

FLIGHT

and
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

The "Sixth Freedom"

THINGS are looking distinctly brighter in the world of British Civil Aviation. Not that we have yet fleets of new commercial aircraft ready to go on the routes, nor that our future internal and external policy is cut and dried. But a spirit of sweet reasonableness is traceable in the circles directly concerned. That spirit can carry us far towards ultimate success unless it is stifled by political intrigues and sheer official ineptitude.

At an informal luncheon in London last week, following the annual meeting of the Air Registration Board, Viscount Swinton was the principal guest. Sir Maurice Denny, chairman of the A.R.B., had expressed the hope that the Board might be allowed to do its job in its own way, and the Minister of Civil Aviation replied that he did not intend to let anything or anybody supplant the Air Registration Board, which, we might remind our readers, was founded while Lord Swinton was Air Minister. He recalled his long experience at the Board of Trade, where he found that co-operation and collaboration between representatives of the different interested parties had resulted in reforms which were opposed by certain sections but which had since proved so successful that they had been copied and adopted by shipping interests in the rest of the world.

In the Air Registration Board they had a similar system, and undoubtedly that was the best way of doing the job. Viscount Swinton's assurance is to be sincerely welcomed. Signs are not lacking, as we have pointed out before, that Millbank is casting envious eyes on the A.R.B., and that, given the slightest opportunity, the Ministry of Aircraft Production would love to grab the whole of the control of civil aviation regulations in technical matters. That must not be allowed to happen, and Lord Swinton's very definite assurance may be accepted

as a promise that, in so far as it lies in his power, it will not happen.

So far as Sir Maurice Denny's hopes were concerned, the Minister of Civil Aviation was equally reassuring. He was proud of parentage, and the Board had proved itself and had accumulated a collective knowledge and responsibility which was very valuable. It was his intention that the Board should be given as much freedom as possible. Lord Swinton made certain references which he asked should not be reported, and on which, therefore, we cannot comment, but they showed that he is thinking along very similar lines to those intimately concerned in the question of airworthiness regulations. So long as that spirit reigns at Aerial House we have nothing much to worry about.

Continuity of Policy

The danger is that under a change of Government a man with very different views may come into power. He could, if he were foolish enough to do so, wreck all the good work done by Lord Swinton, Sir William Hildred and the Air Registration Board separately and in combination. Just by way of showing how too rigid detailed regulations can cause ridiculous situations to arise, we should like to quote two examples from our personal knowledge. In one case an aircraft firm was permitted to fly one of its own aircraft types fitted with a certain engine for which dual ignition had been provided, but only so long as the machine was being flown by the firm's personnel for test and development purposes. If fare-paying passengers were to be carried, single ignition had to be used, as the engine had not passed its type test with dual ignition.

In another case a certain aircraft was ready to fly, but it so happened that the wheels specified were not available. The firm substituted a pair which happened to fit and were actually stronger than those specified.

Permission to fly was refused, since the machine did not conform to the specification!

It may be argued that these examples are ridiculous. Admittedly, but they actually happened, and it is well that designers and the A.R.B. should have a free hand to work together in order to maintain what might be termed a sensible "Sixth Freedom," the freedom of experience and common sense from too much hampering red tape.

Australian Airlines

THE Commonwealth of Australia is a Dominion, and as such it is for her to manage her own affairs without impertinent interference from the United Kingdom. Nevertheless, this country is faced with some problems similar to those of Australia, and cannot be indifferent to the solutions proposed by one of the members of the Commonwealth of Nations. *Flight*, for example, may, we hope, without impropriety express either rejoicings or regrets at steps taken by Australia.

The present Government of Australia is one of Labour, and so measures of a socialistic complexion were to be expected from it. It has introduced into the Parliament a Bill for the nationalisation of Australian inter-State airlines. We are aware that it is universally considered right and proper that the State should own and manage certain public means of communication. In the United Kingdom the strongest opponent of socialism raises no objection to the State's ownership of the Post Office, including the telegraph and telephone services. In India many of the railways are owned and run by the State with perfectly satisfactory results. Why then, it may be asked, should any objection be raised to public ownership of airlines?

Mr. Drakeford, Minister for Air and Civil Aviation, argued that the Commonwealth Government had invested more money in airfields, meteorological services, etc., than was represented by the entire equipment of Australian airlines. It seems to us that this must always be the case during the infancy of such a business as air transport; but it is not likely to be so when services grow frequent and the number of aircraft is multiplied. Probably no country in the world offers a brighter future for air transport than does Australia, and the demand for it must increase as the population swells, as we all

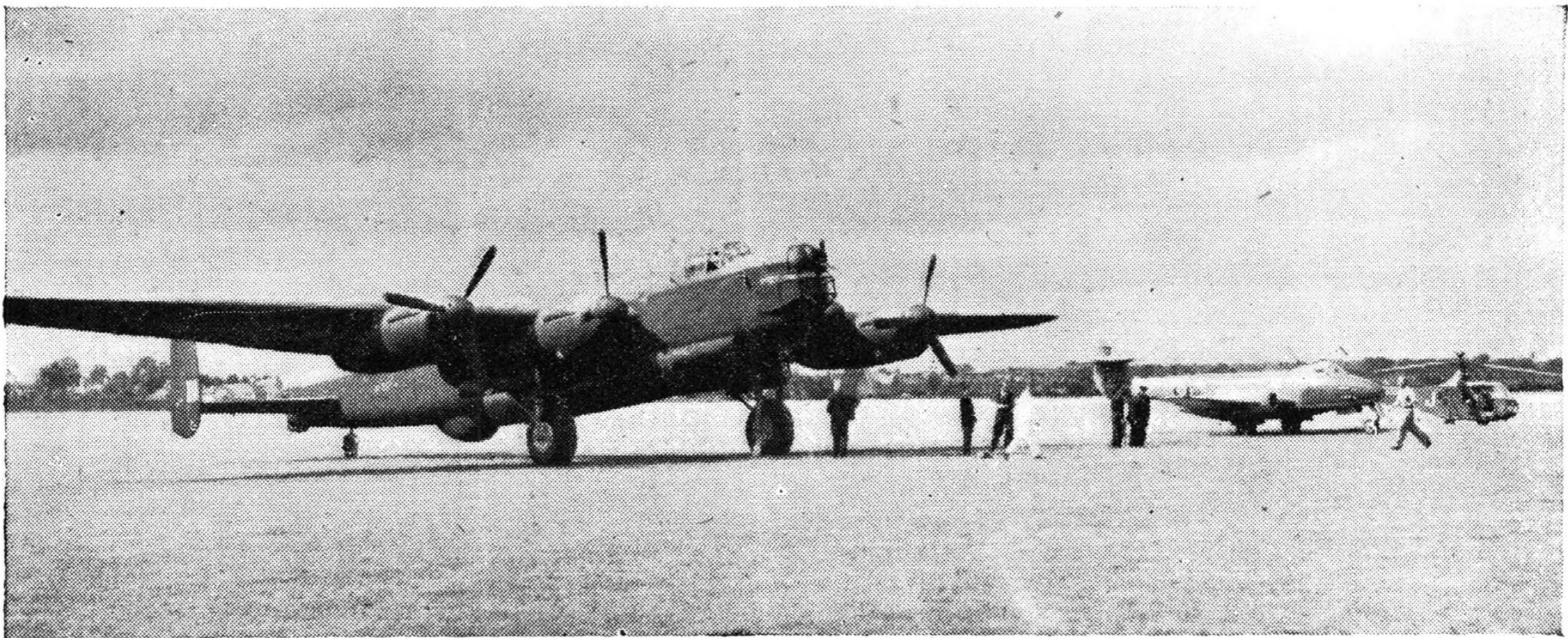
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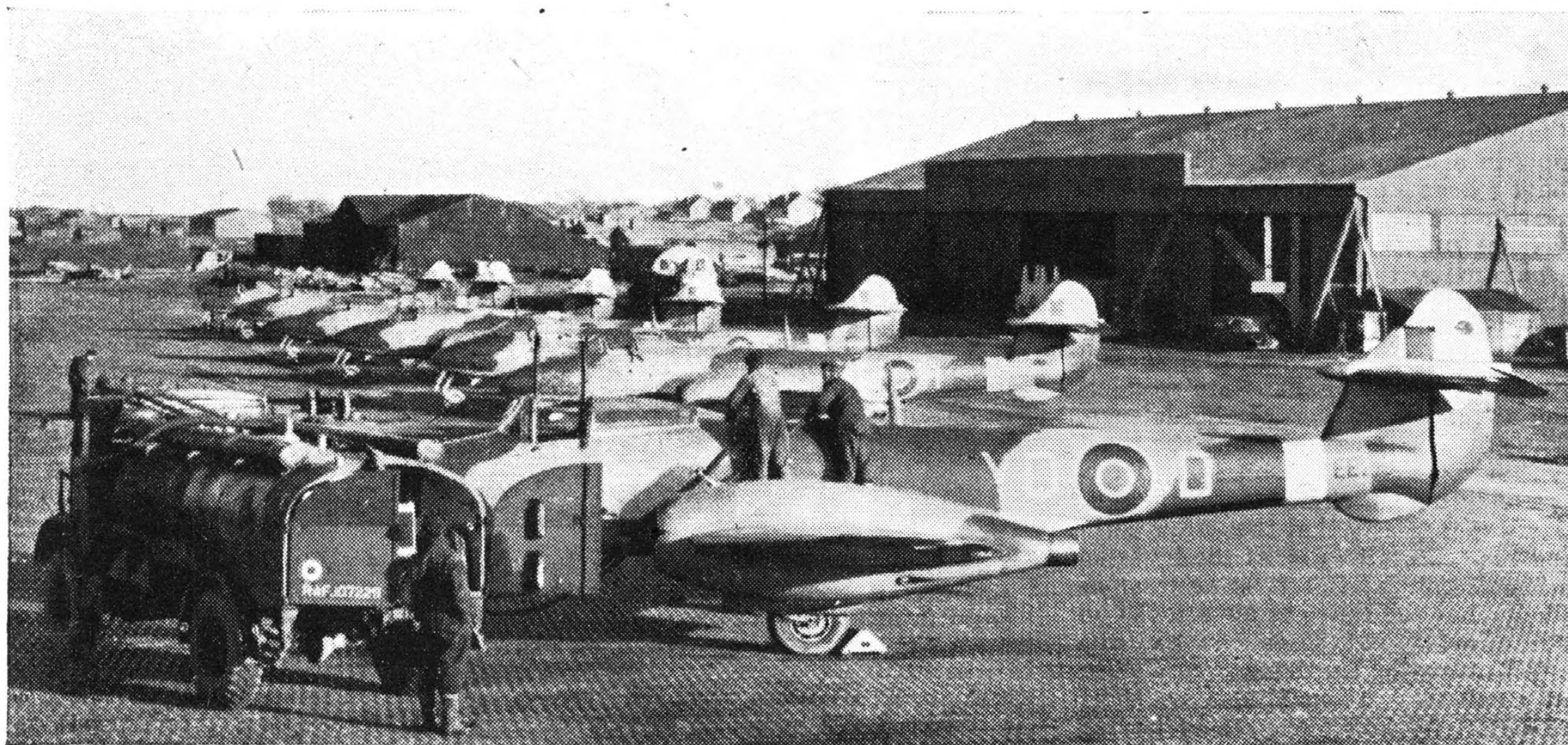
hope that it will do. We shall regret it if all the inter-State lines are owned and operated by the Government, and we hope that if Australia sets the example in this direction the United Kingdom will not follow suit. There are routes in these islands where we consider that air communication is so desirable (e.g., to the outlying islands) that if the services could not pay their way it would be the duty of the Government to support them by generous mail contracts or even by direct subsidies. Also we do not want wasteful competition, but that can be prevented by the Licensing Board. Otherwise, we hope to see air transport left as free as possible.

Private Enterprise

A MOST illuminating light was thrown on the advantages of private enterprise by the chairman of Rolls-Royce, Ltd., this week, when some of the firm's achievements were disclosed. (They will be duly recorded in next week's issue.) He recalled that in the 1920s the firm was practically without Government support. In 1925, at their own expense, they produced the prototype of the Kestrel, from which all later types may be said to have been evolved. In 1932, again at their own expense, they produced the P.V.12, now famous as the Merlin. The Merlin won the Battle of Britain. But for private enterprise, now so much despised in some quarters, we should not have had the Merlin.



"BRING THE FAMILY"—AND OTHERS: An air display was held at Langley last Saturday at which were demonstrated aircraft of the firms in the Hawker group (see p. 95.) The one "outsider" was a Sikorsky helicopter, the only class of aircraft not so far produced by the group. Here are seen, lined up for the display, an Avro Lincoln bomber, a Gloster Meteor jet fighter, and the helicopter.



JETS ON THE JOB : A line of four-cannon twin-jet Gloster Meteor fighters being refuelled.

WAR in the AIR

Along the Japanese Coast : Carrier Aircraft to the Front : British Warships Join In

A WHILE ago the air attacks on Japan were the business of Superfortresses, which alone had the range to get at the enemy country from the available bases in the Marianas. Last week most of the bombing was done by carrier-borne aircraft from Admiral Halsey's Third Fleet which included the U.S. battleship *Iowa* and H.M.S. *King George V*. It will be remembered that the *King George V* (together with the battle cruiser *Renown*) silenced by her 14-inch guns the turrets of the *Bismarck* after the *Swordfish* had slowed her up, and the shells left her a helpless and immobile hulk on the water. Now those same guns have been pouring shells into targets along the Japanese coasts. Attacks by shell and by bomb go together, and it is not possible to tell either the naval story or the air story separately.

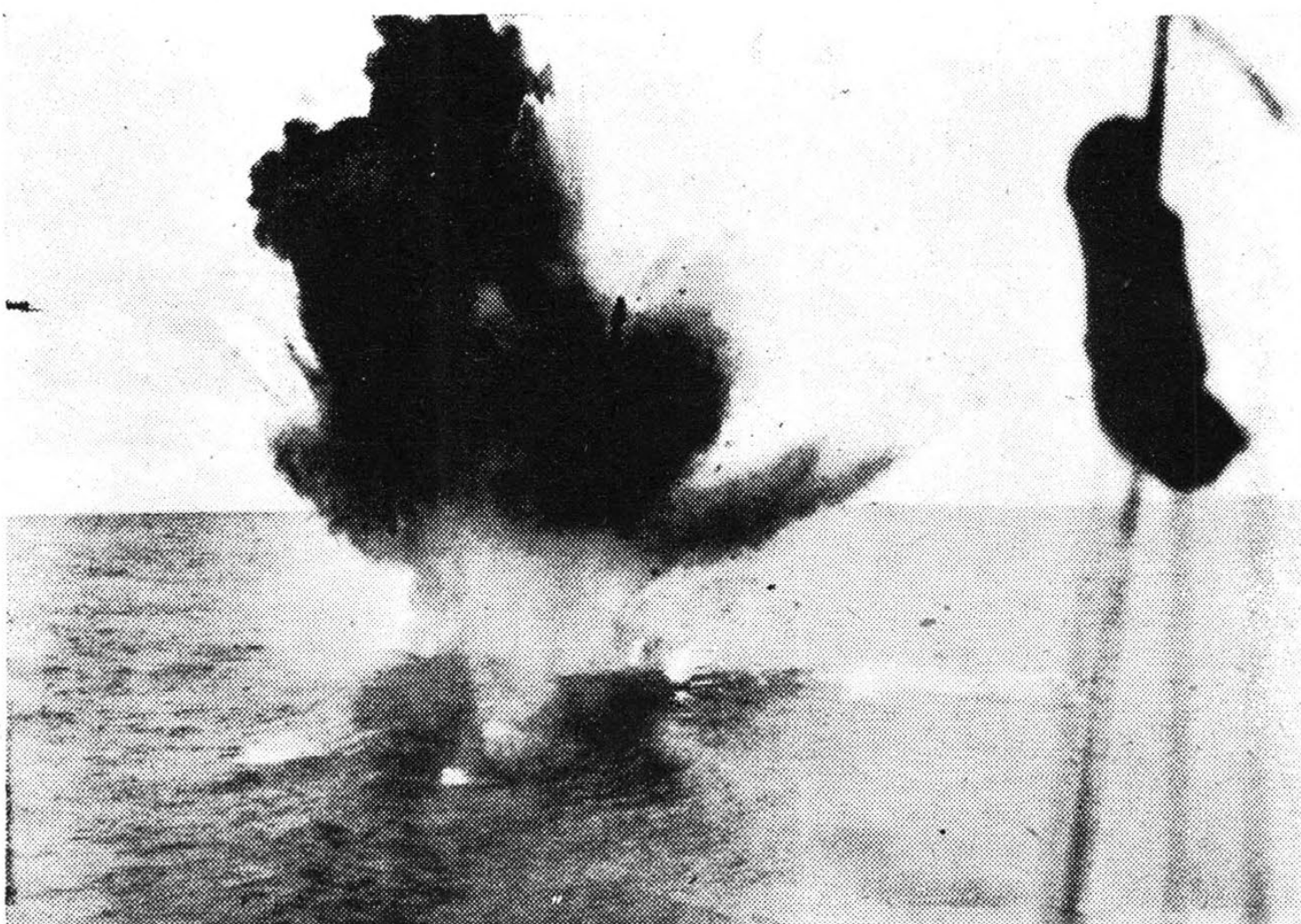
The shelling was a new experience for the Japanese people and according to the Domei agency they disliked the novelty more than the inflictions to which they had become more or less accustomed. The same agency said that it was impossible to fight the fires while the shelling was in progress, and accordingly the danger of fires spread-

ing was greater than when bombing was under way. We cannot understand why it should be. Some of the recent bombings must have been equally effective in keeping the firemen in their shelters.

The bombing programme will soon become even more formidable. The U.S. 8th Air Force is to be equipped with Superfortresses when it reaches the Pacific, and it has also been announced that British heavy bombers

are to swell the Allied forces there. Though the majority of Japanese people live in wooden houses (which are most easily destroyed by fire-bombs) there are solid concrete buildings here and there which would best respond to treatment by some of the mighty bombs which only the Lancasters can lift.

Nobody doubts the fanatical bravery of the average Japanese soldier; but it seems clear from their own reports



ONE THAT DIDN'T : A Japanese suicide pilot, on a twin-engined bomber, shot down into the sea by U.S. Navy Corsairs and A.A. gunners just as it was about to attack an escort carrier.

WAR IN THE AIR

that the civil population of Japan is now in a state of panic. The papers have been complaining that the Government has not provided for the defence of the second-size towns, to which many thousands had fled when the main cities had been well and truly bombed. These second cities are now becoming targets. The Allies as well as the Japanese civilians are wondering about the absence of the defence. The 3rd Fleet steamed along the coast within easy range of shore-based aircraft, but none came out against it. The Japanese say that they are reserving their aircraft to resist the invasion when it comes; but it is at least as likely that the series of air attacks on the airfields and bases has had the effect of leaving the defence very short of machines. It may also be short of petrol by now, in spite of having had the oil wells of the East Indies in its hands for so long. We do not know how much of the accumulated reserves has been hit by Allied bombs.

It is not often that one hears complaints from the Army about the work of the R.A.F., but lately the engineers in Burma have been saying that the aircraft had done their work only too well, and had breached the railway lines more than was necessary. Re-



THE BUTTERFLY: Designed by Prof. Wagner of Junkers, this radio-guided anti-aircraft rocket projectile is said to exceed 600 m.p.h., have a ceiling of 50,000ft. and a range of 20 miles. It is known as the Schmetterling (Butterfly) and was about ready to go into mass production.

pairing broken bridges when the rivers are swollen by monsoon floods is naturally difficult work for the R.E., and as the 14th Army has advanced it has naturally needed to get the railways into working order again.

For the last week or so the Japanese have been making a determined effort to extricate the remains of their Army from Lower Burma. They have to infiltrate through our line of strong posts to reach the Sitang river, which itself is running fiercely, swelled by

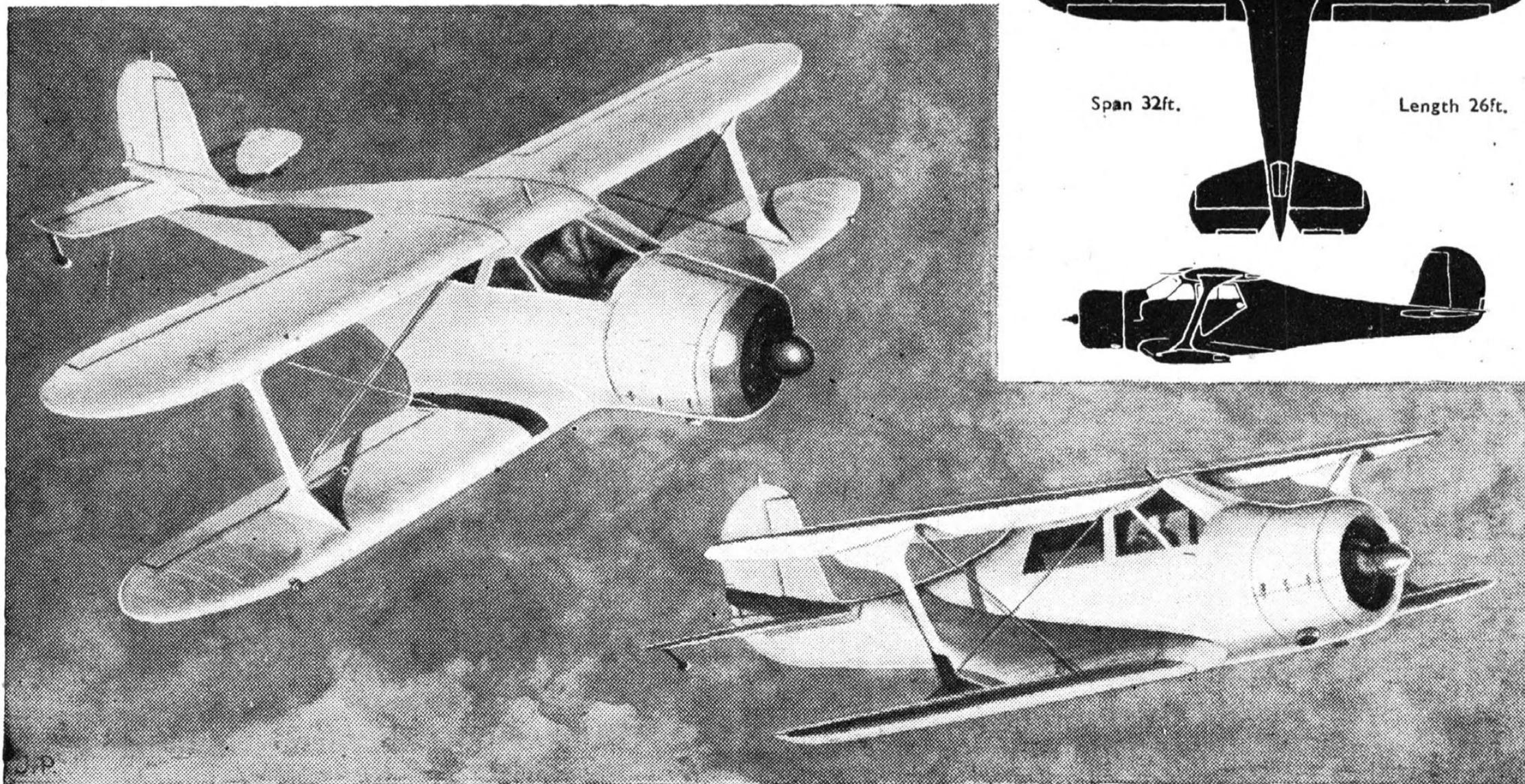
the monsoon rains, and even if parties reach it the problem of crossing it remains. Our aircraft may be trusted to make the operation as difficult and as sanguinary as possible for the weary enemy. The pilots are having a most trying time in flying through the rain clouds; and lately the battle-supply squadrons have taken on the additional job of dropping food to remote Burmese villages.

Spitfires have now landed at an airfield near Balikpapan in south Borneo.

Beechcraft UC-43 "Traveller"

THERE are several sub-types of the Beechcraft "Traveller," depending on the type of engine fitted. A typical example has the 450 h.p. Pratt and Whitney Wasp-Junior, giving a cruising speed of 202 m.p.h., at which the range is 700 miles. The UC-43 is

mainly used as a personnel transport for executive officers in the U.S., and military air attaches abroad, and accommodates three or four passengers in addition to the pilot. Two versions, the GB-1 and GB-2, are also used for similar functions by the U.S. Navy.



HERE AND THERE

S'cuse, Pleees!

THE Japanese News Agency (quoted by Reuter) recently announced that firebomb cases dropped on Tokyo are to be turned into shovels and frying-pans. Out of the flying can into the fryer!

Germans' Uranium Bomb

A FURTHER disclosure on what might have happened to us had the war gone on for another six months came from Wing. Cdr. A. G. Pither, of the R.A.A.F., in a recent broadcast from Melbourne.

Had they been given this extra period in which to perfect it, he said, the Germans would have used a uranium disintegrating bomb many times more destructive than the V.2. A 24lb. uranium bomb, explained the Wing. Cdr., has a destructive force equal to that of the one ton explosive charge of the V.2.

Or Would You Rather be a Mule?

SEVEN mules were recently dropped by parachute from an R.A.F. Dakota to troops in Burma. Still most useful in this country for carrying supplies up to the front line, these experimental drops have shown that mule casualties can be replaced quickly by air, and the pioneer seven are now reported to sport parachutists' wings on the brow bands of their head collars.

Mules are, until thoroughly trained, decidedly allergic to aircraft; so much so that the men who persuade them aboard have to train for the job, too.

Britain Leads

MAJOR H. P. KILNER, deputy-president of the S.B.A.C., who opened the exhibition of paintings of British aircraft by British war artists, arranged by the Society in the Rootes building, Piccadilly, said that civil airliners Britain was now building would be "far ahead of anything in use in the world to-day."



TOP-NOTCHERS: As recorded in last week's issue of *Flight*, Marshal of the R.A.F. Sir Charles Portal recently paid a visit to the "Britain's Aircraft" exhibition in Oxford St., London. As Chief of Air Staff, he has no doubt seen a Centaurus before, but a sectioned, working show model with Perspex cowling and spinner, is of particular interest.

"The science of aeronautics and aircraft design has proceeded very rapidly of late, and we shall be able to take advantage of this," he said.

"Two important air transports which have done their test flights," Major Kilner added, "have shown exactly what was expected of them, and there is every prospect of their being in production before the end of the current year." He was, presumably, referring to the Tudor and the Viking.

On Every Horizon

"WE want an air force big enough and strong enough to forbid aggression; we must see that we are not content with a mere quota," said the Duke of Sutherland, president of the Air League of the British Empire at the annual meeting in London last week.

They wanted British air power, he said, to be a massive bulwark for our defence. "We do not want air disarmament of the 1922 kind as our reward for joining with the United Nations to guarantee the peace of the world."

"We want to see British aircraft on every horizon," proclaimed the Duke.

The Earl of Harewood accepted the presidency of the League for the ensuing year.

A Record?

NEW YORK RADIO, quoted by Reuter, last week reported that a B-17 Flying Fortress had reached an altitude of 43,499ft. (nearly 11 miles).

This is claimed to be a record for a four-engined aircraft, but at the time of writing no details of the aircraft or the flight are to hand beyond the statement that the Fortress remained at over 40,000ft. for a period of 2 hr. 21 min.

Westwards to the East!

