

FLIGHT

and
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Reflections

ON the finish of the war in Europe, we must all nerve ourselves for the final struggle with Japan. Exactly what part will be played in it by the British Empire forces is not at the moment clear; though it is certain that we must recover Singapore and Hong Kong. At this moment, however, after two days of relaxation and cheering for victory, it is inevitable that our minds should turn back to the ordeal from which we have emerged.

Thanks to the Royal Navy and to Fighter Command, Britain has not been occupied by the modern Huns. Thanks to the Merchant Navy and those sea and air forces which escorted it, as well as to the noble efforts of our farmers and to the excellent arrangements of Lord Woolton and Col. Llewellyn, we have never gone hungry. In these ways we British have been much more fortunate than most of the nations on the Continent of Europe.

Nevertheless, we have suffered, and most of our sufferings have come from the air. London still stands. It has not met the fate meted out to Rotterdam, Belgrade, and many cities of Russia. But the loss of life has been sufficiently grievous; very many families have had their lives dislocated through evacuation, and the nerves of all who remained have undergone a strain from which it may take a long time to recover. To many of us the sound of an aircraft overhead still causes reminiscent pangs, and in the two VE days the persistence with which British and American bombers flew fairly low over the Capital brought painful memories of nights when bombs crashed down and houses crumbled. We are glad, and a little proud, that we stuck it out; but the memories are there none the less.

It follows that for the future our chief concern must

be to maintain Fighter Command and all that goes to make up air defence at the highest pitch of perfection. Even though the Foreign Office may guarantee (as it did in 1920) that there will be no more war for ten years—or even 20—we must never let ourselves be reduced to the parlous condition we were in at the time of the Munich crisis, with out-of-date fighters, out-of-date guns and out-of-date searchlights. Admittedly such equipment is no protection against V-bombs. It is commonly said that every new weapon produces its antidote in time; but so far we know of none except occupation of the sites by the Army. But at present the V-bombs are not accurate enough to destroy vital defences. Only an overwhelming attack by piloted bombers could clear the way for an invading land force, and it is against that threat that we must take precautions. For an island kingdom a supreme force of the best fighters, guns and lights is the primary assurance for survival.

A Harbinger

MANY a time and oft have we lamented the lack of official appreciation in this country of the claims of the flying boat to consideration in British post-war civil aviation. It is, therefore, with very great satisfaction that we record in this issue the first particulars of the Shetland flying boat. But the fact that this country now has flying the largest British aircraft ever built is not, unfortunately, any guarantee that the class will in future be given the encouragement which, in our view, it merits.

The Shetland was designed with wartime long-range patrols and reconnaissance duties in mind, and only the fortuitous circumstance of the improvement in the war situation has made it available for peaceful purposes. For that we may be thankful, and it is now the duty of

those concerned to see to it that this impressive aircraft is put to good use. Invaluable lessons may be learnt even from merely experimental operation of it. So soon as it is ready to go on service, it should be handed over to British Overseas Airways for a series of flights to distant parts of the Empire. Not only would the operational experience thus obtained be extremely useful, but visits by this huge flying boat to South Africa, Australia, New Zealand and Canada would provide these countries with convincing proof that the old country is not asleep. The Shetland could have finished its Empire tours by the time some of the commercial landplanes now being built are ready. Thus the visits by the Shetland would occur just at the time when they are most needed.

And in very truth this flying boat is a fine example of British aircraft engineering, one of which Britishers the world over can be proud. With its wing span of 150ft. and its total loaded weight of 58 tons, it represents a British high-water mark in size. That it has been possible to produce it without introducing any experimental features is, of course, primarily due to the Bristol Centaurus engines which, with their 2,500 h.p. each for take-off are the most powerful engines in the world in actual service. A flying boat of this weight *could* have been produced by fitting a greater number of smaller engines, but it is almost inevitable that it would have been less efficient, and certainly a great deal more complicated.

Rockets and Guns

UNTIL the Prime Minister broadcast to the country on last Sunday night, probably few people had realised that the Germans had prepared multiple long-range artillery somewhere on the coasts of France and Holland for the bombardment of London. Mr. Churchill spoke of the "grave peril" from them and the V-weapons, and said that had we not blasted the viper in his nest just in time the autumn of 1944 (to say nothing of 1945) might well have seen London as shattered as Berlin.

The mention of the long-range guns recalls those known as "Big Bertha," with which the Germans threw a number of shells into Paris towards the end of the first world war. Subsequently some German artillery officers wrote a detailed description of the artillery

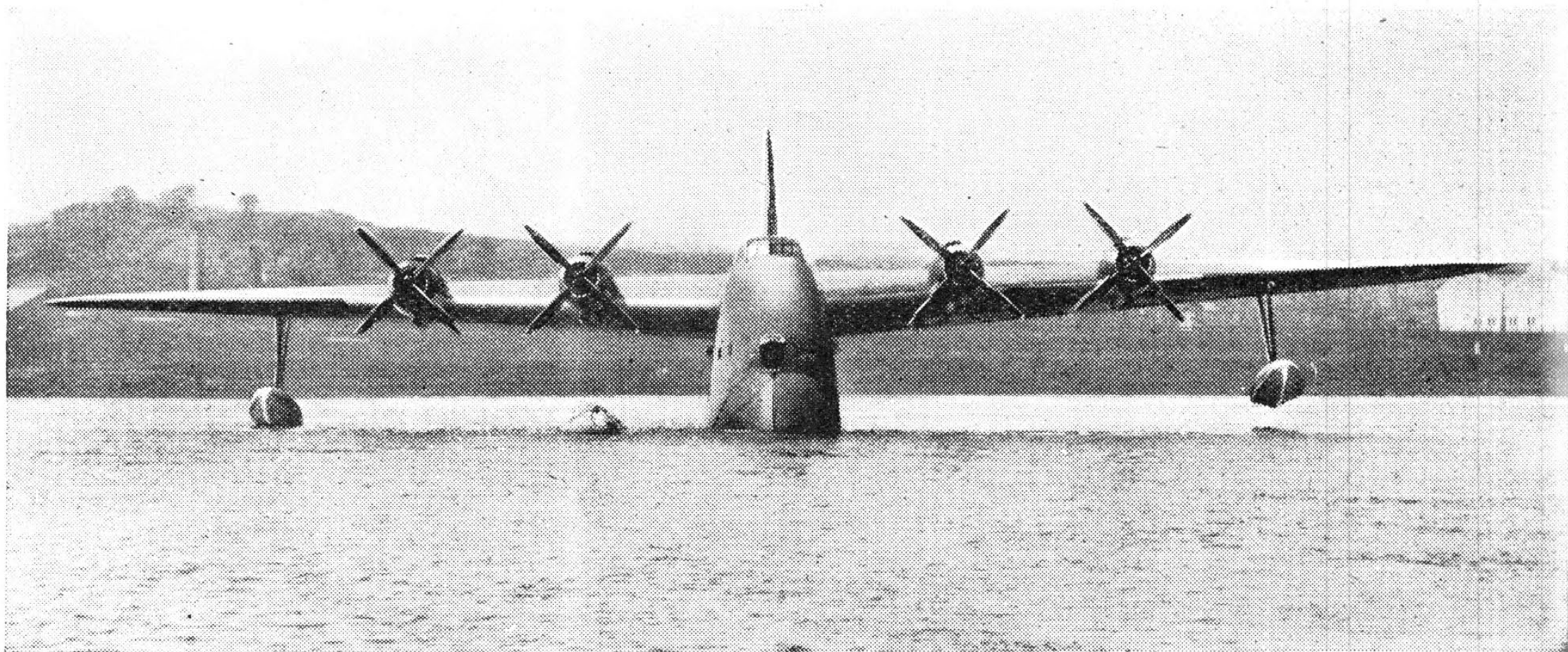
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problems involved, which was published in a British Service magazine—*The Journal of the Royal United Service Institution*, if we mistake not. It was a highly technical article, and probably only artillery officers could fully understand it. From such a distance it was not an easy matter to hit such a target as Paris. The shells killed a lot of civilians, but, of course, did not subdue France. The life of the guns was very short, for the force generated soon wore out the barrels; and not a great number of shells was fired.

In this recent war Dover has suffered much from guns which fired across the Channel; and so cunningly were they mounted that repeated bombardments by heavy bombers failed to knock them out. The sites had to be captured by ground troops after the landing in Normandy.

The interesting point about the recent revelation is that the Germans had evidently lost faith in the V-weapons. They were inaccurate, and could not be trusted to hit with certainty even such a huge target as London. There is comfort in that thought. Fighter Command could deal with the air torpedo (usually called the flying bomb) but not with the rocket projectile; and the rocket (when improved by scientists) seemed to many of us the gravest danger which menaced our island in the future. Guns admittedly are sometimes very hard to spot and to knock out from the air; but they are more expensive and complicated to produce than are rocket bombs, and they wear out; and they cannot be readily moved from place to place.



SHETLAND TO THE FORE: This frontal aspect of Britain's largest flying boat, the 58-ton Shetland, makes evident its clean lines. A full description of this mighty flying boat is included in this issue.



FORTRESS TOWN : A Superfortress base in the Marianas from which the American 21st Bomber Command operates against Japan.

WAR in the AIR

In Europe "Othello's Occupation's Gone" : Coastal Command Works On : Eyes Now on the East : Australian Bombers Busy

ALL along the front from Narvik to Bordeaux the bugles have sounded the call which Tommy Atkins translates into the words, "Let 'em alone," or its American, Russian, or French equivalent. Only for Coastal Command of the Royal Air Force has the call brought no immediate relaxation. Bomber pilots may fly over London with apparent disregard for regulations as to minimum heights—what a strange fascination flying low over built-up areas has for some pilots!—but Coastal Command patrols have to be continued until it is certain that every U-boat has received the order of Admiral Dönitz and is making its way back to port on the surface, flying its black flag. Coastal Command started the war gallantly, patrolling the North Sea and the other waters round the British Isles with its bare 20 squadrons of flying boats, Ansons and Hudsons. During the war it grew to a size considerably greater than that of the whole

Air Force in 1939. It spread its bases as far afield as Iceland and the Azores, and it bridged the gap in the middle of the Atlantic where sinkings used at one time to be most numerous. It gradually came to employ almost every known type of aircraft, except single-seater fighters, and it ended the war with a highly effective campaign against the German shipping in the Skagerrak and Kattegat. The crews of the ships taking supplies to the Germans in Norway or bringing troops home from there must have been as pleased as anyone when they heard that the war was over. They have had a holy horror of those Halifaxes and Beaufighters.

For other Commands the order to surrender by Admiral Dönitz brought an immediate cessation of work. But at first it was not certain whether the Germans would or would not fight on in Norway. Squadrons of the 2nd Tactical Air Force had moved up into Denmark and occupied several air-

fields in that flat country, in case the need should come to fly further north. It did not come. The holiday and the feeling that slaughter was over would be as welcome to the airmen as to all other branches of the fighting forces. We only hope that no pilot crashed his undercarriage during those first days and gave work to the splendid ground crews. All through the war no class of man has done more tiring work, without admitting fatigue, than the ground crews of the Royal Air Force. Many a battle might have been lost if those men had failed to keep their "heart and nerve and sinew" working long after they had gone, and so (the Kipling quotation is familiar) "hold on when there is nothing in you except the will which says to them, Hold On!"

Now our eyes turn eastward. One may start with a good laugh—and the war has not produced many occasions for mirth. But when the Japanese protest that the Germans have deserted

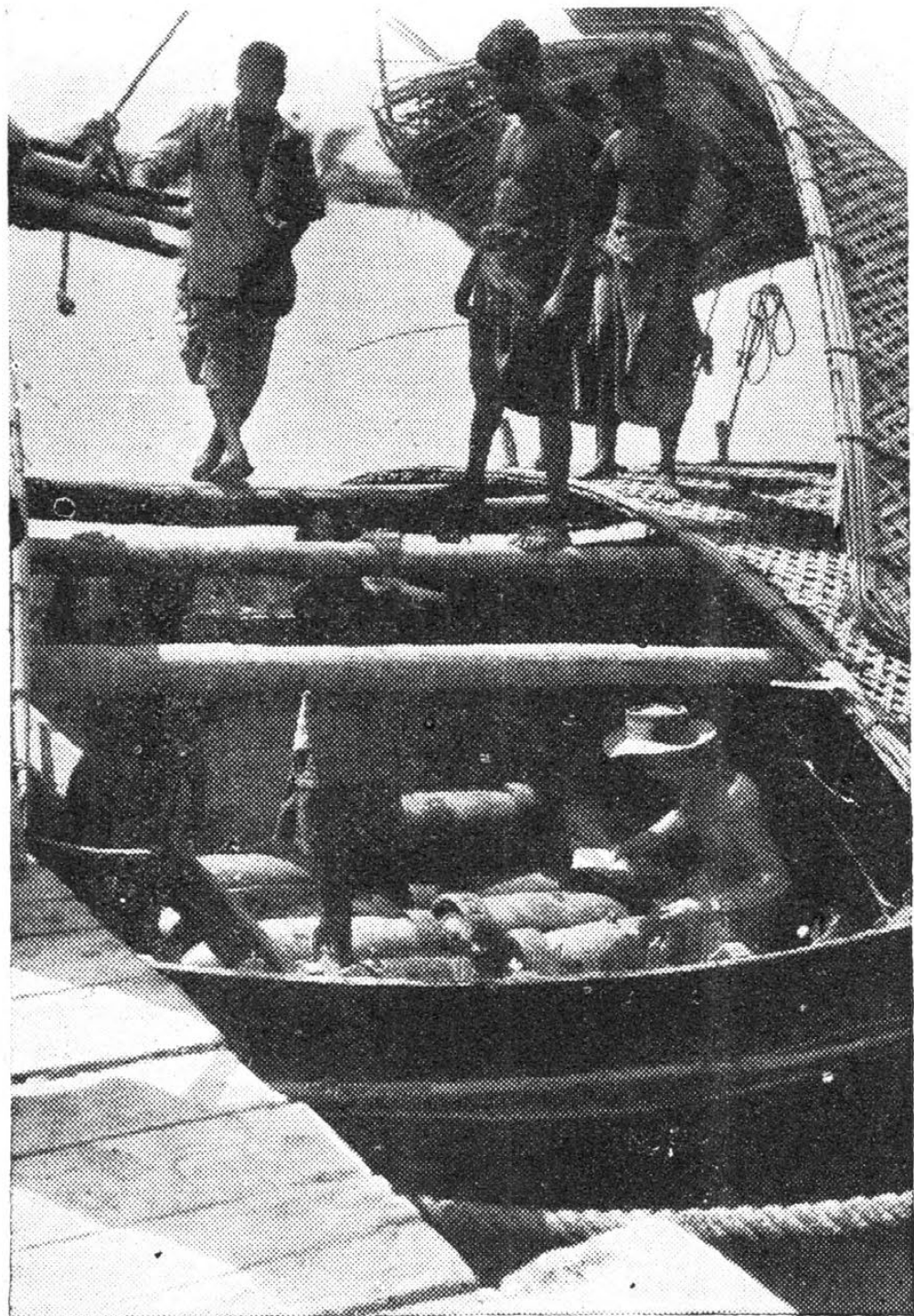
WAR IN THE AIR

them, have broken the treaty about not making a separate peace without mutual agreement, and that consequently Germany can look for no more help from Japan, it really is rather humorous. If the positions had been reversed, we wonder how much consideration the Japanese would have given to the feelings of Germany.

Australia is safe. The threat of invasion has long since been removed from her. Her troops have begun an invasion of Borneo, or rather of the island of Tarakan just off its coast. The R.A.A.F. played a most important part in the landing by sending heavy bombers to hammer all the airfields from which enemy aircraft might have interfered with the landing. Two airfield construction squads landed with the troops, making ready for air cover over the beach-head.

Surprise for the Japs

BURMA is practically free. With Rangoon in our hands supplies can be poured in, and the marvellous efforts of the transport aircraft to keep the troops supplied can now be relaxed. This air supply on such a scale was a new thing in war, and we should give all honour to the aircrews who carried it through, and likewise to the fertile brains which first conceived the idea. It was a surprise which completely confounded the Japanese High Command. One does not expect novel ideas from the Japanese; they are



BURMA TRANSPORT: Delivering 500 lb. bombs by Sampan to an R.A.F. jetty on the Arakan front.



PRESENT AND CORRECT: The *Luftwaffe* controller hands over Hamburg airfield to Flt. Lt. Pinkerton who landed there in an Auster.

remarkable imitators, but not much else.

The Australians have captured the famous base of Wewak, in New Guinea, in a combined operation in which aircraft of the R.A.A.F. and the U.S. Army Air Forces played a prominent part.

A sensation has been caused by the application of eight pilots of the R.A.A.F. to resign on the grounds that they and others have been sent to attack targets the destruction of which is, they assert, of no possible value to the prosecution of the war. Mr. Drakeford, the Australian Air Minister, has appointed a barrister to investigate the case. The officers say that they are not in the least concerned about their lives, but are concerned at the loss of Spitfires and other valuable material.

The following message has been sent by the Air Council to all R.A.F. commands, groups and units at home and overseas:—

“To-day the forces of Nazi Germany lie everywhere in utter defeat, and the Air Council send a message of congratulation to you,

the men and women of the Royal Air Force, the Women's Auxiliary Air Force, the Princess Mary's Royal Air Force Nursing Service, the V.A.D.s and all who have served with the Royal Air Force for the tremendous part you have played and are still playing in the cause of freedom alongside your comrades of the Dominion and Allied Air Forces in whatever lands and over whatever seas your duty has called you. Together with the Allied Armies and Navies, you have, by your exertions, your gallantry and your devotion, protected this country from the horror of enemy occupation, rescued Europe from dreadful bondage and saved civilisation itself. Your deeds are written large in the hearts and minds of free men and women. In this hour let us pay homage to the memory of those who have fallen; now we can clearly see how great is our debt to them. We shall be worthy of their sacrifice if we devote ourselves to the great tasks which lie ahead. For we are not at the end of the road. Germany must be completely disarmed and the tyranny of Japan must be crushed. The Air Council give heartfelt thanks to you all for the massive accomplishments of the past, and pray for your continued success in the days to come.”

In addition to the above, the following messages of congratulations and thanks have been sent. We regret that lack of space forbids us to print them in full: From the Chief of the Air Force (Sir C. Portal) to the Army and Naval Forces of the U.S.S.R.; from the C.A.S. to the U.S. Army Air Forces and the U.S. Navy; from the Air Council to the Allied Air Forces in Europe; from the Air Minister (Sir A. Sinclair) to the civilian staffs of the R.A.F. at home and overseas.

HERE AND THERE

S.B.A.C. Appointment

MR. JAMES STANTON, formerly Press officer to the Conference of International Air Traffic Operators, has been appointed to the staff of the S.B.A.C.'s information department presided over by Mr. E. C. Bowyer.

U.S. Medal for R.A.F. Cpl.

CPL. GERARD CULLEN, R.A.F., of Belfast, has been awarded the U.S. Army Soldier's Medal for heroism in rescuing an American airman trapped in a burning Liberator near Luqa, Malta, on April 17th, 1943.

The presentation was made last week at a special ceremony in London by Brig. Gen. E. F. Koenig, commanding general of the U.K. base of the U.S. Army.

V.C. Pilot Missing

WING CDR. J. B. NICOLSON, who won the V.C. in August, 1940, when he pursued and shot down a German raider over Southampton although his Hurricane was in flames, was last week reported missing, believed killed, in the Far East.

Nicolson was the first fighter-pilot V.C. of the war and was posted to the India theatre in 1942.

From First to Last

FLT. LT. P. E. BARNES, a navigator in 2nd T.A.F. Mosquito squadron, made the first operational flight to Germany with No. 21 Squadron on September 27th, 1939, and also the last flight over Germany with that squadron on the night of April 24th, 1945. Altogether he has made 75 operational flights, and

was leading navigator for the pin-point attack on Amiens prison.

Thanks to Air Power

A MESSAGE of congratulations has been sent by Maj. Gen. Stratemeyer, chief of Eastern Air Command, to the commanding officers of the various U.S.A.A.F. and R.A.F. units taking part in the Burma campaign culminating in the fall of Rangoon.

"Never before have operations been so utterly dependent on air power, and never has the air so magnificently fulfilled its mission," said the U.S. general in thanking everyone concerned for their "unstinting efforts in a job superbly done."

Not Disproved

LT. GEN. JAMES DOOLITTLE was not to be drawn when, at his Press conference last week (reported elsewhere in this issue), he was asked if he thought the war against Germany could have been won by air power alone.

Saying with a smile that the question had "got him out on a limb," the commander of the U.S. Eighth Air Force replied that although the war had not, in fact, been won by air power alone, that did not prove it could not have been done. In order to prove it could be done we should have had to put the whole of our fighting resources into the air, but we had not done that.

He added that he believed the conquest of Japan would be achieved by the same strategy as was used in Europe—softening by air power and occupying by ground forces—and Maj. Gen. Anderson, his deputy commander, said that if necessary they would be able to put more than 2,000 super-heavy bombers into the air against Japan at a time.

Saying It with Flowers

LANCASTER crews engaged on the pleasant mission of dropping food supplies to the Dutch, have seen "Many Thanks" and "Thank You, Boys," laid out on the ground below in tulips.

The bags of food, dropped from only about 500ft., reach their targets with great accuracy and, says the Air Ministry, intelligence officers to whom the crews report on their return, are getting used to the phrase "They fell right in the larder."

Peter Masefield's New Post

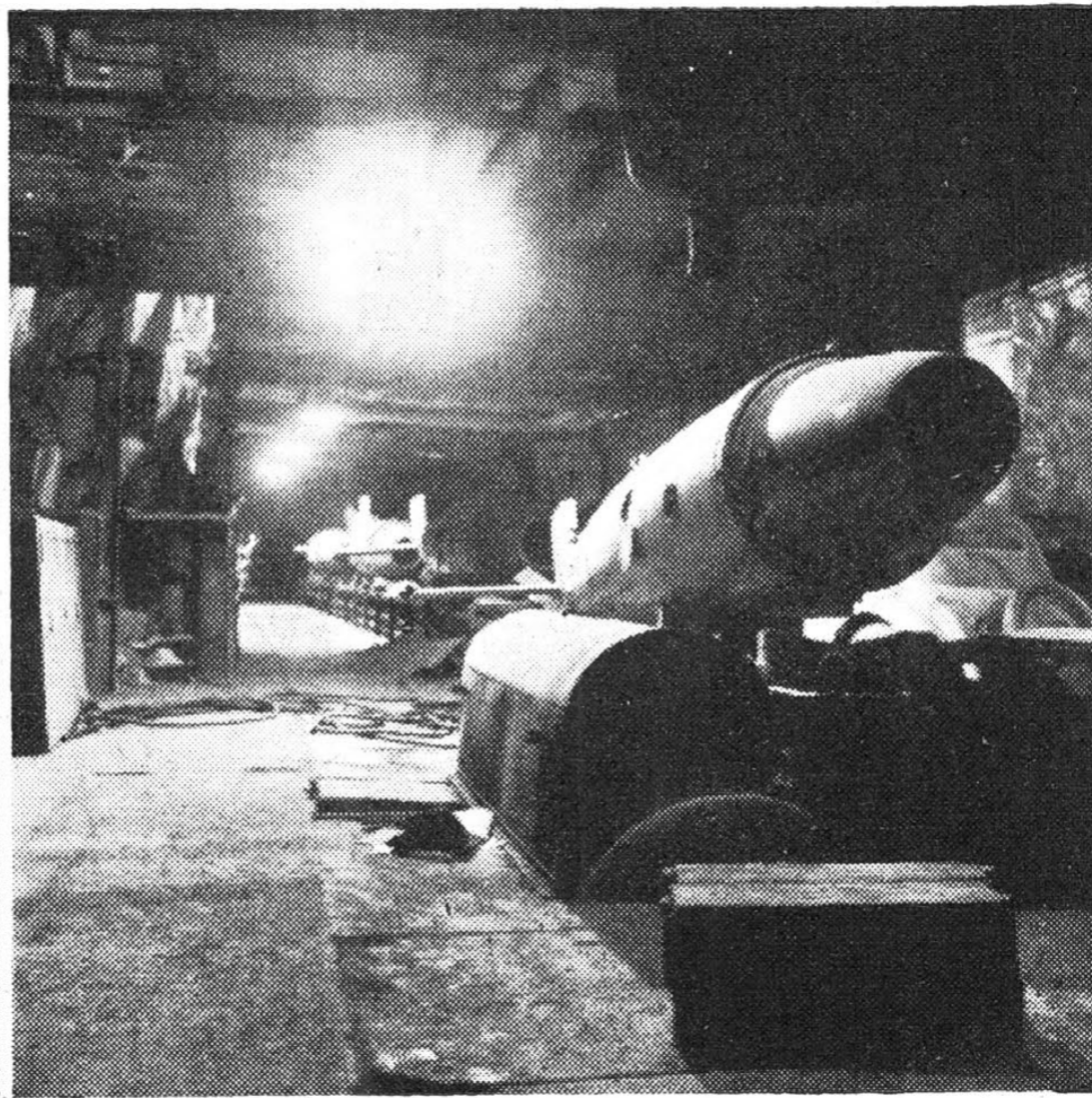
THE appointment of Mr. Peter Masefield as first British Civil Air Attaché to Washington is announced. Mr. Masefield is well known in both this country and America through his writings, and we feel the appointment will be popular on both sides of the Atlantic. He combines youth and enthusiasm with extensive technical knowledge, and as personal assistant to Lord Beaverbrook, the Lord Privy Seal, he has been in the closest touch with recent developments.

Flight wishes Mr. Masefield all good fortune in his new post.

"Flying Earl" Promoted

AIR COMDRE. LORD BRANDON, D.S.O., who is the only peer to have made the R.A.F. his career straight from college and who consequently became known as the "flying earl," has recently been promoted to the rank of Acting Air Vice-Marshal.

Lord Brandon is an Irishman and was commissioned from Cranwell in 1924 at the age of 19. In the early 1930s he was flying with a Middle East



NIPPED IN THE BUD: On the left are the remains of a railyard full of V2 components outside the Kleinbodungen factory after Allied attention. In the foreground is seen a truckload of combustion units which appear to have survived undamaged. On the right is the VI assembly line in an underground factory at Nordhausen.

HERE AND THERE

squadron, was put in command of a home-based squadron shortly after the outbreak of war, and since last July has been commanding a group in Eastern Air Command, S.E.A.C. In addition to his D.S.O., which he was awarded in 1940, he has been mentioned three times in despatches.

Rehabilitation

A SPECIAL R.A.F. rehabilitation centre for returned prisoners of war has been formed within Technical Training Command.

The function of the centre, which will be large enough to deal with as many as 1,000 R.A.F. officers and airmen at any one time, will be mainly medical and surgical rehabilitation.

A senior medical officer of R.A.F. Technical Training Command said: "Many of the men now returning will obviously need post-hospital treatment designed to fit them for the future, and they will get that treatment at this new centre."

Czechs Fly Home

A CZECH Spitfire squadron of No. 11 Fighter Group, R.A.F., many of whose pilots have taken part in nearly every major air battle since Dunkirk, flew back to their liberated homeland on the day before VE-Day. Their Spitfires were followed by a Dakota carrying Czech ground crews, and when the squadron took off, the runway was lined with the personnel of R.A.F. squadrons using the same airfield who cheered and waved them farewell.

"This," said the C.O. of the Czech squadron, Sqn. Ldr. A. Hrbacek, with understandable feeling, "is the greatest day of our lives."

Peaceful Piper

THE four-seater Piper "Skysedan," powered by a 165 h.p. Franklin engine, has been announced to sell at \$2,998 (about £700). It is of all-metal construction apart from fabric wing coverings, and has a manually operated

retractable undercarriage, including the tail wheel. Trailing-edge flaps are also fitted. Top speed is said to be 140 m.p.h., cruising speed 125 m.p.h., and landing speed 50 m.p.h. Dimensions are: Span, 34ft. 6in.; length, 26ft.; height, 5ft.; gross weight, 2,300 lb.; and empty weight, 1,250 lb.

Post-war Association

THE first hand-book of the No. 42 Air School (Port Elizabeth, S.A.) Post-war Association has just been issued, setting forth the objects of the organisation and its rules, etc.

The foundation meeting was held in the Middle East a year ago, but there is a United Kingdom branch which recently held its first dinner in Birmingham.

