

# FLIGHT

and  
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor  
C. M. POULSEN

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

War Correspondent  
JOHN YOXALL

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Telephone : Waterloo 3333 (35 lines).

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8-10, CORPORATION ST.  
Telegrams : Autocar, Coventry.  
Telephone : Coventry 5210.

**BIRMINGHAM, 2 :**  
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NAVIGATION ST.  
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Telephone : Blackfriars 4412.

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## The Outlook

### Unique Promotion

AIR CHIEF MARSHAL SIR ARTHUR TEDDER'S promotion to the rank of Marshal of the Royal Air Force is in various ways unprecedented, but everyone will agree that it has been very well earned. The rank is equivalent to Admiral of the Fleet and Field Marshal. Apart from three Kings, it has never been conferred upon any officer who has not held the appointment of Chief of the Air Staff. Only two, Lord Trenchard and Sir Charles Portal, have been promoted to this rank while still actively employed as C.A.S. Sir John Salmond, Sir Edward Ellington, and Sir Cyril Newall received their promotions after vacating their positions at the Air Ministry.

For the sake of accuracy, we ought to qualify the above statements by pointing out that King George V was never gazetted Marshal of the Royal Air Force. But when he inspected the Royal Air Force at Mildenhall he wore the uniform with the badges of that rank.

Sir Arthur Tedder's promotion comes as reward for long and exceptional services in time of war. It was an accident which first took him to the Middle East as Deputy A.O.C.-in-C., as the officer originally chosen for that post had been made a prisoner of war by the Italians while flying out to take up his appointment. Sir Arthur Longmore, the then A.O.C.-in-C., was soon after recalled, and Sir Arthur Tedder stepped into his shoes. The brilliance of the air operations which he inaugurated during the triumphant drive of the Eighth Army from Alamein to Tunisia removed the reproach that the British did not understand how to use an Army and an Air Force in combination—a reproach for which there had previously been considerable justification. But during that series of brilliant operations Tedder must have shown a grasp of war and battle in general, for he was made Deputy Supreme Commander of the

Allied Army of Liberation. If General Eisenhower had fallen sick, Tedder would have been in supreme command of all the Allied forces of sea, land and air. To have taken the chance of placing him in that position would have been a very rash step on the part of Mr. Churchill and Mr. Roosevelt if they had not felt complete confidence that he was capable of conducting the invasion of the Continent to a victorious conclusion.

Early in the campaign Sir Bernard Montgomery was promoted to Field Marshal. It would certainly have been inappropriate that the Deputy Supreme Commander under whom he might have had to fight should have remained in a subordinate rank. Sir Arthur's promotion is a unique step; but it strikes us as not having been conferred one day too soon.

### Faster, Bigger and Better

THE British light, hidden for years under the security bushel, is beginning to peep out from beneath that partly lifted container, which could have been tipped over quite a while ago without endangering the safety of the country. As it is, other lights have been shining, and the claims that "the Hornet is believed to be the fastest propeller-driven aircraft in the world," and "the Vampire is believed to be the fastest jet-propelled aircraft in production in the world to-day," although they disclose a highly satisfactory state of affairs, will not have the same prestige value as if the same statements had been made six months ago.

We would go even further and say that no possible harm could have resulted if, in the spring of last year, an announcement had been issued recording the fact that a new type of British aircraft had been carefully timed to exceed by a considerable margin the speed of 500 m.p.h. in level flight. It would not have told the enemy anything.

However, at long last we are being permitted to tell

the world at least a part of British air achievements, and very creditable they are. The de Havilland Hornet and Vampire, each in its own sphere, are amazing aircraft, as anyone will agree who was present at the flying demonstration at Larkhill some months ago, a demonstration to which *Flight* was invited, but the account of which we have not yet been permitted to publish. They do more than uphold the reputation established by the Mosquito during the war.

The Avro Lincoln was at the same demonstration, and the way in which its pilot "threw it about" gave some indication that, in spite of the fact that it is larger and heavier than the Lancaster, it is highly manoeuvrable. Its bomb load is impressive, both in the total weight that can be carried, and in the size of single bomb for which there is room.

As for the Rolls-Royce Griffon engine described in this issue, it is difficult to express one's admiration without being accused of fulsome praise. If there is a future for the high-power piston engine, the Griffon will be in the forefront. Remembering the development of the Merlin, one would hesitate to prophesy as to the powers with which the Griffon may finish its career.

### The Few

**F**IVE years ago *Flight* foretold that future ages would come to regard the Battle of Britain as one of the decisive battles of the world. As the years of war have passed with leaden feet the truth of that remark has come to be increasingly recognised. That battle stopped the victorious German onrush, and preserved the base from which in time the liberating forces set out to free Europe and break for an incalculable time the aggressive force of the most unscrupulous and brutal Power which has ever arisen in Europe. Had the *Luftwaffe* mastered Fighter Command a terrible fate would

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have befallen the people of Britain, and freedom would have disappeared.

From the very first day of the daylight raids it became apparent that the eight-gun fighters of the R.A.F. had the upper hand of the German bombers and their escorts, and day by day the evidence of that mastery became more evident, until on September 15th, 1940, the smashing blow of 185 machines shot down demonstrated conclusively to Göring and his fellows that the *Luftwaffe* was a beaten force.