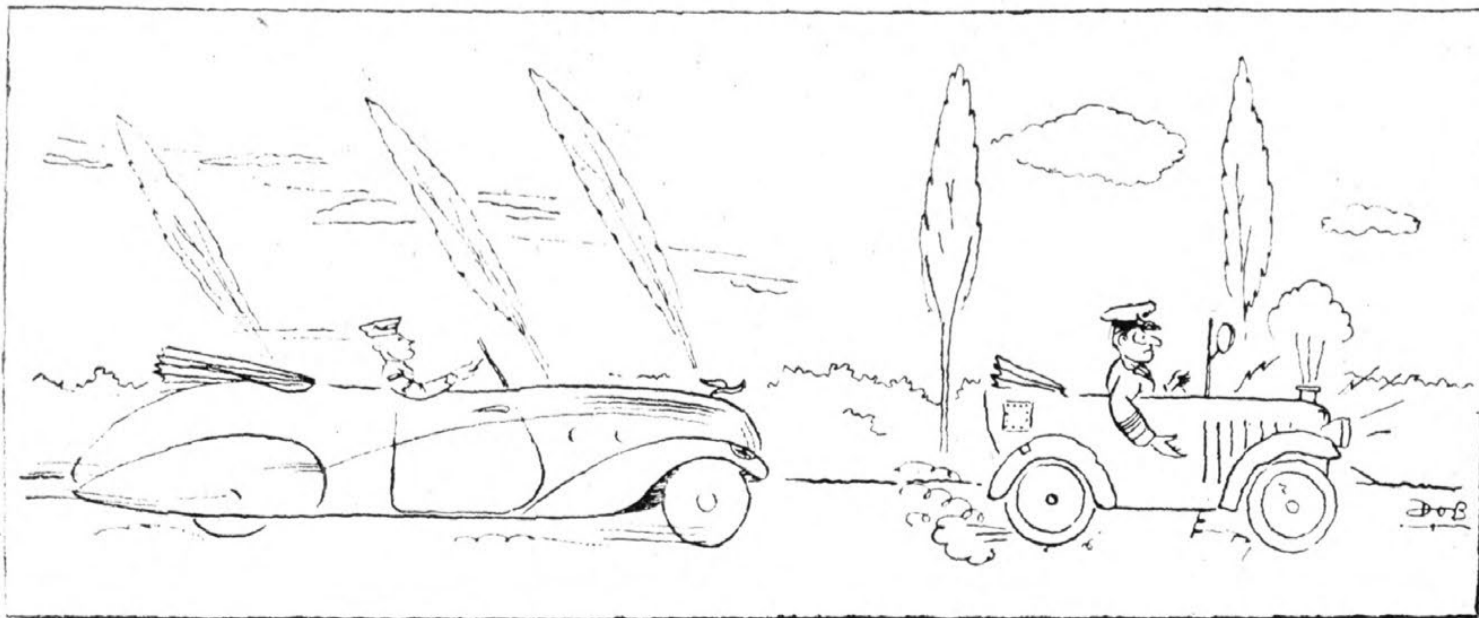
THE last of the 2,118 heavy bombers—Fortresses and Liberators—of the U.S. Eighth Air Force left Britain recently for America, carrying westwards over the Atlantic the last contingent of that famous Force's 41,500 personnel.

The entire undertaking of transferring the men and machines of the "Eighth" back to their native airfields was completed in 51 days, and, curiously enough, they will ultimately fly still farther west across the States to take part in operations in the Far East!

Tribute to Chennault

CHUNGKING newspapers paid a well-deserved tribute last week to Maj. Gen. Claire Chennault, commander of the U.S. 14th Air Force in China, who is now to retire from active service.

"We shall never forget how Gen. Chennault protected countless lives and properties in China, reduced casualties among Chinese troops, and laid the foundation of final victory," said the *Central Daily News*. "Even a golden



Back to "basic" principles.

HERE AND THERE

statue would be inadequate as a memorial to his contribution to China's war resistance."

Chennault, who pointed out that he "retired for health reasons eight years ago," took the famous "Flying Tigers" to help the Chinese before the 14th Air Force was actually formed. Moreover, their early type P-40 Tomahawks were so outmatched by the more nimble Jap Zeros that Chennault had to warn his pilots, "Unless you are three-to-one against a Zero you are outnumbered!"

U.S. June Production

MR. J. A. KRUG, chairman of the U.S. War Production Board, said recently that only 5,794 of the 6,022 aircraft called for in the June schedule had been delivered, a deficit of 228.

This fall behind schedule was in spite of the fact that two companies building B-29 Superfortresses had actually exceeded their quota. The industry, Mr. Krug believed, would find a way of eliminating the factors that adversely affected production.

Death of Sir Edward Campbell

FLIGHT regrets to hear of the sudden death of Sir Edward T. Campbell, late M.P. for Bromley. He was for many years Parliamentary Private Secretary to the late Sir Kingsley Wood. The latter was Secretary for Air at the important time of the expansion of the R.A.F. before the outbreak of war.

During this period Sir Edward attended most of the Air Ministry Press Conferences, and made friends with many of the air correspondents. He also often accompanied them on facility visits to R.A.F. stations, and was most helpful to them in many ways.

Enemy Agents?

THE death of Mr. A. J. Sikora, Wright's chief plant engineer, is thought by officials of that company to be the work of enemy agents, according to a Reuter report last week.

Mr. Sikora left the Wright premises in Cincinnati "with plans concerning B-29 production which would have far-reaching effects on the Japanese war, and would be just the kind of information the enemy would find of tremendous value." He later met his death by a fall from the twentieth floor of a Chicago hotel.

But the police did not disclose if any plans were found in his room.

Foretaste

THE end of hostilities in Europe has enabled A.T.C. cadets to enjoy the benefit (not to mention the thrill) of more extensive flying activities and, for lucky members of No. 256 Battersea Squadron last week, under much more realistic conditions.

Eighteen members of this squadron, some of them only 15½ years old, took part in a mock bombing operation in which they flew out over the Continent before coming in to "raid" a target in the West of England by the light of marker flares and against fighter "opposition."

Altogether they were airborne for seven hours and landed back at base at 5 a.m.—to enjoy an "operational" breakfast, of course!



HOME AGAIN: Men of the U.S. 1st Division disembarking from a Skymaster at Presque Isle Airport, Maine, after being flown from near Paris in the 50,000-a-month troop movement from Europe. The homeward flight from Europe is completed within 24 hours.

News in Brief

BETWEEN 1942 and 1945 the U.S. Navy has increased its number of first line aircraft carriers from four to 26, and has also built up a fleet of 65 escort carriers.

Two 45,000-ton aircraft carriers of a new class and known as battle carriers were recently launched by the U.S. Navy. They are officially described as "the most formidable vessels of their type afloat."

The Air Ministry announced last week that search for the Liberator missing since it left Montreal on July 3rd with Government officials from the San Francisco Conference had been abandoned. No trace of it, or its occupants, had been found.

£250 is the announced purchase-price of a single-seater "sport plane" called the Skyhopper to be marketed by Aviation Boosters Inc., Kansas City. It is said to cruise at 110 m.p.h., take-off in 400ft., and climb at 750 ft./min.

At the request of Lord McGowan, the Minister of Aircraft Production has agreed to release Mr. E. M. Frazer, director-general of aircraft production, from his official duties. Mr. Frazer left I.C.I. in July, 1939, to go to the War Office and went to M.A.P. in 1942.

The U.S. Office of War Information has just released for publication the text of a series of letters presented at a hearing before the Kilgore sub-committee of the Senate Military Affairs Committee by Mr. Orvis A. Schmidt, Director of Foreign Funds Control, U.S. Treasury Dept. These exhibits (presumably captured in Germany) were presented as evidence of the manner in which the firm of I.G. Farben assisted the German Wehrmacht in foreign espionage.

An article describing how three A-20 Havocs were used to spray mosquito-infested marshes and ponds in Italy, which appeared in a recent issue of *Douglas Airview*, had the heading "The Real Mosquito Bombers." Such, indeed, is fame!

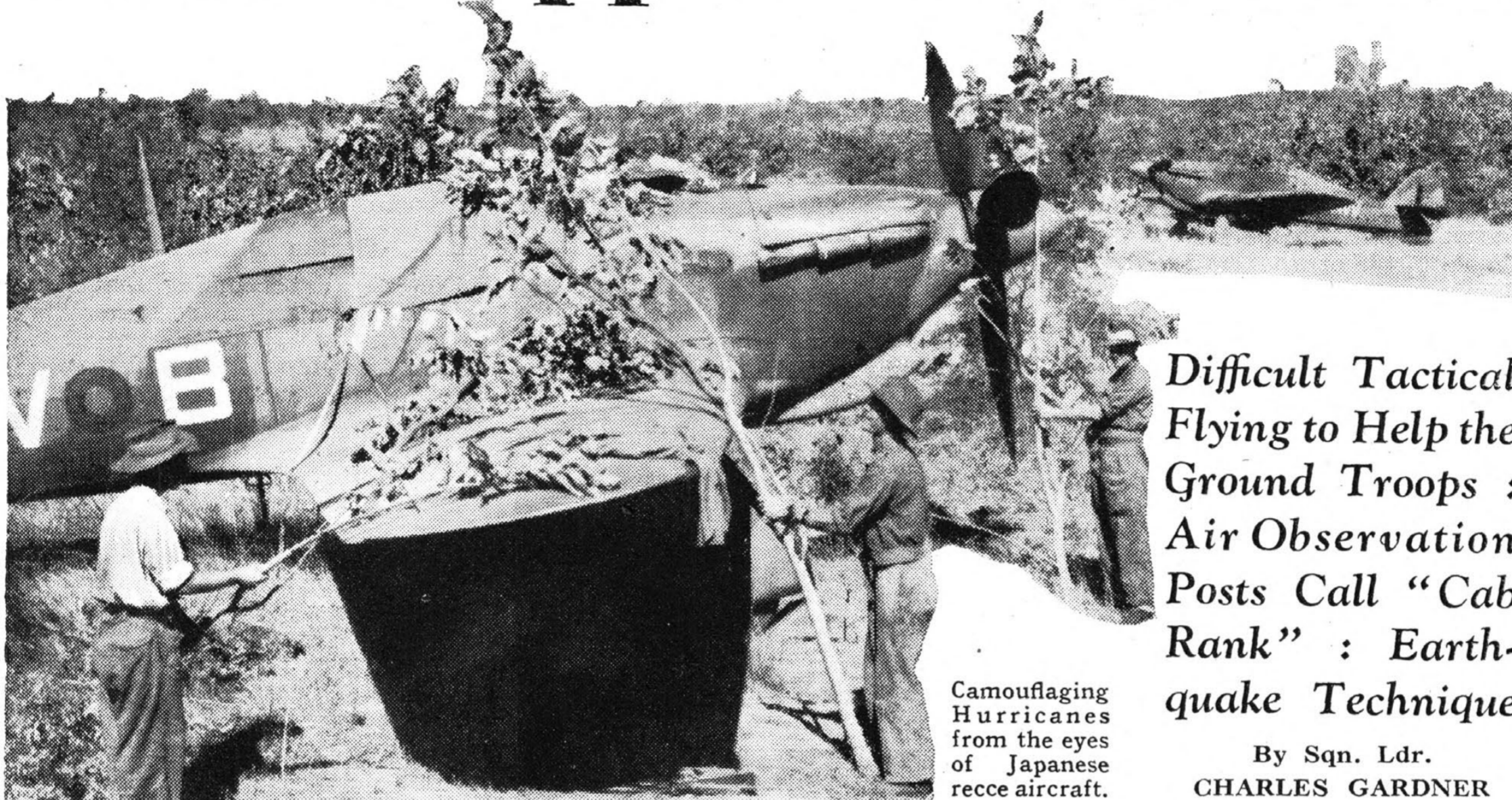
Japanese propaganda experts have explained the lack of opposition to the current Allied onslaughts on their home islands as "a strategic waiting game," and Mr. Robert Patterson, the U.S. Under-Secretary for War, has also stated that the Japs have plenty of aircraft but are saving them up, presumably for the actual invasion.

A booklet is being issued to all members of the United Steel Companies, Ltd., now serving in the Forces or the Merchant Navy, which not only welcomes them back on their release, but tells them exactly what is being done to reinstate them in suitable posts. A complete organisation has been set up for this purpose, and the booklet is headed "Passport to Peace." Incidentally, this reinstatement and rehabilitation plan was drawn up long before legislation on the subject was introduced.

Mr. T. Frazer, a director of Metropolitan-Vickers Electrical Co., Ltd., has been appointed to the board of Hunting Aviation, Ltd. He is vice-president and past chairman of the Institute of Production Engineers, and past president of its Manchester section.

Mr. C. G. Vokes was elected president of the British Society of Associated Filter Manufacturers when this society held its inaugural meeting recently. Mr. R. F. Brooker was elected vice-president, and the following were elected to the council: Capt. C. C. Barker, Mr. W. B. Bentley, Mr. R. R. Houston, Mr. E. L. Joseph, and Mr. S. C. Toye.

Close Support in Burma



Camouflaging Hurricanes from the eyes of Japanese recon aircraft.

Difficult Tactical Flying to Help the Ground Troops : Air Observation Posts Call "Cab Rank" : Earthquake Technique

By Sqn. Ldr.
CHARLES GARDNER

WHEN Air Marshal Sir Keith Park took over the job of chief airman in South East Asia Command one of his first jobs was to go on a tour of his 800-mile front. After he came back to his headquarters in Kandy the Air Marshal said, "During this war I've seen close air support for the army in a number of places, but I don't think I've ever seen anything so good as the show being put on in Burma."

Close air support has indeed been developed to a very high standard in the 14th Army area. In the later stages of the Burma campaign it is, I think, true to say that the Air Force and the Army came closer to being one coherent war machine than at any other time in R.A.F. history. With the exception of certain heavy bomber raids, every sortie of what was then Eastern Air Command was made to further the land effort.

The two actual groups—221 under Air Vice-Marshal Vincent* and 224 under Air Vice-Marshal the Earl of Bandon—were entirely concerned with close support. Their Beaufighter and Mosquito Squadrons were shooting up the enemy lines of communication behind the battle front. Outside the groups the P.R.U. was surveying potential airheads for the army and watching Jap movement; while many of the strategic Air Force missions were devoted to the railways running to and from the enemy front. Eastern Air Command was, in fact, the first command to use its heavies tactically. During the siege of Imphal in the spring of 1944, Liberators and Wellingtons were switched in strength on to Jap positions along the Tiddim road. Deft use of 1,000-pound bombs produced artificial landslides on the monsoon-soaked hills and blocked enemy movement. Admittedly this use of the heavies was at a time of crisis—but, since then, they have been dovetailed into the close-support pattern more or less as a "standing dish."

There are, of course, very few strategic targets, as we know them, out in South East Asia. The docks at Bangkok and Singapore are about the only examples—and even they have something of a tactical tang about them. It is not surprising, therefore, that this concentrated all-in tactical air support, accorded to the S.E.A.C. land war, has been of

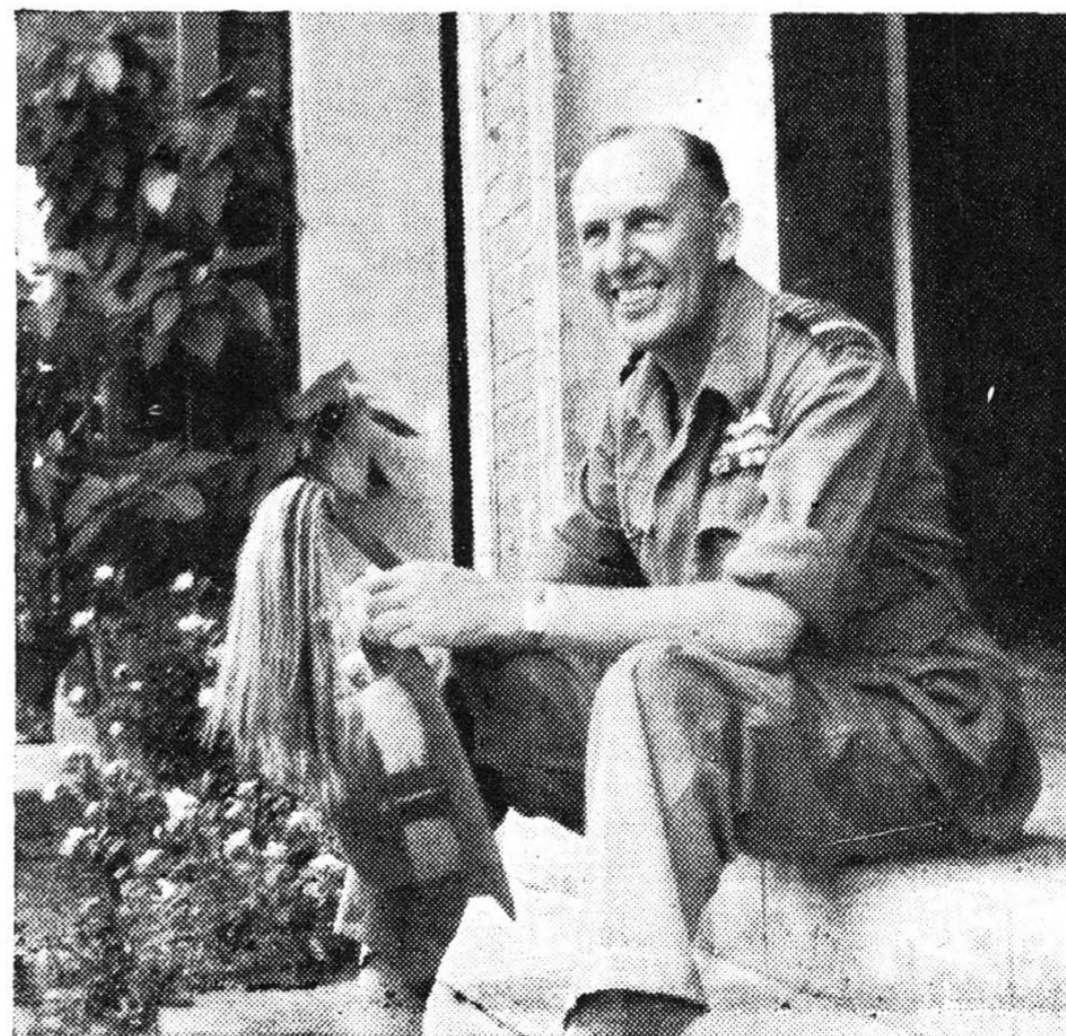
*Since this article was written the appointment of A.V.-M. C. A. BOUCHIER to succeed A.V.-M. Vincent has been announced.

Air Vice-Marshal S. F. Vincent, D.F.C., A.F.C., who for a long while commanded No. 221 Group in Burma.

such a standard as to deserve the title "war winning." There is a story that the only time there was major disagreement between the Army and the Air Force in Burma was when an Air Staff Officer of 221 Group said within the hearing of an Army Liaison Officer from 224 Group that "221 are the only people who really know the close support business."

Air/Land Integration

This air-land integration in S.E.A.C. starts right at the top and comes down through both services. The "Supremo"—Admiral Mountbatten—thinks in terms of "combined-ops" all the time. General Slim and Air Vice-Marshal Vincent share the same H.Q. and live in the same mess. General Christison of 15th Corps and Air Vice-Marshal the Earl of Bandon also share an H.Q. and attend a joint Navy-Army-Air "morning prayers." The Earl of Bandon, when in London on leave recently, himself stressed the three-service amity of S.E.A.C. His own contribution



CLOSE SUPPORT IN BURMA

to it has been large—and all those who have seen the General and the A.O.C. setting out on their walking conferences together, will agree that 15 Corps and 224 Group march as one.

General Slim, G.O.C. of the 14th Army, wouldn't thank anyone for calling him "air-minded." He regards air and land all as part of the continuum of war, and he is outspoken about anyone who makes a special virtue of what he regards as a simple military axiom. Coming down the scale, the same close-weaving of the two Forces is found at divisional, brigade and company H.Q.s, at Group, at Wing, and at Squadron.

Many forward positions of the Army have attached to them a V.C.P. (Visual Control Post) manned by Army and Air Force officers. This V.C.P. directs close support attacks by R/T; and is one of the favourite "operational rest" occupations of the S.E.A.C. pilots. In this case the change must be as good as the rest—no one can call a V.C.P. a quiet job. At the squadrons there are always A.L.O.s (Army Liaison Officers) who do most of the pilot briefing, while there are R.A.F. liaison officers dotted about as specialist advisers with each 14th Army division. As well as this official interweaving, there is a lot of unofficial liaison. Parties of pilots spend a few days with the Army, and the technical problems of pinpoint support are thrashed out by the junior officers of both services whose lot it is to carry out those tactical orders which come from "on high." Many "snags" of armament and method of attack and approach have been ironed out by these forward unit "get togethers"—and in many places the friendliest basis is in operation between Army V.C.P.s and the pilots they are directing by R/T.

Standard of Co-operation

It is not surprising, therefore, that, in such an atmosphere, R.A.F. Burma claims to have reached an "All time high" in Army-co-op. They say out there that if a higher standard is ever reached it will be 221 and 224 Groups that reach it. The aircraft on the job have been, in the main, Vengeances, Hurribombers, Spitfires and Thunderbolts. The Vengeances, about which *Flight* had an article the other week, are now "out"—but they did a grand job at a critical time. The Hurribombers are on their way out—but if and when they do go, there will be a pang of regret through the command. The Hurribomber always was a gentleman's aircraft, and it has been manoeuvrable, accurate and easy to maintain throughout its jungle career.

The "T-bolts" are now gaining favour in the eyes of the men who fly them. At first they weren't too popular, and petrol vent trouble made them less so. Also they meant conversion courses, and it is in the nature of things to object to change when one is quite happy with the existing equip-

ment. The position was summed up by the commander of a "T-bolt" wing who said, "Nobody likes the Thunderbolt until he's flown it—then he does." I myself have spoken to ex-Hurribomber pilots now on T-bolts, who say they wouldn't change back—especially after flying them on ops.

Spitfires, Mustangs, Mosquitos, Beaufighters, Lightnings, Liberators and Wimpeys have, as I have said, all played their part in close support. But the main tactical duties during the Burma advance were shouldered by the Thunderbolts and Hurribombers.

Strike Timetable

The pinpoint bombing that these squadrons have done compares very well with the work in Europe of the special Mosquito sorties which coped with No. 10 Hitlerstrasse in some town or other while leaving numbers 8 and 12 untouched.

A typical routine and timetable for a strafe on a pinpoint target during the big advance was this:—

11.00: Our ground troops held up by Japs in a chaung (gully).
11.02: Div. (or Brigade) H.Q. informed—with full details of position of our troops—position of Japs and suggested treatment and "time on target" (say 12.15).

11.04: Div. H.Q. request R.A.F. Group Combined Ops. Room for a strike. Group decides from the task and situation board which wing can accept the strike and at what time the aircraft will be on target.

(N.B.—There were very few refusals, and the time was usually that originally suggested by the Army.) The chosen wing notified and wing details a squadron.

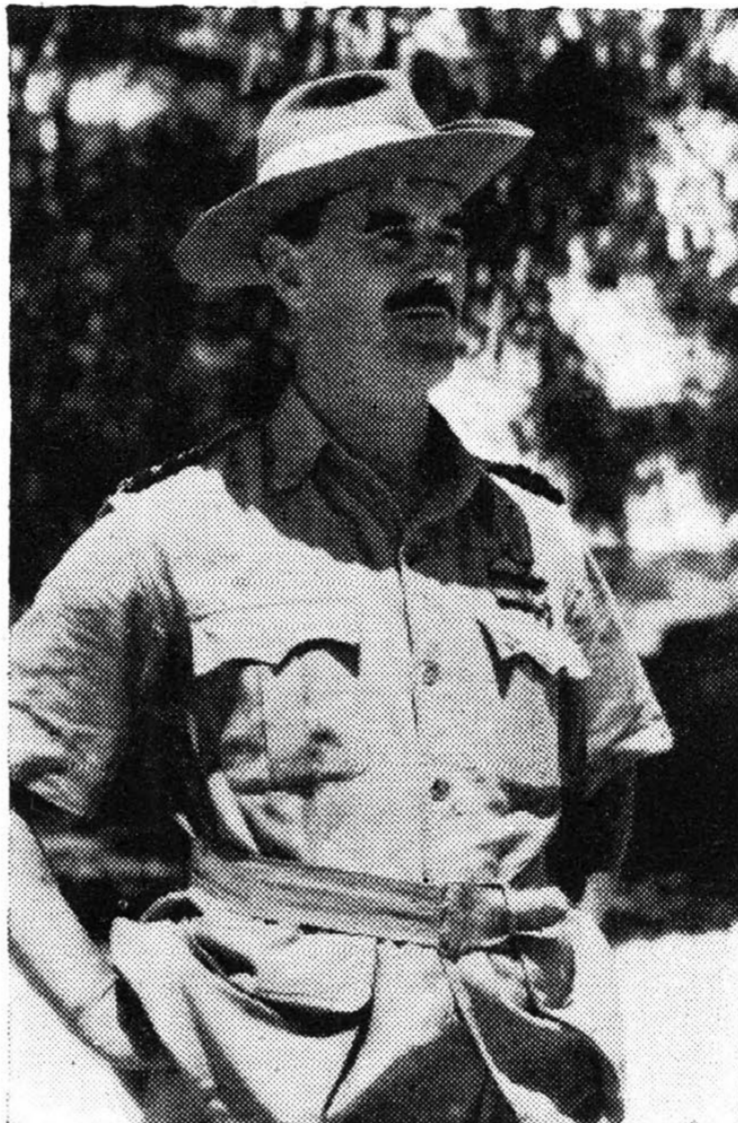
11.10: A.L.O. at chosen squadron briefed.

11.15: Stand by squadron briefed by A.L.O. Time of take-off fixed; target described; direction of attacks laid down, armament to be used decided; call-sign of the V.C.P. issued, and pilots told by what route to "escape" if shot down.

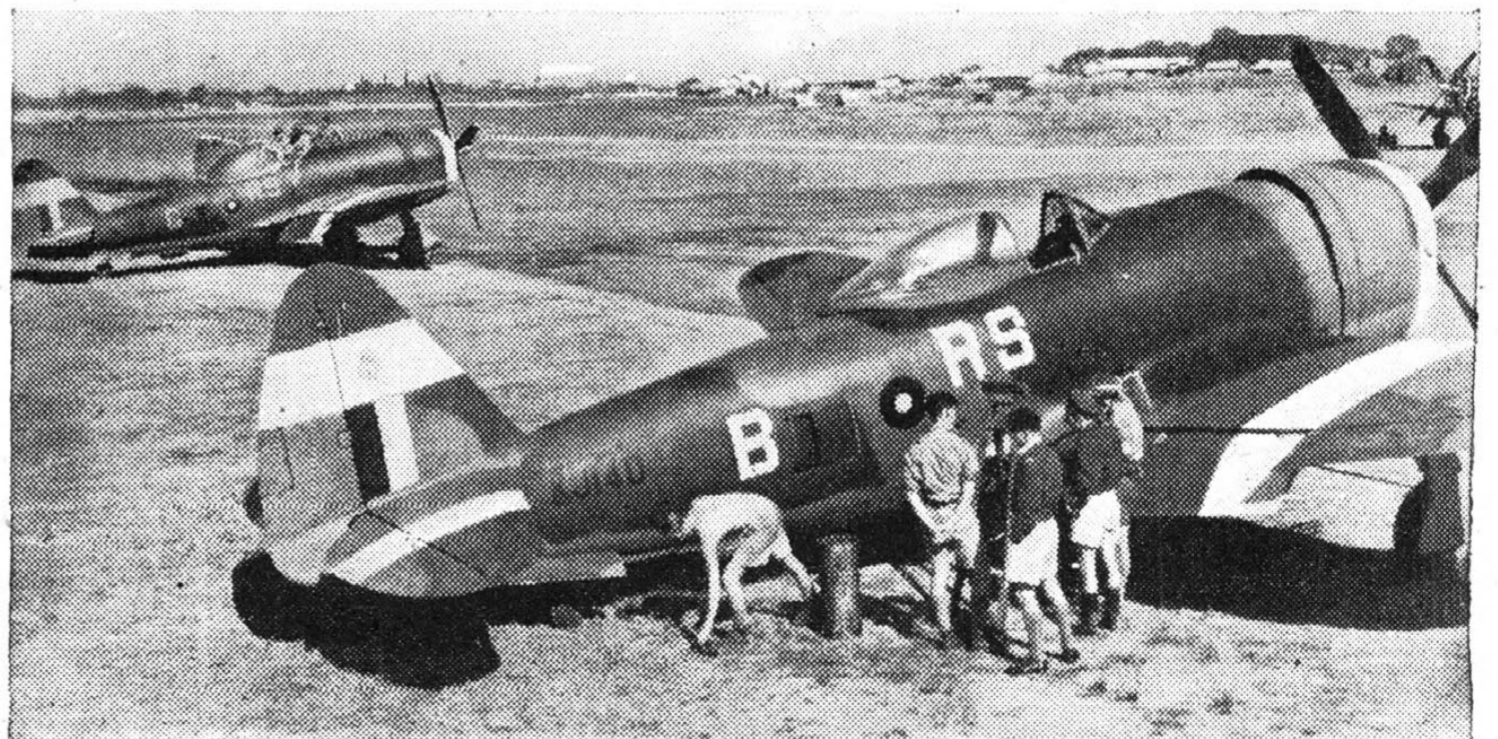
11.40: Squadron (or, if small job, flight) takes off. Forward troops notified of time on target.

