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and
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The Outlook

In Germany To-day

THE account given on another page in this issue of a tour of Germany by Mr. Geoffrey Smith, Managing Editor of *Flight*, will let in a flood of light on the speculations which have been occupying the minds of many good folk in this country. To the man and woman in the street of the towns of the home counties the V weapons came as an unpleasant shock. They had endured the original "blitz" of 1940-41, which followed the Battle of Britain, the "Baedeker raids," the hit-and-run attacks on south coast towns, and the smaller blitz of February, 1944. When that died away, the people of southern England felt that they deserved a bit of a rest from overhead inflictions—but then came the flying bombs, followed by the rocket projectiles, of which a specimen standing in Trafalgar Square arouses something like awe. The British naturally began to wonder if German scientists had any further horrors in store for them. Fortunately, the invasion of Normandy and the over-running of the Pas de Calais saved them from any more harrowing experiences.

Still, the desire for more knowledge remained. The Army and Air Force of Occupation soon began to find out the facts, and passed them on to the scientists of the Government; but the people in general learnt little. The article which we publish in this issue supplies a great deal of information, as well as giving a vivid picture of the state of Germany in its present condition of collapse.

In radar and in some other lines British scientists were comfortably ahead of the Germans; but in various other ways the Germans were well advanced in really devilish inventions. Their methods are being carefully studied and the results digested. In the years to come it will obviously be necessary to prevent German scientists

from making secret progress towards other inventions which might encourage some future Hitler to engage once more in the hazards of warlike aggression. In the meantime we may be profoundly thankful that the Allied invasion nipped so many projects in the bud.

A Single Fighting Service

IN his last message to Congress President Truman forecast the unification of the armed forces of the United States into a single Department of Defence. The minds of many fighting men have been running on those lines of late; but this statement of the President is the first time that the theory has been put into words by the head of one of the great States.

A Department of Defence does not necessarily mean only one Service. Great Britain had a Minister of Defence (Mr. Churchill) all through the recent wars, with great advantage; but the three Services remained separate under their own Chiefs of Staff, wore their own distinctive uniforms, and generally managed their own affairs in such matters as pay, promotion, and discipline.

Whatever happens at the top, there must always be specialists in fighting on sea, land, and in the air. One could never contemplate transferring an officer from command of a heavy bomber to command of a destroyer or a tank. It is equally certain that in the British forces the historic uniforms must remain. Though the traditional scarlet has gone from the Army, except from bands and from the Guards in peacetime, one cannot imagine naval ratings dispensing with their bell-bottomed trousers, or airmen feeling happy in anything but the grey-blue which is supposed to suggest the colour of the sky. Pride in uniform has a great influence in swelling the moral of any fighting force.

Some idea of how unification of all three Services might work can be gained by examining the age-long

organisation of the British Army. Before 1914 it consisted of foot, horse, artillery, engineers, and various ancillary corps. These branches were all specialists, and each wore a distinctive uniform. Gunnery was a recóndite mystery to the ordinary infantryman, and so on. Yet every officer had to understand the part played in a battle by all the various arms ; and when he reached the stage of being a General Officer he had to be competent to command a force of all arms, whatever his own branch may have been. Thus, Lord Roberts was a horse-gunner, Kitchener a sapper, and Allenby a cavalry officer, while Alexander and Montgomery both came from the infantry.

So it might be with the higher command in the future. The recent wars have produced the Supreme Commander with strategic authority over all Services. In the future every commander will have to understand the role of air power.

Of course, there is the possibility that the atomic bomb may dominate all future warfare, and upset all our present ideas. But that is not a certainty, and an antidote may be found. Working on the basis of past experience, there is much in President Truman's expectation which deserves careful study.

The Future American Navy

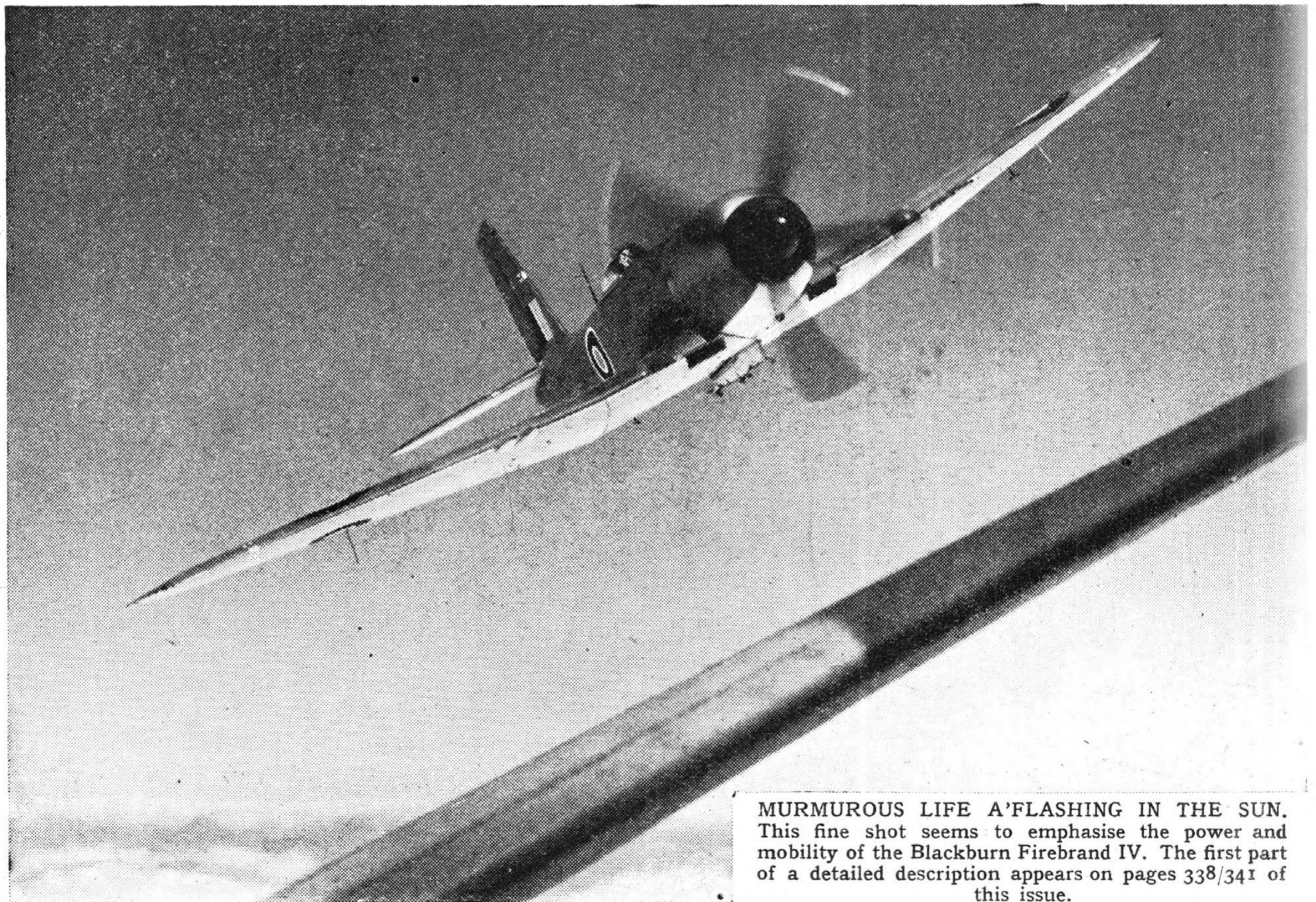
MR. FORRESTAL, Secretary of the United States Navy, has expressed the view that the atomic bomb does not call for the scrapping of the Navy. He recommended a substantial peacetime fleet, with command of the air over it, because control of the ocean is the key to American security. He recommended an active fleet of 300 major warships, with another 800 in reserve. This fleet would include 11 battleships, 15 aircraft carriers, 21 escort carriers, as well as

CONTENTS	
The Outlook	327
Atlantic Achievement	329
"Lily," The Floating Airstrip	330
Here and There	331
In Germany To-day—Part I	333
Blackburn Firebrand IV	338
De Havilland History	342
Civil Aviation News	349
Correspondence	351
Service Aviation	352

cruisers, submarines, etc. The Navy should have at least 8,000 aircraft.

This allocation reflects the lessons which the United States have learnt from the recent wars. Obviously aircraft carriers must be provided in large numbers. They have proved their worth—in fact, their indispensability. A certain school of naval thought may doubt the necessity for such a large number of battleships, pointing out that that class of warship did not play an important part in the defeat of Japan. To this Mr. Forrestal may reply that the Japanese in the late war did not show any capacity for using battleships; but that it would be unsafe to conclude that a future antagonist would be equally inept. Admiral Halsey, for one, has stated his belief in the utility of the battleship.

The loss of H.M.S. *Prince of Wales* has shown that a battleship which has no fighter cover can be sunk by torpedoes from the air; but if a fleet has superior or approximately equal air power the action may well be decided by the guns of the heavily armoured surface vessels, and it would be very rash of the United States if it neglected that possibility.



MURMUROUS LIFE A'FLASHING IN THE SUN. This fine shot seems to emphasise the power and mobility of the Blackburn Firebrand IV. The first part of a detailed description appears on pages 338/341 of this issue.

Atlantic Achievement

Return Ferry's Fourth Anniversary : The Senior Trans-Ocean Service Operated by the British Overseas Airways Corporation

WHEN in years to come the historian looks for record milestones in man's efforts to fly the Atlantic, he will discern two clearly marked phases in this development; the first phase, the heroic endeavour of brave individuals to traverse the vast expanse of the ocean, and the second phase that of planned operations based on team work.

This second phase began on September 24th, 1941, for it marked the start of the Return Ferry Service operated by the B.O.A.C. between the United Kingdom and Canada—the first service ever to fly the Atlantic in the winter and for two winters the only service venturing across the North Atlantic.

The story of the North Atlantic Return Ferry really began in August, 1940, when the Ministry of Aircraft Production decided to establish an organisation for ferrying American military aircraft from Canada to the United Kingdom. Colonel Burchall, formerly an Assistant Director-General of British Overseas Airways, and Captains A. S. Wilcockson, D. C. T. Bennett, I. G. Ross and Humphrey Page, who had been seconded by British Overseas Airways, went over to Canada, to assist in the setting up of this ferry service.

There were no aircraft, no mechanics, no radio officers and, except for the three British Overseas Airways captains (Wilcockson, Bennett and Page), no pilots. They had the use of a small airfield near Montreal, and invaluable assistance was rendered by many Canadian business men and others.

After some preliminary work in Canada, they went to the airfield at Hattie's Camp, Newfoundland, to begin the work of building up their organisation from scratch. Here they had no hangars, and the only available accommodation in the bitter Newfoundland winter, was three old railway coaches. They searched the highways and by-ways of Canada and the United States for pilots who, as they arrived, were put into training.

The Beginning

By the time the first 21 American bombers to be delivered to Britain were ready for despatch, a large number of B.O.A.C. personnel had arrived, including several experienced captains.

But as the Atlantic had never before been flown in winter, and only a small number of operational flights had been made at any time, wireless and meteorological data were scanty and there had been no practical knowledge of actual conditions to be encountered in winter operations.

It was therefore largely a venture into the unknown when 21 aircraft were drawn up on the airfield at Hattie's Camp to fly to England. There were, moreover, few airline captains available who had the skill and experience to make it reasonably sure that they would be able to bring their aircraft safely across.

The 21 aircraft were divided therefore into three groups of seven, each to be led by an experienced captain. These captains were D. C. T. Bennett (now Air Vice-Marshal Bennett, C.B.E., D.S.O.), who planned the operation, Capt. Humphrey Page (since killed on service) and Capt. Gordon Store.

For this first flight, instead of the usual "flight plan" prepared by each individual captain, the principle adopted was that the three experienced captains would make out their "master" flight plans, which would be given to the others in the formation with instructions that, if they were to lose contact with their leader, they should adhere to these master flight plans, which should bring them to their destination. The journey was divided into five zones, and the formation pilots were told the courses to steer, speeds

and heights at which they were to fly, and the various engine control settings, and so on. The flight plans on this occasion also gave a great deal of additional directions, in that the same particulars were worked out for a large number of different heights, so that, if they were unable to fly at the prescribed heights, the pilots had only to run their fingers along a number of columns to find out the necessary courses, engine control settings, etc.

Then the three flights took off. What had been foreseen as probable did actually happen. Most of the followers soon lost their leaders in the murk and cloud over the Atlantic. Nevertheless, the skill and experience of the three leaders, embodied in these flight plans, enabled all the aircraft, except one which had to turn back, to arrive safely at their destinations within 20 minutes or half an hour of each other.

Two-way Service

Before long 50 aircraft had been flown across the Atlantic, a triumph for the skill, long experience and careful planning by the small group of British Overseas Airways captains and operations staffs who had laid down the first organisation and worked out the operational details.

Next, a much more difficult question had to be tackled. Since weeks would be lost if the ferry pilots had to return by sea, it was necessary to organise a two-way Atlantic service which would function winter and summer. Many experienced operators on both sides of the Atlantic pointing out the many difficulties on the east-to-west route, such as the average 50-miles-an-hour head winds, regarded the idea with great scepticism. Yet the next task was tackled and successfully accomplished by the B.O.A.C. captains and operational staffs.

Six Liberator bombers were converted in the summer of 1941 for the purpose of maintaining this two-way Atlantic service. These aircraft had not been designed for North Atlantic service, especially in winter, and a large number of alterations had to be carried out, particularly to the engines. Carburettor heating had to be installed before delivery of the aircraft to enable the engines to function satisfactorily in temperatures of 40 degrees below zero Centigrade, which, from the experiences of the previous winter, it was known would be constantly encountered. Alcohol sprays were fitted for clearing ice from the carburettors. Shutters were fitted to the oil coolers, and cabin heating was devised with double windscreen panels to avoid icing in the cockpit. This latter problem was satisfactorily solved, but it was only some six months ago that the last aircraft was so equipped.

Having made these preparations, the aircraft were put into service, and the British Overseas Airways captains began to make the first east-to-west air crossings of the Atlantic in history. Despite the pessimistic prophecies, the service went on through the winter, and was increased until, in June, 1942, 29 flights were made. It was clear that, if required, a daily double service across the Atlantic was practicable.

In September, 1941, owing to the great increase in the Atlantic ferrying, the two-way service was separated from the "military" one-way ferrying (the R.A.F. Ferry Command), and was made the responsibility of the British Overseas Airways Corporation, which has operated it ever since.

Conditions now are very different from those with which the pioneers had to contend in 1940. The formerly primitive airfield in Newfoundland became a small city of bungalows, cafés and canteens. Whereas the first pioneers had to keep their machines, service and maintain them in open in temperatures far below zero, and often had to

ATLANTIC ACHIEVEMENT

dig them out of the snow, heated hangars have been installed.

The hazards and adventures of the early days of taming the Atlantic are now things of the past. Eleven British services are now operated each week across the Atlantic. From east to west the length of the Return Ferry flight, United Kingdom-Montreal (3,139 miles), is generally about 17 hours, and 13 hours in the reverse direction.

Week in, week out the aircraft run with clockwork efficiency. *Flight* had the privilege last week of getting a glimpse of this smooth efficiency and quiet confidence when, at the invitation of the B.O.A.C., a party gathered at Prestwick to celebrate the fourth anniversary of the Return Ferry. These services are truly a combined operation; to Scottish aviation goes the credit of looking after the maintenance side at the Prestwick end of the operations, and it speaks well for their efforts that all six of the original Liberators are still in service.

Altogether, the twelve Liberators used on the Return Ferry Service are in themselves an achievement in the art of conversion based on tests and accumulated experience. They carry 16 passengers and a crew of five, and have

been greatly modified to increase safety and comfort.

Practically every member of the 15 aircrews has flown at least 100 times across the Atlantic. The latest figures of Atlantic crossings completed by the top-scoring pilots and other aircrew are: Capt. L. V. Messenger 136, Capt. S. W. A. Scott 132, Capt. W. L. Stewart 135, Capt. J. Pentland 111, First Officer R. C. Bullock 76, Navigating Officer H. L. Staples 126, Radio Officer D. N. Rennie 134, and Flight Engineer E. D. Gilbertson 114.

With the team work of such crews, the results of four years during which the B.O.A.C. operated this senior Atlantic service for the Air Ministry are impressive: a total of 1,750 transatlantic crossings has been made, and 20,000 priority passengers, 1,352,791 lb. of freight and 2,300,000 lb. of mail have been carried across the Atlantic.

But figures alone do not adequately express the achievement of this service. Inter-continental air transport now passes over from haphazard, seasonal "flights when possible" to scheduled and planned operations. The practical value of telescoping time and distance by air transport depends on such uninterrupted time-table operations. The Return Ferry service has the unique distinction of being the only two-way service to have regularly operated through four winters and summers across the North Atlantic and of thus opening up the world's most important traffic lane to all-year-round safe commercial air transport.

"Lily," The Floating Airstrip

Invention Based on Increased Surface Tension of Water

BRITISH scientists have found a way to build a mid-Atlantic airstrip or a floating cross-channel bridge. This latest discovery in engineering-on-water began when an inventor's brainwave sent him motor cycling along a tarpaulin stretched over a river ford, and the principle has been sponsored and developed by the Royal Navy.

Ordinary surface-tension will support a needle on the water's surface. By putting a flexible synthetic surface on the sea, and by increasing the tension about 400,000 times, it has been found possible to support heavy lorries and aircraft in mid-ocean. One practical result of the discovery is the production of man-made "islands" composed of hundreds of hexagonal buoyancy cans—"islands" which can be built to any shape or length required, and which can be easily dismantled, transported and reassembled. Known as "Lily" because the pattern resembles a carpet of lily leaves on a pond, the immediate application is that of the floating airstrip.

Another, which has already stood up to the severe practical tests of war, is the "Swiss roll," a floating pier that can be rolled up, carried on board ship and later rolled out again from ship to shore. This pier is nearly twenty times as light as a Bailey bridge of equal length, yet it will carry a 9-ton lorry.

Inventor of these new devices is Mr. R. M. Hamilton, of Victoria Street, London, S.W., who served at the beginning of war as a Petty Officer in the Royal Naval Patrol Service. He is an inventor by profession. Co-operating on the involved mathematical calculations required was Mr. J. S. Herbert, housemaster at Eton College.

"Further developments from the original discovery are being made," Mr. Hamilton said, "but for the time being their nature must remain secret."

The Navy's latest experiments, only recently concluded, have been with a further development of the same fundamental principle, the "Lily" floating airstrip.

"Lily" is a very different proposition from "Swiss roll." It consists of numbers of buoyancy cans with hexagonal surfaces, so linked together that they "give" in a controlled manner to the motion of the sea from any direction, yet remain sufficiently rigid to take the weight of a heavy aircraft. Whereas in "Swiss roll" tension is applied externally, "Lily's" hexagonal surfaces, when linked together, create their own tension.

The Navy's experimental airstrip shown in the picture is the smallest on which practical tests could be undertaken, 520ft. long and 60ft. across. On this an aircraft, laden to 9,000lb., has been landed and has taken off again. A strip of this size can be assembled by 40 men in one hour. At present the cans are only 6ft. across and 30in. deep, but their size could be scaled-up.

The whole surface of "Lily" is flexible, so that it will not break up, but this flexibility is controlled by the use of underwater dampers. The inventor claims that, with the latest type dampers, more than 3 tons pressure is required to move the surface at all and that "Lily" will remain flat in waves up to 36ft. from crest to crest.

The dream of Atlantic seadromes has hitherto been unattainable because it has not been possible to build large enough storm-proof flat-surface structures.



"LILY": The Navy's experimental floating airstrip measuring 520ft. x 60ft. is here seen undulating in the wash of a passing launch. A 9,000lb. aircraft has successfully used it.

HERE AND THERE

End of a Warrior

IT has been disclosed that *Dauntless Dottie*, the first B-29 to bomb Tokyo, crashed into the sea near Kwajalein last June. Ten officers and men were killed and three survived.

Dottie had dropped 180 tons of bombs on Japan in 44 missions.

A.T.A. Pageant

EVEN if the weather should be unkind on Saturday afternoon, it will not seriously affect visitors to the Pageant and Exhibition being staged by the Air Transport Auxiliary at White Waltham airfield because almost everything will be under cover. An augmented bus service will be run from Maidenhead.

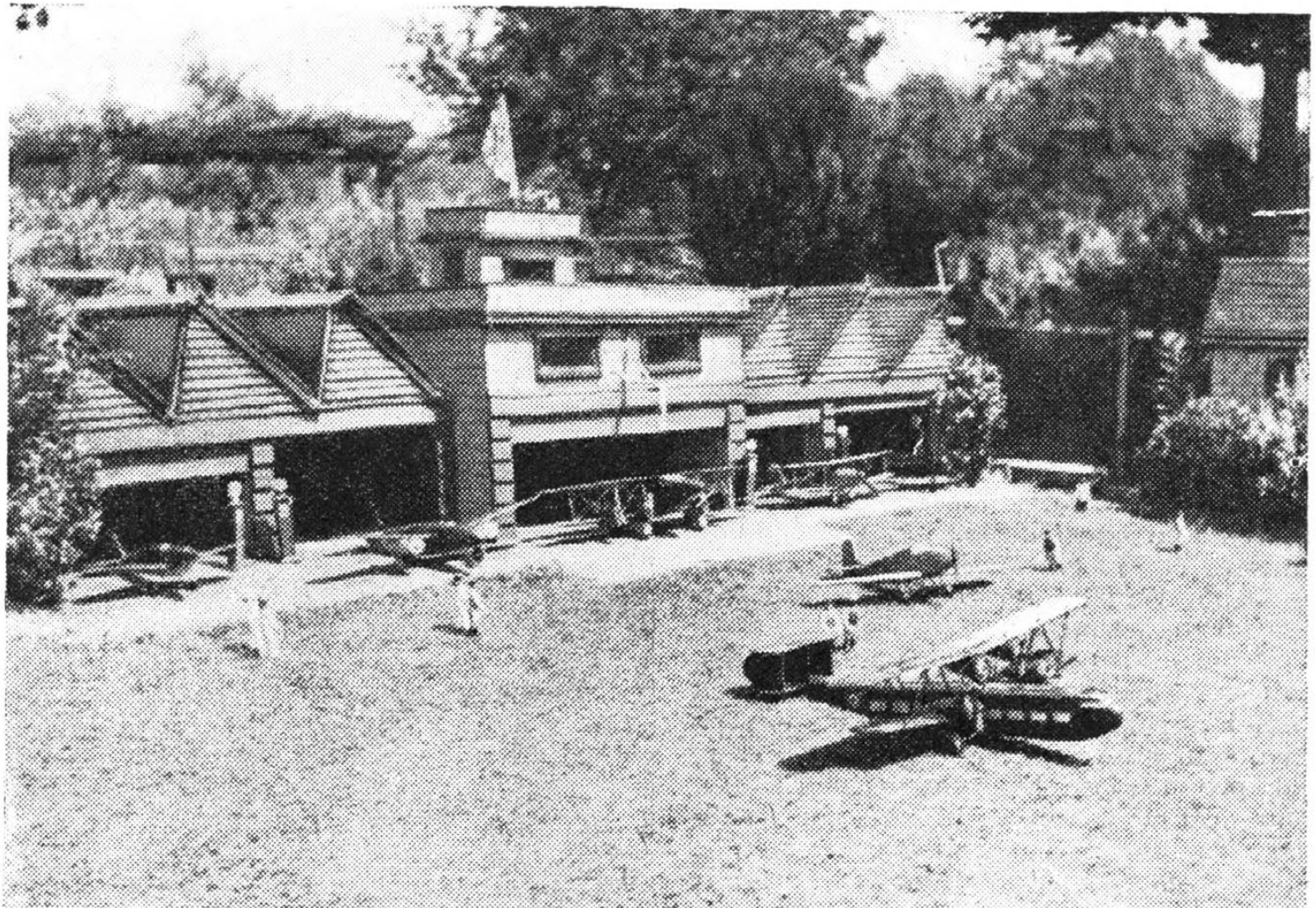
Besides the wide range of R.A.F. and German aircraft, modern civil types, and numerous other exhibits, there will also be a Fun Fair and various stalls.

Proceeds are in aid of the A.T.A. Benevolent Fund.

Atomic Announcement

"HALF a dozen atomic bombs would make hostile entry into a continent an impossibility," said Air Chief Marshal Sir Arthur Harris in a recent interview at Capetown, according to a Reuter message.

Adding that this ultra-modern missile had changed the rôle of the Navy entirely, Sir Arthur then said (Reuter reports), "Even the war which has just



VILLAGE AIRPORT: Probably the only village in England to have its own airfield is the model village known as Bekonscot, which covers some 1,100 sq. yds. and has raised over £8,500 for charity. It is at Beaconsfield, Bucks, and its little airport has been called Hanton.

ended has shown that the battleship is fast becoming out of date. In sea battles they did little more than get sunk."

One can well imagine the "cosmic" effect of this devastating observation in high Naval circles!

Ill Winds

THREE B-29 Superfortresses which last week attempted to fly from Japan to Washington non-stop were all forced to land at Chicago, 600 miles short of their objective, through shortage of fuel.

Lt. Gen. Barney M. Giles, deputy commander of the U.S. Pacific Air Forces, who was in charge of the attempt, told newspapermen at Washington that they encountered strong headwinds practically

all the way, and described the flying conditions as "weather you wouldn't hit once in 50 times."

Globe Trotter

MR. W. S. (Horace) Shackleton is shortly leaving this country for an eight weeks' trip to Canada, U.S.A. and Mexico. He is to study passenger and freight aircraft operation in those countries.

During his absence from his London office the firm's business will be conducted by his co-director and partner, Sqn. Ldr. J. H. C. Beard, who has recently been released from the R.A.F.

Parting Guests

A FAREWELL luncheon to His Excellency Senhor Selgado Filho, the Brazilian Air Minister, was given by the Air Council at the Dorchester Hotel last week. The Secretary of State for Air, Viscount Stansgate, presided.