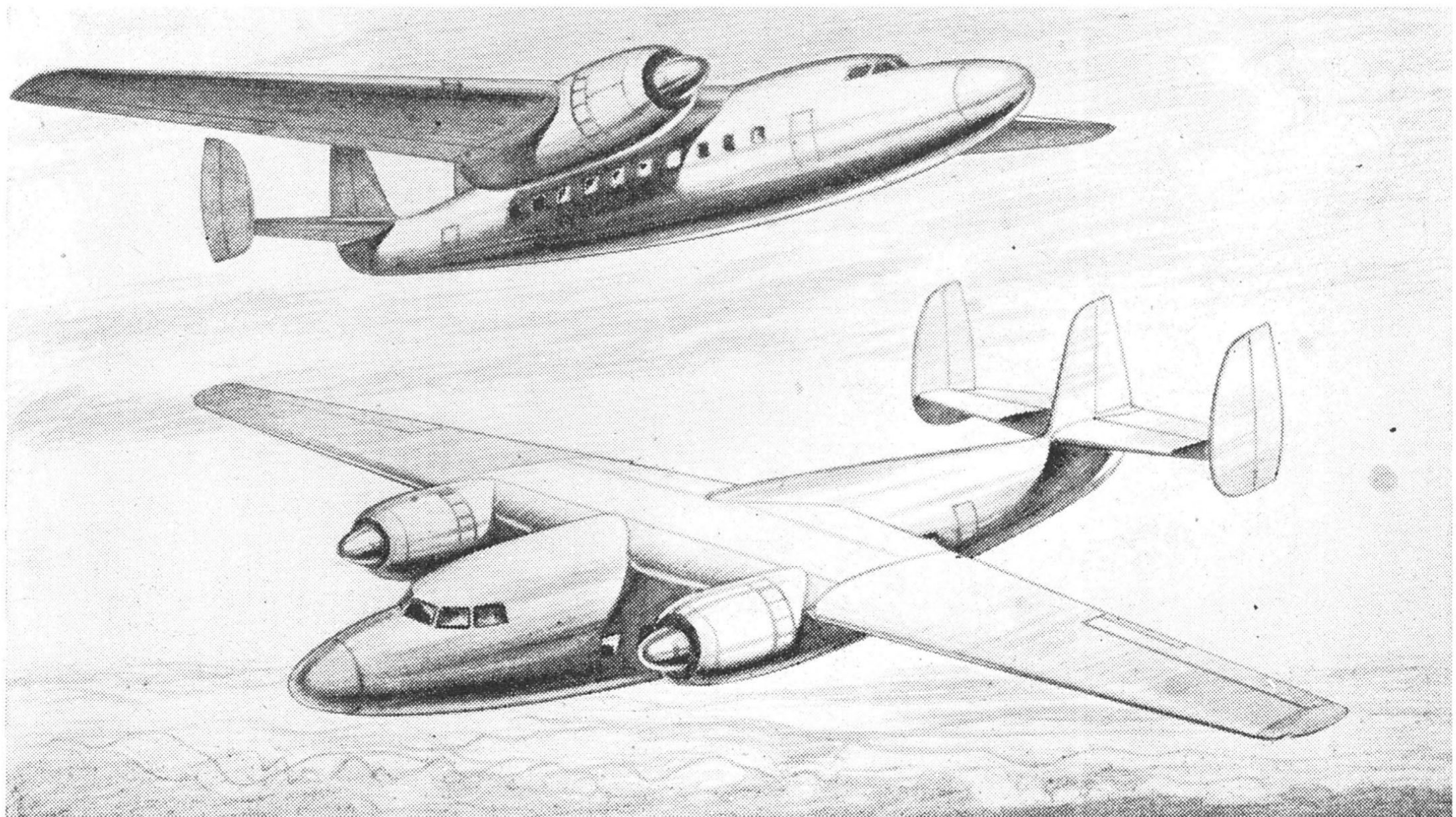
Such thoughts were surely in the minds of the millions of Londoners who gazed upwards at 12.30 p.m. last Saturday to watch the great massed flight of hundreds of R.A.F. aircraft, mainly fighters, pass low over London. That victory flight was the fitting finale to the stupendous effort of "The Few."

### NEXT WEEK

## IN GERMANY TO-DAY

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

Following a visit by air to the Ruhr, N.W. Germany and Austria.



**FORMULA FOR THE FUTURE:** An impression of the Airspeed 28/36 passenger A.S. 57 Ambassador transport, which is being built to fill medium-range and size requirements. It is a twin-engined aircraft, in which the two Centaurus engines have a power-reserve sufficient to give it four-engined safety margins and a range of cruising speeds more than ample for all conditions. With its high wing and pressurised cabin, the passengers should be happy enough, while the operating costs are being kept down to economic levels despite a more than adequate performance. Some of the estimated cost figures were analysed in *Flight* of February 22nd of this year.

# In the Air

## Handling Impressions of R.A.F. Aircraft : The First of a Series of Brief Word Sketches by "Indicator"

AFTER a spell as a ferry pilot with A.T.A. in the early stages of the war, "Indicator" then entered the Royal Air Force as a test pilot. He thus has had a unique opportunity to handle military aircraft as delivered from the factory and also under service conditions.

The quiet fun which he pokes at some of the types may be gentle revenge for the occasional tight corner in which he has found himself whilst flying a diversity of types during the past six years.

**N**OBODY has yet succeeded in explaining to everyone's satisfaction the peculiar fascination which flying has for those who have been at all actively concerned with it. One or two writers have come very close to the elusive truth in their attempts to explain the probably inexplicable—but they have themselves obviously felt the grip of the thing. Certainly it is nothing to do with being "air-minded," or of being of an "adventurous nature," or even of being inordinately fond of things mechanical.

Whatever the reason, it causes flying people to talk more shop, in and out of school, than any other section of the community; it causes them to shoot what appear to be monumental "lines" amongst themselves; and it probably causes them to be the last word in bores when

they make the cardinal error of getting on to their pet subject amongst philistines.

For their sins, or otherwise, the majority of wartime pilots have, perforce, been concerned with only two or three aircraft types during their careers. They may be interested in somebody else's ideas about aircraft they haven't flown—and will probably be infuriated by this same person's ideas about aircraft which they know, or have known, very well.

Each type can be considered as a stepping-stone to better things, and none is perfect, so there should be no harm in poking a little quiet fun at some of the features and habits of aircraft which were once at the top of their class and considered to be as perfect as Caesar's wife.

## Ubiquity Itself—the Beaufighter

**I**T was rather like standing at the back of the upper circle at the cinema, that first "see-how" ride in a Beaufighter, with my hands on the back of the pilot's seat and his head so thoroughly impeding the view of the "screen." Furthermore, the "cinema" consisted almost entirely of a mighty Wurlitzer at which sat the pilot-organist, and the impression was even more strong when, after a circuit, I took my place at the desk, while the demonstrator all but broke his neck in a panic effort to get out before I took off with him.