12.15: Strike carried out under R/T. control from V.C.P.

In the days of the jungle war the elapsed time between request and strike was fantastically low—sometimes at Imphal it came down to five or ten minutes, as many of the targets were almost "on the circuit" of our own airfields. Then, as the 14th advanced on to the Burma plain the time lag naturally lengthened. The R.A.F. and R.I.A.F. squadrons cut this factor down as much as



Air Vice-Marshal the Earl of Bandon, D.S.O., who commands No. 224 Group in Burma.



R.A.F. Thunderbolts being serviced on a forward airstrip on the Arakan front.

possible by hopping to forward airfields and returning to main base at night. The average time elapsed between urgent request and the actual strike was in the region of 30 to 40 minutes for a "short haul" job and an hour to 90 minutes for a "long haul" one.

These times were, of course, reduced to almost nothing when the "cab rank" method was put into operation. The "cab rank" is the usual standing patrol of up to a dozen aircraft, orbiting a given spot near a battle. These aircraft can be called in on any objective by R/T in pairs—flights—or all at once. All aircraft which have expended their bombs

are replaced at set intervals by rearmed machines.

No. 221 Group used the cab rank principle more than No. 224 Group—in particular at the battle of Meiktila. There are advantages and disadvantages in the scheme—the main disadvantage being overall wastefulness of engine hours and the limitation on the weight of any given attack. The maximum weight can only be that of the total number of aircraft in the rank, and this sometimes may be insufficient. It is held by some that it is better to lose an hour and lay on a two- or three-squadron show, than to do an "immediate" but smaller strike from the rank. Obviously there are times when both methods have their advantages—and both systems were used consistently.

The latest development of the V.C.P. is to carry it in an aircraft—especially when there is a "cab rank" in operation. The aircraft normally used for the job is the little L.5, piloted by an R.A.F. officer with an Army officer as air observer. The airborne V.C.P. works from a strip near Brigade Headquarters and takes off at the request of forward battalions to help them in locating Japanese objectives, such as mortars or guns. It has been found that an air observer using binoculars from the slow-moving L.5 has no difficulty in locating such enemy positions. The strike on these objectives is laid on in the normal way, but is controlled by the Army officer in the observer aircraft.

In the earlier days one of the big close-support problems was that of the jungle itself. An order to bomb a given blade of grass in a 10-acre field bears a reasonable comparison with some of the tasks handed out in the Tiddim Road and Imphal areas. The V.C.P. principle narrowed the target area down—but even then—with an unbroken carpet of green underneath—it was, at times, impossible to see movement. The Vengeances and Hurribombers, which were the main equipment of the time, managed to cope extremely well. The Vengeances used steep dives down to about 2,000 feet and the Hurribombers shallow dives to 500 feet, or sometimes less.

Impact and D.A. Bombs

The advantage of the Vengeance, with its dive brakes and steep angle of attack, was that 250-pounders dropped from it stood a good chance of "sticking" where they dropped. In any case impact explosion could be used with a 2,000-foot pull out. The problem of "bouncing bombs" was no mean one—especially in dry weather. Various methods were used to ensure accuracy, especially from the flatter Hurribomber strafes. Impact explosion would, of course, have solved the whole thing—but that had to be ruled out because of risk of blast damage to the aircraft. Eventually a skip-bombing technique was evolved. This was done with eleven-second delay bombs, dropped from as low as 100 feet (though this was sometimes risky on hard ground in case the bomb decided to return to the aircraft again). This skip-bombing would slide the bombs into the objectives (hillsides, basha huts, bridges, buildings, M/T, etc.) and the judgment of the length of skip was up to the pilot. In other words it was basically the same "Nelson's eye" technique which was used by Coastal Command for its depth charge dropping.

The first "bridge busting" in Burma was done in this way by No. 42 Hurribomber Squadron of No. 224 Group. They "bowled" their bombs in from 100 feet and were

pioneers in a technique which has since become a Burma speciality. An interesting variant of this normal bridge-busting routine was the ultra-long delay bomb used on river bridges. These bombs would be slipped into the river under the bridge at the same time as the bridge was blown by an ordinary low level strike. The idea was that the delay-bomb would go off just as the Japs were getting on nicely with the job of repairing the bridge.

Now that Thunderbolts have taken over most of the close support, they too, are working to the "low-level Nelson's eye" formula, and have achieved remarkable accuracy. The weight of

their front gun fire is a big asset during the run-in, and they carry two 550-pounders which can give hefty "artillery" support. During the 82nd West African Division's lonely advance down the Kaladan Valley in Arakan, the division dispensed with artillery, which they could not move over such rough going. They relied entirely upon 224 Group to provide the "shell-fire." This, I think, is the first example of such complete trust in air power during the war, and the trust was more than justified.

Ultra-close Support

One of the advantages of the Thunderbolt is its ability to look after itself—an ability lacking in the Vengeances and the Hurricane. Japanese air opposition has been virtually nil for the last year in SEAC, but it may not always be so, and the close-support pilots now go out with much more confidence knowing that they can hold their own in a straight fight. Talking of accuracy—it has been interesting to see the confidence the army has had in giving out its "bomb lines." Two hundred yards ahead of our own troops is now regarded as unremarkable: 30 yards was once offered and taken (by Vengeances). Fifty yards has been done several times.

The perfection of the V.C.P. has been a big help. Two examples of this were given by A.V.M. Lord Bandon at one of his conferences. He said that when one squadron was bombing some Japanese on a hill feature which the Army were about to attack, half the squadron had completed its line-astern bombing when the R.A.F. officer with the visual control post "rang-up" the squadron and said: "Last six aircraft are to cease bombing. Our troops are just starting to advance." On another occasion the V.C.P. was right forward in a jeep and the jeep was being annoyed by being fired at by some Japanese a short distance away. The V.C.P. Flt. Lt. rang up and said: "Please strafe Japanese 50 yards north of my jeep." The Japanese no longer annoyed him!

The Air Vice-Marshal also described a typical "tactic" of necessity, evolved for dealing with Jap troops on hill features.

It had been found that a normal strike put the Japs' heads down all right—but the going was so rough that our own troops could not get up to the hill-top soon enough to take advantage. Several ideas were worked out—but eventually we used H.E. or fire bombs on the Jap positions. At the same time, we had strafing aircraft going round and round the hill shooting up the troops who were sheltering on the blind-side hoping to get away with it.

For months on end during 1944-45 the tactical squadrons were flying 1,000 operational hours a month per squadron, which was almost double the normal rate expected. This could only be done because of the magnificent work by the maintenance crews, and by the whole of the maintenance organisation in India which backed them up. We were never short of aircraft, and we never had to damp down on operations through lack of serviceability. This record is the more remarkable when one remembers the conditions under which they had to work. Sometimes it was so hot that the men could hardly touch the aircraft. At other times it was so wet that they could literally sail to work in a dinghy.

Close support tactics are naturally always being modified. Two interesting innovations during the later stages of

CLOSE SUPPORT IN BURMA (CONTINUED)

CLOSE SUPPORT IN BURMA

the campaign were the "master-bomber" and the "earthquake."

The "master-bomber" business was a variant of the European technique, and was, I think, evolved by Grp. Capt. (now Air Cdre.) B. A. Chacksfield, commanding a Thunderbolt wing of 221 Group.

He used it with effect at Fort Dufferin in Mandalay, where the Thunderbolts breached the immensely thick walls of the fort.

Grp. Capt. Chacksfield flew back and forth over the target area, controlling and directing his wing by R/T. He saw that the bombs of the first few aircraft were "skipping" over the wall and likely to finish up among our own troops. Immediately he stopped the attack and switched it round, as it were, on the reciprocal. He was also in the best position to give advice on run, height and on the spot of the wall to keep hammering at. This whole attack bears a small-scale comparison to the Moehne dam sortie, and it was the cumulative effect of the bombs, all placed in one spot, which eventually breached the thick fort defences.

The "earthquake" is a combination of the heavies and the tactical aircraft. Details of it are not releasable—but the essence of the thing is first-rate timing—a blanket of all kinds of bombs, together with cannon and machine-

gun fire—all immediately preceding an army attack. Several Jap-held villages on the Irrawaddy were treated to an earthquake just prior to the 33 Corps crossings. I saw those villages afterwards and agreed the earthquake is no misnomer. This bomb blanket attack involves some nice staff work. Anyone who has had to draw up a scheme for getting different sorts of aircraft, with different flying at different airspeeds, and at different heights, on to a target within a given time will appreciate this.

The Army has been very generous in its praise for the support squadrons. Nearly every formation has many "strawberries" in its line-book—from Army, Corps, Divisional, Brigade, and Battalion commanders. Some of these strawberries have been given immediately by R/T, and once or twice the formation leader has heard the ground commander come up on the V.H.F. from the control post to give personal thanks before sending his men in.

The technique of close support in S.E.A.C. will doubtless continue to be modified and to progress with the campaign. The Thunderbolt, supported by the Mosquito, is now the backbone of the day-to-day work, and will probably continue so to be. The weight of front gun fire is very important, and both these aircraft can pour out a good rate of fire to discourage enemy ground gunners from being too offensively defensive.

The next phase of S.E.A.C.'s war will undoubtedly propose some interesting new problems for solution. There is equally no doubt that 224 and 221 Groups will solve them.

SIR F. BOWHILL'S NEW POST

THE announcement that Air Chief Marshal Sir Frederick Bowhill, G.B.E., K.C.B., C.M.G., D.S.O. (and Bar), has been appointed U.K. representative with the Provisional International Civil Aviation Organisation at Montreal induces us to look back at one of the most unique careers and achievements of any of the men who have held high command in the recent war.

Sir Frederick Bowhill was educated in the training ship H.M.S. *Worcester*, which has provided the Royal Navy with so many distinguished officers, and his earliest ambition was to get a commission in the Navy. He failed by three marks to pass into the cadet ship H.M.S. *Britannia*, being just beaten by the future Admiral Sir Edward Evans (of the *Broke*). So Bowhill



went to sea in the Merchant Navy for 17 years, rose to be chief officer in the P. & O. line, and was commissioned in the Royal Naval Reserve.

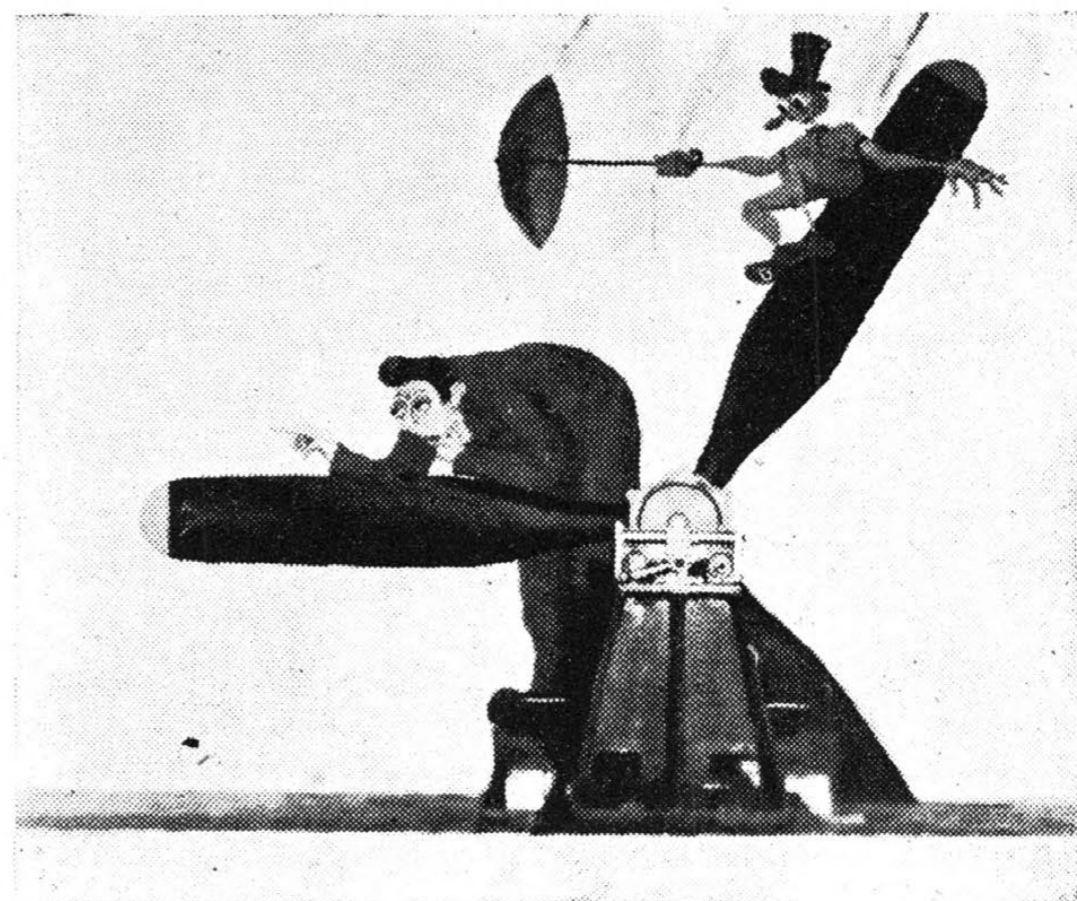
At the age of 32 he learnt to fly, and then the Admiralty granted him a commission in the Royal Navy. His work was not confined to flying, and in 1914 he was given command of the seaplane carrier H.M.S. *Engadine*, which he commanded during the raid on Cuxhaven on Christmas Day. On the way back something went wrong with his ship, and he was attacked by a low-flying Zeppelin. He drove it off with rifle fire, and so damaged it that it never flew again. Later in the war he was one of the pilots who dropped food and ammunition to the British force besieged in Kut. Then he commanded the R.N.A.S. detachment in General Smuts' East African campaign.

After the Armistice Bowhill (then a Wing Commander, R.A.F.) was chief of staff to the air contingent which played the chief part in routing the Mad Mullah of Somaliland.

In 1937 he was appointed A.O.C.-in-C., Coastal Command, and held that post until after the sinking of the *Bismarck* in May, 1941. It was a Coastal Command Catalina which picked up the German ship after touch had been lost for a good many hours. At the outbreak of war the Command had only 171 aircraft, some of them of obsoles-

cent type. Bowhill laid the foundations of the later magnificent widespread operations of the Command, which played so large a part in winning the Battle of the Atlantic. In 1941 Bowhill was transferred from Coastal Command and sent to America, where he developed the Atlantic bomber ferry, which in time grew into R.A.F. Transport Command. Naturally Bowhill became the first A.O.C.-in-C. of that Command. It has done remarkable work, but its story has been told before, and need not be repeated here.

Air Chief Marshal Bowhill might well be called the ideal combination of sailor and airman, and no doubt he will do more good work in helping to spread British air transport across the oceans of the world.



THE "PROP" GREMLIN: A new branch of the notorious family discovered by Wing Cdr. J. M. West ("Jock" West, of Motorcycle T.T. fame) who commands No. 151 F.R.U. "Jock" made this valuable addition to our entomological knowledge whilst engaged in balancing airscrews.

Europe's Air Transport

Expansion of Network : Lessons from the Past : Glance into the Future : The Need for Planning

By VICTOR L. GRUBERG

ALTHOUGH the pattern of air routes shown on the accompanying map is not a set arrangement likely to be rigidly adhered to in the future, it is an indication of the desires and plans advanced by different nations for the re-establishment of their air services. The routes indicated are based on proposals submitted by 17 nations to the International Conference at Chicago, and, needless to say, a considerable amount of research and planning have gone into their preparation.

In this sense the network suggested is not a mere speculation, but rather reflects the needs of the nations, and allows a pre-view of Europe's future air transport development.

The absence of British and Commonwealth proposals is due to the well-known different scheme with which the British Commonwealth came to the conference. Russia's plans for the operation of any international routes have not, as yet, been made public.

From a superficial glance at the map, it might appear that as a whole the proposed network shows a considerable intensification of routes over Europe. But in the light of achievements of air transport mobilised for war, one is frequently apt to overlook the fact that even before 1939 European air transport featured a closely woven pattern of routes.

Europe is the focal zone of an economically highly active area in which 18.4 per cent. of the world's population and an overwhelming part of its industrial activity are concentrated. Over 60,000,000 Europeans live in cities of 100,000 inhabitants or over, and it is such centres that generate commerce and transport.

A feature of the proposed network is that, broadly speaking, it appears to be based more on considerations of economy than on those of prestige so popular in pre-war Europe. The highest concentration of routes and services coincides, of course, with industrial concentration, and overseas branches radiate in the general direction of national trade interests. European nations engaged in air transport recognised long ago that the internal Continental system cannot remain the final goal, but that its true function is to be the feeder and distributor of a wider, inter-Continental network.

Transatlantic Operations

If the proposed network thus displays traditional features, it also embraces a number of innovations. The most striking of them is the increase in transatlantic operations proposed by European operators. This is partially due to the experience accumulated in transatlantic services during the war, the development of suitable aircraft types and to the increased interest in trade relations with America.

The pre-war transatlantic surface transport (the airborne volume was negligible) was primarily operated by American, British, Dutch, German and Swedish interests. All European shipping nations now display a keen interest in transatlantic air transport, and propose to secure a share in this traffic. A contributory factor in these plans is the desire to secure the much-needed dollar currency. Before the war, U.S. residents accounted for some 70 per cent. of the total passenger revenue on transatlantic shipping, and about 90 per cent. of this went to non-American shipping. Since about 50 per cent. of this passenger traffic was carried first and cabin class, a proportion might be diverted to air travel, and should this be secured by American-flag airlines, the flow of dollar currency into Europe would suffer a further setback.

The international air transport arena which had been cleared of German and Italian enterprise is now marked by the appearance of new operators whose activities before

the war were confined either to domestic routes or to a few small international services. Following closely in the wake of this expansion, new junctions have appeared and an increase in service of those already established. Intensification of transatlantic services, for instance, brings both Lisbon and Madrid within the orbit of the entire European and American network. No fewer than 13 routes operated by ten nations would, under the scheme, converge upon Lisbon and about the same number on Madrid. Perhaps a singular exception to the rather improved coverage is the North African coast, which shows hardly any increase in air connections compared with pre-war schedule-operated services. This is to some extent due to the absence of the two Mediterranean nations primarily interested in that region, viz., France and Italy.

On the other hand, the network of services converging upon the Middle East shows a considerable increase in route mileage to be operated by local enterprise, some of which enters the field of air transport operations for the first time. The proposed expansion of the Egyptian system, for instance, covers services to Khartoum, Jidda, Teheran, Athens and London; each of the newcomers, Lebanon, Syria and Persia, desire to span their operations over the Middle East; Turkey, who has finally come out of her shell, proposes to establish services to Afghanistan, Greece, Iraq and Czechoslovakia.

Middle-East Operators

With the absence of British and French proposals and the elimination of Italian-operated lines, only two of the pre-war European operators remain in the Middle East field, viz., Holland and Poland. But the line-up of newcomers is impressive: the U.S. propose a route from U.S., via Dakar, Cairo, Basra to Karachi; Czecho-Slovakia desires to operate via Athens, Cairo and Lydda to Baghdad; Denmark from Copenhagen to Ankara, Baghdad and Karachi; Switzerland, Sweden and Yugoslavia also propose to operate their routes to Egypt.

This expansion of routes and services to the Middle East is prompted by the growing realisation of the value of rapid communications for securing export markets.

Whether or not this increase in commercial transactions will be accompanied by an equally rapid increase in traffic remains to be seen. But there is little doubt that air transport has no equal as an instrument of export policy designed to foster and accelerate commercial relations between the European countries and the East.

Despite the overall expansion, especially in the direction of overseas routes, the proposed European system shows in the main the same anomalies which plagued it before the war.

A glance at the map will readily demonstrate the somewhat disorderly layout of routes and reveals the lack of uniform planning which at best had been confined to group consultation and tentative reciprocal arrangements. If this, then, is the prognosis of the shape of things to come, one might perhaps hope that since the situation in Europe is still very much unsettled, nothing will happen too early. For although European aviation had made important strides on the way to a better cohesion and co-operation, the lack of effectively planned and co-ordinated central guidance constantly impeded its efficiency.

With an area of 1,925,000 square miles and a population of 338,356,000, excluding U.K., Continental Europe had 34 air transport companies operating a network of 73,160 route miles in 1932. By 1938 the number of companies went down to 24, which operated 210,980 route miles, of which the U.S.S.R. alone accounted for not less than 65,865 km.

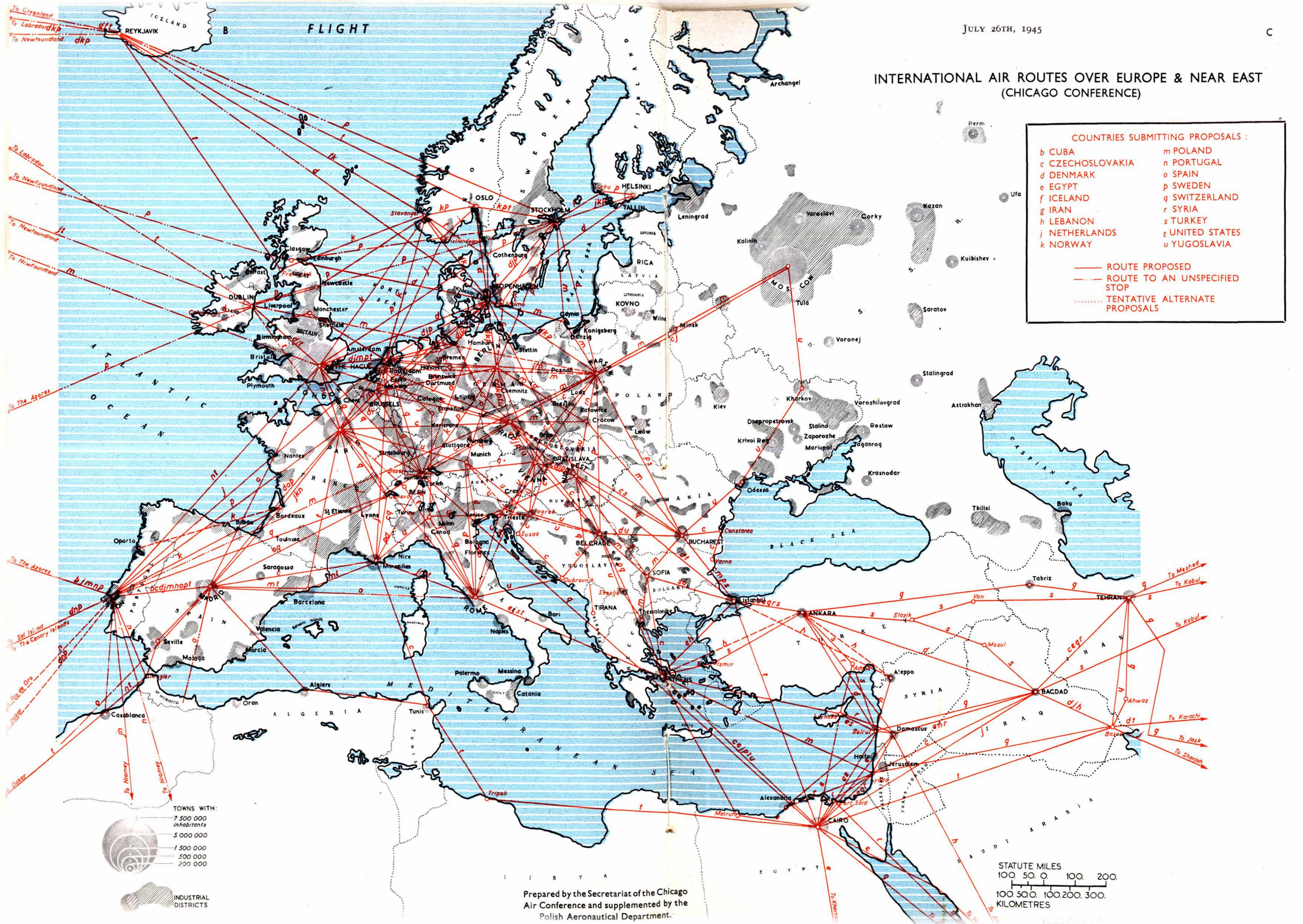
The U.S., with an area of 2,977,000 square miles and

INTERNATIONAL AIR ROUTES OVER EUROPE & NEAR EAST (CHICAGO CONFERENCE)

COUNTRIES SUBMITTING PROPOSALS :

b CUBA	m POLAND
c CZECHOSLOVAKIA	n PORTUGAL
d DENMARK	o SPAIN
e EGYPT	p SWEDEN
f ICELAND	q SWITZERLAND
g IRAN	r SYRIA
h LEBANON	s TURKEY
j NETHERLANDS	t UNITED STATES
k NORWAY	u YUGOSLAVIA

— ROUTE PROPOSED
 - - - ROUTE TO AN UNSPECIFIED STOP
 TENTATIVE ALTERNATE PROPOSALS

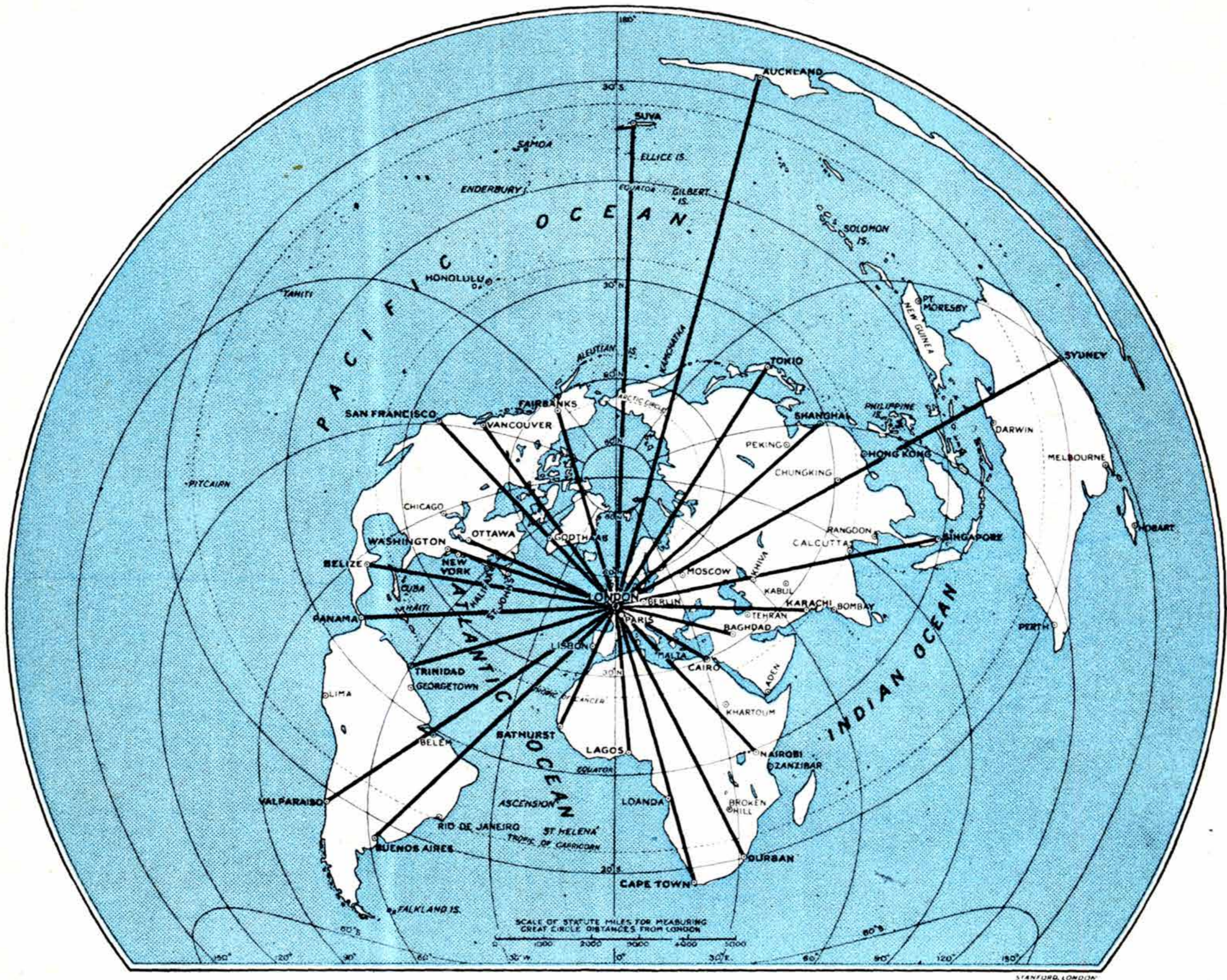


TOWNS WITH:
 7 500 000
 5 000 000
 1 500 000
 500 000
 200 000

INDUSTRIAL DISTRICTS

STATUTE MILES
 100 50 0 100 200
 100 50 0 100 200 300
 KILOMETRES

Prepared by the Secretariat of the Chicago Air Conference and supplemented by the Polish Aeronautical Department.