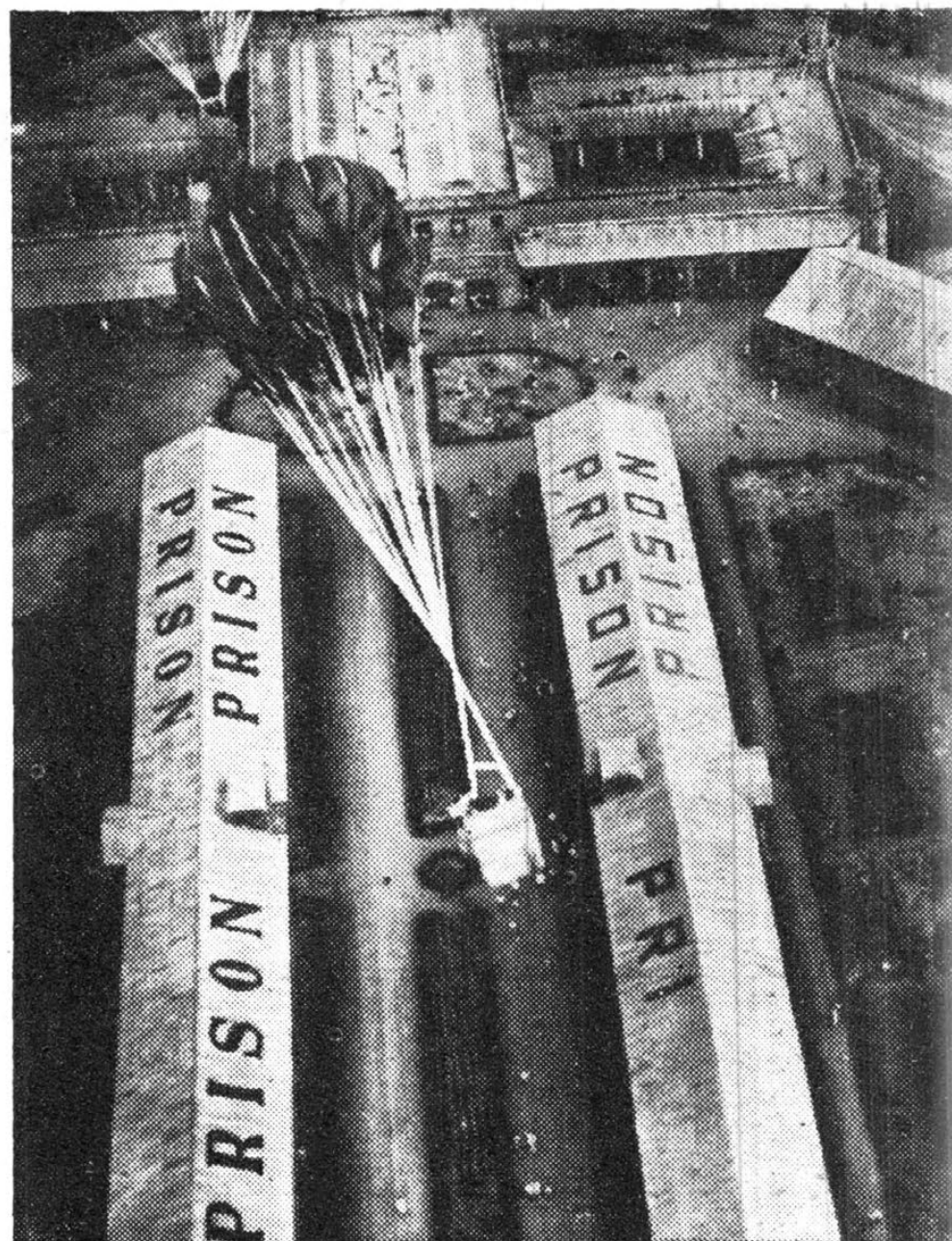
The Association is a truly democratic "get-together" affair open to all who served at this air school irrespective of nationality, service, rank or sex, and the U.K. secretary is F/O. G. L. Hindley, 57, Park Street, Southport, Lancs, to whom enquiries should be sent.

Keeping Faith

WHEN the Germans invaded Belgium in 1940 their panzer forces overran Gosselies, near Brussels, and the Avions Fairey factory on the weekly payday.

And now, five years afterwards, the parent company in England has, through the medium of the Belgian press, invited workers to collect their back wages.

All documents, including work records, were lost and the funds stolen by the Ger-



MANNA: Food and medical supplies being parachuted to civilian inmates of a Jap prison camp on Luzon. "Prison" was painted on the roofs to guide the U.S. aircraft

mans, and the loss of wages might justifiably be regarded as an inevitable misfortune of war. But Fairey Aviation very creditably prefers to redeem obligations to Belgian workers.

Busy Days for Little Men

THE prodigious output of munitions by small concerns has been one of the vital aspects of the war effort in Britain, and their manifold contributions have covered everything except building battleships.

As an example, seven Morris car distributors produced 10,000 aircraft wings (involving some 5,000,000 assembly details), thousands of sets of aerofoil sections and pilots' seats for Lancasters and Manchesters, and 70,000 other aircraft parts, besides repairing and returning to service more than 600 Ansons and Mosquitoes.

Additionally, they produced millions of shells and machined parts, hundreds of thousands of gun components, and thousands of Bailey bridge parts and barge frames, to say nothing of some hundreds of complete 6-pounder guns.

Incidentally, it was a Morris agent who designed and produced a cartridge positioning machine which was standardised for use by the R.A.F. and U.S.A.A.F.

Trade Announcement

MR. R. H. COMLEY, joint managing director of the Avon India Rubber Co., Ltd., has been elected president of the Federation of British Rubber and Allied Manufacturers' Associations for the ensuing year, in succession to Mr. Alex Johnston, director of the North British Rubber Co., Ltd. Messrs. Alan Sinclair and H. H. Hillier are the new vice-presidents.



CARRYING ALL BEFORE HIM: A Firefly pilot, undergoing training on the escort carrier H.M.S. *Empress*, trips up slightly in landing-on. Observe the tip of one airscrew blade, bending as it hits the deck.

SERVICE AVIATION

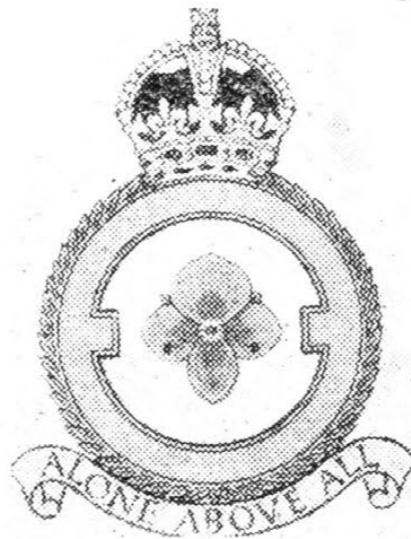
successful sorties during his third tour of operational duty. These have included night attacks on enemy transport, road and rail communications and close support of the troops. In October, 1944, he damaged some trains near Alstatt and in November, 1944, set fire to a goods train near Groenlo. On many occasions he has encountered intense and accurate enemy opposition, but this has never deterred him from completing his missions most effectively.

Flt. Lt. P. A. H. MCKEAND, D.F.C., R.A.F.V.R., No. 240 Sqn.—Now on his second tour of operational duty, Flt. Lt. McKeand has taken part in a large number of sorties. At all times this officer has displayed outstanding keenness and efficiency. His meticulous attention to detail and planning has materially contributed to the successful completion of many missions.

Flt. Lt. V. D. PAGE, D.F.C., R.A.F.V.R., No. 11 Sqn.—This officer has served in both Europe and the Middle East. Since the award of the D.F.C. he has taken part in operational sorties over the Far East theatre of war and has continued to display great keenness, courage and devotion to duty.

Distinguished Flying Cross

- Flt. Lt. E. F. DAVIS, R.A.F.V.R., No. 524 Sqn.
- F/O. B. A. TAYLOR, R.N.Z.A.F., No. 524 Sqn.
- Flt. Lt. R. J. GARVIN, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
- Act. F/O. J. A. G. BECK, R.A.A.F., No. 186 Sqn.
- P/O. N. W. T. BEETHAM, R.N.Z.A.F., No. 524 Sqn.
- Flt. Lt. K. WYVER, R.A.F.V.R., No. 214 Sqn.
- Act. Group Capt. G. T. WEIR, R.A.F.
- Sqn. Ldr. I. J. MCGHIE, R.A.F., No. 619 Sqn. (since deceased).
- Act. Sqn. Ldr. W. A. R. HARRIS, R.A.F., No. 356 Sqn.
- Act. Sqn. Ldr. J. P. MEADOWS, R.A.F.V.R., No. 219 Sqn.
- Act. Sqn. Ldr. W. SMITH, R.A.F.V.R., No. 184 Sqn.
- Act. Sqn. Ldr. A. ZWEIFBERGK, R.A.F.V.R., No. 245 Sqn.
- Flt. Lt. F. W. T. ANDREWS, R.A.F.V.R., No. 200 Sqn.
- Flt. Lt. H. CAST, R.A.F.V.R., No. 357 Sqn.
- Flt. Lt. H. R. H. F. IRWIN, R.A.F. (Lt., Indian Army), No. 174 Sqn.
- Flt. Lt. P. L. F. O'REILLY, R.A.F.V.R., No. 159 Sqn.
- Flt. Lt. R. PROSSER, R.A.F.V.R., No. 183 Sqn.
- Flt. Lt. N. C. PYE, R.A.F.V.R., No. 198 Sqn.
- Flt. Lt. P. C. STURLEY, R.A.F.V.R., No. 264 Sqn.
- Flt. Lt. G. V. VARDIGANS, R.A.F.V.R., No. 211 Sqn.
- Flt. Lt. A. J. WATTON, R.A.F.V.R., No. 74 Sqn.
- Act. Flt. Lt. F. B. BIRMINGHAM, R.A.F.V.R., No. 462 Sqn. (since deceased).
- Act. Flt. Lt. A. BOOTH, R.A.F.V.R., No. 12 Sqn. (since deceased).
- Act. Flt. Lt. R. R. HOWGILL, R.A.F.V.R., No. 100 Sqn. (since deceased).
- Act. Flt. Lt. G. PENDLETON, R.A.F., No. 159 Sqn.
- F/O. A. H. BOBBETT, R.A.F.V.R., No. 107 Sqn.
- F/O. E. A. GARSIDE, R.A.F.V.R., No. 230 Sqn.
- F/O. R. W. JORDAN, R.A.F.V.R., No. 356 Sqn.
- F/O. T. J. R. LARGE, R.A.F.V.R., No. 11 Sqn.
- F/O. O. A. PARRY, R.A.F.V.R., No. 11 Sqn.
- P/O. J. WATSON, R.A.F.V.R., No. 197 Sqn.
- F/O. R. J. M. WILSON, R.A.F.V.R., No. 164 Sqn.
- F/O. J. A. WHITMORE, R.A.F.V.R., No. 182 Sqn.
- P/O. F. C. COOKE, R.A.F.V.R., No. 357 Sqn.
- P/O. H. F. EDWARDS, R.A.F.V.R., No. 11 Sqn.
- P/O. E. C. JARVIS, R.A.F.V.R., No. 181 Sqn.
- P/O. G. L. JENKINS, R.A.F.V.R., No. 623 Sqn. (since deceased).
- P/O. T. E. TOMLIN, R.A.F.V.R., No. 49 Sqn. (since deceased).
- P/O. H. H. TUCK, R.A.F.V.R., No. 625 Sqn. (since deceased).
- W/O. C. E. BROWN, R.A.F.V.R., No. 240 Sqn.
- W/O. A. W. HOPKINS, R.A.F.V.R., No. 211 Sqn.
- W/O. G. P. HOUSTON, R.A.F.V.R., No. 159 Sqn.
- W/O. K. A. MACKENZIE, R.A.F.V.R., No. 11 Sqn.
- W/O. R. A. OUAIFE, R.A.F.V.R., No. 159 Sqn.
- W/O. R. W. STANLEY, R.A.F.V.R., No. 247 Sqn.
- W/O. D. A. SPENCER, R.A.F.V.R., No. 211 Sqn.
- W/O. F. TOMLINSON, R.A.F.V.R., No. 11 Sqn.



The badges of (left) No. 541 Squadron, R.A.F., "Alone Above All." (Centre) Transport Command, R.A.F., "Ferio Ferendo" (I Fight by Carrying). (Right) No. 160 Squadron, R.A.F., "Api Soya Paragasamu" (We Seek and Strike).

- Sqn. Ldr. R. G. CROSBY, R.C.A.F., No. 439 (R.C.A.F.) Sqn.
- Flt. Lt. A. W. APPLEBY, B.E.M., R.C.A.F., No. 684 Sqn.
- Flt. Lt. K. G. BOOTH, R.C.A.F., No. 357 Sqn.
- Flt. Lt. J. J. BOYLE, R.C.A.F., No. 411 (R.C.A.F.) Sqn.
- Flt. Lt. G. S. BROWN, R.C.A.F., No. 400 (R.C.A.F.) Sqn.
- Flt. Lt. C. D. BRICKER, R.C.A.F., No. 430 (R.C.A.F.) Sqn.
- Flt. Lt. J. P. H. A. BRUNELLE, R.C.A.F., No. 414 (R.C.A.F.) Sqn.
- Flt. Lt. H. E. HOLLAND, R.C.A.F., No. 11 Sqn.
- Flt. Lt. W. M. JOHNSON, R.C.A.F., No. 60 Sqn.
- Flt. Lt. J. MACKAY, R.C.A.F., No. 401 (R.C.A.F.) Sqn.
- Flt. Lt. J. A. MORTON, R.C.A.F., No. 400 (R.C.A.F.) Sqn.
- Flt. Lt. J. B. PRENDERGAST, R.C.A.F., No. 430 (R.C.A.F.) Sqn.
- Flt. Lt. J. L. A. ROUSSELL, R.C.A.F., No. 414 (R.C.A.F.) Sqn.
- Flt. Lt. J. W. RUTHERFORD, R.C.A.F., No. 60 Sqn.
- Flt. Lt. G. E. TRIBNER, R.C.A.F., No. 60 Sqn.
- Flt. Lt. E. E. TUMMON, R.C.A.F., No. 400 (R.C.A.F.) Sqn.
- F/O. C. H. ANDERSON, R.C.A.F., No. 11 Sqn.
- F/O. E. J. GEDDES, R.C.A.F., No. 430 (R.C.A.F.) Sqn.
- F/O. M. G. GRAHAM, R.C.A.F., No. 411 (R.C.A.F.) Sqn.
- F/O. D. W. RATHWELL, R.C.A.F., No. 17 Sqn.
- F/O. M. R. SHARUN, R.C.A.F., No. 416 (R.C.A.F.) Sqn.
- P/O. A. E. CAMPBELL, R.C.A.F., No. 159 Sqn.
- P/O. D. J. JAY, R.C.A.F.
- P/O. P. S. GUPTA, I.A.F., No. 1 (I.A.F.) Sqn.
- F/O. K. N. KAK, I.A.F., No. 1 (I.A.F.) Sqn.
- F/O. B. MINOO NOWSHERWAN, I.A.F., No. 1 (I.A.F.) Sqn.
- Flt. Lt. W. J. MURPHY, R.N.Z.A.F., No. 11 Sqn.
- P/O. P. L. CONNOLLY, R.N.Z.A.F., No. 34 Sqn.
- P/O. H. V. SOLE, R.N.Z.A.F., No. 34 Sqn.
- Flt. Lt. E. N. JENNINGS, R.A.F.V.R., No. 206 Sqn.
- Flt. Lt. A. J. S. STEWART, R.A.F.V.R., No. 547 Sqn.
- P/O. J. J. V. GLAZEBROOK, R.A.F.V.R., No. 206 Sqn.
- Act. Sqn. Ldr. R. W. R. DAY, R.C.A.F., No. 67 Sqn.
- Act. Sqn. Ldr. E. B. ROGERS, R.A.F.V.R., No. 640 Sqn.
- Act. Sqn. Ldr. G. H. WHOWELL, R.A.F.V.R., No. 166 Sqn.
- Flt. Lt. G. L. USHER, R.A.F.V.R., No. 12 Sqn.
- Act. Flt. Lt. L. P. BOUCHER, R.A.F.V.R., No. 181 Sqn.
- F/O. E. J. TOYELL, R.A.A.F., No. 299 Sqn.
- P/O. H. M. RITTMAN, R.A.A.F., No. 683 Sqn.
- Act. Sqn. Ldr. C. T. DOUDY, R.A.A.F.
- Flt. Lt. B. E. GROUSE, R.A.A.F., No. 215 Sqn.
- Flt. Lt. E. D. HOUGHTON, R.A.A.F., No. 215 Sqn.
- Flt. Lt. G. O. P. WATSON, R.A.A.F., No. 230 Sqn.
- Act. Flt. Lt. J. RENDALL, R.A.A.F., No. 181 Sqn.

- Act. Flt. Lt. A. J. L. SEDUNARY, R.A.A.F., No. 75 (N.Z.) Sqn.
- F/O. L. E. N. LAHEY, R.A.A.F., No. 35 Sqn.
- F/O. L. E. O. LIST, R.A.A.F., No. 230 Sqn.
- P/O. D. D. CURTIS, R.A.A.F., No. 156 Sqn.
- P/O. J. J. O'DONNELL, R.A.A.F., No. 11 Sqn.
- W/O. D. G. SHARP, R.A.A.F., No. 215 Sqn.
- Flt. Lt. J. F. THOMAS, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
- Act. Flt. Lt. M. A. KILPATRICK, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
- F/O. F. D. BAXTER, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
- F/O. P. N. EWING, R.A.A.F., No. 45 Sqn.
- F/O. J. L. M. L. F. RANCOURT, R.C.A.F., No. 404 (R.C.A.F.) Sqn.
- F/O. M. S. WICKES, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
- P/O. W. D. CORBETT, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
- P/O. H. A. HOSIER, R.A.F.V.R., No. 235 Sqn.
- P/O. R. W. PARR, R.A.F.V.R., No. 640 Sqn.
- P/O. N. J. PARRIS, R.A.F.V.R., No. 149 Sqn.
- P/O. H. SAINS, R.A.F.V.R., No. 76 Sqn.
- P/O. F. W. SCHOON, R.A.F.V.R., No. 156 Sqn.
- P/O. F. W. SHIPSTON, R.A.F.V.R., No. 158 Sqn.
- P/O. A. SMITH, R.A.F.V.R., No. 109 Sqn.
- P/O. R. S. SMITH, R.A.F.V.R., No. 578 Sqn.
- P/O. E. R. TALBOT, R.A.F.V.R., No. 7 Sqn.
- P/O. W. J. TYLER, R.A.F.V.R., No. 158 Sqn.
- P/O. L. WAGSTAFF, R.A.F.V.R., No. 166 Sqn.
- P/O. H. F. WILKINSON, R.A.F.V.R., No. 156 Sqn.
- P/O. T. W. WILLIAMS, R.A.F.V.R., No. 158 Sqn.
- F/O. A. W. S. SHILLAKER, R.A.A.F., No. 35 Sqn.
- F/O. J. W. SPIERS, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
- F/O. G. T. STONE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
- F/O. W. D. TURNER, R.A.A.F., No. 15 Sqn.
- F/O. R. W. VICKERS, R.A.A.F., No. 514 Sqn.
- F/O. B. A. WOODS, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
- Act. F/O. J. H. CAMPBELL, R.A.A.F., No. 622 Sqn.
- Act. F/O. I. R. CAMPBELL, R.A.A.F., No. 514 Sqn.
- Act. F/O. F. W. DOUGLAS, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
- P/O. V. P. ANNELLS, R.A.A.F., No. 158 Sqn.
- P/O. J. BATEMAN, R.A.A.F., No. 149 Sqn.
- P/O. J. H. CARROLL, R.A.A.F., No. 166 Sqn.
- P/O. A. J. CONCANNON, R.A.A.F., No. 102 Sqn.
- P/O. E. A. COOK, R.A.A.F., No. 166 Sqn.
- P/O. R. H. DIXON, R.A.A.F., No. 102 Sqn.
- P/O. A. K. D. GILLIES, R.A.A.F., No. 158 Sqn.
- P/O. A. J. HOLLAND, R.A.A.F., No. 514 Sqn.
- P/O. W. D. KENNY, R.A.A.F., No. 83 Sqn.
- P/O. M. E. LADYMAN, R.A.A.F., No. 35 Sqn.
- P/O. D. B. MCLEAN, R.A.A.F., No. 102 Sqn.
- P/O. M. J. MARTIN, R.A.A.F., No. 35 Sqn.
- P/O. J. F. MARSHALL, R.A.A.F., No. 35 Sqn.
- P/O. K. L. RICHARDS, R.A.A.F., No. 77 Sqn.
- P/O. V. M. SMITH, R.A.A.F., No. 102 Sqn.
- P/O. J. L. STEVENS, R.A.A.F., No. 35 Sqn.
- P/O. J. W. M. TIDEX, R.A.A.F., No. 51 Sqn.
- W/O. N. W. CURTIS, R.A.A.F., No. 35 Sqn.
- W/O. A. H. GREEN, R.A.A.F., No. 35 Sqn.
- W/O. S. J. TURNER, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
- P/O. G. W. DAULBY, R.A.F.V.R., No. 158 Sqn.
- P/O. F. W. D. EMERY, R.A.F.V.R., No. 76 Sqn.
- P/O. A. J. FICKLING, R.A.F.V.R., No. 10 Sqn.
- P/O. G. A. FISHER, R.A.F.V.R., No. 640 Sqn.
- P/O. G. N. FLINT, R.A.F.V.R., No. 635 Sqn.
- P/O. T. R. GADSDEN, R.A.F.V.R., No. 7 Sqn.
- P/O. B. W. GOLDEN, R.A.F.V.R., No. 35 Sqn.
- P/O. B. L. GREEN, R.A.F.V.R., No. 571 Sqn.
- P/O. A. GROZIER, R.A.F.V.R., No. 10 Sqn.
- P/O. A. S. HALL, R.A.F.V.R., No. 101 Sqn.
- P/O. A. HAMBLEY, R.A.F.V.R., No. 635 Sqn.
- P/O. K. A. HARDER, R.A.F.V.R., No. 625 Sqn.
- P/O. L. C. HARRIS, R.A.F.V.R., No. 10 Sqn.
- P/O. T. HINE, R.A.F., No. 622 Sqn.
- P/O. N. S. HUGHES, R.A.F.V.R., No. 76 Sqn.
- P/O. W. HUMPHREYS, R.A.F.V.R., No. 102 Sqn.
- P/O. J. W. JENKINS, R.A.F.V.R., No. 158 Sqn.
- P/O. R. T. JONES, R.A.F.V.R., No. 218 Sqn.
- P/O. S. G. J. KNIGHT, R.A.F.V.R., No. 78 Sqn.
- P/O. R. C. LITTLEMORE, R.A.F.V.R., No. 158 Sqn.
- P/O. J. N. K. MCLAUGHLIN, R.A.F.V.R., No. 635 Sqn.
- P/O. W. A. MAXWELL, R.A.F.V.R., No. 69 Sqn.
- P/O. H. P. NANCARROW, R.A.F.V.R., No. 608 Sqn.
- P/O. E. OLDHAM, R.A.F.V.R., No. 7 Sqn.
- P/O. D. J. N. PALMER, R.A.F.V.R., No. 44 Sqn.

Distinguished Flying Medal

- Flt. Sgt. E. A. ROWLANDS, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
- Flt. Sgt. E. BURN, R.A.F.V.R., No. 180 Sqn.



The badges of (left) No. 119 Squadron, R.A.F., "By Night by Day." (Centre) No. 10 Squadron, R.A.A.F., "Strike First." (Right) No. 251 Squadron, R.A.F., "However Wind Blows."

SERVICE AVIATION

Flt. Sgt. V. A. COLES, R.A.F.V.R., No. 159 Sqn.
 Flt. Sgt. V. J. WHARRIER, R.A.F.V.R., No. 215 Sqn.
 Sgt. (now P/O.) D. J. JONES, No. 12 Sqn. (since deceased).
 Sgt. L. KELLY, No. 218 Sqn. (since deceased).
 Flt. Sgt. S. PROCTOR, R.A.F.V.R., No. 7 Sqn.
 Flt. Sgt. D. C. PUDNEY, R.A.F.V.R., No. 622 Sqn.
 Flt. Sgt. J. A. RAYTON, R.A.F.V.R., No. 635 Sqn.
 Flt. Sgt. J. E. REGAN, R.A.F.V.R., No. 571 Sqn.
 Flt. Sgt. J. E. RIMMINGTON, R.A.F.V.R., No. 97 Sqn.
 Flt. Sgt. J. ROBINSON, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
 Flt. Sgt. G. RUST, R.A.F.V.R., No. 622 Sqn.
 Flt. Sgt. R. STUART, R.A.F.V.R., No. 635 Sqn.
 Flt. Sgt. J. R. SWINSCOE, R.A.F.V.R., No. 158 Sqn.
 Flt. Sgt. G. TITMAN, R.A.F., No. 158 Sqn.
 Flt. Sgt. W. C. H. VINES, R.A.F.V.R., No. 578 Sqn.
 Flt. Sgt. A. J. WHITE, R.A.F.V.R., No. 635 Sqn.
 Flt. Sgt. A. C. C. WILKS, R.A.F.V.R., No. 7 Sqn.
 Flt. Sgt. L. N. WILLIS, R.A.F.V.R., No. 158 Sqn.
 Flt. Sgt. R. K. YEULETT, R.A.F., No. 532 Sqn.
 Sgt. T. A. R. BARR, R.A.F.V.R., No. 195 Sqn.
 Sgt. J. T. B. BILLINGHAM, R.A.F.V.R., No. 158 Sqn.
 Sgt. S. P. CAWTHORNE, R.A.F., No. 608 Sqn.
 Sgt. G. CROSS, R.A.F.V.R., No. 35 Sqn.
 Sgt. F. DARLINGTON, R.A.F.V.R., No. 158 Sqn.
 Sgt. R. FALLOWS, R.A.F.V.R., No. 622 Sqn.
 Sgt. W. HICKLING, R.A.F.V.R., No. 622 Sqn.
 Sgt. A. MIDDLETON, R.A.F.V.R., No. 193 Sqn.
 Sgt. L. ROWLES, R.A.F.V.R., No. 195 Sqn.
 Sgt. J. G. RUMSEY, R.A.F., No. 622 Sqn.
 Sgt. G. STEELE, R.A.F.V.R., No. 90 Sqn.
 Sgt. P. A. E. WOOLLOFF, R.A.F.V.R., No. 622 Sqn.
 Sgt. J. WRIGHT, R.A.F.V.R., No. 90 Sqn.

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

Military Medal

Sgt. W. T. SIMPSON, R.A.F.V.R., No. 299 Sqn.—In September, 1944, Sgt. Simpson was the rear gunner in an aircraft which was damaged by anti-aircraft fire, and the pilot was compelled to make a forced landing. The bomber caught fire and the bomb aimer and flight engineer were trapped in the blazing wreckage. The remainder of the crew managed to get clear, but immediately came under rifle fire from enemy snipers. Sgt. Simpson, although under continuous enemy fire and despite the danger of petrol tanks and ammunition exploding, twice entered the blazing bomber and rescued the two members of the crew who were trapped. About thirty seconds later the fuel tanks exploded and the aircraft was soon burnt out. Sgt. Simpson displayed great bravery and disregard of his personal safety in saving the lives of two of his comrades.

Cpl. H. GREEN, R.A.F.V.R., R.A.F. Regiment.—Cpl. Green has led his section on patrols against the enemy and has at all times displayed outstanding courage and devotion to duty, qualities which have been reflected in the efficiency of those under his command. During the concentration of the 2nd Polish Corps at San Sofia it became essential to discover the precise position of the enemy prior to an attack being made. On October 16th, 1944, Cpl. Green led a patrol detailed to go to Collina Di Pondo. Leading his men on a wide detour, through enemy-held territory, Cpl. Green approached his objective from

the flank unobserved. As the first building entered by the patrol showed signs of recent occupation, Cpl. Green went on to the next farm, where the enemy were encountered in great strength. Cpl. Green, realising that at least one member of his patrol must get back and report the position, directed covering fire to be made on the farm, and this enabled the remainder of the patrol to take cover in a nearby wood. Although an enemy machine gun was now in action, Cpl. Green succeeded in withdrawing his men and the patrol returned without a casualty.