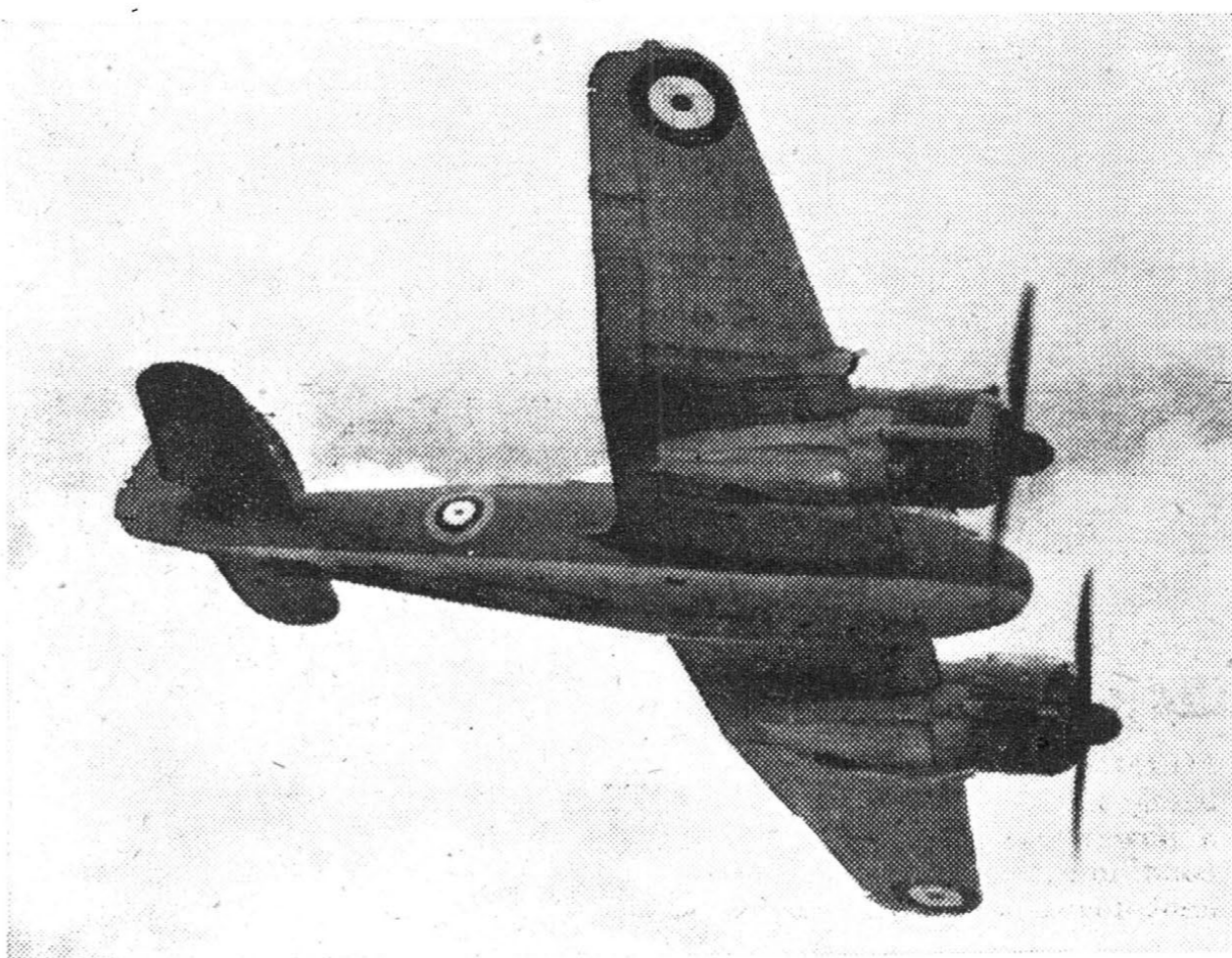
But a well-laid basis of "drill" soon put the cinema-organ effect in its proper perspective, and, after briefly clearing the two Hercules, I turned on to the runway, prayed, and slewed quietly off in what appeared to be a couple of hundred yards. The word "slew" seems to cover the general impression, since, with nothing in front of one but an enormous, flat, bullet-proof screen, it is difficult to know whether the aircraft is really going straight or whether the tail is where it should be. In fact, I should say that nearly everyone makes a tail-down take-off on first attempt—and a great many people continue to do so for the rest of their time on Beaus. But that screen is a real joy at all other moments.

As with every other twin, there is an incipient swing to be corrected on the rudder and throttles, but it is only with the Merlin-engined version that any very obvious corrections must be made. Owing to some peculiarity of relative keel-surface, the latter version appears to travel somewhat crabwise until it has reached a reasonable speed, and this effect may be accentuated by the way in which the undercarriage legs retract one after the other.

Bristol Beaufighters have given long and faithful service. This one is of 1941 vintage.

Though the Beaufighter II did very good work, the machine was, after all, designed around a pair of Hercules, and the II was presumably a necessary and worthy stop-gap in the bad years. Those who "lived" in the II will hear nothing against it—which is always a good sign; every aircraft, for some reason or other, develops a reputation for some peculiarity in its early days.

A solid, rather "hard," affair the Beaufighter is in the air; it feels (and is) immensely strong, and seems to be able to carry anything, while the two Hercules run like smoky turbines and pull the aircraft upwards as if it were a smooth and quiet lift. Earlier versions suffered a degree of fore-and-aft instability, particularly on the glide, but



## UBIQUITY ITSELF—THE BEAUFIGHTER

this was largely damped out when the dihedral tailplane was introduced. If one is prepared to apply a reasonable degree of physical strength, the Beau will do anything in the way of aerobatics, and, trailing vortices from the wing-tips, will out-turn most things.

As far as semi-forced landings are concerned, the flap area is such that the Beaufighter can be brought practically over the edge of the airfield and pointed straight down without obtaining excessive speed. The change of angle, of course, is fairly pronounced during the hold-off in this condition, and it is as well to start the check early from a fairly high speed. The drag, with the flaps down and at the full ground angle, is enough to pull it up very rapidly, with a little differential braking to keep it straight. But one *does* need braking air pressure, since once it starts to veer from the straight the c.g. is so far aft that nothing will prevent a really magnificent ground-loop—which, nevertheless, the aircraft appears to survive, more often than not, without damage.