IN THE FOCUS: On this azimuthal equidistant projection of the world, centred on London, the shortest distances between any point on the earth's surface and London are represented by straight lines.

131,000,000 inhabitants, had, in 1933, a domestic network of 27,812 route miles, and in 1935 some 19 companies operated a route network of 28,267 miles. For each square mile of the total area there were in Europe 0.0038 route miles of network in 1932, and 0.109 in 1938; in the U.S. the figures were 0.009 miles for 1933 and 0.013 for 1940.

The traffic-density factor, or the relation between route mileage and the total of actually operated ton miles shows a much higher factor for the domestic American airlines than for the continental European system. While in Europe it was 145.3 for 1933 and 271.6 for 1937-38, for the U.S. the figures were 1,173.0 in 1935, 2,227.4 in 1938, and 3,030.0 in 1940.

Whilst this unfavourable comparison might be fairly attributed to a number of reasons, including political problems, and the wider use of night service in the U.S., the overall picture of the pre-war state of affairs might be illustrated from yet another angle. The entire network of all regular U.S. services, including foreign and territorial, in 1938, comprising 71,199 route miles, was operated with 379 aircraft which flew over 81,000,000 miles. Continental Europe's system (excluding U.K. and Russia) of 145,115 route miles utilised about 700 aircraft which flew over 46,000,000 miles.

In addition to numerous other factors, such as variations in equipment, political barriers, and all the other concomitants of unco-ordinated transport, the resulting higher utilisation-rate of equipment was responsible for the costs of air transport being considerably higher in Europe than in the U.S.

In fairness to the technical and operational side of European air transport it should be stressed that, in general,

political factors impeded the progress of efficiency more than anything else. To take a random example, travel over a territory half the size of the U.S. but split between over 20 different states was not as easy as within the boundaries of one state.

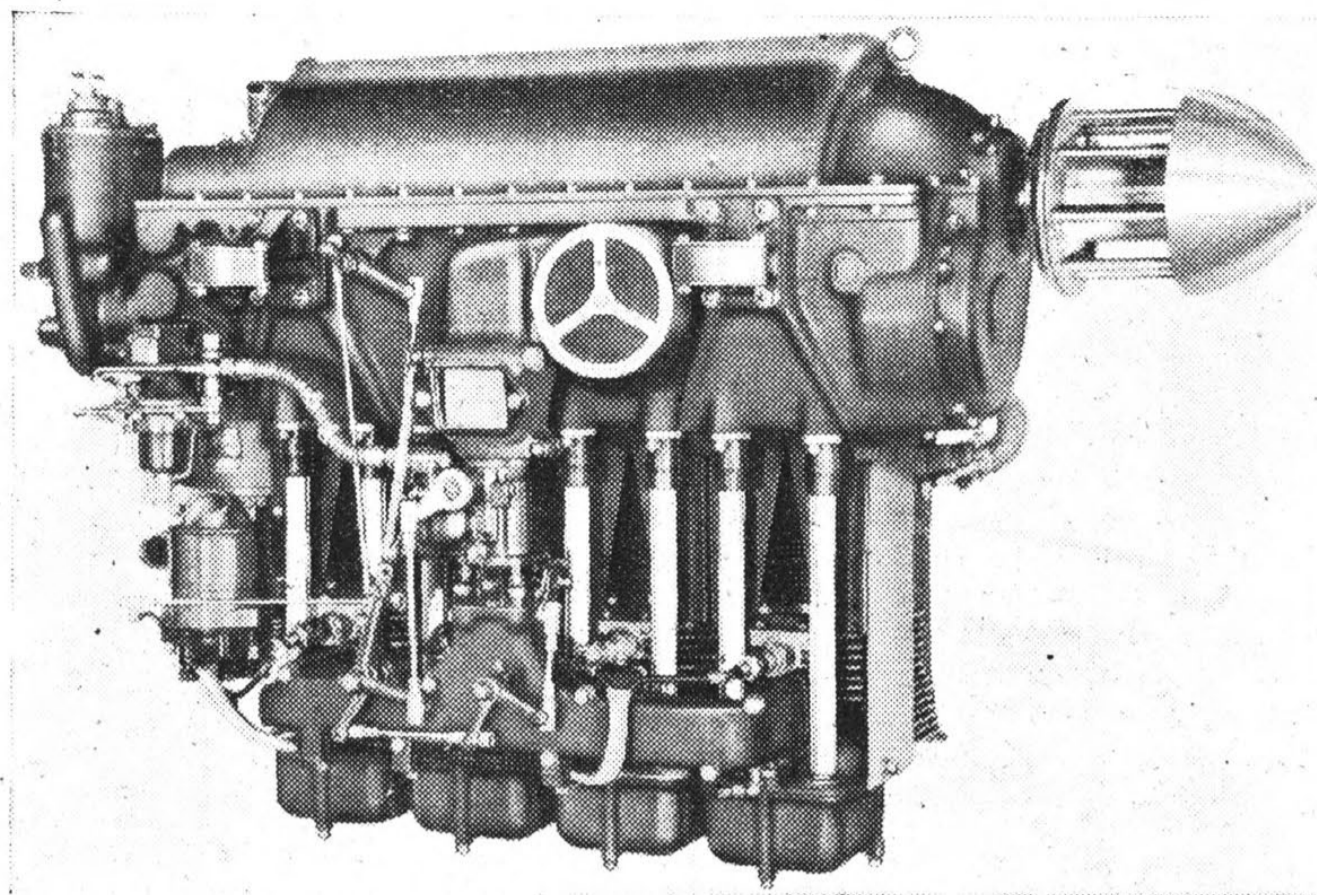
The almost complete elimination of the European aircraft industry (if only temporarily) and the almost total disappearance of commercial aircraft fleets will work against the rapid re-establishing of services.

The further stage, the reconstruction of the international services operated on a normal basis, will be conditioned by a number of factors which, if at first not too apparent, are none the less decisive. Excluding the prospect of airlines totally relying for their subsistence on tax-payers' pockets, the damage inflicted by the war to European economy, the widespread destruction of industrial equipment or its disintegration, the heavily reduced average income of the European coupled with reduced standards of life and inflatory tendencies of the cost of living—all these factors will tell heavily upon the progress of Europe's air transport.

Pregnant as the future of air transport is with possibilities of great expansion, it will also be influenced by the rate of economic recovery of European nations and their ability to regain their share in the world's trade. In face of such heavy odds it would be a short-sighted policy to start reconstruction according to yesterday's unsuccessful pattern. Europe's air transport, if it is to fulfil its role, needs its own master-plan. It needs its own authority to co-ordinate it and integrate it into a regional body. There should be no return to the inefficient *status quo ante bellum*.

Post-war Cirrus Engines

*Additions to the Cirrus
Range Providing Powers
from 90 h.p. up to 155 h.p.*



Compact neatness and clean workmanship is amply demonstrated in the new Series II model of the famous "Minor."

TO have the job of disseminating news of the advent of some new engines specifically suited for light aircraft of the privately owned and club type is a most heartening task, for it sharpens the realisation that the carefree days of flying for club members and non-Service people are once again coming our way.

Blackburn Aircraft, Ltd., the makers of Cirrus engines, announced that the current range of these engines comprises the 90 h.p. Minor Series I; the 100 h.p. Minor Series II; the 150 h.p. Major Series II, and the 155 h.p. Major Series III, all of these being air-cooled, four-cylinder, inverted in-line types.

Starting at the lowest end of the power scale, the Minor Series I is substantially the same as used by the R.A.F. in powering the Taylorcraft Auster I. This engine did, and is still doing, extremely useful work, and has proved itself very reliable under the most trying desert and tropical conditions. It is worthy of note that the Minor Series I is the smallest engine in use in the R.A.F., and the civil version of it is identical to the Service model with the exception that, unless especially ordered, the ignition screening harness is not supplied.

Main points of difference between the Minor Series I and Series II are as under:—

- (i) Cylinder bore of Series II is slightly increased.
- (ii) Cylinder head is of pent roof type in Series II.
- (iii) Induction system of larger engine embodies hot and cold air intake design for automatic operation.
- (iv) Series II engines are designed for higher octane rating fuels which may contain tetra-ethyl-lead.
- (v) Engine mounting bearer feet are of modified design.
- (vi) The oil pump on the Series II is of the gear type and incorporates an Auto-clean filter.

As the Series II Minor engine is likely to be that most in use, a brief résumé of its salient features may well prove of interest.

Cylinders are machined all over from high-grade carbon steel billets, are closely finned and are deeply spigoted into

the crankcase to prevent oil from flooding over to the underside of the pistons. Each cylinder is attached by four short-waisted studs, nuts and distance pieces, so dispensing with long holding-down studs to the cylinder heads. The latter are machined from aluminium alloy castings and are each attached by eight studs to a flange on the cylinder. Additionally, the head casting forms a half of the valve gear box and is fitted with an Elektron cover which serves as an oil bath for the valve gear. One inlet and one exhaust valve per cylinder are arranged transversely to the crankshaft line, each valve being stellite and fitted with conventional type springs, collars and collets.

Optional Self-starter

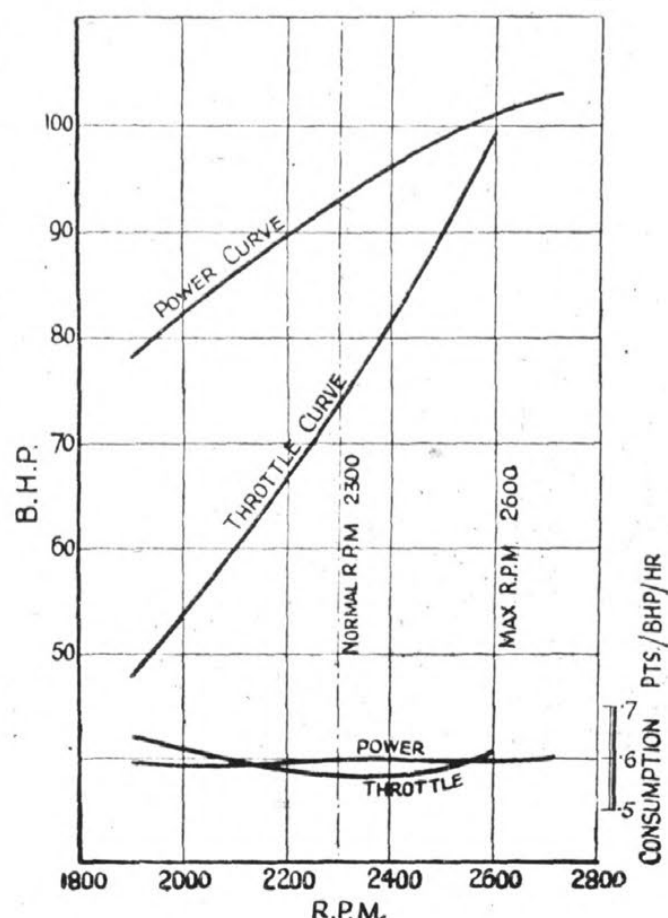
Pistons are of Y-alloy and are of the slipper type fitted with one scraper and two compression rings; gudgeon pins are fully floating. Hyduminium forgings are used for the connecting rods, the big ends of which are fitted with split, white-metal lined steel shells. The crankshaft is machined all over and is carried in five plain bearings with a ball thrust bearing at the front end; the rear end of the crankshaft carries a gear for operating the magneto driving shafts, and a dog can be fitted for an electric starter if required. Crankcase and top cover are heat-treated magnesium alloy castings bolted together on the crankshaft centre line.

Carburation is by a downdraught carburettor which is provided with a hot and cold air intake; warm air is drawn through the flame trap until the throttle is well open, at which point the cold intake is automatically opened. The carburettor is provided with a mixture control valve and is mounted on a one-piece cast manifold.

Dual ignition by two B.T.H. magnetos—one comprising an impulse starter unit—is employed in conjunction with 14 mm. sparking plugs. If desired, Plessey Breeze screening harness can be supplied.

All controls are fitted with spring-loaded ball joints to take up wear, and the throttle, hot and cold intake and magneto controls are interconnected, and automatically advance and retard the magnetos and open the direct air intake in correct relation to the throttle setting. An independent mixture control is fitted.

Engines are normally supplied with hot and cold air intake and flame trap, two magnetos, sparking plugs, unscreened ignition leads, airscrew boss and spinner, cylinder cooling baffle chute and plates, oil pump with Auto-clean filter, oil drain pipe and T-piece, engine controls and a small tool kit for 50-hour routine inspection. Additional accessories available are: bearer feet in three alternative widths, exhaust stubs, Amal fuel pumps and pipes, screened harness and modified cooling chute, and electric starter. The makers recommend that complete overhaul should be



Performance curves for the 100 h.p. Cirrus Minor Series II evidence excellent consumption values.

POST-WAR CIRRUS ENGINES

carried out after 600 hours' flying, which is said to be the most economical period to avoid undue wear on reciprocating parts due to building up of carbon deposits.

The Cirrus Major Series II is a development of the original Major produced in 1936 and designated Series I. In 1937 and 1938 a number of Major engines of 150 h.p. were built and this model was modified with the advent of war, screened harness and a larger diameter airscrew boss being fitted. This engine became the Series II and the later engines, from 1944 onwards, were fitted with hot and cold air intakes and were suitable for leaded fuels.

Largest of the current Cirrus range is the Major Series III, which has a higher compression ratio than the Series II, and also uses a high-grade fuel giving 145 h.p. for take-off, this being with a fixed-pitch airscrew. Other than this, Series I and III engines are very similar.

CIRRUS MINOR SERIES II DATA

Type...	...	4-cylinder, in-line, air-cooled, inverted.
Bore and stroke	...	3.937 in. (100 mm.), 5 in. (127 mm.).
Capacity	...	243.4 cu. in. (3,990 c.c.).
Compression ratio	...	6.25 : 1.
Normal b.h.p. at 2,300 r.p.m.	...	90 (b.m.e.p. 127.3 lb./sq. in.).
Max. b.h.p. at 2,600 r.p.m.	...	100 (b.m.e.p. 125 lb./sq. in.).
Rotation	...	L.H. tractor, direct drive.
Overall length	...	39.878 in. (1,013 mm.).
Overall height	...	25.59 in. (650 mm.).
Overall width	...	1.729 in. (455 mm.).
Weight bare, dry	...	234 lb. ± 2 lb.

CONSUMPTIONS

Full throttle, normal r.p.m.	...	6.3 g.p.h.
Cruising at 2,300 r.p.m.	...	5.2 g.p.h.
80 per cent. power	...	4.9 g.p.h.
70 per cent. power	...	4.5 g.p.h.
60 per cent. power	...	4.0 g.p.h.

These figures are for ground level conditions at full rich mixture. Fuel ... Minimum octane rating 77 (D.T.D.224) t.e.l. additive admissible.

Oils to D.T.D. 472 Grade A. Key letter "R" for Winter use.
"B" "X" for Summer use.
"C" "T" for Tropical use.

Weighty Problems

If One Ounce Saved is Worth Its Weight in Gold, a Nine-stone Pilot Ought to be Paid £630 a Year More Than a Twelve-stone Pilot—Says Horace

THIS is a bad day this is. The first thing is a flat tyre on our 1927 (late) Morris Minor close-coupled sunshine saloon. It is the starboard hind again! However, it is flat only underneath.

We then miss the next train but one and stand up all the way to Waterloo. As we run down the escalator to save time, a poster catches our eye. It says, "Buy an Annuity and Ensure a Serene Old Age." At this moment we trip over a soldier's rifle and nearly break our neck. We decide to buy two of those annuities.

Then we put tuppence in the Piccadilly slot machine, and it swallows the money but keeps the ticket. We hit it in the chest but it does not respond. We give it two more pennies which it gratefully accepts. We hit it violently in the chest. It gives us back one penny. We add our last penny and try again. There is nothing doing. We kick the machine in the chest—it is constitutionally dishonest. What we could do to its Chief Designer, if we had him there, with a pair of gas pliers!

We join a long ticket queue and reach the underground train just as the doors slam in our face. When, finally, we get to the office there are three bills on our desk and the telephone is ringing wildly. It is the Editor.

He says will we write an article on the importance of saving weight in aircraft. So we say we have no desire to do any such thing and why is it so important to save weight in aircraft? The Editor says everybody knows it is important to save weight in aircraft so we say if everybody knows about it what is the point of writing about it? He can have all the weight that is saved, and what he does with the weight that is saved is none of our business.

Besides, we are now dealers in aircraft, and if aircraft can carry only half as much payload perhaps we can sell twice as many! The Editor says that is a plausible but entirely fictitious argument and will we write that article?

We say we are not interested, so he says of course we will write the article and he wants it typed in triplicate—double spacing. He would like it to be of about 1,587 words so that it will just fill up a space he has left, and it must be well constructed, snappy and informative, with no split infinitives—in fact, a sound, scholarly bit of prose.

We tell him our name is Shackleton, not Shakespeare. Then he says it is to be written so that if he or the Censor blue-pencils anything it must just read on as if nothing

has happened. Also we are not to use unnecessary words, such as saying something is pressed out in *two* halves because everybody knows how many halves there are, and he would cut the word out and we should not be paid for it.

But, he said, if we found something that was pressed out in *three* halves then we could mention it because it would be news! The matter was urgent as it was very important to save weight in aircraft, and he was just going to press. He would like the article by 9.00 hours B.S.T. to-morrow.

So we say we hope he will find somebody to write it, and when he does we shall read it with great interest and pleasure. Then he says we are to be a good fellow, 10.00 hours B.S.T. will do, and he will pay the Highest Rates in Journalism.

Suddenly we decide to think around this proposition. Times are hard. We cannot sell two or three aircraft before lunch as we used to do because we cannot get the aircraft to sell. It might not keep the wolf from the door but it will prevent her from whelping on the mat.

So we say we will write the article and we tell Horace, our Tame Stressman, to have it ready for us by 8.00 hours B.S.T. to-morrow. It is to be well constructed in 1,587 words, snappy, scholarly, informative with no split infinitives, and he is not to say something is pressed out in *two* halves. If, however, he can find something pressed out in *three* halves then he can mention it as that will be news, like a man kicking a mule or scratching the cat.

Horace Throws His Weight About

Horace says he is not interested in writing any such article and says he proposes to take seven days' leave forthwith, the first in six years. So we say will he write this article as it is of paramount importance to save weight in aircraft, and Horace says no he will not and we can have any weight that is saved and what we do with the weight that is saved is none of his business.

We remind him he will need some currency on this holiday with which to buy potatoes and things, and we offer him the Highest Rates in Journalism divided by two. He accepts this proposition forthwith, realising the soundness of our advice, and this is what he writes:—

"My friend Dr. Klein, Consultant to Mr. Donald W. Douglas, President of the Douglas Aircraft Company, was

By W. S. SHACKLETON

reported as follows in the American S.A.E. Journal:—

Dr. Klein's discussion of the importance of weight in commercial airplanes will border upon the classic in the form of the simple statement that:

"A saving of 250lb. in weight is worth more than the present first cost of the ship."

For those who like to toy with formulae he will provide equations wherewith they can work their own way to a conclusion that in the 4,000,000-mile operating life of a commercial plane, one pound of weight is worth \$600, one ounce of weight is worth \$37.50, or slightly more than gold.

He will suggest that a good way to make airplane parts lighter is to make them smaller, or at least to rationalise dimensions to the proportions of the men who fly the planes. Examples of possible progress in this field, he will say, is multiplying the output of an electric generator seven times over, with a gain in weight of only 40 per cent; using electrical wiring which saves 60lb., or \$36,000 per plane.

Manufacturing a plane, Dr. Klein will report, is 80 per cent. man-hours spent in assembly and installation operations. Scheduling the parts will be likened to keeping tabs on 200,000 rabbits in a field 2,000 feet square. Biggest job of all is making the thousands of parts fit, not accurately, but exactly, despite time, temperature, hour of the day, and condition of the tools.

Now it will be admitted by one and all, including even Junkers and Mitsubishi, that Mr. Douglas and Dr. Klein know something about the operation and construction of aircraft. Therefore Dr. Klein's opinions on aircraft will be read with great interest and respect, even if he doesn't allow enough grazing room per rabbit.

Still I must admit that I would prefer to keep tabs on 200,000 aircraft parts rather than that number of rabbits. For one thing, a rabbit looks much like another rabbit, and they are more mobile than A.G.S. parts. Also it follows that some of those rabbits might be lady rabbits, and it is even conceivable that a proportion of them would be

on the point of cancelling their engagements. In that case we might soon have more than 200,000 rabbits, which does not seem to be the case with instruments and things.

Still, is it not remarkable to think that weight saved in aircraft is equal in value to its weight in gold? And of course this will apply equally to weight saved in the airframe, or the engines, or the airscrews, and also to the weight saved in petrol, oil and even airscrews.

On this reckoning a 9-stone pilot would be worth \$25,200 more to an airline than a 12-stone pilot in 4,000,000 miles, and might legitimately be expected to suggest splitting this fifty-fifty with the company! This would be worth £630 a year to him in real money!

Of course 4,000,000 miles, as Einstein might be capable of figuring out, is equal to 20,000 hours at 200 m.p.h. or say 4,000 hours per year over five years. That, whilst by no means impossible, seems a rather optimistic figure for the average life of a commercial aircraft.

However, Dr. Klein, with his eye on the future, is no doubt thinking in terms of 300 or even 400 m.p.h. cruising speeds. Indeed, the learned doctor's figures are confirmed, almost exactly, in a recent statement by Mr. G. T. Baker, President of National Airlines, Inc.

This is what Mr. Baker said:—

Airplane weight savings have a highly practical value to manufacturers and airline operators. To the commercial operator, every pound of unnecessary weight saved means increased earning capacity.

National Airlines' maintenance and operations figures show \$156.04 as the annual value of one pound weight saved per airplane operated by us.

We like the odd four cents! Now there you have it. Weight saved in a commercial aircraft is equal to its weight in gold to the airline operator!

Undoubtedly Aviation is the Coming Thing.

PAINTINGS OF BRITISH AIRCRAFT

AN exhibition of paintings by this country's three foremost aviation artists was opened on July 17th at the Rootes Showrooms, Piccadilly. The exhibition is presented by the Society of British Aircraft Constructors and will remain open to the public until July 28th.

Viewing these paintings, one is sensibly affected by the artists' evident feeling for and sympathy with their subject. It has long been a sore point with the writer that our official Air Ministry War Artists seem not to have the facility for portraying aircraft as they really are. The official A.M. artists may be very fine artists, but by demonstration they seemingly cannot faithfully present aircraft; whereas by contrast, Frank Wootton, Roy Nockolds and Terence Cuneo do paint the individual machines and succeed in capturing that indefinable atmosphere which is each separate aircraft's "personality." It is not enough to delineate the shape—the technique of portraying aircraft goes further than that—it would appear that the artist must be thoroughly familiar with aircraft and the air life, and must be thoroughly soaked in the atmosphere; then and then only can he paint his picture with subjective sympathy and objective accuracy.

When walking round this excellent exhibition and seeing the works of these three artists hung cheek by jowl, one cannot help but be struck by the differing treatments. Nockolds is inclined to give his aircraft too clear a delineation, whilst Cuneo gives a little too vigorous and free a portrayal. Wootton, on the other hand, seems to fall somewhere between the two and, whilst achieving a smooth effect without detail worthy of the name, sets a norm by which other works are judged. Without denigrating these co-exhibitors, it must be said that Wootton remains the master of aircraft painting.

In addition to the main paintings, the exhibition includes some watercolours of eight new civil aircraft, the Tudor I, Dove, Brabazon I, Hermes, Shetland, Viking, A.S.57, and Marathon.

"BRING THE FAMILY"

THE huge Hawker factory and airfield at Langley, Bucks, was open to employees' wives and families on Saturday last. Charabancs brought large numbers of people from other Hawker factories, notably from the one at Kingston.

Everyone was invited to go through the works and see the Tempest in production. Test rigs, such as the undercarriage operating mechanism, were working to give the visitors a close-up picture of how it all happens.

The high spot of the afternoon was a flying display by types built by Hawkers and their associated companies. The 10,000th and last Hurricane, flown by the evergreen "George" Bulman, started the programme which, to indicate the sort of show put up, might be termed an afternoon of wing-tip vortices.

After the Hurricane, the Typhoon, in the hands of Mr. Murphy, demonstrated a mock rocket attack. Tempests were next in the air, and these thin-winged fighters, flown by Bill Humble and Richard Muspratt, D.F.C., put on a show of low flying, zooms and upward rolls which the onlookers will remember for some time.

As an anticlimax, in the middle of the programme, the 18-year-old Hawker Hart G-EBMR pursued its steady way round the airfield. It was difficult to believe that there was a time when we looked on the Hart and marvelled at its speed.

A big boy came next in the form of the Avro Lincoln, flown by Armstrong-Whitworth's chief test pilot, C. Turner-Hughes. Charles' idea of showing confidence in his aircraft was to cross the airfield down-wind at no feet, with two engines on one side stopped and the airscrews feathered.

From the Gloster company came the Meteor jet-propelled fighter, so recently off the secret list. Greenwood, Gloster's chief test pilot, brought it along and he flew it both fast enough and low enough to prove to the crowd, which numbered some 6,000, that jet engines leave behind a strong "paraffin lamp" smell.

The display was rounded off by an amazing demonstration by an R.A.F. pilot on a Sikorsky helicopter.

RUMBOLD'S WAR EFFORT

SPEAKING at a delayed VE celebration of the famous aircraft interior decorators bearing his name, Mr. Rumbold said that the firm had expanded more than ten times during the war; yet not one of the several factories had been seriously damaged by enemy action.

Using 3,000,000 sq. ft. of leather, 3,500,000 welding rods and 5,000,000ft. of Elektron tubing, 100,000 aircraft seats had been turned out in addition to special work on armoured vehicles, tanks, submarines, gun turrets and interior fittings of V.I.P. and troop transport aircraft.

For post-war production it was announced that the design department had a number of new ideas which would be made public shortly.

Wing Cdr. Russell, one time of the Redwing Co., has joined Rumbolds as sales manager.

CIVIL AVIATION

Air Registration Board

Some Interesting Facts Disclosed by Sir Maurice Denny

THE annual general meeting of the council of the Air Registration Board was held in London on July 19th. Sir Maurice Denny, chairman of the A.R.B., disclosed in his report that the Board has been able to maintain its position in civil aviation during five years of war, a clear indication of its constitutional soundness and a promise that it will, in increasing measure, fulfil the high hopes entertained when the Board was formed.

After paying tribute to various members of the council, Sir Maurice gave some data concerning the work of the Board during the past twelve months. Two recommendations were made for issues of Certificates of Airworthiness to prototype aircraft; the Taylorcraft Auster and the Vickers Warwick. The Vickers V.C.1 (Viking) is now under investigation. A further two recommendations were made in respect of modified prototypes: the Percival Proctor III and the Avro Lancastrian.

Recommendations were made in respect of 72 "series" aircraft, one-half American and the other British. The types involved were: 27 Dakotas, 6 Short Sunderlands, 4 Avro Yorks, 3 Avro Lancastrians, and 16 de Havilland 89A.

Renewals of C. of A.s numbered 128, of which 50 were carried out overseas as a result of surveys in Egypt, South Africa, Iraq and the United States. A total of 78 recommendations for extensions of C. of A.s was made, usually for a period of one month beyond the normal expiry date. Sir Maurice explained that this was not a practice which the Board encourages, but that it was rendered necessary by war conditions. No fewer than 1,239 modifications were approved, of which the majority required investigation by the Board's technical staff.

