as fitted, for example, to the Thunderbolt.

The complete installation with six rockets weighs 450 lb., and can be dropped at will. The launching tubes are made of paper plastic, and the fins of the rockets are folded; they open when the projectile is fired.

## Canadian Air Chief's Visit

**AIR MARSHAL L. S. BREADNER**, A.O.C.-in-C. R.C.A.F. Overseas, has visited the headquarters of the Eastern Air Command to confer with Major Gen. George Stratemeyer, air commander of the Eastern Air Command, and Air Marshal W. A. Coryton.

Air Marshal Breadner is making a tour of Canadian squadrons

and personnel with the Eastern Air Command.

## Flak Suit Finality ?

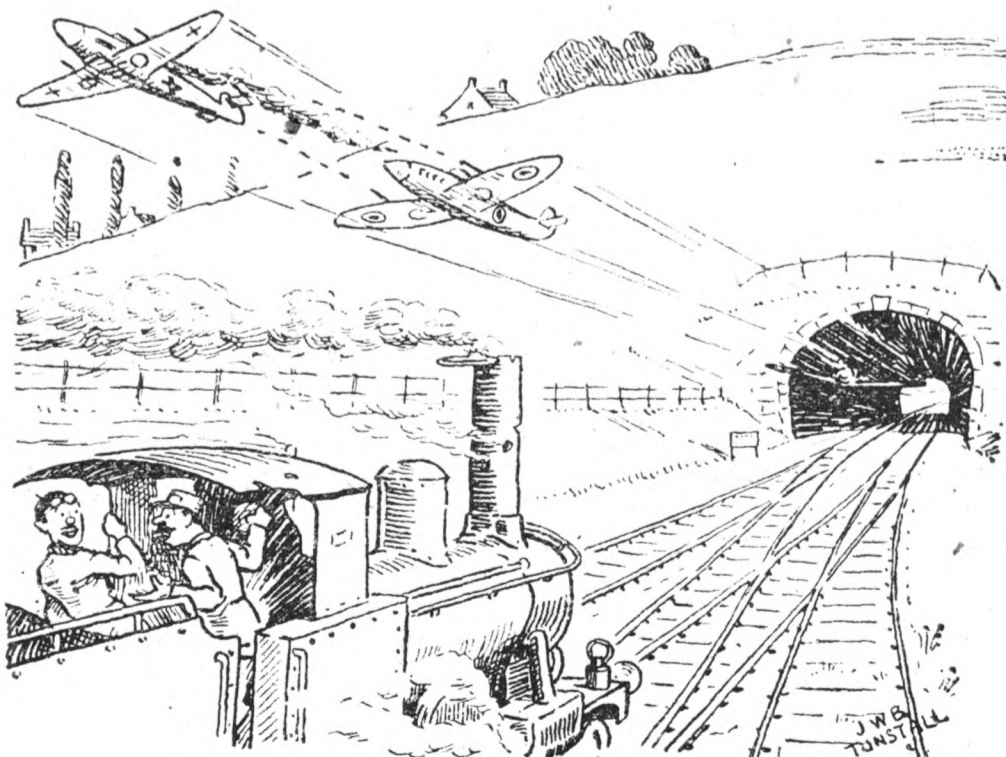
**ARMoured** back to U.S. airman's "flak suits" are the last in a long series of developments designed to protect them from enemy fire, the U.S. Air Service Command in France announced recently.

Formerly air crews depended on the heavy metal backing of the seats for protection. Individual suits of armour for U.S. airmen have reduced casualties due to enemy fire by 66 per cent.

## To be Gipsy-engined

**THE** Miles M60 post-war 14-seater feeder-line aircraft announced in *Flight* last week will, it is now stated, be powered by four de Havilland Gipsy Queen air-cooled, in-line engines with gear-driven centrifugal superchargers.

Each engine will have a cruising output of 360 h.p., and the M60's cruising speed will be 200 m.p.h.



"Well keep blowing your whistle, anyway!"

This aircraft is to the formula of the Brabazon Committee recommendation Type 5.

## D.F.C. for Three U.S. Pilots

**AIR** COMMODORE R. B. LEES, senior air staff officer of the M.A.A.F., has decorated three American pilots with the British D.F.C. at an investiture held at an Italian airfield. The recipients had won the awards for their exploits on Thunderbolt fighter-bomber missions over Yugoslavia.

They were: Colonel Archie J. Knight (Indiana), Lt. Col. Gilbert O. Wymond (Kentucky), and Major Charles C. Leaf (New Jersey).

## S.L.A.E. Lecture

**A** LECTURE and demonstration dealing with the layout and functioning of aircraft actuating systems has been arranged by the Society of Licensed Aircraft Engineers at Hatfield airfield on Saturday, February 3, at 3 p.m. It is to be given by Mr. D. W. Richardson, assisted by Messrs. W. G. James and M. T. Holdham.

All members of the society are invited, but admission will be by ticket only, and application must be made before Saturday next, January 27, to 224, Regent Street, London, W.1.

Convenient trains to Hatfield from King's Cross are the 1.10 p.m. and 1.45 p.m.

## Lord Amherst Leaves the R.A.F.

**THE** Earl of Amherst has relinquished his honorary commission of wing commander, R.A.F.V.R. He was granted the commission in August, 1942, in the administrative and special duties branch.

Before the war he was for a

HERE AND THERE

number of years connected with the Olley Air Services, and was at one time manager of the company's depot at Brighton. He was also an air-taxi pilot.

In 1938 Lord Amherst was chairman of the British Air Line Pilots' Association.

R.A.F.'s New Education Chief

AIR COMMODORE A. H. ROBSON has been appointed Director of Educational Services, Air Ministry, in succession to Air Commodore W. M. Page, who recently retired.

Air Commodore Robson, who is 52, has been deputy director since 1942. After the last war he worked for the Lancashire and Dorset education authorities before entering the R.A.F. educational service in 1923.

He has held appointments at the School of Technical Training for Aircraft Apprentices at Halton and at the headquarters of Flying Training Command.

Immediate Objective

IN a recent contribution to *The Recorder*, Mr. Robert Blackburn, chairman of Blackburn Aircraft, Ltd., makes the point that every American aircraft now used is a potential for replacement by British aircraft when they are available. "The immediate object in civil aviation," he says, "is to see that directly the war in Europe ends, as many operators as possible should be engaged in running as many air routes as possible."

Point of View

"THE trend towards nationalistic air policies," said Air Marshal Bishop, V.C., in a recent New York international broadcast, "is resulting in the jockeying for position in the acquisition of routes. Losers in this race will become dissatisfied and the first seeds of dissension will have been sown."

To avoid this he urged the formation of a world company to direct and operate world aviation, to function under whatever form of world government is established in the peace.

Invasion Supply Expert

COL. JAMES F. EARLY, of Worcester, Mass., and Washington, D.C., has assumed command of the U.S. Eighth Air Force Service Command in England, replacing Brig. Gen. Donald R. Goodrich, of Maeshall, Mich., who has received a new assignment.

Col. Early has had extensive experience as a supply expert for the Army Air Forces. He was previously chief of supply for the Ninth Air Force, and handled supply problems for the Tactical Air Command during the invasion of Normandy.

P.A.A. Plans

PLANS for a post-war 34 hrs. air service between New York and South Africa were described at a meeting of the Civil Aeronautics Board at Washington recently, reports Reuter's correspondent.

Pan-American Airways reported it could make the trip with 59 passengers at a single fare of \$368 (£92).

The liners would follow the new route



YES, WE HAVE SOME PYJAMAS: Four pilots of a Mustang Fighter Group (E.T.O.) enjoy a final cup of tea round their stove before turning in. The "civilised" nightwear contrasts oddly with their primitive but snug quarters.

via the Azores instead of via South America.

"Unless this is done," said the officials, "much of the travel to Africa will go to Europe and from there by foreign lines rather than by American service."

"We should operate the South African route to improve the opportunity for American commerce and to foster and develop trade with Africa," added the Pan-American officials.

Mainly for Photographers

THE 1945 fixture list of the Association for Scientific Photography contains four Saturday afternoon meetings at Caxton Hall, Westminster, all beginning at 2.30 p.m.

The first is on Saturday next, January 27th, when Mr. H. W. Bourne will read a paper on the subject of lighting for photography, dealing in particular with electric discharge lamps, and will demonstrate a range of apparatus.

The other three meetings are on February 24th, March 31st, and April 21st, at which the subjects of spectrography, high-speed cinematography, and micrography will be covered by other speakers.

P.M.'s Foresight

"IT was our present Prime Minister who had the foresight to see that large aircraft were necessary to carry war into other countries," said Sir Frederick Handley-Page, recalling the thirtieth anniversary of his company's first order for a twin-engined machine. Mr. Churchill, then at the Admiralty, ordered four for the R.N.A.S.

Sir Frederick was making a presentation of a model of a Halifax bomber to Mr. G. Heaton Nicholls, High Commissioner for South Africa, to commemorate a trip recently made by a Halifax to South Africa. The model will go to the South African War Museum.

He said that he hoped that the Halifax would pave the way for others and that

the next would be a civil type of aircraft.

The High Commissioner, accepting the gift, said, "South Africa has become a nation of flyers."

Mail by the Million

AT a northern terminal of R.A.F. Transport Command during 1944, nearly 3,000 aircraft delivered 3,183,160 lb. of air mail and freight from the United States and Canada in addition to passengers, states the Air Ministry News Service.

The aircraft used in this service were all controlled by Transport Command, and were operated either by the R.A.F., Trans-Canada Airlines, or the return ferry service run by B.O.A.C. to the requirements of Transport Command.

Well over 500,000 lb. of mail and freight were carried from the U.K. to North America in the same period.

Rubbing It In

THE parachute section of the U.S.A.A.F. Air Service Command repaired and packed more than 52,000 parachutes during 1944.

Mentioning this in a recent news item, U.S.A.A.F. headquarters remarks that these 'chutes represent more than enough silk and nylon to have made two pairs of fully fashioned stockings for every single woman in the United States, or six pairs for every woman in Great Britain.

We call that rubbing it in—or perhaps it will enable the Allied womenfolk to feel extra virtuous in their sacrifice!

Appointments

MR. A. L. M. SOWERBY, who has been on the staff of our associated journal, *The Amateur Photographer*, since 1936, has been appointed its editor. He was previously technical editor.

Mr. R. H. Mason, honorary secretary of the Camera Club and author of two books on photography, has been appointed consulting art editor.



## Our War Correspondent Spends a Night on a Mosquito XVI Station

By JOHN YOXALL

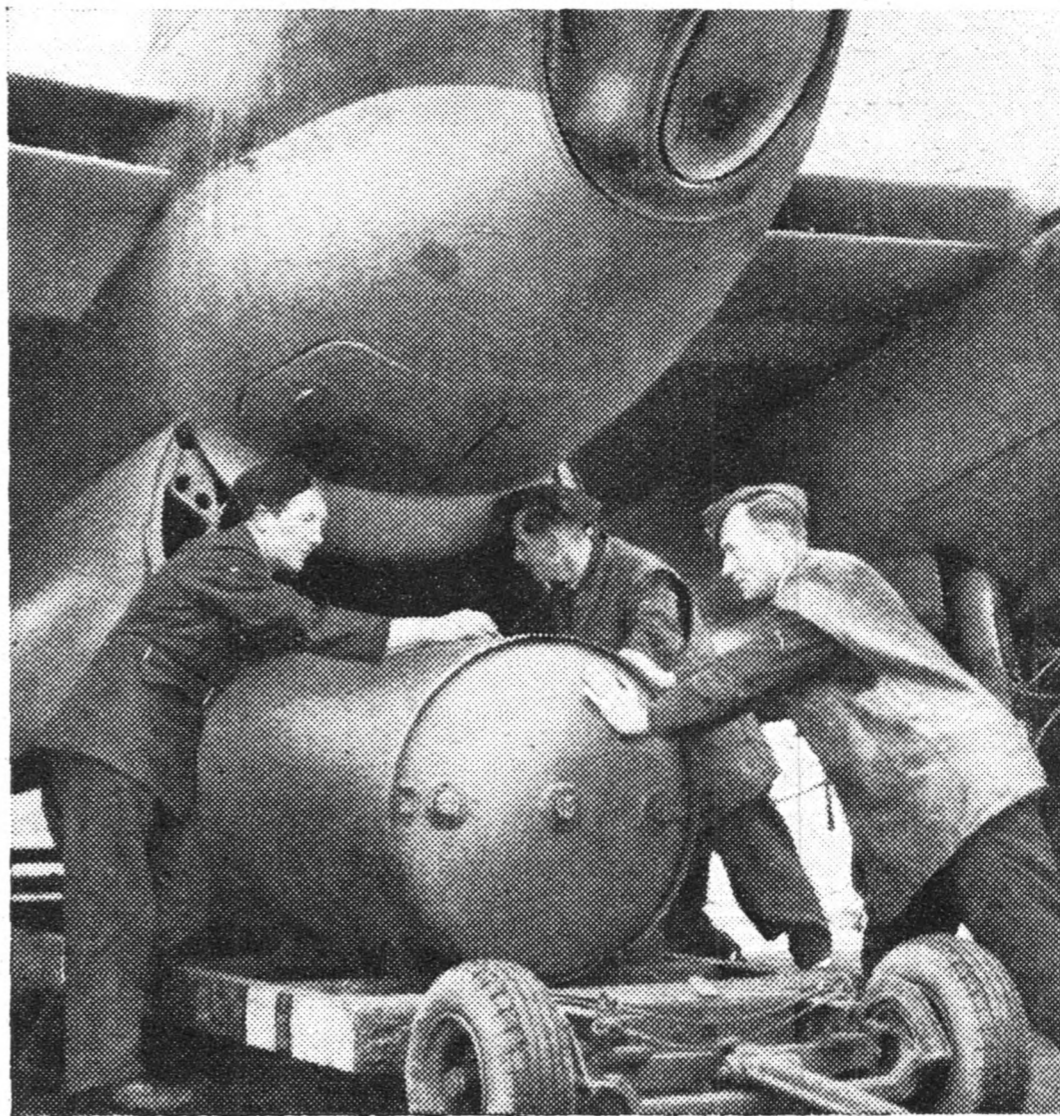
**T**HESE Mosquito XVI's are doing a great job of work. On 55 per cent. of the nights during which they have operated recently the weather has been such that the heavies have been grounded. The reasons for this ability to carry on the attack when other aircraft have to stay at home are the amazing performance of the Mosquito XVI and the pressure cabin with which it is fitted.

It is not generally realised how severe are these Mosquito raids. Frequently Berlin gets over 100 tons in one night on some small target area which is, perhaps, little more than a mile square. The Mosquitoes are operated in the same manner as the heavies, pathfinders and a master bomber controlling each raid. The aircraft are timed and routed to arrive in force, and the whole attack is over in less than five minutes.

The method of checking hits is interesting. Assuming that a raid is carried out from 25,000ft. Each Mosquito aims its 4,000-pounder into the target indicators, which have already been dropped by the pathfinders, and then photographs the explosion when it occurs some 42 seconds after release. This shows the relation of the bomb burst to the target indicators. During the raid the master bomber drops a photoflash bomb and photographs the target area so that the exact position of the target indicators can be determined on a map. By linking the indications shown on these photographs, the explosion of each of these big bombs can be pin-pointed.

The Germans are, of course, well aware of this system of operation and do their utmost to fox our crews by dropping target indicators of their own

all over the place. They have even been known to butt in over the R/T and give instructions purporting to come



Loading a 4,000-lb. bomb into the bomb-bay of a Mosquito XVI.

from the master bomber. Unless, however, the predetermined time of the attack, the exact colours and sequence of flares, and the code words for the raid are known, it is unlikely that our aircrews will be misled.

#### Height Effects

If the pressure cabin were not available, these raids could not be carried out so frequently because of the fatigue which high flying entails. As it is, even with pressurising, the equivalent height is only 10,000ft. below that at which the Mosquito actually is flying, and a man can either stand high flying or he cannot. A pencil dropped by a navigator is a real bother to pick up when flying at 30,000ft. Nitrogen bubbles occur in the blood and produce the effect known to divers as "bends." First there is a small ache and considerable irritation and then such severe pains supervene that they become quite unbearable. All the aircrews on this work are first tested in a decompression chamber to ascertain whether they are suitable for high flying.

The pressure cabin itself has some interesting devices. One of the major problems in design was to prevent frozen condensation on the inside of the Perspex from completely obscuring all vision. If this trouble once gets out of hand—and external temperatures are occasionally as low as minus 55 deg. Centigrade—it is impossible to rectify it. In the Mosquito XVI this trouble is overcome by making the main windows of multi-layer construction with air spaces in between. All the air supplied to these spaces is specially dried by passing it through a silicagel container.

The air pressure inside the cabin, in relation to the external air pressure is controlled automatically by a Westland valve. This valve is, in effect, a leak in the cabin, and is fully open at any height below 15,000ft. As the aircraft climbs above this level the valve gradually closes so that at heights above 30,000ft. there is a differential pressure in the cabin of 2 lb. per sq. in. above the external

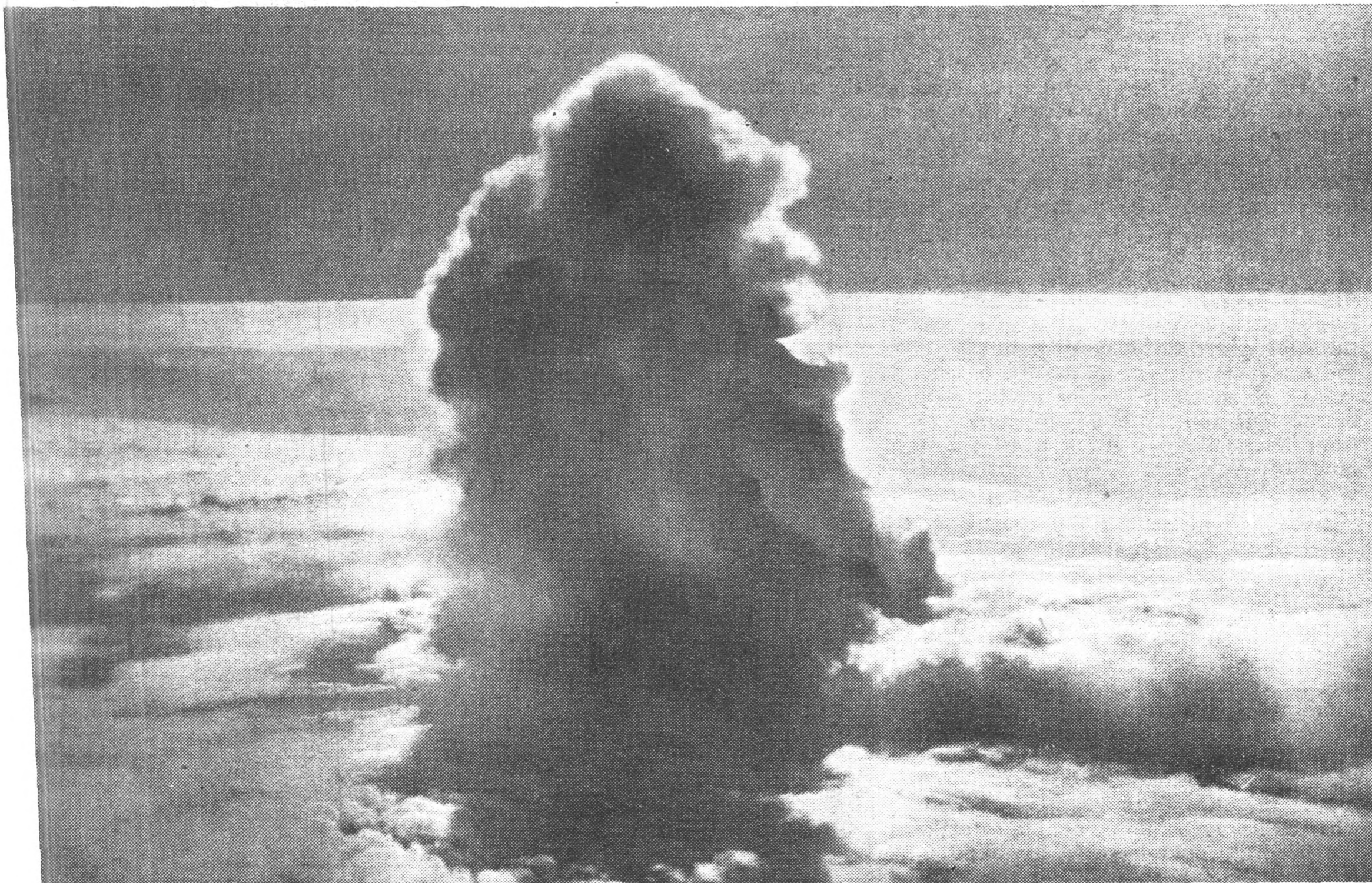
atmosphere. This is the equivalent of 10,000ft. As part of the complete Westland valve there is also a safety valve which blows off at 2.5 lb. per sq. in. pressure should the normal controlling mechanism develop a fault. If the pressure, on the other hand, falls as low as 0.5 lb. per sq. in., then a warning light appears and the crew know that they must adjust their oxygen supply to the actual, as distinct from the equivalent, height. Oxygen has been found to keep the aircrews more alert during night operations, and it is now customary for them to have the oxygen supply turned on from take-off to landing.