The entrance and pilot's emergency hatch is in the belly behind the driver's seat, and both entry and exit require a somewhat special technique if shins are not to be barked. I found that it was best to climb in with the back of the seat upright and with the top hatch open. To leave,

whether in emergency or otherwise, one pulls a lever on the right of the seat, which collapses the back, pulls the hatch release, grasps a pair of overhead parallel bars, and swings oneself out over the gaping hole, through which one climbs or drops out in emergency—if there is no torpedo in the way.

For the first hour or two of one's experience of the Beaufighter the sense of being somewhat "hemmed in" is strong. Though the forward view is above reproach, two hugely cowled engines prohibit the view to port and starboard, and it is an odd feeling to be, so to speak, at the very front of the aircraft while parts of it extend forward on each side. As with everything else in the world of flying machines, one becomes accustomed to it in due course.

One day someone may explain why a pair of Hercules—and particularly in the Beau—make a rhythmic, sing-song noise however well the engine speeds are synchronised on the airscrew controls. On a long flight, and particularly over the sea, it is eventually like the beating of the heart. And when I come to think of it, the rhythm is still there even when one motor is dead and the airscrew feathered. Even before the days of feathering airscrews for the Beaufighter it flew very nicely on one instead of two.

# Battle of Britain Anniversary

## Three Hundred R.A.F. Aircraft in Air Parade over London

VICTORY was in the air at North Weald airfield on Saturday last when Battle of Britain pilots took off to lead a formation over London in celebration of the fifth anniversary of the famous September day in 1940 when the zenith of the air battle was reached, and 185 German aircraft were shot out of the sky by Fighter Command.

In the formation were Spitfires, Mustangs, Meteors, Mosquitoes, Typhoons, Tempests and Beaufighters. The latter had to "pedal" rather hard to keep up, while the Meteor pilots complained bitterly at having to keep down to a modest 250 m.p.h. It is to be much regretted that there were no Hurricanes available in this country to take part. There are still a number in existence and they bore the brunt of the fighting.

I flew in the formation with Wing Cdr. D. L. Cartridge, D.S.O., D.F.C., in a Coastal Command Beaufighter—one of those with the fin extended up the spine of the fuselage to give more fin area. It had been stripped of all excrescences and the gun ports covered to resurrect a few more knots.

As we taxied out to take off we passed Air Chief Marshal Lord Dowding—who commanded Fighter Command in 1940—

talking to a dozen or so of his old pilots. What a galaxy of stars were there. Groups Capts. D. Bader, D.S.O., D.F.C.; C. F. Carey, D.S.O., A.F.C., D.F.M.; P. S. Turner, D.S.O., D.F.C.; Wing Cdrs. P. M. Brothers, D.S.O., D.F.C.; E. P. P. Wells, D.S.O., D.F.C.; R. S. Tuck, D.S.O., D.F.C.; W. Crowley-Mills, D.S.O., D.F.C.; K. T. Lofts, D.F.C.; B. Drake, D.S.O., D.F.C.; J. Ellis, D.F.C.; T. Vigers, D.F.C.; and Sqn. Ldr. C. R. Bush, D.F.C. These twelve made up the formation of 12 Spitfires in the van.

After a ten-second run for take-off we climbed into a very grey sky—so different from the day of which this was the anniversary. On that day there were great white cumulus clouds to frame the deep blue canvas on which history was being painted.

We made a couple of wide circuits while the remainder of the Beaus got into formation, and then set course for Bradwell on the East Coast. On the way we gradually caught up with a formation of rocket Mosquitoes. Two more wide turns over the sea to lose time, and then the formation of twin-engined aircraft turned for London.

As London was approached, at 230 knots, the fighters came in from the starboard beam to take up their station below the Mosquitoes and Beaufighters.

Two circuits over London and its environs were made omitting, strangely enough, the south-eastern suburbs. They, surely, deserved a show more than anyone. The route was Ilford, Poplar, Hyde Park, Northolt, Northwood, Elstree, Finchley, Hackney, Deptford, Wimbledon, Teddington, Welsh Harp, Finchley and out over Ponders End back to North Weald.

As I passed near *Flight* offices I could not help thinking of the days I passed in 1940 as a Jim Crow (roof-spotter), once getting so interested in a head-on attack by Hurricanes against a formation of Dorniers that I almost forgot to sound the alarm bells. I also remembered seeing a single Heinkel III flying on tip-toe, so to speak, while six Spitfires flew close by without noticing him. I could have cried with impotent vexation.

From the height at which we were flying the raid damage could be seen, and certainly it is bad enough.—J. Y.



AT NORTH WEALD: Air Chief Marshal Lord Dowding chatting with Battle of Britain pilots before the formation took off.

# HERE AND THERE

## Another "Fastest"

**CAPT. AMORY J. MARTIN**, flying one of the American Export Airline's Flying Aces, with fifteen passengers aboard, set up a record for a commercial flight between Botwood (Newfoundland) and Foynes on Wed., Sept. 12th. His time was nine hours 23 minutes—six minutes less than the previous record.