Those present included His Excellency The Brazilian Ambassador, Brigadier V. Alves Secco, Colonel C. Montenegro Filho, and other members of the Air Minister's party; Senhor H. G. De Oliveira Gondim, Colonel Hecksher, Lord Winstler, Sir Alexander Cadogan, Air Marshal Sir Leslie Hollinghurst, Air Marshal Sir Roderic Hill, Air Marshal Sir Douglas Evill, Air Marshal Sir Ralph Sorley, Sir Arthur Street, Sir Harold Howitt and Colonel Sir Eric Crankshaw.

A Fine Record

FIGHTER COMMAND Communications Squadron can be justly proud of the record of safety it has achieved, for since the beginning of 1944 it has flown more than 2,500,000 miles without a single casualty to its pilots or passengers. This was commented upon when Air Marshal Sir James Robb, C.-in-C. Fighter Command R.A.F., presented an official address to the squadron at Northolt last week.

During the past few months the squadron's passengers have included Mr. Churchill, Gen. Eisenhower, Field Mar-



YOUTHFUL ENTHUSIASM would appear to constitute something of a threat to this Spitfire. The picture was taken at Ringway on "Battle of Britain" Saturday.

HERE AND THERE

shal Alexander, Mr. Anthony Eden, Lord Gort, the Russian Ambassador, and Prince Bernhardt of the Netherlands.

On one occasion a Mosquito of the squadron can even be credited with saving life, for whilst on a night flight it destroyed a flying bomb.

Research in Australia

AUSTRALIA may become an important laboratory for aeronautical research and construction, in the opinion of Mr. N. J. O. Makin, the Commonwealth's Minister for the Navy and Aircraft Production.

"Our climatic conditions and long distances," he recently said, "provide a better opportunity for important experiments in aircraft design, particularly in jet propulsion, than exists in Britain. Our natural resources include the necessary iron and coal as well as other metals, and uranium, needed for the atomic bomb, exists in South Australia."

For these reasons he believed that there would probably be a large-scale transfer of important secondary industries to Australia.

A MAINTENANCE command has been established by the Royal Canadian Air Force at Ottawa for the procurement of all R.C.A.F. supplies, inspection, distribution, installation and salvage of all equipment, and disposal of surplus war equipment.

Practically all aircraft contracts have been cancelled at Canadian aircraft factories, and by early winter most wartime employees of the plants will have been laid off, according to a recent report from Toronto.

When King Haakon of Norway attended the R.A.F. exhibition in Oslo last week he was met by Air Vice-Marshal Boret, A.O.C., R.A.F. in Norway, who later entertained His Majesty to lunch. A guard of honour was provided by the R.A.F. Regiment.

The M.A.P. has agreed to the use of the following statement by Taylorcraft Aeroplanes (England), Ltd.: "Taylorcraft is the only British company which has supplied A.O.P. aircraft in quantities for British Army use."

A post-war model of the American Aeronca light aircraft is to be produced in Australia in two-, three- and four-seater versions. It is a low-wing cabin monoplane with retractable undercarriage and will sell at less than £1,000.

The Association for Scientific Photography will hear a paper by Mr. R. Peel on "Recording Engineering and Other Work by Stereoscopic Photography" at the Alliance Hall, Westminster, S.W.1, to-night, and a paper on "The Organisation of an Industrial Photographic Unit" by Mr. C. W. Bradley,



FIGHTER-TRAINER: A two-seater version of the Mustang, designated the TP-51, has recently been introduced for advanced training of fighter pilots. This cockpit close-up shows the modification to be a neat one.

News in Brief

of the British Cotton Industry Research Association, on Thursday, October 25th. Both meetings are at 6.30 p.m.

When bells cast by fighter pilots were sold by auction at the launching of the Victory Bell Appeal (mentioned in last week's issue of *Flight*) one autographed by Marshal of the R.A.F. Sir Arthur Tedder fetched the magnificent sum of £1,000. Altogether, £3,500 was raised for the R.A.F. Benevolent Fund on this occasion.

Flt. Lt. W. E. Bowden, of Derby, who is believed to have been the first R.A.F. pilot to have been taken prisoner by the Japs, was last week reported to be safe and on his way home. He was shot down early on December 8th, 1941, the day after the attack on Pearl Harbour, when on a shipping strike with a Blenheim squadron off the Malay coast and was picked up by a Jap vessel after being in the water for 24 hours.



"The wind sock Joe—do you see what I see?"

The Mayor of Blackpool and members of the Town Council were recently given flights in a Miles Messenger and an Aerovan from Squires' Gate airport, after which the desirability of providing the corporation with an aircraft of its own for official journeys to and from London was discussed.

The Air Ministry has now informed volunteers for aircrew duties in the R.A.F. who were deferred after undergoing aptitude tests—some have been deferred for several years—that they will not now be wanted in the R.A.F. as aircrew, but can either be enlisted for ground duties or be transferred to the Royal Navy, the Royal Marines, or the Army.

Mr. Claude Winter, who joined D. Napier and Son, Ltd., in 1919 after serving as a pilot in the R.F.C. and R.A.F. from 1916, has recently retired on pension owing to ill health. During his long association with this firm as sales representative he visited practically every country in the world except Russia and South America, and during the 1939-45 war acted as security officer for Napier factories.

The Travel and Industrial Development Association of Great Britain and Ireland (generally called the Travel Association) which has been charged by the Government to go ahead with the planning of Britain's tourist campaign, has announced its new board of management with Lord Hacking as chairman. Its members represent varied spheres of activity from brewing to bathing, and among them is Mr. J. S. Brancker, who will watch the air transport side.



COLOGNE : A typical scene with people waiting for casual lifts.

PART I: *Factories and Communications Disrupted : Research Establishments Almost Intact : Some Projected Types*

By G. GEOFFREY SMITH, M.B.E.

NEITHER pictures nor descriptions can adequately convey the extent of the bomb and gun damage to German cities, industries and communications. Rail and water transport hardly exist. There is complete reliance on motor vehicles. No major attempt has yet been made to clean up the damage and the absolute dislocation must be seen to be believed. Desolation is complete, movement being impossible without official assistance. There are no telegram or telephone services, and hotels have been requisitioned. Such, briefly, is the impression formed during a recent officially sponsored flying trip to factories in the Ruhr, N.W. Germany and Austria, several research establishments, and a visit to the main centres of the British, American and French zones of occupation. Only uniformed men may move freely with suitable permits which entitle them to use Service messes and official billets.

The outlook is indeed grim for the German nation this winter, and hordes of Allied officials now stationed on the Continent have a stupendous task in restoring some order from chaos. Cities are dead, shops mostly closed and factories idle, but country life goes on, though tanks, cars, trucks and guns litter the roadsides. Bridges everywhere are down, rivers and canals blocked, railways

mostly unusable, the German Army in their hurried retreat having destroyed everything that might now have helped in their own salvation. Coal is the key to the whole position, yet absenteeism in the mines is as high as 25 per cent., the reason being that many workers, cowed and indifferent, take time off to collect food—mostly potatoes—from country districts. This is retribution with a vengeance!

In the Cologne and Essen region there are many pathetic scenes of old men and women and young children wandering with seeming aimlessness and struggling along under the weight of their few belongings. The trek to the Ruhr is increasing rapidly. Every wheeled vehicle from a perambulator to a horse cart is at a premium and loaded to the limit. So the

British authorities are granting high priority for renewed manufacture of handcarts.

Having flown in a Dakota to Brussels we journeyed by Humber army car to Herford, via Maastricht and the much devastated Ruhr Valley, and radiated to Bad Oeynhausen, Bückeberg, Bunde, Hanover and Brunswick to discuss conditions with administrative officers controlling the multifarious sections. The business of regional government of an occupied country in such dire straits as Germany is extremely complex to a

THE accompanying general impressions are of a recent flying trip to Germany and Austria, and appear in "Flight" and "The Autocar."

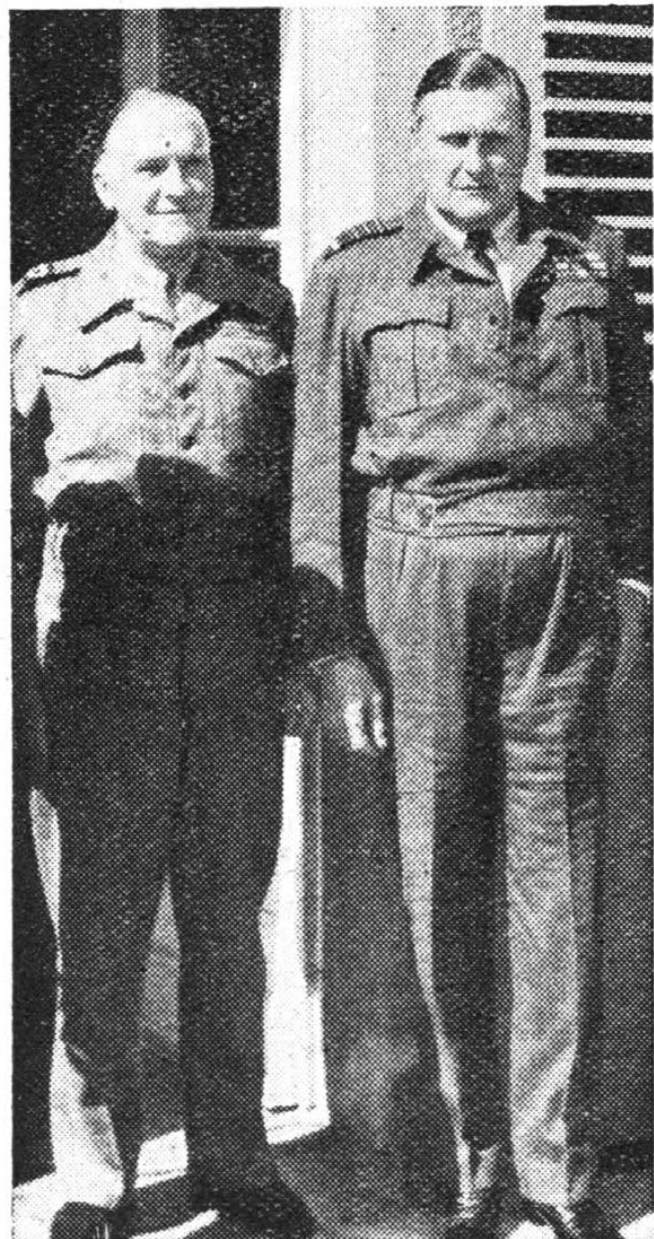
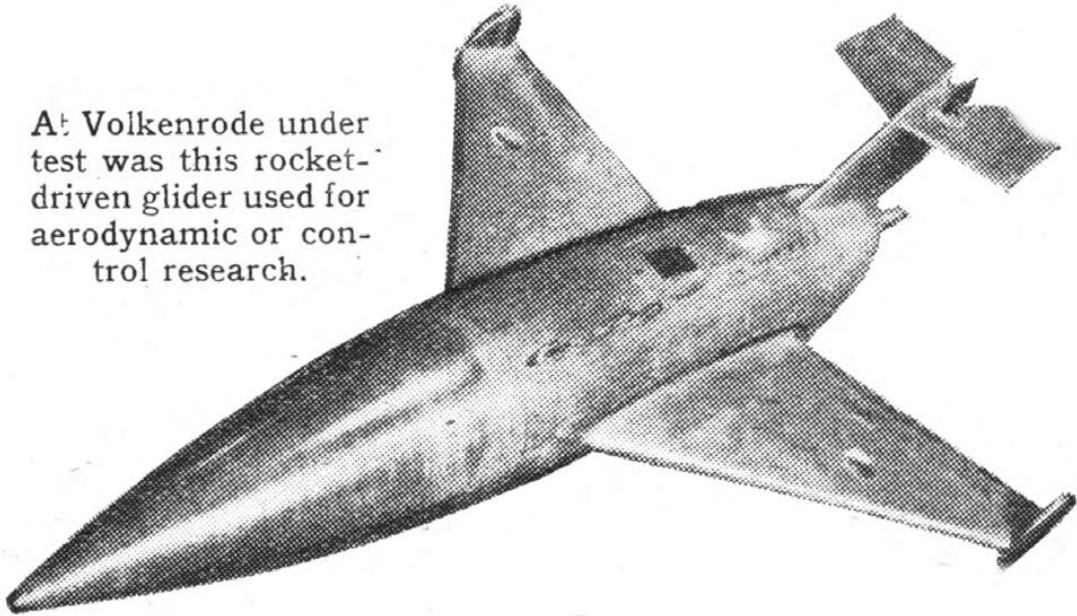
The author desires to extend his grateful thanks to the British and American Armies and Air Forces for their ready help in providing transport facilities by air and road, and for placing at his disposal many facts and figures.

 IN GERMANY TO-DAY

layman. Above all is the Allied Control Commission in Berlin. Apart from military control backed by the flying forces, there are departments—often duplicated and triplicated in different zones—to govern commerce, textiles, plastics, aircraft, shipbuilding, road transport, instruments, metallurgy, public utilities, oil, conversion and liquidation, and the all-important coal production and distribution. Personnel controllers have entirely different problems governing finance, displaced persons, prisoners, public utilities, legal matters, education, religion and similar services. It is Whitehall and government departments such as the Ministry of Supply over again. Only those intimate with the machinery of government can appreciate the complexity and all-embracing nature of the economic and general problems to be surmounted by B.A.O.R. (British Army of the Rhine). A minimum of three or four years will be needed to straighten out the chaos, and no real start can be made until inventories and records are complete and communications restored.

From officials of the Milgov (Military Government) I

At Volkenrode under test was this rocket-driven glider used for aerodynamic or control research.

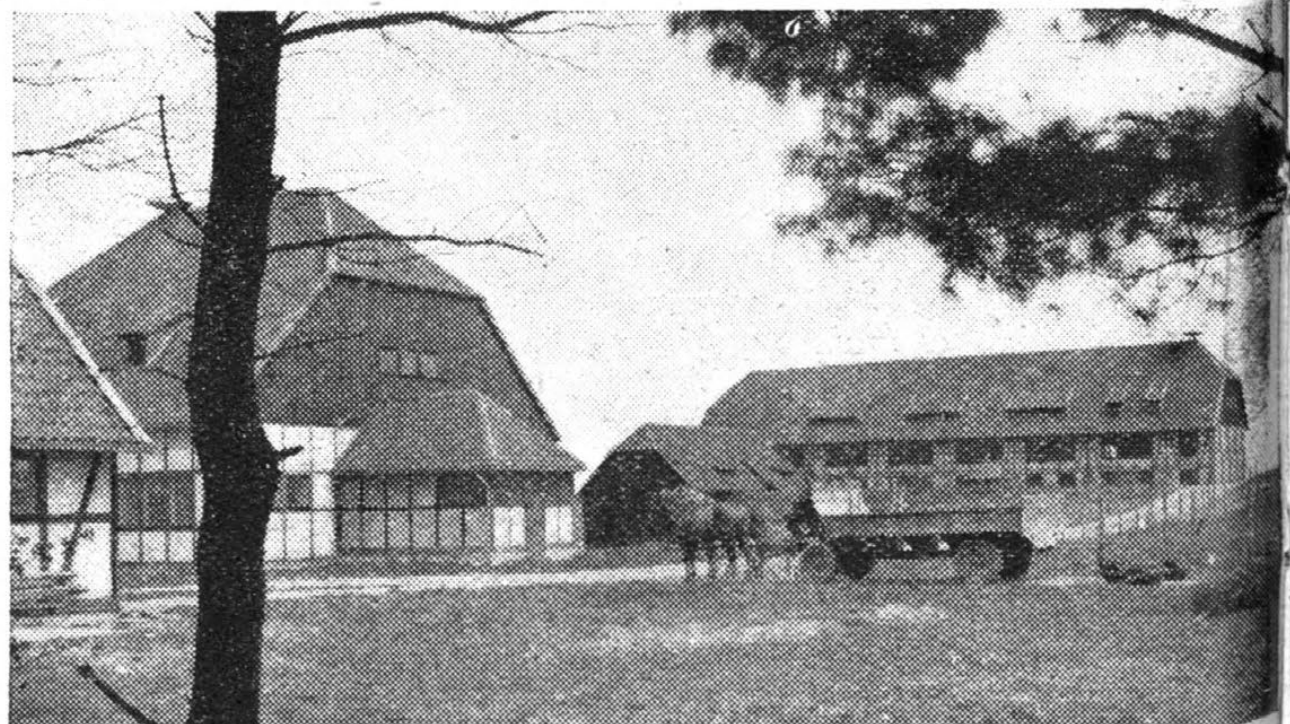
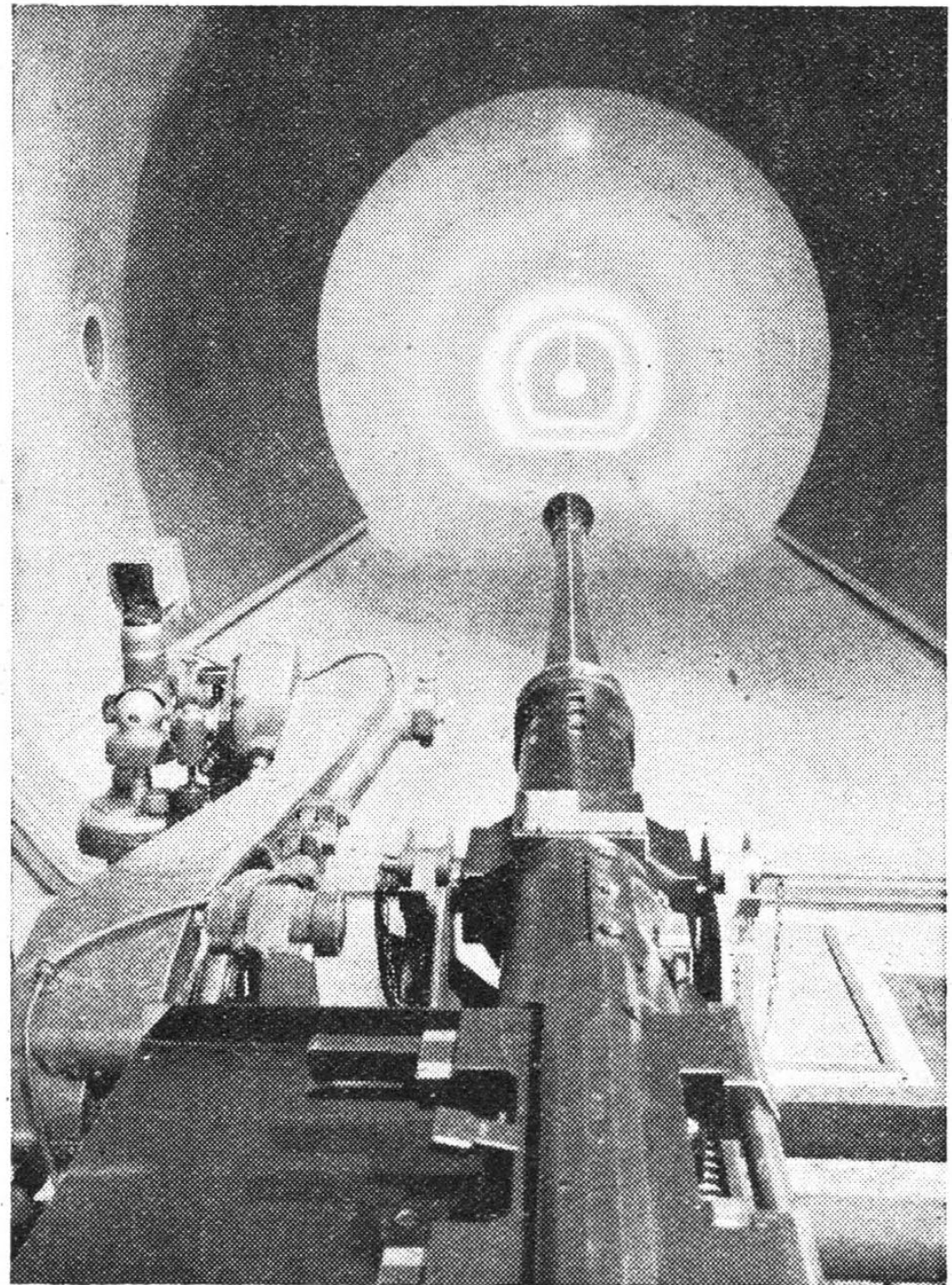


Right: (Top) A 37 mm. A.A. gun being fired in the 400-metre long underground tunnel. It is capable of being evacuated to 1/30th of an atmosphere (corresponding to an altitude of 30,000ft.). (Bottom) This "model farm" at Volkenrode is actually one end of the shooting tunnels in the weapons area. The buildings are capable of accommodating an aircraft.

(Left): Air Chief Marshal Sir Sholto Douglas at his German headquarters with the writer.

learned that there was no evidence of shortage of duralumin or aluminium sheet in Germany, and that several ball-bearing factories are still in operation. Tyre production is slow, and if stocks are low there is no real shortage of buna, though trouble is expected from a shortage of phosphoric acid used in its manufacture. Supplies of chemicals are good, but batteries are a bottleneck. Heavy transport is short to the tune of 25,000 vehicles. Many are being provided by cannibalisation from dumps, and five factories are now at work. Bicycles are scarce and at a premium, as indeed are all light vehicles on wheels. Every effort is now being made to assist Germans to work out their own salvation. Improvisation is the order of the day, and Germans are past masters in the art of *ersatz*. For example, I was told by a chemist, in passing, that from every 20 tons of sulphite pulp waste effluent from paper-making, the Germans produced seven tons of edible yeast!

Visiting Berlin by Avro-Anson, we approached by Potsdam and Spandau, alighting at the Gatow airfield





A glimpse of the devastated region of Hanover from the cockpit of an Avro-Anson.



Inside the gutted Reich Chancellery, the floors of which abound in rubble. Adjoining rooms suffered even worse damage.

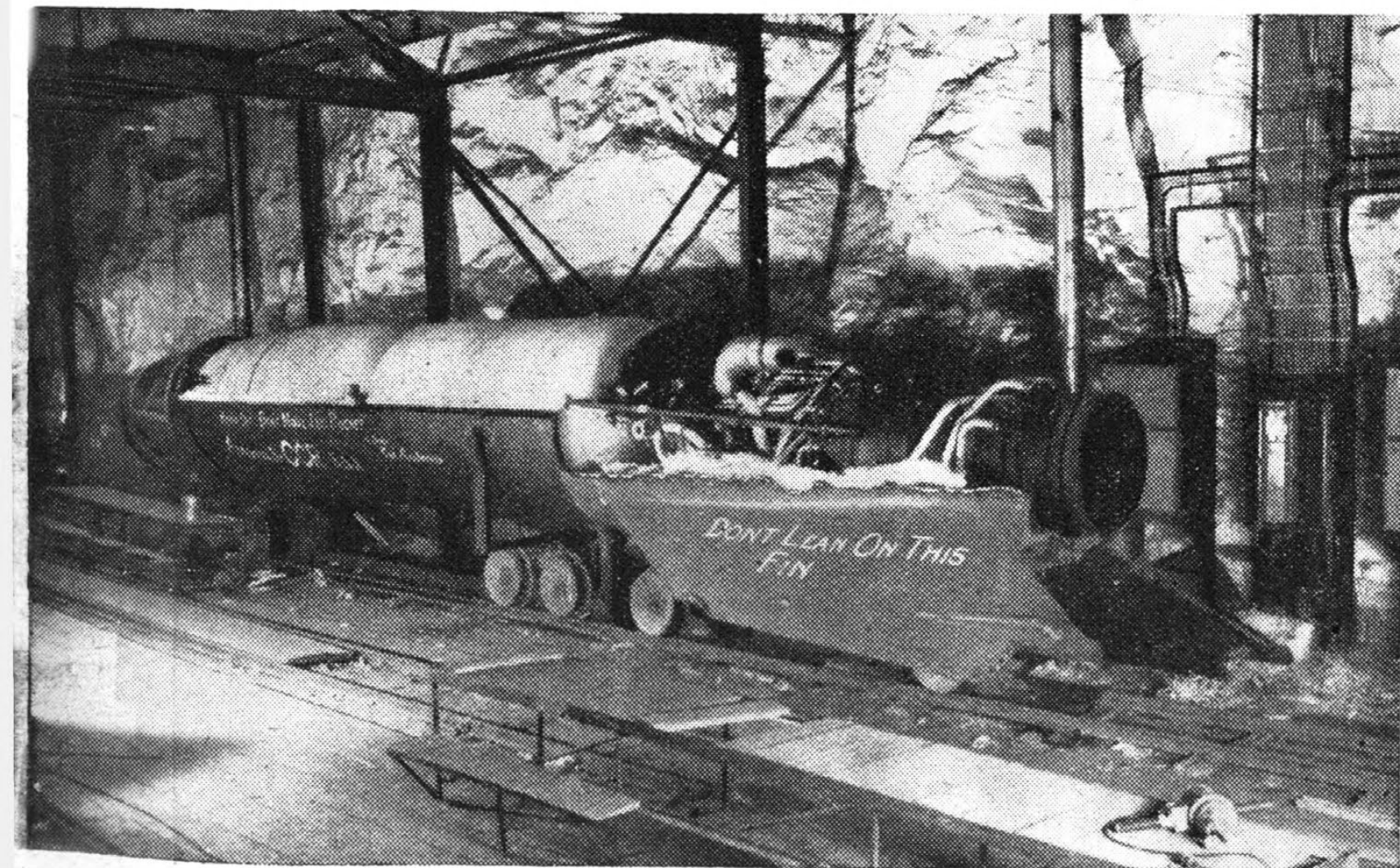
operated by the R.A.F. Devastation in this once proud capital is enormous. A curious stench pervades the atmosphere. We toured some of the main streets, including Charlottenburg, by Mercedes car, and, of course, visited the Chancellery, and noted that the débris remains untouched save by souvenir hunters. Live ammunition was scattered everywhere; the place is a shambles save for the outer walls. Floors, elegant paneling, tables and chairs were shattered. Russian soldiers—some mere boys with rifles slung on their backs—strutted around, and soldiers of every Allied nation were examining the general wreckage of the place. Outside in the Tiergarten exchange by barter was in full swing, Russians and Germans seeming to predominate. *En*

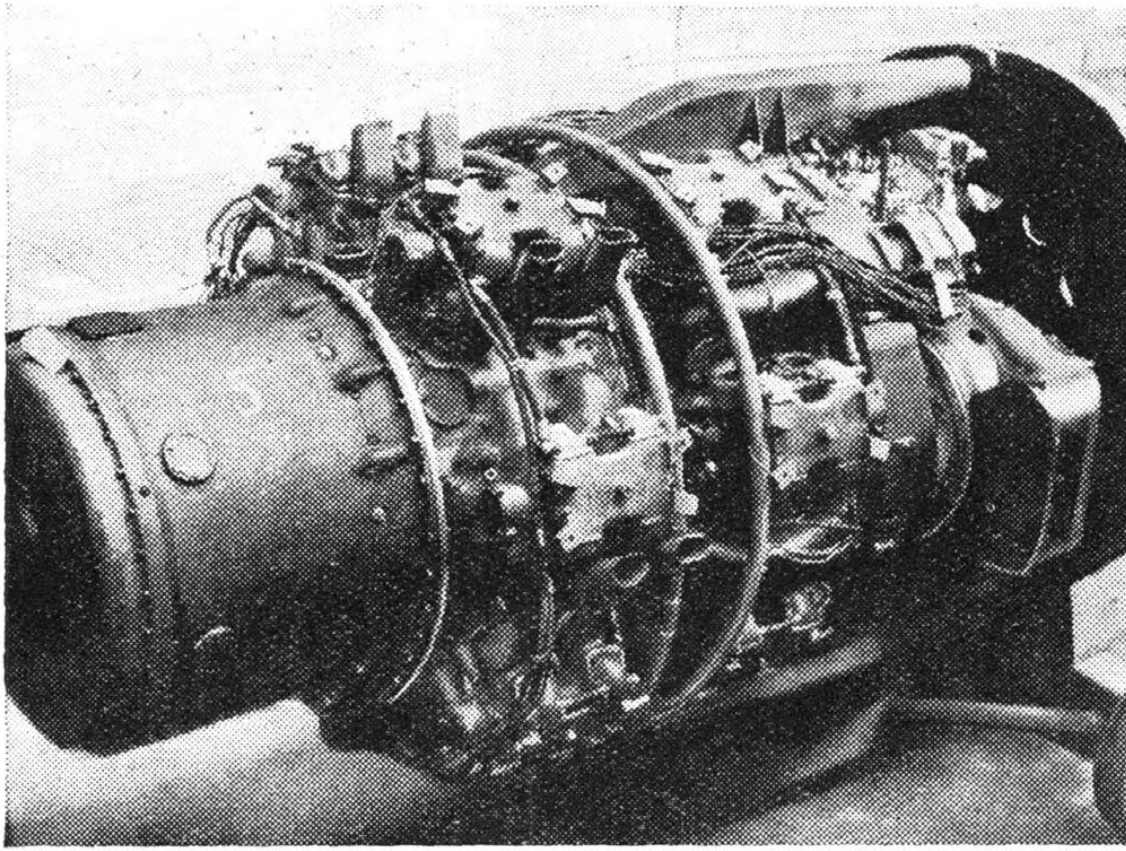
route we had noted bridges down in the canals and rivers, which effectually blocked barge traffic on which the Germans formerly relied so much. The Nazis' reckless work of destruction has enormously complicated the transfer of supplies to their own succour. The countryside, however, appeared well cultivated, yet strangely deserted. Few cattle were to be seen. From our lofty perch we could see that Hanover, Brunswick and Magdeburg have huge districts laid flat. Officers of the occupation forces openly admit that it will be a grim winter for the German people, with little food, no heating and lack of water and drainage. Typhus is common. The recollection of horror camps and many German atrocities during the war checked any tendency toward sympathy. Even so it is a sad sight to behold.