#### Heated Air

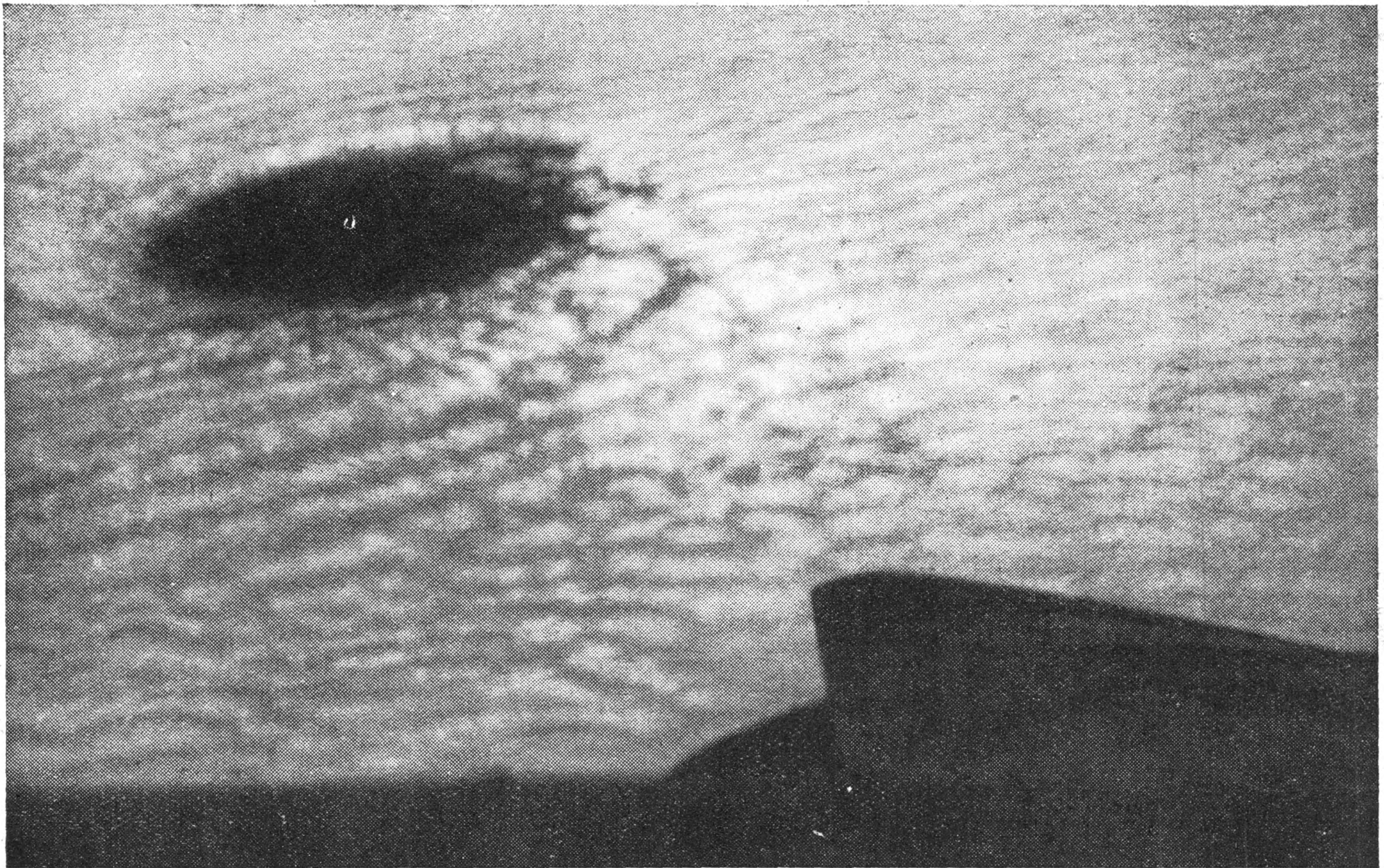
Any degree of heating of the incoming air can be obtained and it is, in fact, heated quite appreciably by just passing through the blower. To avoid unpleasantly high temperatures at low altitudes a spill valve can be operated to prevent the air from the blower from entering the cabin at all.

While operations are pending, but not decided upon, the armourers place a cradle carrying one of these enormous 4,000-pounders under each machine. It appears quite impossible that such missiles could be contained within the sleek lines of a Mosquito. Actually there is room to spare, as shown by the fact that after the armourers have wound a bomb up into its rack, there is ample space to remove the dummy plugs and fit the detonators in their place. If, by any chance, operations are called off at the last minute, the "cookies" are let down on to the cradles again, as it is considered unwise to leave the Mosquitos standing with such a heavy, concentrated, load on board.

The take-off in the evening showed no signs of overloading despite an all-up weight of 25,200 lb., which is 4,700 lb. over and above the maximum landing weight. Because of the northerly direction of the wind a short runway of only 1,600 yards was used for the first time with such heavily loaded aircraft. A certain amount of apprehension



SEEN ONLY BY HIGH-FLIERS : A fantastic example of cumulus cloud over the Bremen area. This phenomenal example of cumuliform development broke through an apparently stable strato-cumulus layer. To the amazement of the crew, it reached a height of 20,000ft. within ten minutes. This photograph was taken from 29,000 ft.



## WITH THE HIGHER UPS

was felt, needless, as it turned out, since all the machines took off with runway to spare. There is, of course, plenty of urge to get them unstuck. The lift flaps are put down 10 to 15 degrees and the 70-series Merlins revved up to 3,000 r.p.m. with +12 showing on the boost gauge. In case of an emergency, the throttle can be pushed "through the gate" and +18 boost immediately obtained.

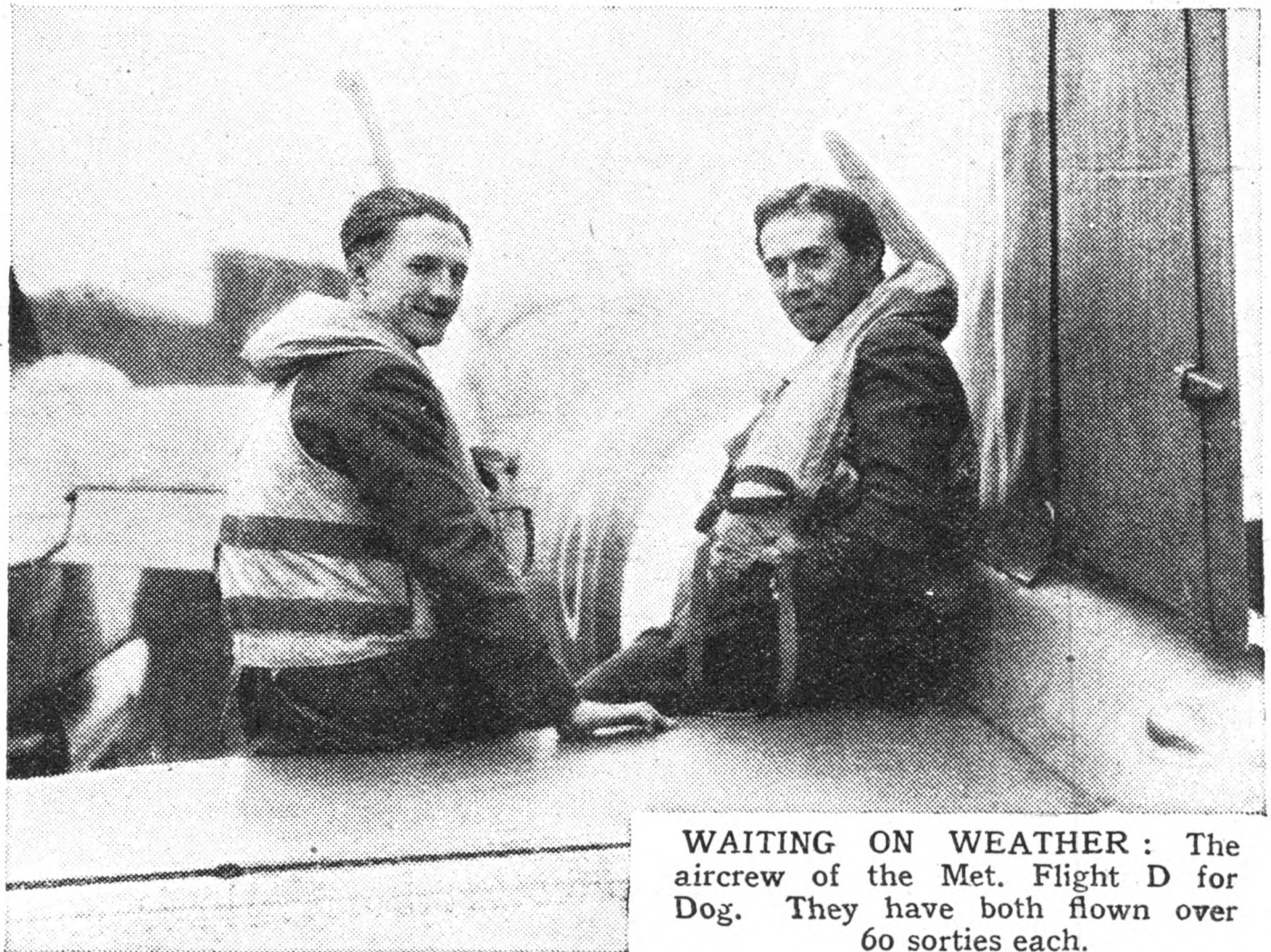
It is somewhat difficult to assess the exact length or time of a Mosquito take-off. There is always a distinct tendency to swing to port on the take-off, and to counteract this, or rather to prevent the swing starting, the throttles are opened very gradually in the early stages. Despite this, a Mosquito with sufficient fuel for a return trip by devious routes to Berlin and back (four hours plus) is airborne after running between 1,200 yards and 1,500 yards. The time elapsed is two or three seconds over the half-minute.

### Overweather to the Target

Once the machine is in the air with the flaps up and the undercarriage retracted, the engines are throttled back to 2,650 r.p.m. with from 4 lb. to 6 lb. on the boost clock. This gives a good climbing speed and rate of climb. At somewhere between 20,000ft. and 35,000ft. altitude, overweather conditions are always to be found. Here a clear run to the target, free of icing, is ensured, whereas heavy bombers, unable to make the height, would have to fly blind in ten-tenths cloud, suffering all the while from icing of airframe, intakes and—perhaps most important of all—the radio aerials.

**HOLES, BOMB-AIMERS FOR THE USE OF :** A perfectly circular hole in an extensive strato-cumulus sheet of cloud which had no other breaks for some hundreds of miles. No explanation of its formation is known. It is suggested that one of these holes should be issued to each aircrew through which to drop their bombs.

At the height at which these Mosquito attacks are carried out, it is surprising that they should be troubled by *flak* at all. The Germans have, however, some special A.A. guns which can put up quite a respectable barrage over 30,000ft. high. To say whether it is accurate or inaccurate would probably be telling the enemy something which he would very much like to know. The number of Mosquitoes brought down by this form of defence cannot give him



**WAITING ON WEATHER :** The aircrew of the Met. Flight D for Dog. They have both flown over 60 sorties each.

## MONOCOQUES

cates the thinnest possible skin, and the fact that he was working with Junkers when the Ju 88 was designed may explain the fuselage construction. That it is extremely strong is shown by the wide versatility of the Ju 88, which has been adapted to everything from a long-range day fighter to the lower component of a composite aircraft with very little structural modification.

### Wooden Monocoques

This survey would be incomplete without reference to a wooden monocoque, and the obvious example to choose is that of the de Havilland Mosquito, the fuselage of which is, structurally, the outstanding feature of the design. The construction is similar to that of the Albatross. The skin is in the form of a "sandwich" made of an outer layer of ply, a centre of balsa and an inner skin of plywood again. At the points where the formers are attached, the balsa core is replaced by a spruce ring.

There are seven formers in all from nose to tail, and each is built up of two plywood skins spaced apart by spruce blocks. Where the skin is most stressed, the plywood is wrapped on diagonally. Where strength is less important wood is saved by putting it on straight. No attachments are made directly to the skin. Instead, a hole

is drilled from inside, through the ply into the balsa, and into this is glued a bakelite plug with a flange attached. This flange is glued to the skin and the loads are transmitted through this when a screw is threaded into the bakelite. The wing pick-up points are made from laminated spruce, glued to spruce inserts on the skin, and thus afford a very large bearing area for distributing the loads.

The fuselage is built in halves, the split being along the top and bottom from nose to tail. This feature makes the installation of equipment very easy, more than 60 per cent. of which is completed before the halves are joined. A point of interest is the simplification of assembly by arranging the control cable runs down the port half, and the hydraulic plumbing, as far as possible, down the starboard side. The halves are scarfed together with vee notches, a plywood strip being placed over the joint inside, and a ply insert on the outside. To obtain a really smooth surface, when the halves are assembled, the whole is covered with fabric and doped.

The last two decades have seen an almost eclipse of wood as a structural material for first-line aircraft. The remarkable successes of the Mosquito have, however, undoubtedly revived a great deal of interest in this form of construction. One great advantage—the speed with which prototypes can be designed and built—will be an important factor in deciding whether some transport aircraft will be of wood or metal. It will not be surprising if the post-war years bring forward a number of wooden feeder-line transports.

## Rootes, Branches and Shadows

### Remarkable Wartime Record of a Group of Motor Firms

SOME idea of the contribution made by the Rootes group of factories to the war effort was given by Sir William Rootes, K.B.E., at a luncheon in London last week. Sir William explained that the Rootes Group has produced 60 per cent. of all the armoured cars, 35 per cent. of all the Scout cars and, in addition, more than 3,600 other armoured reconnaissance vehicles. In fact, the Rootes Group had made over 11 per cent. of the total national output of wheeled vehicles of all types.

When war broke out, the Group (comprising Humber, Hillman, Sunbeam-Talbot, Commer and Karrier) employed some 17,000 workers. At the present time one in every 100 of those employed in war industry was working in the Group. They were working for four Ministries—Ministry of Aircraft Production, Admiralty, Ministry of Supply, and Ministry of War Transport. Of the work done for M.A.P., Sir William said:—

In 1936 we were called in by Lord Swinton, then Air Minister, to start the original Shadow Aircraft factory scheme for the production of bombers. It was uphill work. We had not the slightest knowledge of the aircraft industry. It meant no small sacrifice. We diverted some of our best executives and our most skilled craftsmen, just at a time when competition in the motor car industry was at its fiercest.

### Fields to Factories

I shall always remember, too, the appalling weather which greeted us when, clad in sou'westers and gum boots, we splashed across the sodden fields where a few months later there arose what is now one of the finest factories in the country. I refer to the great factory at Speke.

But we learnt—we learnt! We learnt the ins-and-outs of this new trade; we brought all our production experience and our engineering knowledge to bear on the problems involved; our workers learnt the necessary tricks of hand and brain. So that we were coming into full production just at the most vital period of the war. And I think you will appreciate the size of the achievement when I tell you that 30 per cent. of the bomber aircraft which this country produced in the critical year 1940—aircraft which smashed Hitler's invasion fleet in the harbours of the Low Countries—came from Rootes Group factories, most of which had been open fields such a short time before.

Other firms, who entered the field at a later stage, made notable contributions, but the fact remains that since the outbreak of war up to June, 1944 (the period covered by the recent White Paper) we made about 16 per cent., or one in every seven of all the bomber aircraft the U.K. has produced.

(I should perhaps also mention—merely to underline my main theme of the versatility of the motor car engineering industry—that we have been responsible for producing a number of fighters in recent months.) In addition we have modified some 2,690 aircraft at short notice to suit changing battle conditions. That is not unimportant. I'd like at this point to read you this letter received from an American officer by Rootes Securities, Ltd.

"I would like to offer my deepest appreciation for the all-out effort and complete co-operation with which your concern has expedited the manufacture of Lobelle Thunderbolt canopies for U.S.A.A.F.

"Your splendid achievement in completing many more than the promised quantity of these canopies per week is a tribute to the organisation of your concern and the high-class personnel employed therein. It is the sort of Anglo-American co-operation and unity which will win this war and be the foundation of the complete peace for which we are all striving.

Very sincerely yours,

(Signed)

JOSEPH T. MORRIS,

General, U.S.A. Director of Maintenance.

But aircraft have to be got into the air, and side by side with the shadow aircraft factories there was what was known as the No. 1 and No. 2 Aero Engine scheme. We went into this with some other manufacturers—many of them our fiercest competitors in peace—and between us, in harmony for the common purpose, we produced well over a quarter of this country's aero engines.

Not merely that, but when an aircraft crashes or damages its engines, or has done a specified number of flying hours, its engines are sent to one of a number of factories for overhaul. "Overhaul" is, in many cases, an example of British understatement. When these engines come in—earth driven deeply into them, or seared by fire, scarred by cannon or shell—unpleasant reminders of what has been far too often a tragedy—they need complete rebuilding. Our own factories have dealt with more than 21,000 of these engines.

That, in its broadest outline, is what we have done on the aircraft side. It is a sobering and perhaps a frightening thought that in terms of money the production of the Rootes Group aircraft division alone equal the total Air Estimates of H.M. Government for the year 1938-39.

Mr. G. Geoffrey Smith, managing editor of *Flight*, who had returned from his visit to the United States the night before, replied for the guests. He praised the energy and drive of Sir William Rootes, and paid a tribute to the Rootes Group's splendid contribution to the "Shadow Factory" scheme.

## CIVIL AVIATION

# Air Transport Economics

FIVEPENNY SINGLE FARE PER PASSENGER-MILE MAY PAY ON  
SHORT RUNS WITH GOOD LOAD FACTOR : SUBSIDIES  
NECESSARY FOR LONGER STAGES

MANY optimistic forecasts have been made by all sorts of people in all sorts of places of the tremendous future for commercial aviation. That it will forge ahead and will be of inestimable value, particularly to the British Empire, no one would deny. However, nothing but disappointment can result from prophecies which bear little relation to realities. The day may come when everybody who has to travel more than 100 miles will go by air, but that day is some way off, and a more useful approach, for the present at any rate, is the examination of aircraft and economics as they exist to-day, or at least as they may be expected to exist when commercial flying can be resumed.

In the January 10th issue of *The Shipping World*, Major R. H. Mayo makes such an examination, and his conclusions are illuminating, although they do not make particularly cheerful reading. The Atlantic crossing, with its long stages and consequently small payload, Major Mayo considers to be in a class by itself, and he confines himself to an examination of two other classes of service, a short-haul service of 500 miles average stage lengths and a longer-haul service with 1,000-mile stages.

One of the important items in running an air service, although by no means the only one, is the amount of work got out of an aircraft in a given time. Major Mayo points out that, contrary to a fairly commonly held belief, the aircraft operator does not have complete control of this. Geographical and political considerations have a great influence on the number of flying hours which an aircraft can put in during a year. Figures of 4,500 hours have been achieved by American operators, but that is in wartime, when the public has been willing to travel at any time during the day or night that suited the operator. In the case of British services radiating from Great Britain to the Continent, and taking into account the fact that a considerable proportion of aircraft must be held in reserve, Major Mayo concludes that the operator will be doing very well if he can approach a 2,000-hour per annum standard for his whole fleet.

### Cost per Ton-mile

Taking an average stage length, for the short-haul service, of 500 miles, using moderate-size aircraft, under fairly favourable conditions, Major Mayo arrives at an overall expenditure of about 2s. per capacity-ton-mile. This figure represents actual cost only, and does not include any allowance for interest on capital or other form of profit for the operator. Luggage which the passenger must be permitted to take with him free of charge must be taken into account. The figure arrived at, for the short-haul service, brings the average weight of a passenger and his luggage up to 225 lb., which gives approximately ten passengers to the ton.

Major Mayo gives the following table of revenue for different fares and load factors.

#### SHORT-HAUL SERVICES.

|                                      | d.   | d.   | d.   |
|--------------------------------------|------|------|------|
| Basic single fare per mile .....     | 4    | 5    | 6    |
| Net revenue per passenger-mile ....  | 3.4  | 4.25 | 5.1  |
| Net revenue per ton-mile .....       | 34.0 | 42.5 | 51.0 |
| Net revenue per capacity-ton-mile at |      |      |      |
| Load Factor: 40 per cent.            | 13.6 | 17.0 | 20.4 |
| 50 per cent.                         | 17.0 | 21.2 | 25.5 |
| 60 per cent.                         | 20.4 | 25.5 | 30.6 |
| 70 per cent.                         | 23.8 | 29.7 | 35.7 |

The net fare received by the operator is considerably lower than the actual fare paid by the passenger because

an allowance must be made for reductions on return tickets and for agents' commissions. The assumption is made that the net revenue to the operator will be about 85 per cent. of the basic single fare paid by the passenger.

At a basic single fare of 4d. per mile the traffic does not pull its weight even at a load factor of 70 per cent., which is higher than can be expected. At 6d. per mile the traffic pulls its weight at 47 per cent. load factor, but this fare is too high for the general public, and 5d. per mile seems to offer the best compromise. But it should be noted that this requires the fairly good load factor of 56.5 per cent.

A concrete example is provided by the London-Paris route, which is about 215 miles. The single fare, at 5d. per mile, will be £4 10s., and the return fare perhaps £7 17s. 6d. Major Mayo points out that this may seem high, but that actually it compares reasonably well with the pre-war fares for this service under subsidised conditions; it also bears a reasonable relationship to pre-war fares by surface transport.

### Passenger Weight Increase

Turning his attention to the longer-haul service of 1,000-mile stages, Major Mayo finds a somewhat sombre picture. For these longer flights the passenger will expect, and must be allowed, a greater luggage weight. This brings the weight of passenger and luggage up to 275 lb. and the number of passengers per ton down to eight. On this basis the fare/load factor table works out as follows:—

#### LONGER-HAUL SERVICES.

|                                      | d.   | d.   | d.   |
|--------------------------------------|------|------|------|
| Basic single fare per mile .....     | 5    | 6    | 7    |
| Net revenue per passenger-mile ....  | 4.25 | 5.1  | 5.95 |
| Net Revenue per ton-mile .....       | 34.0 | 40.8 | 47.6 |
| Net revenue per capacity-ton-mile at |      |      |      |
| Load Factor: 40 per cent.            | 13.6 | 16.3 | 19.0 |
| 50 per cent.                         | 17.0 | 20.4 | 23.8 |
| 60 per cent.                         | 20.4 | 24.4 | 28.5 |
| 70 per cent.                         | 23.8 | 28.5 | 33.2 |

Major Mayo's estimate of expenditure per ton-mile for the longer-haul service is 2s. 6d. As in the case of the short-haul service, this figure does not include interest on capital nor any other profit for the operator. The grim fact is disclosed that even at 7d. per passenger-mile a load factor of 63 per cent. must be achieved if the operator is to break even. Unfortunately this fare of 7d. per passenger mile is coupled with long distances. From London to Sydney is about 12,000 miles, so that the single fare must be £350. More, if the operator is to show any profit on the route! As Major Mayo says, a few heads of firms on urgent business, and a few very wealthy globe trotters, might be able to afford it, but an average load factor of 63 per cent. at fares of this order is a forlorn hope. And he comes to the conclusion that if it is decided as a matter of state policy that long-distance air travel must be brought within reach of a reasonably wide public, some form of direct or indirect subsidisation is inevitable. On this question of subsidies Major Mayo says: "It seems to me that there is nothing whatever to be ashamed about in paying or receiving a subsidy, provided it is fair payment for services rendered to the State. Anyway, if it is decided to run such long-distance air services by State enterprise, they certainly will be subsidised, so why should free enterprise be expected to achieve a miracle by making them pay without subsidy?"