## Sweden and Shannon Airport

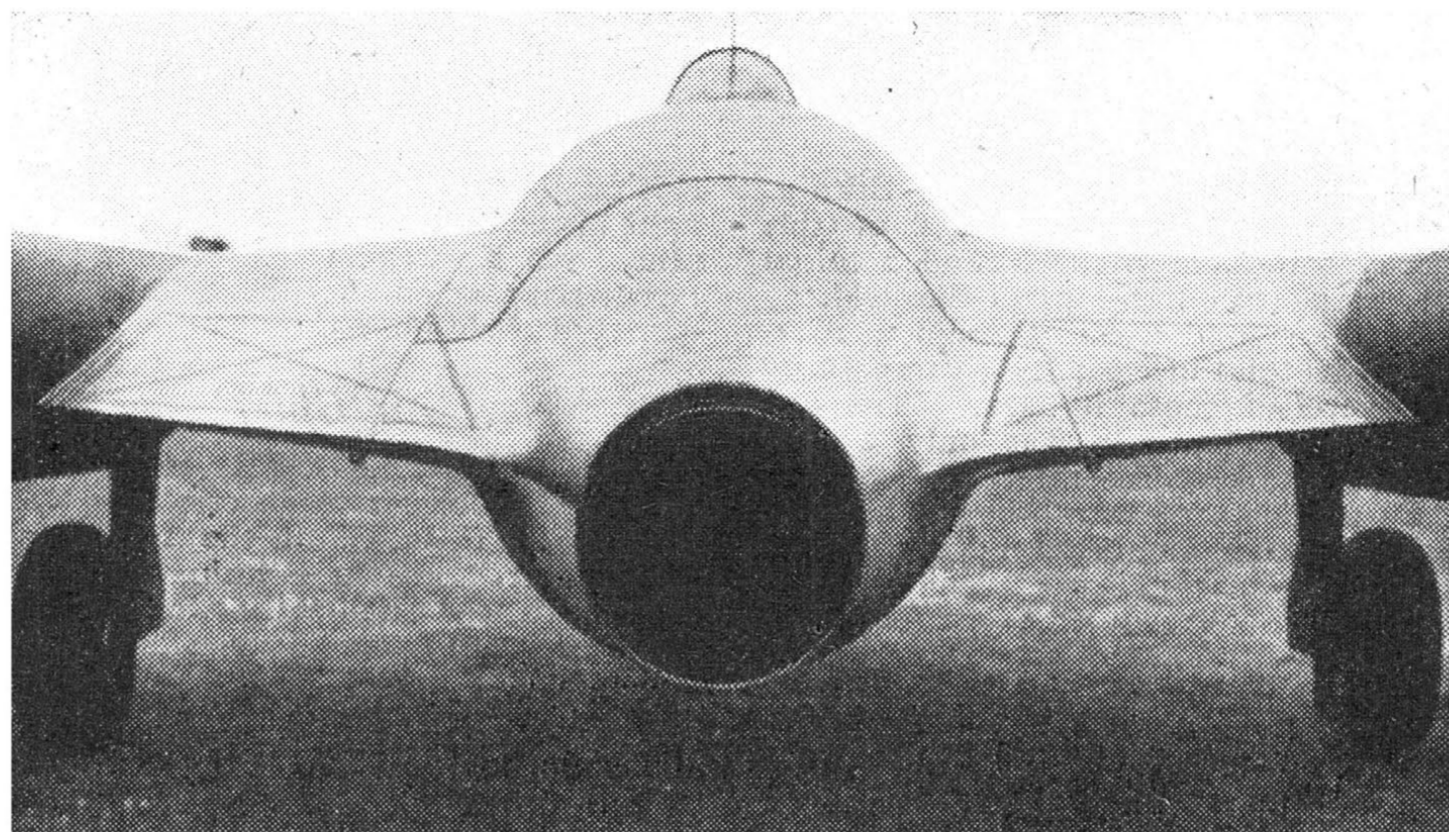
**COUNT LEVENHAUPT**, London Manager for Swedish Air Lines, has just made an inspection of facilities at the Shannon Airport to assess the value of the land base at Rineanna as a possible base for Swedish transatlantic aircraft en route from Stockholm. It is understood that he is returning to Sweden at the end of the month.

## Under Control

**RINEANNA'S** new control tower and radio station was brought into operation on September 12th. The first aircraft to land under directions from the new centre was a B.O.A.C. Dakota. Some of the catering staff is already being transferred from Foynes to Rineanna, where provision is to be made for the serving of a thousand meals a day.

## Blackburn Apprentices

**TWO** brothers, Raymond and Ernest Wilks, of Brough, have both achieved successes in connection with their aeronautical studies at the Hull Technical College and Hull University College. Raymond Wilks, the elder



**IT COMES OUT HERE :** The jet orifice of the Goblin engine of the de Havilland Vampire. The Vampire was demonstrated over London by Mr. Geoffrey de Havilland during the Thanksgiving Week celebrations on Saturday last.

brother, at present employed in the aerodynamics department of Blackburn Aircraft, Ltd., and an ex-apprentice under the Society of British Aircraft Constructors scheme, has been awarded the Apprentice Gold Medal and Prize by the Hull Iron Trades Association as the best apprentice attending the Hull Municipal Technical College during the session 1943/4.

Ernest Wilks, who last year won the scholarship of £100 awarded by Mr. Robert Blackburn, Chairman of Blackburn Aircraft, Ltd., for the student who attains the highest marks in the Ordinary National Certificate examination, has just completed the first year of the course for the Diploma in Aeronautics at Hull University College. He has been awarded the Amy Johnson scholarship for the best first-year student in the course.

## Victory Bells

**A VICTORY BELL** appeal in aid of the R.A.F. Benevolent Fund was launched last week-end when Will Hay auctioned special bells cast by famous Battle of Britain pilots. A sum of £3,500 was realised. These handbells are cast from metal obtained from German air-

craft shot down over this country and are being sold to the public at £1 each.

The whole of the gas and electricity undertakings throughout the country have put their showrooms at the disposal of the appeal committee. Every golf club and many of the leading stores have also agreed to carry a stock of bells.