Research Stations Undamaged

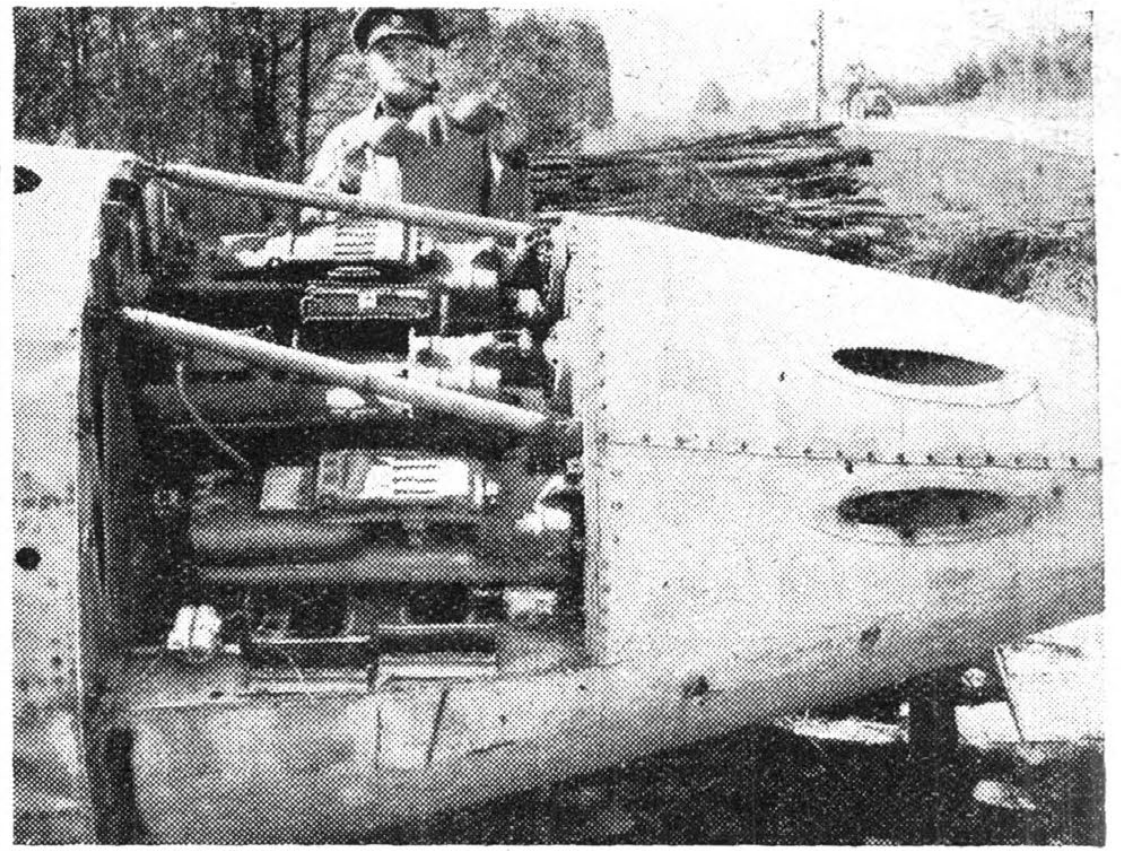
In the numerous centres visited, only a few factories of importance escaped heavy damage, and in most of the remainder no work is being done as yet. Curiously, the well-camouflaged research stations with their priceless scientific equipment are almost intact. This may prove an unmitigated blessing, since the equipment is on a most lavish scale and its value so high as to be impossible to assess. The *Luftfahrtforschung-anstalt*, or the Hermann Göring Institute, hidden in a forest at Volkenrode,

Inside the huge tunnel at Nordhausen, where V1 and V2 weapons were produced in quantity. A partially assembled V2 is seen in the foreground.





A B.M.W. 28-cylinder liquid cooled multi-bank radial engine—the 803. Fuel injectors are retained.



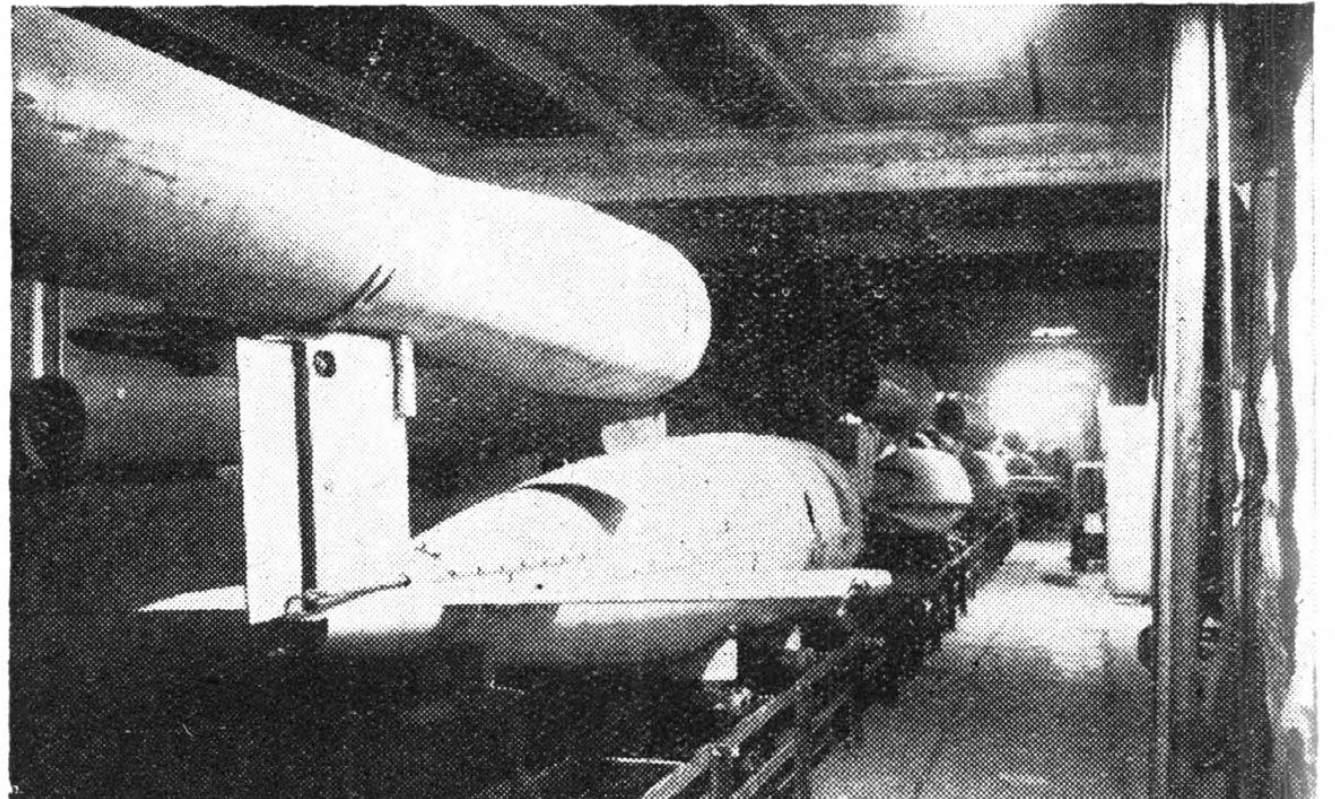
The nose of the M.E.262 jet-propelled plane, showing the housing of the four 30 mm. low-velocity high capacity cannon.

IN GERMANY TO-DAY

N.W. of Brunswick, for example, is estimated to have cost £50,000,000, and the annual grant was £1,000,000. Some 1,200 engineers were employed there during the war, but only a few technicians from Farnborough were working at the time of our visit. The wreckage of equipment planned by the Germans was foiled by officers of the Red Army, who were among the slave workers employed at the establishment. But much equipment has been looted. Only ten bicycles remain of the 250 allotted for official use. There are seven tunnels for investigation of aerodynamics and gas dynamics, as well as sub-sonic tunnels for the investigation of laminar flow aerofoils and of problems of rigidity and strength of materials, performance of aircraft engines, cowling and aerial weapons. Originally, there were four interferometers, or means of measuring interference on a model under ultra high speed conditions. Three remain, but the largest had been transferred by the American authorities during the month that the station was in the U.S. Zone.

Spark Photography of Bullets

One underground tunnel 400 metres long was used for work on ballistics. It has a diameter of 16ft. at the firing end and 24ft. at the butts. There was apparatus for the spark photography of bullets, and the velocity and drag of projectiles could be measured by electrical means. There is also a 100-metre shooting tunnel and a subsidiary 25 metres long used for the measurement of internal temperatures of gun barrels. The biggest calibre gun fired in the main tunnel was the 88 mm. The entrance to the shooting tunnels was via a model farm in a truly rural setting, and it served its purpose in avoiding bomb attacks. I saw a model of a rocket-driven glider used for aerodynamic and control research—the subject of one of the illustrations.



A line of V1 flying bombs in production inside the mile-long Nordhausen underground factory.

The V1 was developed at Volkenrode. Original models gave trouble; instability was cured in one of the tunnels and resonance corrected. The cowling of the B.M.W. 801 was another notable product of this establishment.

In Munich (U.S. Zone) adjoining the B.M.W. works a unique high-altitude engine test chamber, 3.8 metres in

A common roadside scene in Germany, where abandoned guns, tanks and cars litter the verges.



BLACKBURN FIREBRAND IV

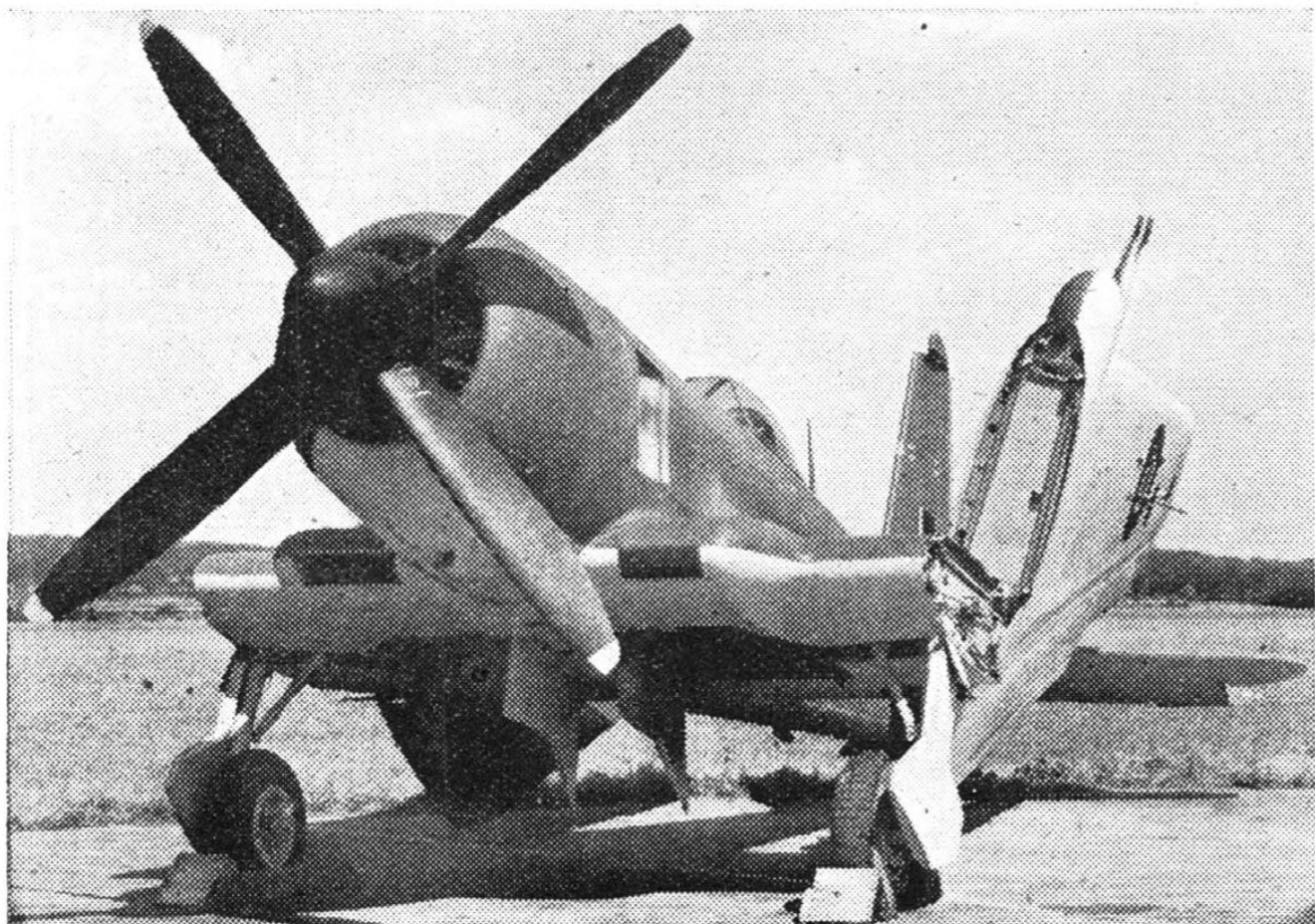
engine and pilot. The cockpit floor is mounted on top of the longerons, whilst extending beneath is a further braced tubular structure which supports the front catapult spools and encloses the auxiliary fuel tank.

High-tensile steel forged end-fittings are employed at engine-mounting pick-up points and also for the four-point attachment between front and rear fuselage structures. Skin plating on the front fuselage is largely composed of detachable panels as a means of providing ready access. The semi-monocoque rear fuselage comprises light channel frames notched for passage of the lipped channel stringers, the frames being each attached to four quadrantly disposed longerons of built-up box-section. Above the two upper longerons is a light decking over which the spine fairing of the fuselage is fitted as a separate sub-assembly; this is built as a light gauge skin on angle stringers over diaphragm formers.

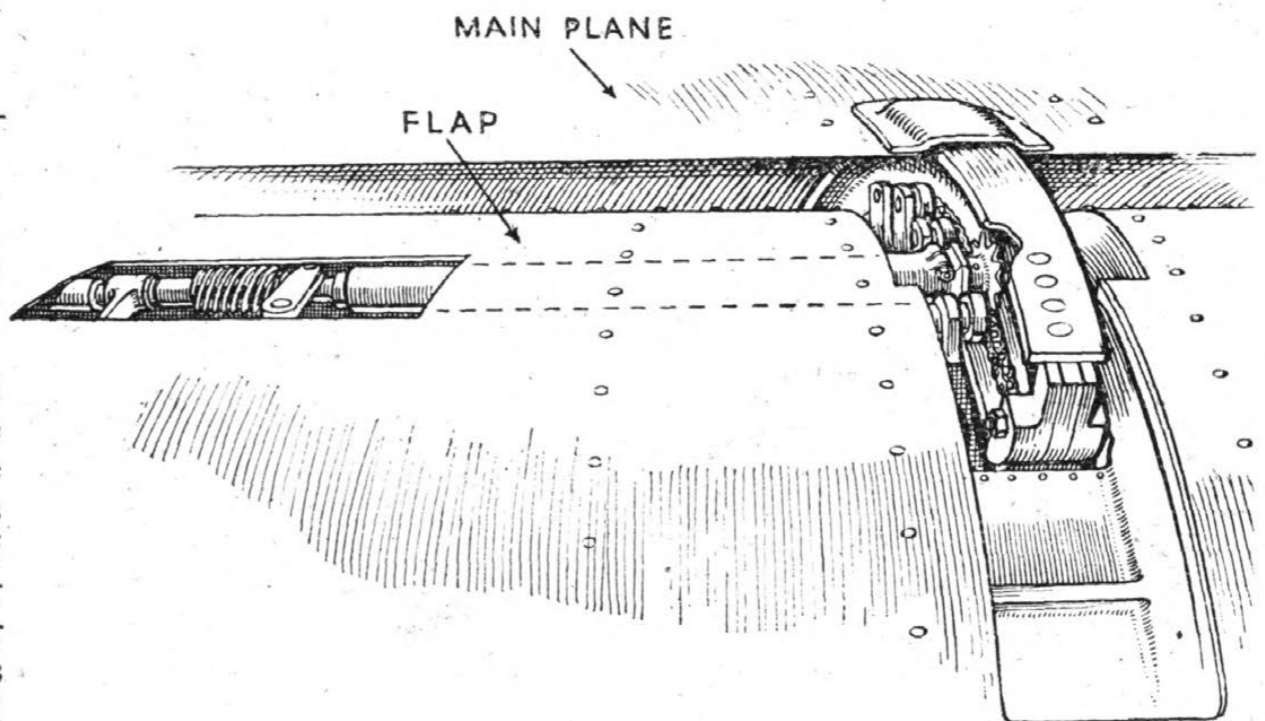
Immediately aft of the cockpit, the front bulkhead of the rear fuselage is a diaphragm stabilised with top-hat section vertical members fore and aft, the brackets for carrying the pilot's seat being fitted on the front face stiffeners. A double bulkhead frame in the rear end takes the tailwheel loads, the wheel strut being pivoted in two stamped brackets on the forward face of the bulkhead. Running aft of this is a double beam keel member which acts as a brace between the tailwheel location and the arrester hook anchorage.

Fin and Rudder

The large area fin is offset 3 deg. to port in order to compensate for the natural tendency of the machine to swing to starboard, and as a structure is skinned on diaphragm former ribs which themselves are carried on a single channel spar, or post, made up of extruded L-section booms with a plate web. Attachment is three-point; one at the heel of the leading edge and the other two at the base of the spar to fittings in the top of the tailwheel mounting frame. Rudder structure is simple and comprises diaphragm ribs on a light pressed channel spar to the base of which is attached a short torque tube. The rudder is primarily supported on the torque tube, which is housed in a bearing at its base, and is located with a good sized backset hinge immediately beneath the aerodynamic horn-balance at the rudder crown.



The wing-folding arrangement is very neat and reduces the overall width for stowage to that of the tailplane span.



To ensure harmonic movement each flap support rail has a chain in which mesh sprockets on each end of a connecting tube.

Tubular booms with plate webs each side make a form of box-spar for the tailplane, diaphragm ribs being attached directly to the spar webs. The leading edge nose skin is a separate piece riveted to light channel intercostals between chordal ribs. In lieu of a spar, a heavy "horseshoe"-section length of 12-gauge plate serves the elevator, the skin plating being riveted to its top and bottom. Forward of the "horseshoe" member the leading edge nosing is a single piece with a full-span brass casting mass-balance weight inside.

All control surfaces of the Firebrand are fitted with spring servo tabs which are of fairly large area in ratio to their parent surfaces, the loading given to the tabs in each case being by means of a linear spring-link incorporated in a toggle linkage.

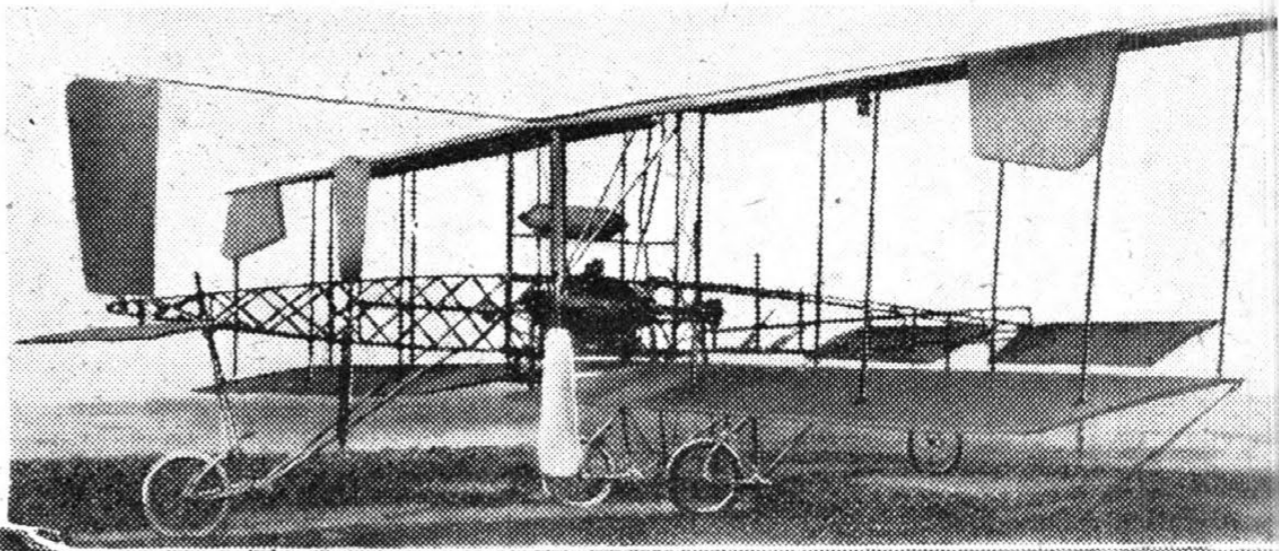
Mainplane

Going up forward we might now consider the main planes, starting with the centre-section. This structure is built up round front and rear spars, each of which is composed of hollow extruded booms joined on their front and rear faces with plate webs, in similar fashion to the tailplane spar. The two spars of the centre-section, however, are connected by diaphragm ribs and, on the fuselage centre line, a massive double frame takes the main load of the torpedo, the carriage for which is suspended from this frame.

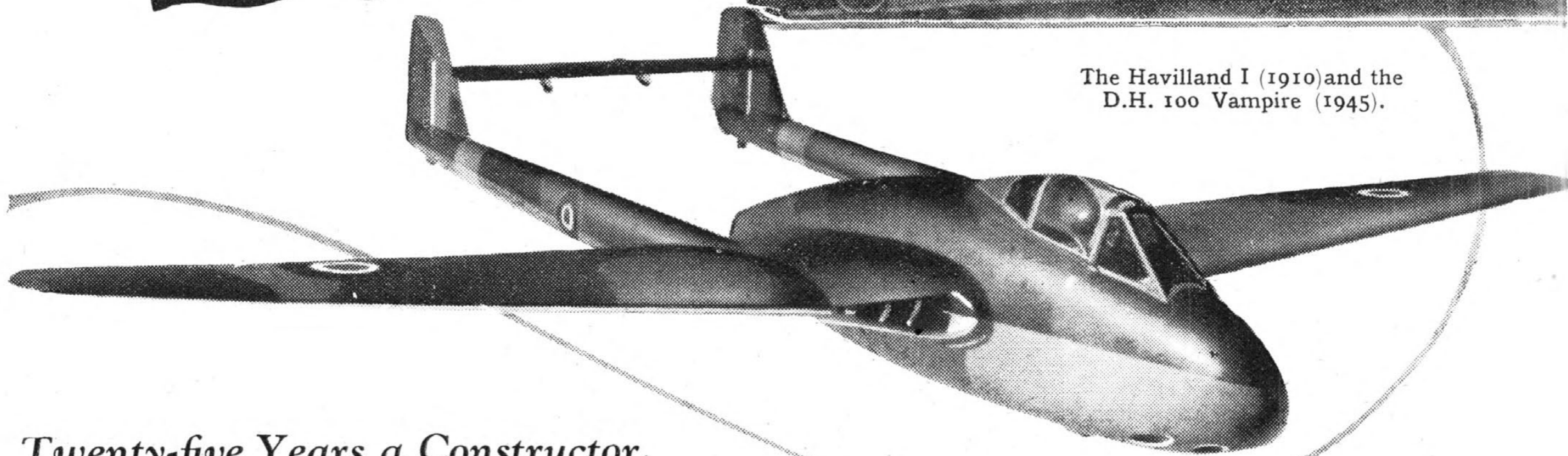
Flanking the main central frame are light doubled frames, that to starboard carrying the major units of the aircraft's hydraulic system (which are very accessible from the wheel well) and that to port acting as a complementary stabilising member for door jack actuation, both beams in addition carrying the wheel fairing doors. Aft of the wheel wells the aerofoil character of the centre-section is completed by trailing edge ribs with extruded Z-section stringers. Outboard of these aerofoil extensions are the large castings, on the rear face of the rear spar, which carry the forged fork-ends of the outer wing panel hinges, and span-wise between the spars outboard of the wheel wells are two rectangular, diagonally braced cast frames to which the undercarriage hinge brackets are bolted. Forward extensions at the wing root in the centre-section embody the engine carburettor air-intake (port) and the oil cooler intake (starboard). Attachment between centre-section and fuselage is by means of saddle blocks on the lower "longerons" of the front fuselage which carry two links each pivoted to pick-up with pin-points to forged brackets carried on the centre-section spar booms.