Some time ago the A.R.B. established a department to deal with surveys for underwriters. The collection and recording of information on accidents, incidents and defects had increased, and Sir Maurice explained that the reports came to the Board from as many sources as possible, the information being used in the amendments of the Board's requirements. In many cases the information was discussed with manufacturers, who did not always have access to it. A total of 64 surveys for underwriters was made during the year.

Inspection

Some interesting facts were given by Sir Maurice about inspection. During the year 112 firms' inspection organisations had been approved, 104 of them for the manufacture of materials, component parts, accessories and equipment; two for the construction, repair and overhaul of series aircraft; and one for the construction of series engines. The design organisations of six firms had been approved, four of these being aircraft constructors and the other two constructors of equipment, instruments and accessories.

Statistics relating to the Board's activities from 1939 to the present time disclosed that during the year 220 engineers' licences were issued; 514 were changed or extended; 1,873 were renewed; and the total number of engineers' licences stood, on January 1st, 1945, at 1,969. Owing to the fact that the revised Air Navigation Regulations have not yet been promulgated, it had not been possible to introduce the new form of engineer's licence. In the interim, personnel who wished to obtain licences as a

post-war qualification were able to take the written and major part of the examination, and 92 candidates had been examined, resulting in the issue of 38 certificates.

Recommendations had been made in respect of the technical examinations for the issue of 56 new pilots' "B" licences and the extension of 147 existing licences. Six glider engineers' certificates had been renewed.

Overseas, the Board had carried out much work, and some of the Board's surveyors had acted on behalf of the Secretary of State for Air in respect of renewal and extension of pilots' and navigators' licences. There had also been regular navigators' examinations in the Middle East and South Africa. Friendly contacts had been made with representatives of the Governments of Southern Rhodesia and Union of South Africa. Both countries had expressed a wish to maintain contact with the Board so as to be guided by its procedure during the reconstruction of their Department of Civil Aviation.

Sir Maurice recalled that one of the greatest tasks which faced the Air Registration Board when it was formed was the preparation and publication of Airworthiness Requirements. The work was begun before the war, but had to be laid aside during hostilities. Only recently had they been able to take it up again. The resignation of Dr. Roxbee Cox, their Chief Technical Officer, was a serious handicap, but Sir Maurice paid a tribute to the work of Mr. K. T. Spencer, who was lent to the Board for a time by M.A.P.

Of the policy which the Board intends to follow in the framing of requirements, Sir Maurice said:—

"It is our intention to frame these so as to enable the British aircraft designer to use the initiative and ability which the excellence of British Service aircraft during the war has shown he possesses. The requirements, therefore, will be restrictive only in such fashion and to such degree as airworthiness demands, but we recognise that, particularly at this stage of the art and in view of past experience, something more than a bald requirement may well be sought by a designer and constructor. We hope, therefore, to supplement our requirements by the issue of manuals, the object of which will be to show recommended practices, the adoption of which should lead to structures acceptable to the Board as meeting the standards required.

"We hope this system, while giving as much information to the designer as he would obtain from more detailed requirements, will yet permit him the maximum freedom of action, the only proviso being that, whatever the method adopted, the product must be demonstrably airworthy."

FATAL JET PLANE ACCIDENT

WHILE Mr. Greenwood, chief test pilot of Gloster Aircraft, was demonstrating the Gloster Meteor jet fighter at the Hawker display at Langley, reported on the previous page, another jet pilot lost his life in a flying accident. The occasion was the sports day held by Power Jets, Ltd., at Whetstone, Leicestershire. The firm's senior test pilot, Wing Commander A. O. Moffat, was piloting a jet plane when it crashed and the pilot was killed instantly. Air Ministry experts have made an examination, and until the results are published it is impossible to know what caused the accident. It may well be that it had nothing to do with the fact that the aircraft was jet propelled.

COUNCIL OF THE AIR REGISTRATION BOARD

Chairman: Sir Maurice Denny, Bt.

Vice-chairmen:

Sir Frederick Handley Page.
Guy F. Johnson (Hon. Treasurer).
Viscount Knollys.
A. J. Whittall.

Members:

Sir Roy Dobson.
F. C. R. Jacques.
Capt. A. G. Lamplugh,
L. Murray Stewart.
J. D. North.
Capt. G. P. Olley.
H. E. Perrin.
A. B. Stewart.
Wing Com. R. H. Stocken.
Major R. H. Thornton.
C. C. Walker.

Secretary: T. R. Thomas.

CIVIL AVIATION NEWS

TO NICE

THE Paris—Nice service via Marseilles—Marignane, recently inaugurated by the French Directorate of Air Transport and operated three times weekly, is shortly to be put on a daily schedule.

AFRICAN AIR

ALMOST half of all trunk routes in Africa are operated by the B.O.A.C.

The African continent, which has been of such importance in wartime communications, is now covered by an extensive network of services covering some 80,000 route miles. As from December, 1944, 298,926 miles were flown weekly in scheduled operation on these routes.

A C.A.B. survey states that 42.4 per cent. of all trunk routes are operated by the B.O.A.C., 33.3 per cent. by the French, 12.5 per cent. by the Belgians, and the rest by American, Portuguese, Spanish and Egyptian operators.

HERCULES FLYING BOAT

AS reported in *Flight*, June 21st, the Howard Hughes Manufacturing Co., of Culver City, California, is building a new giant flying boat.

Recent reports confirm that the aircraft, which is to be named Hercules, is in the 190-ton class and costs more than £5,000,000, has a wing span of 320ft., and is powered with eight 3,000 h.p. engines. With a top speed of about 218 m.p.h., it would be capable of carrying 750 fully equipped troops or a 60-ton tank with men and armour. The Hercules could also be used as a flying hospital accommodating 350 stretcher cases.

CANADA FOR COMPETITION

POOLING arrangements reached at the Commonwealth Air Transport Conference cover practically all major Empire trunk routes apart from the North Atlantic service which Canada declined to pool.

The Canadian view, as represented by Air Marshal Johnson, is that the parallel partnership would not be the best method of operating the North Atlantic service, and while there would be co-operation between the British and the Canadian operators (the B.O.A.C. and the Trans-Canada Airlines) no pooling of revenue or aircraft is wanted. The Canadians feel that there is no need for such arrangements as they expect traffic to be adequate to offer scope for friendly and free competition. Moreover, they are inclined to regard the trans-continental route as an extension of their domestic system and not as a sector of a possible global Commonwealth network.

SPEEDING-UP

THE British Overseas Airways is speeding up its record Lancastrian service to Australia to reach Sydney in 63 hours, clipping 9 hours off the existing schedule.

This 12,000-mile service, inaugurated on May 31st to serve the needs of the war in the Far East, is not only the fastest, but the longest air route in the world. It calls at Lydda (Palestine) and Karachi, where crews of Qantas Empire Airways, B.O.A.C.'s Australian associate, take over and fly the aircraft to Sydney. The number of flights is now increased from one to two weekly in each direction.

A new fast service to India with York aircraft will reach Karachi in 31 hours as against about 33 hours by the previous flying-boat and landplane services. The first flight, last week, was completed under the new scheduled time.

With these additions, over 150 services a week will be flown by British Overseas Airways throughout the world. Of these, 74 a week arrive and depart from the main landplane base in this country at Hurn, near Bournemouth, and from Poole Harbour, a few miles away.

From these two bases services operate to West Africa, Egypt, India, Australia and the U.S.A. From Hurn there are now 14 landplane services a week in each direction to Egypt, and three services a week to India. Hurn is also the base for the Lancastrian service to Australia and for the twice-weekly service to West Africa and the routes to Lisbon and Madrid. From Poole there are six flying-boats a week to India via Egypt, and four to Baltimore, U.S.A.

In addition to these routes, B.O.A.C. is operating a daily service between Prestwick, Scotland, and Montreal, Canada, in

each direction. From Cairo services are operated to East and South Africa, India, Turkey, Persia, Abyssinia, Aden and the Persian Gulf.

U.S. HOME SERVICES

AMERICAN internal services show a substantial increase in schedules and loads as compared with 1942 results.

Services between war-busy cities have increased substantially and the recent transfer of members of U.S. Army to the Pacific war theatre has contributed to the growth of traffic. On some routes such as that from Los Angeles to San Francisco 25 round trips are operated daily and load factors on trans-Continental services range from 82 per cent. to 95 per cent.

The fleet of U.S. domestic operators has been reduced from 359 in 1941 to 279 in 1944. On April 1st, 1945, it averaged 293 available aircraft, which flew a total of 525,304 miles per day or an average of 1,793 miles per aircraft per day. In terms of hours this means 11.93 hours per aircraft daily as compared with 8.03, the average on schedule operations in 1942. The average revenue passenger load factor was 42.34 per cent. in 1930, 59.13 per cent. in 1941 and 89.37 per cent. in 1944.

FRENCH PROJECTS

HERE are some aircraft types on the project list of the French S.N.C.A.S.E.: the S.E.-700, an autogiro for freight and passenger courier services. The machine has not been constructed. The S.E.-1,000, a mid-wing monoplane with a span of 99ft., powered with four Gnome-Rhones is estimated to reach 350 m.p.h. at 25,900ft. The aircraft will be equipped with a pressure cabin and constructed in four versions: a high-speed high-altitude courier with a crew of five; a long-range version accommodating four passengers; another version for eight passengers, and yet another for ten, the latter for continental operations. The S.E.-2,000, a four-engine type of a span of 137ft. 10in. and a length of 128ft. will accommodate 100 passengers and a crew of five to seven. The S.E.-2,100, a side-by-side two-seater powered with a 140 h.p. Renault "Bengali." Maximum speed 150 m.p.h. at 3,200ft.

Finally, three versions of a smaller type resembling the Percival Gull: the S.E.-2300, the S.E.-2310 with a tricycle undercarriage, and the S.E.-2311 for three passengers. All three are all-metal constructions equipped with the Renault "Bengali" motor. Cruising speed at 70 per cent. of power output is 135 m.p.h., landing speed 44 m.p.h. and range with headwind of 20 m.p.h., 6,240 miles.

SABENA

IN a talk at the Belgian Institute, Mr. P. Stouffs gave some interesting details of the wartime fortunes of the S.A.B.E.N.A.

The entire Belgian civil fleet managed to escape the bombing of the Brussels aerodrome and reached Shoreham on May 11th, 1940. It then served with the R.A.F. as a link with the B.E.F. in France. A belated effort was ultimately made to evacuate the fleet to Congo, but at Algeria it was caught by the French armistice and handed over to the Italians. With the remainder of the fleet which was at the time in Africa (seven aged Fokkers and six Ju 52s), the S.A.B.E.N.A. increased their services in Congo and helped to maintain the connection between the Gold Coast and Egypt, the latter being of special importance during the Libyan campaign.

Incidentally, this service was operated with two Lockheed 14s, French Vichy machines which were home-bound from Madagascar in 1940 and which were seized when en route in Congo. Sixty per cent. of the operations were reserved to the war effort of the Allied Armies.

In addition to carrying arms and munitions and R.A.F. crews on charter from Takoradi to Cairo, the S.A.B.E.N.A. carried out many special missions all over Africa, and in June, 1941, established a line Leopoldville—Elisabethville—Johannesburg Capetown.

In September, 1944, a service from the U.K. to Congo via Lisbon and the Sahara was established, and shortly this service is to be extended to Brussels. It is also proposed to restore the pre-war services Paris—Brussels—Amsterdam, Brussels—Prague— and Brussels—Stockholm.

The company's network has actually increased from 5,850 kilometres in 1939 to 27,570 kilometres in 1944. As Mr. Stouffs pointed out, this is even a more noteworthy achievement if one recalls that because of lack of parts only ingenuity could keep the aircraft in flying condition and that this network was operated by a staff of only eighty-six Europeans and 441 natives.

OSC-1 Air Survey Camera

Williamson Company Produce Special Camera for Air Mapping : Huge Areas Photographed in Single Flight

TO appreciate the measure of British achievement in the production of photo reconnaissance equipment for the Allies, it must be realised that no fewer than 72,239 British air survey cameras have been supplied to the R.A.F. during the war.

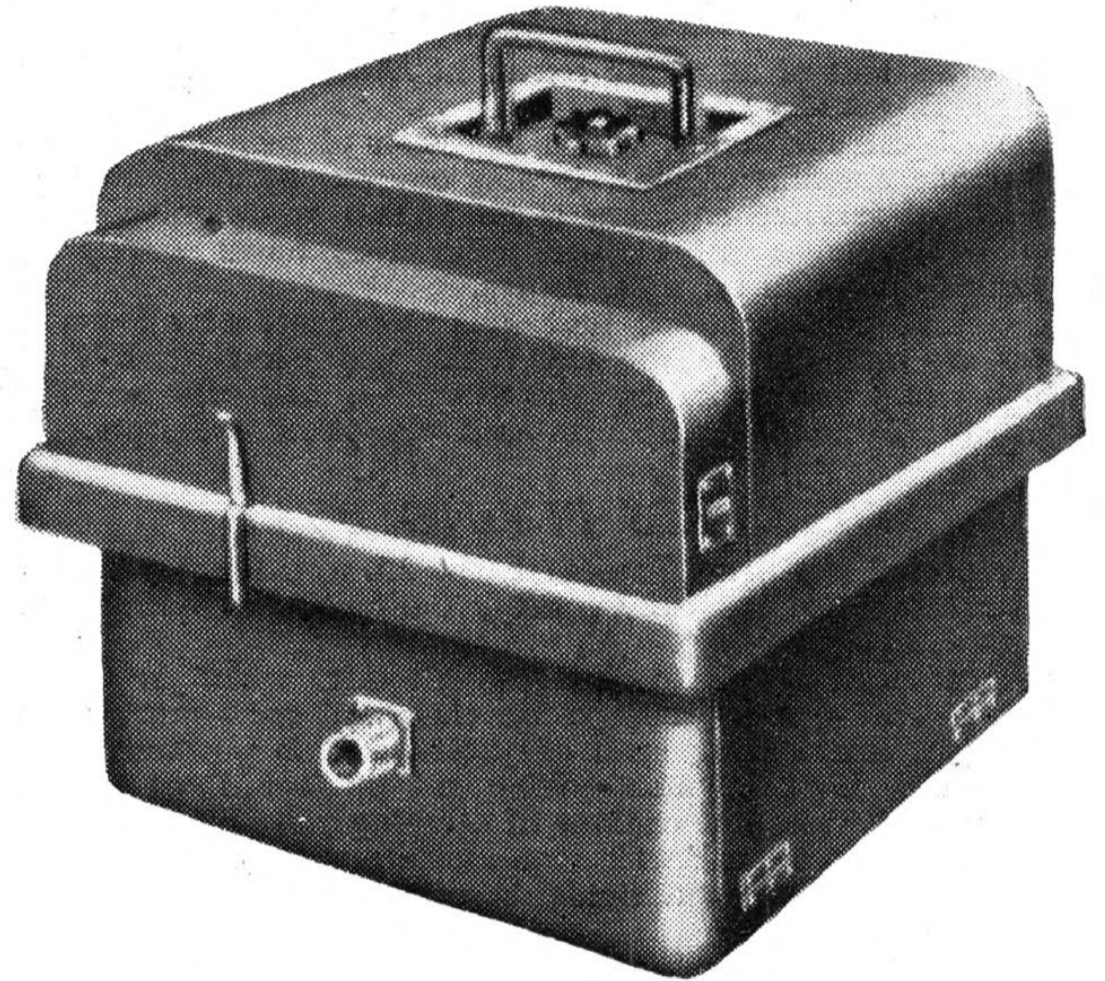
The air survey camera of to-day is a precision instrument possessing a high degree of efficiency, developed during the last quarter of a century. The progress of research and invention have, during these years, eliminated all but less than half a dozen specialist firms in the world who can be said to influence the progressive development of equipment for air survey and photo reconnaissance. During the nineteen thirties it would have puzzled the observer to have decided which of the three countries, America, Germany or Great Britain was ahead in the development of the air camera. Switzerland, Italy and France made up the tail in that order. It is therefore necessary briefly to review the industry during those years.

Zeiss, the great German firm, backed to the hilt with every resource of the Third Reich, certainly did not neglect to develop the air camera for war purposes. The concern prepared for war with an official policy emanating from the German High Command. The Zeiss company were aided by a reputation second to none in the camera and optical industry and were undoubtedly a formidable competitor anywhere in the world where there existed a market for air survey equipment.

America was in the material position of being able to afford more millions of pounds on the development of photography than Great Britain and they, too, were a forceful competitor in the world markets for air survey equipment. Great Britain competed with this formidable array of international specialist competition with little or no Governmental sympathy or support. The Treasury did not regard the science of photogrammetry as a prior art essential to the safety of Great Britain.

Automatic Precision

The R.A.F. reconnaissance camera, developed from the Williamson camera in use all over the world for air survey, was, by its high development of automatic precision, suitable for operation by quickly-trained men. While the German photo reconnaissance equipment was of undoubtedly good workmanship, they, on the other hand, appeared to over-elaborate air survey cameras for reconnaissance work. As a result, the training of operatives must have been over-long and aircrews required an unnecessary degree of skill. This over-elaboration of the German equipment proved a severe handicap, while the simplified British photo equip-



Compact neatness with no excrescences is a feature of the OSC-1 photogrammetric air camera.

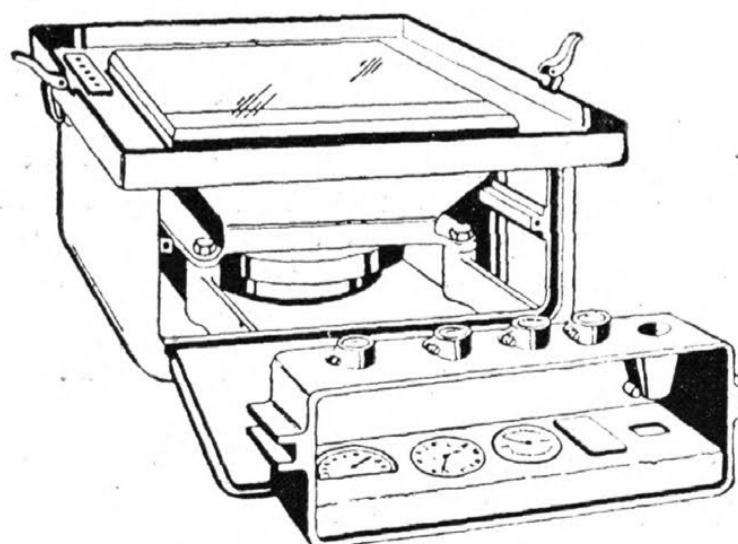
ment ensured a positive standard of results. It is interesting in this connection to note that the British F.24 photo camera was adopted in a modified form as a prototype for a standard American photo reconnaissance camera which became known as the K.24. The British F.52, a larger type camera, is also used extensively by the American P.R.U.

The requirements of photo reconnaissance differ from those of air survey in this respect that, while the former requires a larger image for quicker interpretation, the science of air survey requires a camera with an extremely wide-angle lens to cover as large an area as possible on each exposure. This area in each instance must be covered with the absolute minimum of distortion from mechanical or optical causes. The lens must be calibrated and collimated to a high degree of accuracy to ensure that the exact scale of photographs taken by the camera can be measured.

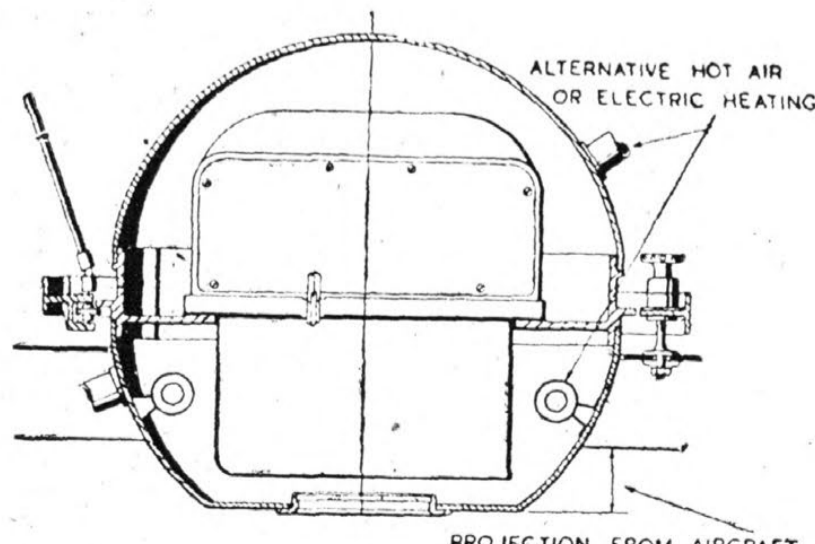
For photogrammetry the film magazine must be interchangeable and of large capacity to cover longer uninter-

rupted flight lines than would be required in normal photo reconnaissance. Provision must be made for recording information on the film, such as altitude, time, degree of tilt, etc., etc. The aim of the air survey expert is to obtain a picture within one-fifth of one degree of absolute vertical. Reliability is an essential and there can be no doubt that this has been achieved. For example, one Williamson survey camera is known to have made no fewer than 100,000 exposures in New Zealand without breakdown or trouble of any sort.

A marked difference between the conclusion of this European war and the last one, is that air survey is being planned on a



The instrument box which will accommodate four instruments to be photographed with each exposure by the camera.



For high flying the camera is contained in an enclosure which can be electrically heated or connected to the exhaust hot-air system.

OSC-1 AIR SURVEY CAMERA

scale hitherto unattempted, and forms part of the Allied plan for the control of Germany. This also applies throughout the Empire, for which a gigantic schedule of air survey has passed beyond the planning stage.

From America it is reported that the whole of Germany is to be photographed. This plan is conceived to cover also the whole of France, Belgium, Holland, Italy and Spain. It may even extend to the Middle East and the Balkans and the Scandinavian countries. Canada is also reported to be undertaking a vast aerial survey programme.

War is the natural forcing ground for producing a mass of experience and knowledge. In the air-camera world this has been collated and applied by the Williamson Manufacturing Company to the production of a new air survey camera known as the O.S.C. Mk. I.

The O.S.C. Mk. I photogrammetric air camera is the result of twenty-five years' experience of precision survey requirements, combined with the very latest knowledge on air photography technique.

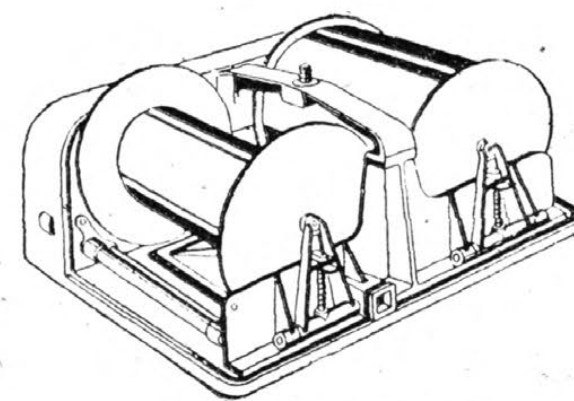
Among its many features are the Ross super wide-angle lens and the 9in. x 9in. format combining to give an area coverage up to 30,000 feet square on each photograph taken

from an altitude of 20,000 feet. Altitude, exposure number, time of exposure, degree of tilt, are all automatically recorded photographically on the film at each exposure. This information, along with such data as latitude and longitude at the beginning and end of each flight line, is essential to the production of accurate maps made from these photographs.

This camera is also provided with a film magazine which affords 500 exposures on each roll, thus enabling each aircraft to cover longer uninterrupted flight lines.

The camera in the aircraft is supported on a mount which is provided with a drift-adjusting ring, shock-absorbing anchorage points and levelling screws, thus aiding in the production of needle-sharp undistorted photographs. The whole camera is enclosed in a heated compartment that maintains the optical and mechanical constance.

The cost of the OSC-1 camera is £1,200.



The roll film magazine is self-contained with its own driving motor. Sufficient film is carried for 500 9in. x 9in. exposures.

Test Pilots and Designers

"Indicator" Taken to Task for His Views on Pushers of Water-cooled Slide Rules

By "TECHNICIAN"

THE writer of these notes does not believe that in his "Topics of the Day" (*Flight*, May 3rd, 1945) "Indicator," who may or may not be a test pilot, has correctly presented the opinion of the majority of test pilots. But to "Indicator" and those who think like him the following is a reply from a member of a Design Staff.

It is a pity that the article by "Indicator" was not written in times when the ballyhoo still surrounded the test pilot, so successfully portrayed on the screen by Clark Gable. Now, after five years of war, when thousands upon thousands of young men with no previous experience of flying have been trained to become very efficient pilots, the difficulties of flying may be seen in a truer perspective. Admittedly not everyone will make a good test pilot, but one can learn to fly in five hours, and it would take five hours to teach many test pilots elementary trigonometry.

It might well be that, with the advent of instrumentation, "Indicator" fears that the job of the test pilot is in jeopardy and is determined to carve a niche for the test pilot of the future. Though why he should resort to criticism of the designer is difficult to understand, unless it was his intention to be facetious, and then one may simply dismiss the article.

But there is no need for "Indicator" to worry about the future of the test pilot. For whereas designers find it necessary, absolutely necessary, to resort to automatic recording, so long as aircraft are flown by people, test pilots will be necessary. So let us not push ourselves up by pushing others down, and try to view the points in the article as if put forward seriously by an intelligent person.

To start with, "Indicator" writes: "Since it is obviously impossible to make every designer a test pilot, we must try our best to make every test pilot a designer." Why is it any more impossible to make every designer a test pilot than every test pilot a designer? Are there not any qualifications required to be a good designer? Or is the ability to fly an aircraft all that is needed to understand the multitude of problems that beset the designer to-day? Is all the work undertaken by our design staffs,

research establishments, and whole lives of study of some of the best brains of the country entirely wasted and unnecessary, or is it so simple that a "wizard" test pilot can learn it all between "two jolly good shows"?

"Indicator" says it is unusual for the clever mathematician to be temperamentally suited to fly an aircraft. But has he ever considered that it may be unusual for a test pilot to possess the brain to be a clever mathematician? And one may add again in the manner of the article that it would be more than stupid if the best test pilots were shelved simply because their brain was incapable of dealing with the many complicated and difficult aspects of design.

... a Little Learning

I feel that it might be to advantage if one said a word or two in favour of the not-so-brainy test pilot—the person who flies the machine, records the measurements required, and then writes his report as accurately as possible without the disadvantage of preconceived theories. Too often can the saying "a little learning is a dangerous thing" be applied to test pilots. What the designer requires is not what the pilot feels is the explanation of so and so, but what actually occurred. The designers will do the rest, and may one say that they haven't done too badly as yet, despite "Indicator's" comments on rule-of-thumb knowledge. For to whom does the credit belong for the qualities of present-day aircraft? To the test pilot or to the aerodynamicist, structures expert, engine designer and the host of other highly specialised technicians who together constitute the design staff? To them or to the test pilot?

Why should a test pilot who has spent an evening or two learning the meaning of C_2 and after much labour possibly D_1 , be any more capable of predicting the queerities that might beset us with compressibility, than the designer of to-day who has spent so long amassing a great deal of knowledge? True it is that the pilot flies and feels, but if he is incapable of passing on his feelings and impressions I suggest he needs training in English so that he will be able better to relate what actually occurs.

There is no need for this growing gulf to exist between

TEST PILOTS AND DESIGNERS

the pilot's language and the designer's language. Let us both speak English and let the pilot realise that if he wishes to understand the more difficult technical problems, let him go to college, after passing matriculation, and then spend many years in the industry learning, learning. But were the test pilot to do that, surely "Indicator" must appreciate that most of them would fall by the wayside, and those who did manage to get on the long, arduous and difficult path to the job of chief designer might not have sufficient time to be the efficient test pilots they otherwise would have been.

But time will be wasted if one proceeded to question every sentence of the article, for they are nearly all double-edged swords and the way in which "Indicator" assumes that only one edge, and always the same edge, is sharp, is really astounding. Incidentally, it appears that test pilots must have a very easy time at present, if, as "Indicator" suggests, they can acquire all this extra knowledge and still do their present work.