Cpl. T. SQUIRE, R.A.F.V.R., R.A.F. Regiment.—One morning in November, 1944, Cpl. Squire was in charge of the leading section during an attack against the Sugar Factory at Classo Fuari, south of Ravenna. The objective was strongly fortified and the only approach was a single and narrow route, which was heavily defended by machine guns. Despite the intensity of the enemy counter fire, Cpl. Squire went straight on to his first objectives and cleared the enemy posts, thereby enabling the remainder of the flight to continue the attack without check. Cpl. Squire's courage and determination greatly inspired his comrades and contributed in a large measure to the success achieved. He has, on many occasions, led his section on patrols against the enemy. He has invariably displayed fine leadership and has set a magnificent example.

Cpl. A. G. BRADFELD, R.A.F.V.R., R.A.F. Regiment.—Throughout the period his field squadron has been under the command of the Eighth Army, Cpl. Bradfield, who is non-commissioned officer in charge of signals, has been responsible for the communications between headquarters and the various flights and commanding formations. He has displayed very great endurance under exceptionally hard conditions in the mountains when operating along Route 16, south of Ravenna, and, later, on the River Lamone with a Canadian armoured brigade. During the period November 19-30th, 1944, covering the attack and occupation of the enemy strong-point known as the Sugar Factory at Classo Fuari, Cpl. Bradfield showed great bravery in going out to repair broken wires along stretches of open road which were continually being swept by enemy shell and mortar fire. On one occasion he was pinned down for over an hour by very accurate mortar fire, but he carried on and completed the task. Although fully aware from these experiences of the danger of his work, he has never hesitated, and has gone out at all hours by day and night and up to the end of the squadron's operational period he has displayed the same disregard for danger. His courage, steadiness and devotion to duty under the most harassing conditions have been outstanding.

LA/C. W. WEARDEN, R.A.F.V.R., R.A.F. Regiment.—During the period September-December, 1944, LA/C. Wearden's field squadron has been under the command of the Eighth Army, and has operated in the mountains, along Route 16, and, after the fall of Ravenna, on the Lamone River with a Canadian armoured brigade. Throughout these operations LA/C. Wearden has carried out the duty of flight signaller in an exceptional and outstanding manner. He has gone out on many patrols to make contact with the enemy and kept a wireless link with his headquarters whilst thus operating. During the period November 19th to 30th, 1944, whilst operating near the Sugar Factory of Classo Fuari and from December 8th to 17th, when his flight was holding a very exposed position on the River Lamone, north of Messano, he has maintained his communications under long periods of enemy fire by shell and mortar, showing a total disregard for his own safety and often working on open stretches of

road in full view of enemy observation and fire. LA/C. Wearden has worked for very long periods without rest, and his courage and devotion to duty under circumstances of great hardship have set a fine example.

George Medal

Act. Wing Cdr. D. L. KINGS, R.A.F.V.R.
 Flt. Lt. J. P. LEWIN, R.A.F.O.

O.B.E. (Mil.)

Flt. Lt. H. J. SHUTTLEWORTH, R.A.F.V.R.

B.E.M. (Mil.)

Cpl. S. B. ROCK, R.A.F.V.R.
 Cpl. J. S. PETERS, R.A.F.V.R.

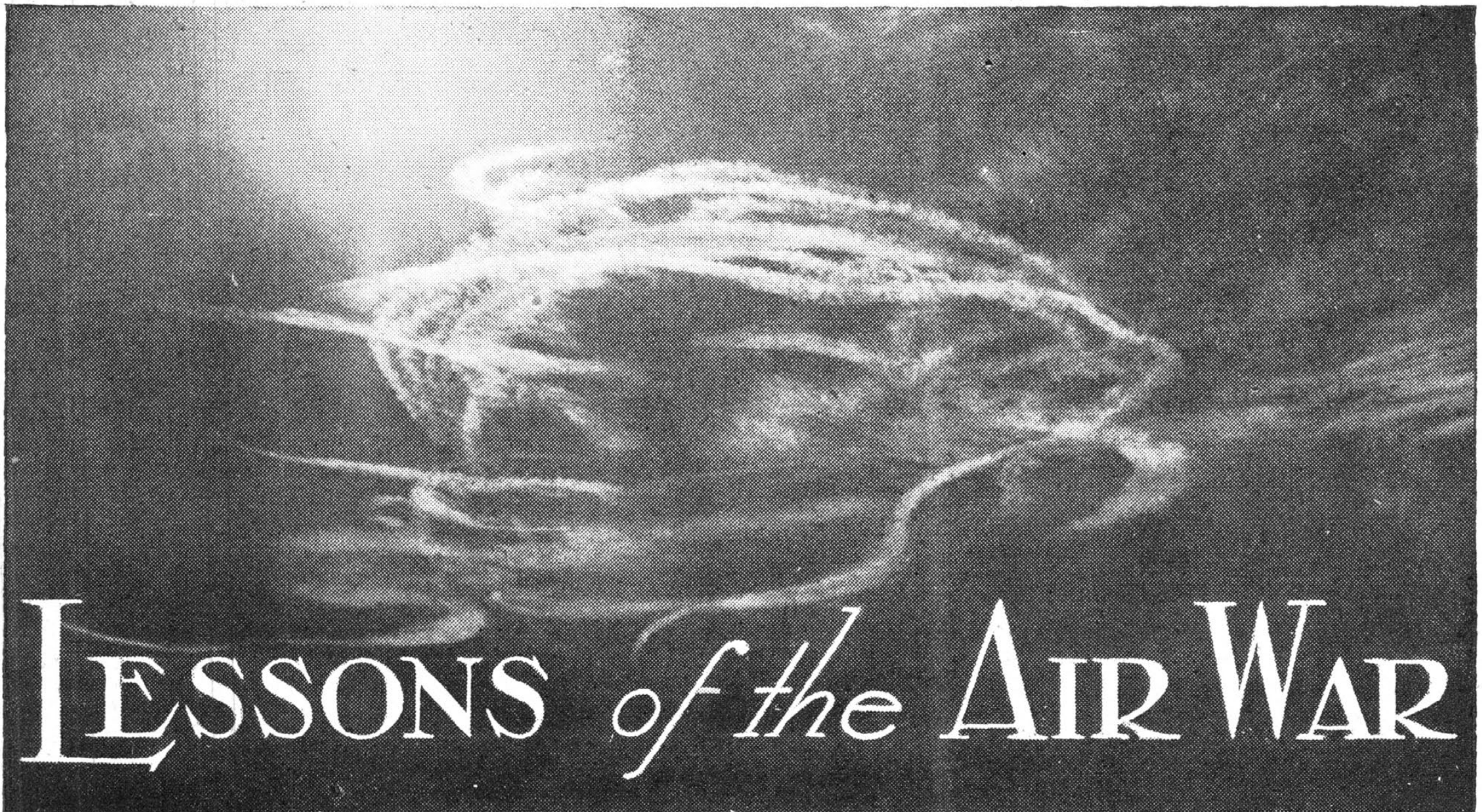
On November 27th, 1944, an explosion on an immense scale occurred in a mine forming the R.A.F. bomb storage depot near Burton-on-Trent. The depot, which consisted of tunnelled workings into low hills, was divided into two parts, known as the Old and New Mines, by a solid wall partly of native rock and partly of artificial construction. The explosion occurred in the small New Mine where some 4,000 tons of bombs and other explosives were stored, including over 1,500 four-thousand-pound bombs. This part of the depot was completely obliterated, a crater 350 yards by 600 yards being formed with an enormous open rent in continuation to the north-west. Serious damage was also done to the Old Mine alongside, where some 8,000 to 10,000 tons of bombs were stored. Here blast caused dangerous roof falls and cracks and scattered bombs and other explosives over the floors, whilst poisonous fumes generated by the explosion percolated from the New Mine. Apart from the damage to the depot, a nearby commercial undertaking, a mine was completely wrecked by huge quantities of rock and sodden earth thrown up by the explosion and by the escaping waters of a small lake which had burst open. Over 60 people lost their lives.

Wing Cdr. KINGS was the first to enter the mine, some ten minutes after the explosion had occurred. All the lights had been extinguished but with the help of a hand-lamp operating intermittently, Wing Cdr. Kings made a full search of the underground area as was possible before he was affected by dangerous fumes and had to retire. He then took control of the emergency work above ground, including the control of stacks of incendiary bombs which had been set alight outside the mine entrance. He arranged for further help and took steps to determine the extent of the casualties and damage. On arrival of the National Fire Service with oxygen apparatus, Wing Cdr. Kings, with Foreman J. C. Salt and three N.F.S. men, again searched the mine, concentrating particularly on the areas where the roof had fallen. He continued this search until for the second time he was forced to retire by the effects of noxious fumes. Thereafter Wing Cdr. Kings made every effort to keep the situation under control, accepting and co-ordinating offers of assistance as they came to hand. Throughout he acted with conspicuous gallantry and resource, and showed fine leadership.

Flt. Lt. LEWIN on his own initiative, and alone, entered the mine some 20 minutes after the explosion and carried out a prolonged search in the underground workings. He later entered a second time with Foreman Coker and remained underground for about an hour, searching most of the roads in an endeavour to find the missing personnel. The fumes had by this time become more dangerous and while Foreman Coker persisted as long as he could, he had in the end to be carried out by Flt. Lt. Lewin, who then re-entered the mine alone to continue his endeavours. He did not abandon his search until the arrival of teams of the Mines Rescue Organisation with oxygen apparatus. Flt. Lt. Lewin then went to the nearby mine and descended the airshaft several times to a dangerous gas-filled area to remove casualties. Finally he assisted Wing Cdr. Kings in organising overground relief measures. Throughout he acted with gallantry, initiative and complete disregard for his own safety.



UNEMPLOYED: Mustangs of the famous Desert Air Force, which gave such excellent air support to the Eighth Army from El Alamein to the Alps.



LESSONS *of the* AIR WAR

PART I—SECURING THE BASE

By MAJOR F. A. de V. ROBERTSON, V.D.

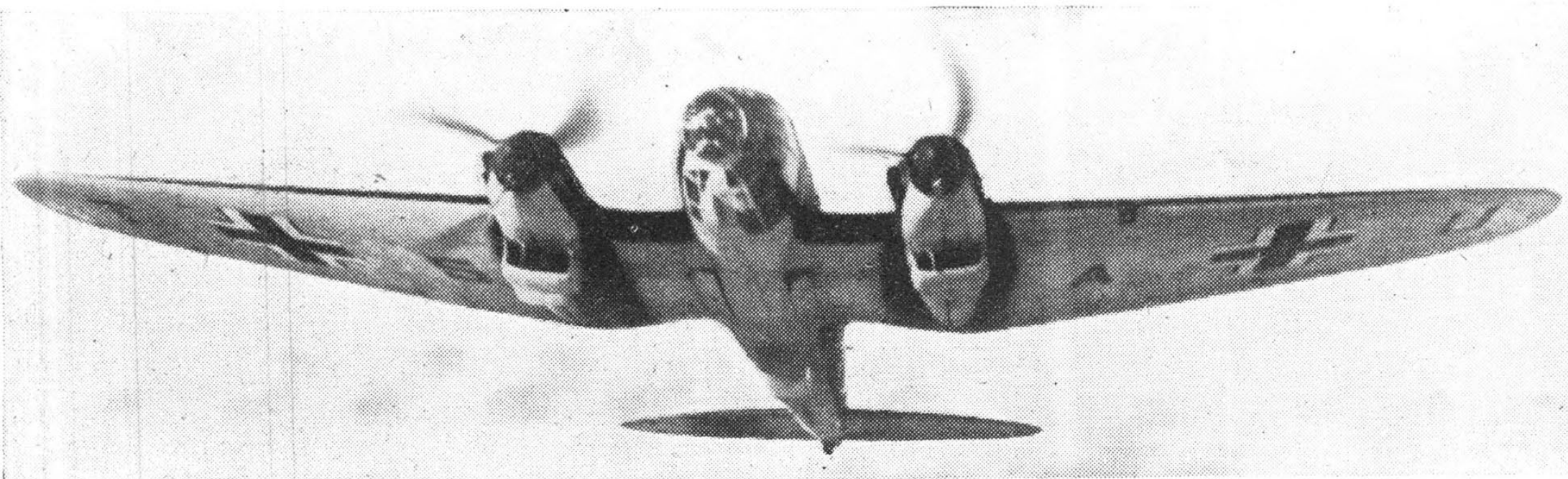
This is the first of a series of articles reviewing the lessons of the war in the air. So many important changes occurred in the technique of air warfare as the conflict emerged from a defensive to an offensive role, that an intimate examination of the developments will be useful at the conclusion of the European war. The opening chapter deals with the position in 1939 and the Battle of Britain. Next week's subject will be "Air Power and Attack."

SAID Field Marshal Montgomery at the close of the Africa campaign: "We first win the air battle; then we win the land battle." He spoke of tactical operations, but his remark is equally true of the strategy of the war against Germany. That war could never have been won by the United Nations without a secure base. That base could only be the island of Great Britain. Without that base not all the vast power of the United States could have defeated Germany, for the American Army could never have got ashore on the Continent of Europe. Without the invasion from the West it is more than doubtful if the great land forces of Russia could have overwhelmed those of Germany. In fact, all subsequent developments hung upon the ability of the British to hold their island as a base.

Because we write of the air and try to analyse its power, let none forget that Great Britain is an island. That fact is as important now as when Shakespeare wrote:—

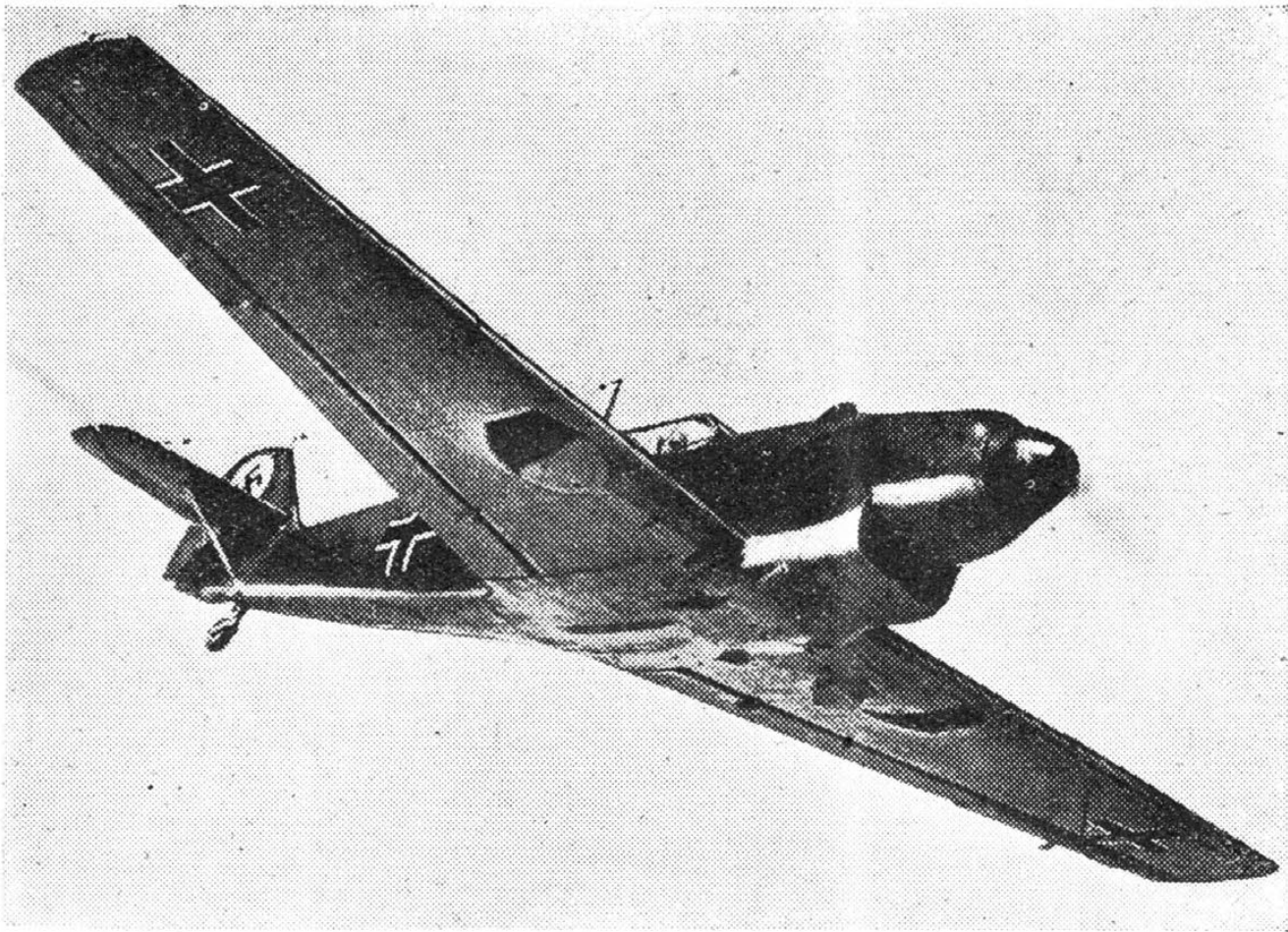
"This precious stone set in the silver sea,
Which serves it in the office of a wall,
Or as a moat defensive to a house."

The German Army could not march into Great Britain as it had marched into Poland and France, and the German Navy was quite powerless to face the Royal Navy in a fair and square sea fight. But if German air power could bomb the British Fleet out of the Channel, then it seemed to Hitler and his band of strategists that an overwhelming German force might be ferried across the Channel. Once



The head-on view of a Heinkel He III which our fighter pilots so frequently saw during the Battle of Britain.

LESSONS OF THE AIR WAR



The Messerschmitt 109, Germany's standard single-engined fighter at the beginning of the war, had one machine gun in each wing and a cannon firing through the nose.

ashore it would meet with but little resistance, for all the British guns and tanks had been abandoned at the time of the evacuation from Dunkerque.

Therefore, it was necessary for the Germans to win the air battle before winning the land battle. It had often been said that the discovery of the art of flying had, for practical purposes, abolished the English Channel. Now was the time to put that saying to the proof.

It does not seem to have been always apparent to Göring and the other chiefs of the *Luftwaffe* that winning the air battle is a matter of fighters. They had made experiments in the Spanish Civil War, where the few fighters opposed to them were not first class. The chief deduction which they drew from their experiments was that speed was the greatest desideratum in both fighters and bombers. Speed, they held, was the best protection which they could give to their bombers, and armament was a negligible consideration. So Göring put on large-scale production the Heinkel He 111, the Dornier Do-17 and 215 bombers, and the Messerschmitt Me 109 fighter. He committed the factories so wholeheartedly to the production of those types that it became impossible to make a rapid change. There seemed at the time to be ample excuse for the policy. The top speed of the He 111 was nearly 275 m.p.h. That of the Do 215 was about 312 m.p.h. and of the Dornier 17 (sometimes called "the flying pencil") about 310 m.p.h.

At the time when Göring, so to speak, went Nap. on

these types the best British fighter was the Gauntlet biplane with a speed of only 230 m.p.h., while its successor, the Gladiator, could only muster rather under 250 m.p.h. The German bombers could easily fly away from such fighters; and, had they ever been matched in combat, the lessons drawn from the Spanish Civil War would have been proved valid. But between Göring's fateful production order and the outbreak of war certain things happened in Great Britain. The Hawker firm produced the Hurricane monoplane which had a top speed of 325 m.p.h., just a little less than that of the Me 109, but the Hurricane was far the more manoeuvrable of the two. It is said that after the Me 109 had been designed a new type of engine was installed in it, which badly upset its balance. About the same time the great Supermarine designer, R. J. Mitchell (now, alas! no more) produced his masterpiece, the Spitfire. The first mark of that type was slightly faster than the Messerschmitt, while later marks have a top speed of 450 plus m.p.h.

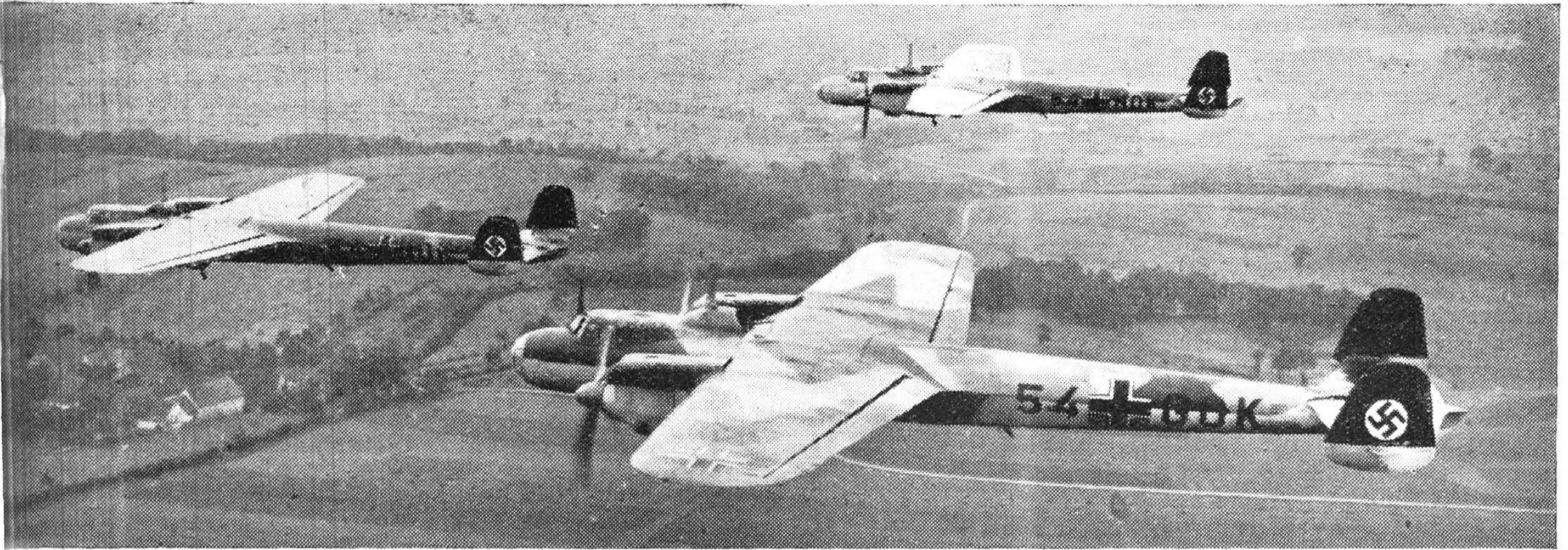
The air side of a war has, since 1914, been largely fought-out in the drawing offices of the two sides. In the first world war it is fascinating to read of how the temporary (but very deadly) supremacy of the Fokker monoplane was overcome by the D.H.1, the F.E.2D, the Sopwith Triplane, and the S.E.5A. Thereafter the drawing offices of both sides raced, now one and then the other side getting its nose in front, until finally the Sopwith Camel ruled the skies over the trench lines. In the second world war the Spitfire was never mastered by any German production; though the latest Messerschmitt is a great improvement on its first avatar. The same process has gone on with aircraft engines. For many years there was a custom, which was almost regarded as a rule, that in the R.A.F. all bombers should be driven by water-cooled engines and fighters by air-cooled radials. That custom has died. The outstanding engine of the late war has been the Rolls-Royce liquid-cooled Merlin. When in 1939 it first went into battle in both Hurricane and Spitfire it produced 1,020 h.p. Now, through skilful improvements, it produces 1,580 h.p., though its size has not been increased.

The Eight-gun Fighter

At the time of the production of these two masterly fighters a momentous decision was taken. We may accept as authoritative the assurance of Wing Commander A. B. Austin (once Director of Public Relations with Fighter Command, and afterwards killed as a war correspondent



A typical picture of 1940. Pilots of a Fighter Command Spitfire Squadron "scramble" to intercept a German raid.



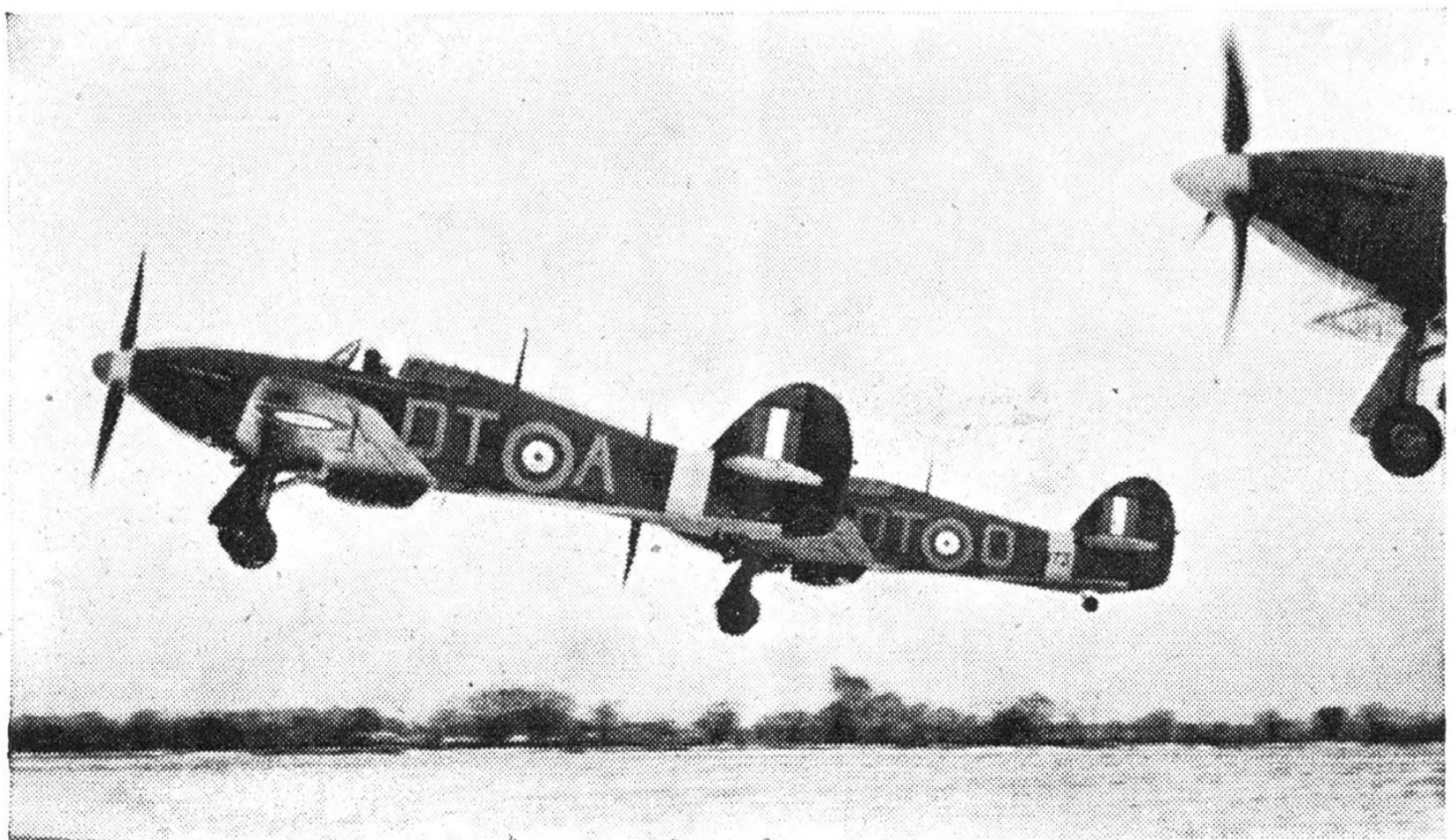
Nicknamed the Flying Pencil, the Dornier Do 17 was contemporary with our Blenheim. Almost unarmed and unarmoured these machines were shot out of the sky by hundreds.

in the streets of an Italian town) that this decision was taken personally by Air Chief Marshal Sir Hugh (now Lord) Dowding when he was A.O.C.-in-C., Fighter Command. This decision was that the new fighters should each be armed with no fewer than eight Browning guns apiece. The calibre was 0.303, similar to that of the Army's Service rifle. The guns were located in the wings, outside the radius of the airscrew; and so there was no need for an interrupter gear to slow down the rate of fire. When the pilot pressed the gun-button bullets poured forth at the rate of 120 a second. They synchronised at a distance of 250 yards, but at both shorter and greater distances they would shatter an enemy aircraft to pieces. One pilot is known to have shot down an enemy at 800 yards, and many were destroyed at a range of 25. Polish pilots, in particular, strongly believed in getting close up to their foe before opening fire.

In the early days of the war, before the Germans invaded the Low Countries, there were only a few R.A.F. fighter squadrons in France and all were equipped with the Hurricane. The undercarriage legs of that machine retracted inwards; those of the Spitfire outwards. Consequently the Hurricane had a wider wheel track than the Spitfire, and could operate from a rougher airfield. The airfields put at the disposal of the R.A.F. in France were mostly rough.