The conclusion of this description, together with further photographs and sketches, will appear in the next issue.

“D.H.”



The Havilland I (1910) and the D.H. 100 Vampire (1945).



*Twenty-five Years a Constructor,
Thirty-six Years a Designer: The*

Achievements of the de Havilland Aircraft Company, Limited

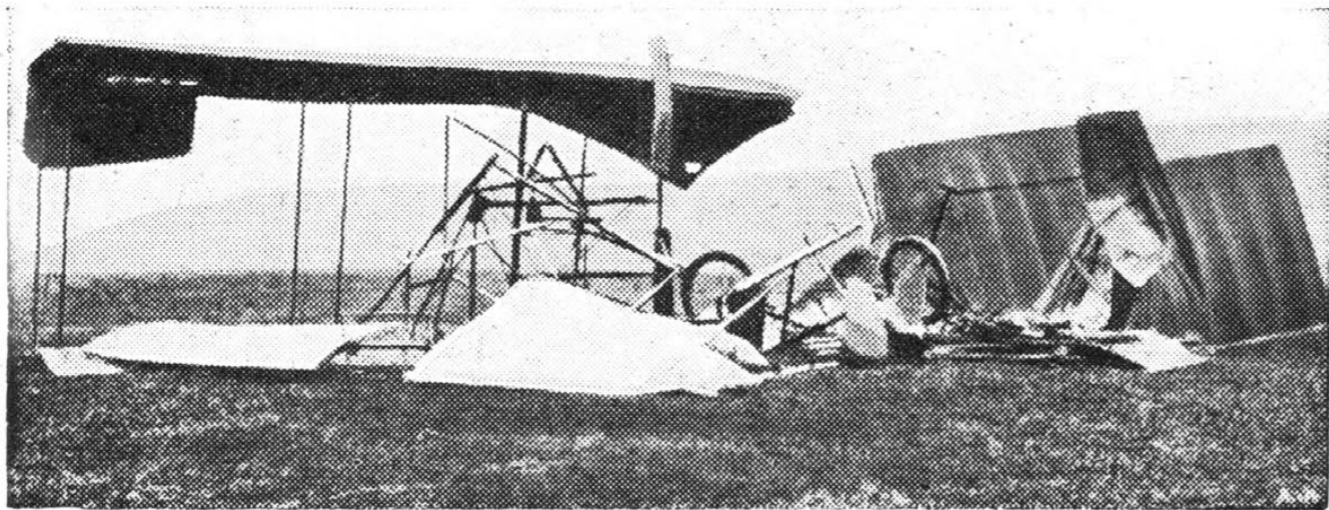
By THE EDITOR

BUT for what can only be regarded as a miraculous escape, the company whose history is surveyed in the following pages would never have come into existence; there would have been no de Havilland aircraft, and the course, if not the result, of two world wars might have been different. That is rather a strong statement, but it is true. The part played in the two world wars by de Havilland aircraft has been extremely important. Not only so, but during the years between the wars de Havilland civil aircraft contributed much towards progress, largely because the firm specialised on commercial, club and private-owner types. That this did not prevent them, when the need arose, from producing one of the finest military aircraft in the world is proved by the Mosquito.

However, to revert to my opening sentence, the escape referred to occurred early in 1910. The machine was described in *Flight* of April 9th, 1910, as the "Havilland No. 1." Mr. Geoffrey de Havilland, as he then was, had designed it, and it had been built in a shed near Newbury with the help of Mr. F. I. Hearle, who is still on the de Havilland board of directors. After getting into the air a few feet the port wings collapsed and the

machine crashed. That it did so pretty thoroughly is shown by the picture of the wreck, taken from the April 16th, 1910, issue of *Flight*, but Mr. de Havilland escaped serious injury. Our comment at the time, written by Algernon Berriman who was then technical editor of the journal, was: "Fortunately for the British industry, Mr. G. de Havilland, its designer and builder, is a man of the type whose enthusiasm and determination is apt to increase rather than diminish after any preliminary setback; while equally fortunate is it for readers of *Flight* that he should be willing to place much of the experience that he has just gained at the disposal of fellow British workers in the interests of the aeronautic movement." We on *Flight* who have had the privilege of knowing and recording, from that time to the present, the work of Sir Geoffrey de Havilland (as he now is) and his team, can subscribe wholeheartedly to that early tribute. It was merited at the time; it is still merited to-day. What is even more remarkable is the fact that, in spite of all his great successes, Sir Geoffrey is as modest and unassuming in 1945 as Mr. de Havilland was in 1910. He is one of those rare individuals whose charm inspires friendship and a loyalty in all who work with and for him, which could not possibly be engendered in any other way.

Although "Havilland No. 1" was not in itself a success, it incorporated many features which are common practice to-day. It had ailerons and an adjustable tailplane. Most important of all, it had a 50 b.p.h. de Havilland "flat four" water-cooled engine which drove adjustable-pitch airscrews through shaft reduc-



The Havilland I crash in April, 1910, which was nearly a pre-natal disaster for the de Havilland Aircraft Co.

DESIGNS OF THIRTY YEARS

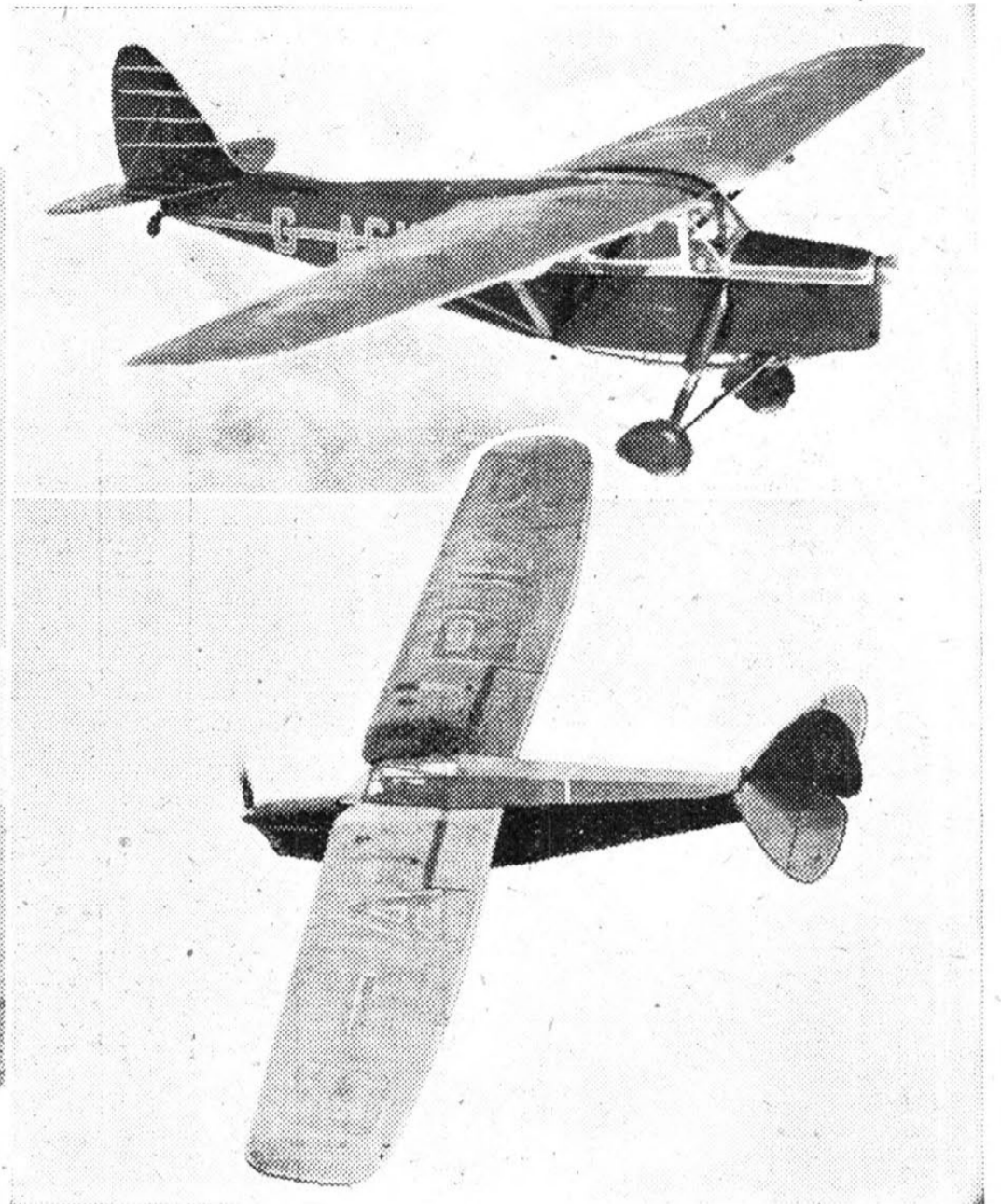
Particulars of All the D.H. Aircraft Types Which Have Flown

Type	Engine	First Flight	Span (ft.)	Area (sq. ft.)	Total Wt. (lb.)	Wt./H.P.	Wing Loading	Speed @ S.L. m.p.h.	Speed @ Height	Remarks
DH.1	90 h.p. Renault	1915	41.0	410	2,044	22.8	5.0	78	—	Pusher.
DH.1A	120 h.p. Beardmore	1915	41.0	410	2,502	20.7	6.2	90	85/10,000ft.	Mod. of D.H.1. Metal tail.
DH.2	105 h.p. Mono Gnome	1915	28.25	227	1,320	12.6	5.8	100	75/10,000ft.	Pusher Scout. Front swivelling gun.
DH.3	2 x 120 h.p. Beardmores	1916	60.8	793	5,776	20.6	7.3	95	87/10,000ft.	Twin Pusher. Extension shafts in Bomber.
DH.3A	2 x 160 h.p. Beardmores	1916	60.8	770	5,776	18.0	7.5	—	—	DH.3 with no shafts. More power.
DH.4	325 h.p. R.-R. Eagle	1916	42.4	435	3,400	11.5	7.8	125	116/10,000ft.	General purpose and bomber.
DH.4	240 h.p. B.H.P.	1916	42.4	435	3,610	15.0	8.3	112	105/10,000ft.	First production type DH.4.
DH.4	265 h.p. R.A.F. 3A	1916	42.4	435	—	—	—	122	117/10,000ft.	Fiat and other engines also fitted.
DH.5	100 h.p. Le Rhone	1917	25.33	212	1,492	13.6	7.0	—	100/10,000ft.	Tractor Scout with back stagger. Clerget also fitted.
DH.6	90 h.p. Renault	1917	35.9	435	2,027	20.3	5.0	—	—	Trainer.
DH.9	240 h.p. B.H.P.	1917	42.4	435	3,559	15.0	8.2	116	112/10,000ft.	Fiat and Napier Lion also fitted. General purpose.
DH.9A	350 h.p. R.-R. Eagle	1917	45.9	490	4,815	13.7	10.0	128	118/10,000ft.	First form of DH.9A.
DH.9A	400 h.p. Liberty	1917	45.9	490	4,645	11.6	9.5	123	114/10,000ft.	General purpose R.A.F. aircraft for some time.
DH.10	2 x 240 h.p. B.H.P.	4.3.18	65.5	840	6,950	14.5	8.7	109	—	Twin-engine pusher.
DH.10	2 x 325 h.p. R.-R. Eagles	20.4.18	65.5	840	8,500	10.6	10.1	—	—	Twin tractor.
DH.10	2 x 400 h.p. Liberty	1918	65.5	840	8,500	10.6	10.1	124	115/10,000ft.	Twin tractor, high compression engines.
DH.10A	2 x 400 h.p. Liberty	1918	65.5	840	8,500	10.6	10.1	131	124/10,000ft.	Engine position modified.
DH.11	2 x 320 h.p. Dragonfly	1918	60.15	720	7,027	11.0	9.8	—	—	Twin-engined fighter. Gunner in back.
DH.12	2 x 320 h.p. Dragonfly	1918	60.15	720	7,027	11.0	9.8	—	—	Gunner moved forward.
DH.9	500 h.p. Napier Lion	1919	42.4	435	3,725	7.2	8.6	144	140/10,000ft.	Altitude record just after War.
DH.14	600 h.p. Condor R.-R.	1919	50.4	617	7,074	11.8	11.5	—	—	DH.4 replacement also built with Napier Lion.
DH.14A	450 h.p. Napier Lion	1919	50.4	617	—	—	—	—	—	—
DH.9A	500 h.p. Napier Lion	1919	45.9	490	4,660	9.3	9.5	—	134/10,000ft.	—
DH.4R	500 h.p. Napier Lion	1919	42.4	323	—	—	—	150	146/10,000ft.	From DH 4 wings. Won Aerial Derby.
DH.9R	500 h.p. Napier Lion	1919	31.7	306	3,219	—	10.5	150	—	From DH.9A wings—speed record.
DH.15	480 h.p. Atlantic	—	45.9	490	4,494	9.4	9.2	—	138/10,000ft.	DH.9A with twinned B.H.P. 12 cyl. Vee engine.
DH.4A	320 h.p. R.-R. Eagle	1919	42.4	435	3,722	11.6	8.6	—	—	Passenger adaption of DH.4. Covered cabin.
DH.16	320 h.p. R.-R. Eagle	1919	45.9	490	4,387	13.7	9.0	120	—	Four passenger adaption of DH.9A—covered cabin.
DH.18	510 h.p. Napier Lion	1920	51.23	621	7,000	13.7	11.3	121	111/10,000ft.	First passenger m/c—8-str. developed from DH.14.
DH.27	600 h.p. R.-R. Condor	—	64.5	1,118	11,544	19.3	10.3	105	—	A.M. Specification.
DH.29	510 h.p. Napier Lion	Aug. '21	54.0	440	7,500	14.7	17.0	115	—	10-passenger high-wing—Two built.
DH.9C	230 h.p. Siddeley Puma	—	42.4	435	3,900	16.2	9.0	—	—	Commercial two-seater adaption of DH.9.
DH.34	500 h.p. Napier Lion	Mar. '22	51.33	550	7,200	14.4	13.0	113	110/10,000ft.	Eight-passenger civil type used extensively.
DH.37	275 h.p. R.R. Falcon	Sept. '22	37.0	398	3,400	11.9	8.5	125	—	Mr. Butler's private two-seater.
DH.37A	300 h.p. A.D.C. Nimbus	—	37.0	398	3,400	10.2	8.5	133	—	Boosted Puma.
DH.9J	360 h.p. Siddeley Jaguar	—	42.4	435	—	—	—	134	—	Used for training.
DH.42	360 h.p. Siddeley Jaguar	—	41.5	398	3,746	10.4	9.4	125	—	A.M. Specification—Reconnaissance.
DH.42A	440 h.p. Bristol Jupiter IV	1927	41.5	398	3,910	8.9	9.8	122	—	All-metal version.
DH.42B	410 h.p. Siddeley Jaguar	1927	41.5	398	4,009	9.8	10.1	128	—	—
DH.50	230 h.p. Siddeley Puma	Aug. '23	42.9	434	4,200	17.5	9.7	113	—	Four-passenger cabin developed from D H.9.
DH.50	230 h.p. Siddeley Puma	1924	—	—	—	—	—	—	—	Same as above but with full span automatic flaps.
DH.51	90 h.p. R.A.F. 100	July, '24	37.0	323	2,240	22.4	6.9	108	—	Private owner machine, two-seater biplane.
DH.51A	90 h.p. R.A.F. 100	Aug. '24	32.0	296	2,240	22.4	7.5	105	—	Single bay—full span automatic flaps.
DH.52	(Glider)	—	—	220	400	—	1.82	—	—	—
DH.53	25 h.p. Blackburn	Sept. '23	30.0	125	565	22.6	4.5	72	—	Douglas and Bristol Cherub engines also fitted.
DH.54	700 h.p. R.-R. Condor	July '25	68.0	1,005	11,000	15.7	10.9	118	—	Fourteen-passenger, releasable under-carriage.
DH.56	422 h.p. Siddeley Jaguar	—	41.5	423	3,962	9.4	9.4	130	122/10,000ft.	A.M. Specification developed from DH.42.
DH.60	65 h.p. Cirrus I	Feb. '25	29.0	229	1,234	19.0	5.15	91	—	First of Moth series.
DH.60x	85 h.p. Cirrus II	—	30.0	243	1,550	18.2	6.2	98	—	Altitude record for light aeroplanes.
DH.60	80 h.p. Siddeley Genet	1926	29.0	229	1,350	17.3	5.9	98	—	Radial engine
DH.60G	98 h.p. Gipsy I	1927	30.0	243	1,650	16.5	6.8	101	—	First of Gipsy Moth family.
DH.60M	98 h.p. Gipsy I	1927	30.0	243	1,750	17.5	7.2	199	—	Metal fuselage, also fitted with Gipsy II.
DH.60	120 h.p. Gipsy III	—	30.0	243	1,750	14.6	7.2	108	—	Tourist Moth, also fitted with Gipsy Major.
DH.60	130 h.p. Gipsy Major	—	30.0	243	1,750	—	7.2	111.5	101/10,000ft.	Moth Major.
DH.60T	120 h.p. Gipsy II	—	30.0	243	1,750	—	7.2	105	107/5,000ft. 90/10,000ft. 100/5,000ft.	Trainer. Forerunner of Tiger Moth.
DH.61	450 h.p. Bristol Jupiter	Jan. '28	52.0	613	7,000	—	11.4	128	—	Also Jaguar and Hornet—6/8 passenger cabin.
DH.65	558 h.p. Napier Lion (direct drive)	17/11/26	45.0	462	5,117	9.2	11.1	155	—	Hound.
DH.65A	605 h.p. Napier Lion (geared)	1927	45.0	462	5,117	8.4	11.1	163	—	World record—speed with load.
DH.65J	465 h.p. Bristol Jupiter (geared)	—	45.0	462	5,117	—	11.1	142	136/10,000ft.	Dural spars.
DH.6J	465 h.p. Bristol Jupiter	15/6/26	45.9	490	4,800	10.3	9.8	126	116/10,000ft.	Stag DH.9A, with Jupiter engine.
DH.66	3 x 450 h.p. Bristol Jupiter VI	30/9/26	79.2	1,547	15,600	11.5	10.1	128	—	Hercules for Imperial Airways.
DH.71	130 h.p. Special Gipsy	Sept. '27	22.5	76.5	850	6.5	11.1	193	—	Small racing monoplane.
DH.72	3 x 525 h.p. Bristol Jupiter	—	95.0	1,930	21,462	13.6	11.1	—	—	Finished by Glosters—night bomber—all dural.
DH.75	198 h.p. DH. Ghost	1929	41.0	255	3,500	7.7	13.7	—	—	Hawk Moth. 4 seater, high wing monoplane.
DH.75	247 h.p. Siddeley Lynx	1929	47.0	281	3,800	15.4	13.5	—	—	Seaplane.
DH.75	247 h.p. Siddeley Lynx	Aug. '29	47.0	354	3,870	15.6	10.9	128	117/10,000ft.	Production machine, geared engine.
DH.75	300 h.p. Whirlwind	1929	47.0	354	3,870	12.9	10.9	136	129/10,000ft.	Production machine, direct drive.
DH.77	337 h.p. Halford "H"	1929	32.2	163	2,290	6.8	14.0	182	—	Interceptor, low wing braced monoplane.
DH.80	120 h.p. Gipsy II Inverted.	9.9.29	—	—	—	—	—	128	—	Puss Moth. Experimental. Wooden fuselage.
DH.80A	120 h.p. Gipsy III	Mar. '30	36.75	222	2,050	17.1	9.3	128	—	New inverted engine. Metal fuselage.
DH.81	82 h.p. Gipsy IV	24/8/31	35.5	149	1,330	16.2	9.4	117	—	Swallow Moth. Experimental. Small private type.
DH.81A	82 h.p. Gipsy IV	—	—	—	—	—	—	129	—	Ditto. Thicker wing and covered cockpit.
DH.82	130 h.p. Gipsy Major	26/10/31	29.3	239	1,770	13.6	7.4	110	—	Tiger Moth Trainer.
DH.83	130 h.p. Gipsy Major	June '32	30.9	247	2,100	16.2	8.5	120	—	Fox Moth. Cabin machine, also seaplane.
DH.84	2 x 260 h.p. Gipsy Major	Jan. '33	47.0	376	4,200	16.2	11.2	128	—	Dragon. Passenger machine, later model cleaned up.
DH.85	130 h.p. Gipsy Major	27/5/33	37.5	206	2,225	17.1	10.8	137	—	Leopard Moth. Private owner type.
DH.86	4 x 204 h.p. Gipsy VI	Dec. '33	64.5	565	10,000	12.3	17.7	173	—	Passenger machine—Australia, etc.
DH.87	130 h.p. Gipsy Major	9/5/34	32.5	221	1,950	15.0	8.9	127	—	Hornet Moth. Tapered wings.
DH.87A	130 h.p. Gipsy Major	—	32.0	221	1,950	15.0	8.9	124	—	Hornet Moth. Square wings.
DH.88	2 x 204 h.p. Gipsy VI	8.9.34	44.0	212	5,550	12.5	26.1	237	220/10,000ft.	Comet. Special H.C. Engines—Australia Race.
DH.89	2 x 204 h.p. Gipsy VI	1934	48.0	340	5,200	12.7	15.3	160	—	Rapide.
DH.85A	205 h.p. Gipsy VI	1935	37.5	206	2,225	10.9	10.8	160	—	Experimental with C.P. Airscrews.
DH.90	2 x 260 h.p. Gipsy Major	Oct. '35	43.0	288	4,000	15.4	13.9	147	—	Dragonfly. One machine with C.P. airscrews.
DH.91	4 x 525 h.p. Gipsy XII	May 20 '37	105.0	1,078	32,500	15.5	30.1	—	220/8750ft.	Albatross. Mailplane.
DH.91	4 x 525 h.p. Gipsy XII	June '38	105.0	1,078	29,500	14.0	27.4	—	225/8750ft.	Albatross air liner, cruise 210 m.p.h./10,000ft.
DH.92	2 x 408 h.p. Gipsy VI	Aug. '36	53.7	393	6,600	15.8	16.8	161	—	Dolphin. Development of Rapide with C.P. airscrews.
DH.93	525 h.p. Gipsyking	June '37	47.5	304	6,860	13.1	22.6	—	—	Don I Trainer.
DH.93	525 h.p. Gipsyking	—	47.5	304	6,530	12.4	21.5	189	213/8750ft.	Don I Communication Machine.
DH.94	90 h.p. Gipsy Minor	June 22 '37	36.6	165	1,500	16.7	9.1	120	—	Moth Minor.
DH.95	900 h.p. Bristol Perseus XVI	Dec. 28 '38	70.0	651	17,600	10.1	27.0	—	239/6500ft.	Flamingo. All metal, high wing. Passenger machine.
Queen Bee	130 h.p. Gipsy Major	5.1.35	29.3	239	1,825	14.0	7.7	109	—	Wireless controlled target aircraft.
DH.98	2 x 1250 h.p. R.-R. Merlin	25/11/40	54.2	436	18,540	7.4	42.5	400/450	Over 40,000	Mosquito. Fighter, bomber and reconnaissance.
DH.100	D.H. Goblin, J-P Unit...	20/9/43	40.0	258	—	—	—	Over 500	50,000	Vampire. Jet-propelled fighter.
DH.103	2 x 2070 h.p. R.-R. Merlin	(prototype) July '44	45.0	361	About 15,000	3.62	41.5	Over 470	Approx. 35,000	Hornet. Fighter.

 "D.H." (CONTINUED)



FOR PRIVATE OWNERS: Top (left) A pointed wing-tip model of Hornet Moth. (Right) The Gipsy Major engined Leopard Moth. Bottom (left) The original 1925 Cirrus Moth G.E.B.K.T. (Right) First de Havilland "car" of the air—the Puss Moth.