Let me conclude by trying to place the two jobs, both important, in their true relationship to each other. All designers will not make good test pilots, and all test pilots

will not make good designers. The qualifications required for the two jobs are so vastly different that it is difficult to realise that one can seriously suggest that the test pilot must in future be as knowledgeable as the chief designer. The chief designer must, and particularly so in the future, have had intensive technical training, practical experience and many years in the industry. To this end not only is hard work and much time required, but also the would-be designer must possess the necessary brain-power to absorb the knowledge, and the ability to apply it. Such gifts are not necessarily given to those who become test pilots. Surely the characteristics of the test pilot are more physical than mental. And whereas there is no doubt that the particular characteristics, similar to but considerably more developed than those required for driving a car, necessary for the would-be test pilot are not granted to everybody, these characteristics are not those required for a chief designer.

The solution appears to be that the designer should, if possible, be a pilot, and the better pilot he is the better for his firm. The test flying must still remain in the hands of the test pilot, who will now have no difficulty in speaking to the designer, since they both fly, and the primary job of the test pilot must continue to be the assessing of the flying qualities and the conveyance to the design staff of what happens.

Dangers in Turning

Author of Original Article Replies to His Critics

By A. SIPOWICZ, Sqn. Ldr., Polish Air Force

ALTHOUGH readers have been kind enough to compliment me on the lucidity of my article "Dangers in Turning," published in *Flight* of April 26th, 1945, their criticism shows that I was not lucid enough for complete understanding of the subject. The following explanations may supplement the article and make it more understandable.

One objection concerns the statement "All accidents following badly performed turns are caused by an inadvertent stalling of the aircraft with a subsequent spin." My statement is based on my experience as a former member of the Investigation Board for Accidents in the Polish Air Force. I remember about a dozen accidents following steep turns at low altitude. All of them were recognised as a consequence of stalling the aircraft. The view that such accidents are the result simply of inaccurate control, covers, of course, all the possibilities but explains nothing about the nature of the inaccuracy. In my experience, so long as an inaccuracy does not impair the controllability it never causes an accident. Only the loss of controllability is dangerous, and this is produced by stalling.

Critics are wrong in assuming that my understanding of flying is more academic than practical. Actually, I discovered the cause of difference in turns in a wind after I had badly side-slipped several times, with only a small margin of safety left. My discussion of the causes with Professors of Aeronautics in Warsaw Engineering College, and repeated flying tests, led me to the discovery that the apparent track of the aircraft was a cause of faulty steering.

I fail to understand a second objection: In steady flight "The greater the angle of incidence the lower the air speed" conveys to me the same fact as vice versa "The lower the air speed the greater the angle of incidence." Both statements are true and express the mutual interdependence of air speed and angle of incidence. But, it is necessary to pull the stick back and thus increase the angle of incidence before the air speed is lowered. This shows that the original sequence of the statement is more natural.

A third objection concerns equation (2) and is a flat denial of a known mechanical principle. This equation is not mine, it is to be found in many manuals on the mechanics of flight, e.g., in "Flying Training Manual"

(A.P. 129, Ch. 1, Para. 80-84), or T. G. Whitlock's "Elementary Applied Aerodynamics," p. 175. I am, however, aware that this reply may not satisfy the critics who are pilots and know from experience that it is possible to make steeply-banked turns without a corresponding increase in load (according to the equation).

But this possibility does not mean that the turn so performed is a correct horizontal turn, as considered in the article. It is possible to make a 90 deg. banked turn with only a small increase in load, though the equation implies that in such a turn the load becomes infinite. Of course, this denotes only that a correct horizontal turn is impossible at 90 deg. bank, but it does not exclude the possibility of a non-horizontal turn. If a pilot does not care to keep altitude during the turn he may bank steeply and pull back only slightly, letting the aircraft turn with a side-slip but without an excessive overload. The exact realisation of these facts would help many to avoid mistakes which may be fatal. Such realisation is not shown by the critics.

Tightness of Turn

A further statement that "In steep turns the governing factor is the acceleration in the pitching plane or tightness of the turn" shows that one critic is not sufficiently acquainted with the mechanics of flight. The acceleration in the pitching plane (a) may be expressed as the quotient of the lift (L) and the mass of the aircraft

$\left(\frac{G}{g}\right)$, minus the gravity component in the same plane,

i.e., $\alpha = \frac{Lg}{G} - g \cos \theta$, while the tightness of a turn may be

expressed as its radius. This radius may be easily found by equalling the centrifugal force to the horizontal component of the lift. This gives:

$$\frac{G}{g} \frac{V^2}{r} = L \sin \theta = c_y S \frac{\rho V^2}{2} \sin \theta \text{ or } r = \frac{G}{S} \frac{2}{\gamma} \frac{1}{c_y \sin \theta}$$

where

$$\begin{aligned} \rho &= \text{density of air.} \\ \gamma &= g \cdot \rho = \text{weight of the air per unit volume.} \\ S &= \text{area of the wing.} \end{aligned}$$

DANGERS IN TURNING

It may be seen from this formula that the tightness of a turn depends on the horizontal component of the lift, on the wing-loading $\left(\frac{G}{S}\right)$ and on the weight of air per unit volume (γ) at the level of turn. By setting out both formulæ the critic may realise the degree of his misstatement on the subject.

A passage of one criticism conveys the impression that the writer understands the term "high-speed stall" rather peculiarly. Stalling may occur at any speed contained in the speed range of a particular aircraft, from the lowest possible to the highest speed in a vertical dive (at the terminal velocity). All that is needed to produce a stall is to increase the angle of incidence beyond its critical value. If such a change is made abruptly, the inertia of the aircraft preserves the speed possessed by it beforehand, at least for a short time, and thus stalling may be produced at *any* speed. Though there is no generally accepted classification of stalling speed, it seems reasonable to call stalling speeds below cruising speed—low stalling speeds, and those above cruising speed—high stalling speeds.

Lastly, the sharpest criticism of Mr. R. H. Henderson

(May 10th, 1945), headed "The pinnacle of misstatement," concerns the sentence: ". . . Warning the pilot of the approach to stalling by the sloppiness of the stick." The critic refers here again to the high-speed stall, which is unnecessarily narrowing, and was not considered in the article. Apart from that it seems that Mr. R. H. H. understands the word "sloppiness" differently from my meaning, i.e., the meaning as ascribed to it by all dictionaries and also suggested by one of my English flying friends. I mean by "sloppiness of the stick"—a marked decline in its steering ability, i.e., a state when a small movement of the stick does not produce the corresponding sharp response of the aircraft. This does not mean that "sloppiness of the stick" is equivalent to absence of any force on the stick. Webster's New International Dictionary and Oxford Concise Dictionary describe "sloppy" as "careless, messy, ill fitting, unsystematic, not thorough." All phenomena warning a pilot about the approach of a stall may be called "laziness of response" or "decline of controllability." My English friend informed me, however, that the popular English term for it is "sloppiness of the stick," and therefore I used this term in my article.

Disregarding various ill-aimed outbursts, they do show the intense interest of the critics in the subject. The whole discussion indicates that there exists an urgent necessity for deepening theoretical instruction on this subject, and this is something which could well be adopted.

The End of the Line

Last Airspeed Oxford Trainer Delivered to the R.A.F.

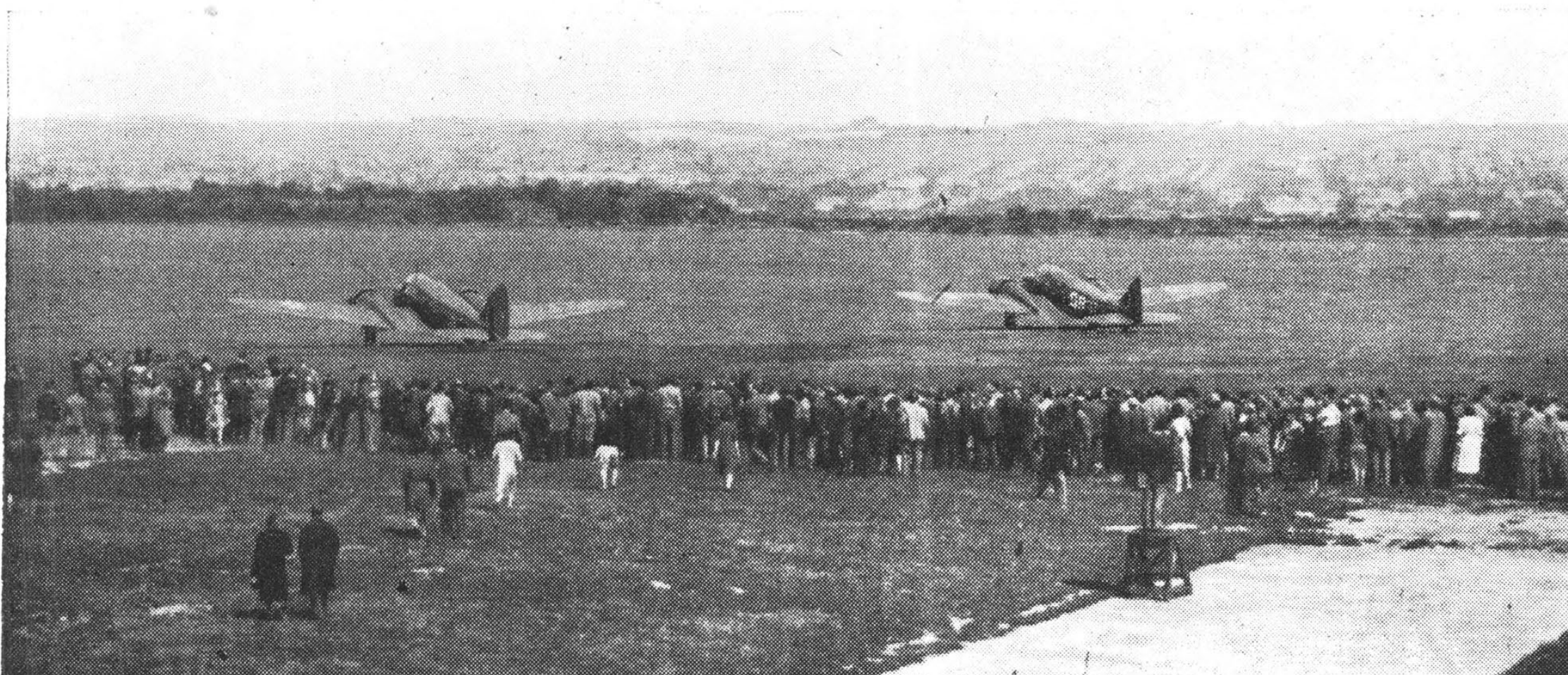
THE first Airspeed Oxford advanced trainer appeared in 1937 and went into service with the R.A.F. in January, 1938. On July 14th, 1945, the last machine was delivered to the R.A.F. at a little ceremony at Portsmouth, it being the 4,411th built by Airspeeds. In all, more than 8,000 of these machines have been built, firms such as the de Havilland Aircraft Company, the Percival Aircraft Company, and the Standard Motor Company having been in quantity production with this machine at various times and for various periods.

When it first came out, the Oxford Mark I was laid out for training in navigation, photography, bomb-aiming, air gunnery and radio, in addition to pilot training. The Mark II, introduced at a later date, had certain of the equipment of the Mark I removed, and was largely used for intermediate training in the piloting of twin-engined

aircraft. The Mark V was produced in 1942, and differed from the Mark I mainly in that it was powered by two Pratt and Whitney Wasp Junior engines instead of the Siddeley Cheetahs of the original machine.

The Oxford has been used in very large numbers in the Service Flying Training Schools in the United Kingdom, Canada, Australia, New Zealand, Southern Rhodesia, South Africa and the Middle East. It is also used as a communications aircraft, and a few have been converted into ambulances.

Gradually the Oxford will disappear from the scene, but it can look back on an honourable career, and who knows but that one day Mr. Hagg and his team may spring on the world a successor to the Oxford—when they can spare the time from their labours on the A.S.57 commercial machine on which they are now engaged.



EARLY AND LATE: The 4,411th Airspeed Oxford—the last to be made—about to be demonstrated before the Airspeed employees alongside the 7th Oxford, which was delivered to Training Command in January, 1938.

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.

TRANSATLANTIC SERVICES Surely More Than a Sideline?

YOUR comment on the news that Pan American, American Export Airlines and T.W.A. are to operate air services on the North Atlantic is that "on this side of the Atlantic we shall have a single corporation . . . to which the route to the U.S.A., is but a sideline."

If this is so, then is it not possible that Pan American's Atlantic Division will be equally a sideline to its main and extensive undertakings, existing and planned, to Latin America, the Far East, Australia and South Africa; and the Atlantic routes of the other two companies will be "sidelines" to their existing routes?

Whether one agrees or not with the recent White Paper on the administration of B.O.A.C., we should do well not to underestimate the calibre of our British merchant airmen. They have, all the year round, maintained and developed services to Africa, India, Australia and elsewhere. B.O.A.C. pilots established the first Atlantic service to fly winter and summer. For two winters they were alone on the route. To-day they are flying eleven Atlantic services a week in both directions.

Surely this is something more than a sideline?

E. LINDSAY SHANKLAND.

POST-WAR AIRCRAFT INDUSTRY "Britons Only," a Myopic Policy

MR. PRATLEY hopes "that all concerned (in the British aircraft industry) will undertake to employ only British men and women, thus making as great a contribution to the peace as they made to the war" (*Flight*, July 19th).

If all concerned adopt such a myopic policy, then so far from promoting peace they will foment war. Employment should depend upon merit. Those British men and women with merit have nothing to worry about, but I do not see why a foreigner should not be employed before a British man or woman if the foreigner offers his services, is highly capable, and if the British man or woman is unskilled.

An extreme case of particularism would be if the Lancashire mills refused to employ a Yorkshireman just because he came from a different county.

Let the British aircraft industry have the best brains and hands available, give those brains and hands the best machines, and then the industry can give to Britain the finest aircraft in the world.

M. T. MOORE.

MOORING FLYING-BOATS A Field for Special Development

I HAVE read with interest the particulars and correspondence recently published on the subject of progressive methods of facilitating the loading and unloading of the giant flying-boats of the future. Might I venture to suggest that some attention might be given to the development of methods that would enable these large aircraft to be moored or "tied up" alongside surface ships in reasonably calm waters.

This mooring facility would be a great advantage as it would allow direct transfer of goods, fuel, passengers and crew, as well as enabling repairs to motors, etc., to be done rapidly and conveniently.

The system would involve special "fending-off" devices and new warping methods. It might also be applied in some cases to piers and jetties.

W. ADAM WOODWARD.

AIRCRAFT NOISE Sudden Selection of Fine Pitch

YOUR correspondent D. R. Campbell asks for an explanation of the Harvard "roar" and also for the drop in air speed (*Flight*, June 21st).

The explanation is very simple and quite logical, namely, that the pilot is probably cruising at about 1,700-1,750 r.p.m. with, say, boost set at 27 to 30 hg. He then swiftly selects "full fine" pitch and the r.p.m. will momentarily reach 2,300 to 2,350 and then settle at approximately 2,250 as the c.s.u. regains control. The Harvard engine is attached directly to the airscrew shaft so that the Hamilton constant-speed propeller will also turn at 2,250 r.p.m. or upwards. The earsplitting roar is caused by the airscrew itself, which will have an enormously high "tip speed" at such r.p.m.

The drop in air speed is very noticeable when a sudden selection of full fine pitch is made and the pilot can be thrown sharply forward if his straps are loose.

This trick can be used to advantage when overshooting whilst in formation, but, of course, the pilot selects "throttle closed" first. The Spitfire V is also apt to lose speed very quickly if the throttle is "chopped," and a quick selection of full fine pitch is made. This trick, however, will not work at all with a Tempest V aircraft. Perhaps someone can explain why it won't.

I suggest that W. R. Campbell's "roar" is nothing more or less than a "particular pilot technique." "DICER."

Blade-tips Whip at High Revs

I AM writing a few lines in answer to a reader's complaint of the earsplitting Harvard roar published in *Flight*, June 21st.

I have worked on many types of high-powered aircraft engines, and this noise, as you know, is not experienced. But the Harvard, Reliant and others fitted with Pratt and Whitney Junior engines or Lycoming engines of the lower-powered type—namely, 450 to 650 h.p.—are not fitted with a reduction gear; the propeller is driven at crankshaft speed. This causes the tips of the blades to whip at high engine revs., as the tip speed is around the speed of sound, thus causing the "roar." It is only experienced when the pilot selects positive fine pitch, i.e., maximum r.p.m. for landings and take-off, or any other time the pilot selects maximum power.

I have tried to get more information about this, but I am afraid nobody seems to know definitely. They do not, however, condemn my theory.

S. FIELD.

EXPENSIVE SPEED

A Category Already Catered For

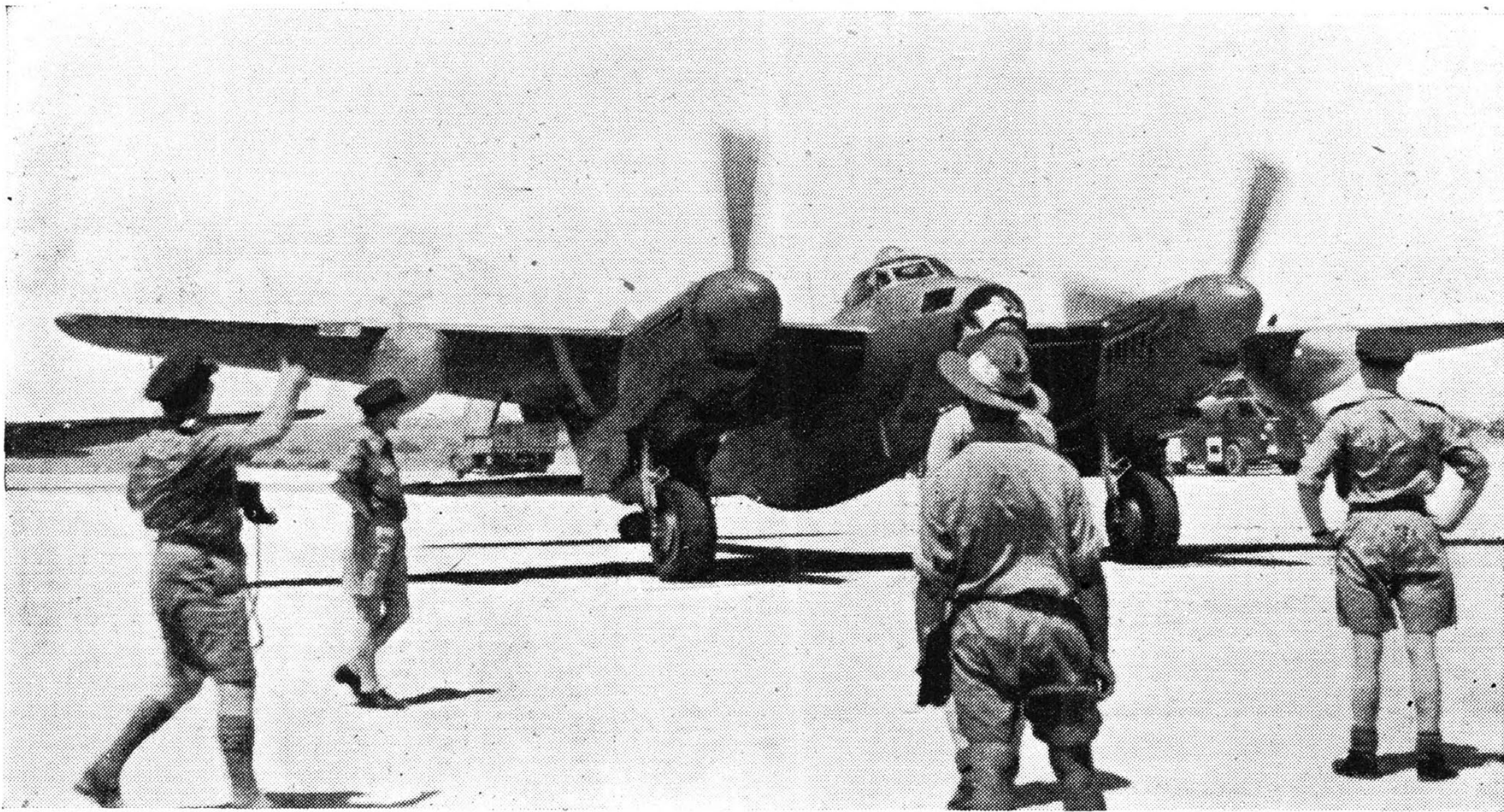
TO what useful purpose does your correspondent, Douglas Deans (*Flight*, July 12th), really wish his proposed society to direct aviation? He cannot have read many of the latest specifications at all deeply, or he would have realised that the sole purpose in every new civil transport design is to carry the maximum volume of payload—passengers or freight—as economically as possible on the specific routes for which the design is intended.

Mr. Deans appears to be mainly interested in cheap weekends on the Continent, a highly competitive field of transport. He admits that in face of good surface transport facilities, air travel which is slow is useless. Why, then, should he expect operators to run a service at a loss because he is not prepared to pay for the speed which is the aircraft's only *raison d'être* in this field? He asks why aircraft must always travel six or seven times as fast as ships when they have only ships to compete with. Surely the answer is that nobody wants to spend more than one day on a non-stop flight over a route which is normally six or seven days' travel by rail and sea.

He has plenty of scorn for the designers of the "bigger and faster" aircraft and the "gadgets" associated with them. Can he tell us how he would set about designing a transatlantic airliner with full sleeping, cooking, sanitation and recreation facilities for even twenty passengers if the trip were to extend on a very moderate comfort level over three days instead of 12 to 15 hours? I fancy he would need well over 500 h.p. per passenger to combat the adverse weather risks which would be six times more likely to be met. Could he provide reasonable sound insulation, ventilation, ice-prevention and stability without the "gadgets" he despises? Of course not, and he is wasting his time if he attempts to apply the Tudor and Brabazon I specifications to aircraft required for short routes like Renfrew to the Hebrides, which are in another category and well catered for.

One specification at least seems to have slipped his memory completely, for where could he find a modern aircraft less encumbered with "gadgets" than the Bristol 170? He has no need to enlist support for his society. It has been in existence for many years, and its membership is mainly composed of our despised designers who know not only exactly what they want, but how useless it is to argue with uninformed armchair critics who cannot assimilate even the daily news that is spoon-fed at their breakfast tables.

SEN-RAB.



Arrival at Karachi, India, of the Mosquito which flew the 4,700 miles from Benson, Oxfordshire, in 12 hr. 25 min. It was piloted by Sq. Ldr. K. J. Newman, and W/O. R. E. Smith was the navigator. Three other standard reconnaissance Mosquitoes did the same journey in less than 13 hr.



SERVICE AVIATION



Royal Air Force and Naval Air Arm News and Announcements

Appointments

THE Air Ministry announces the following appointments:—

Air Commodore John Nelson BOOTHMAN, C.B., D.F.C., A.F.C., to be Assistant Chief of the Air Staff (Technical Requirements) and to be Acting Air Vice-Marshal.

Air Commodore George Robert BEAMISH, C.B., C.B.E., to be Air Officer Commanding No. 45 Group and to be Acting Air Vice-Marshal.

Air Vice-Marshal Boothman, C.B., D.F.C., A.F.C., has been in command of the Aeroplane and Armament Experimental Establishment since July, 1944, and before that he was Air Officer Commanding a Coastal Command P.R. Group and had served in the Directorate of Operational Requirements at the Air Ministry.

In 1918 he served as a voluntary motor driver to the French Red Cross in the Balkans, and for this he was awarded the Croix de Guerre. He took a short service commission in the R.A.F. in 1921, and was granted a permanent commission in 1926. He was a member of the British Schneider Trophy team in 1931, and was awarded the A.F.C. for his share in winning the trophy outright for Great Britain. He commanded No. 44 Squadron during the early months of the war, before being posted to the Air Ministry in December, 1939, on fighter operations duties.

Air Vice-Marshal Beamish, C.B., O.B.E., was appointed A.O.C. No. 44 Group in December, 1943. He was Senior Air Staff Officer of the North-Western Africa Tactical Air Force early in 1943, and previously he had commanded the R.A.F. in Crete and a bomber wing in Egypt.

Awards

THE KING has been graciously pleased to approve the following appointments in recognition of distinguished service in connection with the operations in North-West Europe and Italy:—

C.B.

Air Vice-Marshal R. S. AITKEN, C.B.E., M.C., A.F.C.
Air Vice-Marshal C. B. COOKE, C.B.E.
Air Vice-Marshal R. M. FOSTER, C.B.E., D.F.C.

K.B.E.

Act. Air Marshal C. R. CARR, C.B., C.B.E., D.F.C., A.F.C.
Act. Air Marshal L. N. HOLLINGHURST, C.B., C.B.E., O.B.E., D.F.C.

Act. Air Vice-Marshal H. BROADHURST, C.B., D.S.O., D.F.C., A.F.C.
Act. Air Vice-Marshal B. E. EMBRY, C.B., D.S.O., D.F.C., A.F.C.

C.B.E.

Air Vice-Marshal W. F. DICKSON, C.B., D.S.O., O.B.E., A.F.C.
Act. Air Vice-Marshal V. E. GROOM, C.B., O.B.E., D.F.C.

Air Comdre. C. L. FALCONER, O.B.E.
Air Comdre. F. L. PEARCE, D.S.O., D.F.C.
Act. Air Comdre. R. L. R. ATCHERLEY, O.B.E., A.F.C.

THE KING has been graciously pleased to approve the following appointments in recognition of gallant and distinguished service in Burma:—

C.B.

Act. Air Vice-Marshal the Earl of BANDON, D.S.O.

Air Comdre. J. D. I. HARDMAN, O.B.E., D.F.C.

K.B.E.

Act. Air Marshal W. A. CORYTON, C.B., M.V.O., D.F.C.

C.B.E.

Act. Air Comdre. G. H. VASSE.

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

O.B.E.

F/O. G. HOBBS, R.A.F.V.R.
P/O. H. E. GOLDSTRAW, R.C.A.F., No. 425 Sqn.
W/O. J. H. F. CUTLER, R.A.F.V.R., No. 9 Sqn.
W/O. H. D. RANDELL, R.A.A.F., No. 10 Sqn.
Flt. Lt. G. T. CHINCEHEM, D.F.C., R.A.A.F., No. 3 Sqn.
Flt. Lt. R. H. LUCKY, M.C., R.A.F.V.R., No. 311 Sqn.
Flt. Lt. F. L. RIPPINGALE, R.A.F.V.R., No. 45 Sqn.

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

Distinguished Service Order

Act. Wing Cdr. R. G. DUTTON, D.F.C., R.A.F.O., No. 512 Sqn.—This officer was detailed to lead the glider train comprising well over 400 tug and glider combinations which conveyed members of the airborne division concerned to a point between Weser and Emmerich in March, 1945. Keenly aware of the responsibility entrusted to him, Wing Cdr. Dutton led this great force with

skill and good judgment to the battle area. First to reach the zone, his tug glider combination was subjected to heavy fire, but he flew straight and steady to the landing zone several miles behind the enemy's lines. Only when sure that the glider could reach the objective would he give the order to release. This officer displayed skill, courage and devotion to duty of the highest order.

Lt. Col. P. S. JOUBERT, A.F.C., S.A.A.F., No. 271 Sqn.—This officer has a fine operational record. He has displayed the highest qualities of skill, courage and leadership, and his example has been well reflected in the efficiency of the squadron he commands. He has taken part in three airborne operations, including the Rhine crossing. In these undertakings his work has been outstanding. In addition to his work in the air against the enemy, Lt. Col. Joubert has rendered yeoman service in the training of other members of the squadron.

Act. Sq. Ldr. F. FINNEY, R.A.F.V.R., No. 114 Sqn.—In February, 1945, this officer completed a successful night bombing attack on the marshalling yards at San Giovanni. Proceeding to reconnoitre roads and railways in the vicinity, he attacked six barges at low level. His aircraft was damaged by fire from the ground defences and set on fire. Sq. Ldr. Finney gave an order to abandon aircraft, but, owing to the failure of the inter-communication system, was unable to ascertain whether all members of the crew had been able to comply. He therefore judged it his duty not to leave the aircraft, but to try to reach friendly territory. During the fight the intense heat melted parts of the equipment, so that the aircraft became very difficult to control. Despite the danger, and deprived of the services of his navigator, Sq. Ldr. Finney flew back to a landing ground and made a safe landing by night a full hour after the outbreak of the fire. It was then found that two members of the crew had jumped when ordered and that the body of the air gunner was still in the charred fuselage. Sq. Ldr. Finney displayed great courage and skill throughout the perilous return flight, when his aircraft was a brightly lit target for the enemy. He had previously completed 30 operational sorties with gallantry and determination.