The somewhat gloomy picture painted by Major Mayo of the cost of passenger transport is relieved by a more

promising one of air mails. He points out that although it is the peak load which fixes the aircraft capacity required, and that therefore there must be capacity far in excess of the average load, with consequent low average load factors, the postal rates necessary are not excessive. Past experience has shown an average of 90,000 letters to the ton and at 1.07d. and 1.34d. per half-ounce letter per 1,000 miles on the short-haul and long haul services, the operator must receive 8s. per ton-mile for the one and 10s. per ton-mile for the other. A modest surcharge of say 3d. per half-ounce letter per 1,000 miles would, he maintains, show a profit both to the Post Office and to the operator. The rate of 1.34d. per half-ounce letter per 1,000 miles would

represent 6d. per letter to Karachi and 1s. 4d. per letter to Sydney. He expresses the opinion that the public has not yet been trained to pay fair rates for services rendered in the carriage of air mails, and that the Empire Air Mail scheme set up a false standard of values.

If freight were to be carried on the two types of service visualised, and in the same aircraft as passengers and mails, Major Mayo estimates the cost to the operator (at a 40 per cent. load factor) as 5s. and 6s. 3d. respectively per ton-mile. These figures are equivalent to about 2s. 6d. and 3s. per pound per 1,000 miles respectively. He admits that the cost per ton-mile on a special cargo service operating at lower speeds may be considerably lower.

## Lord Swinton Reports

### THE HOUSE OF LORDS DEBATE ON THE CHICAGO CONFERENCE CLOSE COMMONWEALTH CO-OPERATION

**T**HE House of Lords debate—or “discussion,” as Lord Londonderry aptly called it—on Civil Air Transport gave the new Minister for Civil Aviation an opportunity to present the first comprehensive review of the work of the British Delegation at the Chicago Conference.

The Marquess of Londonderry asked for a clear-cut declaration of policy and expressed his satisfaction that the House would now receive a direct reply instead of what he was impelled to describe as previous vicarious answers of the Air Ministry.

In pleading for a declaration of policy Lord Londonderry pointed out that the position of Great Britain in the air is closely allied with the foreign policy, and he thought the recent debates on the structure of the Foreign Office had revealed the vital necessity for the closest co-operation between the Minister for Civil Aviation and the Foreign Secretary. He advocated more plain speaking without keeping the world guessing as to the position Britain wanted to occupy.

Pointing out that this capacity for plain language is aptly displayed by the Americans, he deplored the propaganda issued from this country which ignored the fact that we have been ahead in all inventions in the air.

The Minister for Civil Aviation (Viscount Swinton) said that it was perhaps natural that issues on which there was disagreement should have been given wider publicity than those upon which for the first time a large measure of agreement had been reached.

Dealing with the details of the Chicago Conference, he said that the problems of international air transport revolved around the exercise of “Five Freedoms”: (1) The privilege to fly across the territory of another country; (2) to land for non-transport purposes; (3) to set down passengers, mail and freight provided they were embarked in the country of origin of the aircraft; (4) the converse of (3) privilege, and (5) the right to take on and set down intermediate traffic.

The policy of the U.K. was set out in the White Paper and more fully expanded by him at Chicago. The U.K. proposed a multilateral convention which would cover freedoms one, two, three and four, while the fifth should be the subject of bilateral negotiations. Such multilateral convention would define the international routes over which these privileges would be exercised, and eliminate wasteful competition by determining frequencies. The British proposal suggested that these would be divided on the basis of traffic involved so that each country's share would depend on the amount of traffic embarked in its own country. The setting-up of an international authority was proposed to supervise the carrying-out of these provisions.

#### Unlimited Competition

The U.S. policy—Viscount Swinton explained—differed fundamentally, being based on the conception of practically unlimited competition on every route covering the five freedoms, and an international organisation of merely a consultative nature. Such unlimited competition was considered by the British Delegation as wasteful and unfair. It was further felt by many that civil aviation and security are intimately bound together.

The Minister then mentioned the Australia and New Zealand proposal for an all-embracing international company which would own and operate all civil aircraft of the world. Anxious

as people were to meet the security question, that particular way of meeting it could not find sufficient supporters.

The U.K. Delegation and all the Commonwealth countries found themselves in agreement with a great part of the Canadian Draft Convention covering the first four freedoms. But the U.S. counter-proposals insisted on the general application of the fifth freedom, a general right to pick up intermediate traffic in any country along the route.

Summarising the considerable discussion which ranged around the fifth freedom, Lord Swinton said that various attempts were made to devise mathematical formulæ to govern its practical application, but they were all found impracticable. The method adopted in the British final proposal aimed at relating the number of services to the amount of traffic, a fair division of the services between the countries on the basis of traffic embarked and a division of long routes into operational sectors. The international authority in consultation with the operators should fix the capacity of the services which each State should be entitled to operate in each division. In making the decision the international authority would be guided by tests which follow the pattern applied by the Civil Aeronautics Board of the U.S. in deciding whether or not an additional internal airline service should be entitled to operate.

#### The “Escalator” Clause

The British plan also embodied the elastic escalator clause which provided that if for a period of twelve months an operator had increased his load factor (60-65 per cent. being the agreed “constant load” factor) he would be entitled to increase the number of his service, and in the opposite event he would have to come down again. And finally provision was made that those countries which had been unable to develop civil aviation because of their war effort should have a three years' period of grace during which other countries which had come in on the route should be called on to reduce their national quotas.

The U.S. were unable to accept this proposal, and the American counter proposal embodied a general and unconditional grant of all five freedoms. This was signed, in addition to the U.S., by ten Latin American States (not including Brazil), Sweden, China, Afghanistan, Liberia, Lebanon *ad referendum*, and Turkey with some considerable reservations.

On initiative of the U.K. delegation another agreement was reached between twenty-eight countries, including Britain and America, accepting the first two freedoms between the signatories.

It was unanimously resolved that all outstanding matters in which we had failed to agree should be referred to the Interim Council of the International organisation they had set up for report and recommendation to the Governments concerned.

Dwelling on achievements in technical collaboration, Lord Swinton said that for the first time a universal charter or code of air navigation has been adopted to which all nations would conform. A whole range of agreements of practical importance had been reached, summarised in twelve chapters of Technical Annexes internationally standardising a code of air navigation; airways systems and their equipment; air traffic control practices; meteorological information; radio communications; investigation of accidents, and minimum flexible standards of airworthiness procedure.

Lord Swinton summarised the results of the Chicago confer-

## LORD SWINTON REPORTS

ence by saying that it reaffirmed the doctrine of the sovereignty of the air space above national territory, which was universally defined as including the Colonies and Protectorates and Mandated Territories; and the right of each country to its own internal traffic.

Turning to the Commonwealth air talks in Montreal and London, the Minister said that they had established a Commonwealth Air Transport Council of a consultative character. The Council—which will meet as required in different parts of the Commonwealth—will have a permanent secretariat. For the time being the Civil Aviation Department in London will fulfil this function with liaison officers from each of the High Commissioners' Offices attached to it. The Dominions, as well as India, Southern Rhodesia, Newfoundland, and the Colonies, will be represented. Full plans were made for the operation of routes from U.K. to South Africa via Egypt, East Africa and Rhodesia; from U.K. to India; the U.K. route via India to Australia and New Zealand; the U.K. to Canada transatlantic route, and the Pacific route from Australia and New Zealand via Fiji to Canada. The work of the C.E.R.C.A.—Commonwealth and Empire Conference on Radio for Civil Aviation—will be brought under the aegis of the Commonwealth and Empire Air Council.

Lord Strabolgi thought that the most important questions had been left in abeyance at Chicago owing to the absence of the Russians. He considered it unfortunate that three separate plans were presented at Chicago by the Commonwealth, instead of one previously agreed policy. Beginning with the great trunk lines to India and Australia, he suggested the formation of an Inter-Dominion Company which other countries would be invited to join later. In this way he envisaged a method of materialising gradually the "Anzac" plan.

The Duke of Sutherland said that as a result of the policy we had pursued we had to go to Chicago with a plan for a restricted American contribution to post-war civil aviation to give us an opportunity of getting on our feet.

Viscount Rothermere hoped that at some future not too distant date opportunities would be given to the House to debate all home questions and the policy the Government was proposing to adopt. He thought that the most important thing that came out of Chicago was that it brought the

members of the British Commonwealth together as never before and confirmed the assets which it possessed in the location of its bases spread over the whole world.

Viscount Elibank congratulated the Minister upon what he achieved at Montreal. The formation of the Commonwealth Air Council, he said, would speed up business and improve relations within the Commonwealth; he saw in it a beginning of a big policy which might lead to much more than could be realised to-day.

Lord Grimthorpe thought that the Chicago Conference was too hastily convened and that a preceding conference of airline operators would have helped towards agreement. A beginning was made with the C.I.A.T.O. conference in London last May, but unfortunately full benefits from this conference could not be achieved because of the refusal of the B.O.A.C. to join. This, he said, led other foreign companies, such as the Dutch and American, to remain aloof. The attitude of the Air Ministry towards the C.I.A.T.O. he described as "damned with faint praise."

Lord Grimthorpe then said that as a result of a meeting of forty representatives of airlines held at the end of the Chicago Conference a committee of seven members was appointed to draft a set of rules for an international association of airline operators. A meeting to consider these draft rules is to meet in Havana in April next.

Replying, Viscount Swinton said that with regard to Russia it was hoped that she would feel able to come in. For this purpose a place has been left for Russia upon the council of the international body. Practical experts agreed with him that the British plan submitted at Chicago was entirely practical, and it had, he assured the House, very great Commonwealth support. He was not opposed to joint companies, but the desire of the Commonwealth at present was that the great trunk lines should be operated in parallel.

The British plan was not based on expediency, the Minister said, but on what was thought to be right and necessary for all countries, great or small. He reassured Viscount Rothermere that there was no delay in working on all matters concerning home civil aviation problems (such as the question of the "chosen instrument"), and he would make a statement and invite the fullest debate of the House.

Reverting to Commonwealth collaboration, he agreed with Viscount Rothermere that this was one of the most valuable outcomes of their meetings. "It is a living reality now," he said, "and that spirit will continue in existence."

## CIVIL AVIATION NEWS

### BUDGET

FORTY-TWO and a half million dollars are earmarked for the office of the Administrator of Civil Aeronautics in the U.S. Budget estimates for the current fiscal year submitted by President Roosevelt to Congress.

One of the major responsibilities of this Federal agency is to establish and maintain various aids to air navigation along federal air routes. By the end of 1946 it is expected that 40,308 miles will be in operation, or 17 per cent. more than at the close of 1944.

### U.S. SURVEYS

AMERICAN fondness for Gallop polls, surveys, etc., has been recently applied to gauge post-war aviation prospects.

An enquiry conducted by American Airlines as to preferences of air travellers showed that 84 per cent. of them regarded the size of aircraft as unimportant; 56 per cent. had no preference as between landplane and flying boat, and 34 per cent. preferred flying boats.

The survey gives some interesting data on the trend of opinion of people who have travelled by air: 67 per cent. were for extra charge for speed; 74 per cent. wanted stewardesses only on board; 31 per cent. wanted to have luggage on board. Most of the travellers generally prefer day flight, but 64 per cent. of those who travel on business preferred night flying.

As centres of tourist attraction Britain ranges first, followed by the Continent, other American countries, U.S.S.R., Asia Minor, Africa, the Far East, Australia, Pacific and the Balkans. Business men were equally attracted to the first four.

Another survey conducted by *Time* of the views of 401 travel agents disclosed that most of them expect post-war American tourist traffic to Europe to continue by surface travel, 32 per cent. envisage a majority of tourists using combined air-surface routes, and only 10 per cent. see all-air travel to Europe by tourists in comfortable circumstances.

### AVIATION'S FUTURE

MAKING a strong plea for the development of aviation on competitive, not monopolistic, lines, Sir Richard Fairey, addressing the Bermuda Rotary Club, said that the future of aviation depended on whether it would be allowed "to strike out for itself" free from Government control. But enterprise could not move by itself and depended on what action the Government took.

The function of the Government he said, would appear to be to provide airports even as ports were provided for shipping, but the aim should be that users of the air should pay for air.

American airlines, he added, were in a leading position through competitive enterprise which "finds out most quickly what the customer wants."

### NEWFOUNDLAND SANCTION

WITH a view to the widest possible use of Newfoundland's airports, the Newfoundland Government Commission now agree that the "Two Freedoms Agreement" drafted at the International Civil Aviation Conference in Chicago last month should apply to Newfoundland.

The "Two Freedoms Agreement" gives to all signatories the right of passage over the territory of another nation and the right to land for refuelling without taking up or setting down passengers or cargo.

At the time of the Chicago Conference a reservation was entered by Lord Swinton at the request of the Newfoundland delegates, but the position has been reconsidered now by the Newfoundland Government Commission. In a statement, issued by the Commission dealing with Newfoundland's agreement to the two freedom's convention; it is stated that "In the long run the employment which will thus be created, revenues from landing fees and facilities which will be made available for passengers and cargo traffic to and from the island will far outweigh any temporary immediate benefit which might conceivably accrue from bargaining with other countries for civil aviation rights."

"Indicator" Discusses Topics of the Day

# "Passenger-conscious" Pilots

## Making Transport Flying Feel Safe : Considering the "Eggs in the Basket" : The Necessity for Smooth Flying and Unworried "Drill"

ONE of the many things that must be grafted into the perfect transport pilot is something that I can only describe as a "passenger-consciousness." For some time before the war attempts were made to discipline airline pilots by way of obtaining the same result, but no discipline or nagging in the world can really produce the desired effect. This must grow in, and be thoroughly appreciated by, the pilots themselves.

It is very largely a question of putting oneself in the other person's place. The transport pilot must never forget the passengers and crew; he must never do his job in the way in which he wants to do it; he must never forget, even in the most harassing moments, that he is not alone in the aircraft. The cardinal error can best be described as that inevitably developed by almost any single-seater pilot and, more particularly, by any test pilot. The latter offers the extreme example; he is necessarily interested only in the aircraft and himself.

Ultimately, no amount of lecturing or talking or reading can make a pilot "passenger-conscious," and no amount of discipline will do more than prevent the more glaring examples of self-sufficiency. Both can be a reminder and set the pilot's habits so that he is never, at any time, outstandingly inconsiderate, but the real thing must grow naturally in the pilot's way of unconscious thinking, so that he never imagines himself, even for a moment, to be alone or to be the solely interested party in any experiment he cares to make. The eggs are always in the basket, and the basket is always full; furthermore, the eggs are very easily broken.

If I hadn't, time and again, seen examples of appalling airmanship from the passengers' point of view—and if I hadn't several times been a very worried egg myself—I wouldn't consider the point worth stressing. Maybe the majority of the passengers sit back somnolently and accept everything—but I very much doubt it. And year by year the passengers will become more and more "educated," and will expect better and more accurate and "bookish" flying from their crews.

### Pilot Preference

I won't labour the point by citing all the moments in a flight when smooth and unworried "drill" is vitally necessary, or when any sign of raggedness in the procedure will be noticed by the least air-conscious of passengers. But I will say that, even in the ignorant years, a surprisingly large number of ordinary persons had very definite preferences and prejudices where companies and even individual crews were concerned. After this war is over they are likely to have even more preferences and prejudices, and there will be quite a fair proportion of passengers who have that unpleasant itch of the driver-being-driven.

Take-off technique is vital, and approach technique in bad conditions is doubly vital. Anything that happens between the two is largely a matter of indifference except to passengers with unstable interiors. The most moronic and ignorant passengers will know quite well whether or not a pilot understands his business when it comes to an approach in really bad conditions. That is the final test of calm confidence as well as of "passenger-consciousness."

By way of emphasis and explanation, let me describe one incident (or series of incidents) at the termination of a transport run with which I was vaguely concerned. This description should really carry a separate heading: "How Not to Do It," and experienced film operators should have been placed with cameras at various vantage points on the ground and in the aircraft so that special educational shows could be given to all transport crews.

The scene was set at a comfortably large airfield with a very adequate series of aids and guides of all kinds. Visibility was of the order of 500 to 1,000 yards; there was a broken cloud layer at 200ft. A.G.L.; and there appeared to be a main base at about 800ft. Improvement was promised, and, in fact, within a couple of hours conditions were reasonably flyable for any sort of aircraft; furthermore, the crew had been informed that another airfield some distance away was offering six miles' visibility and a 1,500ft. cloud base. We will give the pilot the benefit of the doubt and forget that he may have had a date near his base, while we may even take it for granted, too, that his fuel reserves were inadequate for further flying. We will forget, too, that his terminal Met. report should have caused him, in any case, to cancel the run. We will pretend that he *had* to get through, and that, once through, he had to land at his particular airfield. Conditions were not, in fact, impossible, and were almost safe, provided everything went reasonably according to plan.

Since I was not in the aircraft I will not attempt to give a running commentary on the whole performance. After an initial series of comparatively dignified circuits and trial approaches, the efforts culminated in what can only be described as a succession of wild stabs. The circuits became almost low-level beat-ups with their centre about a thousand yards from the end of the runway in use. In other words, as soon as the pilot saw the field he started a turn preparatory to another attempt, and on each Guess-and-God attack the aircraft's altitude became lower and lower. One spectator described the whole thing quite adequately as "an approach by brute force and — ignorance."

Finally, he crossed the airfield boundary at approximately the right place but a hundred feet too high and about fifty miles an hour too fast, closed the throttles after a considerable pause of apparent hesitation, executed a series of minor turns to put the outfit in line with and over the runway, touched down about halfway down, and ground-looped to a standstill. That last I admit to be pure hearsay—with the allegation that he hit something "lightly" in the end. Maybe he didn't do either, but there must have been very little room to spare. I don't even know whether he had any passengers aboard; if he had they'll be cured of air travel for all time. But merely to fly and make decisions in such a way while in control of £?0,000-worth of aircraft is almost a capital offence.

Arrivals of that kind should surely be made to a pattern. The airfield in question had V.H.F. transmitters, and its up-to-date approach lighting system was in action at the time. Even if the aircraft's own V.H.F. equipment had been unserviceable, the series of approaches should have been made according to the old well-tried plan which, with accurate flying, will produce an approximately correct arrival to the point where the approach lighting can be seen and used. Meanwhile, the little voice in the pilot's head should have been saying: "There's no panic; plenty of time. If the first, second and third attempts don't bring me to the right place, then the fourth will do it—and, in any case, there's a good-weather airfield an hour's flying away. Above all, I must fly smoothly, maintain height in cloud until the right moment arrives, and give my passengers no cause for alarm. . . ."

There may have been people who breathed "Good show!" when the expensive outfit was safely grounded at ninety-odd. So it would have been if the aircraft had been a fighter with five gallons of petrol in its tanks and if the pilot had merely had the choice of "having a try" and/or going up to bale out.

"INDICATOR."

# Single-float Seaplanes

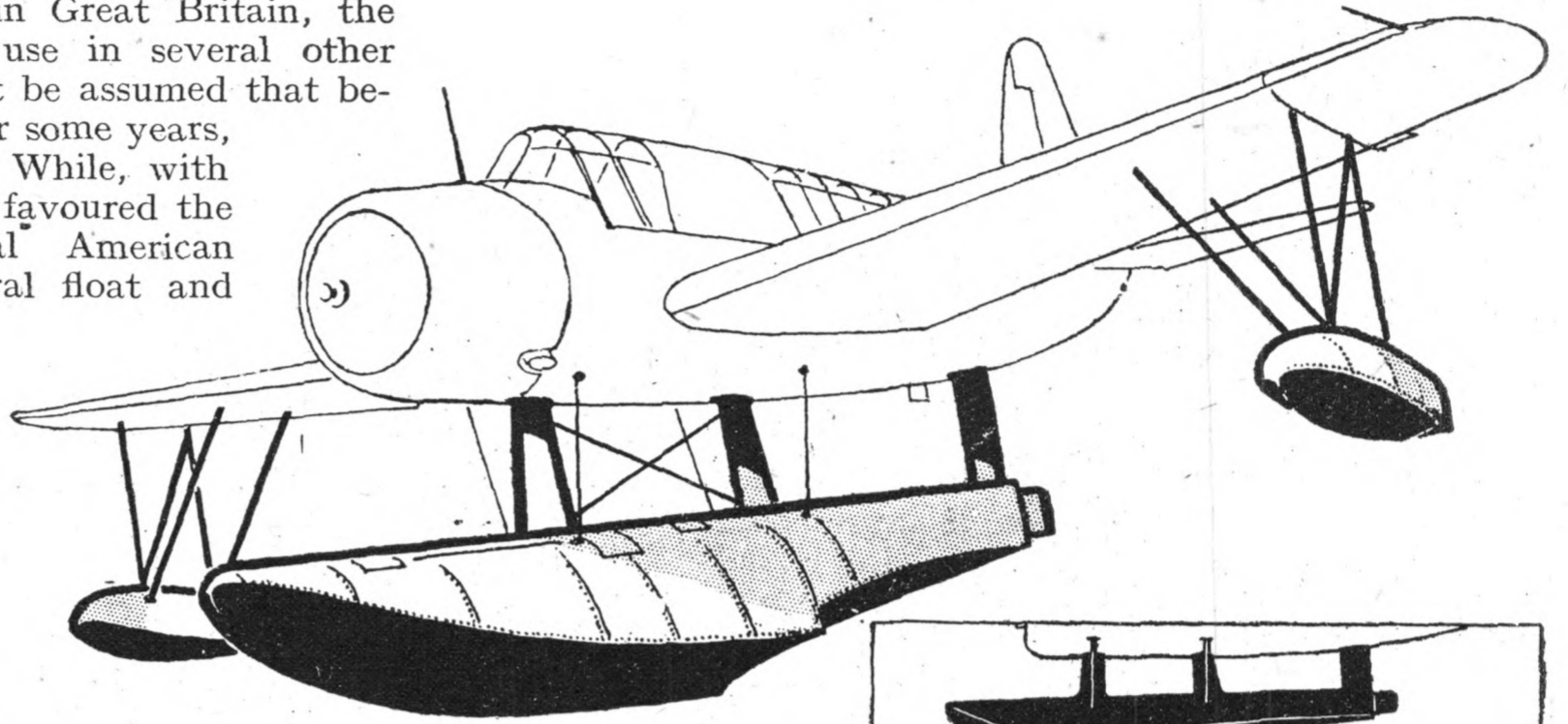
## Advantages of the Layout and Factors Influencing Design

**A**LTHOUGH almost extinct in Great Britain, the float seaplane is still in use in several other countries, and it should not be assumed that because it has not been seen here for some years, the type is necessarily "dead." While, with few exceptions, British designers favoured the twin-float arrangement, several American firms developed the single central float and obtained lateral stabilisation from outboard floats of the type familiar from flying boats.