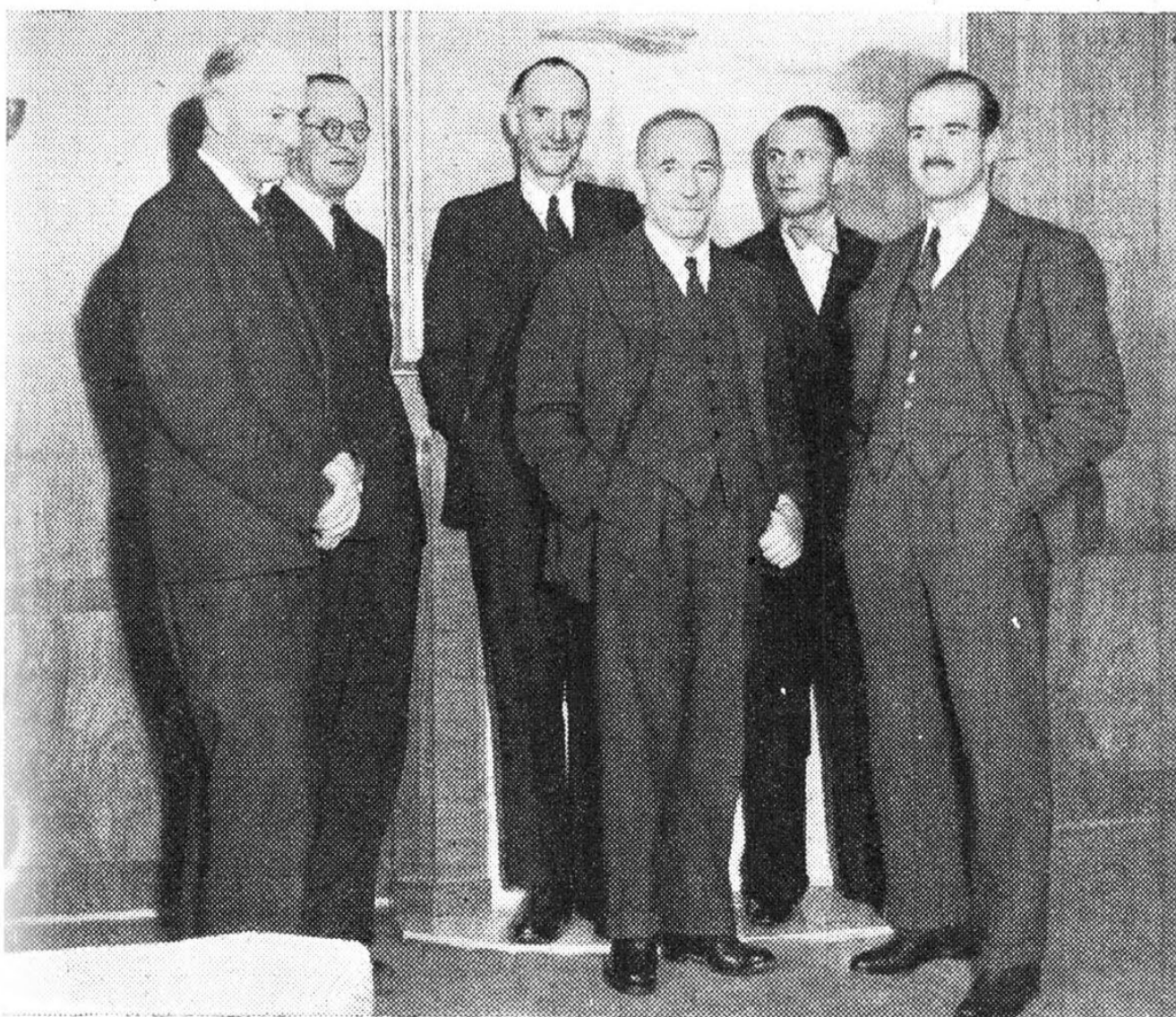
tion gearing. The blades had sheet aluminium covering over a tubular stem, and not only the whole pitch could be varied, but the twist in the blades. This may not seem very remarkable to-day, but let it be remembered that 1910 was the year in which Paulhan and Grahame-White struggled for mastery in the London-Manchester "race," and that British aviation was, at that time, a long way behind the French, for example, and was meeting with no official encouragement.

This is, in the main, intended to be a brief review of the history of the de Havilland Aircraft Co., Ltd., but in order to give the proper background to the picture it is necessary to follow the career of its famous designer during the years between "Havilland No. 1" and the formation of the company in September of 1920.

Reference has been made to the foresight shown in many of the features of "Havilland No. 1." Evidently de Havilland's abilities as a designer were appreciated in official circles, for he was invited to join the Army Aircraft Factory at Farnborough (it became the Royal Aircraft Factory in 1918), and there he was responsible for the design of the early B.E. class, a type of biplane in which great stress was laid on natural stability. Three separate classes of aircraft were being developed at "The Factory" in those days: the B.E.s, the F.E.s and the S.E.s. Incidentally, the letters stood for Bleriot Experimental, Farman Experimental and Scouting Experimental. The F.E.s were pushers, the B.E.s and S.E.s tractor biplanes. Geoffrey de Havilland also had a hand in the design of the S.E.s, although they were mainly the responsibility of Major F. M. Green and Mr. H. P. Folland.

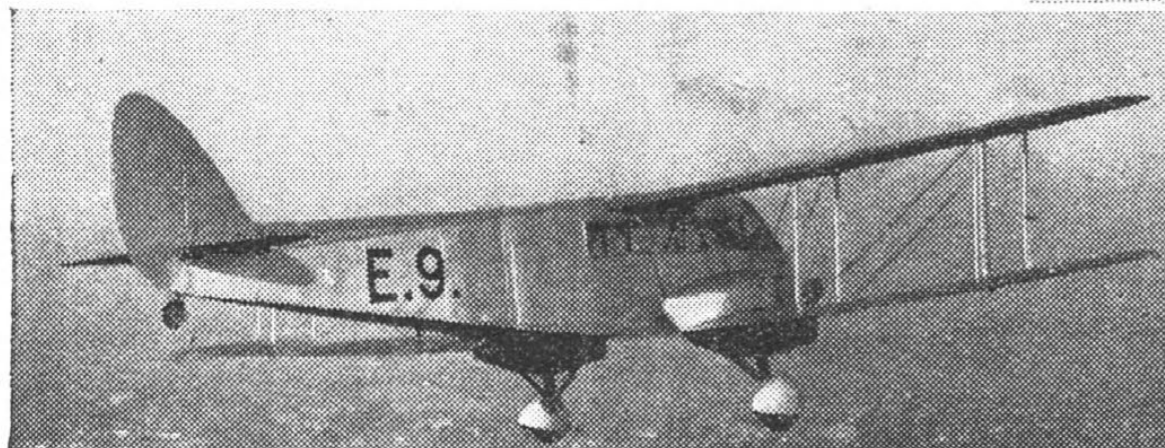
Airco/DH

In 1914 Mr. G. Holt Thomas, head of the Aircraft Manufacturing Company, succeeded in getting de Havilland released from the Royal Aircraft Factory and the Royal Flying Corps, in which latter he had become a Captain in 1913. Mr. Holt Thomas's firm at that time had confined itself to building Maurice Farman pusher biplanes under licence, but when Capt. de Havilland joined him a series of original designs was begun, some of which were destined to become famous. The family of aircraft were known as "Airco" for short, and were identified by the letters D.H. and a numeral. Thus was laid the foundation of possibly the most famous initials in aviation—"D.H." Captain de Havilland himself was

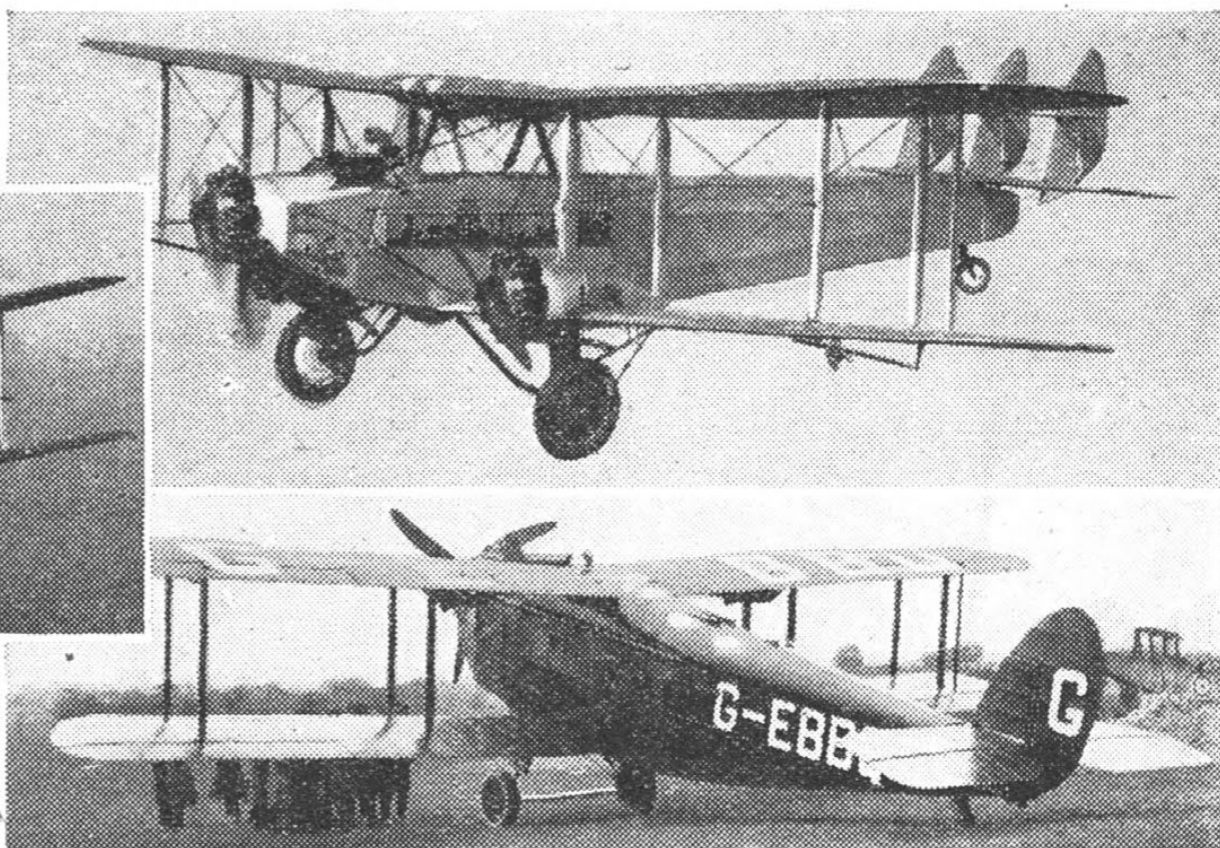


AT THE HELM: (Left to right) F. T. Hearle, Director; W. E. Nixon, Managing Director; Sir Geoffrey de Havilland, Technical Director; C. C. Walker, Director and Chief Engineer; F. E. N. St. Barbe, Sales Director; A. S. Butler, Chairman.

"D.H." (CONTINUED)



EARLY TRANSPORTS: (Left) E.9 the prototype Dragon. (Right) The triple engine D.H. 66 (Hercules) and the Napier engine D.H. 34 of 1922.



always known to his friends as "D.H.," and many of us, the writer included, find some considerable difficulty in breaking a habit that is almost lifelong, now that he has become Sir Geoffrey.

Space does not permit a reference to all the Airco D.H. types produced before Mr. Holt Thomas closed down the Aircraft Manufacturing Company and helped de Havilland to found the de Havilland Aircraft Company, Ltd., but a few examples will show the progress made during the four years of the first world war. The D.H.1 was a two-seater pusher biplane, as it was mainly intended for observation work and a good forward view was deemed desirable. With a 90 h.p. Renault engine it had a speed of 78 m.p.h.

A couple of twin-engine biplanes followed, but it was really the D.H.4, a tractor biplane, which established the fame of the D.H. series which has culminated to-day in the D.H.100, the jet-propelled Vampire. The D.H.4 was designed for the B.H.P. engine, although the first prototype had a Rolls-Royce Eagle of 325 h.p. It is interesting to recall that the letters B.H.P. stood for Beardmore-Halford-Pullinger, the Halford part of the trio being the same as the present designer of the de Havilland and Napier engines.

Next to be built in really great numbers was the D.H.9, similar in a general way to the D.H.4, but with the seats somewhat shifted to give the gunner a better view and field of fire. I remember once during the first world war Capt. de Havilland telling me that the Airco firm was turning out D.H.9s at the rate of about one every 40 minutes!

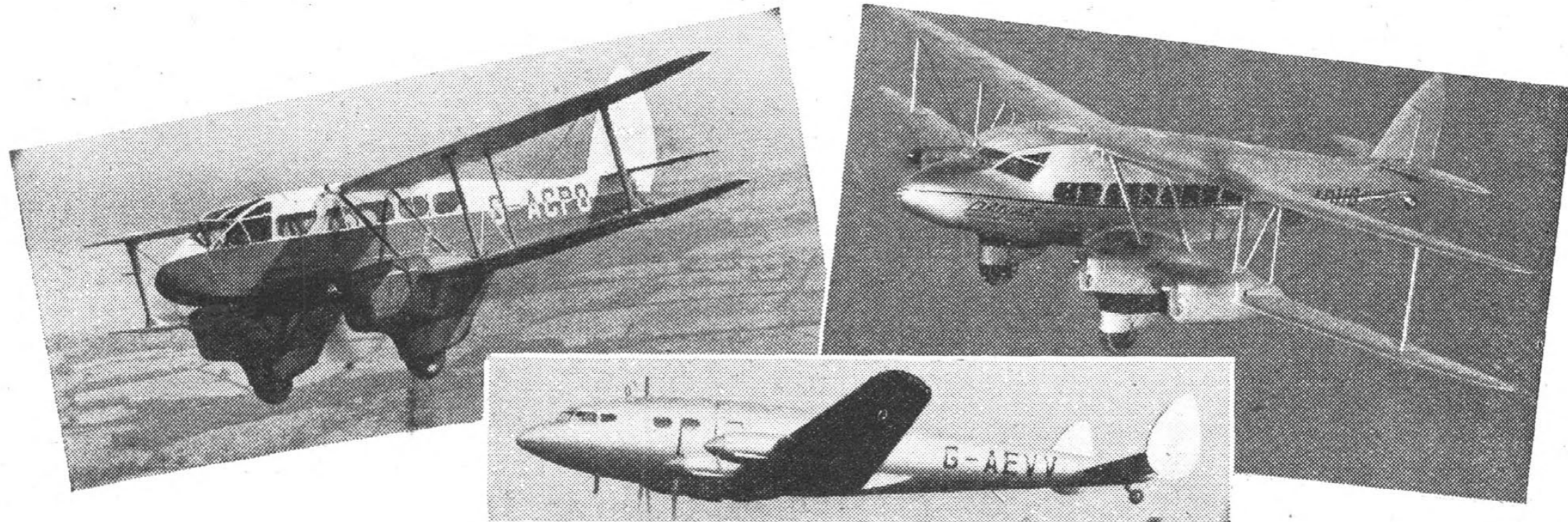
Then came the end of the war, and orders were cut off almost overnight, although somehow the aircraft industry managed to carry on under its own momentum, so to speak, for a while. By 1920, however, the outlook had

become pretty grim, and the B.S.A. Company, which had acquired the Aircraft Manufacturing Company, decided to close down. At considerable difficulty to himself, Mr. Holt Thomas promised to find £10,000 wherewith to start a de Havilland company. The firm was incorporated on September 25th, 1920, with a nucleus of some 50 people from the old Airco firm.

Rebeginning

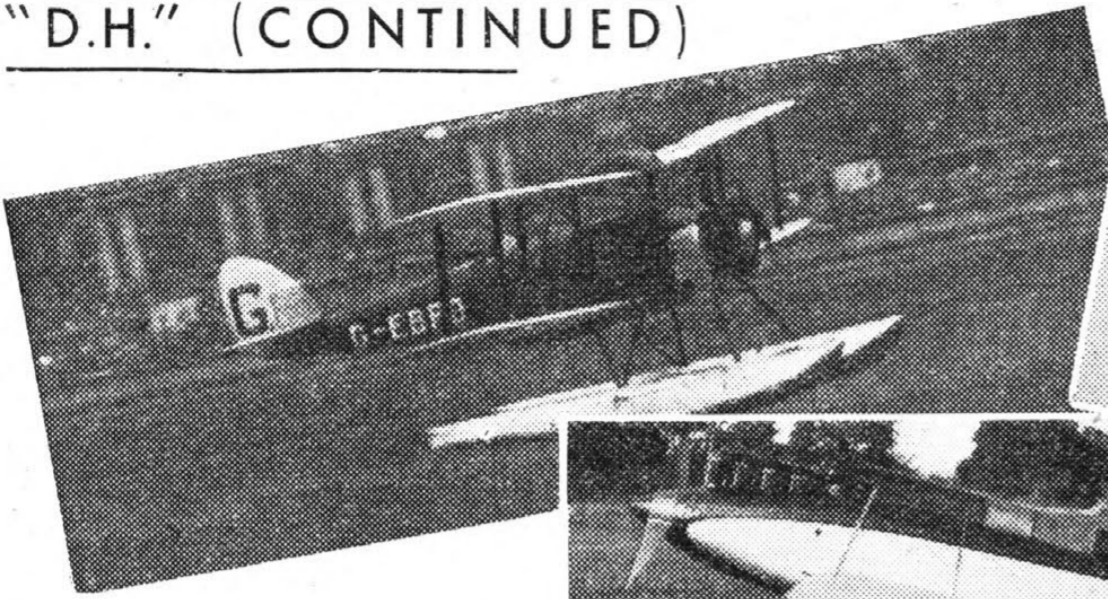
Work was begun in a small hut and a couple of canvas hangars at Stag Lane, Edgware. The only orders on hand were for the completion of two D.H.18 eight-seater commercial biplanes which had been begun by the old Airco firm for the Air Ministry. In this type there was a trace of a tendency towards a greater wing loading than had been usual, some 11 lb./sq. ft.! Capt. de Havilland clearly visualised the advantages of high wing loading for commercial operation, and design work was begun on a monoplane, the D.H.29, in which the figure was raised to 17 lb./sq. ft. This was considered very daring at the time, but the machine was built and made its first flight in August, 1921. Some development work was found necessary (directional control was somewhat inadequate, for example), and as a demand had arisen for some machines for the cross-channel service of Daimler Airways, it was decided to drop the 29 and concentrate on the rapid production of a more orthodox type, the D.H.34 eight-seater with 450 h.p. Napier Lion engine.

In the autumn of 1921 it was decided to buy Stag Lane, which had been rented from the London and Provincial company controlled by Messrs. Warren and Smiles. The price was £20,000 and the purchase was much facilitated

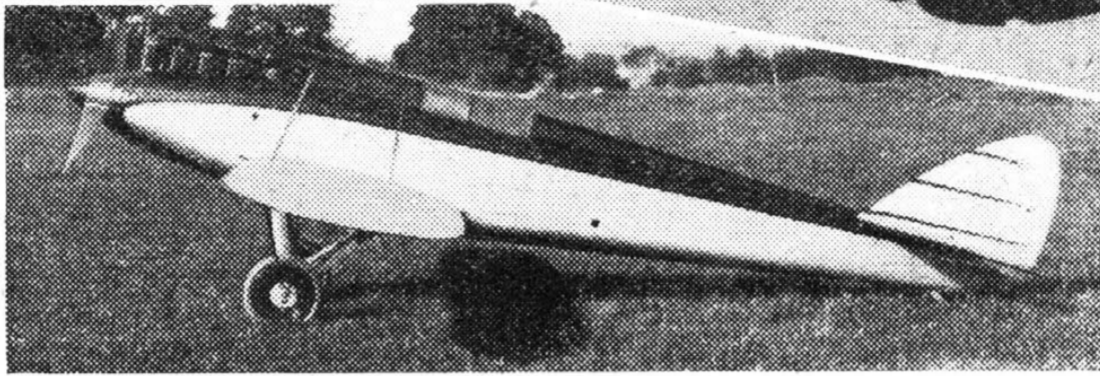


LATER TRANSPORTS: (Left) The twin-engine D.H. 89 or Dragon Rapide. (Right) One of the many D.H. 86 air liners built for air services the world over. (Bottom) The elegant D.H. 91, Albatross, which had four Gipsy XII engines.

"D.H." (CONTINUED)



FOR RECORDS : (Above) Sir Alan Cobham landing his D.H.50J. on the Thames after his flight to Australia and back in 1926.



(Above) "The Comet." One of these won the race from England to Australia in 1934. (Left) The 130 h.p. Tiger Moth which exceeded 186 m.p.h.

by the fact that at about that time a wealthy young sportsman by the name Alan S. Butler, approached the firm to build for him a two-seater (D.H.37) for his personal use. Mr. Butler put £7,500 into the company, became a director and, in 1922, chairman of the firm, a position which he still holds.

Next to achieve fame was the D.H.50, a four-passenger biplane with Siddeley Puma engine (a development of the original B.H.P. engine). The pilot sat aft of the main planes. This machine was entered for a competition held in connection with the Gothenburg aero show and won first place with 999 points out of a possible 1,000. It was piloted by Mr. (now Sir Alan) Cobham, who later made many famous flights in other versions of the "50," including London to North Africa in a day and a flight to Australia and back. In Australia Col. Brinsmead flew 8,000 miles around Australia in 25 days.

Private Owner Types

For the light aircraft trials at Lympne in 1923 de Havillands designed the 53, a tiny single-seater with a Blackburne motor cycle engine. The firm did not consider that the small single and two-seaters with tiny engines were the right answer to what the private owner wanted, and decided to produce their own idea of what was really wanted. Major Frank Halford had, in the meantime, designed the Cirrus engine for the Aircraft Disposal Company, and the prototype Moth was fitted with this. It was a four-cylinder, in-line air-cooled and developed 65 h.p. I shall always remember my first flight in the original Moth. There was a demonstration at Stag Lane but, as was not infrequently the case, the field was waterlogged and Capt. Hubert Broad, who was then de Havilland's chief test pilot, took the machine off solo and flew it across the few yards to Hendon, where I climbed on board and was taken for a flight. The little machine gave a feeling of intimacy which I had never experienced in larger types, and the gentle purring of the Cirrus was very different from the almost unbearable noise of the more powerful engines to which one had become accustomed.

The Moth progressed through various stages of development and was fitted with many different engines. Thereby hangs a tale. The de Havilland company decided to build their own engines, presumably because the Aircraft Disposal Company would not reduce the price of their Cirrus engines to what was considered a reasonable figure. Be that as it may, de Havillands commissioned Major Halford to design an engine for them, and the Gipsy I was the result. This was an upright engine of the four-cylinder in-line air-cooled type and provided the power for nearly all the early Moths operated by flying clubs. In fact, it may be said that the Moth made the many flying clubs possible.

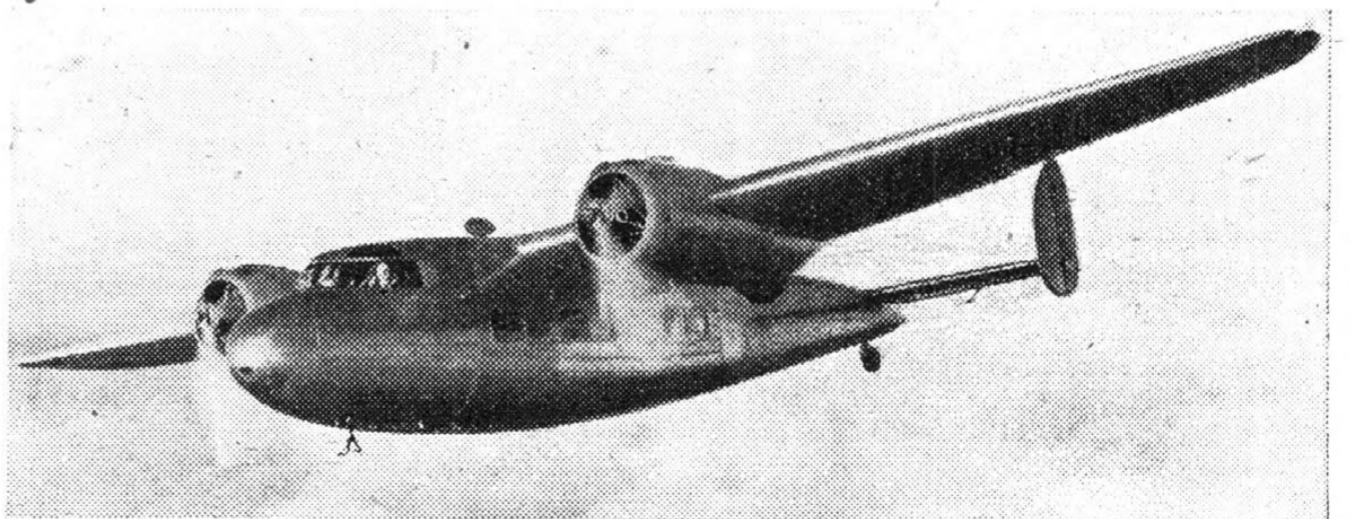
From the light aircraft market de Havillands turned to the commercial with the design of the D.H.66, which was by far the largest machine they had undertaken up till then (15,600 lb. loaded). A "large" order was received from Imperial Airways (five machines!) for the Cairo-Basra route.

At the other end of the scale, de Havillands built the tiny little Tiger Moth monoplane. It was 71 in the D.H. series and had a wing span of only 22ft. 6in. So small was it that it used to be said that Hubert Broad was the only pilot who could get into the cockpit. That was an exaggeration, and I believe the machine was flown by Hereward de Havilland, but it certainly was small. On it Capt. Broad established a world's speed record over 100 km. with an average of 300.1 km. (1.186.47 miles) per hour.

By this time the de Havilland business was growing by leaps and bounds. In addition to the home market the firm was doing an excellent export trade, and it was decided to form branches. The Australian branch was founded in 1926, and a year or so afterwards the Canadian company was formed. At home the expansion of business was such that Stag Lane was rapidly becoming quite inadequate. The airfield at Hatfield being used for testing, and in the financial year 1929-30 de Havillands acquired the site. The firm had been made a public company and gradually all flying and some of the works were transferred there.