So it came about that when the Germans decided to conquer Britain from the air, some of their pilots had had experience of the Hurricane, but none of them had yet fought a Spitfire. The German bombers who tried to raid the Fleet in the Firth of Forth had been chased away by the Spitfires of the A.A.F. squadrons of Edinburgh and Glasgow, and odd bombers and reconnaissance machines over the North Sea had sometimes met, and fallen victims to, patrolling Spitfires; but the *Luftwaffe* as a whole had but little knowledge of the type, or for that matter of the shattering effect of fire from eight guns.

A flight of Hurricanes taking off. While the Spitfires tackled the German fighter escorts, the Hurricane got into the bombers mostly by head-on attacks.



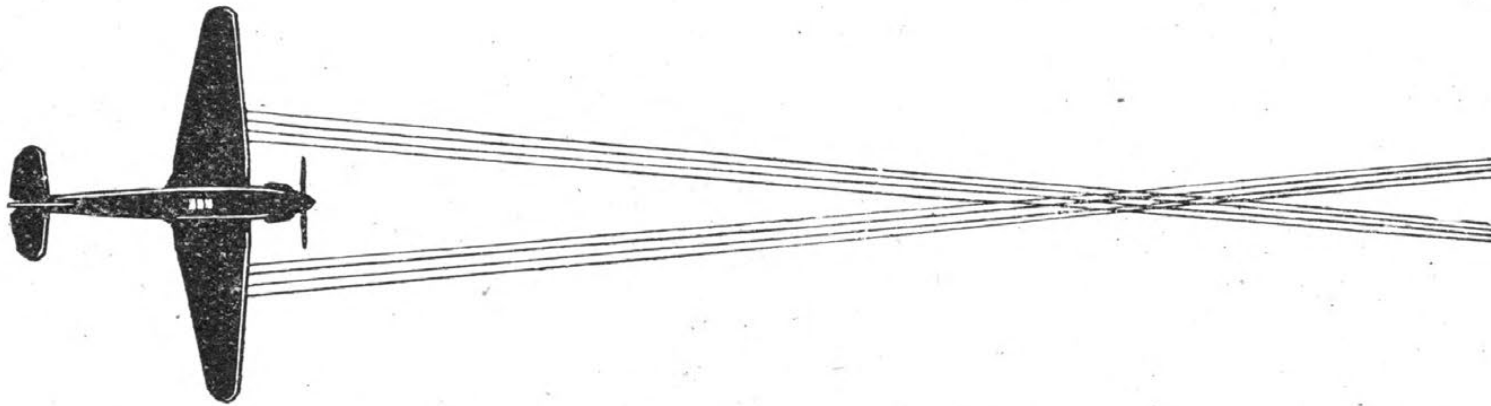
Fighter Tactics

So, light-heartedly and full of the insolence begotten of easy victories in Poland, Norway and France, the *Luftwaffe* set out to beat Fighter Command and clear the way for a German invasion of Britain. The story of the Battle of Britain has in part been told in an official publication. But that was written at a time when considerations of security forbade the telling of the whole story. The German tactics and their changes of tactics are described; but of Fighter Command it is usually said that it adopted new tactics to meet the novelties of the Germans, and that these tactics were successful; but what the British tactics were is left unsaid. One knows that three Fighter Groups were concerned. No. 11 Group occupied the inner ring of airfields round London: North Weald, Hornchurch, Northolt, Kenley, Biggin Hill and others, with Manston, Hawkinge and Tangmere on the coast of Kent and Sussex. This was naturally the hardest-worked group. No. 12 Group looked after the North Sea coast from Duxford northwards. No. 10 Group had the rest of the South Coast and the West of England, and had to contend with furious raids on Portsmouth, Southampton, Plymouth, etc. These groups had to help each other on many occasions, and it must often have been a nice point for Fighter Command to decide when to reinforce a certain group without leaving important places inadequately protected. The

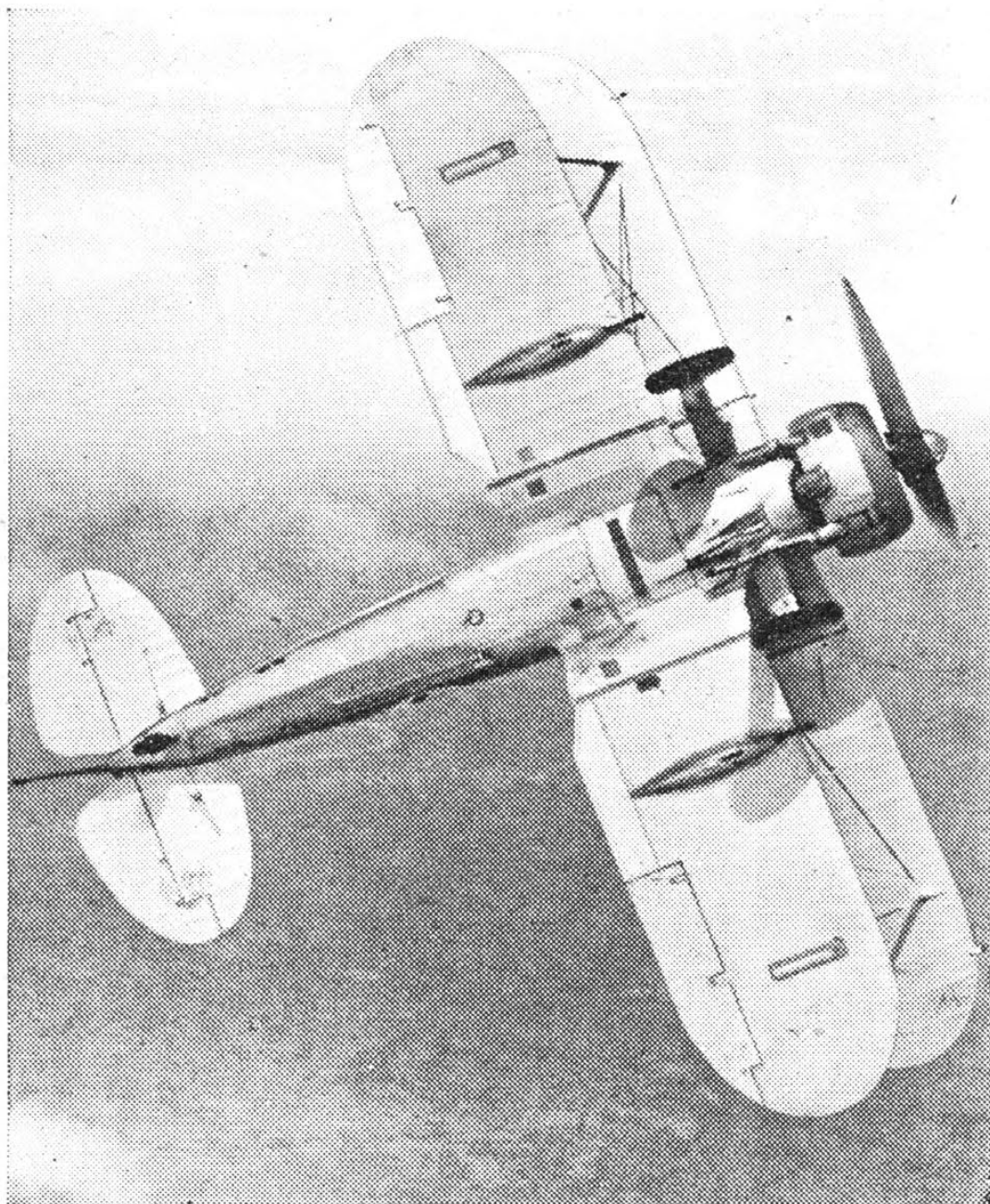
LESSONS OF THE AIR WAR

details of how it was done have not been revealed. Some day, not a very remote day we hope, they should make very interesting reading. The actual minor tactics employed by the Wings and Squadrons in dealing with various sorts of German formations are also a secret to be disclosed some day. We all know that it is desirable to attack from above, and to dive out of the sun; but there is much more to it than that. Skilful leaders of Groups and Wings were able to impose their will upon the enemy, and make him fight as they wanted him to do. In the main it may be said that the object was to destroy enemy bombers without giving a free hand to the escort of Messerschmitts overhead. Sometimes, however, the best tactics were for the front rank (so to speak) of British fighters to attack the escort and disorganise it, leaving the bombers unprotected to be dealt with by our second and third lines.

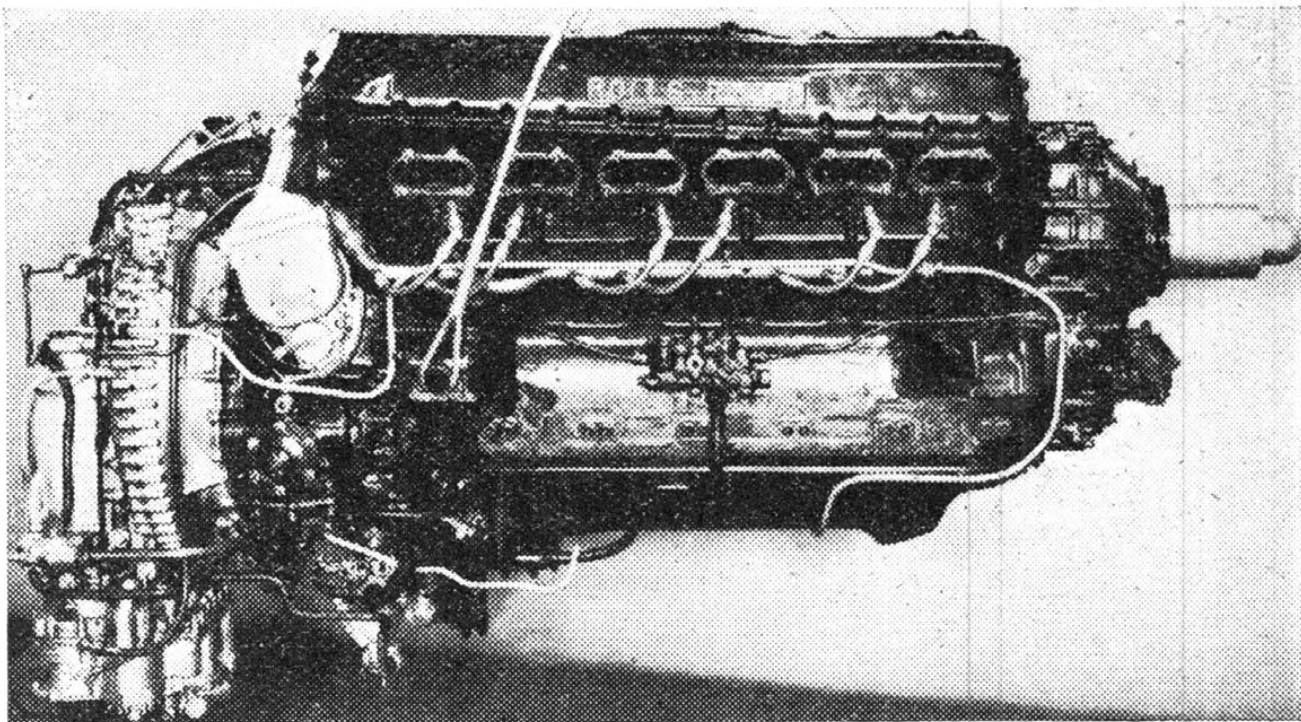
All planning, of course, depended on prompt information and plotting of approaching raids. The Germans did not know, nor did the British public at that time, that



Diagrammatic layout of the cone of fire of one of our eight-gun fighters with which we fought the Battle of Britain.



Although only a four-gun fighter (two in the fuselage and one under each bottom wing) the Gladiator did some wonderful work in Norway and Malta.



The Merlin engine which equipped all our eight-gun fighters was the envy of the air forces of the world.

we were using radiolocation. Quite possibly that invention saved us from disaster. None the less, great credit is due to the Royal Observer Corps, which worked ceaselessly and hard to report the approach and the course of the raids. Its work was invaluable.

The Battle of Britain may justly be deemed one of the decisive battles of the world. Had it been lost, freedom, too, would have been lost, perhaps for all the world. We might well have had a Buchenwald in Kent.

In the Battle of Britain the R.A.F. lost 375 pilots killed and 358 wounded. Between August 8th and October 31st they destroyed in daylight 2,375 German and Italian aircraft.

While writing about the holding of bases, we should not forget another island base—Malta. On the holding of that base depended all our Mediterranean strategy. It, too, was held by fighters; not by hundreds of them but by dozens or even half-dozens. While it was held it broke the Axis plans for an enormous pincers movement towards the East.

One lesson the British people have learnt and must not forget. Victory is not possible without air power; air power cannot be brought to bear without air superiority; and air superiority must be won mainly by fighters.

(Another article will appear next week.)

FIGHTER COMMAND

IT is announced that Air Marshal Sir Roderic Hill, K.C.B., M.C., A.F.C., will relinquish his position as A.O.C.-in-C., Fighter Command, on appointment to the Air Council as Air Member for Training *vice* Air Marshal Sir P. Drummond. He will be succeeded by Air Marshal Sir James M. Robb, K.B.E., C.B., D.S.O., D.F.C., A.F.C.

Sir Roderic Hill has commanded Fighter Command since October, 1944. In the last war he commenced his service in the Royal Fusiliers, but in 1916 joined the R.F.C. After the war he commanded No. 45 Squadron in Iraq, and wrote an excellent book, *The Baghdad Air Mail*. Later he was an instructor at the R.A.F. Staff College, and for two years was Air A.D.C. to the King. He was for a time Chief Instructor to the Oxford University Air Squadron, but in 1936 went to command the R.A.F. in Palestine and Transjordan. In 1938 he was D.T.D., and later Director-General of Research and Development.

Sir James Robb enlisted in the Northumberland Fusiliers in 1914, gained a commission, and in 1916 joined the R.F.C. In 1926 he commanded No. 3 Squadron. In 1932 he passed through the Naval Staff College. He also served with the Fleet Air Arm. In 1936 he became Commandant of the Central Flying School. Recently he has been Deputy Chief of Staff (Air) at S.H.A.E.F.

Short Shetland

Review of Britain's Largest Aircraft : A Machine Eminently Suitable for Showing the Flag : Long Endurance with Great Carrying Capacity

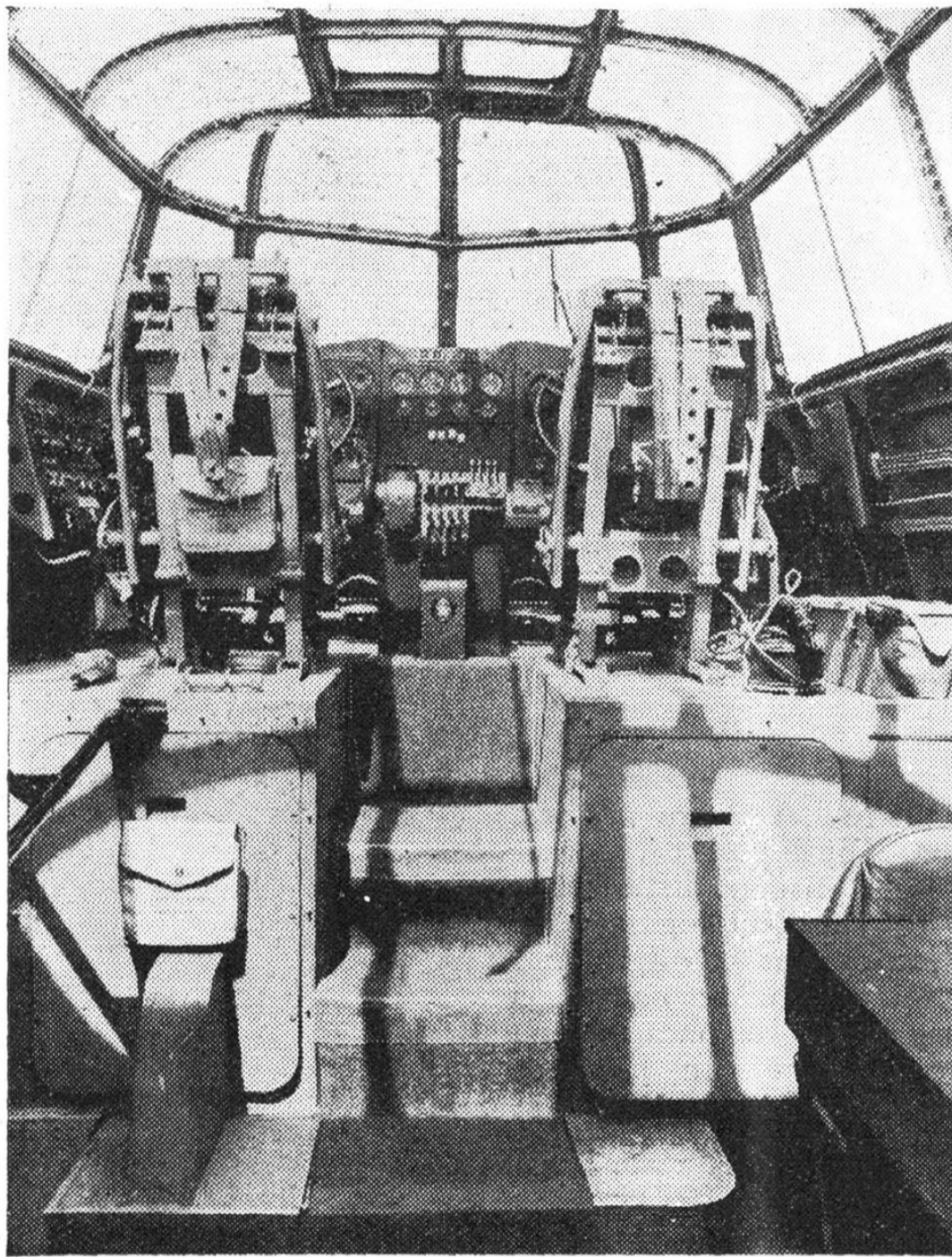
SHORT BROS., of Rochester, have made for themselves during the passage of years a name generally conceded to be pre-eminent in the marine aircraft world, for not only have their products been superbly fitted for their work, but their performance and comfort have always been outstanding. People who flew to various parts of the world in the Empire and G class boats are best qualified to judge the superlative comfort—even luxury—of these machines, a quality which placed them far ahead of any other boats of their time; and to this was added a degree of reliability and economy of operation almost equally without parallel in that era. Further, there are few military aircraft of contemporary age with the Sunderland which, flying to-day, have the Sunderland's magnificent record.

The Shetland is the largest British aircraft flying at the moment, and, at 58 tons, a very impressive aircraft it is. One cannot fully appreciate what a wing span of 150ft. actually is until seeing it in the shop. Then, standing at one end and seeing the other tip 50 yards away in comparison with people and familiar objects, one realises what this span figure really means. When assembled on the hull and viewing the boat as an entity, the size is lost in the proportions; only people

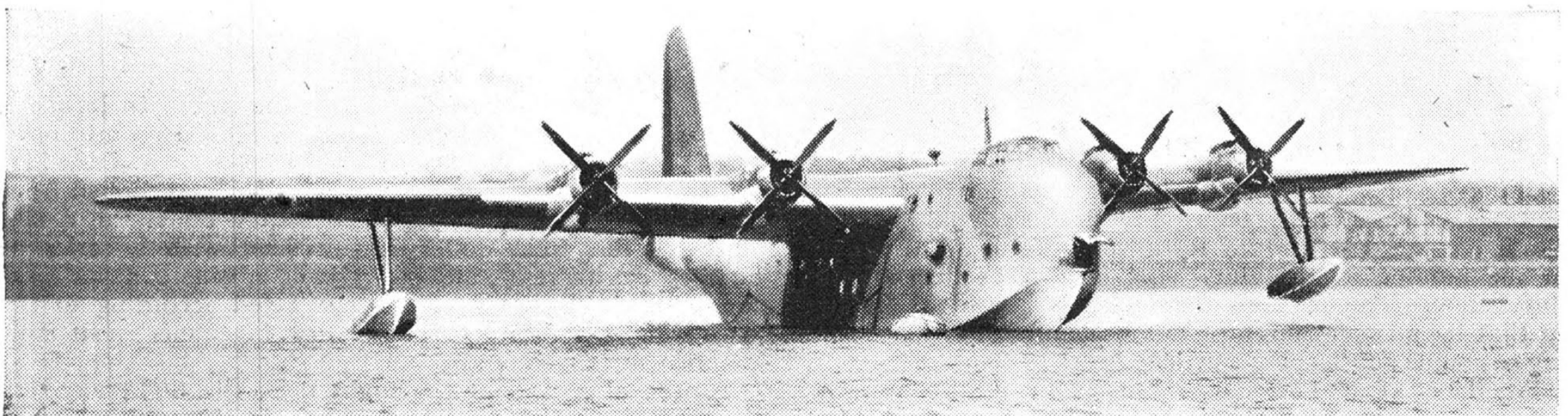
walking about give scale to the machine, but even then the impression given is not really true; it is too vast to appreciate what the vastness is in relation to normal things. To illustrate this, the height from the bottom of the keel to the tip of the fin is over 40ft.—nearly a third as high again as the average suburban house.

Although the Shetland is essentially a Short boat, the company had the collaboration of Saunders-Roe in producing the wings. Concept and original design were, of course, Short's, and naturally included the wings, their aerofoil section, plan form and general type, etc., but Saunders-Roe were responsible for the detail design and manufacture of component parts of the wings, including the flaps, ailerons, engine mountings and wing-tip floats.

When inspecting the boat (one is almost tempted to refer to it as a ship) probably no impression of the interior so well illustrates its massive proportions as does the flight deck, this compartment being the preserve of the operational crew. Far from being a cockpit or control cabin, the flight deck is a room in spaciousness; certainly in no other aircraft we have ever examined have the flying crew had such commodious quarters in which to do their work. Excellently placed,



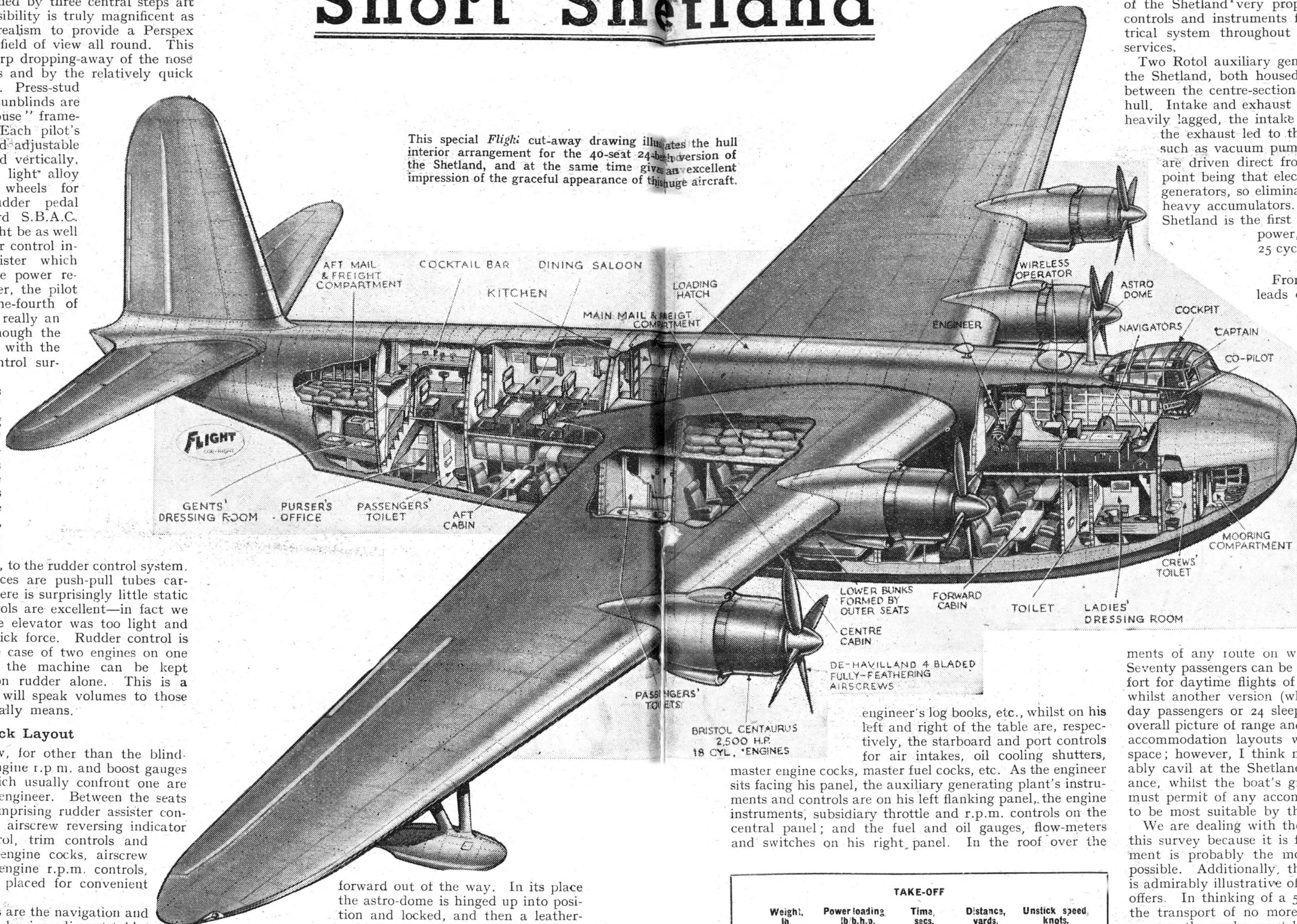
Pilots' station from flight deck showing the very neat layout and marvellous sense of airy spaciousness. The blank space below the central instruments is for the autopilot instrument panel.



From the starboard bow the general aspect of the boat is clarified and an idea can be gained of the magnificent field of view obtainable from the flight deck.

Short Shetland

This special *Flight* cut-away drawing illustrates the hull interior arrangement for the 40-seat 24-sleeper version of the Shetland, and at the same time gives an excellent impression of the graceful appearance of this huge aircraft.



the captain and his second pilot sit well forward on a floor raised about 2ft. 6in. above the normal flight deck level, their seats being reached by three central steps aft of the control pedestal. Visibility is truly magnificent as the designer has had the realism to provide a Perspex coupé top which permits a field of view all round. This field is enhanced by the sharp dropping-away of the nose forward of the front screens and by the relatively quick tumblehome of the hull sides. Press-stud pips for the attachment of sunblinds are incorporated in the "glasshouse" framework—a sensible feature. Each pilot's seat is very comfortable and adjustable for position fore and aft and vertically. Control columns are slim, light alloy tubes surmounted by $\frac{3}{4}$ wheels for aileron control, whilst rudder pedal assemblies are the standard S.B.A.C. foot-adjustable type. It might be as well to state here that the rudder control incorporates an electric assister which provides three-fourths of the power required to displace the rudder, the pilot having only to provide one-fourth of the input. This measure is really an electrical servo system, although the title should not be confused with the use of servo tabs on a control surface.

Electric servo assistance is also applied to the pilots' throttle levers, these being movable under finger pressure with the assistance, but needing considerable urge when unassisted. However, the throttle-control linkage is positive so that even in the event of assistance failure, control of the engines is maintained. This maintenance of control also applied, of course, to the rudder control system.

Control runs for all surfaces are push-pull tubes carried in Tufnol guides, and there is surprisingly little static friction. In flight the controls are excellent—in fact we were told that originally the elevator was too light and had to be given increased stick force. Rudder control is so good that in the extreme case of two engines on one side suddenly cutting out, the machine can be kept straight without difficulty on rudder alone. This is a very severe test indeed and will speak volumes to those who appreciate what it actually means.

Flight Deck Layout

Pilots' instruments are few, for other than the blind-flying panels and duplicate engine r.p.m. and boost gauges most of the instruments which usually confront one are under the care of the flight engineer. Between the seats is a neat control pedestal comprising rudder assister control, auto-pilot control lever, airscrew reversing indicator lights, cockpit heating control, trim controls and indicators, throttles, master engine cocks, airscrew feathering buttons, and the engine r.p.m. controls, all of these being very well placed for convenient operation.

Behind and below the pilots are the navigation and radio operator's stations, each having adjacent tables and equipment panels against the starboard wall. Opposite is the staircase leading down to the lower deck, and aft of the landing at the stair head is a rest settee for off-duty crew. The back of the settee is hinged at its top so that it can be swung up, the seat and back thus forming a couple of sleeping berths.