Act. Wing Cdr. P. L. CHILTON, D.F.C., A.F.C., R.A.F., No. 149 Sqn.—Wing Cdr. Chilton was pilot and captain of an aircraft detailed to lead a bomber force in a daylight attack against Bremen in April, 1945. To ensure success, a high degree of accuracy was essential owing to

SERVICE AVIATION

the presence of our ground forces in the vicinity. When passing over Wilhelmshaven, Wing Cdr. Chilton's aircraft was hit. The starboard aileron was rendered almost ineffective, the hydraulic system was made unserviceable, and petrol commenced to leak from the tank in the starboard wing. Although the aircraft became difficult to control, Wing Cdr. Chilton maintained his position in the formation and went on to execute a successful attack. He afterwards flew the damaged aircraft safely back to base. This officer, who has completed many sorties on his third tour of operational duty, set a splendid example of skill, courage and tenacity throughout.

Second Bar to Distinguished Flying Cross

Flt. Lt. F. A. O. GAZE, D.F.C., R.A.F.V.R., No. 610 Sqn.
 Flt. Lt. A. N. CROOKES, D.F.C., R.A.F.V.R., No. 488 (R.N.Z.A.F.) Sqn.

Bar to Distinguished Flying Cross

Sqn. Ldr. J. D. MITCHNER, D.F.C., R.C.A.F., No. 416 Sqn.
 Act. Sqn. Ldr. C. M. RAMSEY, D.F.C., R.A.F.V.R., No. 264 Sqn.
 Flt. Lt. R. D. SCHULTZ, D.F.C., R.C.A.F., No. 410 (R.C.A.F.) Sqn.
 Sqn. Ldr. W. E. SCHRADER, D.F.C., R.N.Z.A.F., No. 486 (R.N.Z.A.F.) Sqn.
 Act. Sqn. Ldr. J. R. CULLEN, D.F.C., R.N.Z.A.F., No. 183 Sqn.
 Act. Sqn. Ldr. P. W. E. HEPPELL, D.F.C., R.A.F.V.R., No. 118 Sqn.
 Act. Sqn. Ldr. R. G. GRAY, D.F.C., R.C.A.F., No. 418 (R.C.A.F.) Sqn.
 Flt. Lt. D. R. CAMPBELL, D.F.C., R.C.A.F., No. 196 Sqn.
 Maj. F. K. WEINGARTZ, D.F.C., S.A.A.F., No. 250 Sqn.
 Flt. Lt. J. P. W. CARRNS, D.F.C., R.A.F.V.R., No. 488 (N.Z.) Sqn.
 Flt. Lt. K. A. RICHARDS, D.F.C., R.A.A.F., No. 3 (R.A.A.F.) Sqn.
 Act. Sqn. Ldr. R. D. HEMPHILL, D.F.C., R.C.A.F., No. 425 (R.C.A.F.) Sqn.
 Act. Sqn. Ldr. R. EDMUND, D.F.C., A.F.C., R.A.F.V.R., No. 226 Sqn.
 Flt. Lt. E. H. STROM, D.F.C., R.A.A.F., No. 450 (R.A.A.F.) Sqn.
 Maj. J. E. GASSON, D.S.O., D.F.C., S.A.A.F., No. 92 Sqn.
 Act. Flt. Lt. J. G. ELDRIDGE, D.F.C., R.A.F.V.R., No. 166 Sqn. (since deceased).
 F/O. J. N. THOMAS, D.F.C., R.A.F., No. 613 Sqn.
 Flt. Lt. J. MACKAY, D.F.C., R.C.A.F., No. 401 (R.C.A.F.) Sqn.
 Act. Sqn. Ldr. A. C. BRAY, D.F.C., R.N.Z.A.F., No. 7 Sqn.
 Flt. Lt. H. J. SHEILD, D.F.C., R.N.Z.A.F., No. 105 Sqn.

Distinguished Flying Cross

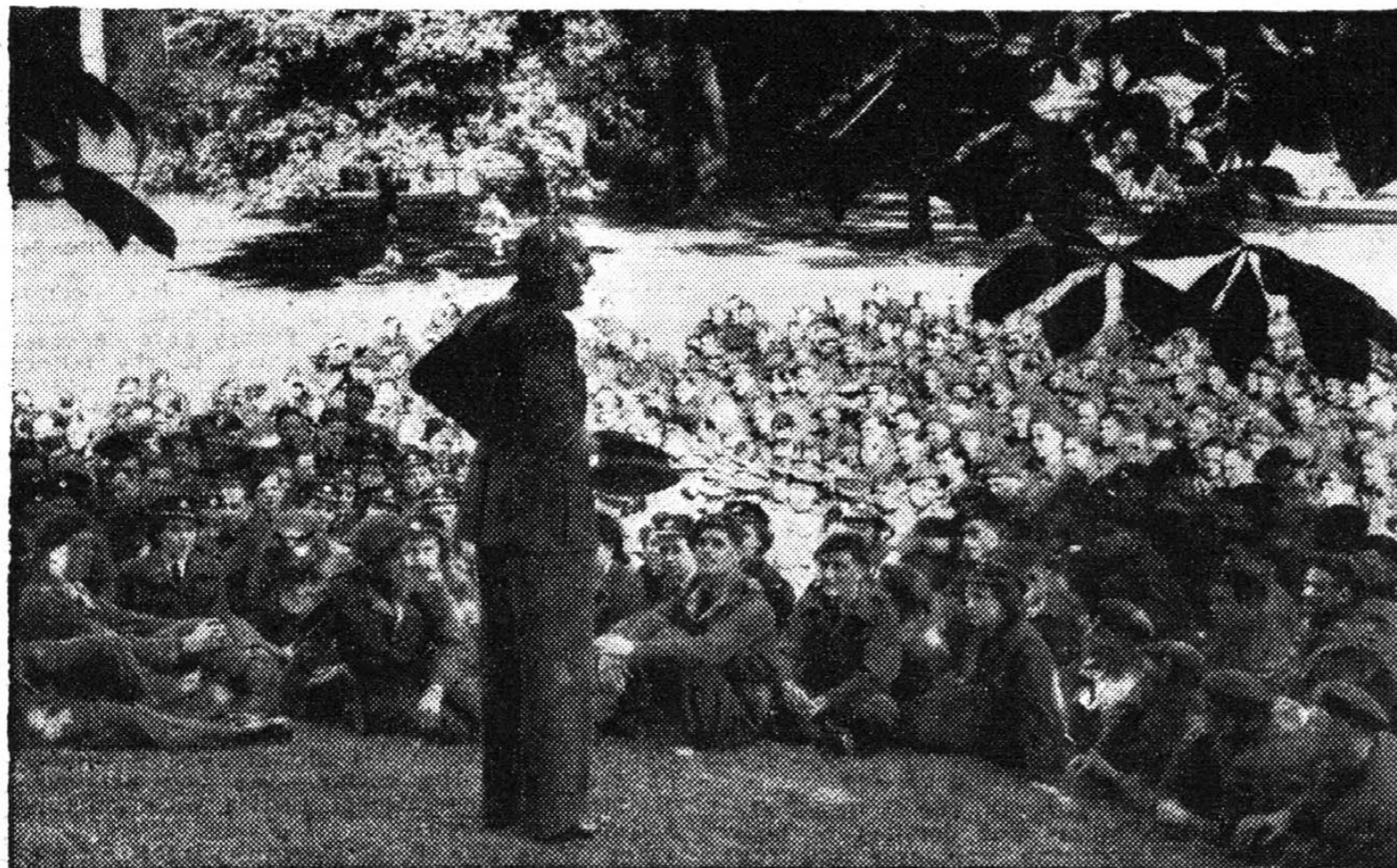
Flt. Lt. I. G. HANDYSIDE, R.A.F.V.R., No. 184 Sqn.
 Flt. Lt. J. LOMAS, R.A.F., No. 25 Sqn.
 Flt. Lt. J. C. R. WATERHOUSE, R.A.F.V.R., No. 602 Sqn.
 Act. Flt. Lt. H. G. INNES, R.A.F.V.R., No. 156 Sqn. (since deceased).

Act. Flt. Lt. J. W. STAYMAN, R.A.F.V.R., No. 211 Sqn.
 Act. Flt. Lt. L. S. WEBB, R.A.F.V.R., No. 97 Sqn. (since deceased).
 F/O. J. H. NEWBERY, R.A.F.V.R., No. 357 Sqn.
 F/O. F. C. REED, R.A.F.V.R., No. 57 Sqn. (since deceased).
 F/O. J. E. WALTON, R.A.F.V.R., No. 241 Sqn. (since deceased).
 P/O. C. FULLER, R.A.F.V.R., No. 619 Sqn. (since deceased).
 Act. Sqn. Ldr. P. S. OSBORNE, R.A.F.V.R., No. 619 Sqn.
 F/O. D. J. DAVIES, R.A.A.F., No. 619 Sqn.
 Flt. Lt. D. B. BRETHERTON, R.A.F.V.R., No. 106 Sqn.
 Act. Flt. Lt. G. COLEMAN, D.F.M., R.A.F.V.R., No. 139 Sqn.
 Act. Flt. Lt. R. V. OSTLER, R.A.F.V.R., No. 15 Sqn.
 Sqn. Ldr. D. S. PAIN, R.A.F.O., No. 89 Sqn.
 Act. Sqn. Ldr. P. A. KENNEDY, R.A.F.V.R., No. 4 (R.I.A.F.) Sqn.
 Act. Sqn. Ldr. P. R. VINCENT, R.A.F.O., No. 156 Sqn. (since deceased).
 Flt. Lt. N. B. FLEET, R.A.F.V.R., No. 25 Sqn.
 Act. Wing Cdr. M. E. BLACKSTONE, R.A.F.V.R., No. 165 Sqn.
 Act. Sqn. Ldr. J. A. SOWREY, R.A.F., No. 131 Sqn.
 Act. Flt. Lt. C. E. PETERS, R.A.F.V.R., No. 77 Sqn.
 Capt. W. J. REA, S.A.A.F., No. 102 Sqn.
 F/O. R. A. BOGGIANO, R.A.F.V.R., No. 156 Sqn.
 F/O. W. MCH. DAVIDSON, R.A.F.V.R., No. 550 Sqn.
 F/O. W. F. KEELER, R.A.F.V.R., No. 156 Sqn.
 Flt. Lt. J. E. BENNETT, R.A.F.V.R., No. 29 Sqn.
 F/O. L. C. WILSON, R.A.A.F., No. 626 Sqn.
 W/O. P. A. BARKER, R.A.F.V.R., No. 524 Sqn.
 W/O. W. C. WINDSOR, R.A.F., No. 524 Sqn.
 Act. F/O. G. B. HAMPSON, R.A.F.V.R., No. 156 Sqn. (For citation see Sgt. D. R. Bowers, C.G.M.)
 P/O. R. B. VAN METRE, R.C.A.F., No. 405 (R.C.A.F.) Sqn. (For citation see W/O. A. Robb, C.G.M.)
 Act. Sqn. Ldr. T. C. RIGLER, D.F.M., R.A.F.V.R., No. 603 Sqn.
 Act. Major R. P. MARTIN, S.A.A.F., No. 115 Sqn.
 F/O. D. H. ROBERTS, R.A.F.V.R., No. 12 Sqn.
 Flt. Lt. D. D. CARROW, R.A.F.V.R., No. 298 Sqn.
 Flt. Lt. R. A. WIGELSWORTH, R.A.F.V.R., No. 29 Sqn.
 F/O. S. T. BLOOMFELD, R.A.F.V.R., No. 29 Sqn.
 F/O. J. T. G. DAVIES, R.A.F.V.R., No. 298 Sqn.
 F/O. D. C. EVA, R.A.F.V.R., No. 165 Sqn.
 Act. Sqn. Ldr. G. E. WILLIS, R.A.F.V.R., No. 524 Sqn.
 Flt. Lt. H. G. PROUDMAN, R.A.F.V.R., No. 601 Sqn.
 Act. Flt. Lt. G. T. CRAVEN, D.F.M., R.A.F.V.R., No. 19 (S.A.A.F.) Sqn.
 Act. Flt. Lt. D. L. MILLAR, R.A.A.F., No. 450 (R.A.A.F.) Sqn.
 F/O. G. D. SHUTTLEWOOD, R.A.F.V.R., No. 612 Sqn.
 Lt. J. R. WATSON, S.A.A.F., No. 114 Sqn.
 W/O. S. W. HOLMES, R.A.A.F., No. 454 (R.A.A.F.) Sqn.
 Sqn. Ldr. R. BURRELL, A.A.F., No. 105 Sqn.

Act. Sqn. Ldr. R. S. BOAST, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
 Act. Sqn. Ldr. J. CRAMPTON, R.A.F.V.R., No. 76 Sqn.
 Act. Sqn. Ldr. P. J. DUNCAN, A.F.C., R.A.F.V.R., No. 128 Sqn.
 Act. Sqn. Ldr. B. R. W. FORSTER, R.A.F.V.R., No. 195 Sqn.
 Act. Sqn. Ldr. W. H. GORDON, R.A.F.V.R., No. 189 Sqn.
 Act. Sqn. Ldr. W. H. HAMMOND, R.A.F.V.R., No. 625 Sqn.
 Act. Sqn. Ldr. D. G. JOHNSON, A.F.C., R.A.F.V.R., No. 608 Sqn.
 Act. Sqn. Ldr. J. N. OWEN, R.A.F., No. 105 Sqn.
 Flt. Lt. A. ALLNUTT, R.A.F.V.R., No. 223 Sqn.
 Flt. Lt. P. J. ATKINS, R.A.F.V.R., No. 115 Sqn.
 Flt. Lt. A. A. BOWLEY, R.A.F.V.R., No. 109 Sqn.
 Flt. Lt. R. M. B. CAIRNS, R.A.F.V.R., No. 582 Sqn.
 Flt. Lt. M. R. J. CHETWYND-STAPYLTON, R.A.F.V.R., No. 128 Sqn.
 Flt. Lt. R. K. FOULKES, R.A.F.V.R., No. 630 Sqn.
 Flt. Lt. J. HARRIS, R.A.F.V.R., No. 550 Sqn.
 Flt. Lt. T. S. HARRIS, R.A.F.V.R., No. 156 Sqn.
 Flt. Lt. K. C. HUDSON, R.A.F.V.R., No. 115 Sqn.
 Flt. Lt. D. L. JONES, R.A.F.V.R., No. 77 Sqn.
 Flt. Lt. G. T. S. JONES, R.A.F.V.R., No. 571 Sqn.
 Flt. Lt. W. R. LEA, R.A.F.V.R., No. 186 Sqn.
 Flt. Lt. M. F. A. MALTIN, R.A.F.V.R., No. 550 Sqn.
 Flt. Lt. D. J. MANNING, R.A.F.V.R., No. 10 Sqn.
 Flt. Lt. D. P. J. MONK, R.A.F.V.R., No. 571 Sqn.
 Flt. Lt. J. MORTON, R.A.F.V.R., No. 608 Sqn.
 Flt. Lt. G. A. NICHOLLS, R.A.F.V.R., No. 139 Sqn.
 Flt. Lt. H. R. OSBORNE, R.A.F.V.R., No. 571 Sqn.
 Flt. Lt. H. T. PADDISON, R.A.F.V.R., No. 635 Sqn.
 Flt. Lt. C. M. ROSTRON, R.A.F.V.R., No. 109 Sqn.
 Flt. Lt. P. J. SLINGSBY, R.A.F.V.R., No. 105 Sqn.
 Flt. Lt. J. W. G. SMITH, R.A.F.V.R., No. 128 Sqn.
 Flt. Lt. N. G. TESTER, R.A.F.V.R., No. 582 Sqn.
 Flt. Lt. F. J. TRUEMAN, R.A.F.V.R., No. 100 Sqn.
 Flt. Lt. A. G. WHITE, R.A.F., No. 142 Sqn.
 Flt. Lt. D. A. WHITE, R.A.F., No. 102 Sqn.
 Flt. Lt. J. WHITE, R.A.F.V.R., No. 233 Sqn.
 Flt. Lt. J. L. WHITWORTH, R.A.F.V.R., No. 162 Sqn.
 Flt. Lt. P. F. WINGATE, R.A.F.V.R., No. 619 Sqn.
 Flt. Lt. G. M. YOUNG, R.A.F.V.R., No. 150 Sqn.
 Act. Flt. Lt. K. ALLERSTON, R.A.F.V.R., No. 35 Sqn.
 Act. Flt. Lt. G. BATES, R.A.F.V.R., No. 218 Sqn.
 Act. Flt. Lt. P. I. BRIGGS, R.A.F.V.R., No. 171 Sqn.
 Act. Flt. Lt. R. L. BROWN, R.A.F.V.R., No. 582 Sqn.
 Act. Flt. Lt. S. M. BYRNE, R.A.F.V.R., No. 433 (R.C.A.F.) Sqn.
 Act. Flt. Lt. P. COGGAN, R.A.F.V.R., No. 35 Sqn.
 Act. Flt. Lt. F. W. T. CROSS, R.A.F.V.R., No. 35 Sqn.
 Act. Flt. Lt. D. J. DAWE, R.A.F.V.R., No. 635 Sqn.
 Act. Flt. Lt. W. H. DIMENT, R.A.F.V.R., No. 192 Sqn.
 Act. Flt. Lt. J. R. DOWLING, R.A.F.V.R., No. 115 Sqn.
 Act. Flt. Lt. S. J. ELIISON, R.A.F.V.R., No. 195 Sqn.
 Act. Flt. Lt. E. J. FRANCIS, R.A.F.V.R., No. 102 Sqn.
 Act. Flt. Lt. J. H. L. FRENCH, R.A.F.V.R., No. 15 Sqn.
 Act. Flt. Lt. N. D. FULLER, R.A.F.V.R., No. 195 Sqn.
 Act. Flt. Lt. J. H. W. GIBSON, R.A.F.V.R., No. 186 Sqn.
 Act. Flt. Lt. J. T. W. GRAY, R.A.F.V.R., No. 622 Sqn.
 Wing Cdr. A. W. LANGTON, A.F.C., R.A.F.O., No. 464 (R.A.A.F.) Sqn.
 Act. Sqn. Ldr. E. H. DUNKLEY, R.A.A.F., No. 464 (R.A.A.F.) Sqn.
 Act. Sqn. Ldr. W. J. HIBBERT, R.A.F.V.R., No. 274 Sqn.
 Flt. Lt. P. S. BARTON, R.C.A.F., No. 400 (R.C.A.F.) Sqn.
 Flt. Lt. E. A. HOLBECH, R.A.F.V.R., No. 2 Sqn.
 Flt. Lt. C. F. B. STEVENS, R.C.A.F., No. 430 (R.C.A.F.) Sqn.
 F/O. W. G. JUDSON, R.N.Z.A.F., No. 487 (N.Z.) Sqn.
 Flt. Lt. F. H. FODEN, R.A.F., No. 272 Sqn. (since deceased).
 Flt. Lt. G. R. S. MCKAY, R.A.F.V.R., No. 145 Sqn.
 Flt. Lt. J. MILLER, R.A.F.V.R., No. 272 Sqn.
 Flt. Lt. D. P. SAMPSON, R.A.F.V.R., No. 111 Sqn.
 Act. Flt. Lt. N. B. REAY, R.A.F.V.R., No. 178 Sqn.
 F/O. H. F. BURDITT, R.A.F. (Lt., Royal Regiment of Artillery), No. 293 Sqn.
 F/O. S. P. JOHNSON, B.E.M., R.A.F.V.R., No. 682 Sqn.
 F/O. G. C. NICHOLS, R.A.F.V.R., No. 249 Sqn.
 P/O. W. J. MONTGOMERY, R.A.F.V.R., No. 178 Sqn.
 P/O. R. W. MORRIS, R.A.F.V.R., No. 178 Sqn.



Badge of No. 801 Squadron, Naval Air Arm. "On les Aura" (We'll get them). On a white field, a trident erect blue, winged proper.



WINDING UP A GOOD CONCERN: Air Marshal Sir Arthur Coningham saying goodbye to the airmen and airwomen of his H.Q. staff on the disbanding of 2nd T.A.F.

P/O. A. G. STEVENS, R.A.F.V.R., No. 293 Sqn.
 Act. Flt. Lt. W. J. BUCHAN, R.C.A.F., No. 12 Sqn.
 F/O. R. G. SCREEN, R.A.F.V.R., No. 550 Sqn.
 F/O. W. O. SIMPSON, R.C.A.F., No. 170 Sqn.
 Act. Sqn. Ldr. H. E. MARTINEAU, R.A.F.O., No. 211 Sqn.
 Flt. Lt. J. M. FARQUHARSON, R.A.F.V.R., No. 20 Sqn.
 Flt. Lt. J. D. COMPTON, R.A.F.V.R., No. 247 Sqn.
 W/O. D. H. MANN, R.N.Z.A.F., No. 489 (N.Z.) Sqn.
 Flt. Lt. R. A. CLARKE, R.A.F.V.R., No. 159 Sqn.
 Sqn. Ldr. F. O. BARRETT, R.A.F., No. 305 Sqn.
 Act. Sqn. Ldr. D. G. T. R. HAYES, R.A.F.
 Flt. Lt. T. HELPER, R.A.F.V.R., No. 161 Sqn.
 Flt. Lt. T. D. MACMILLAN, R.A.F.V.R., No. 635 Sqn.
 Act. F/O. J. H. JACKSON, R.A.A.F., No. 57 Sqn.
 Wing Cdr. F. R. SHARP, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
 Act. Sqn. Ldr. R. R. MONK, R.A.F.V.R., No. 174 Sqn.

Conspicuous Gallantry Medal (Flying)

Sgt. D. R. BOWERS, R.A.F.V.R., No. 156 Sqn.—Sgt. Bowers and Flt. Sgts. Mann and Reynolds were flight engineer, rear gunner and second navigator respectively in an aircraft piloted by F/O. Hampson detailed to attack Harpenerweg. When nearing the target the aircraft was hit by anti-aircraft fire. Sgt. Bowers was severely wounded in the leg. In spite of this he remained at his post. Almost immediately another shell burst underneath the aircraft and caused extensive damage. The bomb bay was wrecked. A fire started and the fuselage became filled with smoke. The aircraft began to lose height and it seemed as though it would have to be abandoned, but F/O. Hampson succeeded in regaining control. Just then the aircraft was again hit. Sgt. Bowers sustained further injury. His leg was almost severed. Whilst F/O. Hampson was taking evasive action, Flt. Sgts. Mann and Reynolds went to the assistance of their badly wounded comrade to whom first-aid was given. Afterwards they did everything possible to assist their pilot and captain in his endeavour to fly the crippled aircraft home. Grievously wounded as he was, Sgt. Bowers also fully determined to be of assistance. After dragging himself nearer to the instrument panel he kept his pilot advised of the fuel position and gave directions regarding the changing of the respective fuel tanks. Finally F/O. Hampson reached an airfield. The bomb doors were open. The hydraulic gear and the flaps were unserviceable. Nevertheless, the undercarriage was lowered by means of the emergency system and F/O. Hampson brought the severely damaged aircraft safely down. This officer displayed the finest qualities of skill, courage and coolness. Flt. Sgts. Mann and Reynolds gallantly supported their captain and their conduct throughout was exemplary. Sgt. Bowers, though grievously injured, set a magnificent example of courage, fortitude and devotion to duty. His example will long be remembered.

W/O. A. ROBB, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.—P/O. Van Metre and W/O. Robb were wireless operator and mid-upper gunner respectively in an aircraft detailed to attack Dessau. Whilst over the target the aircraft was attacked by three enemy fighters. The first enemy aircraft to attack was shot down by the rear gunner. W/O. Robb engaged the second fighter. Following a short but accurate burst of fire from his guns the enemy aircraft fell to the ground. The remaining fighter attacked with great persistence. The rear gun-turret of the bomber was badly hit and set on fire. The rear gunner was trapped. P/O. Van Metre and W/O. Robb, displaying the greatest determination, immediately went to the assistance of their trapped comrade. By their joint efforts, these crew members finally extinguished the flames and extricated the rear gunner from the gun turret. P/O. Van Metre had severely burned his hands. In spite of much pain he returned to his post to work at his wireless apparatus throughout the return flight. P/O. Van Metre and W/O. Robb set a fine example of courage and resolution in very trying circumstances.

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

Military Cross

F/O. J. S. MILLAR, No. 2781 Sqn., R.A.F. Regt.
 Act. Sqn. Ldr. N. F. MCMICHAEL, R.A.F.V.R., R.A.F. Regt.
 Flt. Lt. H. A. NOCK, R.A.F.V.R., No. 51 Sqn.
 Flt. Lt. R. G. JOHNSON, R.C.A.F., No. 28 Sqn.

Distinguished Service Cross

F/O. B. W. AHEARN, R.A.F.

Military Medal

Cpl. T. H. ELLERTON, R.A.F.
 L.A/C. A. OLIVER, R.A.F.V.R.
 Cpl. G. H. WINGATE, R.A.F.V.R., R.A.F. Regt.
 L.A/C. P. L. WARD, R.A.F.V.R., R.A.F. Regt.
 W/O. L. J. S. BROWN, R.N.Z.A.F.
 Flt. Sgt. (now P/O.) I. R. C. INNES, R.A.A.F.
 Sgt. (now W/O.) C. ROFE, R.A.F.V.R., No. 40 Sqn.
 Sgt. B. R. KEY, R.A.F.V.R., No. 268 Sqn.

R.O.C. STAND DOWN :

The presentation of a cup from the Royal Air Force, by Air Marshal Sir N. B. Bottomley, Dep. Chief of Air Staff, to Air Comdre Finlay-Crerar, Commandant of the Royal Observer Corps.



Roll of Honour

Casualty Communiqué No. 528.

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 these 148 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. E. W. Bradshaw; Sgt. R. Campbell; Flt. Sgt. C. Chesnutt; Sgt. R. G. Crollie; Sqn. Ldr. V. J. Fenwick; Flt. Sgt. P. H. Field; Sgt. C. H. Finch; Sgt. G. L. Harris; Sgt. C. R. Hazelby; Sgt. J. G. Lynch; Sgt. C. J. Pettitt; F/O. J. W. Pierce; Sgt. P. G. Roberts; Sgt. S. Sampson; F/O. J. D. Walker.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. G. H. Moggridge; Sgt. S. Scott.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. F. Allen; Sgt. E. A. Anthony; Sgt. D. Armstrong; Sgt. D. A. Barber; Flt. Sgt. A. D. Barnett; Flt. Lt. D. A. Bell; Flt. Sgt. L. E. Bliss; F/O. P. W. Booth-Smith; P/O. J. Brodie; Sgt. F. J. Burton; Flt. Sgt. H. D. Cawson; Sgt. J. W. Churchman; W/O. P. P. Cowan; Sgt. C. H. Crosbie; Sgt. A. P. Curran; Sgt. P. M. Davies; P/O. J. Dudman; Flt. Sgt. T. P. Fenwick; F/O. C. L. Fox; Flt. Sgt. R. T. Gosling; Sgt. P. W. Groom; Sgt. J. A. Helliwell; Sgt. L. J. Hambly; Sgt. C. A. Hargood; F/O. R. T. Hayes; Flt. Sgt. G. T. Haynes; Sgt. P. K. Heller; Flt. Sgt. J. W. Hern; F/O. A. J. Hewetson; Sgt. R. D. Howard; F/O. M. H. Hughes; P/O. S. B. Ingram; Flt. Lt. F. A. Kent; Sgt. K. J. Kinchington; F/O. F. Levy; Sgt. C. F. Lewis; Sgt. C. Lidgitt; Flt. Sgt. G. M. McGuire; Sgt. C. C. McKenna; Sgt. R. Mansbridge; Sgt. P. G. Mellor; Flt. Sgt. S. Melors; W/O. E. Mercer; Sgt. P. Monck; Flt. Sgt. J. F. J. Murray; F/O. J. F. Naylor; Sgt. R. Openshaw; Sgt. G. O. Parker; Sgt. V. T. A. Patey; Flt. Sgt. E. E. S. Peck; W/O. W. G. Penman; F/O. T. H. Prickett; Flt. Sgt. R. A. Read; Sgt. F. A. Saunders; Flt. Lt. C. B. Scott; F/O. D. C. Shea, D.F.C.; Sgt. E. K. Slatery; Sgt. D. G. Smith; Sgt. E. C. Sparkes; Sgt. O. W. Sporne; P/O. W. Stead; F/O. F. Stevens; Flt. Sgt. E. C. Stevenson; Flt. Sgt. N. H. Sutton; Sgt. W. C. Taylor; Flt. Sgt. D. G. Thomas; Sgt. K. Thompson; Sgt. W. J. Throsby; Sgt. A. S. J. Tollit; Sgt. W. E. Topping; P/O. H. H. Tuck; Sgt. W. Wallace; Sgt. W. A. F. Watson; Sgt. S. A. West; Sgt. H. F. Willcocks; F/O. J. R. H. Willson; Flt. Sgt. J. L. Wilson; Flt. Lt. G. R. Wood; Sgt. L. A. Wood; Sgt. H. H. Wooding; F/O. A. E. Wraight.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. W. Raine.