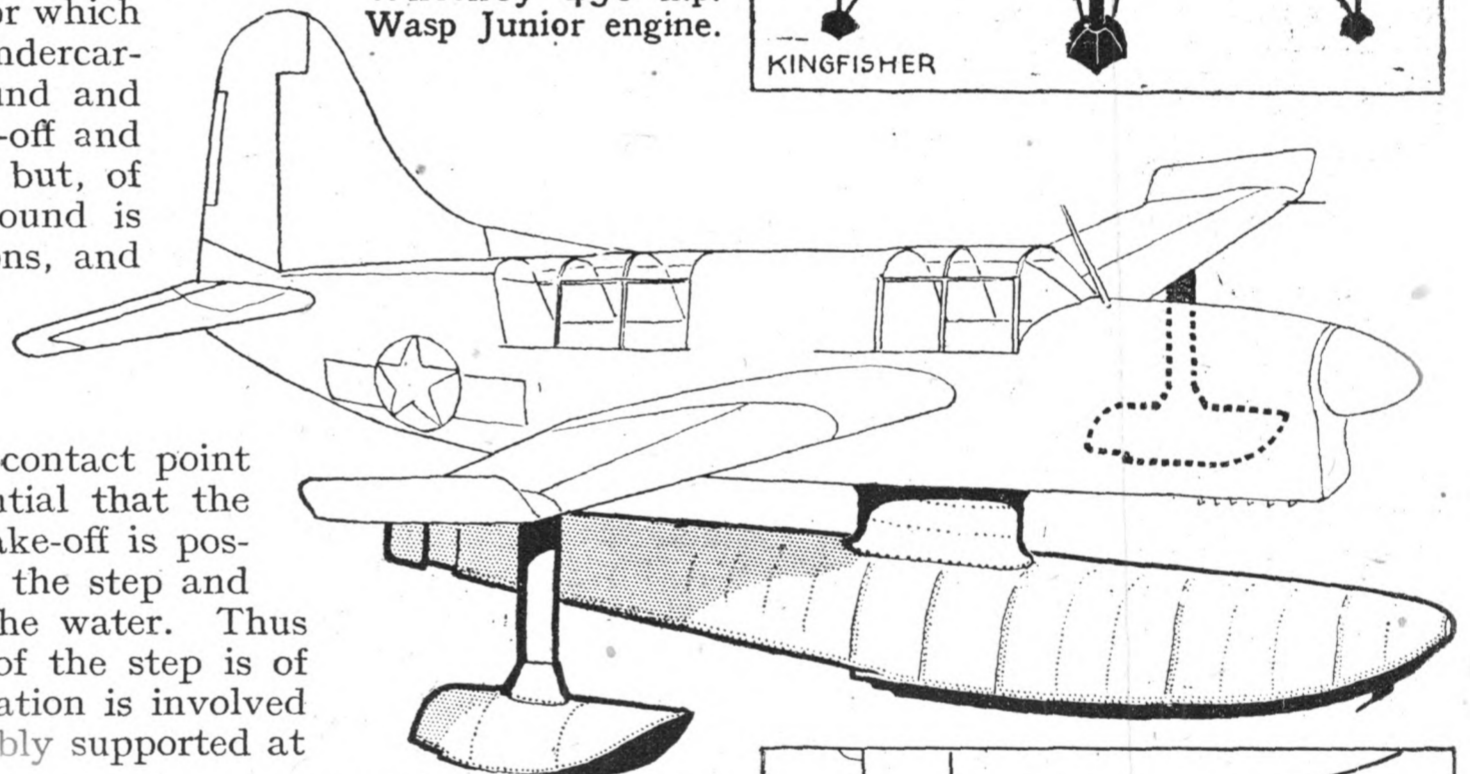
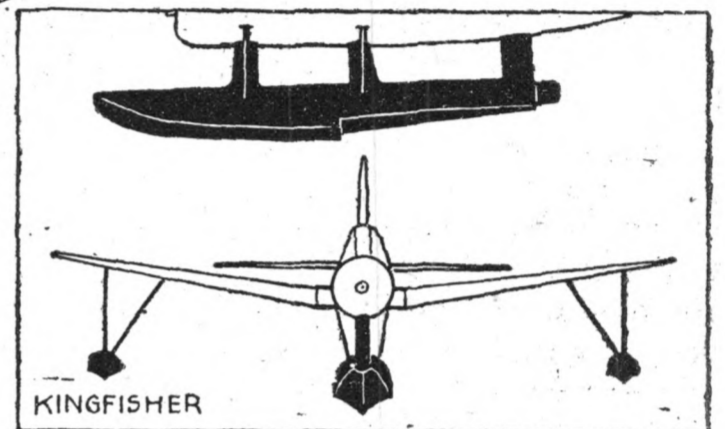
Probably the chief reason why a single float is employed is that a reduction in air drag is achieved for a given buoyancy factor. Additionally there are the factors of reduced wetted area for a given required buoyancy, reduced keel surface, reduced moment of inertia, and simplicity of construction and maintenance, all of which are advantages of the single-float over the twin-float layout.

Float design, as such, has become stabilised, and thus all main floats are basically similar although the detail design differs with the particular aircraft for which the float is intended. With a wheel undercarriage the point of contact with the ground and its relation to the aircraft's c.g. and take-off and landing attitudes is of great importance, but, of course, the wheel's contact with the ground is virtually a point, from these considerations, and can be looked upon as a concrete entity.

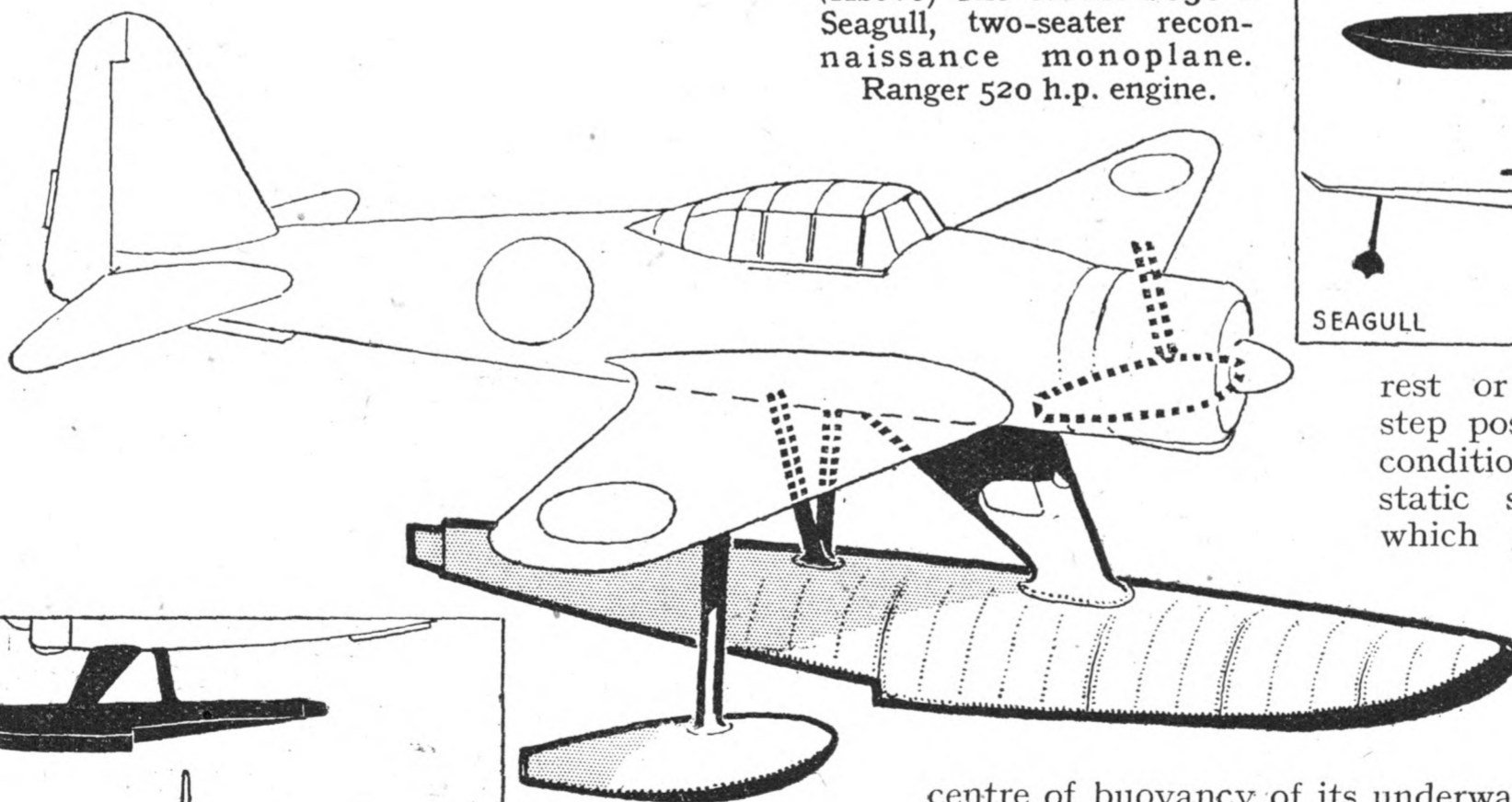
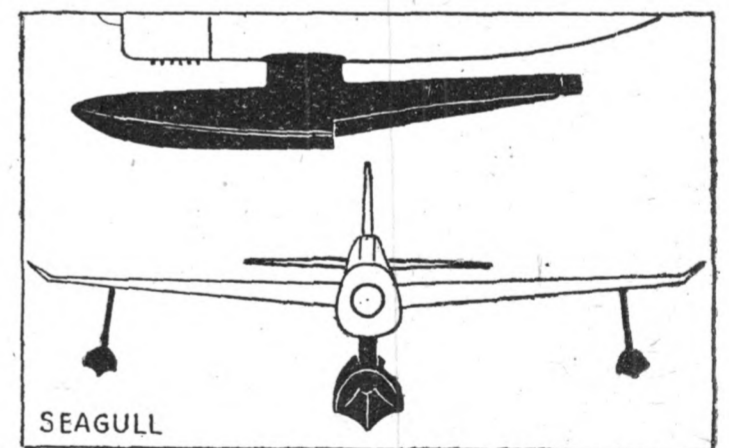
Such is not the case, however, with floats. Broadly, the step in the float's underbody can be likened to the ground-contact point of the land undercarriage, for it is essential that the machine be planing on the step before take-off is possible. Again, when touching down, it is the step and afterbody of the float which first meet the water. Thus it can be appreciated that the location of the step is of prime importance; but an added complication is involved by the necessity of the machine being stably supported at



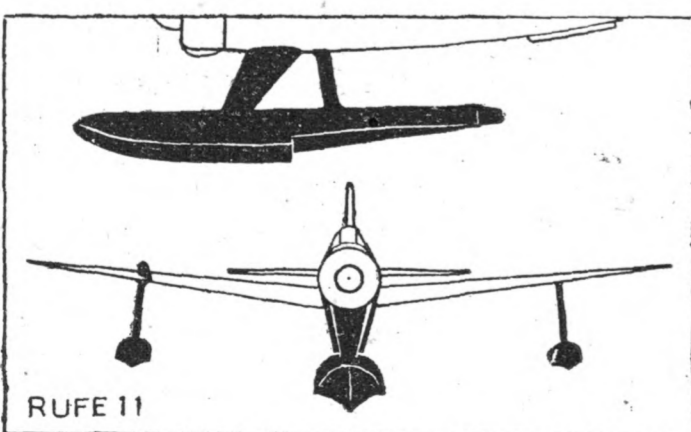
(Above) The Vought-Sikorsky OS2U-3 Kingfisher, two-seater reconnaissance monoplane. Pratt and Whitney 450 h.p. Wasp Junior engine.



(Above) The Curtiss SO3C-1 Seagull, two-seater reconnaissance monoplane. Ranger 520 h.p. engine.



The Nakajima Rufe 2, single-seater fighter. Sakae 12, 14-cylinder radial air-cooled engine.



rest or whilst taxiing. The step position is decided by the conditions mentioned, and the static stability is the factor which governs the degree of buoyancy given by the forward and after sections of the float hull.

Treating the float as a normal hull, the centre of buoyancy of its underwater body will need to be beneath the aircraft's c.g. or, possibly, a trifle forward of it. This will ensure that the attitude of the aircraft on the water is reasonably level, or, if anything, a little tail-down.

Again, the shape of the float's underwater body is

designed to provide a good planing surface which will allow of getting "up on the step" both easily and quickly, and, at the same time, will give differing quantities of lift, or buoyancy, between the forward and after sections. This quality is imparted in order to damp out any tendency towards "porpoising," which can so easily occur by virtue of the couple produced between the aircraft's c.g. and the float's centre of buoyancy. One of the main factors which governs the arm length between the two centres is tip clearance of the airscrew, and consequently the vertical distance

from the fuselage centre-line to the float has to be somewhat greater for the single-float installation than it needed to be in the twin-float arrangement.

The three floatplanes illustrated here all have a great deal in common, but sundry individual diversities in flotation arrangements may be discerned. That feature which, perhaps, strikes one most forcibly is the system of float mounting which, in the Seagull, the Japanese Nakajima (Rufe 11), and the Kingfisher respectively, illustrates examples of the very clean, the moderately clean, and the "busy."

## M.A.P. Chief Executive Retires

*But Will Continue as Member of Air Supply Council*

**A**IR CHIEF MARSHAL SIR WILFRID FREEMAN is retiring at his own request from the post of Chief Executive of the Ministry of Aircraft Production, which he has held since 1942.

The Minister of Aircraft Production has felt bound, with the greatest regret, said a recent official statement, to accede to Sir Wilfrid's request to be released from his duties, and has put on record his warm appreciation of the valuable services which the Chief Executive has rendered over many years before and during the present war.

Since 1936, when he became member of the Air Council for Research, Development and Production, Sir Wilfrid Freeman has played a leading part in guiding and creating the great aircraft industry on which our success in the air has been based. In particular, he was closely connected with the schemes for the expansion of the industry and the creation of shadow factories which, on the out-

break of war, made possible that great and rapid development of the aircraft industry necessary to our rearmament in the air. Sir Wilfrid Freeman will continue to be a member of the Air Supply Council.

He will be succeeded as from March 25th next by Mr. E. N. Plowden, who has served in the department in various capacities since 1940, and is now Director General of Engine and Materials Production.

Mr. Plowden is a director of a firm of metal, chemical and produce merchants, and joined the Ministry in 1940. For a time he was responsible for the supply of aluminium. In July, 1942, he became Deputy Director General, and in June, 1943, Director General of Materials Production. On the formation of Power Jets (Research and Development), Ltd., he was appointed to the board as a director.

Sir John Buchanan, Assistant Chief Executive, becomes Special Adviser on Production to the Minister.

### AN AIRSHIP OFFICER

**L**AST week Wing Cdr. R. S. Booth, A.F.C., retired from the Ministry of Aircraft Production on reaching the age limit. It is a long time since R100 was broken up with hacksaws and sold as scrap, and few people now will readily remember the anxiety caused to the whole nation when the earlier airship, R33, broke away from her mooring mast in a gale and was blown across the Channel in a very damaged condition. Booth was on board her and in command. He decided not to abandon ship, but to make an effort to bring her back to base. It was a plucky decision, involving risk, but with great skill Booth brought his ship safely home. For this he received the Air Force Cross, and his crew were given other awards.

Later he was given command of the larger airship, R100, and when she flew the Atlantic to Montreal and back Booth commanded her crew, though Major Scott was in charge of the flight. The destruction of R101 by fire and of R100 by hacksaw ended the careers of airship officers as such in the R.A.F. or the Civil Aviation Department, but Wing Cdr. Booth has continued to do good work for his country.

### "MEET THE FAMILY"

**A**HIGH tribute was paid the other day by Mr. T. O. M. Sopwith to the men and women who have worked so hard and consistently to produce aircraft and engines in the Hawker-Siddeley group under difficult conditions. The occasion was a pre-view of a film produced in order to let all these thousands of workers see in action some of the finished products of their labours. Describing himself as "the grandfather of the family," Mr. Sopwith, in introducing the film, apologised for its lack of excitement. To us it seemed that a criticism which might more justly be levelled at it was its understatement of their achievements. The part played by the Hurricane in the Battle of Britain, for example, is worthy of far greater emphasis than it receives in the film. One serious shortcoming is that the film having been made some time ago, when certain security restrictions were still in force, the Hawker Tempest and the Gloster jet-propelled machine are not included.

Even to those who are in the closest touch with flying matters the film is a welcome reminder of the Hawker-Siddeley contribution to the war. Beginning with the Gladiator, which gathered undying fame at Malta (Faith, Hope and Charity), the film shows the many types of the group, Hurricane and Typhoon from the Hawker stable, the Armstrong-Whitworth Whitley and Albemarle, the Avro Anson, Manchester and Lancaster, and a few glimpses of the manufacture of that amaz-

ingly reliable engine, the Cheetah. The "air university," Air Service Training, also comes in for a little well-earned praise, but the glimpses of the different designers are so short that one barely has time to recognise them.

The film commentary is spoken by Rex Palmer ("Abide With Me"), now a Wing Commander, R.A.F., and from the style of his scrip we suspect that this was written by Mr. H. K. Jones.

### WORKERS' PLAYTIME

**T**HERE may not appear to be much in common between the art of golf and that of building aircraft, and, indeed, but for the fact that early last year a few of those engaged in the aircraft industry happened to get together for a game of golf one Saturday afternoon, the two pursuits might never have been closely linked. But that particular game proved so enjoyable that it gave rise to the formation of The Aircraft Golfing Society, and the link was established. Such a combination of interests obviously possessed "what it takes" to ensure success, and the society's first annual dinner, held at the Grosvenor House Hotel, Park Lane, London, W.1, last Friday night was a fitting climax to this organisation's initial year with Lord Brabazon as president.

As Col. the Rt. Hon. J. J. Llewellyn, Minister of Food and an ex-Minister of Aircraft Production, pointed out in responding to the toast of "The Guests," both pursuits (golf and aircraft construction) involved the arts of making something rise into the air, pursue a desired course, and alight safely on the fairway. The aircraft industry, he added, had done a magnificent job in providing the country with all the aircraft it needed, plus a considerable number for the use of Allied air forces, and thus it now well deserved a little healthy relaxation on the golf course.

This justification of the society's activities in wartime was, however, about the only serious remarks that any of the speakers made, for Lord Brabazon (another ex-Minister of Aircraft Production) led off with a highly amusing dissertation on the peculiarities of the golf ball. Sir Frederick Handley Page was also on top of his form in light comedy, and the jovial atmosphere of the occasion was indicated by the slanderous anecdotes told by certain speakers about the sort of golf played by his companions. It was, in fact, an extremely enjoyable function, during which Flt. Lt. Henry Cotton auctioned off two golf balls and raised £14 for the R.A.F. Benevolent Fund, and which was rounded off by an excellent entertainment from members of the celebrated R.A.F. Gang Show. Incidentally, Henry Cotton is to be congratulated on his moral courage in sticking to the old-fashioned "golf" in defiance of all the other "goffs."

# 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

## AIRBORNE OUNCES

### A System in Dynamic Equilibrium

THE solutions to the canary and cage problem given by your correspondents in the January 4th issue seem to me to ignore the nature of the supporting medium—air.

A canary's wings are of a "natural" aerofoil section and lift is therefore derived from movement of these wings through the air. Nearly all the lift at small angles of attack is obtained from the pressure distributions above and below the wing between extreme undisturbed streamlines, thus, neglecting turbulence, etc., air in these outer regions of laminar flow takes no part in the lifting process and is incapable of transmitting any of the forces acting in the lift area.

Were this not so, I feel that many people would already have reported feeling flattened as airborne aircraft passed over them.

Therefore, provided that the canary does not fly very close to the floor of its cage there will be no reaction on the floor and so, taking weights as used before, the scales would register 20 ozs. Even in the stifling atmosphere of an airtight box the canary would reduce the scale-reading by 1 oz. when it became airborne, since its weight could be wholly supported by purely local pressure variations induced by the contour of its wings moving through the air.

The problem is greatly simplified if we consider the bird in straight and level flight to be part of a system in dynamic equilibrium then, due to a beautiful theorem ascribed to Schmelie, it can exert no force on any other independent system.

HAROLD H. CAPLAN.

## IMPLICATIONS OF V2

### To Escape the Earth's Gravity

I HAVE read many articles on extra-terrestrial travel possibilities, and the basic principles seem to me as follows. In order for a body to "escape" from the earth it is necessary to perform a certain amount of work upon it. Part of this energy is used in directly counteracting the gravitational pull of the earth on the body, and part in building up a velocity which would ensure that, at any distance from the earth, it retains sufficient momentum to maintain positive velocity radially outward from the earth.

The jet of a perpendicularly directed rocket provides a reactionary force on the projectile which more than cancels the weight, the surplus force producing an acceleration. Once a "liberation velocity" is attained the rocket will continue on its course unaided, as the decreasing deceleration effected by the receding earth will not reduce its velocity to zero within any finite time or distance. The gravitational attraction varies inversely as the square of the distance, so the deceleration being  $-32 \text{ ft./sec.}^2$  at the earth's surface converges rapidly on zero at an infinite distance. It is obvious, therefore, that the escape velocity also decreases with the distance. The acceleration involved in its attainment is immaterial, the only limiting factor being the burning duration of the fuel. The effective thrust must at least cancel out the weight.