At the rear and almost over the head of the radio operator is a hatch in the roof reached by a jack ladder, and a very clever arrangement it is. Normally the hatch door is closed, but when the navigator wants to take a celestial sight, the ordinary hatch is opened and hinged

forward out of the way. In its place the astro-dome is hinged up into position and locked, and then a leather-padded armrest ring is unclipped from its stowage and also swung into position under the dome. Further, the jack ladder is furnished with a series of notches on its rear side into which a generous platform for the sighting navigator can be fitted according to the man's height. Altogether a very ingenious, neat and practical arrangement.

At the after end of the flight deck the flight engineer sits facing aft at his athwartships control panel, which is in three portions, the side panels raking forward so that every dial can be seen without parallax. Beneath the panels is a table top incorporating a drawer for the

engineer's log books, etc., whilst on his left and right of the table are, respectively, the starboard and port controls for air intakes, oil cooling shutters, master engine cocks, master fuel cocks, etc. As the engineer sits facing his panel, the auxiliary generating plant's instruments and controls are on his left flanking panel, the engine instruments, subsidiary throttle and r.p.m. controls on the central panel; and the fuel and oil gauges, flow-meters and switches on his right panel. In the roof over the

engineer's head are controls for supercharger speed change, idler cut-outs, and fuel jettison. Thus the flight engineer of the Shetland very properly has under his charge the controls and instruments for every mechanical and electrical system throughout the aircraft other than flight services.

Two Rotol auxiliary generating plants are employed in the Shetland, both housed in their own "engine room" between the centre-section wing spars' passage across the hull. Intake and exhaust ducts are large in diameter and heavily lagged, the intake being taken from the side and the exhaust led to the roof. All ancillary services, such as vacuum pumps, generators, oil pumps, etc., are driven direct from these a.g.p.s, an interesting point being that electric supply is straight from the generators, so eliminating the necessity for bulk and heavy accumulators. It is also interesting that the Shetland is the first British aircraft to employ A.C. power, the system being of 110 volts, 25 cycles.

Accommodation

From the flight deck the staircase leads down to the mooring compartment in the nose of the lower deck. Here are stowed all the impedimenta and fittings for handling the boat on the water including, among other things, a C.Q.R. anchor and a telescopic self-closing boat-hook. A winch for the mooring cable is housed under a hinged flap in the floor, and a hinged bollard for temporary attachment of pick-up or slip lines is fitted beneath an opening window in the stem. The entrance door for the crew is in the starboard wall of this compartment immediately forward of their toilet room.

Interior accommodation is somewhat naturally in such a large hull, capable of many diverse arrangements according to the operational require-

ments of any route on which the aircraft may be used. Seventy passengers can be accommodated in very real comfort for daytime flights of ranges up to, say, 1,500 miles, whilst another version (which we illustrate) caters for 40 day passengers or 24 sleepers. To give anything like an overall picture of range and payload examples with various accommodation layouts would take up a great deal of space; however, I think no potential operator can justifiably cavil at the Shetland's range and payload performance, whilst the boat's great amount of interior volume must permit of any accommodation arrangement thought to be most suitable by the operators.

We are dealing with the 40-seater/24-sleeper version in this survey because it is felt that this particular arrangement is probably the most representative of the many possible. Additionally, the layout is very well done and is admirably illustrative of the sort of facilities the aircraft offers. In thinking of a 58-ton flying boat being used for the transport of no more than 40 day or 24 night passengers, the reader must bear in mind the order of luxury in which the passengers are carried. No other form of conveyance, other than a crack ocean liner, can compare with this luxury of travel; it is far in excess of that of any train.

In all models of the Shetland, the flight deck and mooring compartment, etc., are standard, and so, having described these, we will re-enter the hull through the forward passenger door on the port-side immediately aft of the staircase leading up from the mooring compartment to the flight deck. The doorway opens into a vestibule, on the starboard side of which is a ladies' dressing room

TAKE-OFF				
Weight, lb.	Power loading, lb./h.p.	Time, secs.	Distance, yards.	Unstick speed, knots.
130,000	13.0	61.0	1,640	96.0
125,000	12.5	52.0	1,360	94.0
120,000	12.0	44.5	1,125	92.0
115,000	11.5	38.0	935	90.0
110,000	11.0	32.5	780	87.5
CLIMB at 130,000 lb.—Gills Closed, M Gear				
Condition	Engine:	Sea level	Rate—ft./min. 5,000ft.	
Normal climb power	4	765	645	
Normal climb power	3	350	250	
Max. W.M. cruise	4	345	350	
Time to 5,000 ft. (normal climb power)—7 mins. at 130,000 lb. 5½ mins. at 120,000 lb.				

SHORT SHETLAND

furnished with lavatory basins, dressing table, full- and half-length mirrors and a built-in bucket seat; aft of the dressing room is the ladies' toilet.

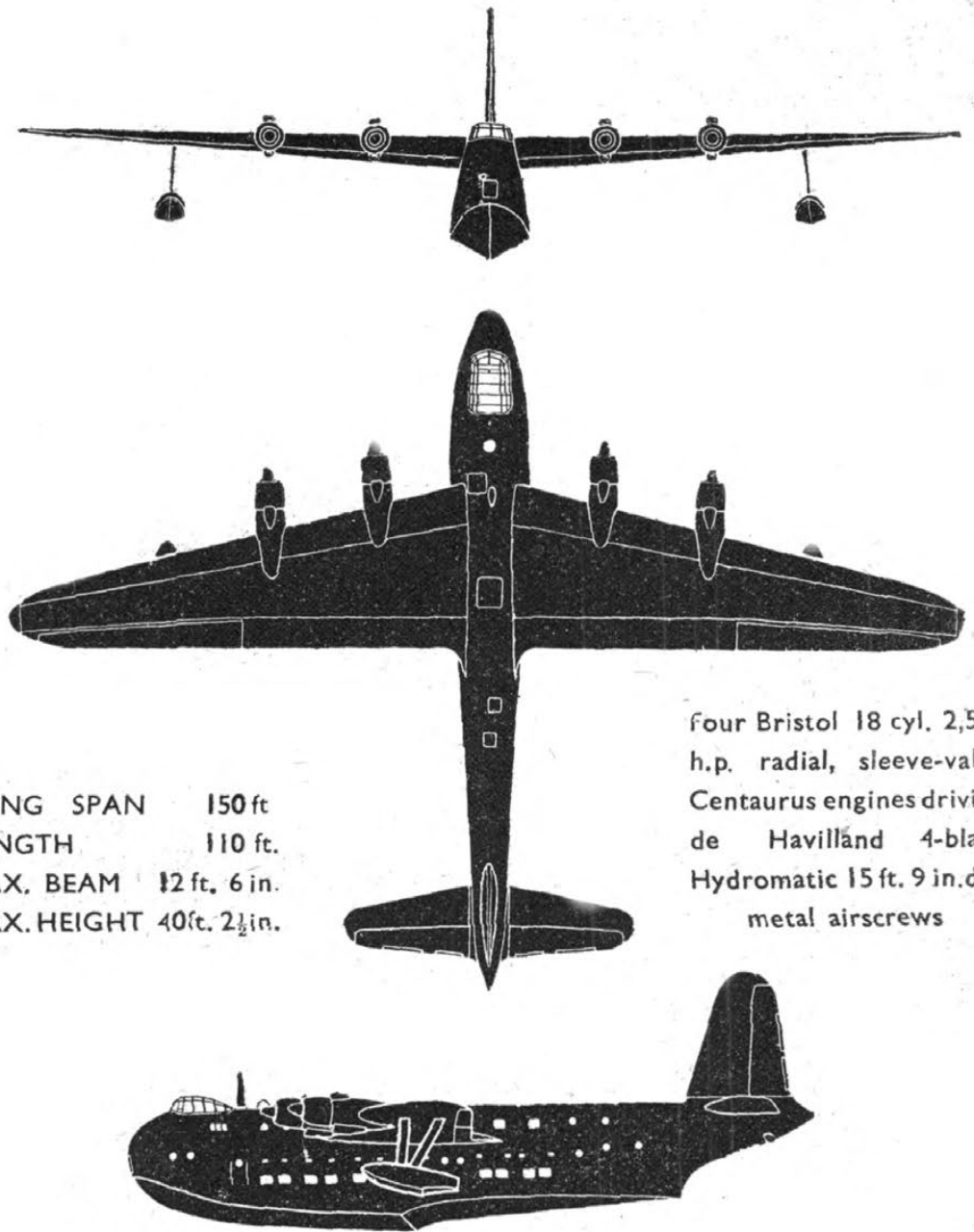
A central door in the aft bulkhead of the vestibule gives access to the main forward passenger cabins. These are arranged on each side of the central aisle, and each seats four passengers in massive side-by-side armchairs facing fore and aft. Generously wide windows are placed at each seat station and above them, and so beautifully concealed that one would never guess at their existence are the upper berths. For night travel, the upper berths are hinged down and stayed by universally jointed tubular struts, folding, tubular lee boards being provided, whilst the spring mattresses are supported on spring steel ribbons. A concealed hinged valance in the roof can be opened to provide full-length curtains by which each berth is ensured privacy. To provide the lower sleeping berth, each pair of armchairs is pivoted on its lower frame so that the normally raking backs become flush against the wall. An extensible frame on each outboard chair is swung forward to complete the berth frame; and the seat cushions of the inboard chairs go to make the full mattress; finally the central, wide armrests dividing each pair of seats are swung up flush with the seat backs, and each separate cabin is in this fashion transformed into a really luxuriously comfortable double sleeper.

Private Suites

There are eight of these compartments forward of amidships, and aft of the rear pair are four toilets, two each side. It should be pointed out that in all probability the starboard rear lavatory here may instead be employed as a servery for passengers desiring food served at their seats rather than ascending to the dining saloon on the upper deck; in this event a light service lift can be installed to link the servery with the galley immediately above.

Continuing our progress rearward through the lower deck, we next enter the rear passenger cabins which, owing to the narrowing of the hull, are arranged to accommodate only two passengers each, and, as there are two cabins port and starboard, eight people are accommodated here either during the day or at night. In order to cater for the person who is willing to pay for such things, each of the foremost of these cabins can be made into private suites complete with private toilet, the latter being the two aftermost of the four toilets previously mentioned; in the event, however, of the starboard toilet being deleted in favour of a servery, only the port front cabin can be arranged as a private suite.

Rearward of the after-cabins we come to the rear-entry vestibule with access doorway to port and, to starboard, a toilet. Aft of the toilet is the purser's office, which is neatly arranged beneath the passengers' staircase leading up to the top deck. To port opposite the staircase is a commodious wardrobe with sliding doors and, aft of the vestibule, the gentlemen's dressing room; this compartment, similarly to the ladies' version forward, is equipped with lavatory basins, mirrors, dressing table and built-in seat. In the extreme tail of the lower part of the hull aft of the dressing room, and with access from it, is a good-sized storage space for passengers' hand baggage.



WING SPAN 150 ft
LENGTH 110 ft.
MAX. BEAM 12 ft. 6 in.
MAX. HEIGHT 40 ft. 2½ in.

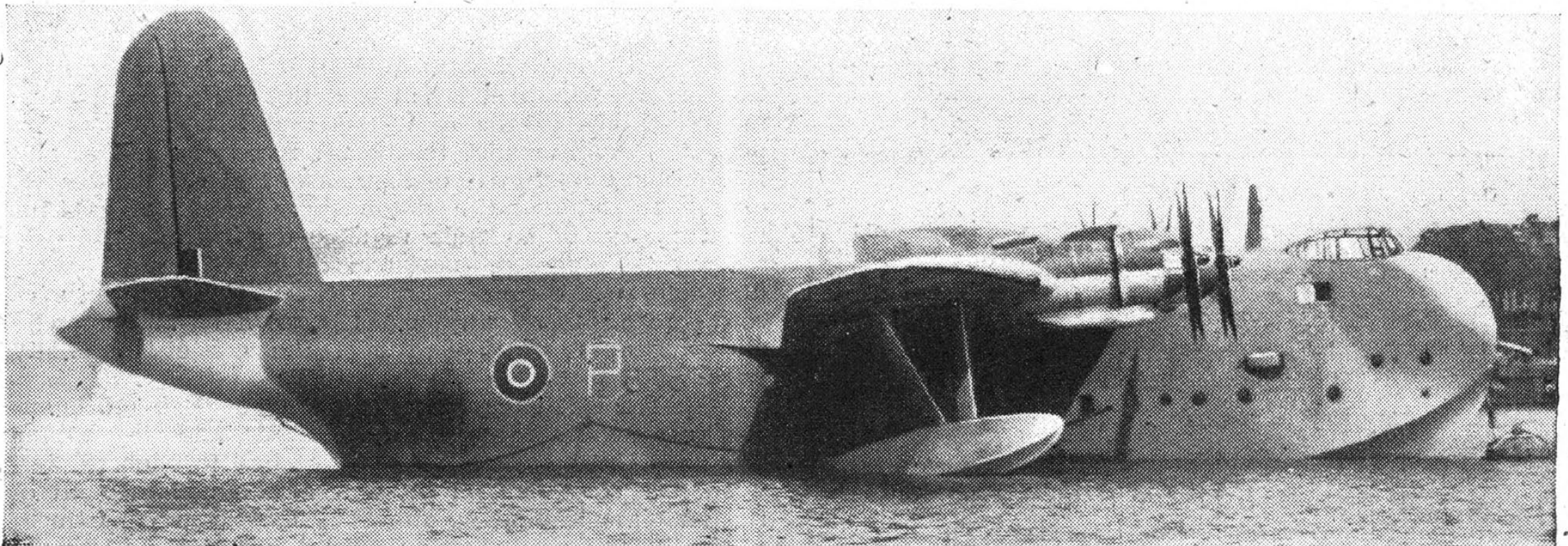
four Bristol 18 cyl. 2,500 h.p. radial, sleeve-valve Centaurus engines driving de Havilland 4-blade Hydromatic 15 ft. 9 in. dia. metal airscrews

Now let us climb up the staircase to the upper deck. This stairway is conveniently furnished with slim hand rails, but owing to the narrowness of this part of the hull and the quick tumblehome of the topsides, the stair well is rather narrow; this cannot, of course, be helped and, in actuality, will probably be found to occasion very little inconvenience.

Refreshment Provision

The stair landing at the top is in the cocktail bar where, doubtless, beer as well as wines and spirits will be obtainable. Arrangement of the bar proper frankly delighted us, for never before have we seen so neat a layout. When the bar is closed, there might well be no bar there for all one can see. Centrally, in the rear bulkhead, is a door giving access to the cellarette and, further aft, to a 185 cu. ft. mail and freight compartment. When the bar is open for trade, this central door is swung back and a further door opening athwartships makes a recess and, at the same time, discloses the cellarette, the walls and inside surface of the door of which are fitted with bottle racks.

Additionally, a flap like the lower half of a stable door fitted with a shelf on top also open athwartships across the front of the cellarette recess and, by so doing, forms the bar, the interior of the stable-door flap and the space it encloses being fitted with racks for holding wine glasses, tumblers, etc. There should, however, be some separate provision for a sink in which to rinse glasses without this having to be done in the galley. Along the port wall of the bar is a shelf and four high stools; there



Starboard side of Shetland giving a good idea of the hull size and proportions. Scale is given by the 15ft. 9in. diameter airscrews.

SHORT SHETLAND

is even a foot rail, but it is light alloy instead of the traditional brass. To starboard forward of the staircase are two chairs each side of a communal table where one can sit in comfort drinking, talking and/or admiring the scenery passing below.

Forward of the bar is the dining saloon with seating for twelve, the port tables each seating four and the starboard tables two. At times other than during the service of meals this dining saloon could, of course, serve as a lounge to the bar. The chairs are comfortable tubular affairs in the modern manner, and the tables are light but rigid and also have tubular frames.

The steward who prepares the food for Shetland passengers, or, possibly, it may be a chef, is provided with a kitchen which would honour a modern flat. One hesitates to call this feature a galley—it is too fine. Beautifully equipped with commodious cupboards, large plate racks, concealed sink, electric cooker and refrigerator, it is supremely well fitted for furnishing discerning passengers with the most choice meals.

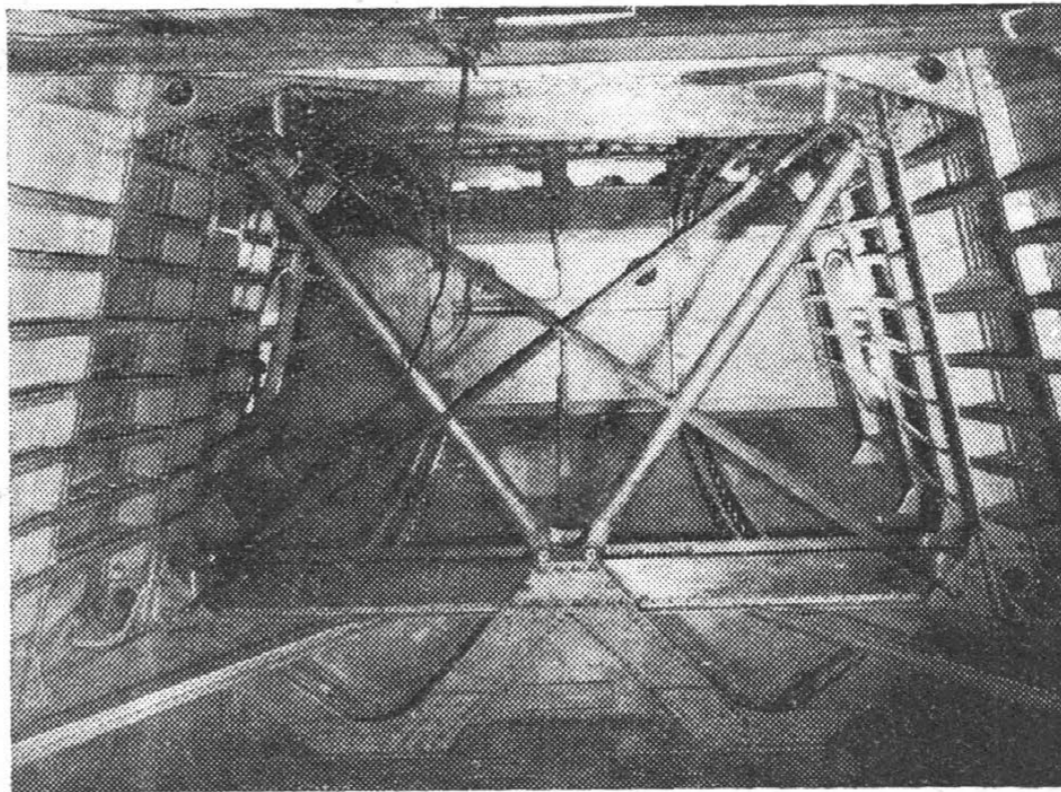
Wonderful Hull Form

There now remains only the main mail and freight compartment, which is located amidships forward of the kitchen. With an available volume of 247 cu. ft. and strong wire-mesh shelves, a great deal of mail and goods can be stowed here. Loading access for this compartment is through a 4ft. 8in. x 4ft. 0in. hatchway in the roof, which therefore permits relatively large and bulky objects to be housed. Forward of this is the auxiliary generating plants' compartment which has already been described.

The whole of the interior accommodation of the hull is insulated for sound and temperature by the employment of a cellular non-hygroscopic material applied as a lining to the various compartments. Interior finish can, of course, be as desired by the operator, but will probably be of Vynide, a synthetic leather which is of excellent appearance and is extremely durable.

Structurally, the Shetland is also worthy of study, not, perhaps, because of any revolutionary form employed, but because the whole machine is built in a simple, straightforward manner best suited to ease of production. In the words of one of the staff at Short Bros., building Shetlands is "a halfpenny cake job." The phrase, we think, speaks for itself.

Aerodynamically, the boat is clean, the general lines blending well, and there being remarkably few excrescences to produce parasitic drag. Probably the one single element that is best illustrative of Short's prowess in the flying-boat field is the hull design, more particularly the design of the planing bottom. This is of V-form throughout with gently sweeping chines and a raking step. We were privileged to be given a demonstration of the 1/24th scale model hull in the testing tank where the



Above are shown the boom beams, V-bracing and box-frame lower bracing together with the jointing forgings of the hull spanning structure at the main wing spar.

hull form was developed and proved. Sitting on the travelling trolley and watching the model hull being accelerated gave a wonderful illustration of design skill; in a few seconds the hull was "on the step" and planing, the initial curving bow-wave had flattened out and the hull's wake was as clean as a whistle. There were no wings on the model hull, but the manner in which it climbed out of the water and skimmed the surface made it seem as though it were striving to fly without those necessary appendages.

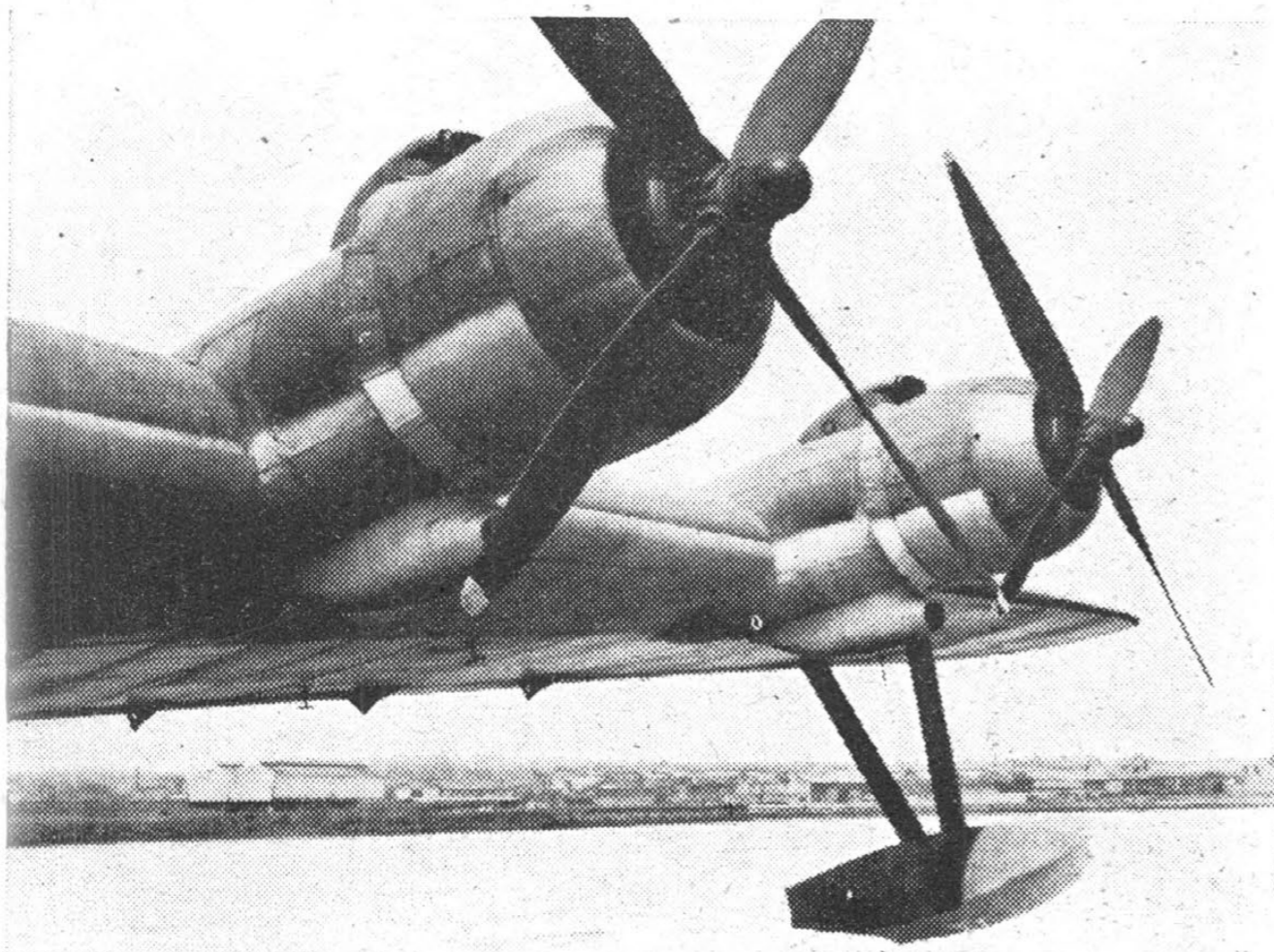
Range, Payload and Take-off

Originally the Shetland was conceived as a military machine, and although in no sense can it be regarded as a "converted bomber" class of aircraft, a penalty is paid for its birth in the large amount of tumblehome to the hull topsides. This has the effect of making the upper deck rather narrower than it would otherwise be; however, this is not particularly noticeable except at the after portion of the upper deck.

With a percentage structure weight of 30.2 and an interior volume of 8,743 cu. ft., the Shetland could hardly help but be successful, whilst with a cruising speed of 184 m.p.h. and a payload of 7,620 lb. for a range of 4,650 statute miles (the distance from London and Bombay) or alternately, cruising at 188 m.p.h. and carrying a payload of 30,000 lb. (13½ tons) for a range of 2,076 miles, operation of the boat would definitely appear to be economically acceptable. Design and performance data are tabulated, and the reader can readily appreciate that the Shetland is an exceptional aircraft. Point is given to the operational scope of the machine by the fact that at its maximum all-up weight of 130,000 lb.—i.e., 58 tons—it gets into the air in no more than 1,640 yards, this corresponding to a time of 61 secs. and an unstick speed of 96 knots. At the other end of the scale, at 110,000 lb., take-off distance is the amazingly small figure of 780 yards, the time 32½ secs. and the unstick speed 87½ knots.

Structurally, as stated, the Shetland is straightforward. The hull skin plating is carried on top-hat section stringers for passage of which the shallow channel-section frames are notched, the two being anchored together with shear cleats. Throughout the midship length of the hull, frames are doubled, back-to-back, but a change in the skeleton obtains from the base line of the windows down to the chine. This section of the hull wall is built up with shallow Z-section stringers having lightening holes in the webs and of similar depth to the frames, the latter extending unbroken down to the chine angle with the stringers notched for frame passage. Side and bottom skin plating is joined at the chine by internal and external angle strips through-riveted with a double row of rivets to each skin.

At each frame station throughout the hull, the bilge (below lower deck level) is divided into compartments by semi-bulkheads consisting of diaphragms capped with L-section extrusions on each side, covered with a finishing strip to provide floor bearers. Bulkhead diaphragms are stiffened on each side with top-hat section stabilising strips,



Port nacelles, wing and tip-float illustrating the clean cowlings, carburettor and oil cooler air intakes, etc. Normally the airscrews will carry spinners and thus add to the neat appearance.

SHORT SHETLAND

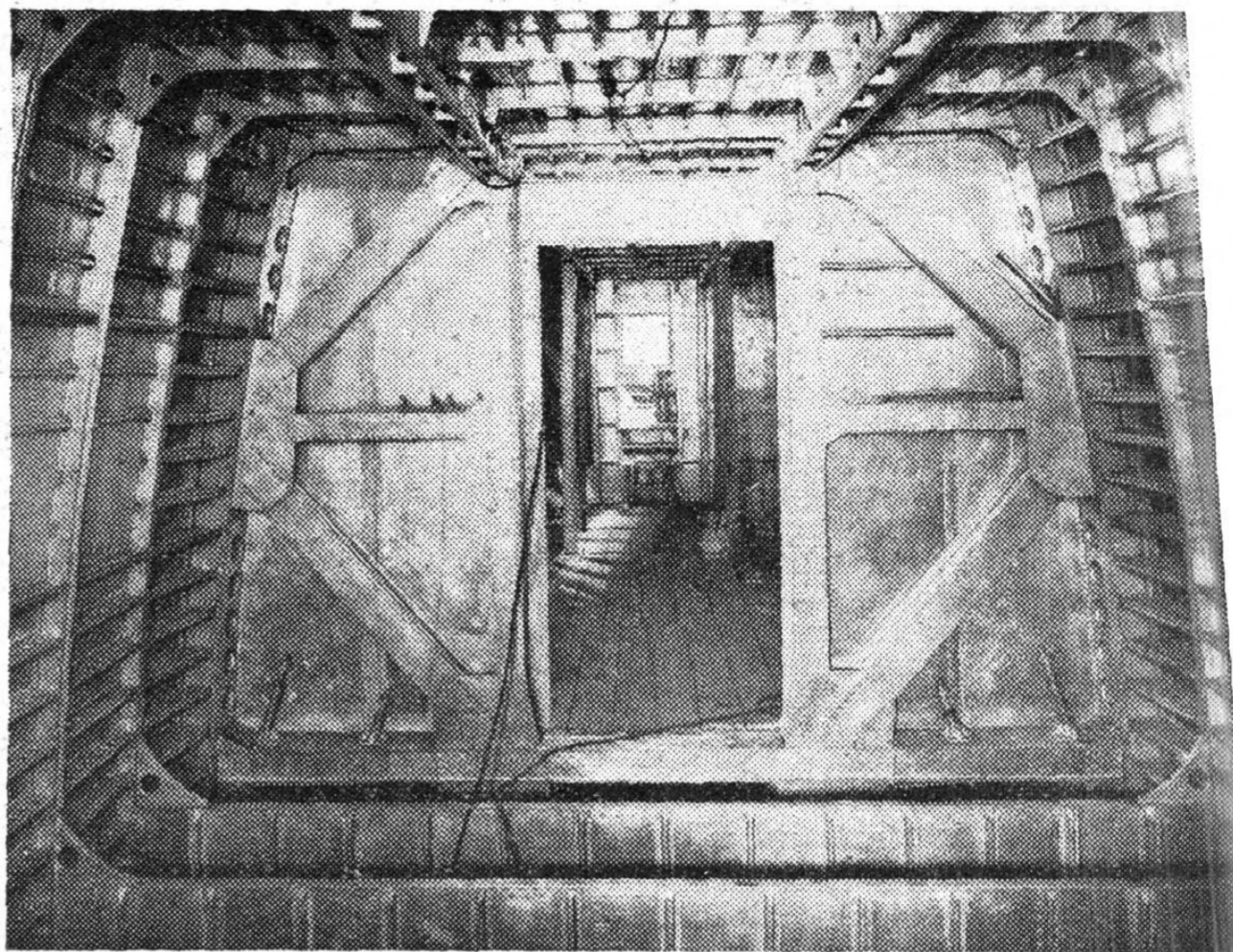
and the lower edge of the diaphragms corresponding to the V bottom are edged with T-section extrusions passing over the beaded webs of the T-section extruded stringers on which the planing bottom is skinned and attached to them with shear cleats. Thus there are limberholes or spaces between the bottom stringers for passage of bilge-water, the diaphragm bulkheads acting as frames for the planing bottom.