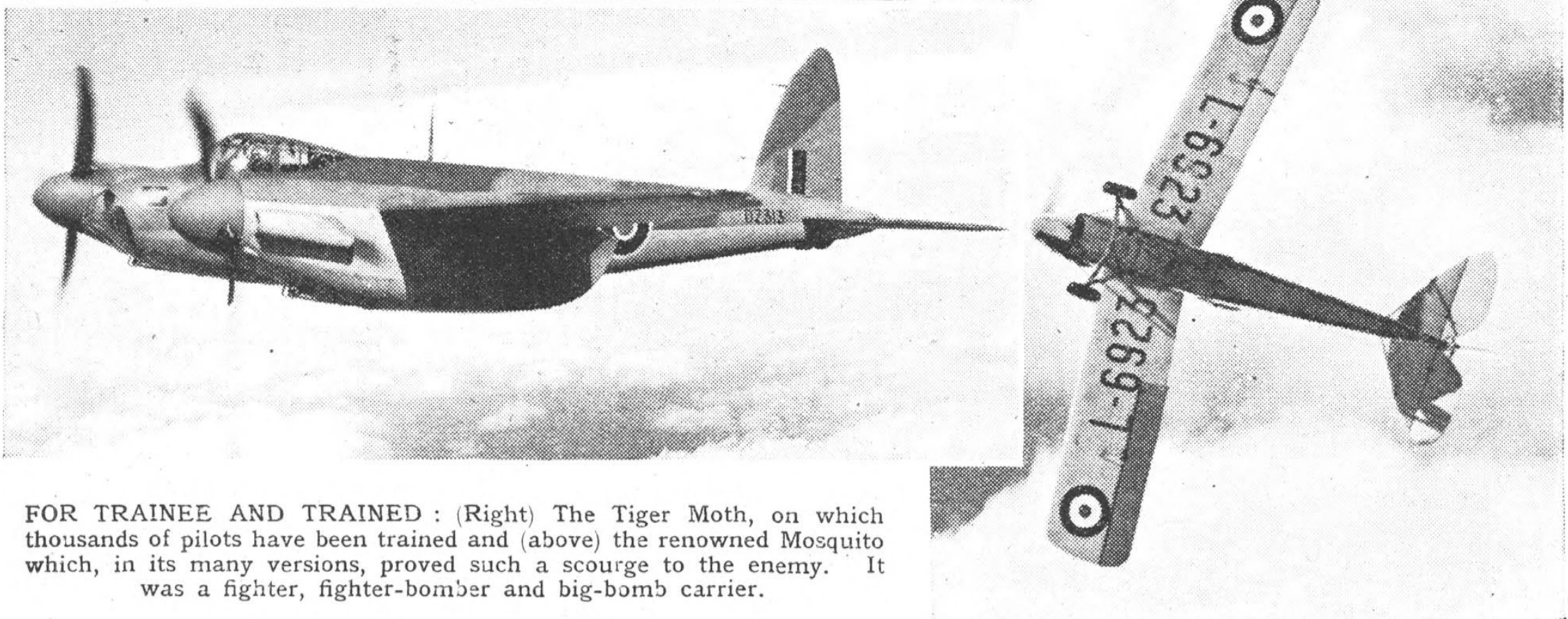
Reverting to the design side, in 1929 was produced what was to become the forerunner of a series of monoplanes intended for the private owner. The first machine was known as the Moth III from the fact that it had the first inverted Gipsy engine. This was very like the Gipsy II, but instead of the cylinders being above the crank case they were below it, an arrangement that has since become standard. One considerable advantage was that the pilot got a better view forward over the crank case.

While catering for the private-owner market, de Havillands did not lose sight of the importance of flying training. The Tiger Moth (not to be confused with the little D.H.71) was produced as a Moth replacement. Although maintaining many



CIVIL AND MILITARY: The 12/18-seater Flamingo with two 900 h.p. Perseus XVI engines. It was also used as a military transport and named the Hertfordshire.

"D.H." (CONTINUED)



FOR TRAINEE AND TRAINED : (Right) The Tiger Moth, on which thousands of pilots have been trained and (above) the renowned Mosquito which, in its many versions, proved such a scourge to the enemy. It was a fighter, fighter-bomber and big-bomb carrier.

of the characteristic Moth features, it differed in several respects, notably in the wing arrangement. Instead of the vertical biplane wings of the Moth, the Tiger Moth had the wings staggered and swept back.

Although it was not built in great numbers, mention should be made here of a very remarkable machine, the D.H.83 Fox Moth. It was a biplane with cabin seating for four passengers and the pilot placed in the open, behind the wings and cabin. What was remarkable about the Fox Moth was that it carried as disposable load something like 95 per cent. of its own tare weight. It was thus extremely economical. One of these machines fitted with floats was used by Mr. John Grierson on one of his arctic journeys.

Next in chronological order came a machine which laid the foundation for a long line of small economical transport aircraft. It was the D.H.84 Dragon and was designed with the Hillman Romford-Paris route in mind. It shared with the Fox Moth some of that machine's excellent payload qualities in that it carried as disposable load 82.5 per cent. of its tare weight. It was a twin-engined biplane and the first aircraft to make unsubsidised flying possible.

1933 was a remarkable year in the history of the de Havilland firm. No fewer than three new models made their first flights in that year, and evidence of the way in which the company catered for both the "personal" and the commercial market is afforded by the way in which, not only in this year, but in most years, lighter types alternated with heavier. Mention has been made of the Dragon D.H.84. This was followed by the D.H.85 Leopard Moth, a successor to the Puss Moth, which it resembled in a general way. It was a popular type for the private owner-pilot, and it was given a fillip by the fact that it won the King's Cup air race that year, piloted by Capt. de Havilland.

Towards the end of 1933 de Havillands broke into the "four-engined market" with the D.H.86.

True to the sequence of light and heavy types alternating, the D.H.87, which followed the Express Airliner, was a private-owner and club type. As distinct from the Leopard Moth, the Hornet Moth was a biplane, at first with tapered wings and later with square wing tips.

While the de Havilland engine business was increasing rapidly at home and abroad, the airscrew question was not being overlooked, and in 1934 the company acquired the licence to build Hamilton Standard controllable-pitch airscrews with metal blades. By now there is, of course, a wide range of models available, most of which have been used extensively during the war in a variety of aircraft. It was, too, in that year that the England-Australia race was held, for which de Havillands designed and built the Comet (D.H.88). That machine set a new standard in aerodynamic efficiency, with its monoplane wing, retractable undercarriage and generally clean design. Piloted by Scott and Campbell Black, it won the race. The speed of the Comet was about 235 m.p.h.

Turning from the ultra-refined to the utilitarian, the D.H.89 Dragon Rapide, which followed the Comet in the series, became, in the years to follow, a wonderful small commercial type. It combined the economy of the earlier Dragon with an improved performance, and so well did it suit operating conditions in many parts of the world that it is not until now that it is about

to be supplanted by the new Dove monoplane of all-metal construction.

By 1935 de Havillands had developed quite a characteristic biplane outline, with wings of large span, narrow chord, high aspect ratio and very pronounced taper. In none of the types was this feature more marked than in the D.H.90 Dragonfly, a small twin-engined type in which the biplane bracing system had been reduced to two struts on each side, and inner of inverted vee formation and a single outer I-strut. Further cleaning-up was achieved by mounting the Gipsy engines ahead of the leading edge and very low, fairing the undercarriages into the engine nacelles by "trouser legs."

Modern Monoplanes

With the type 90 de Havillands may be said to have reached the end of the biplane era. It was followed by a number of monoplanes, many of which became famous. Their most ambitious undertaking, up to that time, was the D.H.91 Albatross, of which two versions were projected, one a long-range mailplane and the other a passenger machine. With a gross weight around 30,000 lb., the Albatross was practically twice the loaded weight of the previous largest, the Hercules. In addition, it was incomparably "cleaner," much of the high-speed experience gained with the Comet having been made full use of in its design. It had a speed of 225 m.p.h. and cruised at 210 m.p.h. on 1,360 h.p. One of the interesting features of the Albatross was the pressure-duct cooling system for the Gipsy-Twelve engines.

The year during which the Albatross was being developed, viz., the financial year 1935-36, was a great one in the history of the firm. The year closed with more orders on the books than ever before. The Hatfield factory had grown to three times the size visualised two years before. Aircraft production exceeded one per day (including Sundays!). A total of 770 engines was produced, aggregating 130,000 h.p. The airscrew output was among the largest in the world. Associated companies had been formed in Australia, Canada, South Africa, Southern Rhodesia and India.

For a great number of years de Havillands remained faithful to all-wood, or at least mixed wood and metal construction. It had many advantages and had enabled the company to produce new models quickly and, relatively, cheaply. By 1938 it was decided that the time had come to produce an all-metal aircraft incorporating stressed-skin construction. There is no denying the fact that the aviation world expected the first attempt of the Hatfield factory to be just a little amateurish. After all, the firm had no previous experience, and it would not be very strange if the new machine showed traces of the fact. To everyone's surprise, when the D.H.95 Flamingo appeared its "skinning" was remarkable for its smoothness and total absence of "waves."

The Flamingo had no chance to get properly established in the commercial world before war broke out, but a small number were completed and went into service in the R.A.F. Communications Wing. With its two Bristol Perseus engines and good payload capacity, the Flamingo is a very useful type, and it is to be hoped that it may be revived.

The war period, so far as the de Havilland company is concerned, has been entirely dominated by the Mosquito.

"D.H." (CONTINUED)

Probably no other aircraft has ever shown such amazing versatility.

The initial conception of the Mosquito was a fast unarmed bomber with a crew of two, a bomb load of 1,000 lb. and a range of 1,500 miles. Geoffrey de Havilland, Jun., flight-tested the first machine on November 25th, 1940, and after a relatively small start, due to official uncertainty as to likely operational requirements, production grew at Hatfield and elsewhere. Before the Mosquito had reached the end of its development its original bomb load had been quadrupled.

Latest de Havilland military types to appear are the D.H.103 Hornet long-range, twin-engined fighter, claimed to be the fastest airscrew-driven aircraft in the world, and the D.H.100 Vampire jet-propelled fighter, thought to be the fastest of its class in production at present.

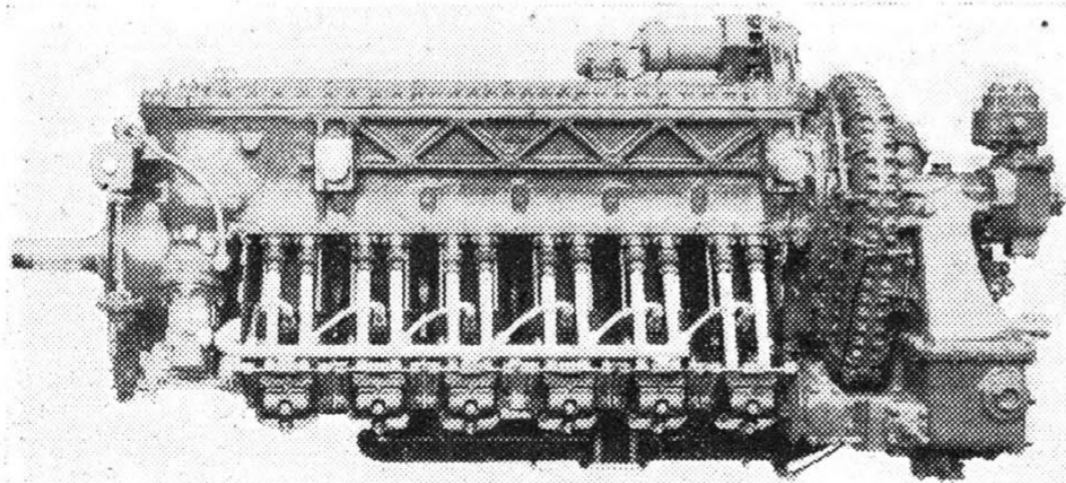
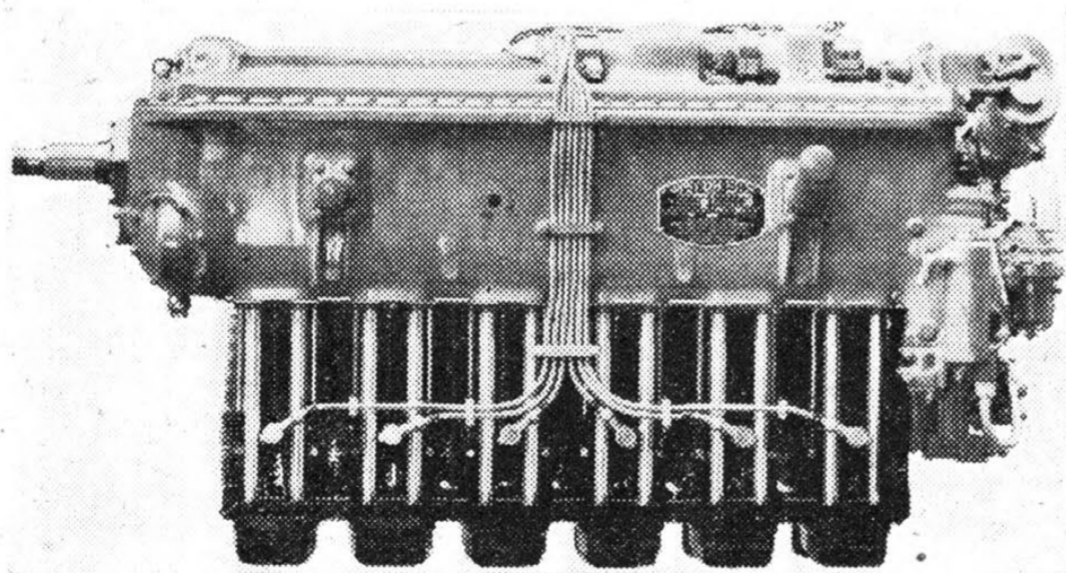
Nearing completion at Hatfield now is the D.H.104 Dove, a small twin-engined civil machine intended as a modern economical replacement of the Rapide.

This, in brief outline, is the history of the work of a famous designer. To have inspired 104 designs in a period of thirty-six years, or an average of three types a year, is in itself a record. But to have personally flown the great majority of those types is a distinction not shared by any other aircraft designer in the world. Sir Geoffrey de Havilland's is a triple success: as a designer, as a constructor, and as a pilot. Truly a remarkable achievement.

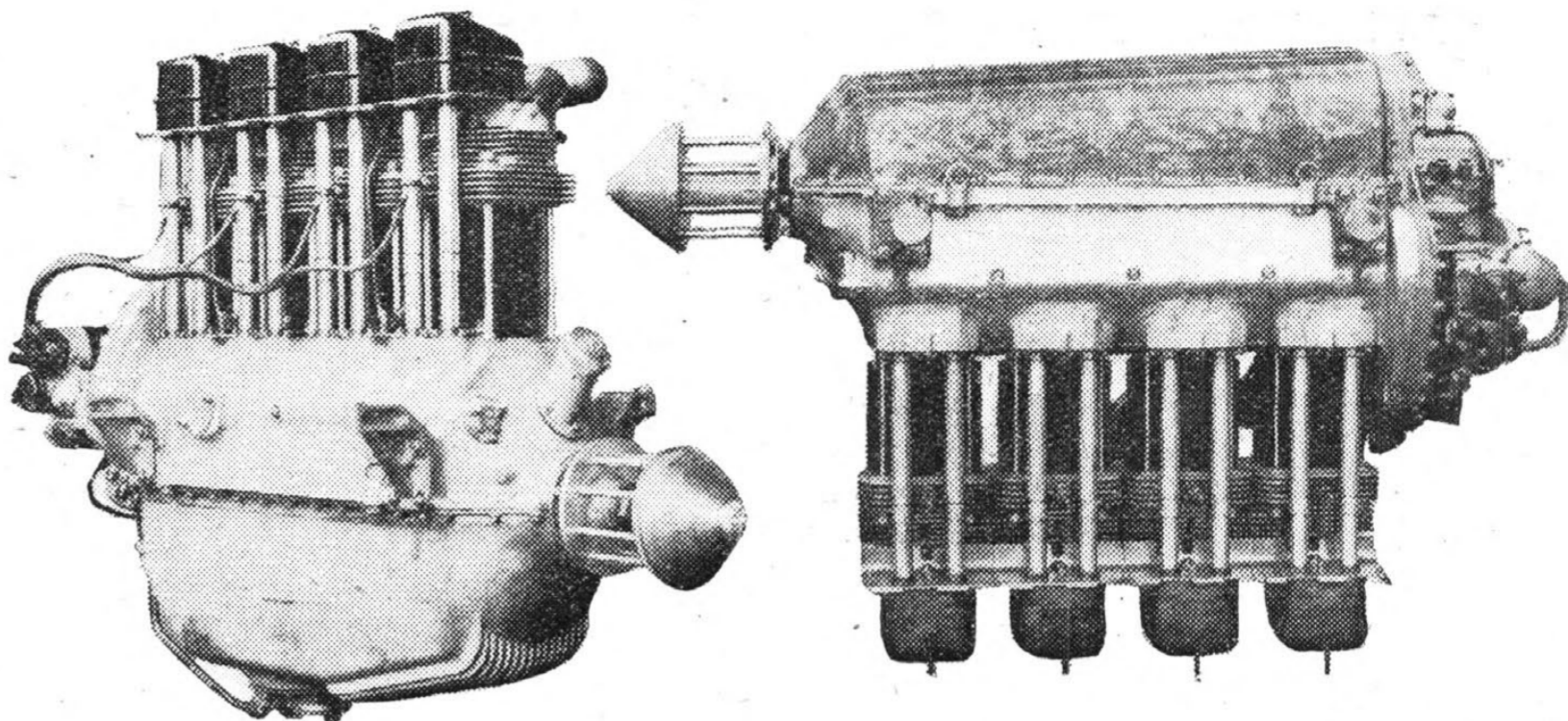
ENGINES

As famous as is the name "Moth" in the realm of aircraft, equally famous is the name, "Gipsy" in the world of aircraft engines, and inextricably linked with that title is the name of Halford, for in 1927 Major Frank B. Halford created the very first de Havilland Gipsy engine and he has created every D.H. engine since.

The first engine of that famous Gipsy I series developed



IN LINE AND VEE : (Top) The 205 h.p. Gipsy Six II and (bottom) a side view of the 525 Gipsy XII.



EARLY FOURS (Above) : The 120 h.p. Gipsy II and the "inverted" Gipsy III. (Right) Major F. B. Halford, Chairman and Technical Director of the engine company, who has been responsible for every D.H. engine.



130 h.p. and created a stir by establishing a world speed record for light aircraft at 187 m.p.h. in the little D.H.71 Tiger Moth monoplane flown by Hubert Broad; for production (which started in 1928), the engine was, however, derated to 100 h.p., and it is interesting to note that one of the first batch was flown 600 hours under Air Ministry seal, the only attentions allowed being routine inspection of tappet clearances, plugs and filters. The subsequent strip shows the engine to be in excellent shape and total replacement cost but £7 2s. 11d.

In 1929 the V-eight 200 h.p. Gipsy Ghost—a double Gipsy I—was created as part of Halford's policy of general research. This engine was first flown in the D.H.75 Hawk Moth but was not put into production. The 120 h.p. Gipsy II first appeared in 1930 as a refined version of the Gipsy I, and was followed almost immediately by the Gipsy III, also of 120 h.p., the first of the inverted range of engines, the reason for designing the engine "upside-down" being to simplify installation and improve visibility for the pilot. A small engine, the Gipsy Minor, was introduced in 1931 and started its life as a 75 h.p. unit, being first flown in the D.H.81 Swallow Moth two-seater monoplane, since when it has had a steady increase in power and has been in use almost continuously for various developments.

An increase in power to 130 h.p. came with the inception of the Gipsy Major range of engines, the Mark I being first produced in 1932; a further innovation with this engine was the elimination of top overhauls, the unit running for the whole complete overhaul period of 450 hours without attention other than routine inspection.

The 200 h.p. six-cylinder Gipsy Six I was developed from the Major engine and appeared in 1934, the Mk. II 205 h.p. model of the series, which was designed for use with a controllable-pitch airscrew, following in 1936. A second model of the Major, the Gipsy Major II, was brought out in 1937, and almost at the same time the inverted V-twelve cylinder supercharged and geared Gipsy Twelve also made its bow. This latest and largest of the Gipsy engines was a most attractive unit by virtue of the cleanliness of its design and the remarkably low frontal area of its installation.

This brief survey of de Havilland engine history would not be complete without reference to the amazing extension of overhaul periods from the original 450 hours with top overhauls at 150 hr., to the unique 1,500-hour period achieved this year. An account of this growth appeared in the June 7th, 1945, issue of *Flight*.

For the future, in addition to their outstanding work with jet-propulsion units, the de Havilland Engine Company will meet the needs of both civil and military aircraft designs by a new series of Gipsy Major and Gipsy Queen (Six) engines incorporating superchargers and reduction gears.

CIVIL AVIATION NEWS

SWISS AIR

REGULAR air service between Switzerland and the U.K., for which test flights have been carried out for some time, will be resumed soon by the Swiss airlines, according to Swiss radio quoted by Reuter.

It is stated that Swissair opened, last week, a direct service from Zurich to Amsterdam and are preparing regular flights to Cairo, Algiers, Spain, and Prague.

BRAZIL'S PLANS

SENHOR J. P. SALGADO FILHO, Brazil's Air Minister, who was visiting Britain at the invitation of the Air Ministry, said that he would like to see British freight aircraft built under licence in his country.

Brazil's plans include a service to Europe, but lack of suitable equipment will necessitate a delay in the establishment of such services; a British air service to Brazil, however, would be welcomed.

CAR DELIVERIES BY AIR

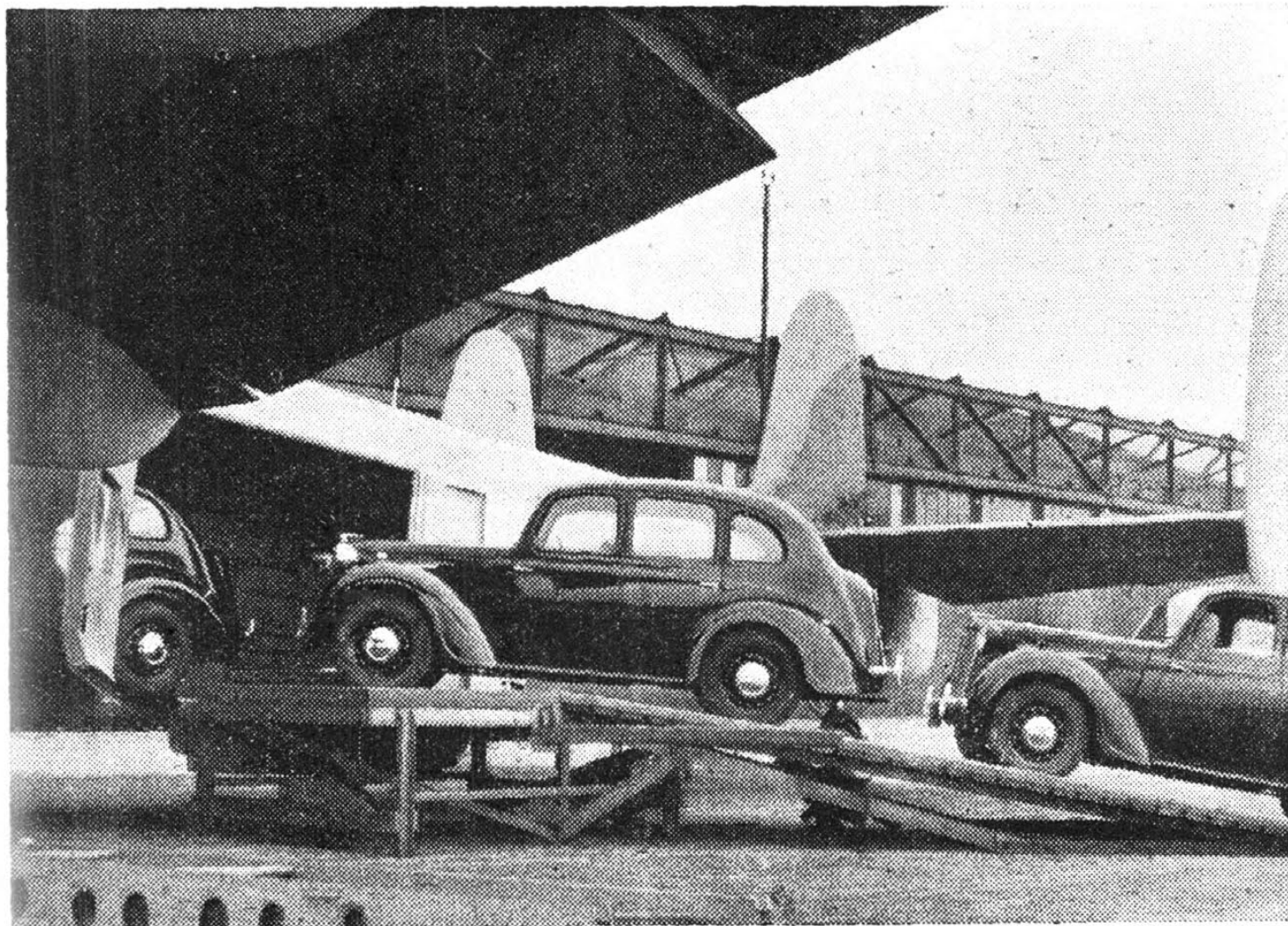
THE transport of motor cars to overseas markets by air is showing great promise, and the York is likely to become the "chosen instrument" for this type of operation.

The loading of jeeps has amply demonstrated that the interior layout of the York is particularly suitable for the carriage of large bulky items of freight, as there are no internal obstructions or constructional supports to interfere with the disposal of the cargo.

To investigate the stowage of motor cars in the York a trial installation was recently carried out jointly by A. V. Roe and Co., Ltd., and the Austin Motor Company, who have been building Lancasters.

The results were highly satisfactory, and but for the claims on priority of war supplies, Austin cars would now be reaching the Dominions by air. Either three Austin Eights or three Austin Tens can be comfortably accommodated with space to spare. They can be quickly loaded and lashed in a matter of half an hour, and as easily unloaded. No dismantling is necessary, the only special requirement being a loading ramp with an oblique approach so that the cars can be driven into the York fuselage and swung round into position. The cars can be driven to the allotted position and the ample clearance allows the driver to open the door and get out.

Three Austin Tens constitute a payload of under 3 tons—a figure well within the capabilities of the York for a maximum range of 3,100 miles. No departure from existing flight schedules would be necessary, as there is further space available for additional cargo, and the Yorks could be used for carrying freight between the intermediate stops.



TRIAL RUN: Loading Austin cars into an Avro York to test its suitability as a car delivery transport.

I.A.T.A.

THE final meeting of I.A.T.A. convened to wind up formally the association's activities took place recently in London.

The International Air Transport Association was formed in 1919 with headquarters in The Hague, and, as reported in *Flight*, August 23rd, ceases now to exist and will be replaced by a new, world-wide association under same initials with head office in Montreal.