The weight decreases with the distance from the earth; also the weight and the mass of the rocket decrease as the fuel is consumed. It seems to me that the acceleration need not be very high for the following reasons:

(a) Violently fluctuating loads on the structural members would be avoided.

(b) The passengers, if any, would be more comfortable, and more capable of controlling the machine.

(c) The bulk of the acceleration would take place well away from the earth and in a near vacuum where

(1) Atmospheric resistance is nil and rocket efficiency very high.

(2) The mass, weight and escape velocity would all be less than at lower levels.

On the other hand, the dead weight of the rocket has to be supported longer, and the fuel capacity limits the range of possible accelerations by its burning duration. Consideration of the problem is difficult, due to the complexity of variables, but a competent mathematician (or should I say magician?) may be able to evolve an equation which would determine the optimum control settings (if any).

If a body is given an orbital velocity of 4.9 m.p.s. at strato-

spheric levels centrifugal force will cancel its weight. Further out the orbital escape velocity is less—it is only 3.47 m.p.s. 4,000 miles out. An increase on this velocity would result in a very complex path of motion. I should imagine it would approximate to a rapidly expanding spiral.

However, it is obvious that the orbital escape velocity is less than the perpendicular or radial escape velocity. This fact somewhat offends my logic—does it result from the fact that the rocket would have to be supported perpendicularly until it attains its orbital velocity?

If a rocket were projected from the equator it would have, from the start, the momentum imparted by the earth's rotation, i.e., an orbital velocity of approximately 1,000 m.p.h. (Does a given mass weigh less in tropic regions for that reason?) An acceleration of  $50 \text{ ft./sec.}^2$  (approximately  $1\frac{1}{2}g$ ) would enable it to attain a velocity (orbitally) of 4.9 m.p.s. within 9 min. A further radial acceleration of  $50 \text{ ft./sec.}^2$  (with the earth's gravity already eliminated and the mass greatly reduced by fuel consumption) would give it an additional radial velocity of approximately 5 m.p.s. within 9 min.

For a mean mass of 10 tons this involves a thrust of 500 tons maintained for 18 min. If the acceleration in each case were only  $5 \text{ ft./sec.}^2$  it would involve a thrust of 50 tons maintained for 180 min. Since low velocities in atmospheric layers are very wasteful of fuel, it might be advisable to tow the projectile up to stratospheric levels, thus giving it a useful initial circular velocity and economising in its fuel.

The V.2 would seem to show that interplanetary travel is graduating from a possibility into a probability—attainment of a sufficiently high power/weight ratio was, I believe, the main difficulty. I should imagine the next requirement is a superman with a double-barrelled supercharged slide rule, a strong stomach, and an Einsteinian knowledge of mathematics, to operate as navigator! Forward, Horace!!!

ESCAPIST.

## ASYMMETRY AGAIN

### Snags in a Suggested Design

WE have read your paper for a good many years with interest and appreciation, especially the articles, which, on the whole, are good, particularly those by "Indicator." We have never before written to you, however, but the article (*Flight*, January 11th) by Roger Tennant on Asymmetry has been too much.

First, the picture. It looks beautiful, but anyone can draw a picture of a beautiful-looking machine if excrescences such as exhausts and air intakes are omitted, neither of which items are mentioned in the article. Another item, mention of which is carefully avoided, is the undercarriage, which, of necessity, would be both complicated and unstable, owing to the impossibility of putting either a nose or tail wheel in line with the C.G.

Further, it is stated as an axiom that the fighter must be on even terms with single-seat fighters, yet it is automatically handicapped by a wing loading of 58 and an aspect ratio of 11, both of which would have an adverse effect on manoeuvrability.

It is also suggested that it would be advantageous to cruise on one engine, the yawing couple being airily dismissed as small, to obtain a low fuel consumption. This, however, would require a comparatively high power output from the one engine in operation, which necessarily raises the specific fuel consumption. Surely it would be more economical as well as practical to run both engines at a low output?

From the production and maintenance angle Mr. Tennant has at one fell swoop also done away with interchangeability of both power plants and airscrews, which, in spite of the example of the Lightning, would still be a very desirable feature when operating thousands of miles from the source of production.

All this would be enough to put any sensible designer off at once, yet Mr. Tennant goes on to suggest towing the fuel overload behind in a winged petrol tank (attached by a stressed petrol pipe) which, far from being a disadvantage, is going to help the take-off. Since we are going to credit this "fuel-bug" with a mind and will-power of its own, may we point out that the pilot would have to be very careful about throttling back, as the fuel tank, being cleaner than the tug,

CORRESPONDENCE

might well creep up and hit him in the back. . . . The notion is certainly intriguing.

However, we very much doubt whether anybody will take Mr. Tennant seriously or, in fact, is intended to do so.

J. BERNARD AND A. CRICHTON.

A CIVIL POWER PLANT

Radiator Design and Pressure Cowlings

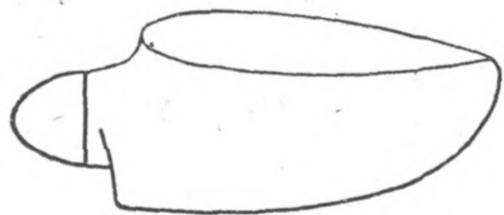
HAVING trailed my coat before the critics it is perhaps incumbent upon me to substantiate my previous claims and to confirm my belief that the power plant for civil aircraft, which I described in *Flight* of December 7th, 1944, is indeed worthy of the consideration I suggested.

While I firmly reiterate my original convictions that an engine slung below the wing will effect a considerable weight economy, my critics may perhaps be willing at this point to study some speculative problems relevant to the civil power plant.

At the outset, there appears to be some misapprehension regarding the position of the radiators relative to the header tank. J. R. Palmer, in his letter (*Flight*, December 21st), seems to have sustained the erroneous impression that it is upon this unusual feature that my scheme must either stand or fall: not a bit of it. I consider the possible rearrangement of the coolant system, and the re-dispositioning of the units of that system, to be a desirable attribute of any civil power plant. Moreover, these objects can be readily achieved by the scheme I originally recommended; that is, a nacelle slung below the wing.

By way of demonstrating this feature I have prepared a further arrangement embodying a new radiator assembly.

With this type of radiator, which is virtually of the underslung pattern though differing somewhat in principle, the header tank is above the radiator—as Mr. Palmer prefers it to be—and the radiator duct is retained. It will be observed that the nacelle is not as deep, from top to bottom, as the conventional underslung radiator of, say, the Lancaster, and this is one of the lesser virtues of the arrangement.



Underslung pattern radiator assembly with header tank above.

I must, of course, make it abundantly clear that I have not evolved this particular radiator set-up. On the contrary, it is, actually, already in existence, though its application to this case is plainly indicative of the adaptability of the scheme as a whole.

So far, so good. Now let us turn to the irritating question of pressure cowlings. Either my critic is woefully misinformed on such matters, or is out of contact with recent developments. Whichever the case he is lamentably wide of the mark and an early disillusionment is at hand for him.

The installation of the Junkers Jumo 211B engines in the Ju 88 was one of the first indications of any abandonment of ducted radiators, and although there is so far nothing to prove that the experiment will become a permanent practice, it is a fact that the practical limitations which inspired the idea have still as great an influence as ever on the design of a power plant.

The fact of the matter is that each successive increase in the power output of an aircraft engine is accompanied by a corresponding increase in the size of radiators, and at the

present time the size of radiator which it is possible to accommodate below the crankcase is rapidly approaching the critical. In consequence, we may shortly witness a revival of the type of radiator common to the Ju 88, and if such be the case it will be a physical impossibility to arrange a radiator duct to suit.

Under these circumstances it is conceivable that a possible solution would be to dispense with the radiator duct altogether and to substitute an arrangement whereby the air, after having passed through the radiators, would be allowed to circulate around the engine and be finally discharged by, and through, an adjustable flap situated on the bottom of the cowling as at present. This is a pressure cowling, Mr. Palmer, and there is nothing new about it.

As an example of confused thinking, I believe that the criticisms of O. M. Etoe (*Flight*, January 4th) would be hard to beat. He first asserts that an airscrew should be a certain distance forward of the wing, failing which he advocates extending the nacelle farther aft as was done on the Mosquito, though how any alteration of the flow over the rear of the nacelle will improve that at the front he is careful not to explain. Actually the effect is precisely nil, and although the Mosquito nacelle was extended there was never anything wrong with the location of the airscrew.

The case of the Flamingo, and the Beaufort, are examples of a totally different problem altogether and one far removed from that of airscrew location. Both these aircraft were fitted with radial engines, the nacelles of which interfered with the airflow both over and under the wing, and this was further aggravated by the considerably turbulent flow from the cooling gills. With the Flamingo this was actually foreseen and the gills were embodied at the rear, and on the underside, of the nacelle.

In one of the appended sketches I have illustrated the engine nacelles of both of the above aircraft and also that of an American contemporary, the Boston. It will be observed that in the latter case the nacelle is almost completely below the level of the wing and the cooling gills are confined to the lower half only.

C. A. H. POLLITT.

PLUGGING

The Silver Cast Core

WE have just read the letter from the AC-Sphinx Sparking Plug Company which appears in your Correspondence columns of the January 18th issue.

Due credit must certainly be given to Mr. D. H. Corbin for the invention of the silver cast core which was first incorporated in AC-Sphinx aero plugs and reproduced under official instructions in certain K.L.G. models in the same way that certain of our features have been incorporated in the other two makes of aircraft plugs.

Unfortunately, however, Mr. Stockbridge is thoroughly misinformed when he says that his feature was to be found in the K.L.G. plugs which are included in the tribute made to British aero plugs by President Roosevelt, for such is not the case, and no K.L.G. plugs supplied for American aircraft engines had a silver cast core.

We regret the necessity for asking you to prolong this correspondence, but we must ask for this further hospitality of your columns.

L. M. BRAUND,

Director, K.L.G. Sparking Plugs, Ltd.

BOOK REVIEW

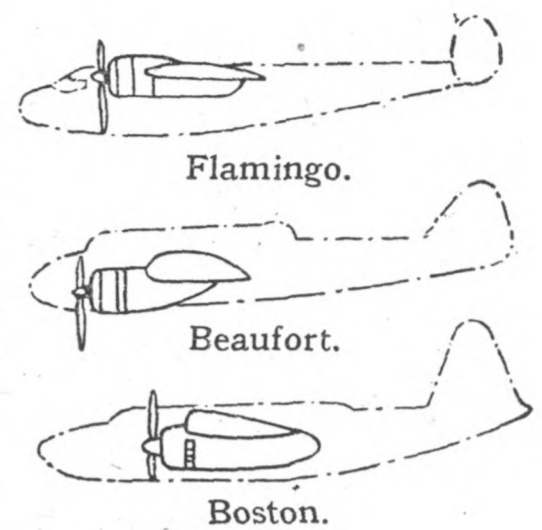
*Aircraft of the Fighting Powers, Vol. V. Compiled by H. J. Cooper and O. G. Thetford, and edited by D. A. Russell, M.I.Mech.E. Harborough Publishing Co., Ltd. £1 11s. 6d.*

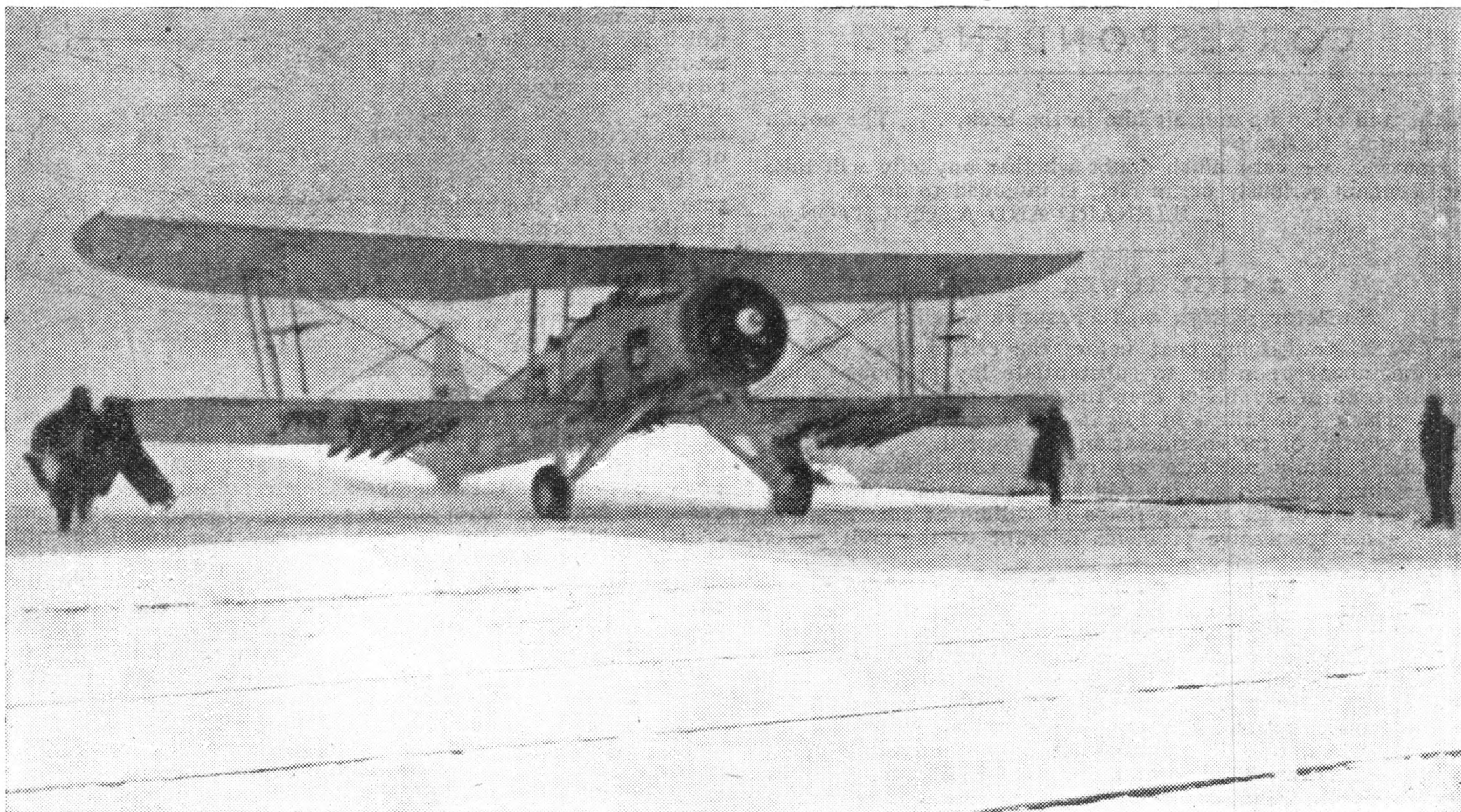
SEVENTY current types of Allied and enemy aircraft are described and illustrated with photographs and three-position drawings in the fifth volume of this popular and now familiar annual, the general standard of which is well up to that originally set. Incidentally, the drawings are to the 1/72nd scale favoured by modellers, with the exception of one or two whose size demanded a reduction to 1/144th.

Other useful pages are a compendium of designation systems and another of aircraft markings and colour schemes. A page of colour standards of M.A.P. is also included and, accepting

the colour printing as accurate, we are bound to say it needs very perfect eyesight to detect any difference between dark slate grey, dark green, light green, and the extra dark sea green, even when thus seen together; viewed separately it would appear to be virtually impossible to differentiate between them.

Produced on art paper, this volume is beautifully finished, but the price has jumped up by another half-guinea. The volume of advertising matter has also increased, and the contents page is separated from the first aircraft by so many advertisement pages and other matter that reference to the main contents is not as quick as it might be. It is, nevertheless, a very useful publication, but one hopes it will prove the last of the series under its present title—that the Powers will not be fighting when the next is due.





ARCTIC ESCORT : A rocket-firing Swordfish takes off from H.M.S. *Fencer's* snow-covered flight deck to provide air cover for a convoy to Russia.



# SERVICE AVIATION



Royal Air Force and Fleet Air Arm News and Announcements

## Appointments

Air Comdre. A. H. ROBSON, O.B.E., M.C., M.Sc., Ph.D., has been appointed Director of Educational Services, Air Ministry, in succession to Air Comdre. W. M. Page, who recently retired. Air Comdre. Robson, who is 52, has been Deputy Director since 1942. Formerly Assistant Educational Adviser at the Air Ministry, he has since held appointments at the School of Technical Training for Aircraft Apprentices at Halton, and at the Headquarters of Flying Training Command.

Group Capt. (Act. Air Comdre.) L. F. SINCLAIR, G.C., C.B.E., D.S.O., is appointed Air Aide-de-Camp to The King and relinquishes his appointment as additional Air Aide-de-Camp. Oct. 1st, 1944.

The following are appointed Additional Air Aides-de-Camp to The King, Oct. 1st, 1944:—

Group Capt. A. S. ELLERTON, C.B.E.  
Group Capt. J. G. HAWTREY.  
Group Capt. (Act. Air Comdre.) D. F. W. ATCHERLEY, D.S.O., D.F.C.  
Group Capt. (Act. Air Comdre.) S. H. HARDY, C.B.E.

Group Capt. (Act. Air Comdre.) W. W. STRAIGHT, C.B.E., M.C., D.F.C., A.A.F.

The following relinquish their appointments as Additional Air Aides-de-Camp to The King, Oct. 1st, 1944:—Air Comdre. D. A. BOYLE, C.B.E., A.F.C.; Air Comdre. G. R. BEAMISH, C.B.E.; Air Comdre. G. W. AMBLER, O.B.E., A.F.C., A.A.F.; Air Comdre. A. C. H. SHARP; Group Capt. A. H. JACKSON.

## Promotion

### GENERAL DUTIES BRANCH

Group Capt. (Act. Air Vice-Marshal) D. C. T. BENNETT, C.B.E., D.S.O., is granted the rank of Air Comdre. (war subs.), December 6th, 1944.

### TECHNICAL BRANCH.

Air Comdre. G. D. DALY, D.F.C., is granted the act. rank of Air Vice-Marshal, Jan. 1st, 1945.

## Awards

### Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:—  
For undaunted courage, skill and determination in carrying out daring attacks on the German battleship *Tirpitz*.

## Distinguished Service Cross

Act. Lt. Cdr. (A) R. L. BIGG-WITHER, R.N.  
Act. Temp. Lt. Cdr. (A) McD. GARLAND, R.N.V.R.  
Act. Temp. Lt. Cdr. (A) C. WALKER, R.N.V.R.  
Temp. Lt. H. T. PALMER, S.A.N.F. (V).  
Temp. Lt. (A) I. H. MacA. GUNN, R.N.V.R.  
Temp. Lt. (A) F. L. JONES, R.N.V.R.  
Temp. Lt. (A) D. LEVITT, R.N.V.R.  
Temp. Lt. (A) D. G. J. WILKEY, R.N.V.R.

Temp. Sub Lt. (A) C. R. CARTLEDGE, R.N.V.R.  
Temp. Sub Lt. (A) P. H. MOGRIDGE, R.N.V.R.  
Temp. Sub Lt. (A) D. MORTEN, R.N.Z.N.V.R.  
Temp. Sub. Lt. (A) W. PERCY, R.N.Z.N.V.R.

## Distinguished Service Medal

Act. Temp. P. O. Airman S. DUNN.

## Royal Air Force

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

## Distinguished Service Order

Act. Wing Cdr. R. J. A. LESLIE, A.F.C., R.A.F.O., No. 75 (N.Z.) Sqn.—This officer has participated in a large number of sorties and has displayed the highest qualities of skill, courage and determination. Since assuming command of the squadron he has led the formation in numerous attacks on various targets. Throughout, his leadership has been inspiring and has played an important part in the success achieved. This officer has rendered most valuable service.

Act. Wing Cdr. B. W. McMILLAN, A.F.C., R.A.F.O., No. 582 Sqn.—This officer has set a fine example of skill, courage and devotion to duty in operations against the enemy. He has participated in a large number of sorties against strongly defended targets, including such centres as Berlin, Stuttgart, Stettin, Duisburg and Kiel. In October, 1944, Wing Cdr. McMILLAN took part in an attack on Cologne. In spite of considerable anti-aircraft fire, this intrepid pilot remained over the target for many minutes to press home a most determined and successful attack. This officer is a highly efficient flight commander, whose sterling qualities have impressed all.

Act. Wing Cdr. C. G. MILSON, D.F.C., R.A.A.F., No. 455 (R.A.A.F.) Sqn.—Since the award of the D.F.C., Wing Cdr. Milson has completed numerous operational missions which have included a number of outstanding attacks in the face of the heaviest opposition. In July and August, 1944, he led formations of aircraft to attack several strongly escorted enemy convoys and, despite adverse weather and heavy defences, the attacks caused much damage and destruction. On one occasion his aircraft sustained severe damage but, with cool courage and determination, he attacked two vessels and then flew safely to base, a distance of 300 miles on one engine. In September, 1944, this officer was deputy leader of a force detailed to attack shipping in



Wing Cdr. J. B. Tait, D.S.O., D.F.C., who has recently been awarded a third bar to his D.S.O., and is the only R.A.F. officer to hold this distinction.

SERVICE AVIATION

the heavily defended harbour at Den Helder. While under fire, he carefully manoeuvred his section and in the face of the fiercest opposition, led them into an attack against heavily armed escort vessels. Two of the attacks were pressed home to deck level. Sqn. Ldr. Milson's brilliant leadership, gallantry and careful planning have contributed greatly to the success of many missions.

Act. Wing Cdr. T. L. BINGHAM-HALL, D.F.C., R.A.F., No. 156 Sqn.—Wing Cdr. Bingham-Hall has completed many sorties against targets deep in enemy and enemy-occupied territory. He has proved a skilful and courageous leader. In October, 1944, he was detailed for a daylight attack on an important oil installation in the Ruhr. Very heavy and extensive anti-aircraft fire was encountered and his aircraft was hit in many places. Undeterred he continued to direct the attack, which was highly successful. Later, this officer was again detailed to attack a target in North-West Germany. On this occasion his aircraft was severely hit and one engine was put out of action. Nevertheless, he continued with his task and successfully completed his mission. By his personal example Wing Cdr. Bingham-Hall has imbued his squadron with a high standard of efficiency.