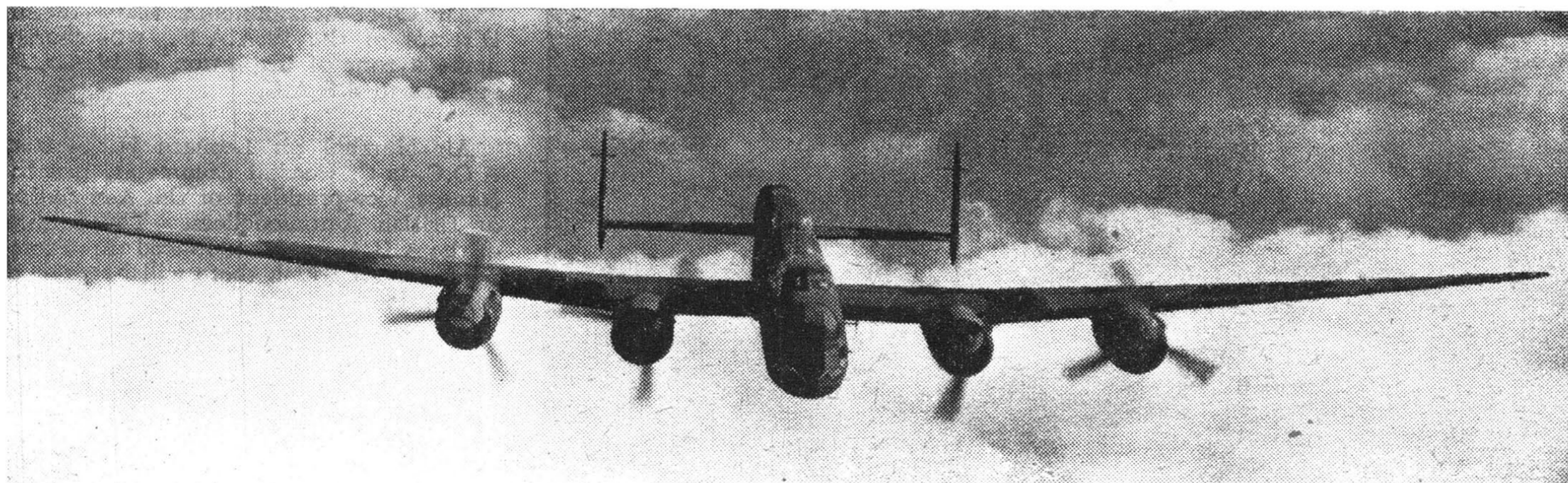
## Back on the Map

**CHANNEL ISLANDS AIRWAYS, LTD.**, announce that Commander G. O. Waters, R.N.V.R., A.R.Ae.S., the General Manager of the Company and of its associates, Jersey Airways, Ltd., and Guernsey Airways, Ltd., has been appointed Managing Director of all three.

Cdr. Waters, who has now resumed residence in Jersey, was released from wartime service with the Royal Naval Air Arm in the autumn of last year when he relinquished the position of Deputy Superintendent of the largest R.N. Aircraft Repair Yard in Great Britain in order to reconstruct the Channel Islands air services.

## Movements by Air

**DURING** last year the R.A.F. evacuated 300,000 sick and wounded from all fronts. Between D-Day and



**FOR BIG BOMBS :** The Avro Lincoln, concerning which a few bare details are now released by the Air Ministry. Dimensions: Span 120ft.; Length 78ft. 3½in.; Height 17ft. 3½in.; Wing area 1,421 sq. ft.; Weight 75,000 lb. approx. Crew of seven is carried. Mk. I has four Rolls-Royce Merlin 85 engines of 1,750 h.p. each, driving four-bladed Rotol hydraulic airscrews. The Mk. II has Merlin 68's of the same horsepower and de Havilland hydromatic airscrews. Some aircraft have two 20 mm. cannon in the mid-upper turret but the usual arrangement is 2 × .5in. in nose, 2 × .5in. in mid-upper, 1 × .5in. under fuselage and 2 × .5in. in tail turret.

## HERE AND THERE

VE-DAY 82,000 were ferried to Britain.

Undoubtedly the knowledge of this speedy attention to the wounded raised the morale of our troops in the field.

In the second week of August, 1944, the daily total of casualty clearances by air exceeded those by sea. The airborne mortality rate was only 25 per cent. of the seaborne rate.

Ex-prisoners of war brought back to Britain by air numbered 144,188.

**Poor Fish**

**S**PEAKING at the commissioning ceremony of the U.S.S. *Midway*, the 45,000-ton aircraft carrier, Mr. Artemus Gates, Under-Secretary of the Navy, said: "The U.S. Navy is working to adapt the atom bomb to carrier planes."

**R.A.F. in Norway**

**A**N exhibition telling the wartime story of the R.A.F. was opened in Oslo recently by Air Chief Marshal Sir Sholto Douglas, C.-in.-C. of the British Air Forces in Germany.

Crown Prince Olaf and Crown Princess Martha of Norway were present, and thousands of Norwegians crowded the square outside during the ceremony.

Crown Prince Olaf, speaking in excel-

lent English, praised the R.A.F.'s fight in the dark days of 1940. He said that Norwegians never felt resentment when R.A.F. bombs damaged their homes.

**New Air Chief**

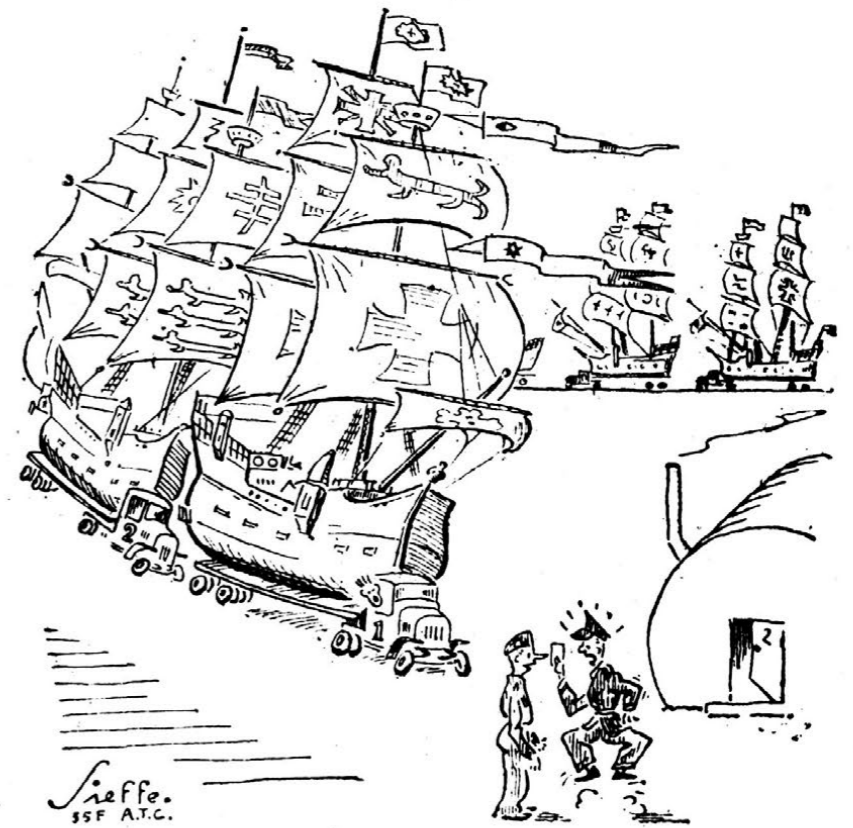
**MAJOR-GEN. RIISER LARSEN**, former Antarctic explorer and C.-in.-C. of the Norwegian Air Force in Britain, has been appointed Chief of Norwegian Air Defence.