Keel structure is simple yet immensely strong, with an "anchor" section extruded internal keel member, to the underside of the "flukes" of which the planing bottom skin is secured; a heavy-gauge keel strip similar to a curved butt strap covers the joint externally, the whole being through-riveted in two staggered rows each side.

The upper deck is a light alloy floor carried on channel-section beams at each frame station, with Z-section longitudinal "joists" at about 6 in. centres running between the athwartships beams and attached to them with shear cleats. This comprises the floor structure, which is additionally supported by two built-up box-section beams spaced about 4 ft. 8 in. apart and running fore and aft between the mooring compartment bulkhead and the front bulkhead of the after-entrance vestibule. These beams vary in length, the greatest depth of section occurring between the stations at which the wing spars' connecting structures span the hull.

At these stations are massive bracing structures enclosed with double bulkheads, the heavy-gauge sheathing being stiffened with top-hat-section horizontal stabilisers and large-lipped channel-section "box" posts running vertically beneath the main roof beams. The internal bracing within these bulkheads is composed of built-up box-section members arranged as a warren-girder-type structure, and a similar bracing structure to the planing bottom is also embodied below floor level.

On the upper deck the pilots' floor above the normal flight deck is a simple structure carried on channel-section beams.



Hull interior, lower deck. Here is shown the bilge bulkhead construction, hull wall and upper deck structure and the built-up box-frame bracing to the double bulkhead at the main spar station.

The framework of the coupé "glasshouse" is, however, worthy of note. It is composed of cast and extruded sections bolted together on the centre line and at the main side pillars of the front screens, the Perspex glazing being furnished normally.

The Shetland's wing is, perhaps, the most unconventional structure of the whole aircraft, this being designed on the main spar torsion box principle used in sailplanes.

A modified Göttingen 436 aerofoil section is employed, and the plan form shows a graceful wing of 8.62 aspect ratio with pronounced sweep back of the leading edge, the trailing edge being perpendicular to the hull axis. Three spars are used, although the foremost two are both employed as sides of the torsion box. The front spar is stationed at 5 per cent. of the chord, and consists of a sheet web with L-section extruded booms, and from this extends rearward the very heavy-gauge upper and lower skin plating to pick up the main spar and thus form the torsion box. Similar construction is used for the main spar, although massive T-section extruded booms are used in this case, the skin being attached with $\frac{1}{4}$ in. and $\frac{3}{16}$ in. pan head rivets. Webs of both 5 per cent. and main spar are stiffened with vertical T-section extrusions, and the torsion box is divided throughout its span by diaphragm bulkheads at chordal rib stations, each bulkhead being vented with manholes.

The remainder of the wing structure is relatively light and comprises diaphragm chordal ribs stiffened with vertical top-hat-section strips and edged with extruded L-section strips on each side, which make a T-section capping at the aerofoil profile line. Skin plating of the wing is attached to Z-section intercostal stringers bolted to the capping extrusions of the chordal ribs. The rear spar is very like the others in having a heavy sheet web with T-section extruded booms and L-section extruded attachment strips to each inter-spar rib.

Frise-type fabric-covered ailerons, each with a trim and servo tab, are employed, and each is swung on five self-aligning ball-race hinges carried in brackets off the rear spar. Flaps are metal-covered and of the Handley Page slotted type; each is actuated by two electric screw jacks with integral motors, the jack rods picking up with a pin joint to lever brackets off the flap. Like the ailerons, flaps are swung in five self-aligning ball bearings, relative flap motion being governed by the offset (which is a good 12 in.) between hinge axis and screw-jack attachment.

Bristol Centaurus 2,500 b.h.p. engines power the Shetland, each equipped with a Rotol fixed cooling-fan and driving de Havilland four-bladed Hydromatic airscrews. The latter are all constant-speed full-feathering airscrews, but those fitted to the inboard engines are also reversing types by means of which handling the boat on the water is facilitated.

Fuel is carried only in the wings, there being no fewer than ten tanks in each. Seven narrow, deep tanks are slung chordwise between the inner-spar ribs, and outboard of these are three conventional-type tanks carried on flexible mountings off stiffeners on the inter-spar rib webs. Oil tanks are housed within the torsion box immediately aft of each nacelle.

DATA

Wing area (gross)	2,636 sq. ft.
Aspect ratio	8.62
Dihedral	3°—29'
Incidence	6°—37'
All up Weight	130,000 lb.
Wing loading	49.3 lb./sq. ft.
Span loading	$\frac{W}{b} = 864$ lb./ft. $\frac{W}{b^2} = 5.75$ lb./sq. ft.
Load factor (at 130,000 lb.)	3.5
Wing aerofoil	Modified Göttingen 436
T/c ratio	Root: 20 per cent. Tip: 10 per cent.
Fin and rudder area (gross)	242 sq. ft.
Tailplane and elevator area (gross)	410 sq. ft.
Tail unit aerofoil section	Raf 30
Tailplane dihedral	6°—0'
" incidence	4°—38'
Percentage weights (at 130,000 lb.)	
Structure	30.20
Power plants	15.35
Tankage	1.39
Equipment	7.70
Auxiliary generating plants	1.07
Heating, anticicing, etc.	1.20
Crew	8.40
Fuel	33.25

HULL VOLUME

Total cabin volume	3,088 cu. ft.
Dining saloon and bar	837 "
Toilet and dressing rooms	781 "
Galley	272 "
Purser's office	57 "
Forward cloak room	94 "
Aft cloak room	78 "
Forward vestibule and gangway	203 "
Aft vestibule and gangway	210 "
Mooring compartments	476 "
Crew's quarters	1,500 "
A.G.P. compartment	300 "
Mail and freight	847 "
Total volume	8,743 cu. ft.

PAYLOAD AT VARIOUS RANGES (at 8,000ft.—still air)

7,620 lb. for 4,650 statute miles at 184 m.p.h.
22,000 lb. " 3,000 " " 185 m.p.h.
30,025 lb. " 2,076 " " 188 m.p.h.

"Indicator" Discusses Topics of the Day

Paying the Piper—

—And Calling a Better Tune? : Insurance Costs as a Future Guide to Airline and Other Civil Developments : Paving the Way for a Self-ruled Air Transport System

AT the risk of finding myself innocently involved in politics and high finance (whatever that may mean), I must say something about aviation insurance from the interested layman's point of view. It has always seemed to me that, in any eventual free-for-all system of civil aviation, all operational methods and equipment, as well as the choice of aircraft types and even crews must directly or indirectly be guided by insurance interests. Directly, for instance, when the insurer flatly decides that a particular aircraft type will not be covered, or a particular airfield can only be used at the operating company's own risk, or even when a particular pilot's premium is refused. Indirectly, when the premiums charged are so very high that the operating company itself is forced to discontinue the use of a particular aircraft or airfield until each has been modified to suit the underwriter.

It is reasonable to suppose that in earlier years the insurance companies were rather feeling their way on a basis of year-to-year accident rates. Even experienced underwriters, who were in the best possible position to know the answers, must have felt that they were working in financial shadow, comparatively speaking. It will certainly not be the same in the future. Not only must there now be a reasonably accurate set of profit and loss figures on which to work, but there must be a great many more thousands of "experts" who can be engaged to judge the various issues.

But, will come the question, why bring Big Business into it? Surely the outlays and risks will always be so immense that they will have to be taken over by the Government? That may be so, but the "Government" is nothing much more nor less than a giant insurance concern, whether it is dealing with doles, pensions, subsidies, or war-preparedness, and the bill still has to be met with an overall profit—using the word in its widest sense.

Economics Without Tears

This, of course, is where I am liable to fall into the bottomless pit of economic darkness, where there is always a weeping and gnashing of teeth over points which sometimes seem to the ordinary person to be as basically simple as they were in the Garden of Eden—though with a somewhat larger and less easily calculable number of people involved. So I will steer away from the edge with the reminder that John Smith multiplied sixty million times behaves, as a shareholder, in much the same way as Fred Robinson multiplied only a million times, and representing the individual "owners" of an insurance combine. Maybe even the Robinsons, guided by an energetic and brave board of directors, will demand smaller premiums than the Smiths, who may be guided only by necessarily less brave and possibly less well-informed civil servants.

Let us think of the operating companies and private owners who are not prepared to carry, or capable of carrying, the whole "baby." They will endeavour to find an insurance concern which, at the lowest reasonable figure, will be ready to cover them against the various risks involved. Obviously, this figure cannot be arrived at accurately by a mere process of average computation. The underwriters are not dealing with standardised road, rail, or marine vehicles, with "average" drivers and comparatively small risks involved, but with individually measurable values and losses that can be either alarmingly

great or quite small, according to the selection of aircraft and operating crews. The underwriters are not only likely to want to know all about the routes, types of aircraft used, and the individuals employed both on the ground and in the air, but may also insist that one of their knowledgeable representatives is, at least in the case of a large concern, on the spot all the time, with absolute freedom of movement, but without, of course, the power to dictate any immediate policy. He will merely be expected to watch the proceedings, with knowledge and experience behind him, and to know everyone, so that the premiums can be assessed on a basis of his reports. If the right type of man is chosen for the job he will not be considered as a "spy," but, by constant discussion and by taking part in the actual operations as a supernumerary pilot, will be accepted as a necessary and useful part of the organisation. All the more useful and necessary because he will not be dealing with figures but with facts, and will be able to recommend changes or improvements by which the premiums—and consequently the concern's eventual profits—may be modified.

Underwriters' Influence

All of which is a mere suggestion. Possibly the underwriters will prefer to work on a computation basis, leaving the operators to their own devices. But their direct or indirect influence *must* be felt in the end. For their own immediate good they will need to follow closely all technical developments which involve operational safety, and their opinion of these developments must inevitably influence the operators in their choice of equipment. And it is hard to see how this influence can, for better or worse, be prevented from spreading through the entire organisation, since safety depends as much on personnel as on material.

Without going too deeply into it, I am inclined to the view that, judged by overall results covering a period of years, it will be found to be better for civil aviation to be guided and/or driven by insurance cost considerations, rather than to be ruled by a series of Government departments to whom ultimate safety considerations—so long as they are "covered"—are naturally of no great interest. Aviation cannot, after all, be for ever hanging on to the apron strings of the Civil Air Ministry. It will eventually be left to walk and run by itself, and it will be better if, gradually, a vast safety-check organisation is brought into action by natural means.

Guided at first by the Air Ministry, the insurance interests might, if only to save themselves from "irrecoverable" losses, start slowly to develop a vast "control" system which would eventually cover all aspects of air operation—from the airworthiness of aircraft and the standardisation of safety and navigational equipment to the licensing of personnel and the checking of operational systems and conditions. Premiums would perhaps need to be higher—though, if they took a sufficiently long view, the underwriters might reasonably consider that the necessary layout merely as "bread cast upon the waters"—but at least the operators who were paying the premiums would consider that they were paying for something over which they would have some control, and for a system which would help to make the whole thing self-supporting and self-operating in the much later years to come. So long as a Civil Air Ministry is allowed to act as a

PAYING THE PIPER

ificent Uncle the operators cannot complain if this same Air Ministry demands its own way in so many matters. While they are not directly paying for facilities, but are merely allowed to "borrow" them, the operators are inevitably the hirelings of the Government.

I am presuming, of course, that we actually expect civil aviation to pay directly for itself in the end, and not merely to carry on *ad infinitum* as a heavily subsidised public service for the general benefit of all. If operators are always going to be satisfied to sit back with the spoon held at their mouths, while running uneconomic aircraft on profit-proof services for the benefit of a few black-

hatted V.I.P.s, then there is nothing more to be said. So long as the Treasury coughs up and M.P.s are discouraged from taking too marked an interest, then civil aviation can continue in its work of conveying, at vast expense in four-seater, four-engined giants, these V.I.P.s to conferences in various parts of the world. Those are jobs, anyway, which should be done by a special R.A.F. Command, as they are at present, or as directly and handsomely paid-for charter trips arranged by operators whose primary business is to run services which either pay for themselves or which show a reasonable likelihood of so doing in due course.

Eventually, civil aircraft operation must, surely, be a hard matter of profits and losses, and the sooner we start to organise for that future the better.

"INDICATOR."

S.A.A.F. ASSOCIATION

THE comradeship fostered between the Allied Air Forces and the South African Air Force on the battle fronts in this war will be strengthened in peace by the formation of the South African Air Force Association, which is modelled on the Royal Air Forces Association. This peacetime fellowship organisation, formed with the approval of the Director-General of the S.A.A.F., Major-General C. J. Venter, C.B., D.F.C., is more than an "old boys" club—its reunions will be gatherings with a practical meaning.

Apart from the fostering of friendship between all members, the association has a number of objects which have been realistically framed for the purpose of making the organisation a post-war body which will translate the needs of former members of the Air Force in accordance with living conditions. The transition from war to peace is a subject which will occupy the association, one of the aims being to create panels of specialists in the medical, legal and technical fields to give any help necessary to past and serving members of the S.A.A.F.

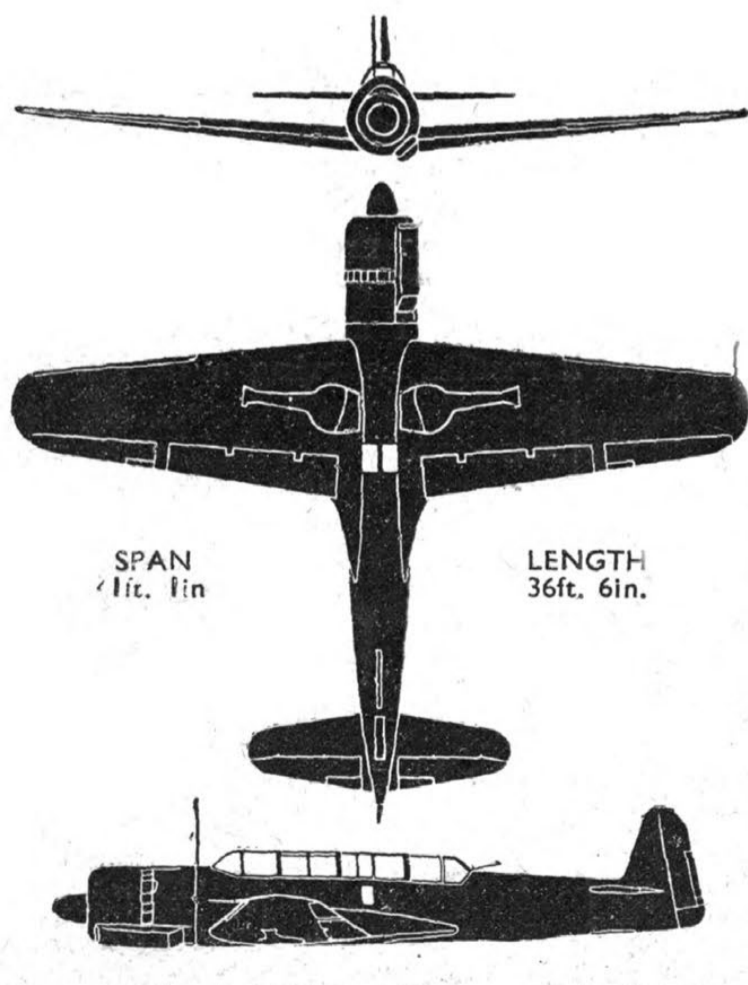
The association is of a democratic and non-sectarian nature and will play no part in politics. It is open to all ranks, men and women, past and present, who have served for not less than three months in any of the following Services or Corps: South African Air Force (Permanent Force or Active Citizen

Force), S.A. Women's Auxiliary Air Force, other arms or corps of the Union Defence Force or Women's Auxiliary Defence Corps, provided the individual concerned has been attached for a period of not less than three months to the S.A.A.F., Royal Air Forces, including R.N.A.S., R.F.C., R.A.F., Fleet Air Arm, A.A.F., R.A.F.V.R. and W.A.A.F., Dominion Air Forces, Colonial Air Forces and Allied Air Forces.

Among the more important objects of the association is the safeguarding of the interests of dependents of members and to give assistance to them.

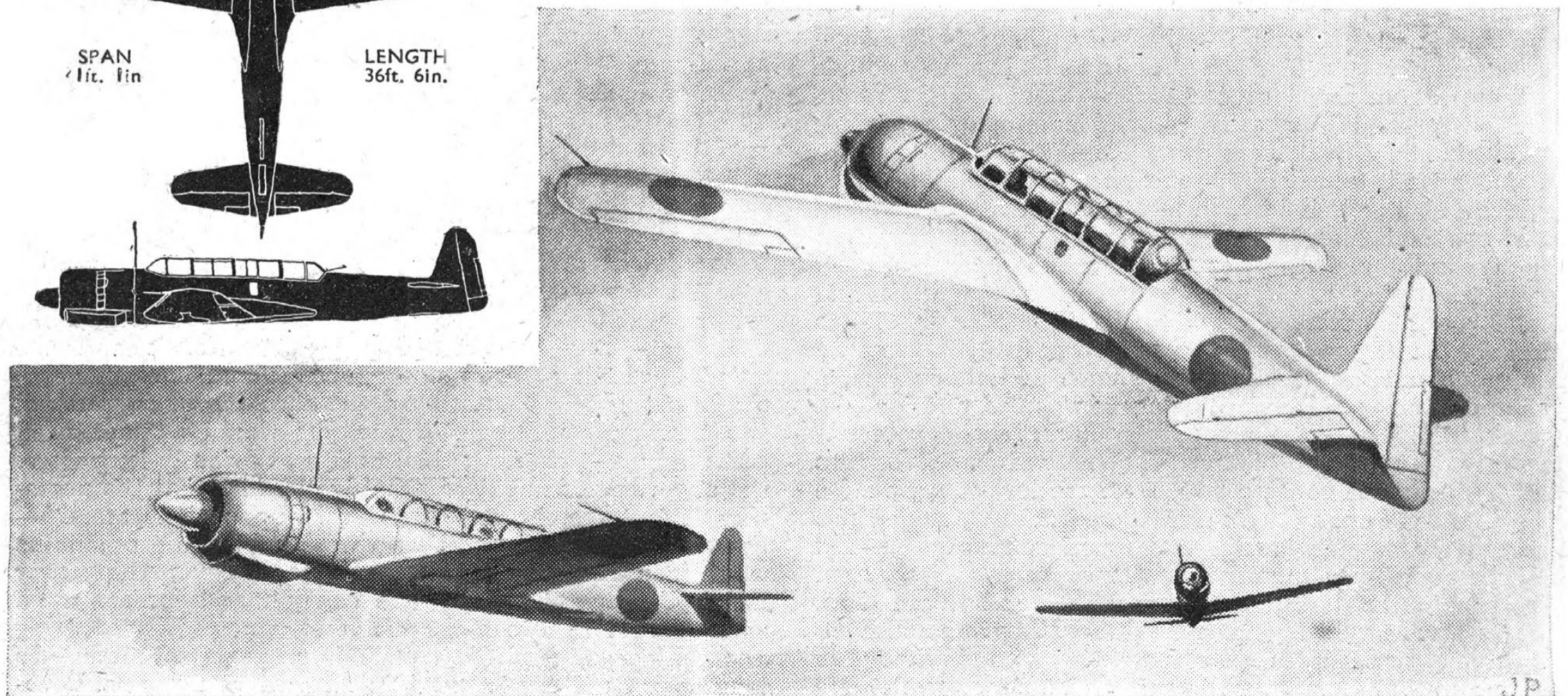
The scheme is an ambitious one, which envisages the opening of clubs, canteens and recreational and social centres by branches of the association throughout South Africa, and its own journal will be published to keep members conversant with the activities of the various branches and the whereabouts of members.

There are three kinds of membership, namely, annual membership, life membership and honorary membership. Annual membership carries a subscription of 10s. and life membership £5. Members of the S.A.A.F. and other Air Forces wishing to join the South African Air Force Association can obtain application forms by writing to Major A. H. Fish, S.A.A.L.O., South Africa House, Trafalgar Square, London.



"MYRT" ("SAIUN"-PAINTED CLOUD)

With a resemblance to the earlier "Kate" and "Jill" that shows its Nakajima origin, "Myrt" is one of the latest carrier-borne torpedo-bomber-reconnaissance types of the Japanese Navy. Its native name is "Saiun" which means painted cloud. Two versions are in service, the Model 11 powered by a Homare 11 air-cooled radial engine of 1,680 h.p. giving a top speed of about 375 m.p.h. and the Model 12 with 2,000 h.p. Homare 21 engine giving top speed of 390 m.p.h. Range is about 2,600 miles in both cases. One 7.9 mm. gun is mounted in the rear cockpit.



The U.S. Eighth Air Force

Lt. Gen. Doolittle Reviews Its Contribution to the Defeat of Germany:
Timely Advent of the Long-range Fighter Escort

AN outline of the work done by the U.S. Eighth Air Force during the war was given by its commander, Lt. Gen. James Doolittle, at a Press conference in London last week, when he said that all claims of enemy aircraft destroyed by fighter pilots were confirmed by movie cameras in the aircraft's wings, and, after talks in Germany with German prisoners and their own released prisoners, they were satisfied that their method of analysing and checking claims by bomber crews had resulted in figures for enemy aircraft so destroyed which were "on the lean side."

The "Eighth" had put in 995 days in the air attack on Germany and had destroyed a total of 15,439 enemy aircraft; fighters had shot down 5,231 and destroyed 4,207 on the ground, while bomber gunners had shot down 6,001. Additionally, 3,073 enemy aircraft had also been destroyed on the ground by bombing. Their own losses had been 43,742 fighter pilots and bomber crew listed as killed or missing in action and 1,923 others seriously wounded.

Some 300,000 men and women had served in the "Eighth," which had operated more than 2,400 bombers and 1,200 fighters from 60 airfields, and had consumed 1,044,202,950 U.S. gallons of aviation fuel, which was equivalent to 869,821,058 Imperial gallons. They had dropped 4,377,984 bombs of various kinds and 27,556,978 small 4-lb. incendiaries. This represented 701,300 (U.S.) tons of bombs on enemy targets in Europe, of which 531,771 tons had been dropped on Germany. In addition, 1,444,280,000 leaflets had been dropped on night operations.

Altogether 616,900 aircraft had been dispatched on all kinds of operations, and during the past 12 months they had averaged 1,200 aircraft dispatched every day and dropped a ton of bombs every minute. They could have kept up sorties at the rate of 1,200 bombers and 800 fighters daily and, when necessary, could put as many as 2,000 bombers and 1,200 fighters into the air at a time.

"Our first objective was the defeat of the *Luftwaffe*," said Gen. Doolittle. "It was our mandate from the Allied joint chiefs of staff and the keystone upon which all hopes and plans for successful invasion of Europe were built.

Seeking Air Battles

"We began and pressed this campaign in daylight for two reasons: We believed it the most effective way to hit the many widely scattered and frequently isolated aircraft plants, and we deliberately intended to precipitate large-scale air battles, because inflicting heavy losses on the German Air Force in being was essential to air supremacy before invasion.

"The Eighth began its campaign outnumbered heavily. The German fighters were equal or superior to any American planes; their pilots were capable, well trained and experienced, and some of them were based as close to us as the Pas de Calais. As early as July and August of 1943, we had cut into the German aircraft industry and their combat strength sufficiently to force their replacement potential temporarily below their current replacement needs. In the fall and winter of 1943-44, improved German tactics and more lethal armament increased the *Luftwaffe's* toll of our bombers on deep penetration missions until we faced a very grave crisis.

Neutralisation of the *Luftwaffe* was not only a campaign against a powerful enemy force but a race against time. It had to be done in time to permit land invasion

during the favourable summer weather of 1944. Losses approaching a prohibitive rate on deep penetration into Germany threatened to restrict these operations so as to question our ability to make our deadline, and this gave us many bad nights. But early in 1944, the long-range fighter, which had been continuously in development, came into the air battle of Germany in sufficient numbers to win for us in this period of our greatest crisis. The effect of all this was manifest on D-Day, when the *Luftwaffe* didn't seriously contest the invasion, because it was unable.

"Apart from large destruction of German planes in combat, it is very conservatively estimated that Eighth Air Force bombardment of German aircraft factories during the first five months of 1944 alone kept at least 5,000 enemy fighters from reaching the front. This came at a time when it hurt the Germans most.

Oil Campaign

"After D-Day we concentrated on our next and most important objective, destruction of the enemy's means to wage war effectively on the ground. By November, 1944, the fuel shortage created by aerial bombardment forced the *Luftwaffe* to fly operational sorties only in the most favourable circumstances

"The oil campaign began, as far as we were concerned, on May 12th, 1944. It was a continuing contest between Allied air power and all the resources of the Germans. At Leuna, west of Leipzig, the enemy's largest synthetic oil plant had to be attacked 18 times by the Eighth and three times by the R.A.F. Each attacking bomber was the target of at least 437 88mm. and larger, rapid-fire, heavy anti-aircraft artillery cannon. A smoke screen 30 miles in perimeter covered the area. It was the most heavily defended single industrial plant in all of Germany.

"Allied bombardment halted all production there on five separate occasions. Each time the Germans applied thousands of repair men to the job and resumed some production in time—but never normal capacity. The manager of the Leuna Werke told one of our intelligence officers who went there a few days after its capture by the First U.S. Army that in addition to the 11,000 people employed in operating the plant, 4,000 men were assigned to the plant solely for repair of bomb damage and reconstruction.

"So, here as everywhere, it was a continuing contest between bombardiers and reconstruction battalions. Unless the Germans were willing to end all resistance, they could not afford to stop repairing and rebuilding the plants which made resistance possible. By September of 1944 the enemy's gasoline production was down to about one-fifth of the pre-attack level, about half of what he needed as a stringent minimum for full-scale defensive effort. At Leuna alone, by the plant manager's estimate, Allied bombardment denied the German army 59,190,750 U.S. gallons of gasoline between May 12th, 1944, and mid-April, 1945—when the plant was captured.

"Ordnance sources say it takes 54,000 U.S. gallons of gasoline per day for one armoured division in the field. Hence it might be said that bombardment of this one plant alone was equivalent in effect to immobilising 12 armoured divisions for three months. In the early months of this year, material deficiencies and transport and communications difficulties not only reduced the enemy's effectiveness far below the potential of the troop strength he still had left, but it materially reduced the will to resist and hastened the enemy troops' realisation that the end was near.

"Attacks on German rail facilities, usually co-ordinated with immediate objectives of the Allied ground forces, were

THE U.S. EIGHTH AIR FORCE

an important part of the air contribution. Preparatory to the crossing of the Rhine in March, rail traffic out of the industrial Ruhr valley was reduced 75 per cent. by an Allied air campaign to isolate this area. On March 19th, 1945, 20 Ruhr rail yards were photographed by reconnaissance planes and the pictures showed virtually nothing in motion.