Bar to Distinguished Flying Cross

Flt. Lt. R. V. HEARN, D.F.C., R.A.F.V.R., No. 112 Sqn.—Flt. Lt. Hearn has completed very many sorties since the award of the Distinguished Flying Cross. He continues to display outstanding skill and daring, setting a magnificent example to all who fly with him. In September, during an armed reconnaissance near Pirano, Flt. Lt. Hearn attacked and destroyed a medium sized enemy vessel. The same day, in the Verona area, despite intense anti-aircraft fire, he led his flight so successfully that they destroyed three S.M.79s on the ground and damaged five others. With only one of his guns in action, Flt. Lt. Hearn, in aerial combat, destroyed a Ju. 88. The next day, under the inspiring leadership of this intrepid flight commander, his squadron added to their successes by the destruction of six locomotives and twenty loaded railway coaches.

Act. Wing Cdr. G. F. H. WEBB, D.F.C., A.A.F.—This officer has completed numerous successful reconnaissance sorties. He has consistently selected dangerous operations and his enthusiasm and determination have been a source of inspiration to the whole wing. His unflinching devotion to duty and high courage have been most praiseworthy.

Sqn. Ldr. C. I. R. ARTHUR, D.F.C., R.A.F., No. 72 Sqn.—Sqn. Ldr. Arthur has continued to lead his squadron with skill and determination. Since the award of the D.F.C. he has completed many sorties and has destroyed at least one enemy aircraft. During the invasion of the South of France he has led his squadron in many sorties which resulted in the destruction of 37 mechanical transport and other vehicles and damaged many others. His coolness, determination and outstanding leadership have largely contributed to the successes achieved by his squadron.

Sqn. Ldr. K. D'A. TAUTE, D.F.C., R.A.F., No. 464 (R.A.A.F.) Sqn.—This officer has been a flight commander throughout his tour with this squadron, achieving some important successes through his courage and determination. In June, 1944, he completed an outstanding attack on a troop train. In August, 1944, he delivered an effective attack on railway installations, where he bombed a goods train and destroyed two locomotives. Later in the same month, Sqn. Ldr. Taute hit and set on fire many vehicles while attacking a very large concentration of mechanical transport. He is a fine pilot, whose skill and gallantry have inspired his flight and caused great damage to the enemy.

Act. Sqn. Ldr. J. L. W. ELLACOMBE, D.F.C., R.A.F.O., No. 487 (R.N.Z.A.F.), Sqn.—Throughout a large number of operational sorties, Sqn. Ldr. Ellacombe has displayed outstanding keenness and a fine fighting spirit. During August, 1940, his aircraft was so badly damaged by enemy action that he had to make a crash landing in a field. A few days later, owing to enemy action, this officer was forced to leave his burning aircraft by parachute. After three months in hospital, he resumed operational flying, and in August, 1942, during an attack on Dieppe, he was again shot down. After being rescued from the sea, Sqn. Ldr. Ellacombe served in a night fighter squadron. Since the award of the D.F.C. he has destroyed an enemy aircraft and successfully attacked a large variety of targets. He is an excellent leader and flight commander, and has set a fine example by his perseverance, skill and courage.

Act. Sqn. Ldr. H. C. RIGBY, D.F.C., R.A.F.V.R., No. 222 Sqn.—Since the invasion of Normandy, Sqn. Ldr. Rigby has led his squadron on numerous bombing sorties in support of the Canadian Army, achieving much success. On four occasions his aircraft has been damaged by anti-aircraft fire, but each time he has flown it safely back to base. In October, 1944, a 40 mm. shell penetrated the mainplane, causing the aileron to jam. By skilful airmanship, Sqn. Ldr. Rigby landed without further damage. Throughout this period this officer has caused much damage and destruction to enemy transport, barges, trains and tanks. He has built up his squadron into a first-class fighting unit.

Flt. Lt. C. E. BROAD, D.F.C., R.A.F.V.R., No. 222 Sqn.—Since the award of the D.F.C., Flt. Lt. Broad has taken part in many successful opera-

tions against the enemy. He has repeatedly led the squadron in bombing attacks, greatly contributing to their success by his exceptional flying ability and powers of leadership. On one sortie in May, 1944, he led the squadron in a daring and successful attack on a heavily defended railway junction. His aircraft was hit and he himself was wounded on this occasion. Flt. Lt. Broad's outstanding navigational ability has enabled the squadron to achieve many successes against flying bomb sites. He has also delivered successful attacks against transports, despite intense anti-aircraft fire.

Flt. Lt. G. LANSDELL, D.F.C., R.A.F.V.R., No. 613 Sqn.—Flt. Lt. Lansdell has an exceptionally fine record of achievement as a pilot. By his outstanding efficiency, courage and unflinching devotion to duty he has materially contributed to the many successes achieved by his wing. He has completed many successful attacks against airfield runways at Cambrai, Deelin and Venlo. Since D-day, he has participated in numerous sorties in support of the ground forces in Normandy and the Seine area.

Flt. Lt. A. C. L. MACKIE, D.F.C., R.A.F.V.R., No. 233 Sqn.—Flt. Lt. Mackie is now on his third tour of operational duty. Since the award of the D.F.C. he has participated in many more operational sorties. This officer took part in the initial airborne invasions of Normandy and Holland, subsequently flying on supply missions to the paratroops in the face of intense fire from the ground defences. On one of these occasions he led a squadron formation and, despite intense anti-aircraft fire, he made three runs over the target to ensure that the supplies were dropped in the limited area occupied by the Allied Forces. Flt. Lt. Mackie is an outstanding pilot, who has consistently displayed keenness, determination and devotion to duty.

Flt. Lt. R. MCKIMM, D.F.C., R.A.F.V.R., No. 140 Sqn.—Now on his second tour of operational duty this officer has a long and distinguished record of operational flying. Since the award of D.F.C. in May, 1943, he has continued to display outstanding keenness, courage and devotion to duty. Flt. Lt. McKimm is a skilful photographic reconnaissance pilot, who has flown on sorties over Belgium, Holland and Germany, frequently encountering very adverse weather in addition to enemy fighter opposition. Recently this officer has been acting as flight commander and, both administratively and operationally, he has displayed great efficiency.

Distinguished Flying Cross

- F/O. D. J. LANE, R.A.F.V.R., No. 76 Sqn.
- F/O. B. D. J. LANKTREE, R.A.F.V.R., No. 408 (R.C.A.F.) Sqn.
- F/O. F. L. LEACH, R.A.F.V.R., No. 7 Sqn.
- F/O. A. LEWIS, R.A.F.V.R., No. 156 Sqn.
- F/O. J. A. LONGMUIR, R.A.F.V.R., No. 425 (R.C.A.F.) Sqn.
- F/O. G. A. MACKIE, R.A.F.V.R., No. 214 Sqn.
- F/O. T. N. MILLER, R.A.F.V.R., No. 76 Sqn.
- F/O. R. V. OSBORNE, R.A.F.V.R., No. 166 Sqn.
- F/O. W. S. PARKER, R.A.F.V.R., No. 192 Sqn.
- F/O. G. E. PRATT, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- F/O. W. A. M. SAVILL, R.A.F.V.R., No. 156 Sqn.
- F/O. V. S. SCOTT, R.A.F.V.R., No. 51 Sqn.
- F/O. R. W. SHARP, R.A.F.V.R., No. 101 Sqn.
- F/O. A. G. SHEFFIELD, R.A.F.V.R., No. 625 Sqn.
- F/O. V. P. SKONE-REES, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- F/O. A. L. SMITH, R.A.F.V.R., No. 76 Sqn.
- F/O. R. H. SMITH, R.A.F.V.R., No. 7 Sqn.
- F/O. F. C. V. STEED, R.A.F.V.R., No. 7 Sqn.
- F/O. B. F. STEEL, R.A.F.V.R., No. 166 Sqn.
- F/O. A. W. STRICKLAND, R.A.F.V.R., No. 571 Sqn.
- F/O. F. A. TERRY, R.A.F.V.R., No. 578 Sqn.
- F/O. T. H. WARREN, R.A.F.V.R., No. 35 Sqn.
- F/O. P. WATSON, R.A.F.V.R., No. 424 (R.C.A.F.) Sqn.

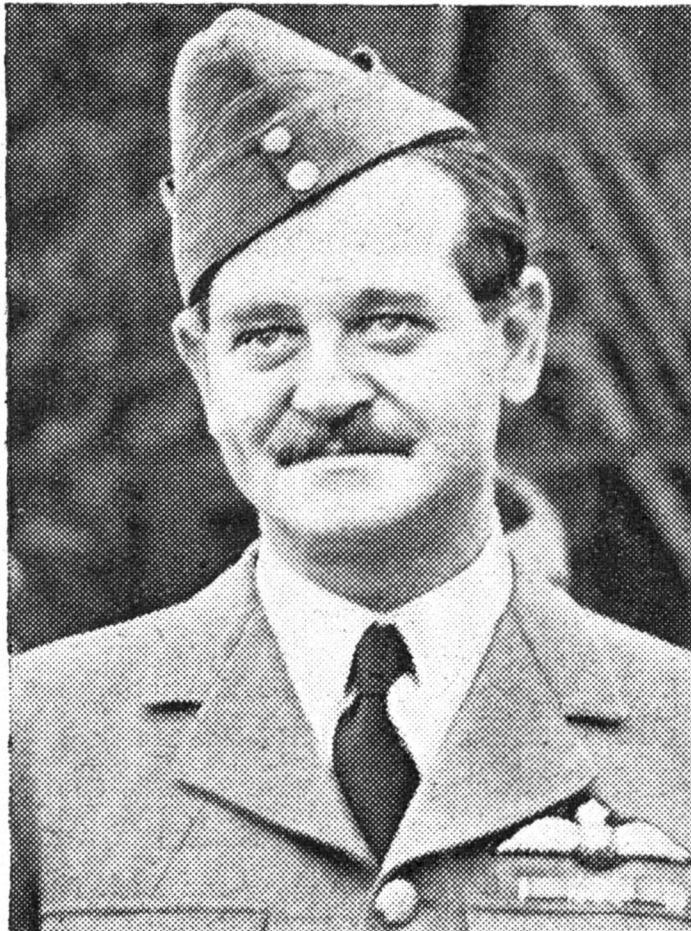
- F/O. T. A. WELSBY, R.A.F.V.R., No. 101 Sqn.
- F/O. A. R. WITTY, R.A.F.V.R., No. 12 Sqn.
- F/O. P. E. WORT, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- Act. F/O. E. A. ASKEW, R.A.F.V.R., No. 101 Sqn.
- Act. F/O. A. R. CARTER, R.A.F.V.R., No. 78 Sqn.
- Act. F/O. W. R. IRELAND, R.A.F.V.R., No. 576 Sqn.
- Act. F/O. R. G. LADBURY, R.A.F.V.R., No. 100 Sqn.
- Act. F/O. J. R. STEDMAN, R.A.F., No. 576 Sqn.
- Act. F/O. N. STOCKWELL, R.A.F.V.R., No. 44 Sqn.
- P/O. B. BAINBRIDGE, R.A.F.V.R., No. 78 Sqn.
- P/O. W. L. BAMSEY, R.A.F., No. 51 Sqn.
- P/O. C. H. BEAKE, R.A.F.V.R., No. 76 Sqn.
- P/O. J. H. BENNETT, R.A.F.V.R., No. 161 Sqn.
- P/O. D. C. BIGG, R.A.F.V.R., No. 149 Sqn.
- P/O. V. E. BILLINGS, R.A.F.V.R., No. 76 Sqn.
- P/O. N. A. BOYCOTT, R.A.F.V.R., No. 76 Sqn.
- P/O. W. BRAITHWAITE, R.A.F.V.R., No. 77 Sqn.
- P/O. L. C. BURTON, R.A.F.V.R., No. 76 Sqn.
- P/O. J. A. CASTLES, R.A.F., No. 49 Sqn.
- P/O. J. CHISHOLM, R.A.F.V.R., No. 78 Sqn.
- P/O. H. J. CHITTENDEN, R.A.F.V.R., No. 78 Sqn.
- P/O. W. A. CLARE, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- P/O. A. T. COLES, R.A.F.V.R., No. 158 Sqn.
- P/O. C. J. COLVILL, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- P/O. R. H. CROSBY, R.A.F.V.R., No. 78 Sqn.
- P/O. W. D. CUMMINGS, R.A.F.V.R., No. 7 Sqn.
- P/O. J. DAVIDSON, R.A.F.V.R., No. 76 Sqn.
- P/O. G. E. DAVIES, R.A.F.V.R., No. 102 Sqn.
- P/O. H. G. DAVIES, R.A.F.V.R., No. 424 (R.C.A.F.) Sqn.
- P/O. M. DAVIS, R.A.F.V.R., No. 578 Sqn.
- P/O. A. E. DEVENISH, R.A.F.V.R., No. 161 Sqn.
- P/O. H. A. FARNELL, R.A.F.V.R., No. 156 Sqn.
- P/O. K. FILLINGHAM, R.A.F.V.R., No. 101 Sqn.
- P/O. M. W. FINNEY, R.A.F.V.R., No. 156 Sqn.
- P/O. R. G. GILLETT, R.A.F.V.R., No. 424 (R.C.A.F.) Sqn.
- P/O. G. GRAHAM, R.A.F.V.R., No. 7 Sqn.
- P/O. J. GREEN, R.A.F.V.R., No. 103 Sqn.
- P/O. A. J. HARPER, R.A.F.V.R., No. 7 Sqn.
- P/O. S. S. HARRISON, R.A.F.V.R., No. 78 Sqn.
- P/O. G. F. HOLBROOK, R.A.F.V.R., No. 12 Sqn.
- P/O. T. HOWLEY, R.A.F.V.R., No. 76 Sqn.
- P/O. F. E. JOHNSON, R.A.F.V.R., No. 78 Sqn.
- P/O. T. J. JONES, R.A.F.V.R., No. 7 Sqn.
- P/O. D. E. KING, R.A.F.V.R., No. 78 Sqn.
- P/O. R. G. LUCKETT, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- P/O. G. MACKENZIE, R.A.F., No. 582 Sqn.
- P/O. A. L. MCCARTHY, R.A.F.V.R., No. 78 Sqn.
- P/O. R. MCHATTIE, R.A.F.V.R., No. 101 Sqn.
- P/O. R. H. MONTGOMERIE, R.A.F.V.R., No. 101 Sqn.
- P/O. E. A. R. PAGE, R.A.F.V.R., No. 76 Sqn.
- P/O. W. E. L. PALMER, R.A.F.V.R., No. 76 Sqn.
- P/O. D. H. PERRET, R.A.F.V.R., No. 101 Sqn.
- P/O. G. A. PEERS, R.A.F.V.R., No. 76 Sqn.
- P/O. A. S. PHILLIPS, R.A.F.V.R., No. 625 Sqn.
- P/O. R. M. PRINCE, R.A.F.V.R., No. 78 Sqn.
- P/O. J. F. RICHARDS, R.A.F.V.R., No. 7 Sqn.
- P/O. P. J. RICHARDSON, R.A.F.V.R., No. 7 Sqn.
- P/O. D. J. ROBERTS, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
- P/O. E. ROBERTS, R.A.F.V.R., No. 76 Sqn.
- P/O. A. L. ROBERTSON, R.A.F.V.R., No. 625 Sqn.
- P/O. E. ROWE, R.A.F.V.R., No. 139 Sqn.
- P/O. J. J. B. RYDER, R.A.F.V.R., No. 576 Sqn.
- P/O. A. SHENBANJO, R.A.F.V.R., No. 76 Sqn.
- P/O. H. J. SHIRES, R.A.F.V.R., No. 76 Sqn.
- P/O. J. L. SIDLEY, R.A.F.V.R., No. 578 Sqn.
- P/O. H. E. STANLEY, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
- P/O. G. W. A. STEEL, R.A.F.V.R., No. 78 Sqn.
- P/O. D. G. THOMAS, R.A.F.V.R., No. 78 Sqn.
- P/O. L. W. J. THOMAS, R.A.F.V.R., No. 49 Sqn.
- P/O. G. P. WADDINGTON, R.A.F.V.R., No. 432 (R.C.A.F.) Sqn.
- P/O. H. WALKER, R.A.F.V.R., No. 78 Sqn.
- P/O. S. F. WALL, R.A.F.V.R., No. 101 Sqn.



U.S. HONOURS: General Doolittle, Commander of the U.S. Eighth Army Air Force, presenting American decorations to 31 R.A.F. and Dominion airmen.

P/O. N. S. WHITWELL, R.A.F.V.R., No. 578 Sqn.  
 P/O. L. J. WILSON, R.A.F.V.R., No. 626 Sqn.  
 P/O. R. WYNNE, R.A.F.V.R., No. 7 Sqn.  
 W/O. (now P/O.) S. J. BIRCH, R.A.F.V.R., No. 156 Sqn.  
 W/O. J. A. B. BROWN, R.A.F.V.R., No. 156 Sqn.  
 W/O. V. G. BURGESS, R.A.F.V.R., No. 61 Sqn.  
 W/O. P. J. CHIPPING, R.A.F.V.R., No. 76 Sqn.  
 W/O. D. DICKSON, R.A.F.V.R., No. 578 Sqn.  
 W/O. J. E. FLACK, R.A.F.V.R., No. 214 Sqn.  
 W/O. E. W. HAY, R.A.F.V.R., No. 156 Sqn.  
 W/O. E. MAUDE, R.A.F.V.R., No. 23 Sqn.  
 W/O. C. R. POYNTON, R.A.F.V.R., No. 90 Sqn.  
 W/O. F. D. SAY, R.A.F.V.R., No. 514 Sqn.  
 W/O. W. H. SMART, R.A.F.V.R., No. 429 (R.C.A.F.) Sqn.  
 W/O. L. P. WOOLDRIDGE, R.A.F., No. 578 Sqn.  
 W/O. J. WRIGHT, R.A.F.V.R., No. 75 (N.Z.) Sqn.  
 Act. W/O. R. A. W. MATCHAM, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.  
 Act. W/O. G. D. MOIR, R.A.F.V.R., No. 97 Sqn.  
 Act. F/O. P. H. MARTIN, R.A.A.F., No. 61 Sqn.  
 Act. F/O. R. J. THOMAS, R.A.A.F., No. 462 (R.A.A.F.) Sqn.  
 Act. F/O. F. W. G. TROPMAN, R.A.A.F., No. 35 Sqn.  
 P/O. R. I. BELL, R.A.A.F., No. 15 Sqn.  
 P/O. L. E. CLAES, R.A.A.F., No. 78 Sqn.  
 P/O. S. O. DALEY, R.A.A.F., No. 460 (R.A.A.F.) Sqn.  
 P/O. M. C. GRIFFITHS, R.A.A.F., No. 12 Sqn.  
 P/O. W. N. R. HANNA, R.A.A.F., No. 578 Sqn.  
 P/O. R. K. HUTCHINSON, R.A.A.F., No. 578 Sqn.  
 P/O. K. KEIGHTLEY, R.A.A.F., No. 578 Sqn.  
 P/O. L. H. MCEACHERN, R.A.A.F., No. 7 Sqn.  
 P/O. K. G. SELLECK, R.A.A.F., No. 460 (R.A.A.F.) Sqn.  
 W/O. D. MCK. TUNNICLIFFE, R.N.Z.A.F., No. 489 (N.Z.) Sqn.  
 Sqn. Ldr. J. N. KENTISH, R.A.F.O., No. 78 Sqn.  
 Flt. Lt. R. A. CLOTHIER, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
 Act. F/O. G. H. STEWART, R.A.A.F., No. 467 (R.A.A.F.) Sqn.  
 Act. F/O. D. H. STRACHAN, R.N.Z.A.F., No. 619 Sqn.  
 Flt. Lt. E. B. VAN SLYCK, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 Act. Flt. Lt. E. W. ANDREW, R.C.A.F., No. 78 Sqn.  
 Act. Flt. Lt. L. J. J. TERROUX, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 F/O. R. J. AUSTEN, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
 F/O. L. J. CORBEIL, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
 F/O. W. A. DANIEL, R.C.A.F., No. 617 Sqn.  
 F/O. W. T. G. WATSON, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 F/O. E. C. WHITNEY, No. 419 (R.C.A.F.) Sqn.  
 Flt. Lt. L. J. A. WHITTAKER, R.A.F.V.R., No. 220 Sqn.  
 F/O. L. J. BARCHAM, R.A.F.V.R., No. 404 (R.C.A.F.) Sqn.  
 F/O. D. S. BIELBY, R.A.F.V.R., No. 172 Sqn.  
 F/O. S. T. FAITHFUL, R.A.F.V.R., No. 404 (R.C.A.F.) Sqn.  
 F/O. D. HILL, R.A.F.V.R., No. 541 Sqn.  
 F/O. H. J. O'BRIEN, R.A.F.V.R., No. 220 Sqn.  
 F/O. J. E. ORCHARD, R.A.F.V.R., No. 248 Sqn.  
 F/O. H. C. S. POWELL, R.A.F.V.R., No. 540 Sqn.  
 Flt. Lt. G. W. ROUSE, R.A.F.V.R., No. 235 Sqn.  
 P/O. P. B. OSBORNE, R.A.F.V.R., No. 236 Sqn.  
 Act. F/O. P. J. D. HACHE, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 Act. F/O. P. H. MARTIN, R.A.A.F., No. 617 Sqn.  
 P/O. N. J. CROOK, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 P/O. J. G. McNAUGHTON, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 P/O. R. M. STEVENS, R.C.A.F., No. 415 (R.C.A.F.) Sqn.  
 Act. F/O. R. D. CAMPBELL, R.A.F.V.R., No. 158 Sqn.  
 Act. F/O. D. A. J. B. WATERMAN, R.A.F.V.R., No. 158 Sqn.  
 W/O. E. B. HUDSON, R.C.A.F., No. 70 Sqn.  
 W/O. A. W. RUSSELL, R.A.F.V.R., No. 158 Sqn.  
 Act. F/O. E. MCGINDLE, R.A.A.F., No. 462 (R.A.A.F.) Sqn.  
 Act. Sqn. Ldr. L. H. GILBERT, R.A.F.V.R., No. 156 Sqn.  
 Act. Sqn. Ldr. R. W. L. MULLINER, R.A.F.V.R., No. 183 Sqn.  
 Flt. Lt. A. F. CHILDS, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 Flt. Lt. C. E. EDINGER, No. 410 (R.C.A.F.) Sqn.  
 Flt. Lt. H. H. FIELDING-JOHNSON, R.A.F.V.R., No. 21 Sqn.  
 Flt. Lt. C. A. McC. BARBOUR, R.A.F.V.R., No. 168 Sqn.  
 Flt. Lt. L. S. BLACK, R.N.Z.A.F., No. 485 (N.Z.) Sqn.  
 Flt. Lt. A. F. HALOROW, R.C.A.F., No. 411 (R.C.A.F.) Sqn.  
 Flt. Lt. C. E. BLAIR, R.C.A.F., No. 59 Sqn.  
 F/O. J. H. SYMONS, R.C.A.F., No. 404 (R.C.A.F.) Sqn.  
 W/O. J. PERBY, R.C.A.F., No. 404 (R.C.A.F.) Sqn.  
 F/O. C. A. MCKENZIE, R.C.A.F., No. 420 (R.C.A.F.) Sqn.  
 F/O. R. J. A. PARK, R.A.F.V.R., No. 489 (N.Z.) Sqn.  
 P/O. G. B. TODD, R.A.A.F., No. 582 Sqn.  
 P/O. K. R. TRUEMAN, R.A.A.F., No. 578 Sqn.  
 W/O. G. T. ANDERSON, R.A.A.F., No. 460 (R.A.A.F.) Sqn.  
 W/O. F. H. GREEN, R.A.A.F., No. 97 Sqn.  
 W/O. W. J. STEWART, R.A.A.F., No. 35 Sqn.  
 F/O. G. C. MCKAY, R.C.A.F., No. 434 (R.C.A.F.) Sqn.  
 F/O. H. E. MCKINLEY, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
 F/O. G. A. McNAMEE, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. R. W. MACKENZIE, R.C.A.F., No. 166 Sqn.