WOUNDED OR INJURED IN ACTION.—Sgt. M. J. Shearman.

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

MISSING, BELIEVED KILLED IN ACTION.—Sgt. W. Andrews; Sgt. S. W. Argent; W/O. J. H. Coates; Sqn. Ldr. B. V. Draper, D.F.C.; F/O. K. Dutton; W/O. W. H. Holliss; W/O. P. R. James; Sgt. D. R. Lewis; Flt. Sgt. W. R. Riddle; Sgt. J. A. Robinson.

MISSING.—Sgt. W. Absalom;

Flt. Lt. B. J. Aldous; Flt. Sgt. F. J. Amey; Sgt. D. W. S. Amps; Sgt. S. A. Ancell; Sgt. W. G. Austen; Sgt. R. Bailey; Sgt. D. J. Bates; W/O. R. Best; F/O. A. F. Biggs; P/O. S. Birch; Sgt. W. Brewer; Sgt. D. C. R. Burnell; Flt. Sgt. H. Callaghan; Sgt. W. A. A. Chatters; Flt. Sgt. J. T. Cockburn; Sgt. McA. Coles; Flt. Sgt. D. F. Cook; Flt. Lt. F. W. Cooper; Sgt. E. P. Coutts; F/O. J. D. Craven; Flt. Sgt. H. McK. Currie; Sgt. A. J. Deverell; Sgt. T. Dixon; Sgt. T. E. Drennan; Sgt. B. J. Dye; F/O. T. Dykins; Sqn. Ldr. C. D. Erasmus, D.F.C.; F/O. R. L. S. Farquharson;

Sgt. J. Fitzpatrick; P/O. C. Foy; F/O. H. W. Fuller; Sgt. W. H. C. Fuller; W/O. H. A. Hall; Flt. Sgt. C. A. Hamill; Sgt. D. U. Hart; Sgt. R. G. Hodgson; W/O. T. F. Hunter; Flt. Sgt. B. Jackson; Sgt. A. A. James; Flt. Sgt. D. E. Johnson; Flt. Sgt. R. Johnson; Sgt. W. A. M. Johnstone; Flt. Sgt. W. S. Jones; Sgt. P. Kane; F/O. D. W. King; F/O. T. H. B. Kirkby; Flt. Sgt. P. G. Laurence; Flt. Sgt. J. A. Leigh; Sgt. P. Looms; Sgt. A. S. Lorimer; Sgt. L. R. J. Lucas; F/O. D. P. F. McCaig; Sgt. W. K. MacCallum; Sgt. A. G. McKenzie; Flt. Sgt. J. Mahoney; F/O. W. S. J. Moore; Sgt. K. L. Mowl; Flt. Sgt. R. E. O'Neill; P/O. C. D. Palmer; F/O. T. Pawsey; F/O. S. A. Pearce; Flt. Sgt. W. C. Pilkington; F/O. K. G. Powell; Sgt. S. Power; Flt. Sgt. G. A. R. Pritchard; Sgt. R. V. Rands; Flt. Lt. F. H. Ridgewell; Sgt. R. L. Rogers; Sgt. G. E. Rolls; Sgt. S. G. Rother; Flt. Lt. L. H. Scargill, D.F.C.; Flt. Sgt. J. Scott; F/O. B. L. Sims; Flt. Sgt. A. Smee; Flt. Sgt. R. V. Smith; Sgt. B. L. Smout; P/O. R. South; Flt. Lt. A. C. Stark; Sgt. J. Taylor; Flt. Sgt. L. Thomas; F/O. P. E. Thompson, D.F.C.; W/O. R. D. Toynton; Flt. Sgt. M. Venton; F/O. W. K. Watson; Sgt. R. H. Wiltshire.

KILLED ON ACTIVE SERVICE.—Flt. Lt. J. C. Blair; Sgt. P. J. Bourke; L.A/C. W. Briggs; L.A/C. R. W. Davis; Flt. Sgt. A. R. Edwards; Flt. Lt. A. S. J. Fardell; Cpl. T. J. Garred; F/O. R. A. C. Green; P/O. J. G. Howell, D.F.C.; A/C2 A. J. McL. Keay; Sgt. F. C. Leonard; Flt. Lt. J. M. Robertson; Sgt. F. Turner; W/O. C. Wagstaff; Cpl. N. Whyvel; F/O. S. C. Willis.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C2 E. O. W. Bradbury; Flt. Lt. F. B. Gipsom, D.F.C.; A/C2 C. I. Hutchinson; Flt. Lt. D. I. Jones; Sgt. B. A. O'Carroll; P/O. P. R. Stevens.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. A. Heeley.

DIED ON ACTIVE SERVICE.—Flt. Sgt. L. Bland; A/C1 R. W. Coombs; Sqn. Ldr. T. B. Cooper, D.F.C.; A/C1 J. Ellis; L.A/C. J. Gregory; L.A/C. D. H. H. Innocent; Cpl. E. C. McDowell; L.A/C. J. Milne; F/O. K. Sutton; L.A/C. J. F. Thompson; Flt. Lt. E. A. Wallis; A/C1 T. H. Williams.

Women's Auxiliary Air Force

KILLED ON ACTIVE SERVICE.—L.A/CW. F. E. M. Clinker.

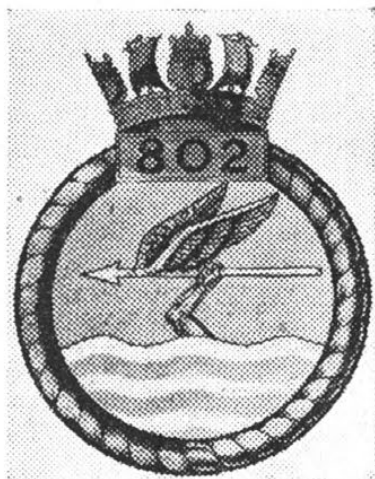
Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. C. S. D. Tainsh.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. G. A. Clyne; W/O. T. E. Dowling; P/O. B. W. Giddings; F/O. A. F. Mattingley; Flt. Sgt. S. A. Nystrom; F/O. E. H. Ross; Flt. Lt. E. McL. Scott; P/O. A. J. Stapleton; Flt. Sgt. R. J. Warren.

MISSING.—Flt. Sgt. C. McC. Cahill; Flt. Sgt. W. D. Callaghan; W/O. H. W. Calman; F/O. C. J. Cameron; F/O. R. B. Eggs; Flt. Sgt. A. E. Gillespie; Flt. Sgt. J. B. Grady; Flt. Sgt. P. W. C. Hutton; Wing Cdr. E. Le P. Langlois, D.F.C.; Flt. Sgt. T. P. Ledwith; P/O. T. H. McFarlane; Flt. Sgt. P. J. Madden; Flt. Sgt. D. C. Palmer; F/O. J. C. Paton; F/O. E. C. Patten; F/O. A. F. Reid; Flt. Sgt. R. V. Richardson; F/O. B. G. Sherry; P/O. G. B. Swift; P/O. R. E. Taylor; F/O. D. D. Tennent; W/O. C. H. Terras; Flt. Sgt. A. B. Walker; F/O. J. S. Walker; F/O. R. T. Ward; F/O. J. H. Willmott.

WOUNDED OR INJURED ON ACTIVE SERVICE.—



Badge of No. 802 Squadron, Naval Air Arm. "Primus Ferire" (First to Strike). On a blue field, issuant from water, in base Barry wavy white and blue, an arm embowed gold, the hand grasping a dart winged gold

SERVICE AVIATION

Flt. Sgt. J. R. Angus; Flt. Lt. W. J. Barclay, D.F.C.; F/O. E. T. Stone.
DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. C. R. Bundara.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. R. A. O. Floripe; Flt. Lt. J. G. L. Laffoley; F/O. D. L. Neil; P/O. T. L. O'Kane; F/O. M. B. Stock; P/O. L. A. Thorndycraft; F/O. R. B. Trout.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—W/O. J. M. G. L. Lavoie.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. J. M. Baldwin; Flt. Lt. H. H. Bow; Sgt. A. J. Bradshaw; F/O. D. O. Brown; Flt. Sgt. E. M. Bryant; P/O. D. S. Campbell; F/O. R. H. Carleton; P/O. R. L. Clarkson; P/O. R. S. Cole; P/O. D. A. Cooper; W/O. F. S. Dewis; F/O. J. W. K. Dunn; P/O. H. F. Edmunds; F/O. W. Essar; F/O. J. S. Ferrier; Sgt. J. P. A. Gauthier; P/O. H. B. Gilmore; F/O. J. E. Gloeckler; P/O. J. M. Hanon; P/O. C. R. Harnish; Flt. Sgt. A. J. Henderson; Flt. Sgt. G. A. Hodgkins; F/O. G. R. Hodgson; F/O. A. MacK. Howden; P/O. J. R. Irish; P/O. G. Jackson; P/O. S. L. Krawchuk; F/O. D. L. Lewis-Watts; P/O. G. L. Lindensmith; P/O. A. M. McGregor; P/O. C. W. Martens; P/O. E. M. Matheson; F/O. C. J. Mitchell; F/O. F. O. Montgomery; P/O. J. H. Morriss; W/O. G. D. Pettes; F/O. G. Robinson; P/O. A. E. Roe; P/O. J. A. Santo; P/O. S. Saprutoff; F/O. D. W. Smith; P/O. J. Smith; Flt. Lt. J. R. Taylor; P/O. J. C. Tracey; P/O. A. R. Van Slyke; Flt. Lt. J. D. Virtue; W/O. W. C. Waye; P/O. J. W. Weyers; Sgt. M. W. Wheeler; P/O. W. J. L. Wright; Flt. Sgt. W. A. Youngs.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. W. R. Ashdown; F/O. D. A. Wade.

KILLED ON ACTIVE SERVICE.—F/O. P. N. Bernhart.

Royal New Zealand Air Force

KILLED IN ACTION.—W/O. J. B. Annand.
PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. J. McLean; W/O. R. A. P. Ople.

MISSING.—W/O. J. Crawford; W/O. R. C. Macpherson.

Casualty Communique No. 529

Of the names in this list 142 are second entries giving later information of casualties published in earlier lists.

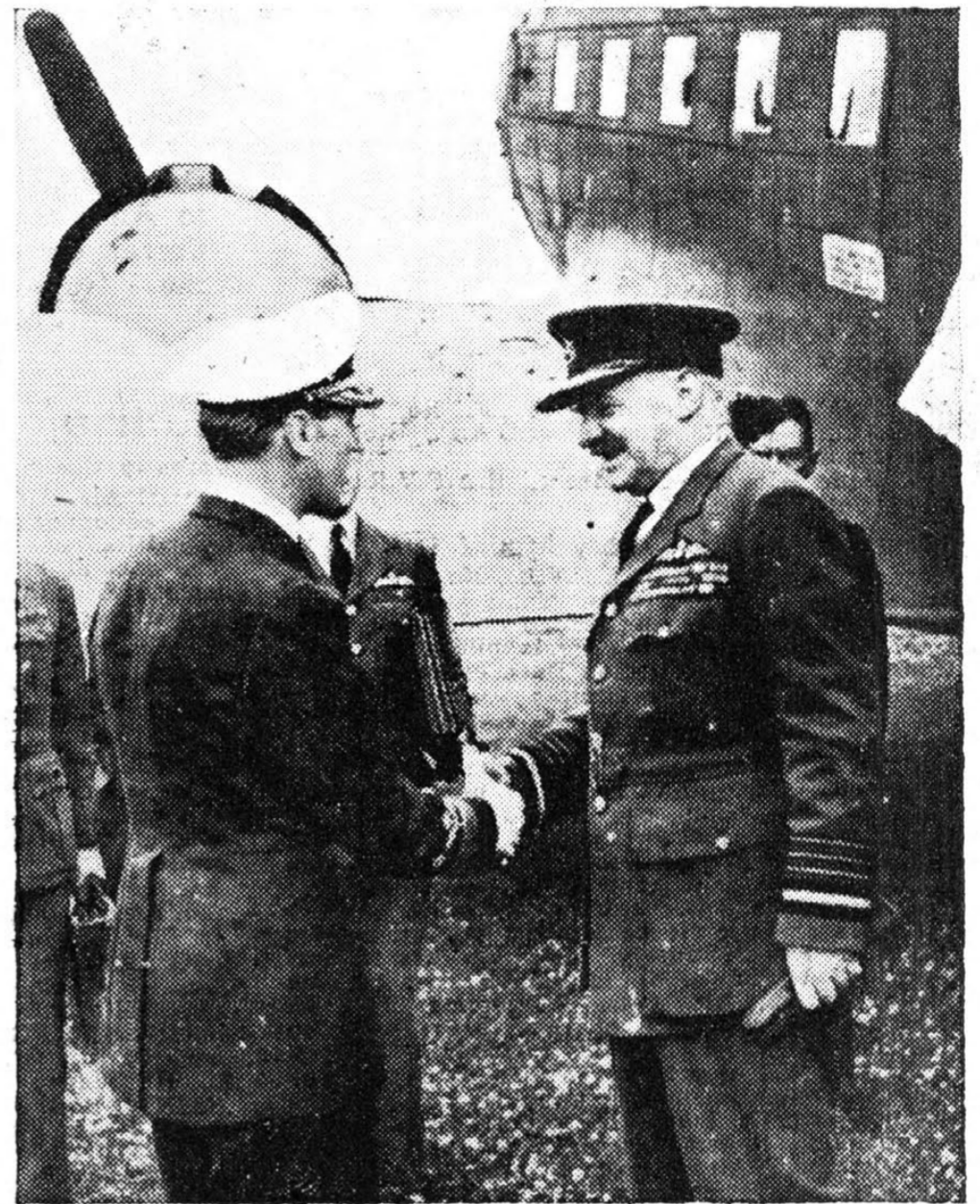
Royal Air Force

KILLED IN ACTION.—Sgt. J. C. Anderson; Sgt. F. N. Benson; Flt. Lt. G. L. Chapman; Sgt. J. D. Clark; F/O. F. Clarke; W/O. W. S. Clementson; Flt. Sgt. M. W. Cockbaine; Sgt. C. J. Cutting; Sgt. A. Denbigh; Sgt. P. Dick; Sgt. S. Forster; F/O. J. C. Gould; Sgt. R. T. Grapes; F/O. H. G. Harrison; Sgt. D. C. Holmes; Flt. Sgt. R. G. Holmes; F/O. I. R. G. Hunter; Sqn. Ldr. H. K. Laycock; Sgt. C. G. Lloyd; Flt. Sgt. T. McCaffrey; Flt. Sgt. R. W. McCormack; Flt. Sgt. W. F. Norrington; Sgt. G. J. P. Ralph; Sgt. S. Robinson; Sgt. A. C. Scott; Flt. Sgt. S. Smith; Sgt. A. Streatfield; P/O. A. G. Thomas; Sgt. E. V. Wallis.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. S. H. Barnard; Sgt. R. Carr; Sgt. G. M. Ferguson; Sqn. Ldr. J. C. N. Forshaw; Flt. Lt. G. C. F. Jones; F/O. A. S. Middleton; Sgt. R. A. Milligan; P/O. C. H. Quinton.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. R. Albone; Sgt. L. V. Ashton; Sgt. C. E. Baines; F/O. C. Baker; Sgt. B. H. J. Baldwin; Sgt. L. E. Basford; Flt. Sgt. D. R. Beesley; Sgt. G. P. Binder; Sgt. W. E. Blore; Sgt. K. D. Blyth; Sgt. G. Bone; Sgt. J. B. Brennan; Sgt. T. S. Brookfield; F/O. H. E. V. Budge; Sgt. T. J. Burleigh; Flt. Sgt. D. R. Butler; F/O. N. E. Cooper; Sgt. G. Cosgrove; F/O. J. L. Coward; F/O. S. W. Cross; P/O. J. F. Crossley; Flt. Sgt. E. Crowther; Sgt. J. G. Cuthbertson; Sgt. T. Davies; Sgt. D. J. Dennehy; Sgt. N. Derham; Sgt. A. D. Dickson; Sgt. J. Doyle; Flt. Sgt. T. R. Dunlop; Sgt. G. E. Dyckhoff; Flt. Sgt. J. Easton; Sgt. J. Ellis; Sgt. G. F. Ennals; Sgt. E. W. Everett; Flt. Sgt. J. Ferguson; P/O. F. S. Folley; Flt. Sgt. B. J. Forsyth; Sgt. H. H. Francis; Sgt. W. H. Freer; Sgt. F. Gaffney; Sgt. P. J. Galivan; Flt. Lt. S. T. Geary, D.F.M.; Sgt. K. E. Gilson; Flt. Sgt. J. S. Gordon; F/O. N. A. Gray; Sgt. A. H. Hall; Flt. Sgt. F. H. Hall; F/O. O. H. M. Hall; Sgt. R. H. Hall; Flt. Sgt. G. R. S. Halliday; P/O. J. R. Harmer; Flt. Sgt. H. H. Hewitt; Sgt. W. Higgins; Sgt. G. H. Holt; Sgt. D. H. Hooper; Sgt. A. Horsfield; Sgt. R. A. Horton; Flt. Sgt. R. F. Houghton; Sgt. E. H. Hunter; F/O. J. F. Ineson; F/O. R. W. James; Flt. Sgt. A. E. T. Jones; Sgt. J. B. H. Killingback; Sgt. P. King; Sgt. F. S. Knight; Flt. Sgt. W. H. G. Lehatt; Flt. Sgt. M. C. E. Lewis; Sgt. L. E. Lilley; Sgt. H. E. Long; P/O. I. H. McDowell; Sgt. A. McIlroy; Sgt. R. Maddison; Flt. Lt. K. Marshall; Flt. Sgt. B. B. Millen; F/O. S. B. Morcom; Sgt. S. K. Morrison; Sgt. J. M. Moss; W/O. H. F. G. Murray; Flt. Lt. W. J. Murray; Flt. Sgt. A. Myres; Sgt. R. E. Nineham; Sgt. J. L. Parker; Flt. Sgt. E. Parry;

BOMBER ON NEUTRAL TERRITORY:
Air Chief Marshal Sir Arthur Harris being greeted on his arrival at Saeve airfield, near Gothenburg, Sweden.



W/O. J. Paterson; P/O. L. W. A. Pierce; Sgt. L. S. Preator; Flt. Sgt. D. M. Quarendon; Flt. Sgt. S. G. D. Rice; Sgt. K. Richardson; Sgt. V. J. D. Riddell; Sgt. D. G. Robbins; Flt. Lt. B. R. Robinson; Sgt. S. P. Rogers; P/O. R. H. Simson; F/O. J. Stevenson; Flt. Sgt. G. J. Stoddart; F/O. J. W. Summers; F/O. D. Tabor; Flt. Sgt. W. J. Thomas; Flt. Sgt. G. Tivey; Sgt. J. J. Turner; Sgt. B. B. Vivour; P/O. H. J. Watkins; Flt. Sgt. S. Whitehurst; Sgt. J. Whitfield; Sgt. E. M. C. Wilkinson; Sgt. J. Wilkinson; Sgt. C. G. Wilson; P/O. F. B. Woodman; Sgt. C. W. Woods.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Flt. Sgt. J. L. B. Morgan.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. B. F. Cooper; Sgt. J. W. Croke; F/O. E. D. Roberts.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. D. G. Patterson.

MISSING.—Flt. Sgt. C. R. Badger; Sgt. E. E. Barnes; W/O. J. H. M. Bird; P/O. F. Blunstone; Flt. Sgt. G. E. Bolland; P/O. D. A. Bradbury; Sgt. P. Brooks; Flt. Lt. P. Brown; Flt. Sgt. D. Bryant; Sgt. G. H. Burch; Flt. Sgt. H. J. Burton;

Flt. Sgt. C. B. Carter; Flt. Sgt. J. Connell; F/O. J. A. Costello; P/O. J. Crane; Flt. Lt. J. H. Dean; F/O. R. W. Donner; F/O. T. W. Downey; Sgt. A. G. Fry; Flt. Sgt. J. P. Gascoyne; P/O. S. A. Gilbert; Flt. Sgt. N. Goodyear; Sgt. I. Graham; Sgt. C. I. Grant; P/O. F. E. Grimsdale; Sgt. J. Grindlay; P/O. E. Grundy; F/O. W. J. Havell; P/O. A. C. Hogg; P/O. W. J. Hunter; Sgt. T. S. Instone; Flt. Sgt. J. H. Kendall; Sgt. H. B. King; Flt. Sgt. J. F. Le Marquand; Sgt. F. S. Langton; F/O. J. A. Lewis; Flt. Sgt. D. A. McCauley; F/O. W. McLeod; F/O. R. Mallinson; Flt. Sgt. H. Mann; Sgt. A. Martin; Flt. Sgt. N. G. Mayo; F/O. P. W. Morgans; W/O. A. J. Norman; Sgt. F. C. J. O'Shea; P/O. A. A. Oak; Flt. Lt. W. H. Polgreem; Flt. Lt. G. O. Powell; Sgt. S. A. Powell; Sgt. K. Pratt; Sgt. J. Robb; Sgt. E. C. Roberts; F/O. D. Rodger; Flt. Sgt. J. Roy; P/O. J. E. F. Sadler; Sgt. W. A. Senior; Sgt. J. G. Smith; F/O. B. G. Smoker; Sgt. R. P. S. Sowerbutts; Sgt. E. Stansill; Sgt. S. J. Stephens; Sgt. G. B. Tate; Flt. Sgt. E. Thompson; Sgt. R. Thomson; P/O. J. Thornber; P/O. P. Thorne; Flt. Sgt. J. C. E. Toft; Sqn. Ldr. T. J. Warner; Flt. Sgt. C. J. T. Watt; F/O. D. W. Weston; Sgt. E. E. Whittaker; Sgt. A. H. Whyte; Sgt. J. Wilson; Sgt. H. Winning; F/O. K. L. Worden; Flt. Sgt. R. Wynn.

KILLED ON ACTIVE SERVICE.—F/O. B. W. Drake; Flt. Sgt. W. H. Ford; Sgt. D. W. Gilbert; Sgt. J. Thompson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. A. Brown; F/O. R. J. Davis; Sqn. Ldr. C. M. Willy.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. G. Ratcliffe.
DIED ON ACTIVE SERVICE.—L.A./C. C. W. G. Arnison; A/C.1 J. R. P. Baker; Cpl. M. Bent; L.A./C. H. Challis; A/C.2 M. Cornfield; L.A./C. C. H. Tuck; Flt. Sgt. C. Widdicombe.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. A. Cryer; Flt. Sgt. G. E. Davis; Flt. Sgt. R. L. Horstmann; Flt. Sgt. N. E. Lewis; W/O. W. A. Porter; Flt. Sgt. W. N. Pridmore; Flt. Sgt. A. H. Weston.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. R. E. Yarra.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. D. C. Bates; F/O. A. E. Buckley; P/O. A. C. W. Grant; P/O. R. J. Proud; F/O. A. H. Ringland; Flt. Sgt. R. A. Smyth; W/O. J. H. Stibbard.

MISSING.—Wing Cdr. W. A. Forbes, D.F.C.
KILLED ON ACTIVE SERVICE.—W/O. D. C. McLellan; Flt. Sgt. T. G. Truskett; Flt. Sgt. J. B. Yorkston.

DIED ON ACTIVE SERVICE.—Wing Cdr. J. R. Ratten, D.F.C.; Flt. Sgt. G. S. MacLaine.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. P. G. Anderson; Flt. Sgt. M. R. Bullocks; W/O. J. W. Buttery; Flt. Sgt. G. F. Caley; P/O. R. Campbell; W/O. L. T. Chevrier; F/O. W. Darlington; P/O. K. W. Griffey; F/O. G. H. Lloyd; P/O. D. A. McFayden; F/O. T. J. Nelson; F/O. S. J. Reid; Flt. Sgt. W. R. Southcott.

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

F/O. E. D. Figg; P/O. G. M. Larsen; P/O. L. W. McElroy; F/O. R. S. McGibbon; F/O. D. Morrison; P/O. G. C. Reason; P/O. W. D. Robertson.
MISSING.—Flt. Sgt. N. P. H. Anderson; F/O. L. A. Blaney; F/O. J. A. Bleich; F/O. A. J. Breault; F/O. G. E. Creswell; Flt. Sgt. J. B. Davey; F/O. E. Essenberg; F/O. W. J. Gilmore; F/O. A. J. Gombaz; F/O. G. L. Halsall; W/O. D. Hanna; F/O. G. B. Henson; Flt. Sgt. A. J. Hunter; F/O. G. T. McCauley; P/O. W. G. Mendenhall; Flt. Sgt. E. S. Neil; F/O. T. J. O'Neill; F/O. E. F. Patzer; F/O. T. B. Phelan; W/O. R. S. Pyatt; Flt. Lt. D. McW. Sanderson; Flt. Sgt. D. E. Sherman; F/O. R. B. Smith; F/O. J. W. Thompson; Flt. Sgt. W. W. Wagner; P/O. J. M. Wallace; Flt. Sgt. R. M. Wood.

KILLED ON ACTIVE SERVICE.—F/O. A. E. Hayes.
DIED ON ACTIVE SERVICE.—Flt. Lt. F. W. Hall; L.A./C. R. C. Healy

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. J. W. A. Myers

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. C. C. W. Gover; Flt. Sgt. D. R. N. Keith.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. A. Francis.

MISSING.—F/O. R. C. Noice.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. D. H. Barnes.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. C. N. Vice.

WOUNDED OR INJURED IN ACTION.—2nd Lt. J. H. Quilliam.

Air Transport Auxiliary

First Officer E. A. D. KEMPSTER, A.T.A., and Second Officer H. RACE, A.T.A., killed in an aircraft accident in Germany on June 30th, 1945.

Official Corrections

Casualty List No. 525.

Under "KILLED IN ACTION."—P/O. D. Kinnell should read F/O.; Sgt. R. F. D. Schafer should read Shafer.

Under "MISSING, BELIEVED KILLED IN ACTION."—Delete F/O. K. Bailey and transfer to "KILLED IN ACTION."

Under "MISSING."—Delete Sgt. W. L. Colquhoun and transfer to "KILLED IN ACTION."

Delete F/O. V. M. Collins; F/O. T. B. Cooper, D.F.M.; Flt. Lt. H. M. Dean; F/O. J. G. Graham; Sgt. J. Halsall; Sqn. Ldr. G. Hampton, D.F.C.; F/O. D. R. McLean; Flt. Sgt. H. Morgan; F/O. W. J. D. Muir; Flt. Sgt. A. M. Robertson; Flt. Sgt. J. G. Rudman; Sgt. G. P. R. Seagrave; Flt. Sgt. R. W. Sheen; Sgt. J. Simpson; Flt. Sgt. R. Westgarth; Flt. Sgt. T. D. Whately; Sgt. D. R. White; and Flt. Sgt. W. W. Woakes.

Under "R.A.A.F. KILLED IN ACTION."—Alter F/O. L. R. Pederson to read Pedersen.

Under "MISSING" delete F/O. J. H. Caldwell; W/O. R. W. Mann; and P/O. E. S. Quirk.

Under "S.A.A.F. MISSING" delete Lt. L. M. Jacobs.