Nineteen companies from fourteen countries—Belgium, Czechoslovakia, Denmark, Eire, France, Great Britain, Holland, India, Norway, Poland, Switzerland, Sweden, Yugoslavia, United States—were represented at the London meeting.

Lord Winster, who attended the conference, said that the reason for winding up I.A.T.A. is not because it failed, but because present needs of air transport called for a wider, all-embracing association. Referring to the wider issues of International Air Transport, the Minister said that Britain stands for its ordinary development, which "does involve some degree of regulation, but this does not imply restriction." Other speakers were Mr. A. Plesman, of the K.L.M., president of I.A.T.A., and the secretary-general, Dr. Goedhuis.

A General Aviation Code presented to the conference was unanimously accepted and recommended for adoption by the new I.A.T.A. as a valuable instrument in facilitating international commercial air transport operations. The code is composed of a number of sections devoted to a variety of subjects, such as booking, cities' tables, companies' tables, etc.

READY TO START

CAPT. HAROLD E. GRAY, manager of Pan American World Airways' Atlantic Division, who was in charge of the route-check flight made to this country last week by one of the line's DC-4 aircraft, told a Press conference at Claridge's that they were ready to start a regular transatlantic service to Britain as soon as the matter of frequencies, now under consideration, was settled between the British and U.S. Governments.

The DC-4 was piloted by Capt. Calvin Y. Dyer with Wallace A. Tallos as co-pilot and Alden Tibbetts as navigator, and the ocean crossing was made from Gander, Newfoundland, to Shannon, Eire, in 9 hr. 26 min. Two flight engineers, two radio officers and two stewards completed the crew, while the passengers included nine other officials of P.A.A. besides Capt. Gray, and also a C.A.A. inspector.

From Shannon, the Skymaster, which was a C-54E version of the DC-4 as used by the U.S.A.A.F. for the comfortable movement of American V.I.Ps., flew to Hurn, near Bournemouth, and from thence to the U.S. Transport Command station at Bovingdon. There it was met by Mr. John Leslie, the Pan American Atlantic manager in Britain, who stressed the urgent need for a suitable transatlantic terminal a great deal nearer London than Hurn Airport, 115 miles away.

Mr. Leslie told the conference that they were starting the service with eight DC-4 airliners, but had on order three different types of much larger land planes, including the Constellation. No flying boats were contemplated for the service. Fares were not yet fixed, but would be substantially less than in 1939. What they were aiming at was a "Ford" market for air travel; there was no future in it for millionaires only, and they hoped to get aircraft and frequencies making possible fares which would appeal to the person of moderate means.

"We sincerely hope," concluded Mr. Leslie, "that there will also be a British flag service flying alongside."

RADAR

TRANS-CANADA AIRLINES have established an experimental radar station at their Winnipeg headquarters for use on their inward and outward bound trans-continental operations. Thus, a beginning has been made in Canada to employ radar equipment for commercial airlines.

To ensure simpler traffic control and

CIVIL AVIATION NEWS

better safety in civil air transport a network of radar stations is envisaged to cover the U.S.

This proposal has been put forward by the head of the Radio Laboratories of the U.S. Office of Scientific Research and Development, Dr. L. A. Du Bridge, who considers that the radar network, which would constantly show an aircraft in its relationship to other aircraft in any given area as well as all flight obstacles in bad weather, is the only means of insuring speedy and efficient control. The expenditure to develop such a system would be, of course, very considerable, but it is thought that it would be justified by resulting improvements of efficiency and safety in air transportation.

NO FORCED LANDING

B.O.A.C. state that the report from Lisbon issued by a news agency there and recorded in *Flight* of August 30th, to the effect that a B.O.A.C. airliner returning from South Africa forced landed at Lisbon, necessitating the use of a Dutch aircraft to enable the passengers to continue the journey was inaccurate.

What actually happened was that the aircraft was delayed for some hours at Lisbon with engine trouble, but there was no question of a forced landing and the passengers continued their journey in the same aircraft.

AZORES DEAL ?

THE future of the Santa Maria Airport in the Azores, built by the Americans during the Allied occupation of the island, is still unknown.

During the war the airport, which is on Portuguese terri-

R.A.F. PAGEANT AT THE ALBERT HALL

ON two evenings last week an R.A.F. pageant, organised by the *Daily Telegraph*, was given at the Royal Albert Hall. It had been written by two Squadron Leaders. The outstanding feature of it was provided by No. 1 Apprentices School, Halton. Its band played as well as ever, and the 16 pipers filled the great hall with Highland music. No. 1 Apprentices Wing marched and drilled with a smartness and precision worthy of a Guards battalion, and the team of athletes who gave a display of P.T. and gymnastics was really first-class.

For the rest, narrators at the microphones outlined the history of flying from the days of the Wright brothers and of the R.F.C. and R.A.F., while crowds and parties on the floor of the hall endeavoured to make the history live again. It brought back old times to many to hear Miss Violet Lorraine sing once more "If you were the only girl in the world" as enjoyably as in the days of "The Bing Boys." A choir of W.A.A.F. girls very tunefully helped out the choruses. The hall was crowded, and the audience evidently enjoyed the show to judge by the enthusiastic applause.

ANOTHER WAR SECRET DISCLOSED

THE secret of the key weapon which increased the effectiveness of our A.A. fire to nearly 100 per cent. in the battle against the V1 flying bombs has now been revealed, not by the British War Office but by the U.S. Navy which used the same device with considerable success against the Japanese suicide planes and piloted Baka flying bombs in the Pacific.

It is the vital item which Gen. Sir Frederick Pile, as C.-in-C. Anti-Aircraft Command in Great Britain, was never allowed to mention, and it is, in effect, a miniature radar set no bigger than a milk bottle which is fitted in the nose of the A.A. shell and explodes it as soon as the projectile gets within 70ft. of its target—near enough to inflict damage.

Known as the "radio proximity fuse," it consists of a five-valve radio transmitter sending out electro-magnetic impulses at the speed of light—186,000 miles per second. These impulses are reflected back to the set by any target giving radio deflection (such as metal objects, water, or earth) and when the shell passes within 70ft. of its target the reflected impulses act on a fuse which touches off an electrical detonator, thus firing the main charge in the normal way. Obviously the mechanism would have to include a safety device in case the projectile missed the target by more than 70ft., so that it could not be exploded by a return to earth. But no details of this part of the proximity fuse are actually given. It may well

tory, formed an important base for the Allied air control of the Atlantic, and has become a familiar sight to thousands of American soldiers who were transported home by air from Europe.

The airport is now nominally Portuguese property, but unconfirmed reports say that it will be returned to the U.S. on a 99 years' lease in return for various transport equipment needed by the Portuguese army.

AFRICAN MEETING

THE Southern Africa Air Transport Council will meet for the first time in Pretoria on September 25th and 26th.

The council will probably decide on arrangements for a London-Johannesburg airline, discuss regional services covering the whole of Southern Africa and the co-ordination of services with neighbouring territories and generally implement the decisions of the Cape Town Air Conference.

The temporary airport for international traffic at Palmietfontein is practically ready and work on the Salisbury airdrome is also making good progress.

ELUDING THE ENEMY

IN spite of constant attacks by German fighter aircraft operating from Norway and Denmark a total of 6,000 passengers and 500,000 tons of freight were transported over the dangerous courier route between Stockholm and Great Britain during the war, Mr. D. Grey, chief of the B.O.A.C. Stockholm office, stated at a Press conference in Oslo.

The aircraft which had to fly over German-occupied Norway carried ball-bearings, machine parts and manganese, besides great quantities of courier mail.

After 1942 they were piloted exclusively by Norwegian personnel, who did remarkable work with the minimum of accidents, Mr. Grey added.

have taken the form of an additional time fuse which would explode the projectile at the top of its trajectory if the proximity fuse had not been called into operation.

IMPROVED ROCKET LAUNCHING

YET another little war secret now also released for publication is the "zero-length projector" which does away with the long rails, or in the case of American types, long tubes from which rocket-firing aircraft launch their projectiles. The fitting releases the rocket after only one inch of forward movement. Greater accuracy as well as less bulk is claimed for this development in rocket-firing from aircraft.

DEATH OF JACK SAVAGE

WE regret to announce the death of Major J. C. Savage, M.B.E., late R.A.F., which took place on Monday, September 17th. Jack Savage, born in 1891, was a flying pioneer, being apprenticed to Graham White in 1909 and later becoming manager for B. C. Hucks, the first Englishman to loop. As a member of the staff of *Flight* he wrote technical notes under the *nom de plume* of "Oiseau Bleu."

After distinguished service in the R.N.A.S. and R.A.F., 1914-1918, he invented sky-writing, and for some years owned and operated the largest British civil air fleet in sky-writing campaigns throughout the Americas, India, Australia and Europe. Later he invented and built searchlights, using a revolutionary reflecting principle for projecting slogans on night clouds. Though Air Ministry intervention, later relaxed, strangled the development of sky projection in England, he sold the invention abroad, and used its basic principles in developing military searchlights. In the period between these major inventions he pioneered crop-spraying from aircraft and sponsored the Savage-Bramson anti-stall gear.

As war approached he founded Savage and Parsons, Ltd., at Watford, and directed his brilliance and inventive mind to the design and manufacture of searchlights, sound locators, electric and remote control gear and other highly technical apparatus for the armed forces.

Perhaps the work of which he was most proud was his development, and his firm's production, of Wing Commander Leigh's idea of combating the U-boat menace at night—the phenomenally successful Leigh light.

Jack Savage was mentally and physically big, but the biggest part of him was his heart. What a host of friends will mourn his passing and sympathise with his widow and family.

G. A. L.

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.

GLOSTER METEOR IN ACTION

Smoke Trails Always Present

I HAVE read in more than one report that the abovementioned aircraft does not normally leave smoke trails in its wake and I am rather interested to know why this statement is persisted in.

Many times I have watched Meteors traversing the sky on "doodle-bug" patrol, etc., and the trails always seem to have been present to a certain degree.

The hatched line trail effect, which appeared to occur when the guns were opened up, was rather amusing and may have been caused by the recoil retarding the aircraft and having a temporary limiting effect on the expansion of the gases emitted.

I might add that when these aircraft start their run to take off quite a pall of what appears to be black smoke is left around the starting point.

H. M. ABSOLON.

WHAT'S IN A NAME?

"Vampire" Not the Happiest Choice

WITHOUT full information it is impossible to appreciate the system adopted in naming aircraft. If, however, aptness be a criterion, I suggest, with all due apologies to the makers and selectors of the name Vampire, that a happier choice was open.

Perhaps the following few lines will illustrate the point. I would stress that this criticism is not to detract from admiration of a fine display of airmanship, and a magnificent performance by a lovely aircraft.

HYDE PARK.

Sunday, September 16.

Who named thee "Vampire,"	As thy swift beauty
Named thee not well;	Shears Victory sky,
No terror are thou	Rather attribute thee
from nethermost Pit,	Angelic scion,
Creature of Hell.	Hell to defy.

Breath of thy passing
Like sword of flame
That guarded Eden,
Thy watchword Duty,
"Falchion" thy name.

S. L. QUINE, Group Capt.

THE TUNE HAS CHANGED

Air Ministry and the A.T.C.

WITH reference to your leading article in *Flight* of September 6th, there is nothing "priceless" about the Chief Commandant's appeal for officers for the A.T.C. It was inevitable that the victorious conclusion of the war should leave a surplus of aircrew and of potential aircrew. To have attempted in 1942 or 1944 to adjust the A.T.C. entry to the precise demands of 1944 would have been utterly impossible, since no one could foresee what the losses might be. In war it is the duty of the Government to build up its strength in material and man-power to the utmost to meet possible reverses or protracted campaigns. Victory will inevitably leave a surplus.

It is, of course, hard to justify the acceptance in the R.A.F. of men who were not cadets after cadet entries had been stopped, and quite impossible to justify the selection of cadets for mining by lottery. But the directing of cadets into the Army, though hard on the individual, was a national necessity that the best type of cadet accepted with good grace. Many ex-cadets have stated that the Army treated them very well.

There may, however, be differences of opinion about this, but there can be no doubt that although for the moment there may not be enough jobs in the R.A.F. and civil aviation for all who want them, it is still essential that the British Empire should have a large reserve of young men with some training in air matters who would be ready in case they were wanted. There is no doubt, either, that the young men are willing. Though they are not prepared to spend five nights a week swotting at maths., as they were under the stress of war in 1941, there are many thousands anxious to give a reasonable amount of time to voluntary air training without calculating the possible reward in the form of jobs in aviation.

The appeal to demobilised personnel to become officers and instructors is an attempt to ensure that the training of these young men shall be in the capable hands of those who have brought us victory in the war.

L. TAYLOR
(Editor, *A.T.C. Gazette*).

CAMPAIGN AWARDS

Fleet Air Arm "Left Out"

NOW that the war is over and there are so many campaign stars and medals being awarded, may I point out that once again the Fleet Air Arm has been left out?

During the war so much publicity (well earned, I agree) has been given to the R.A.F. and so little to the F.A.A. that a lot of people are under the impression that the R.A.F. are the only people who have flown against the enemy. May I suggest that the "Europe" be deleted from the new star "Air Crew Europe Star," and qualification based on a certain number of operational hours flown, regardless of the theatre of ops.?

The great majority of our Service do not qualify for this star though they may have flown in attacks in all parts of the world. The squadrons that operated over Norway, because they flew from carriers, are debarred from claiming the award—though R.A.F. personnel doing the same job, but flying from land bases, are entitled to it. To my knowledge only one or two F.A.A. squadrons will be eligible for it—the mine-laying squadrons working from a southern airfield. I do think that there should be some recognition of the fact that we also did a bit of flying during the war. "POTAG."

DEFLEX-REACTION PROPULSION

A Fallacious Argument

I SHOULD like to offer the following comments on Mr. Umpleby's article in *Flight*, September 13th.

It is a fundamental truth that the thrust of a jet engine is given by the overall increase in the momentum of the air handled by the unit, i.e.:

$$\text{Thrust} = \frac{M}{g} (V_j - V)$$

where M = mass flow per unit time
V = forward velocity relative to surrounding atmosphere

V_j = jet velocity at exit nozzle relative to power unit

This equation must hold good irrespective of what path the air follows in its passage through the engine.

Mr. Umpleby's argument is therefore fallacious, one reason being that momentum considerations will only give the total reaction due to any process provided the pressure of the working fluid is the same at the end as at the beginning of the process.

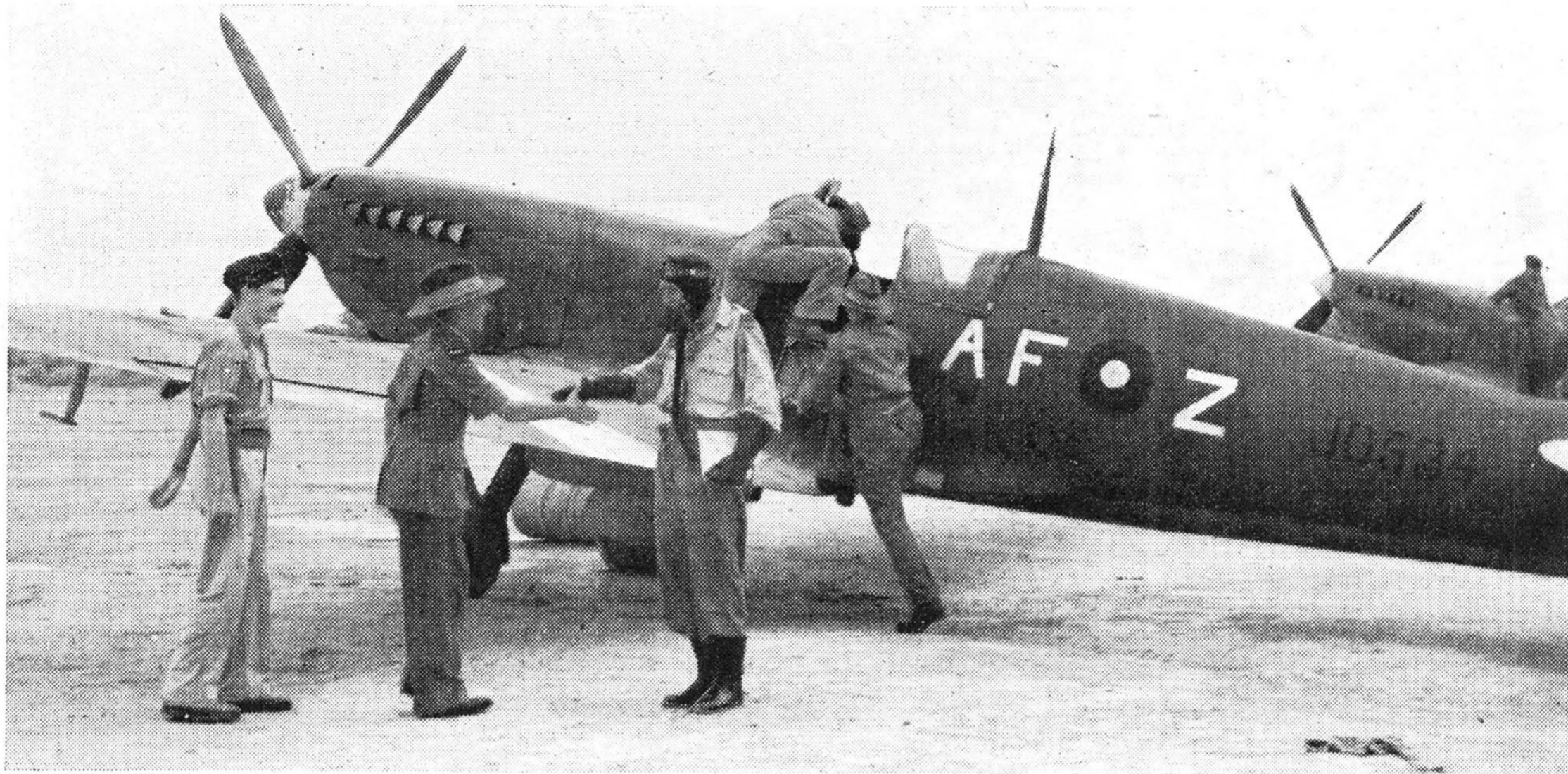
D. R. NEWMAN, A.F.R.Ae.S.

Half the Facts Ignored

THE article in *Flight* of September 13th, 1945, on "Deflex- Reaction Propulsion" is not really controversial; it ranks as pure fallacy. At its best, it is an attempt to assess the distribution of propulsive thrust between different points on a particular type of engine, and even then it ignores completely all the forces due to different pressures occurring at different stages in the engine.

If allowance is made for these pressure forces integrated over the whole of the surfaces on which they act, in addition to the forces due to change of momentum, it is possible to estimate with a fair degree of accuracy the resultant thrusts taken by the various components of a gas turbine engine. But no matter how the path of the gas twists and twines, the algebraic sum of the axial components of these forces will equal the propulsive force of the engine defined in the normal way as equal to the rate of change of momentum of the gas passing through the engine. Useful thrust = mass of gas per sec. (component of jet velocity in line of flight—aircraft velocity) and unless bending the flow-path of gas is going to result ultimately in a higher jet velocity—which is most unlikely since every bend results in losses due to friction and turbulence—it will produce no improvement in thrust. No amount of calculation which ignores half the facts can provide a basis for serious controversy.

D. H. MALLINSON, B.Sc.
(Messrs. Power Jets (R & D), Ltd.).



SQUADRON'S END: When No. 607 County of Durham Auxiliary Squadron was disbanded recently, Air Vice-Marshal C. A. Bouchier, C.B., C.B.E., D.F.C., made a surprise visit to the Squadron. Air Vice-Marshal Bouchier, who commands an R.A.F. Group in Burma, is seen greeting Flt. Lt. Nicholson, who flew the last sortie.



SERVICE AVIATION



Royal Air Force and Naval Air Arm News and Announcements

Awards

Royal Air Force

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

Distinguished Service Order

Act. Wing Cdr. J. H. DEALL, D.F.C., R.A.F.V.R., H.Q., No. 146 Wing.—On his first tour of operations Wing Cdr. Deall took part in numerous missions over North-Western France, operating on fighter patrols, sorties against enemy shipping and on attacks on enemy airfields. During this tour he destroyed three enemy aircraft and damaged one. Since the award of the D.F.C. he took part in the operations in support of the invasion of Normandy. As commanding officer of a squadron, Wing Cdr. Deall led many brilliant and successful missions, in the course of which he destroyed important German H.Q. at Dordrecht and Bilthoven. As Wing Commander Flying this officer has planned and led a number of important attacks. Many of his sorties have been hazardous in the extreme, and on all occasions he has displayed outstanding gallantry and devotion to duty.

Second Bar to Distinguished Flying Cross

Act. Sqn. Ldr. J. SHEPHERD, D.F.C., R.A.F.V.R., No. 41 Sqn.—Sqn. Ldr. Shepherd is now on his third tour of operational duty. Since the award of a Bar to the D.F.C. he has destroyed seven enemy aircraft and seven flying bombs. He has also destroyed or damaged 160 enemy transport vehicles. Intense anti-aircraft opposition has never, in any way, deterred him from completing his missions. As a squadron commander, Sqn. Ldr. Shepherd has set a fine example to all under his command.

Distinguished Flying Cross

Act. Wing Cdr. D. MACKENZIE, R.A.F.O., No. 547 Sqn.
Sqn. Ldr. R. G. ENGLISH, R.A.F.O., No. 220 Sqn.
Act. Sqn. Ldr. F. L. DODD, D.S.O., A.F.C., R.A.F.V.R., No. 544 Sqn.
Act. Sqn. Ldr. J. A. F. LEAVER-POWER, R.A.F.V.R., No. 254 Sqn.



The recently approved badge of No. 296 (Airborne Forces) Sqn., R.A.F.—“Prepared for All Things.”

Flt. Lt. L. F. BANKS, R.A.F.V.R., No. 206 Sqn.
Flt. Lt. F. W. BARKER, R.A.F.V.R., No. 524 Sqn.
Flt. Lt. S. A. BARRY, R.A.F.V.R., No. 517 Sqn.
Flt. Lt. T. L. BRINTON, R.A.F.V.R., No. 524 Sqn.
Flt. Lt. W. R. BROWN, R.A.F.V.R., No. 524 Sqn.
Flt. Lt. D. J. D. CLARK, R.A.F.V.R., No. 542 Sqn.
Flt. Lt. J. G. COOPER, R.A.F.V.R., No. 248 Sqn.
Flt. Lt. G. W. COTTERILL, R.A.F.V.R., No. 540 Sqn.
Flt. Lt. G. DAVISON, R.A.F., No. 58 Sqn.
Flt. Lt. L. S. DEARLING, R.A.F., No. 541 Sqn.
Flt. Lt. J. F. J. DEWHURST, R.A.F.V.R., No. 612 Sqn.
Flt. Lt. E. C. W. FIELDER, R.A.F.V.R., No. 220 Sqn.
Flt. Lt. W. F. J. HARWOOD, R.A.F.V.R., No. 86 Sqn.
Flt. Lt. R. A. HILTON-BARBER, R.A.F.O., No. 540 Sqn.
Flt. Lt. J. KELWAY, R.A.F.V.R., No. 236 Sqn.
Flt. Lt. D. F. MEDHURST, R.A.F.V.R., No. 86 Sqn.
Flt. Lt. K. McK. MURRAY, R.A.F.V.R., No. 210 Sqn.
Flt. Lt. H. J. RAYNER, R.A.F., No. 224 Sqn.
Flt. Lt. D. J. SAVAGE, R.A.F.V.R., No. 236 Sqn.
Flt. Lt. R. H. SMYTH, R.A.F.V.R., No. 541 Sqn.

Flt. Lt. A. J. W. STANCOMB, R.A.F.V.R., No. 524 Sqn.
Flt. Lt. E. A. STONE, R.A.F.V.R., No. 220 Sqn.
Flt. Lt. S. G. TURNER, R.A.F.V.R., No. 88 Sqn. (With effect from August 12, 1944 (since deceased)).
Act. Flt. Lt. R. W. BOON, R.A.F.V.R., No. 228 Sqn.
Act. Flt. Lt. D. L. VANSTONE, R.A.F.V.R., No. 524 Sqn.
Act. Flt. Lt. M. WARD, R.A.F.V.R., No. 83 Sqn.
F/O G. F. BARNES, R.A.F.V.R., No. 236 Sqn.
F/O G. W. CALDER, R.A.F., No. 236 Sqn.
F/O I. CAY, R.A.F.V.R., No. 254 Sqn.
F/O E. HILL, R.A.F.V.R., No. 544 Sqn.
F/O P. E. LAIRD, R.A.F.V.R., No. 206 Sqn.
F/O L. G. R. OLIVER, R.A.F.V.R., No. 540 Sqn.

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

Military Medal

Sgt. A. M. BROWN, No. 3207 Servicing Commandos.

Roll of Honour

Casualty Communique No. 539.