"In fact, in all of western Germany rail movement was limited by March to strictly military traffic that moved only at night. At some points military trains were stranded from three to ten days, awaiting locomotives to move them. Journeys that should have been a matter of hours took days and even weeks in some instances. Consequently the arrival of weapons, supplies and reinforcements were frequently too little and too late. Dislocation in essential war industries was also inevitably severe.

"Extermination campaigns were carried out against German aircraft production, oil production and ball bearings. The Germans use ball bearings more than we do and in many cases were obliged to change to plain bearings, with a resultant delay in production. Against other industries we tried to do as much as the remainder of our strength, weather and time would permit. We did not hit all their tank ordnance depots, for example. But we did hit those which were of immediate importance to German defence in a particularly hard-pressed sector. We hit certain V-1

and V-2 installations, their submarine yards, steel plants, chemical plants, tank plants, motor vehicle plants and many others.

Strategic bombing was our primary mission. One of your colleagues has aptly defined the difference between strategic and tactical bombing this way: 'Tactical bombing is knocking over the milk pail every day, while strategic bombing is an effort to kill the cow.'

"But our strategic force proved handy to have around for other purposes occasionally. In the 12 months of 1944, almost one-third of our total effort, as measured in bomb tonnages, was in tactical operations. And in the months from December, 1943, through August, 1944, more than one of every ten tons of bombs we dropped was aimed at flying bomb installations.

"If there were any who did not realise the effect of strategic bombardment on Germany's fate, Goering apparently was not among them. He is reported to have told the *Luftwaffe* on November 1st, 1944: 'Unless you bring down at least 500 Flying Fortresses on the next big raid, you will go to the trenches.' The next day we destroyed 180 German fighters, taking a loss of 40 bombers and 13 fighters.

"I believe that in the picture behind the fall of Germany which now begins to be revealed from inside Germany, the rôle of strategic bombardment will be very impressive. But as to what caused the downfall of Nazi Germany, I say it was team work—the greatest and most complex team effort in history."

A.T.C. VICTORY PARADE

OVER 2,000 A.T.C. Cadets, one from every unit throughout the country, "saluted the R.A.F." last Sunday afternoon in a mass victory thanksgiving service followed by a march-past in Hyde Park. The salute was taken by Air Marshal Sir Roderic Hill, newly appointed member of the Air Council for Training, on behalf of Marshal of the Royal Air Force Sir Charles Portal, Chief of the Air Staff. High officers of the U.S.A., Dominions and other Allied Air Forces, together with distinguished naval, military and civic representatives, were present. The Rev. J. A. Jagoe, Chaplain-in-Chief, R.A.F., conducted the service, assisted by Canon Woolnough, of Manchester Cathedral.

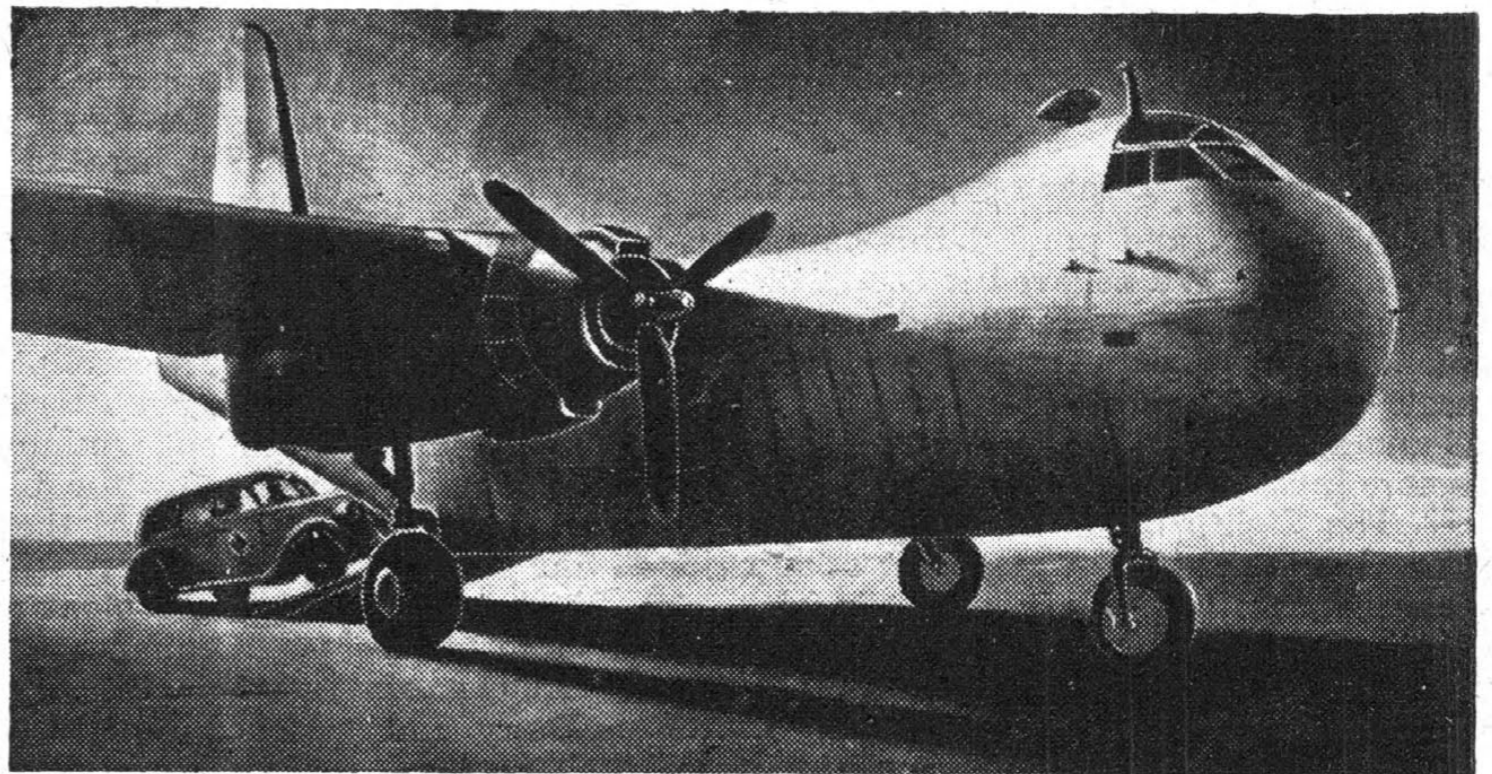
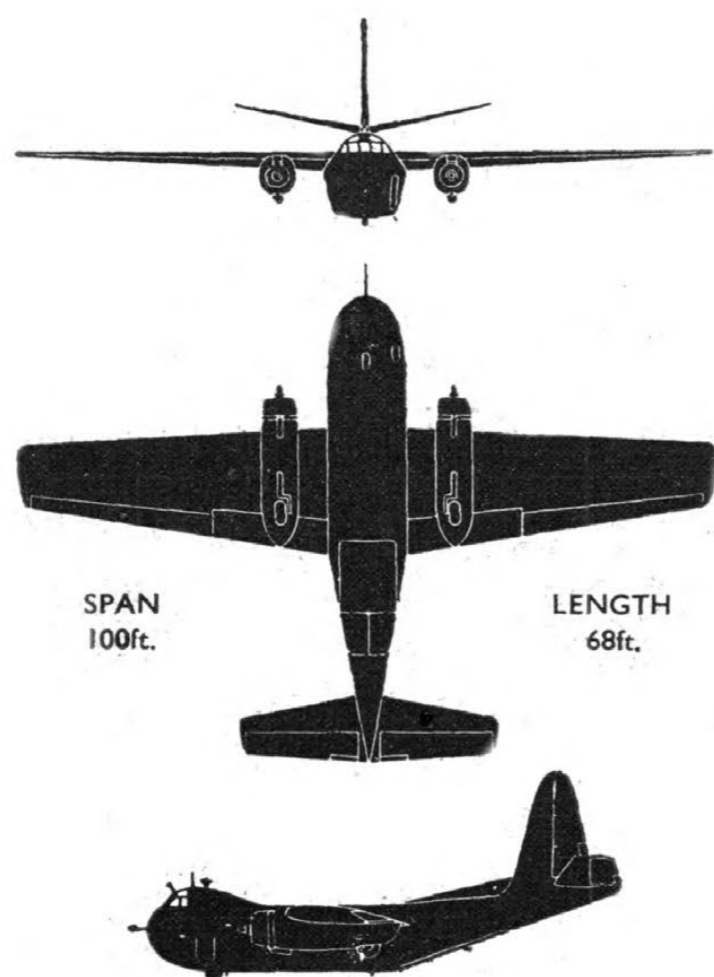
This Hyde Park parade and service was the highlight of a three-day national rally, including an international A.T.C. football match at Tottenham on Saturday, and the national A.T.C. boxing championships on Monday.

For the first time since the Corps was formed in 1941, air

cadets from all over England, N. Ireland, Scotland and Wales were brought together in the heart of the Empire to pay homage to their elder brothers of the R.A.F., in which over 100,000 ex-cadets are now serving. Simultaneous parades were held in other cities and towns where the A.T.C. is represented.

All the cadets visiting the Capital—some of them had never done so before—were accommodated in a "camp" in the A.R.P. deep shelter at Camden Town, and special facilities for hot meals, clean bedding and entertainments were provided. A satellite "camp" was also established in Hyde Park for main meals and for mustering. Visiting A.T.C. officers and W/O.s were accommodated in the deep shelter with their cadets.

Air Marshal Sir Leslie Gossage, meeting the cadets on their arrival, said: "London welcomes you and London expects a high standard of you, which I know you will fulfil. This victory week-end will be a date to be remembered for all time."



BUDD RB-1 CONESTOGA: Notable for its shot-welded, stainless steel construction, the Conestoga, built by the Edward G. Budd Co., Philadelphia, was developed for the U.S. Navy as a corrosion-proof transport. But after a contract had been placed, certain difficulties arose and production was discontinued. It is powered by two 1,050 h.p. Pratt & Whitney Twin-Wasp engines and has a top speed of 165 m.p.h. Maximum range is 1,700 miles. The cargo space measures 8ft. square by 25ft. long and the hydraulically-operated loading ramp at the rear forms a watertight door when closed.

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.

THE MILES M.48

Margin of Error Near the Stall

I WAS flattered to read Mr. Bage's congratulatory letter in the issue of *Flight*, April 26th. Pleased as we are with the performance of the M.48, however, we should hesitate to claim the very high C_L max. of 7.8 with which he credits us. It is true that the aircraft remains under control down to an indicated airspeed of below 25 m.p.h., but, as Mr. Bage will know, it is difficult to ensure an absolutely accurate indication of speed by the conventional instruments when flying very near the stall, and an error of a few m.p.h. at such extremely low airspeeds makes a remarkable difference to the apparent C_L maximum.

We do, however, believe that with the Messenger and M.48 we have attained a higher lift coefficient than has previously been achieved on any but purely freak aircraft needing a specialised piloting technique.

The actual figures for C_L max. after correcting for instrument error and position error are 4.56 with engine on and 3.17 with engine off.

G. H. MILES.

PRESSURE CABINS

First Demonstrated in 1904

IN the *Gazette* published by Qantas-Empire Airways, February, 1945, under "Production Postscripts," appears the following item:—

"A British invention now in use makes possible stratosphere flying without oxygen masks or special clothing. A super-charger maintains constant air pressure in the interior of aircraft cabins at any height up to 40,000ft."

This method of reaching great heights was first described by my two late brothers, Horace and Eustace Short, in a joint lecture given before the Royal Aeronautical Society on May 29th, 1904. The lecture was illustrated by lantern slides, which I have before me as I write. I was present at the lecture.

The drawings were made by Horace and show a hand-driven pump with two cylinders and a link motion operating the valves in such a manner that only frictional resistance had to be overcome.

No patent was taken out for this invention, but the prior publication has been of great value to those who are now designing pressure cabins, because the broad principle which is of primary importance in a patent cannot be claimed by anyone.

Only details of construction can be claimed, and such, as all inventors know, need not be exactly followed.

If any British, American or Russian inventor could claim the broad principles within the period of the "life" of his patent, large sums in royalties would have to change hands.

HUGH OSWALD SHORT, F.R.Ae.S.

"ONLY ANGELS MAY FLY"

Strict Rules Without Red Tape

WITH reference to Mr. Ryder's article, "Only Angels May Fly" (*Flight*, May 3rd), while I am in complete agreement with him in that the private flyer should be encouraged as much as possible and that strait-jacket regulations are second only to high cost in discouraging him, we must realise that flying must, and, I hope, will, be far more strictly controlled than is motoring.

In his article the writer quotes certain examples of U.S. regulations and ridicules them. I have flown, though not civilly, in both U.S.A. and this country, on both land- and sea-planes.

From my own experience I believe that, no matter what restrictions one makes, there will always be *someone* who piles up low flying, but the greatest deterrent is the fact that one knows that if one is caught flying under 500ft., whether dangerously or not, one's flying days are over, and NOT the fear that one might get killed doing it; 90 per cent. of young pilots believe that they are cleverer than all the others that have "pranged" before them. Thus the rule that prevents the landplane descending below 500ft. and the amphibian below 300ft. is fully justified, as it saves the insoluble definition of what is a dangerous altitude.

If the margin were 3,000ft. there would be some ground for the claim that it wastes petrol to climb to the minimum altitude for a short flip across a gulf. It is highly undesirable to have many aircraft skidding across the water at 200ft. I also maintain that one can ascertain definitely from an

altitude of 300ft. whether the water is suitable for alighting.

In my opinion, the U.S. authorities were generous to allow a limit of 1,000ft. over congested areas. It is the minimum height at which a pilot has a reasonable chance of making a forced landing comparatively safely in a less dense space.

I think roof-top landings are far too hazardous for those in the street, but a modification to the above law stating that if one was in the circuit of, and within gliding (or single-engined) distance of, an air park, one might violate the regulation, it would be ideal.

Mr. Ryder's other examples show that the U.S. regulations badly need revising. As for parachutes, I am opposed to laws making them compulsory—as, for instance, to equip a four-seater a private owner must pay about £240. Airlines and air taxis should provide them, however.

To sum up. Traffic regulations must be strict, as must be airmanship tests, but every effort must be made to cut down cost and unnecessary red tape in order to encourage the private owner to the utmost.

A SERVICE PILOT.

"Indicator" Has a Word to Say About Flying Discipline and the Private Owner

WHILE some of the restrictions light-heartedly outlined in the article "Only Angels May Fly" (*Flight*, May 3rd) seem to be a trifle idiotic, I must say that I think the general idea of such "preventive measures" is a good one, and the U.S. Bureau of Air Commerce is at least working on the right lines.

In pre-war days the vast majority of accidents to amateur-flown aircraft, in this country at least, were caused by various forms of stupid flying, such as "pressing on" when the weather was hopeless, indulging in low-level aerobatics or beat-ups, overloading, and rankly careless flying in the circuit. Freedom to commit suicide is all very well when there are only a few hundred aircraft in circulation, but there must obviously be some form of control and discipline when and if the numbers reach four figures or more. Even a magisterial assessment of moral character would at least tend to reduce the number of out-and-out anti-social types, complete with gats and scowls, from using aircraft in the course of their various law-breaking pursuits!

This article linked up interestingly with another in the same issue dealing with private-owner aircraft designs. Pte. Fotheringham's layout, for instance, could not possibly be effectively used by any but a well-trained pilot in a reasonably disciplined and controlled flying world, while people flying the kind of aircraft exemplified by Mr. Wheeler's design would be in a totally different category.

It seems that at regular intervals the idea of a "foolproof" light aircraft must inevitably be mooted. By all means let us have aircraft which are, as far as possible, viceless in their handling qualities—at least as viceless as the Spitfire and the Mosquito!—but it seems to me that we are putting the cart before the horse if we try to introduce an extreme of quite theoretical safety at the expense of performance and handling qualities. Whatever may be done to make aircraft stallproof and accident-proof as far as mere handling is concerned, experience is still necessary for ultimate safety in all conditions.

INDICATOR

AIRSCREW QUIZ

What Happens if it Flies Off?

I WOULD appreciate your readers' views on a mildly technical problem, the subject of a discussion among my crew. With our aircraft flying straight and climbing slightly, one engine raced beyond control up to over 3,500 r.p.m., the oil pressure failed, and the engine began to seize due to fusing of the bearings and valve mechanism. Had the airscrew not been feathered promptly, and the engine thereby stopped, it is almost certain that the airscrew shaft would have snapped and the airscrew been lost.

Now, had this happened, would the airscrew have necessarily cartwheeled to either side, or would it rather have spun away in a straight line forward and downward, until the rotating force imparted by the engine was lost?

The airscrew rotates anti-clockwise viewed from the rear of the aircraft, and there was no other force due to the attitude of the aircraft since we were practically straight and level. In other words, since the defective engine was a starboard inner, would the airscrew necessarily have flown toward the fuselage, or away from it?

N. C. SKINNER (Flt. Sgt.), R.A.A.F.



A long line of Short Stirlings waiting on a Continental airfield to bring back released prisoners of war.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements



Awards

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. Sqn. Ldr. J. A. KING, D.F.C., R.A.F., No. 357 Sqn.—This officer has displayed the highest standard of skill and gallantry in air operations. Since being awarded a Bar to the Distinguished Flying Cross, Sqn. Ldr. King has completed numerous operational flights, necessitating a high degree of courage and resolution. The success achieved is a splendid tribute to this officer's sterling qualities.

Act. Sqn. Ldr. G. S. SHARP, R.N.Z.A.F., No. 4 (R.I.A.F.) Sqn.—In January, 1945, this officer led the squadron on a sortie in support of a landing by ground forces at Myebone. The purpose was to lay a smoke screen. Precise timing and great accuracy were essential to success. In spite of considerable anti-aircraft fire, Sqn. Ldr. Sharp led his squadron in to the target with great skill and, as a result of the excellent work performed, the ground forces were enabled to execute a landing under a well-timed and accurately placed smoke screen. During the operation Sqn. Ldr. Sharp's aircraft was hit several times by anti-aircraft fire, but he flew it back to base. This officer has completed many reconnaissances over difficult terrain and in extremely bad weather, with excellent results. He has displayed exceptional skill, great courage and devotion to duty in the execution of his allotted tasks.

Col. J. D. W. HUMAN, D.F.C., S.A.A.F.—During the period of his command, Col. Human's wing has accomplished its full part in the Italian campaign and has achieved excellent results in close support of the Army. Col. Human has led the wing on all occasions with great determination, often on very hazardous missions. In July, 1944, he bombed an important railway line, encountering intense anti-aircraft fire and dense cloud, cutting the line at the entrance to a tunnel. Subsequently in December, 1944, this officer led the wing in attacks against military targets, including tanks, pressing them home with excellent results in the face of intense anti-aircraft opposition. He has proved a steady and resourceful commander.

Act. Sqn. Ldr. D. F. PERRENS, D.F.C., R.A.F.,

No. 208 Sqn.—This officer has completed many sorties on his second tour of operational duty. He has displayed exceptional tactical skill, great bravery and a determination to complete his mission with success which has won the highest praise. In January, 1945, Sqn. Ldr. Perrens was detailed for an artillery reconnaissance in the vicinity of Bologna. Whilst over the target area he was engaged by heavy and light anti-aircraft fire. His aircraft was repeatedly hit, but he remained over the target for nearly another hour to direct our artillery fire on to the enemy's positions. He was forced to turn away, however, when the engine of his aircraft failed. Nevertheless, he effected a successful crash landing in our forward defence lines. His coolness and courage in the face of concentrated enemy fire set a fine example.

Second Bar to Distinguished Flying Cross

Act. Sqn. Ldr. D. B. EVERETT, D.F.C., No. 35 Sqn.—One night in February, 1945, Sqn. Ldr. Everett was pilot and captain of aircraft detailed to attack Goch. Whilst making his first run over the target his aircraft was badly hit. The starboard mainplane was extensively damaged and the starboard inner engine caught fire. Momentarily the aircraft went out of control. Sqn. Ldr. Everett quickly levelled out though and feathered the propeller of the burning engine. The flames were then extinguished. Although unable to assess the full extent of the damage sustained, Sqn. Ldr. Everett went on to several further runs over the target, which he left only after he was satisfied as to the success of the operation. He afterwards flew the badly damaged aircraft safely to base. This officer displayed a high degree of skill, courage and resolution throughout.

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. P. H. C. HANBURY, D.F.C., R.A.F.V.R., No. 305 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Hanbury has participated in very many sorties. In February, 1945, he took part in a sortie over Germany. After successfully attacking a storage building in the railway sidings at Atterdorf he also bombed a road-railway bridge. Later he raked a train with machine-gun fire, obtaining numerous hits. After attacking the last-named target, Sqn. Ldr. Hanbury had to feather the airscrew of one of the engines, which had become overheated. On the return flight his aircraft twice came under considerable light anti-aircraft fire and sustained some damage. In spite

of this, Sqn. Ldr. Hanbury flew back to base. He effected a safe landing although both the tyres on the landing wheels had been punctured. This officer has consistently displayed a high standard of skill and courage.

Act. Wing Cdr. A. W. HEWARD, D.F.C., A.F.C., R.A.F.O., No. 97 Sqn.—This officer has completed numerous sorties since being awarded the D.F.C. and throughout has set a fine example of determination and devotion to duty. He is a highly successful squadron commander whose exceptional skill, great drive and untiring efforts have been well reflected in the high standard of efficiency of the squadron which has achieved much success.

Act. Sqn. Ldr. W. R. CHRISTISON, D.F.C., R.C.A.F., No. 404 (R.C.A.F.) Sqn.—Since being awarded the D.F.C. this officer has taken part in a number of attacks on enemy shipping and throughout has displayed courage and resolution of a high standard. In February, 1945, Sqn. Ldr. Christison participated in an attack against an enemy force of eleven naval vessels. The ships were sheltered by high cliffs rising steeply from the water's edge and defended by anti-aircraft batteries on the shore. In the face of fire from these guns and from those of all the enemy ships, and also opposition from enemy fighters, Sqn. Ldr. Christison led his squadron into the attack which was pressed home with the greatest determination. His undoubted skill contributed materially to the success achieved.

Act. Wing Cdr. L. F. PENNY, D.F.C., R.A.F.O., No. 110 Sqn.—For the last seven months this officer has been in command of his squadron. Both in the air and on the ground he has set a fine example and under his inspiring leadership the squadron has maintained a high standard of operational efficiency.

Act. Sqn. Ldr. D. O. MACDOUGALL, D.F.C., R.A.F.V.R., No. 355 Sqn.—Sqn. Ldr. MacDougall has completed two tours of operational duty. Throughout he has displayed outstanding leadership and a fine fighting spirit. Since the award of the D.F.C. he has led the wing with great gallantry and efficiency on numerous missions. Both in the air and on the ground this officer has set an inspiring example to all.

Act. Sqn. Ldr. J. E. WILLSON, D.F.C., R.A.F.V.R., No. 153 Sqn (since deceased).—This officer has destroyed nine enemy aircraft by night. Since his arrival in the North African theatre of war in June he has destroyed three Heinkel 111s and a Junkers 88.

Flt. Lt. E. G. ATKINS, D.F.C., R.A.F.V.R., No. 305 Sq.—Flt. Lt. Atkins has completed many

SERVICE AVIATION

Clifton; F/O. P. J. Coleman; P/O. C. W. Coward; Sgt. M. S. Crawshaw; Flt. Sgt. N. V. Creighton; P/O. S. H. Davis; Sgt. G. R. Deeley; Sgt. L. Dryer; Sgt. T. K. Dudley; Sgt. T. A. Eburne; Sgt. A. E. Elms; F/O. F. G. Fidler; Sgt. H. R. Gibbon; Flt. Sgt. L. G. Glaus; Sgt. J. A. Hamilton; Sgt. J. P. Hennessey; Sgt. D. F. Hicks; P/O. G. W. Hinde; Sgt. A. S. Hollands; Flt. Sgt. J. W. Homewood; P/O. M. Hopkins; F/O. J. Horsley, D.F.C.; Sgt. G. C. Howell; P/O. P. L. Johnson; Sgt. J. M. Jones; Sgt. T. E. Jones; Sgt. W. J. Jones; Sgt. W. R. Kelman; Flt. Sgt. D. B. Laidlaw; P/O. G. C. Lawrence; Sgt. R. Lethbridge; Sgt. J. R. McCourt; Flt. Sgt. P. D. Martindale; P/O. A. H. Milward; Sgt. R. A. D. Mirams; P/O. C. Newton; Sgt. T. Newton; Sgt. A. Nicholson; Flt. Sgt. C. A. S. Noad; Sgt. J. E. Normington; Flt. Sgt. E. E. J. Patmore; Flt. Sgt. R. M. Patmore; Sgt. R. A. Pearson; Sgt. W. R. Percival; Sgt. A. W. E. Pilgrim; Flt. Sgt. H. J. Pleydell; Sgt. J. S. Pomeroy; Sgt. R. S. Pountney; P/O. W. Renton; F/O. P. Rowe; Sgt. P. R. Rowthorn; Sgt. H. Sadler; Flt. Lt. A. J. Sayer; Flt. Sgt. N. B. Sefton; Sgt. C. C. Sharland; Sgt. I. E. Smedley; Flt. Sgt. J. M. Smith; Flt. Sgt. M. A. Stevens; Sgt. E. H. Thomas; Sgt. G. A. N. Thompson; Sgt. L. St. C. Thompson; Sgt. J. W. Walker; Sgt. P. W. Webb; Sgt. S. W. Weedon; Sgt. T. L. J. Whittick; F/O. J. Wilkinson; Sgt. R. C. Yates; Sgt. W. A. J. Young.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. C. D. Bassett; F/O. J. D. Booth; Flt. Sgt. A. H. Brameld; Flt. Sgt. J. E. J. Farrow; Flt. Sgt. J. E. W. Fenwick; Flt. Sgt. J. F. Grimshaw; Flt. Lt. A. A. F. Mills; Flt. Sgt. H. Pickup; Sgt. W. J. D. Pugh; Flt. Sgt. S. R. Smith; Flt. Sgt. G. E. Tudor.

MISSING.—Sgt. C. L. Atkins; Flt. Sgt. R. S. Bennett; P/O. J. W. Bickerton; Flt. Sgt. K. J. A. Bicknell; Flt. Lt. B. Bonakis; Flt. Sgt. R. S. Brown; P/O. A. J. Bulter; Sgt. A. F. Butcher; Flt. Sgt. A. H. Calvert; Sgt. S. S. Carter; Sgt. J. Court; P/O. L. Cowell; Sgt. R. L. Cundy; Sgt. P. Day; Sgt. E. Dixon; Flt. Sgt. J. Draper; Flt. Lt. E. C. Duke, D.F.M.; Sgt. J. S. Ernest; Sgt. E. W. Evans; F/O. P. H. Fitzgerald; Sgt. R. S. Garland; Flt. Lt. W. D. Harrow; Sgt. J. A. Heenan; F/O. D. A. Hemmings; Flt. Sgt. W. R. Hill; P/O. R. C. Hollings; F/O. C. F. Jelley, D.F.C.; Sgt. W. Kenny; Sgt. H. W. Kirsh; Wing Cdr. K. J. Lawson, D.S.O., D.F.C.; P/O. D. C. F. McCrae; Flt. Sgt. J. Mace; P/O. C. D. MacKenzie; Sgt. R. A. Marett; Sgt. F. Meekison; Sgt. T. Miller; Flt. Sgt. C. D. Mountain; Sgt. J. B. Mullholland; Sgt. A. C. Overett; Flt. Sgt. D. J. Parsons; Flt. Sgt. G. H. Pearson; Sgt. J. Perry; P/O. W. T. Pethard; Sgt. J. M. Pickering; Sgt. J. H. Pinsent; W/O. E. J. Prince; Flt. Sgt. T. Robertshaw; Flt. Sgt. C. A. Robinson; Flt. Lt. H. R. Sindall; Sgt. D. Sleep; Sgt. M. A. Solomon; Flt. Sgt. H. F. Stephens; Sgt. J. Sutcliffe; Sgt. J. D. J. L. Tarlton; Sgt. D. Thayer; Flt. Sgt. R. W. Thomas; Flt. Sgt. F. J. Walker; Sgt. T. E. Walker; Flt. Sgt. J. H. Watson; Sgt. J. K. Welburn; Flt. Sgt. C. F. Wellstead; Sgt. R. Whybrow; P/O. A. A. Wiggins; Flt. Lt. D. G. Williams.