**"Royal Air Force Day"**

**D**ESPITE reports to the contrary, no decision has yet been reached regarding future commemoration of the Battle of Britain. It had been said that the pre-war Empire Air Day and the Battle of Britain commemoration should be absorbed into one Royal Air Force Day.

**Royal Transport for S.E.A.C.**

**ADMIRAL LORD LOUIS MOUNTBATTEN** has accepted the offer by the Duke of Gloucester of his Avro York *Endeavour* for use in moving sick and



Clod—I ordered sixty GALLONS!"

wounded prisoners of war in the Far East.

The interior is being altered to take eight stretcher and six sitting cases. It will be available for this purpose for at least two months.

**News in Brief**

**R**ESOLUTIONS recently introduced into the U.S. Senate calling for a peacetime Navy of 1,079 ships included provision for 116 aircraft carriers.

\* \* \*

Rotor heads for Sikorsky R-5 and R-6 helicopters are now being produced by the Hamilton Standard Propellers division of the United Aircraft Corpora-

tion at East Hartford. Each rotor head—of which about 400 have already been delivered from this factory—contains approximately 900 separate parts, some of which are being machined by subcontractors in various districts of New England.

\* \* \*

The Ministry of Aircraft Production

announces that, following the introduction of the simplified control procedure for light metals, Mr. G. W. Lacey, B.Sc., A.I.C., has relinquished his appointment as Controller of Light Metals in order to rejoin the British Aluminium Co., Ltd. He is succeeded by Mr. C. G. McAuliffe, B.A. The address of the Controller of Light Metals remains as formerly, namely, Southam Road, Banbury, Oxon.

\* \* \*

The new head office of the Aeronautical Engineers' Association at 108, Church Street, Croydon, will be opened on October 1st. The former head office at 68, Royal Avenue, Belfast, is being retained as the Northern Ireland district office.

\* \* \*

Air Chief Commandant Lady Welsh, Director of the W.A.A.F., will shortly make a tour of inspection of W.A.A.F. sections in S.E.A.C.

\* \* \*

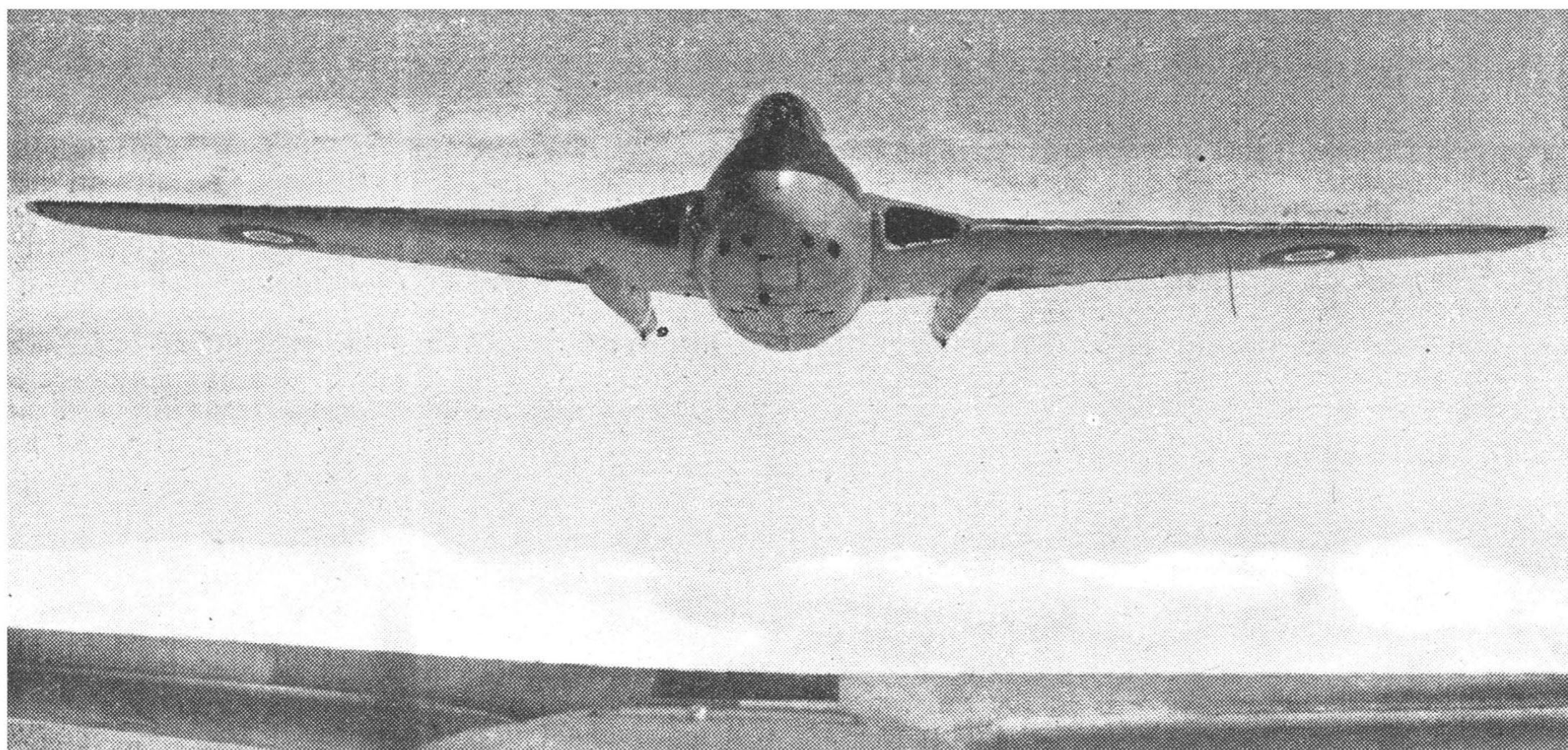
Air Marshal Sir Leonard H. Slatter, A.O.C.-in-C. Coastal Command, has become a vice-president of the Association of British Aeromodellers. The council of the A.B.A. have announced three competitions for which there will be £210 in cash prizes and four silver trophies.