F/O. E. V. MACKLIN, R.C.A.F., No. 434 (R.C.A.F.) Sqn.  
 F/O. W. J. MADDER, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. J. D. MEARS, R.C.A.F., No. 420 (R.C.A.F.) Sqn.  
 F/O. C. R. D. MILLER, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 F/O. D. H. MURRAY, R.C.A.F., No. 625 Sqn.  
 F/O. G. A. MUSGROVE, R.C.A.F., No. 15 Sqn.  
 F/O. C. V. MYERS, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 F/O. G. F. NICHOLL, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. P. N. J. NOBLE, R.C.A.F., No. 156 Sqn.  
 F/O. L. R. NORTON, R.C.A.F., No. 51 Sqn.  
 F/O. W. H. NOVICK, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 F/O. J. F. O'GORMAN, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 F/O. L. W. PATTEN, R.C.A.F., No. 415 (R.C.A.F.) Sqn.  
 F/O. D. M. PEDEN, R.C.A.F., No. 214 Sqn.  
 F/O. L. M. PEDERSON, R.C.A.F., No. 49 Sqn.  
 F/O. J. I. PELLETIER, R.C.A.F., No. 166 Sqn.  
 F/O. A. H. PHILLIPS, R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
 F/O. R. M. POTTS, R.C.A.F., No. 432 Sqn.  
 F/O. A. S. QUINLAN, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
 F/O. W. E. RIOME, R.C.A.F., No. 424 (R.C.A.F.) Sqn.



Wing Cdr. W. B. Collins, D.F.C., who has retired from the R.A.F. He has flown the King to N. Africa and Italy, and he piloted Mr. Churchill to the Cairo Conference.

F/O. F. F. SAIT, R.C.A.F., No. 78 Sqn.  
 F/O. G. R. SCOTT, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 F/O. W. C. SHIELDS, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 F/O. V. E. SMITH, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 F/O. A. J. SOBOTIN, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 F/O. L. SPRUSTON, R.C.A.F., No. 626 Sqn.  
 F/O. E. F. TAYLOR, R.C.A.F., No. 428 (R.C.A.F.) Sqn.  
 F/O. V. A. C. THYGESEN, R.C.A.F., No. 550 Sqn.  
 F/O. M. R. TIDY, R.C.A.F., No. 424 (R.C.A.F.) Sqn.  
 F/O. G. G. TYNAN, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. D. UNGERMAN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 F/O. R. S. WATT, R.C.A.F., No. 76 Sqn.  
 F/O. G. W. WEBB, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. D. S. WHITELAW, R.C.A.F., No. 424 (R.C.A.F.) Sqn.  
 F/O. O. E. WILLNER, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 F/O. J. Q. WOOD, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 Act. F/O. R. S. EARL, R.C.A.F., No. 424 (R.C.A.F.) Sqn.  
 P/O. K. E. BARTLEMAN, R.C.A.F., No. 156 Sqn.  
 P/O. L. F. BATEMAN, R.C.A.F., No. 101 Sqn.  
 P/O. M. R. BLOOMFIELD, R.C.A.F., No. 7 Sqn.  
 P/O. A. H. BRANCH, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 P/O. G. D. BRITAIN, R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
 P/O. C. H. BROWNING, R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
 P/O. W. R. BURTON, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 P/O. J. H. CAMPBELL, R.C.A.F., No. 626 Sqn.  
 P/O. K. CHRISTIE, R.C.A.F., No. 90 Sqn.

P/O. W. J. H. COWAN, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 P/O. R. W. DALTON, R.C.A.F., No. 78 Sqn.  
 P/O. M. McL. DINGWALL, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 P/O. K. C. FOX, R.C.A.F., No. 419 (R.C.A.F.) Sqn.  
 P/O. I. MacB. GALLOWAY, R.C.A.F., No. 428 (R.C.A.F.) Sqn.  
 P/O. J. V. IRVINE, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 P/O. W. G. KNOWLES, R.C.A.F., No. 156 Sqn.  
 P/O. W. KUBIAK, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 P/O. J. S. LEE, R.C.A.F., No. 640 Sqn.  
 P/O. L. J. MACFARLANE, R.C.A.F., No. 161 Sqn.  
 P/O. T. W. MCEACHERN, R.C.A.F., No. 429 (R.C.A.F.) Sqn.  
 P/O. D. B. MADDOCK, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 P/O. G. A. P. MORIN, R.C.A.F., No. 78 Sqn.  
 P/O. M. D. O'REILLY, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 P/O. H. D. RAMEY, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
 P/O. M. N. SKOSOV, R.C.A.F., No. 76 Sqn.  
 P/O. H. L. THOMPSON, R.C.A.F., No. 426 (R.C.A.F.) Sqn.  
 P/O. T. A. THOMSON, R.C.A.F., No. 427 (R.C.A.F.) Sqn.  
 P/O. C. F. TINDALE, R.C.A.F., No. 428 (R.C.A.F.) Sqn.  
 P/O. P. E. VERRY, R.C.A.F., No. 427 (R.C.A.F.) Sqn.  
 P/O. G. F. WILKINS, R.C.A.F., No. 433 (R.C.A.F.) Sqn.  
 W/O. G. W. AINSWORTH, R.C.A.F., No. 207 Sqn.  
 W/O. I. M. FLEMING, R.C.A.F., No. 156 Sqn.  
 W/O. G. J. GUILLETT, R.C.A.F., No. 78 Sqn.  
 W/O. W. B. STEELE, R.C.A.F., No. 415 (R.C.A.F.) Sqn.  
 W/O. C. F. WAITE, R.C.A.F., No. 76 Sqn.  
 W/O. R. G. WILLIAMS, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. G. H. HEWITT, R.N.Z.A.F., No. 626 Sqn.  
 F/O. J. W. LENNON, R.N.Z.A.F., No. 630 Sqn.  
 F/O. T. G. WILSON, R.N.Z.A.F., No. 625 Sqn.  
 Act. F/O. A. D. H. MEYER, R.N.Z.A.F., No. 75 (N.Z.) Sqn.  
 Act. F/O. T. H. SINCLAIR, R.N.Z.A.F., No. 158 Sqn.  
 P/O. E. R. BARLOW, R.N.Z.A.F., No. 101 Sqn.  
 Flt. Lt. A. E. CAILLARD, R.A.F.V.R., No. 515 Sqn.  
 Flt. Lt. A. H. MORRISON, R.A.A.F., No. 514 Sqn.  
 Flt. Lt. P. R. MELLOR, R.A.F.V.R., No. 635 Sqn.  
 Act. Flt. Lt. J. W. HOFFMAN, R.C.A.F., No. 514 Sqn.  
 W/O. L. W. TURNER, R.A.F.V.R., No. 169 Sqn.  
 F/O. R. S. CLEMENT, A.F.M., R.C.A.F., No. 626 Sqn.  
 W/O. D. V. HAMMOND, R.A.F.V.R., No. 46 Sqn.  
 Act. Flt. Lt. A. C. POWELL, R.A.F., No. 186 Sqn.  
 F/O. K. PRITCHARD, R.A.A.F., No. 514 Sqn.  
 Act. F/O. E. L. FIELD, R.A.F.V.R., No. 186 Sqn.  
 Act. F/O. D. W. MCKENZIE, R.N.Z.A.F., No. 100 Sqn.  
 Act. F/O. K. L. TRENT, R.A.F.V.R., No. 625 Sqn.  
 F/O. N. T. O'CONNOR, No. 182 Sqn.  
 F/O. J. A. M. PELOQUIN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 F/O. C. L. VAESSEN, No. 410 (R.C.A.F.) Sqn.  
 F/O. M. A. WETZ, R.A.F.V.R., No. 16 Sqn.  
 Act. F/O. R. F. ADAMS, R.A.F.V.R., No. 9 Sqn.  
 Act. F/O. W. B. J. SEDGWICK, R.A.F.V.R., No. 166 Sqn.  
 Act. F/O. G. A. THORNE, R.A.F.V.R., No. 635 Sqn.

#### Distinguished Flying Medal

Flt. Sgt. W. B. DALE, R.A.F.V.R., No. 608 Sqn.  
 Sgt. V. H. CLARE, R.A.F.V.R., No. 77 Sqn.  
 Flt. Sgt. E. F. R. FRANCIS, R.A.F.V.R., No. 169 Sqn.  
 Flt. Sgt. D. A. HARRISON, R.A.F.V.R., No. 46 Sqn.  
 Flt. Sgt. E. S. JARVIS, R.A.F.V.R., No. 578 Sqn.  
 Flt. Sgt. J. H. KEMP, R.A.F.V.R., No. 101 Sqn.  
 Flt. Sgt. (now W/O.) H. J. KENNAN, R.A.F.V.R., No. 61 Sqn.  
 Flt. Sgt. F. A. KIRBY, R.A.F.V.R., No. 50 Sqn.  
 Flt. Sgt. K. S. LEWIS, R.A.F., No. 582 Sqn.  
 Flt. Sgt. S. LEWIS, R.A.F.V.R., No. 582 Sqn.  
 Flt. Sgt. (now W/O.) S. LOSEBY, R.A.F.V.R., No. 582 Sqn.  
 Flt. Sgt. S. MATHER, R.A.F.V.R., No. 214 Sqn.  
 Flt. Sgt. (now W/O.) E. C. MEREDITH, R.A.F.V.R., No. 90 Sqn.  
 Flt. Sgt. W. P. MORGAN, R.A.F.V.R., No. 76 Sqn.  
 Flt. Sgt. R. NUTLEY, R.A.F.V.R., No. 433 (R.C.A.F.) Sqn.  
 Flt. Sgt. S. NUTTALL, R.A.F.V.R., No. 35 Sqn.  
 Flt. Sgt. R. OLLERHEAD, R.A.F.V.R., No. 626 Sqn.  
 Flt. Sgt. A. L. POLE, R.A.F.V.R., No. 635 Sqn.  
 Flt. Sgt. G. H. REDFORD, R.A.F.V.R., No. 35 Sqn.  
 Flt. Sgt. K. J. REES, R.A.F.V.R., No. 35 Sqn.  
 Flt. Sgt. (now P/O.) L. ROBERTS, R.A.F.V.R., No. 578 Sqn.  
 Flt. Sgt. A. N. ROBINSON, R.A.F.V.R., No. 582 Sqn.  
 Flt. Sgt. (now P/O.) L. D. A. ROLFE, R.A.F.V.R., No. 218 Sqn.  
 Flt. Sgt. R. H. SADLER, R.A.F.V.R., No. 35 Sqn.  
 Flt. Sgt. (now P/O.) J. A. SCORER, R.A.F.V.R., No. 578 Sqn.  
 Flt. Sgt. J. SKIDMORE, R.A.F.V.R., No. 49 Sqn.  
 Flt. Sgt. R. SMITH, R.A.F.V.R., No. 156 Sqn.  
 Flt. Sgt. J. F. STEARN, R.A.F.V.R., No. 156 Sqn.  
 Flt. Sgt. M. WADDELL, R.A.F.V.R., No. 78 Sqn.  
 Flt. Sgt. J. WEAVER, R.A.F.V.R., No. 35 Sqn.  
 Flt. Sgt. W. J. WILKINSON, R.A.F.V.R., No. 578 Sqn.

AVIATION

- Flt. Sgt. A. J. C. WILSON, R.A.F.V.R., No. 156 Sqn.
- Sgt. T. M. P. KETTLE, R.A.F.V.R., No. 625 Sqn.
- Sgt. H. McC. KNOX, R.A.F.V.R., No. 44 Sqn.
- Sgt. W. McALLISTER, R.A.F.V.R., No. 76 Sqn.
- Sgt. K. NIGHTINGALE, R.A.F.V.R., No. 76 Sqn.
- Sgt. A. PATON, R.A.F.V.R., No. 578 Sqn.
- Sgt. (now P/O.) W. G. RICHARDS, R.A.F.V.R., No. 578 Sqn.
- Sgt. A. E. SMITH, R.A.F.V.R., No. 35 Sqn.
- Sgt. R. E. SMITH, R.A.F.V.R., No. 78 Sqn.
- Sgt. L. G. J. STEVENS, R.A.F.V.R., No. 578 Sqn.
- Sgt. J. S. WHITEHOUSE, R.A.F.V.R., No. 76 Sqn.
- Flt. Sgt. W. P. METCALFE, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
- Flt. Sgt. H. L. SEAMAN, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
- Flt. Sgt. W. H. WESTBY, R.A.F., No. 205 Sqn.
- Sgt. F. WEBSTER, R.A.F.V.R., No. 619 Sqn.
- Flt. Sgt. C. W. J. DEADMAN, R.A.F.V.R., No. 254 Sqn.
- Flt. Sgt. J. W. TOWNSEND, R.A.F.V.R., No. 540 Sqn.
- Flt. Sgt. R. CALOV, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
- Flt. Sgt. C. M. BUJOLD, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
- Sgt. (now P/O.) J. D. HAMILTON, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
- Sgt. H. HAMMOND, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
- Sgt. K. C. SHEASBY, R.A.F.V.R., No. 578 Sqn.
- Flt. Sgt. C. F. BALDWIN, R.A.F.V.R., No. 462 (R.A.A.F.) Sqn.
- Flt. Sgt. E. G. WHELAN, R.A.A.F., No. 462 (R.A.A.F.) Sqn.
- Sgt. S. L. SOAMES, R.A.F.V.R., No. 462 (R.A.A.F.) Sqn.
- Sgt. (now P/O.) C. F. GIBBS, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.

Bar to Air Force Cross

THE KING has been graciously pleased to approve the following award:—  
 Sqn. Ldr. A. F. MARTINDALE, A.F.C., R.A.F.V.R.—This officer has been engaged as a test pilot in diving aircraft at high speeds. In the course of one such dive his aircraft had exceeded a speed of 600 m.p.h. when it caught fire. Realising that he was over the outskirts of a large town, Sqn. Ldr. Martindale remained at the controls and headed for open country. The fire died down and he decided to try to reach base although flames still came into the aircraft. Dense cloud obscured the base airfield and Sqn. Ldr. Martindale was compelled to attempt a forced landing in a field. When making the approach to land, oil over his windscreen prevented this officer from seeing high-tension cables directly in his path until he was almost on them. He had no alternative but to crash in a wood. The aircraft burst into flames, but Sqn. Ldr. Martindale was able to get clear. After removing his parachute he returned to the burning aircraft, retrieved the recording apparatus, and although injured in the spine, kept on-lookers clear until the local fire brigade arrived. This officer's courage in remaining at the controls undoubtedly saved lives and damage to property, whilst his bravery in returning to his aircraft made available data recorded on this test.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations conferred upon the personnel indicated in recognition of valuable services rendered in connection with the war.

*Conferred by the President of the National Government of the Republic of China.*

**Cloud and Banner Decoration (Special Cravat) and Order of the Sacred Tripod (Paoting) (Special Cravat)**

Air Vice-Marshal L. A. PATTINSON, K.B.E., C.B., D.S.O., M.C., D.F.C., R.A.F., retd.

*Conferred by the President of the Republic of Poland*

**Order of Polonia Restituta (Third Class) Group Capt. W. E. RANKIN, D.S.O., R.A.F.**

**Cross of Merit (With Swords)**  
 Act. Sqn. Ldr. P. A. CARRIE, M.B., Ch.B., R.A.F.V.R.

Roll of Honour

Casualty Communiqué No. 462.

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 76 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

**KILLED IN ACTION.**—Sgt. P. B. Aviet; P/O. D. I. Brain; Sgt. D. F. Brown; Sgt. R. W. Bysouth; Sgt. B. P. Caley; Sgt. W. R. Campbell; Sgt. D. M. Carman; Act. P/O. A. H. Carver; Sgt. R. H. Clifford; Sgt. T. P. Cookson; Sgt. D. Fallon; Sgt. G. Farrington; Sgt. J. C. Fawcett; Sgt. L. J. Fisher; Sgt. J. A. Gibbon; Sgt. E. T. Goodrum; Sgt. W. G. N. Heath; Flt. Sgt. J. Kennedy; Sgt. A. P. C. Kuster; Sgt. J. H. Lindley; Sgt. A. D. Medcall; Sgt. A. E. Muat; Sgt. E. Mutch; Sgt. F. G. Plowman; P/O. F. A. Pocock; Sgt. H. G. Popper; Sgt. W. G. Rasey; P/O. N. K. Robinson; Flt. Sgt. K. Stephenson; Flt. Lt. W. A. McL. B. Stewart; Sgt. W. V. Taylor; W/O. S. B. Williams; Sgt. J. S. Wood.

**PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.**—F/O. H. E. Bennett; F/O. R. H. Edmeades; Sgt. W. Fleming; Sgt. R. Garside.

**PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.**—F/O. J. Anstee; F/O. G. L. Ashman; Sgt. G. E. J. Ballard; Flt. Sgt.

Flt. Lt. G. B. Eccles, A.F.C.; F/O. F. E. Eley; Sgt. W. J. Faulkner; Sgt. D. S. Farley; Sgt. J. Fawkes; Flt. Sgt. T. W. Ferguson; Sqn. Ldr. J. G. Fleming, D.F.C.; F/O. E. E. Fletcher; Flt. Sgt. D. Forster; Sgt. C. W. Garner; Sgt. C. W. Garrett; F/O. D. F. Gay; Sgt. G. F. Gibson; Sgt. J. Grice; Flt. Sgt. R. H. Hall; Sgt. G. C. Hanson; Sgt. A. Hargill; Sgt. E. Hatzfeld; Act. Flt. Lt. F. W. Healey; Sgt. C. Hemingway; Sgt. R. Hewitt; F/O. I. H. R. Hood; Act. F/O. J. H. Horspool; Flt. Sgt. J. Hyams; Sgt. E. H. G. Jackson; Sgt. C. C. Jeffrey; Sgt. K. Kay; Sgt. H. C. Keatley; Flt. Lt. H. B. Kelly; Sgt. R. Kilner; Flt. Lt. H. Lawson; Act. Sqn. Ldr. J. J. Le Roux, D.F.C.; Sgt. D. W. Lillicrap; P/O. H. Lyndon-Adams; Grp. Capt. W. N. McKechnie, G.C.; Sgt. D. H. Malcolm-Jones; Sgt. G. R. Millward; Flt. Sgt. C. W. Morley; Sgt. R. W. Myers; Act. Flt. Lt. J. Neville; Sgt. W. G. Owen; W/O. W. Owens; Sgt. E. G. L. Parker; Sgt. E. W. Parker; Sgt. C. Pearson; Flt. Sgt. F. Pearson; Sgt. B. J. Peverelle; P/O. R. Pickles; Flt. Sgt. L. Prior; Sgt. E. C. Reid; Flt. Sgt. G. Rhodes; Flt. Lt. E. J. O. Richardson; F/O. V. A. Robertson; Flt. Lt. E. S. W. Ross; F/O. F. Sayles, D.F.M.; Sgt. J. Scaife; Act. Sqn. Ldr. R. H. Schofield; P/O. L. H. Simpson; Act. Flt. Lt. C. W. Slatter; Flt. Sgt. G. B. Smith; Flt. Sgt. J. B. Smith; Sgt. S. Stanton; Sgt. A. Stewart; F/O. N. J. Stronell; Sgt. O. Tabuteau; Flt. Lt. D. B. Tattersall; F/O. W. L. Thacker; W/O. E. R. Trumper; Sgt. E. J. Walton; Flt. Sgt. R. F. Wardle; Flt. Sgt. G. H. Wheatcroft; Sgt. J. G. C. Whitworth; Sgt. H. W. Wickenden; Flt. Lt. W. E. Wilbur; Flt. Sgt. D. H. P. Womar.

**MISSING, BELIEVED KILLED ON ACTIVE SERVICE.**—Sgt. J. Boyd.

**KILLED ON ACTIVE SERVICE.**—Sgt. T. M. Affleck; Sgt. W. J. Barnett; Sgt. E. Brisbane; Sgt. E. F. Cooper; Sgt. J. K. McMahon; Sgt. F. C. Moran; Sgt. A. W. Pack; Flt. Sgt. J. L. Potter; Sgt. R. Telford; Flt. Sgt. J. Valentine.

**PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.**—Sgt. B. F. Franks.

**WOUNDED OR INJURED ON ACTIVE SERVICE.**—A/C.1 K. Newbury; Sgt. E. J. Perry.

**DIED ON ACTIVE SERVICE.**—Sgt. J. Cross; L.A./C. C. J. Drewery; L.A./C. W. T. W. Girvan; Cpl. W. Harding; F/O. F. E. Hawkins; Sgt. G. N. Jack; Cpl. G. Kershaw; L.A./C. R. MacAskill; Cpl. C. H. A. Morgan; Cpl. F. E. Nash; Act. Sqn. Ldr. L. Simm; W/O. J. M. Tailford; A/C.1 F. Thompson

Women's Auxiliary Air Force

**DIED ON ACTIVE SERVICE.**—L.A./CW. P. C. M. Coole.

Royal Australian Air Force

**KILLED IN ACTION.**—Flt. Sgt. N. G. A. Burgess; F/O. T. H. Smith.

**PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.**—F/O. J. P. Grant; Flt. Sgt. E. C. Hobbins; F/O. R. K. McIntyre.

**PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.**—Flt. Sgt. V. S. Barnes; Flt. Sgt. K. R. Heming; P/O. M. A. Line; Flt. Sgt. R. S. Neighbour; Flt. Sgt. F. E. Nowland.

**MISSING.**—F/O. T. K. Clarke; F/O. E. T. Leslie; Act. Flt. Lt. K. M. D. Lyons, D.F.M.; Flt. Sgt. R. H. McLean; Act. F/O. M. J. Roe; Flt. Sgt. T. R. Ryan; Act. Flt. Lt. J. H. Wilkinson

**KILLED ON ACTIVE SERVICE.**—P/O. R. E. Byrne.

Royal Canadian Air Force

**KILLED IN ACTION.**—Flt. Lt. H. J. Callin; W/O. M. C. Grant; Flt. Sgt. W. H. Howie; Flt. Sgt. F. J. Kendall; P/O. R. A. Lamb; Flt. Sgt. D. A. MacDonald; F/O. R. B. Mumberson; F/O. G. L. Piprell; F/O. W. B. Richardson; F/O. J. E. Swanson; F/O. F. H. Watts; P/O. A. A. J. Willis; P/O. W. Wright.

**MISSING, BELIEVED KILLED IN ACTION.**—F/O. R. O. Moen; W/O. M. E. Soules.

**MISSING.**—F/O. J. R. Beveridge; F/O. W. W. Brown; F/O. C. R. Cameron; Flt. Sgt. N. C. Capar; Flt. Sgt. H. W. T. Carter; Flt. Sgt. A. R. Chalmers; Flt. Sgt. J. L. deV. Conolly; F/O. G. D. Danielson; Sqn. Ldr. J. T. J. Davis; F/O. T. De Vries; W/O. H. L. Dowland; Flt. Lt. A. P. Forbes; Flt. Sgt. W. F. Fraser; F/O. T. Foster; Flt. Sgt. S. R. Frith; F/O. T. Gorak; P/O. L. G. H. Griffiths; P/O. L. S. Guernsey; P/O. F. C. Harman; Sgt. J. R. Hawkins; F/O. G. C. Holseth; F/O. B. I. Kalheim; W/O. H. J. Linn; P/O. W. L. Long; F/O. J. E. Lundy; F/O. S. A. MacKenzie; F/O. P. E. McNamara; Flt. Lt. H. E. Maguire; F/O. R. B. Melville; Flt. Lt. R. B. Motz; Flt. Lt. G. W. Nathan; Flt. Sgt. P. W. O'Leary; Sgt. G. W. Pharis; Flt. Sgt. R. G. Pickering; Flt. Sgt. T. A. Purvis; P/O. K. A. Roche; P/O. N. Shlahetka; F/O. C. B. Thompson; P/O. E. C. Van Blarcom; Flt. Lt. A. Wallace; F/O. C. R. Watts.

**KILLED ON ACTIVE SERVICE.**—Sgt. G. H. Barr; Sgt. G. Brown; F/O. L. R. Corney; Sgt. R. M. Dickie; Sgt. R. A. Dutton; F/O. J. L. Eastwood; Sgt. F. L. Frank; Flt. Sgt. E. D. Gordon; F/O. C. G. Kennedy; Flt. Lt. M. K. McGuire;



**WATCHMAN'S BRAZIER:** Cpl. Lever, of an R.A.F. mobile repair unit, finds warmth in the exhaust from an air compressor. The aircraft in the background is a Transport Command Sparrow.

R. H. Banks; Flt. Sgt. T. W. Boynton; Sgt. R. Clark; P/O. W. A. Clark; Sgt. R. Cotterill; Sgt. A. E. Cowell; P/O. W. J. Craddock; Sgt. G. A. Crowe; Sgt. S. Ecclestone; Sgt. E. Edge; Sgt. B. H. Fardell; Sgt. R. W. Fontaine; Sgt. J. Ford; P/O. F. H. Garnett; Sgt. S. H. Godfrey; Sgt. W. A. Green; Sgt. W. Hazeldine; F/O. A. Hazell; Sgt. F. Holland; Sgt. E. Holloway; Sgt. S. H. Hopson; Sgt. R. Hughes; Flt. Sgt. P. G. L. Kerr; Flt. Sgt. A. A. King; Sgt. N. Legg; Sgt. D. McLean; Sgt. A. A. King; Sgt. N. Legg; Sgt. Mulcahy; P/O. R. F. Neil; Sgt. J. C. O'Mahony; Flt. Sgt. E. N. Parker; Sgt. E. M. J. Pease; Sgt. F. W. Porteous; Sgt. R. P. Prothero; Sgt. B. S. Ranson; Flt. Sgt. J. G. Redfern; Flt. Sgt. T. J. Robertson; Sgt. H. W. Rudelhoff; F/O. A. J. Rudman; Flt. Sgt. M. W. Saunders; Sgt. M. J. Sheryn; F/O. A. F. P. Stanislaus; Sgt. J. A. Stewart; F/O. F. J. Stuart, C.G.M.; Sgt. G. H. Stubbs; Sgt. W. A. Taylor; Flt. Sgt. T. J. Thomas; Sgt. T. H. Tibbles; Sgt. K. H. H. Wardle; Flt. Sgt. E. R. Watts; Sgt. R. C. Whale; Sgt. J. A. Withington.

**MISSING, BELIEVED KILLED IN ACTION.**—F/O. R. K. Stratford, D.F.M.

**MISSING.**—Sgt. J. A. Akers; Sgt. C. Alexander; Flt. Sgt. R. L. Alexander; Sgt. A. Anderson; W/O. W. H. S. Ansell; F/O. D. W. Aston; Sgt. R. F. G. Bailey; Flt. Sgt. R. Baxendale; Sgt. W. A. Baxter; Flt. Sgt. G. W. Battersby; Sgt. M. T. Bird; F/O. L. O. W. Boivin; Sgt. W. Bradley; Act. Flt. Lt. T. S. Brady; Sgt. W. S. Bryson; Sgt. R. W. Bullen; Flt. Sgt. G. M. Canning; F/O. H. Clark; P/O. R. B. Clarke; Sgt. J. F. Cleary; P/O. H. E. W. Colgate; Flt. Sgt. E. L. Collins; P/O. C. Cousin; Sgt. J. C. Coverley; W/O. D. A. Denton; W/O. H. Dixon;

## SERVICE AVIATION

F/O. N. Merinuk; F/O. F. G. Norman; P/O. C. C. Todhunter; F/O. J. W. Tucker.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. J. T. W. C. Anderson; F/O. D. C. Campbell; F/O. H. G. Crossley.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. J. Brown.

DIED ON ACTIVE SERVICE.—Sgt. M. B. Wilson.

### Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. T. Dance; Flt. Sgt. J. S. S. Fleming; F/O. T. Lodge; Flt. Sgt. K. O. Schultz; Flt. Sgt. S. E. Simpson; Flt. Sgt. O. N. Ussher; F/O. N. C. B. Wilson.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. S. G. Catto.

MISSING.—F/O. R. D. MacDuff; Act. F/O. D. G. Twiddle.

### South African Air Force

KILLED IN ACTION.—Lt. I. H. Impey; Lt. S. C. R. Saunders.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. A. R. Ingle, D.F.C.

WOUNDED OR INJURED IN ACTION.—W/O. R. P. Schenck.

MISSING.—Lt. C. T. Bain-Marais; W/O. W. F. Van der Walt; Lt. W. R. A. Grosse Rasgado; Sgt. R. G. Luke; Lt. D. Patterson; Lt. S. C. Street; W/O. G. J. Terblanche.

### Casualty Communiqué No. 463

Of the names in this list, 76 are second entries giving later information of casualties published in earlier lists.

### Royal Air Force

KILLED IN ACTION.—Sgt. J. F. Andrew; Flt. Lt. A. G. Brewis; Act. Sqn. Ldr. A. E. Cook, D.F.C.; Flt. Sgt. H. Gordon; P/O. J. R. Greenaway; Flt. Lt. S. H. Pyrah; Flt. Sgt. R. A. E. White; P/O. J. McCartney.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. E. D. K. Howe-Browne.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. R. A. Bell; Sgt. C. W. Billett; Sgt. T. C. Bramley; Sgt. D. G. Button; Act. W/O. A. Charlesworth; Sgt. J. Cockroft; F/O. H. L. G. Dodson, D.F.M.; P/O. S. G. Dorrell; Sgt. D. Gadsden; Flt. Sgt. J. H. Gainsborough-Allen; F/O. G. S. Hall; Sgt. J. W. Harvey; Sgt. R. W. Hayes; Flt. Lt. J. A. Hoskin; Sgt. R. H. Kibby; Flt. Sgt. E. G. Kirkland; Sgt. R. W. Lenton; Flt. Sgt. D. McGrath; Sgt. I. A. McLeod; F/O. G. D. L. Machin; Flt. Sgt. L. V. Murrell; Sgt. E. North; Sgt. E. O'Neill; Sgt. J. W. Richardson; Act. Flt. Lt. A. J. W. Silk; Flt. Sgt. J. N. Underwood; Flt. Sgt. W. G. Waller; Sgt. R. W. Webb; Sgt. F. R. Wise.

WOUNDED OR INJURED IN ACTION.—F/O. E. A. F. Hall; W/O. W. L. Nicol.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. G. G. Atkinson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. A. Barratt; Act. Sqn. Ldr. J. Berry, D.F.C.; Flt. Sgt. T. G. Nottingham; Sgt. P. D. Secretan; Sgt. R. E. Williams; Sgt. J. Brown; Sgt. W. McN. Docherty; Sgt. J. Goodall; Sgt. A. E. Jeans; Flt. Sgt. A. Laverick; Sgt. J. W. Lenton; P/O. W. G. Musgrave; Flt. Lt. W. L. Saunders-Knox-Gore; Sgt. W. J. D. Smith; F/O. S. Solomon; L.A./C. A. Swallow; Flt. Sgt. J. W. Wagstaffe; F/O. D. W. O. Wood; Sgt. N. L. Young; F/O. W. G. F. Filby; F/O. A. G. Henriquez; Flt. Sgt. P. W. Jarvis; Sgt. A. McKenzie.

MISSING.—F/O. H. E. Allman; P/O. P. S. G. Apperley; Sgt. D. C. E. Aspinell; Sgt. E. R. Atkinson; Sgt. G. Barnes; Act. Sqn. Ldr. C. R. Barrett; Sgt. G. H. Benson; Act. Flt. Lt. N. G. Berkeley; Sgt. T. H. Billington; Sgt. R. Birkby; P/O. H. W. Blacklock; Sgt. W. P. Blake; Flt. Sgt. B. V. Bowen; F/O. G. R. Bradley; Act. F/O. W. D. Brickwood; Flt. Sgt. P. Bullimore; Sgt. D. Bullock; Flt. Lt. G. Butterfield, D.F.M.; W/O. K. S. Callicott; P/O. T. T. Charlton; F/O. K. P. Dack; Sgt. W. Damen; Sgt. G. W. Darkin; Sgt. D. W. H. Davey; F/O. R. G. Devine; Sgt. P. Devlin; Sgt. E. Dobson; P/O. R. L. Dodds; F/O. C. J. Dunn, D.F.C.; Flt. Sgt. W. J. J. Farbrace; Sgt. B. Farndale; Sqn. Ldr. A. L. Farrington; Sgt. J. R. Fawcett; Flt. Lt. P. R. S. Filleul; Sgt. G. B. Fitzgerald; F/O. E. S. Fogden; F/O. A. A. Frederick; F/O. Q. Garden; Flt. Sgt. J. Gardner; F/O. W. E. Gibbs; Sgt. K. M. Goodman; F/O. T. Gould, D.F.M.; Sgt. H. Grice; Sgt. A. E. Hall; Sgt. L. Hall; Sgt. J. P. Hanet; Flt. Sgt. H. Hardy; Sgt. J. Harrison; P/O. C. E. Hatch, D.F.M.; Sgt. I. Howitt; Sgt. J. W. T. Hudson; Sgt. T. K. Hunter; Sgt. J. L. G. Huntley; F/O. A. L. Johnston; Sgt. D. L. Karck; Sgt. D. Kedward; Flt. Sgt. R. T. Keen; Flt. Sgt. S. G. Kentch; Flt. Sgt. A. G. Kilsby; Sgt. J. King; F/O. A. F. Lavender; F/O. J. Leadbeater; F/O. D. C. Lindsay; P/O. C. E. Lockwood; Sgt. A. McDonnell; Sgt. J. McFarlane; Sgt. S. H. Mackay; Sgt. K. M. McKie; Sgt. J. McNeer; Sgt. C. Manley; Flt. Sgt. A. H. Maude; Sgt. W. T. Mercy; W/O. R. Middleton, D.F.M.; W/O. D. C. Moore; Sgt. J. K. Norgate; Sgt. R. E. S. Packham; Flt. Lt. T. G. J. Parker; Flt. Sgt. M. E. Pearce; F/O. M. Pearce; Sgt. H. S. Picton; Sgt. R. W. Pomroy; Sgt. J. D. Potter; F/O. A. F. Reynolds; Flt. Sgt. D. S.



**SOLO TRAVELLER:** Air Comdre. F. J. W. Mellersh, Commander of the Strategic Air Force, Eastern Air Command, visits heavy bomber stations under his command in his own Hurricane.

Richards; Flt. Sgt. D. Robertson; F/O. C. Robinson; F/O. C. J. Sanders; Flt. Sgt. W. G. Sankey; P/O. H. Silverwood, D.F.M.; Sgt. J. K. Sim; Flt. Sgt. R. Smyth; F/O. J. Stanners; Flt. Sgt. D. F. J. Stevens; F/O. J. E. Stevens; Sgt. N. Stevens; F/O. C. F. Stewart; Flt. Lt. J. Summers; Flt. Lt. D. H. Sumsion; Sgt. L. Taylor; F/O. E. C. Tebb; P/O. J. N. Thorne; Flt. Sgt. H. Thornton; Sgt. W. C. Thorogood; Sgt. G. Tickner; Sgt. K. Towers; Flt. Lt. T. E. Tranter, D.F.C.; Sgt. J. A. Trayhorn; Flt. Sgt. J. Tuhey; Act. Wing Cdr. J. H. Walker, D.F.M., A.F.C.; Sgt. W. B. Walker; F/O. W. B. Wardle; Sgt. E. A. Weatherhead; Sgt. J. F. M. Webber; Sgt. P. J. Wilson; F/O. G. W. Winter; Sgt. R. R. Wood; F/O. H. Woods; F/O. N. F. Young; Sgt. H. A. N. Yule.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—W/O. G. D. M. Robb.

KILLED ON ACTIVE SERVICE.—P/O. T. A. Armstrong; F/O. B. Christison; L.A./C. A. S. Fairs; Cpl. F. Harrison; Sgt. E. A. Madge; P/O. J. Playford, D.F.M.; F/O. L. G. Prout; Flt. Sgt. H. Ramsay.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. H. T. Sanctuary; Sgt. R. R. Webb.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Act. Flt. Lt. F. J. Cripwell; Flt. Sgt. N. A. Lush; F/O. S. Sutcliffe; F/O. J. Varty.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A./C. C. H. Barrett; Sgt. J. B. Jubb; L.A./C. L. Pearson.

DIED ON ACTIVE SERVICE.—L.A./C. J. T. Carr; A/C.2 O. Cassar; W/O. C. J. Gilbert; Wing Cdr. W. Milligan; L.A./C. W. S. Palmer; L.A./C. R. T. Round; A/C.2 F. G. H. Wilson.

### Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A./CW. A. J. Oates.

### Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. A. Chester; Flt. Sgt. R. H. Lawn; F/O. A. Robinson; Flt. Sgt. R. W. Rowley; F/O. E. C. Truscott.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. H. Campbell; P/O. H. W. Harris; P/O. L. J. Johnson; Flt. Sgt. B. J. V. King; Flt. Sgt. E. L. Lancaster; Flt. Sgt. F. N. Looney; P/O. J. G. McAlpine; Flt. Sgt. C. R. McLaren; P/O. V. A. Martin; Flt. Sgt. W. R. Tinman; P/O. J. Weatherill; Flt. Sgt. R. Wilkinson.

WOUNDED OR INJURED IN ACTION.—F/O. M. L. Tapp.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. W. N. Christie; P/O. O. K. Smith.

MISSING.—P/O. E. K. Adams; Act. F/O. E. D. Alexander; W/O. N. C. Barrett; Act. Flt. Lt. D. D. Browne; Act. F/O. J. E. Corlis; Flt. Sgt. T. H. F. Dodd; W/O. S. A. Folbigg; W/O. E. A. Hogan; Flt. Sgt. T. G. Jamieson; Flt. Sgt. E. J. L. Klemm; P/O. J. S. Lupton; P/O. A. D. MacDougall; Flt. Sgt. I. F. MacGugan; F/O. W. A. MacLennan; P/O. P. C. Maughan; Flt. Sgt. R. Parker; Flt. Sgt. A. S. Parsons; W/O. V. W. A. Pivott; Flt. Sgt. K. W. Rust; Flt. Sgt. N. A. Taylor.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. H. Smith.

### Royal Canadian Air Force

KILLED IN ACTION.—Sgt. C. F. Adair; F/O. T. Baillie; F/O. D. K. Moores; Sgt. D. A. G. Sparkes; F/O. J. A. Wilding.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN

ACTION.—Sgt. J. J. Crawford; Flt. Sgt. A. L. Sedgwick; Flt. Sgt. S. Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. A. Box; F/O. D. C. W. Clark; F/O. MacD. S. Gordon; P/O. H. J. Gould; Flt. Lt. A. C. Harding, D.F.C.; Flt. Sgt. G. R. Harrison; F/O. B. G. Henderson; Sgt. W. E. Hogarth; F/O. G. J. Lawrence; F/O. F. E. Lewis, D.F.C.; Flt. Sgt. A. C. McNabb; Flt. Lt. S. P. Marlatt; Flt. Sgt. J. A. Miller; W/O. E. G. Millidge; P/O. W. H. Parlee; Flt. Sgt. L. C. Patrick; Flt. Lt. H. J. Southwood; P/O. L. A. Titof.

WOUNDED OR INJURED IN ACTION.—W/O. J. H. E. Contant; Flt. Sgt. C. A. Pike.

MISSING.—P/O. W. H. Billing; Sgt. F. D. Bristow; F/O. R. J. Calford; F/O. W. J. Calverley; Sgt. M. G. Casey; Flt. Lt. E. Chatterton; F/O. R. F. Dell; P/O. N. E. P. Douglas; F/O. M. Emsig; F/O. L. H. C. Gardiner, D.F.C.; W/O. J. P. Gravelet-Chapman; Flt. Sgt. R. K. Jack; Sgt. C. Jutz; F/O. A. M. Kovacich; Sgt. D. McLean; F/O. W. C. Miller; Flt. Sgt. D. C. Odell; F/O. L. S. Plunkett; Flt. Sgt. J. C. Reeb; F/O. J. K. Reid; Flt. Lt. A. C. Strout; Flt. Sgt. J. M. Turachek; Flt. Lt. L. V. Tyndale.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—W/O. R. G. Needham.

### Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. M. Godby; F/O. A. G. Greentree.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. W. A. D. A. Knight; Flt. Sgt. A. E. McCormick.

MISSING.—Flt. Sgt. J. M. Biggar; Flt. Sgt. W. J. V. Boyd; Flt. Sgt. J. P. A. Giles; P/O. J. B. Gudgeon; Act. F/O. W. O. A. Hadley; P/O. P. C. Siddall.

KILLED ON ACTIVE SERVICE.—F/O. D. A. Attwood; Flt. Lt. J. H. Reeves; F/O. G. M. Templar.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. A. E. Lander; F/O. J. R. Massey.

### South African Air Force

WOUNDED OR INJURED IN ACTION.—Lt. L. W. Gillman.

MISSING.—2/Lt. D. M. Cameron; Capt. E. A. Endler; Lt. S. P. Griessel; Lt. A. G. McCabe; Lt. G. Morgau; Lt. T. A. Stewart.

### Air Transport Auxiliary

Second Officer Thomas Blair Willans, A.T.A., died as the result of injuries received in an accident whilst ferrying His Majesty's aircraft in Scotland.

### Official Corrections

Casualty Communiqué No. 459.

Under "MISSING" delete Sgt. R. Ashworth, Flt. Sgt. D. A. Barnes, F/O. C. Carter, W/O. G. Dugdale, Sgt. R. Gough, Act. Flt. Lt. P. Green, Sgt. N. Hayward, Flt. Lt. T. C. Hood, Sgt. N. Huntley, W/O. N. F. Slade and Sgt. W. C. Tatum. For Sgt. C. J. R. MacDougall read Flt. Sgt. C. J. R. MacDougall.

Under "DIED ON ACTIVE SERVICE" for Sgt. E. C. W. Newton read Flt. Sgt. E. C. W. Newton. R.A.A.F.—Under "MISSING" delete P/O. B. L. J. Foley and Flt. Sgt. R. J. Mullins.

Under "KILLED ON ACTIVE SERVICE" for Sgt. H. R. W. Fox read P/O. H. R. W. Fox; for W/O. S. C. Walker read P/O. S. C. Walker.

R.N.Z.A.F.—Under "MISSING" delete Flt. Sgt. C. J. H. Falconer and Flt. Sgt. H. G. Reay.