KILLED ON ACTIVE SERVICE.—L.A./C. S. T. Hatch; Cpl. E. W. Page; Sgt. G. Pope.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. S. J. Richards.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. P. H. Constant; Flt. Sgt. S. A. Stephen.

DIED ON ACTIVE SERVICE.—A/C.2 W. Hattersley; L.A./C. C. A. J. Salt.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Lt. D. R. Beale; Flt. Sgt. E. E. Brownhall; Flt. Sgt. T. R. Foreman; Sgt. W. F. Gallivan; Flt. Sgt. P. H. Hodgson; Flt. Sgt. J. Jackson; Sgt. P. H. Keeler; Flt. Sgt. A. C. Phillips; Flt. Sgt. F. L. Preece; Sgt. E. G. Selwyn; Flt. Sgt. J. E. Taylor; W/O. W. B. Urwin; Sgt. K. Yearsley.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.1 E. V. B. Cramb.

Royal Australian Air Force

KILLED IN ACTION.—F/O. C. K. Flockhart; F/O. R. G. Grivell; W/O. R. L. Hawke; F/O. S. J. Holder; W/O. F. C. Miller; Flt. Sgt. E. A. Smith.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. E. J. Greenwood; Flt. Sgt. K. C. Walker.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. G. Archibald; F/O. J. Downes; P/O. J. A. McLoughlin; Flt. Sgt. W. C. Napier; Flt. Sgt. E. M. S. Norris; P/O. O. J. Trotman.

MISSING, BELIEVED KILLED IN ACTION.—P/O. G. D. Long; F/O. R. C. O'Neill.

MISSING.—Flt. Sgt. M. B. Bruckner; Flt. Sgt. L. Cain; Flt. Lt. R. M. Clarke; F/O. J. R. Donald; F/O. N. K. Dunlop; P/O. S. H. Fitzhenry; Flt. Sgt. J. D. Gloury; Flt. Sgt. M. J. Gordon; P/O. G. K. Hendy; Flt. Sgt. R. W. McCulloch; F/O. W. A. McNamee; F/O. M. A. Mathieson; P/O. C. T. Pollard; Flt. Sgt. A. W. Robinson; Flt. Lt. J. A. Rowland; Flt. Sgt. L. J. Saulwick; Flt. Sgt. S. Servos; Flt. Sgt. H. J. Williams.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. C. D. G. Small.



U.S. GAS COMPANY: Filling "Jerricans" with petrol at a fuel dump in Germany.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. N. Baker; Flt. Sgt. H. Clements; F/O. W. H. Pogson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. E. F. Baldrey; F/O. R. E. Conroy; F/O. J. E. F. Hawke; P/O. L. R. Ingell; W/O. G. McCann; F/O. D. N. McKenzie; P/O. J. L. Michell; F/O. P. Nazari; P/O. G. G. Vipond; F/O. R. J. Webster.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. D. McL. Awrey; P/O. A. McA. Barrowman, D.F.M.; W/O. J. D. Bremner; Flt. Sgt. J. G. Burke; W/O. W. T. Claridge; P/O. E. R. Dujay; P/O. S. H. Goulding; P/O. F. E. Halliday; F/O. G. P. Kinnear; P/O. J. A. Laing; F/O. E. E. Laporte; F/O. J. C. Leithhead; P/O. J. I. MacDonald; P/O. J. E. McInnes; P/O. R. A. McIvor; P/O. J. P. McKenzie; Flt. Sgt. R. W. McNeil; P/O. W. V. Moss; P/O. M. R. N. Mouchet; F/O. D. O. Olsvik; Sgt. H. T. Raine; Sgt. S. J. Rigden; W/O. W. F. Rost; W/O. R. Sharp; P/O. K. D. Tucker; F/O. R. L. Warren; F/O. A. W. Woolverton.

WOUNDED OR INJURED IN ACTION.—F/O. G. R. Ingram.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. J. B. Doak; W/O. K. S. Hanson; F/O. G. E. Jones; Sgt. J. R. Milligan.

MISSING.—Flt. Sgt. T. A. Casey; P/O. R. H. Chittim; Sqn. Ldr. N. Crawford, D.F.C.; P/O. W. R. Dauphin; F/O. G. E. Geaves; Flt. Lt. J. P. O. Howard, D.F.C.; Flt. Sgt. J. W. McLeod; P/O. P. J. Maik; Flt. Lt. W. A. Manyuk; Flt. Sgt. E. D. Mathison; Sgt. W. J. Morgan.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—W/O. C. L. Logan.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—W/O. A. J. Young.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A./C. J. T. Bews; F/O. P. G. Macklem; L.A./C. C. J. A. Martin; Flt. Lt. H. P. V. Massey; L.A./C. R. Simmons; L.A./C. J. L. C. Viel.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Cpl. A. R. O. Eardley; L.A./C. R. C. Medforth.

DIED ON ACTIVE SERVICE.—W/O. J. F. Cartman.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. Crawford; Flt. Lt. W. W. Foster; F/O. A. G. Kinnis; P/O. W. A. Waldram; F/O. J. R. Willis.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. K. F. Debenham; Sqn. Ldr. B. M. Gilmour; Flt. Sgt. F. T. Lovegrove; F/O. E. W. H. Salter; W/O. K. A. Smith; Flt. Sgt. D. W. Vaughan.

MISSING, BELIEVED KILLED IN ACTION.—F/O. E. P. Parcell; P/O. J. D. K. Sterling.

MISSING.—Flt. Lt. I. T. Yanovich.

Official Corrections

Casualty List No. 497.

Under "KILLED IN ACTION" insert Flt. Lt. J. G. Faulkner.

Under "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION," alter P/O. G. R. Ketcher to read P/O. G. R., D.F.M.

Under "MISSING" delete W/O. K. Baird, F/O.

A. R. Caseley, Flt. Lt. J. G. Faulkner, Flt. Lt. R. C. Hockly, F/O. W. D. Lamb, L.A./C. G. S. Price, Flt. Sgt. R. K. Shirley, F/O. O. S. Watson. Sgt. D. Lunn should read Flt. Sgt. D.; Sgt. A. Sutcliffe should read Flt. Sgt. A.

Under "MISSING" delete Flt. Sgt. R. F. Whately-Knight and Sgt. H. McK. Yearley.

Under "KILLED ON ACTIVE SERVICE" insert L.A./C. G. S. Price.

Alter heading "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE" to read "MISSING, BELIEVED KILLED ON ACTIVE SERVICE."

Under "WOUNDED OR INJURED ON ACTIVE SERVICE" delete L.A./C. J. P. Johnson and insert under heading "DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE."

Under "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR" Sgt. L. Benson should read Flt. Sgt. L.; Flt. Sgt. H. E. Yorke should read W/O. H. E.

Under R.A.A.F., "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION" delete Flt. Sgt. A. H. Boettcher.

Under R.C.A.F., "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE" Sgt. W. R. Christian should read Sgt. W. R. Christian.

Under R.N.Z.A.F., "MISSING," delete Sqn. Ldr. A. H. Smith, D.F.C.

Casualty Communiqué No. 498.

Under "KILLED IN ACTION" F/O. D. Webber should read Flt. Lt. D.

Under "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION, after the name Flt. Sgt. S. B. Stevenson add "D.F.M."

Under "MISSING" delete Flt. Lt. G. Donald, Sgt. R. E. McCann, Flt. Sgt. R. K. Yeulet; delete Sgt. P. J. Mansell, and place him under "KILLED IN ACTION."

Under "KILLED ON ACTIVE SERVICE," Flt. Sgt. H. Biffen should read W/O. H. Biffen.

Under "DIED ON ACTIVE SERVICE" A/C.1 W. A. Briggs should read L.A./C.

Under "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR" Sgt. W. D. Belshaw is now Flt. Sgt.

Under R.A.A.F., "MISSING," delete Flt. Sgt. C. D. Donaghue and P/O. N. F. Swift.

Under R.C.A.F., "PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR," delete Flt. Sgt. L. S. O'Leary.

Casualty Communiqué No. 499.

Under "MISSING" P/O. M. J. Boylan, Sgt. K. F. Matthews, Sgt. W. E. Mawson, Flt. Lt. N. C. Tatam, and Flt. Lt. P. A. Thomas should all be inserted under "KILLED IN ACTION."

Delete Group Capt. C. L. Green, D.S.O., D.F.C.; F/O. F. J. Gunn.

Sgt. J. L. Simpson should read Flt. Sgt. J. L.; Sgt. J. G. Williams should read Flt. Sgt. J. G.

Under R.A.A.F., "MISSING," W/O. R. K. Norworthy change to P/O. R. K.

Under R.C.A.F., "KILLED IN ACTION," W/O. D. R. Currie should read P/O. D. R.; Sgt. E. J. Farrel should read P/O. E. J.; Flt. Sgt. E. P. Harvey should read P/O. E. P.

Under R.C.A.F., "MISSING, BELIEVED KILLED IN ACTION," W/O. F. W. Campbell should be inserted under "KILLED IN ACTION."

Under "MISSING," P/O. A. G. W. Blayney and P/O. W. H. Leese should be inserted under "KILLED IN ACTION." W/O. P. Uzeilman should read P/O. P.

Under R.N.Z.A.F., "MISSING," delete Flt. Lt. O. P. Olson.

Flt. Lt. SHUTTLEWORTH accompanied Foreman Salt into the mine on his first re-entry some half-hour after the explosion when conditions underground were still unknown and there were all manner of possible risks—further explosions, fire, roof falls, noxious fumes. With Foreman Salt he helped rescue an injured man. Later Flt. Lt. Shuttleworth played an important part in maintaining control and, by his fine example, greatly encouraged other rescue workers.

Whilst these rescue operations were developing in the Old Mine, Cpl. Rock and Cpl. PETERS made their way to an airshaft in the New Mine, which they reached about an hour and a quarter after the explosion. They found twenty workmen to be cut off in this part of the mine. They had endeavoured to make their way out by a road passing the ventilating shaft but ran into noxious fumes and five of them died. The remainder retraced their steps to the ventilating shaft. Their calls for help were heard by Cpls. Rock and Peters. Both repeatedly went down the iron ladder in the shaft into the gas-filled chamber, rescued the men who were still alive, and recovered a number of dead.

Roll of Honour

Casualty Communiqué No. 504.

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

Of the names in this list, 209 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. R. J. Keller; Sgt. G. Logie; Flt. Sgt. J. B. Thorburn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. W. McA. Aikman; Flt. Lt. C. A. L. Allen; W/O. R. G. Arding; Sgt. E. E. Appleby; Flt. Sgt. F. B. Baker; Sgt. R. J. Batham; Sgt. E. G. Bird; Sgt. G. C. Borradaile; P/O. A. J. Burchem; Sgt. T. Campbell; Sgt. W. Cannon; Flt. Sgt. K. W. Chalk; Sgt. H. D. Clark; Sgt. S. G. Cohen; Sgt. H. W. Collins; Flt. Sgt. E. C. Doran; Sgt. C. Duerden; F/O. D. J. Duncan; Sgt. J. G. Eastman; Flt. Sgt. W. F. Evans; Flt. Lt. C. K. Fitzgerald; D.F.C.; Flt. Sgt. W. R. C. Fulton; P/O. R. Gallop; Flt. Sgt. J. B. Gilbertson; Sgt. E. H. Glibbery; Flt. Sgt. C. W. Hagerty; Sgt. S. J. Harrison; Flt. Sgt. E. G. Hart; Sgt. E. A. Hatch; F/O. A. G. Hendry; Flt. Sgt. F. R. Horner; F/O. J. E. Hussy; Sgt. F. Jarvis; Sgt. W. H. Jenkins; W/O. D. W. T. Johnson; Sgt. J. E. Johnson; Sqn. Ldr. E. W. Kinchin; Sgt. W. F. Ledingham; Wing Cdr. W. G. Lockhart, D.S.O., D.F.C.; Sgt. A. R. Long; Sgt. G. Lyall; Sgt. D. J. MacLennan; Sgt. J. P. McGinn; Sgt. H. W. H. Marshall; Flt. Sgt. A. Mathews; Sgt. R. Montgomery; Sgt. R. A. Morris; Sqn. Ldr. A. O'S. Murdoch; P/O. R. V. Newlyn; Flt. Sgt. G. A. Orchard; Sgt. R. T. Otte-ward; F/O. R. M. Parker; Sgt. P. Pearl; Flt. Sgt. G. A. J. Prigg; Flt. Sgt. P. Rawlings; Sgt. J. H. Rees; Sgt. J. P. Rothera; Flt. Sgt. S. D. Russell; F/O. S. M. Seddon; Flt. Lt. D. Sellors; P/O. G. Silverwood; Sgt. F. Skelly; Sgt. W. H. F. Smedmore; Sgt. S. W. Smith; F/O. W. A. F. Squibb; Sgt. J. B. Strange; Flt. Sgt. H. H. Streeting; Sgt. J. A. Sturgeon; Flt. Sgt. J. J. Taylor; F/O. A. J. R. Thompson; P/O. J. F. Tosh; Sgt. R. Walton; Flt. Sgt. L. E. Watson; Sgt. S. J. Weir; Sgt. M. White; Flt. Sgt. R. A. Wickham; P/O. T. E. Wilkins; Flt. Lt. D. C. Woodruff; Sgt. H. J. Wright.

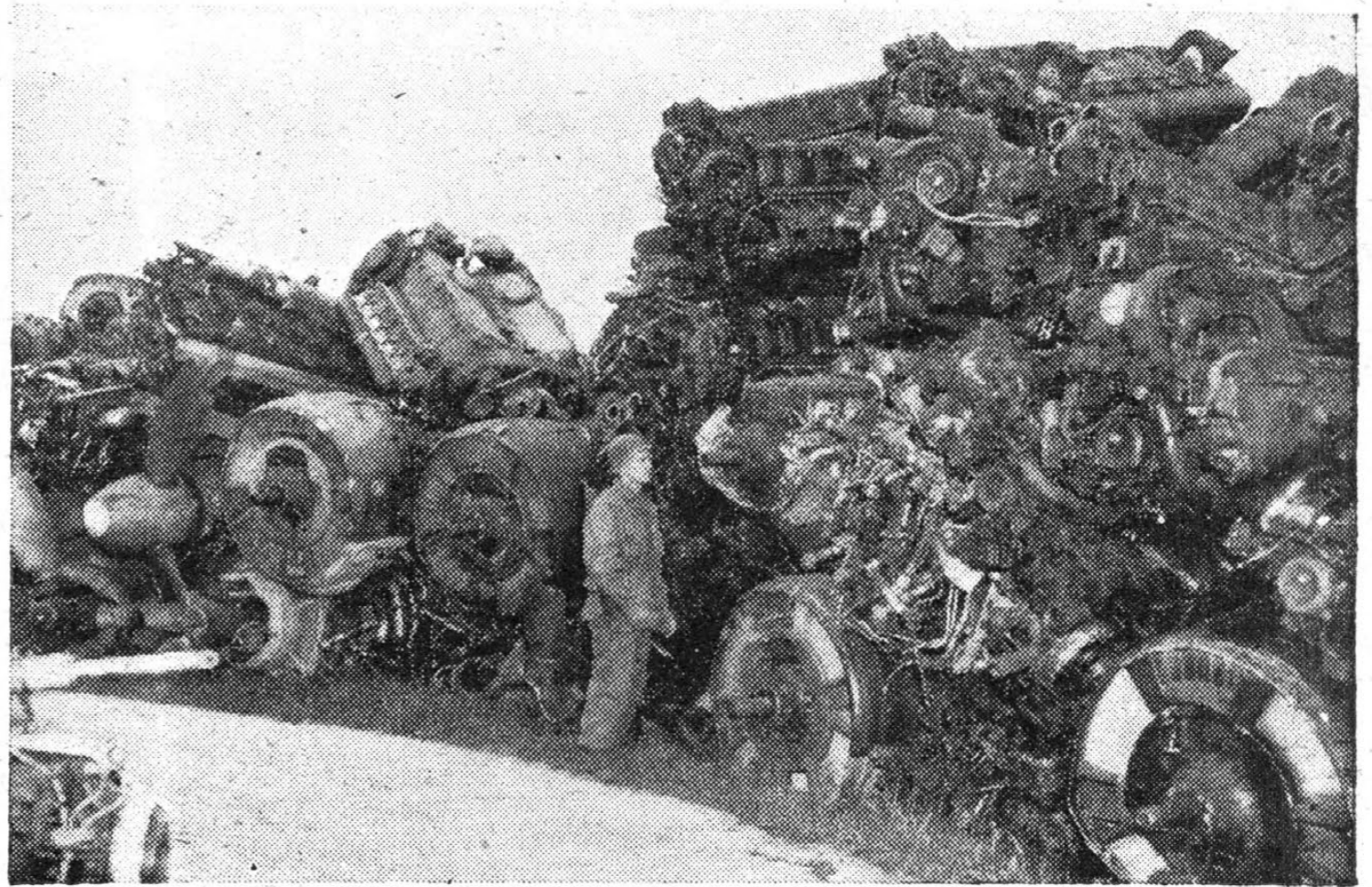
MISSING, BELIEVED KILLED IN ACTION.—W/O. A. Allan; Sgt. A. W. T. Boulton; Flt. Lt. A. Elliott; Flt. Lt. J. A. Mulcahy-Morgan.

MISSING.—F/O. W. Agnew; Flt. Sgt. W. Alder-cotte; Sgt. B. G. Aldred; Sgt. H. G. Backway; F/O. R. Barker; Sgt. W. B. Bartholomew; Sgt. V. D. Basso; Sgt. C. F. Bates; Flt. Sgt. M. A. Belcher; Sgt. J. E. Benton; Flt. Sgt. L. E. H. Blay; Flt. Sgt. W. G. Bowen; Sgt. R. Brown; Flt. Sgt. W. M. Burton; P/O. I. A. H. Croad; Sgt. I. D. B. Danks; Sgt. D. T. Darby; Sgt. R. H. Dickson; F/O. H. D. Dinmore; Sgt. S. J. Dolan; Flt. Sgt. S. F. Elliott; Sgt. E. Gillen; Sgt. A. S. Gordon; Sgt. A. H. Grant; F/O. R. T. Greig; Flt. Sgt. R. E. Herbert; Sgt. C. B. Herridge; Sgt. C. F. Hillier; Sgt. R. W. Holmes; Sgt. N. R. Howell; Flt. Sgt. H. Insley; Sgt. A. Johnson; Sgt. H. C. Johnston; Sgt. H. J. King; Sgt. P. A. Lane; Flt. Sgt. A. A. Law; P/O. A. Leach; F/O. B. D. Lilley; Sgt. C. Lloyd; Sgt. H. P. McCafferty; Sgt. V. I. Michael; Flt. Sgt. E. A. Morley; Sgt. D. Morrison; Sgt. W. B. Morton; Sgt. W. C. Muir; Sgt. P. Neale; Flt. Sgt. A. B. Nicklin; Flt. Sgt. H. J. O'Keefe; Sgt. F. E. Parkhouse; Sgt. D. H. Pemble; F/O. M. D. Pickersgill; Sgt. R. Poulson; Sgt. A. J. Ralph; F/O. J. H. Robinson; Flt. Sgt. A. G. Scarff; Flt. Sgt. J. S. Staples; Sgt. D. E. F. Thomsett; Sgt. D. J. J. Timms; P/O. F. A. Toplis; Sgt. R. L. Watkins; Flt. Sgt. P. D. Watson; P/O. C. J. Weight; P/O. G. E. Widdicombe; Flt. Sgt. D. H. Williams; Sgt. G. A. Wilson; Sgt. T. Wilson; F/O. W. Young.

KILLED ON ACTIVE SERVICE.—Cpl. F. Battersby; L.A/C. F. Boughey; F/O. I. M. Cameron; Sgt. A. E. W. James; Sgt. N. Lees; L.A/C. B. Ott; P/O. T. L. B. Shoolbread; Flt. Lt. P. Wyatt-Smith.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. N. Elcoat.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 E. E. Alexander; L.A/C. S. Bain; L.A/C.



JUNKERS' JUNK: Destroyed engines piled high on the German airfield on the outskirts of Kolleda.

C. D. Bott; L.A/C. T. Bourne; Cpl. G. P. Bradley; Cpl. T. Bradley; A/C.2 K. A. Bridgen; L.A/C. W. Butler; L.A/C. H. J. R. Cox; L.A/C. J. H. S. Dobner; L.A/C. J. Dugham; L.A/C. C. P. Gercken; L.A/C. L. Harker; L.A/C. D. M. G. Hookway; A/C.2 E. G. Last; L.A/C. E. Marland; Cpl. F. R. W. Poole; L.A/C. M. W. Rowe; L.A/C. R. Saint; Cpl. N. L. Shearman; L.A/C. G. R. Smith; L.A/C. E. L. J. Stoddart; Flt. Sgt. C. W. Thompson; L.A/C. K. Thurlow; A/C.1 C. L. Toomer; Cpl. H. C. Wattecamp; Sgt. H. Watson; A/C.2 G. C. Wilson.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. L. A. Beckett; Cpl. D. C. Gregory; L.A/C. R. W. McCristal; L.A/C. T. W. Sherman.

DIED ON ACTIVE SERVICE.—Cpl. G. J. Amos; A/C.2 W. G. Furze; L.A/C. E. W. Gregg; Flt. Sgt. R. E. Pope; Flt. Lt. L. V. Walsh.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. R. N. Aitken; P/O. L. W. C. Lewis; Sgt. R. A. Lowe; Sgt. L. E. Swallow; Sgt. B. C. Winson.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. D. B. Jeffrey. MISSING.—F/O. C. A. Cassidy; F/O. D. Gray; F/O. F. H. R. Kemp; Flt. Sgt. C. R. Mangnall; F/O. V. D. Powell; F/O. B. T. Roberts; Flt. Sgt. G. I. Ruggless; F/O. A. H. Scott; W/O. L. J. Symonds; Flt. Sgt. P. W. K. Walter; P/O. J. M. C. Wilson; F/O. L. A. Wilson.

KILLED ON ACTIVE SERVICE.—F/O. W. V. W. Allamby; Flt. Sgt. K. S. F. Allen; Flt. Sgt. L. W. Cann; Flt. Sgt. G. J. Dunbar; Flt. Sgt. R. Emonson; Flt. Sgt. M. W. Milne; Flt. Sgt. C. J. Nolan; Flt. Lt. J. I. Pritchard; Flt. Sgt. D. I. Savage; Flt. Sgt. C. C. Watson; Flt. Sgt. T. E. H. Wright.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. T. J. Adkison; F/O. J. H. Ballantyne, D.F.M.; P/O. L. Bandle; Sgt. H. M. Coffey; F/O. T. W. Cooper; P/O. A. F. De Dauw; Flt. Lt. A. G. Dickie; Sgt. F. Etienne; P/O. W. G. Hampton; P/O. D. E. James; P/O. J. M. Levasseur; Flt. Lt. G. F. Maffre; P/O. J. R. H. B. C. Mallette; Flt. Sgt. R. A. Meek; F/O. L. L. Mortimer; F/O. L. D. Proctor; P/O. T. Schioler; P/O. C. W. Strom; F/O. J. O. A. R. Tetrault; P/O. P. Warywoda.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. J. B. Allen; P/O. R. J. Atkins; Flt. Sgt. H. J. Beattie; F/O. A. D. G. Bell; P/O. A. C. Belyea; P/O. J. L. Berry; F/O. J. R. Booth; W/O. N. R. Bowman; Flt. Lt. C. M. Brown; Flt. Sgt. W. Burns; P/O. J. A. R. Caron; Flt. Sgt. W. E. Chambers; W/O. E. A. Cornfield; P/O. R. E. Countess; Sqn. Ldr. E. W. Cowan; W/O. A. H. Crosland; F/O. C. W. C. Crowdy; P/O. L. W. Cuming; Flt. Sgt. G. A. Dancey; Flt. Lt. J. L. Dehoux, D.F.C.; P/O. E. P. Devaney; Flt. Lt. R. J. Digney; F/O. J. L. Dobbyn; F/O. J. Doig; P/O. J. G. Doucet; F/O. J. J. A. Ducharme; F/O. K. V. Duffield; F/O. J. Duncan; F/O. G. C. Dunkley; W/O. C. G. Dupuis; P/O. H. Ellis; Flt. Sgt. B. E. Findlay; W/O. A. J. D. Fox; W/O. A. McC. Freeman; P/O. J. Gibson; F/O. R. W. Gilkey; Flt. Sgt. R. T. Griffiths; F/O. N. G. Gzowski; F/O. J. F. Harrigan; F/O. J. G. Hatchwell; P/O. C. W. Hay; P/O. F. W. Heinen; F/O. A. T. Hook; F/O. J. Horn; Flt. Sgt. J. M. Hunter; P/O. J. King; F/O. W. E. Krampe; P/O. M. Kwas; P/O. A. E. Lafferty; P/O. V. M.

Lawson; Flt. Sgt. J. A. Leboldus; P/O. A. C. Letcher; P/O. W. K. M. Love; F/O. B. E. Lynn; F/O. N. A. MacAulay; Sgt. J. A. McEwen; P/O. V. H. McKeown; P/O. J. M. MacLeod; P/O. W. H. Martin; F/O. A. P. Mazur; F/O. N. Melnick; Sqn. Ldr. H. W. Metzler; P/O. F. W. Morris; Flt. Sgt. J. R. E. Nadeau; W/O. T. H. Nolan; F/O. A. J. Normandin; F/O. C. E. O'Brien; Sgt. J. H. Overholt; P/O. A. S. Parker; F/O. F. F. Paquin; W/O. L. H. Patterson; Flt. Sgt. J. L. Piche; Flt. Sgt. C. M. Price; P/O. E. R. Proud; P/O. L. J. Pugh; P/O. D. W. Pulham; P/O. D. A. Rae; Flt. Sgt. C. E. Richard; Flt. Lt. W. A. Roberts; P/O. R. W. Robertshaw; Sgt. W. K. Rodgers; Flt. Sgt. E. F. A. Rowe; F/O. J. E. Sauve; F/O. C. L. Scott; Flt. Sgt. A. E. Sealy; Flt. Sgt. G. A. Sherwood; F/O. H. L. Shortliffe; F/O. L. L. Smith; F/O. K. A. Solmundsson; Sgt. R. H. Stanley; P/O. A. C. Thompson; P/O. R. J. Thompson; P/O. T. A. Thomson; Flt. Sgt. J. G. Tomlinson; F/O. R. D. Van Fleet; Flt. Sgt. P. H. G. Vincent; F/O. R. F. Waddington; P/O. T. E. Wilkinson; P/O. C. H. Winters; W/O. J. J. Zunti.

WOUNDED OR INJURED IN ACTION.—Flt. Lt. A. H. Manwaring.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. R. A. McDonald.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. A. Nova; Flt. Sgt. J. Perkins.

Royal New Zealand Air Force

MISSING, BELIEVED KILLED IN ACTION.—F/O. G. I. Hodgson.

MISSING.—Flt. Sgt. R. G. Moore; W/O. B. D. Jenkins; F/O. L. T. Friedrich; Flt. Sgt. R. A. Young.

South African Air Force

KILLED IN ACTION.—Lt. J. J. Roelelse. WOUNDED OR INJURED IN ACTION.—2/Lt. R. F. Bell.

MISSING.—Lt. R. G. Whitehorn.

Casualty Communiqué No. 505

Of the names in this list, 165 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. K. H. Austin; Sgt. K. Bennett; Sgt. E. Buttrum-Gardiner; Sgt. P. S. Graves; Sgt. R. E. Keel; Sgt. R. W. Keighley; Sgt. T. L. Letchford; Flt. Sgt. A. F. Murdoch; Sgt. L. Peckett; Sgt. R. W. Price; Sgt. J. T. Sanderson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. W. A. Baker; Flt. Sgt. J. F. Clements; Sgt. E. R. Cocker; F/O. E. L. Germain; Sgt. D. C. Kibble.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. D. G. Adams; Sgt. F. T. H. Adams; Sgt. L. S. J. Adkin; P/O. J. M. Alexander; Sgt. P. Amies; Sgt. W. A. M. Anderson; Flt. Lt. D. J. Bacon; Sgt. C. R. Bailey; Sgt. E. Balaam; Flt. Lt. R. R. S. Ballantyne, D.F.M.; Sgt. E. G. Beacham; F/O. B. A. W. Beer, D.F.C.; Sgt. L. Bowes; Flt. Lt. G. K. Boyd, D.F.C.; P/O. H. D. Broad; Flt. Sgt. C. H. Cannon; Sgt. G. H. Carpenter; Flt. Sgt. S. E. W. Cass; Sgt. C. C. Cassy; Sgt. L.