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

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. R. G. A. Breach; F/O E. N. Cave; F/O M. J. H. Cooke; Flt. Lt. J. E. Cryer; P/O J. D'Arcy; Flt. Sgt. N. Davison; Flt. Lt. R. O. Day; P/O R. Fairclough; Flt. Sgt. F. N. G. Ford; Flt. Sgt. S. B. Frith; Flt. Sgt. A. C. A. Grace; Flt. Lt. D. R. Hatton; Flt. Lt. V. Howkins; Flt. Sgt. G. R. Kennedy; Flt. Sgt. J. W. Laing; Sgt. J. McAvooy; Act. Sqn. Ldr. C. E. Maitland, D.F.C.; Flt. Sgt. J. G. Robinson; Flt. Lt. W. H. Shephard; P/O W. A. Togwell; Flt. Sgt. D. J. T. Twist; W/O M. C. White.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. McN. Docherty.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O R. S. Anyon; Flt. Sgt. L. W. J. Arnold; Flt. Sgt. E. Bailey; Sgt. A. W. Baskott; F/O H. W. V. Bearne; Flt. Sgt. F. J. Bell; Sgt. M. Bell; Act. Sqn. Ldr. M. I. Boyle, D.F.C.; Sgt. J. L. Bradburn; Wing Cdr. N. B. R. Bromley, O.B.E., D.F.C.; Flt. Sgt. P. Burt; Flt. Sgt. M. P. Butler; Flt. Sgt. R. Cadman; Flt. Sgt. R. Cairns; Sgt. G. Caine; Flt. Sgt. G. M. Canning; Sgt. G. Carter; F/O J. E. Chapman; P/O T. T. Charlton; Flt. Sgt. E. W. Clark; Sgt. C. A. Clarke; P/O R. B. Clarke; Flt. Sgt. D. Clough; P/O A. T. Cox; Sgt. L. A. Critchley; Sgt. H. M. Crooks; W/O D. H. J. Cross; Sgt. A. H. Dawkins; F/O A. K. M. Dean; Sgt. H. Dewhurst; P/O H. Dixon; P/O P. J. Dunstan; Flt. Sgt. J. C. Earl, D.F.M.; W/O J. P. Edwards; Act. F/O C. Erritt; Sgt. F. W. Evered; F/O E. E. Fletcher; W/O P. Foley; Flt. Sgt. D. Forster; Sgt. W. E. France; Flt. Sgt. F. H. Gibberson; P/O P. A. Gleeson; Sgt. R. F. Godfrey; P/O K. Gosling; P/O D. Graaf; Sgt. T. J. C. Hartley; F/O J. R. Haynes; F/O J. S. Hodge; W/O A. Holland; Flt. Lt. W. E. Hull, D.F.C.; P/O H. Ibbotson; P/O J. A. Jackson; Sgt. L. Johnson; Sgt. R. N. Johnson; Flt. Sgt. G. Jones; F/O

S. E. Jones; Sgt. D. J. Knowles; F/O. K. T. Larman; Act. Sqn. Ldr. H. C. Lobb; P/O. K. G. Marris; Sgt. H. P. Martin; Sgt. N. W. C. Miller; Act. F/O. J. E. Morgan; Sgt. N. V. Naylor; F/O. D. F. O'Sullivan; P/O. P. D. Parkes; Flt. Sgt. S. R. Patti; W/O. A. W. Phillips; Sgt. J. R. Plant; F/O. T. J. Pullin; F/O. V. D. Purvis, D.F.C.; P/O. C. Reed; Sgt. I. H. M. Reid; Flt. Sgt. G. Rhodes; Sgt. J. A. Roberts; F/O. K. R. Rogers, D.F.C.; Sgt. V. R. Roper; F/O. E. L. Sharp; F/O. L. D. Steylaerts; Sgt. R. Stubbings; W/O. E. A. Taylor; Flt. Lt. P. V. Truscott; Sgt. E. H. Turner; Sgt. J. Waites; Sgt. T. Waring; P/O. C. G. Washington; Sgt. R. H. Watts; Sgt. M. Webb; Sgt. B. D. West; Sgt. A. Whimpenney; Act. F/O. W. L. White; F/O. W. H. Widger, D.F.M.; Sgt. R. G. Williams; Act. Flt. Lt. G. Wilson, D.S.O., D.F.C., D.F.M.; F/O. R. D. Wilson, D.F.M.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. C. A. Cunningham.

WOUNDED OR INJURED IN ACTION.—Sgt. D. R. Bowers; F/O. J. D. Burford; F/O. E. Hartley; Flt. Sgt. J. T. S. Kennovin; W/O. T. Tyler, D.F.M.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. F. R. Stead.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. J. Allan; Sgt. A. W. Beauchamp; Sgt. D. F. Brown; F/O. W. J. Ceybird, D.F.M.; Flt. Lt. N. Harwood; Flt. Sgt. R. B. Judge; Flt. Lt. J. H. MacD. MacKinnon; F/O. J. F. A. Neal; Flt. Sgt. R. Pollock; Sgt. R. D. Snape.

MISSING.—P/O. J. A. Anderson; F/O. K. R. Bearcroft; Flt. Lt. N. C. Berrisford, D.F.C.; W/O. D. B. Brichtie; Flt. Sgt. W. E. Browne; Sgt. H. Darbyshire; Flt. Sgt. E. J. Day; P/O. F. H. Debarr; Flt. Sgt. T. G. W. Dew; Flt. Sgt. J. Dyke; P/O. W. J. Edwards; F/O. W. T. Evans; Flt. Sgt. J. J. Ferguson; Sgt. R. A. Fielding; Sgt. J. F. Fry; Flt. Sgt. E. W. Gibbs; Sgt. T. Gibson; Flt. Lt. H. B. Gryniewicz; Flt. Sgt. R. T. C. Guscott; Flt. Sgt. G. E. Gwalter; Flt. Sgt. J. R. Hart; Flt. Lt. S. H. Hatsell, D.F.C.; Sgt. F. R. Haylock; Flt. Sgt. W. L. Hilder; Sgt. F. W. Hughes; F/O. W. A. Hughes; Sgt. K. E. Hunt; Sgt. R. Hurley; Sgt. P. F. Ivett; Sgt. R. Jeffery; Sgt. T. J. Jones; Flt. Sgt. J. L. Jones; P/O. T. MacD. Kerr; Act. Sqn. Ldr. L. F. D. King; Act. Sqn. Ldr. K. G. Laverack; Sgt. G. C. Leeke; Flt. Sgt. G. W. Linnard; Sqn. Ldr. I. MacLeod-Selkirk; Sgt. F. McWilliams; Sgt. F. Milton; Act. Wing Cdr. R. A. Mitchell, D.F.C.; Flt. Sgt. R. Nesbit; Sgt. T. L. O'Marah; Sgt. R. A. C. Pearce; F/O. R. C. Pitman; F/O. W. F. Possee, D.F.C.; Flt. Sgt. A. Pringle; Sgt. W. M. Ratcliffe; Sqn. Ldr. R. Reid; Flt. Sgt. J. W. Richards; Flt. Lt. S. O. Searles, D.F.C.; Flt. Lt. L. A. W. Smith; Sqn. Ldr. I. G. Stewart, D.F.C.; Sgt. R. G. Sutherland; Flt. Lt. D. P. Tough; P/O. J. Toy; Flt. Lt. T. Treby; F/O. A. D. Turner; Act. Flt. Lt. E. Ward; Sgt. G. H. White; Sgt. E. C. Wilkie; Flt. Sgt. E. W. Wilkinson; Flt. Sgt. P. Y. Yanai.

KILLED ON ACTIVE SERVICE.—Sgt. A. Blumbergas; P/O. C. H. Boston; Flt. Lt. R. Campbell; Sqn. Ldr. A. J. Davey, D.S.O.; Sgt. G. Dinsdale; Sgt. J. Ellarby; Sgt. J. Forbes; P/O. A. G. Hemmings; Sgt. J. H. Lawrence; A/C.2 D. J. Laws; Sgt. J. Lawson; P/O. K. A. Millard; F/O. C. G. Montgomery; Flt. Lt. A. K. Murdoch, D.F.C.; W/O. N. H. Pilkington; W/O. A. D. Price; Sgt. P. Richman; Flt. Lt. H. D. Roper; W/O. N. F. Rouse; L.A/C. R. R. W. Stephens; Flt. Lt. A. J. Volek; F/O. A. P. R. Walker; Flt. Lt. J. E. Yarnall.

PREVIOUSLY REPORTED MISSING BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Act. Flt. Sgt. E. A. Hannah.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. H. Elston; L.A/C. G. S. Griffin; Cpl. W. L. D. Locke; L.A/C. W. M. Ward.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. L. V. Huntington.

DIED ON ACTIVE SERVICE.—Cpl. E. A. Davison; A/C.2 G. W. Harvey; Cpl. R. A. J. Hellier; W/O. C. H. Slight; Cpl. J. J. Wadsworth; F/O. J. White.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Lt. J. P. Garrard.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. N. W. B. Brady; P/O. L. F. W. Burrow; W/O. H. J. Deester; Flt. Sgt. R. H. Etherington; F/O. N. T. Glenn; Flt. Lt. M. C. S. Hayes.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.

—Flt. Sgt. J. A. Alexander; Flt. Sgt. C. G. Arthur; Act. Flt. Lt. R. C. Banfield; Flt. Sgt. D. R. Barr; Flt. Sgt. G. W. Bateman; Act. F/O. D. Beharrie; F/O. A. P. Bowman; W/O. R. H. Boyd; Flt. Sgt. R. V. Boyd; Flt. Sgt. M. Box; P/O. T. W. Bradley; Flt. Sgt. E. B. Brown; P/O. K. E. Bryan; Act. F/O. G. C. Bucknell; Act. F/O. J. H. Busby; Flt. Sgt. R. W. Butler; P/O. J. W. Carter; W/O. D. E. Close; Flt. Sgt. G. G. Collard; Act. Flt. Lt. P. A. Cranmer; Flt. Sgt. W. R. Elgar; Flt. Sgt. A. W. Farrer; W/O. R. B. Flegg; Flt. Sgt. H. J. G. Fry; W/O. R. W. F. Gallagher; Flt. Sgt. F. J. Geddes; W/O. O. J. Goddard; Flt. Sgt. M. J. Hackett; P/O. A. H. Harvey; Flt. Sgt. R. H. Hobbs; Flt. Sft. T. A. Hopkins; Act. F/O. K. M. Hutchins; F/O. G. J. M. Johnstone; Act. Flt. Lt. F. J. King; W/O. J. Leary; W/O. J. A. Leaver; Flt. Sgt. V. V. R. Leeder; Flt. Sgt. H. S. Lister; Flt. Sgt. H. G. McAllister; Flt. Sgt. R. McAllister; Flt. Sgt. J. M. Mooney; Flt. Sgt. B. Moxham; Flt. Lt. N. L. Myers; Flt. Lt. K. M. Napier; P/O. J. A. H. Nimmo; F/O. G. Pead; Flt. Sgt. F. R. Rogers; Flt. Sgt. K. J. Schott; Flt. Sgt. J. L. Shortal; Act. Flt. Lt. P. E. Sinclair, D.F.C.; P/O. E. A. Skillen; Flt. Sgt. W. J. Struthers; P/O. A. T. Thornton; Flt. Lt. L. O. Tugwell; Flt. Sgt. J. Turner; Act. F/O. R. G. Turvey; Flt. Lt. D. W. Wickes; F/O. H. E. Williams; Flt. Sgt. R. W. Wright.

WOUNDED OR INJURED IN ACTION.—W/O. S. J. Sandilands.

MISSING.—P/O. W. K. Bennett; P/O. R. G. Crisford; P/O. S. G. De Vis; W/O. J. D. Green; F/O. E. H. McDonald; P/O. B. E. Miller; F/O. G. C. Yorkston.



Air Vice-Marshal P. H. Mackworth, C.B.E., D.F.C., the new S.A.S.O. of R.A.F. Coastal Command.

KILLED ON ACTIVE SERVICE.—F/O. A. E. Brechin; F/O. R. K. Dorrington; Flt. Sgt. W. K. Hunter.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. E. S. Taylor.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. R. D. A. Becker; Flt. Sgt. R. A. Biggerstaff; P/O. H. B. Boddy; Flt. Sgt. M. W. Coones; F/O. E. W. McCann; P/O. B. J. McCarthy; F/O. F. MacG. Myers; F/O. H. S. Watts; P/O. W. A. Way.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. T. H. Dahle.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Flt. Lt. R. L. Sutherland.

MISSING, BELIEVED KILLED IN ACTION.—P/O. A. Coott.

MISSING.—Flt. Sgt. J. W. Allan; Sgt. J. A. Ballamy; Flt. Sgt. D. Bellantino; Flt. Sgt. P. W. Davies; F/O. G. W. Hess; W/O. W. A. Johnson; Flt. Sgt. G. W. Laut; Flt. Lt. J. N. McPhee; Flt. Lt. W. G. E. G. C. Richards; F/O. G. A. Robinson; F/O. R. F. Thompson.

KILLED ON ACTIVE SERVICE.—F/O. J. W. Cairns; F/O. R. F. D. Smith.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. S. G. Catto; W/O. G. L. Gillan; F/O. E. W. Young

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. S. Barker; W/O. K. L. Boyd; W/O. R. Firth; P/O. J. Lawrie; P/O. P. S. Watt; Flt. Sgt. A. L. F. Wright.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Act. Flt. Lt. M. L. Hunt.

MISSING.—P/O. F. M. Ashworth; Flt. Sgt. M. D. S. Davis; Flt. Sgt. E. A. Roy; F/O. E. K. Whitechurch.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. W. R. Allison. MISSING.—Lt. P. E. Hill.

Southern Rhodesian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. P. H. C. Theodosiou.

Royal Indian Air Force

KILLED ON ACTIVE SERVICE.—P/O. N. A. H. McGinn



PACIFIC JAPS: Japanese surrender envoys arriving at Mingaladon airfield, Rangoon. They flew in two "Topsy" transports, one of which is seen, painted all white. A point of interest is the neat cowling of the engines.

SERVICE AVIATION

Casualty Communiqué No. 540

Of the names in this list 169 are second entries giving later information of casualties published in earlier lists.

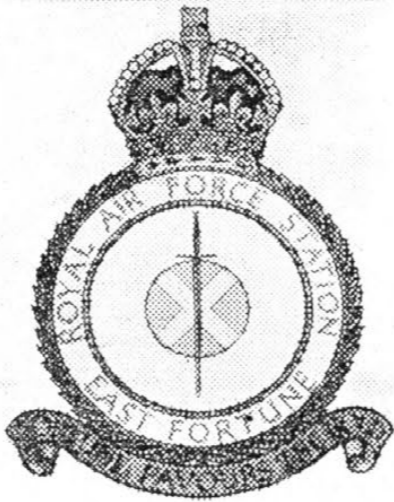
Royal Air Force

KILLED IN ACTION.—W/O. J. E. Bellamy; Sgt. W. Berry; Sgt. J. A. Cornwall; Sgt. L. Elliott; Flt. Sgt. R. R. Evans; Sgt. W. H. Fox; F/O. G. H. Huttleston; Sgt. D. Lucey; Sgt. H. McClements; Sgt. S. Matthews; Sgt. R. F. G. Mitchell; Sgt. J. E. Taylor; Sgt. D. Swingler.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. L. D. Arcus; Sgt. J. Brown; Flt. Sgt. H. T. Wise



(Left) The badge of No. 287 Sqn., R.A.F.—
"C'est en Forgeant" (Practice Makes Perfect).



(Right) Badge of R.A.F. Station, East Fortune—
"Fortune Favours the Bold."

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. F. C. Allford; F/O. J. Allinson, D.F.M.; Sgt. C. Aspinall; Sgt. F. E. F. Bale; Sgt. J. T. Bamford; Flt. Sgt. E. A. Batterbee; Sgt. C. Beagle; Flt. Lt. G. Bell, D.F.C.; P/O. B. F. Blatchford; F/O. A. A. Boad; Sgt. R. J. Boorman; Sgt. R. H. Boulton; F/O. G. A. Bowman; F/O. J. R. Brookes; Sgt. L. Brough; F/O. W. H. I. Cameron; F/O. K. S. Carr; Sgt. J. R. Carruthers; Flt. Sgt. R. D. Christie; F/O. G. D. Coldwell-Horsfall; F/O. E. J. Cole; Sgt. H. Daly; Sgt. R. S. Darling; Sgt. D. R. M. Davies; Act. Sqn. Ldr. J. M. Dennis, D.S.O., D.F.C.; Sgt. H. Forbes; Flt. Sgt. J. C. Gay; Flt. Sgt. S. A. Hancock; P/O. A. Hargrave; P/O. D. E. D. Harvey; Sgt. R. Harwood; Sgt. W. W. Hopper; F/O. M. W. Hustwick; Act. Flt. Lt. J. G. Irwin; Sgt. K. T. James; Sgt. A. C. Jones; Act. Flt. Lt. L. C. Jones; Sgt. P. J. J. Kofod; Sgt. T. Law; Flt. Sgt. A. G. Lawrence; P/O. M. S. Layton-Smith; W/O. G. R. Leiper; Sgt. A. J. Little; Flt. Lt. J. G. McCall; Act. Flt. Lt. P. G. McCarthy, D.F.C.; Sgt. K. McKenzie; Flt. Sgt. R. MacQuaker; F/O. W. McTaggart, D.F.M.; Sgt. K. M. Martin; P/O. J. H. Mason; Act. Flt. Lt. M. I. Masy; Sgt. H. W. Matthews; Sgt. R. H. Moyle; Sgt. J. W. L. Parker; Sgt. R. R. Parker; Sgt. E. G. R. Pepper; Sgt. J. F. C. Rae; Sgt. K. L. Ramage; Sgt. W. B. Rankin; Sgt. D. Rimmer; Sgt. H. P. Robinson; Sgt. P. H. Roots; F/O. A. Roscoe; Sgt. A. R. Rowlands; Sgt. O. E. G. Smart; Flt. Sgt. E. A. Stone; Sgt. W. C. Taylor; Flt. Sgt. F. C. V. Tuck; Sgt. N. Walters; Sgt. B. E. Wareham; Flt. Sgt. J. J. Waters; Sgt. I. J. Weaver; Flt. Sgt. R. B. Webb; F/O. A. W. Weston; P/O. R. A. Wheeler; Sgt. D. B. White; Flt. Lt. R. D. Wibberley; F/O. L. A. Wright.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. A. Relton.

WOUNDED OR INJURED IN ACTION.—P/O. R. M. Perkins; W/O. E. J. Skelton.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. D. A. Drew; Flt. Sgt. D. R. Egan; Sgt. R. Owen; F/O. G. C. Warren; Flt. Sgt. J. W. Williams.

MISSING.—Sgt. J. E. Aldridge; Sgt. S. Armitage; Act. F/O. N. S. Ayres; Flt. Sgt. G. W. Blackshaw; Sgt. E. D. T. Brockhurst; F/O. R. G. Buckland; Sgt. A. H. Bunn; Flt. Sgt. J. D. Cairns; Flt. Sgt. K. L. Challis; Sgt. S. Chapman; Sgt. G. A. Clarke; Act. F/O. C. J. Cooper; Flt. Sgt. E. E. Crofts; Flt. Sgt. A. Davies; Sgt. D. W. Debonnaire; Sgt. L. Dovaston; Sgt. J. P. Edmondson; F/O. J. T. Evans; Sgt. J. Eve; W/O. H. L. Farmer; Sgt. A. Finnerty; F/O. J. V. Gardner; Sgt. J. Goldstein; Flt. Sgt. R. Gordon; Sgt. J. Grant; Flt. Sgt. G. G. Green; Sgt. C. H. Gregory; F/O. H. B. Hale; P/O. A. C. Harris; Sgt. A. W. Hathaway; Sgt. L. Henshaw; Flt. Sgt. J. S. Hickey; Sgt. T. L. Hill; Sgt. P. C. Hopper; Sgt. D. J. Hughes; Flt. Sgt. E. K. Ireland; Sgt. J. F. Jackson; Flt. Sgt. M. R. Jeffrey; Sgt. W. J. Jewiss; Sgt. C. W. Job; Sgt. V. Jones; Flt. Sgt. M. D. A. Kempster; Sgt. G. O. Little; Sgt. N. McNicol; Sgt. J. MacPherson; Sgt. D. Marsden; Sgt. J. Mitchell; Sgt. R. Morris; F/O. F. T. Murray; Sgt. L. B. Neaves; Flt. Sgt. J. Paterson; Sgt. L. Pendleton; W/O. A. E. Redford; W/O. S. E. Silvey; F/O. A. W. Sime; Flt. Sgt. D. C.

Stevens; P/O. H. K. Stott; Sgt. D. W. E. Swift; Sgt. J. Symonds; Sgt. J. E. Taylor; Sgt. T. Tomlinson; Flt. Sgt. J. Tweedy; Sgt. L. J. Vowler; Sgt. S. H. Walker; Flt. Sgt. W. Whitehead; Flt. Sgt. A. E. Whiteing; F/O. R. Wilkinson; P/O. H. Woffenden.

KILLED ON ACTIVE SERVICE.—Flt. Lt. A. H. Burr, D.F.C.; L.A/C. G. H. Johnson; L.A/C. D. C. Moore; L.A/C. B. Rees; L.A/C. T. J. Roberts; Sqn. Ldr. J. R. Tobin, A.F.C.; L.A/C. T. Turner; L.A/C. A. Wilkinson; Cpl. D. L. C. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. J. Boyd; W/O. G. D. M. Robb.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. H. Fairclough.

DIED ON ACTIVE SERVICE.—Sqn. Ldr. F. F. W. Chitty; W/O. R. E. Jamieson; Sgt. R. H. Lawrence; Cpl. K. MacLennan; L.A/C. M. J. Murray; Flt. Sgt. C. A. Phyll; L.A/C. S. Smiles.

Royal Australian Air Force

KILLED IN ACTION.—F/O. L. P. Bacon.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. H. Abraham; Act. F/O. D. A. Barlow; Flt. Sgt. M. R. Jones; Flt. Sgt. J. O. Ohlson; Flt. Sgt. R. K. Scott.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. G. C. Barber; F/O. R. J. Browning; P/O. T. J. Burgess; Flt. Sgt. M. H. Cutmore; Flt. Sgt. W. G. B. Dial; Flt. Sgt. K. MacD. Finney; Flt. Sgt. M. G. Francis; W/O. A. Hamilton; F/O. H. E. Jarvis; P/O. J. W. Smart; W/O. B. G. Stokes.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. McAuliffe.

MISSING.—Act. F/O. R. S. Bennett; F/O. R. G. Dawson; F/O. A. W. Essex; P/O. A. N. Levy; Flt. Sgt. J. F. Ryan.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. L. W. Armstrong; F/O. J. D. Ball; F/O. E. B. Carleton, D.F.M.; F/O. H. L. Garriock; Sgt. T. C. Kossatz; F/O. J. O. Stewart; Flt. Sgt. W. G. White.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. P. E. Cronin; W/O. W. C. Powers; F/O. D. G. Stevenson; P/O. C. B. Sutton.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. A. J. G. Barnes; W/O. R. J. Barrett; P/O. W. B. Bentz; P/O. R. D. Borrowes, D.F.C.; P/O. J. E. Y. Bouchard; F/O. K. Brayne; P/O. R. G. Bruegeman; F/O. A. D. Callander; P/O. O. F. Compton; Flt. Sgt. P. A. Crowley; P/O. C. J. Dempster; F/O. D. G. Depew; W/O. J. Donaldson; Sgt. G. T. Doyle; P/O. K. W. Drumm; F/O. A. H. Eldridge; P/O. L. L. Feindell; Sgt. L. S. Franklin; F/O. F. O. Gilmore; P/O. D. T. Greatrex; P/O. P. Gulevich; Sqn. Ldr. J. D. Hall; P/O. A. L. Horton; F/O. J. A. Kelly; F/O. E. C. N. Kent; Flt. Sgt. S. J. Kozlowski; F/O. R. E. Linklater; Flt. Sgt. W. J. McCollum; F/O. D. McK. MacIntosh; P/O. J. G. Manson; F/O.

W. R. Merrall; F/O. L. B. Mollard; P/O. O. L. Morrison; P/O. H. A. Murphy; P/O. C. R. Narum; F/O. G. G. Perkins; P/O. J. D. Quinn; P/O. W. M. Ross; Flt. Sgt. M. Sawry; F/O. R. H. Smith; F/O. J. E. Spraggett; F/O. W. Stephens; P/O. R. E. Sutherland; P/O. W. H. Thompson; P/O. H. D. Thomson; F/O. S. A. Vasiloff; P/O. N. Venber; P/O. H. De Le B. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—F/O. R. W. Clarke.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. T. A. Rogers.

MISSING.—Flt. Sgt. M. M. Barker; Flt. Sgt. L. E. Bedell; F/O. C. A. Boulton; Flt. Lt. F. E. Connors; F/O. G. H. Davis; Flt. Lt. K. W. Daymond; Flt. Lt. F. E. Dotten; Flt. Lt. A. G. Edwards; F/O. T. E. Farrow; Flt. Sgt. W. H. Fetherston; Flt. Sgt. A. M. Fournier; Flt. Lt. J. M. Fowle; P/O. D. I. Galbraith; Flt. Sgt. A. W. Garnet; P/O. J. S. M. Gibb; Sgt. J. Graham; Sgt. J. H. J. Grahame; Flt. Sgt. D. A. Holliday; Flt. Sgt. R. E. Horne; Flt. Lt. R. R. Haw; F/O. J. D. Johnston; Flt. Sgt. A. H. Jones; P/O. R. B. Jones; P/O. B. C. Kerr; Flt. Lt. L. N. Laing; Flt. Lt. C. W. McBride; F/O. K. W. Mabee; P/O. W. J. Malyon; Flt. Sgt. F. J. Marsh; P/O. F. J. Miller; Flt. Sgt. H. Mino; F/O. J. L. V. Morin; F/O. W. F. Nicol; Flt. Sgt. R. J. O'Reilly; Flt. Lt. K. E. Parkhurst; W/O. R. I. Parks; P/O. J. V. L. A. Patry; F/O. J. C. Pearson; P/O. E. J. Peverley; F/O. D. S. Quinn; Flt. Sgt. L. E. Rae; P/O. P. P. Repsys; Flt. Sgt. W. C. J. Reynolds; Flt. Sgt. R. J. Saunderson; F/O. D. G. Smith; Flt. Lt. A. L. Stepharnoff; W/O. A. Sutherland; F/O. L. H. Tilley; Flt. Lt. A. C. Watt; Flt. Sgt. C. H. Weicker; W/O. J. A. Whitehead; F/O. H. E. Wort; Flt. Sgt. A. E. Wotherspoon.

KILLED ON ACTIVE SERVICE.—F/O. K. S. Brenton; F/O. R. H. Long; F/O. J. L. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. V. E. Clark; Sgt. J. W. Ellis; F/O. A. T. Gorman; F/O. L. A. Green; Sgt. G. Morgan; Sgt. W. L. Southwick.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—F/O. F. C. Bower.

DIED ON ACTIVE SERVICE.—Cpl. R. C. Stenhouse.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. F. C. Bower.

DIED ON ACTIVE SERVICE.—Cpl. R. C. Stenhouse.

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WINGS OVER EVEREST: An R.A.F. Mosquito flying over Mount Everest. Although this and accompanying aircraft were flying at about 32,000 feet, with an outside temperature of 17° below zero, no icing was experienced. Mt. Everest was first flown over by two Westland aircraft in April, 1933.