\* \* \*

Group Capt. F. H. L. Searl has been appointed group sales manager to the Hunting Aviation Group. Among its many concerns the Hunting Group includes Percival Aircraft, Ltd., Field Consolidated Aircraft Services, Ltd., Aircraft Operating Co., Ltd., and Aerofilms, Ltd. Group Capt. Searl's principal occupations during hostilities were co-ordination of close air support for the Army, planning for the Normandy invasion, and Group Capt. (Ops.) with No. 83 Group.



**BERLIN BARTER**: An aircraftman of the R.A.F. looks-on while Russians and an American negotiate a transaction.



MACH No. 2 : Perfect streamlining for high speed is the keynote of the jet-propelled Vampire when seen from head-on.

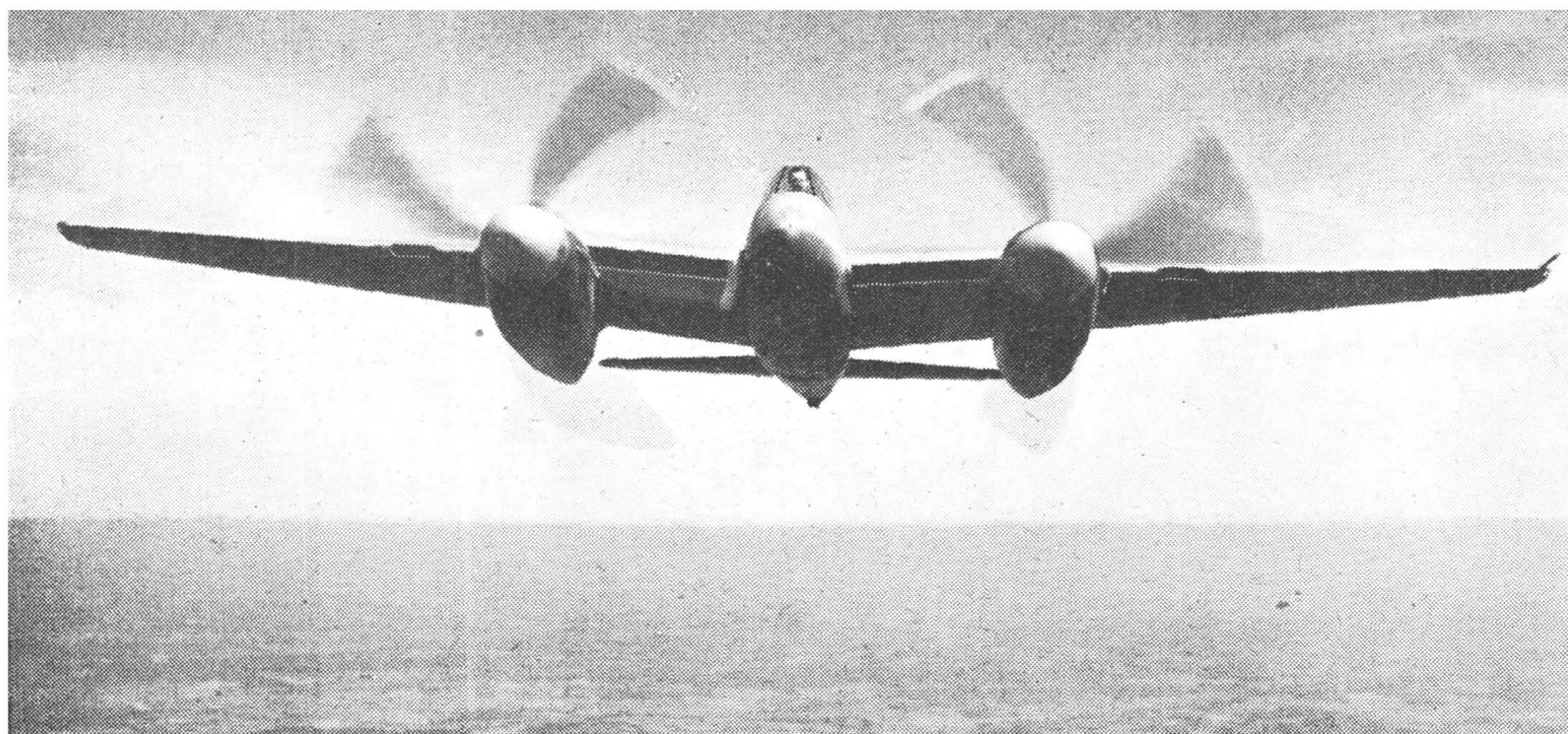
# Vampire and Hornet

*Two de Havilland World Beaters : Jet Interceptor and Long-range Fighter : Level 500 m.p.h.-plus for the Vampire : 2,500-mile Range for the Hornet*

**I**T is rarely that an aircraft firm has developed and produced two really outstanding types as parallel projects, and still more remarkable that one of these should be entirely new in conception. For, however publicised the principle of jet propulsion may be, it is still "new" so far as its effects on general design are concerned, and for a firm to produce concurrently a more

than successful reaction-propelled fighter and an outstanding "conventional" long-range fighter is a very solid achievement.

Were it not for the arrival of the jet engine, with all its possibilities of increased performance, the airscrew-driven Hornet twin-engined fighter would have set a new standard not only in the matter of fighting range but



CONVENTIONAL PERFECTION : The de Havilland Hornet with its close-cowled Rolls-Royce engines represents the zenith of cleanness in an orthodox layout.

DE HAVILLAND VAMPIRE AND HORNET

FIGHTERS

in sheer performance. Just because it is based on conventional power-units, the Hornet is really the more remarkable of the two aircraft, since the performance has been obtained by sheer design refinement. Whereas the Vampire exceeds 500 m.p.h. in level flight—at an unspecified height, but presumably at the 20,000ft.-plus levels—the Hornet maximum is better than 470 m.p.h.; and whereas the Vampire's ceiling nears 50,000ft., that of the Hornet is around 35,000ft.

History of Goblin

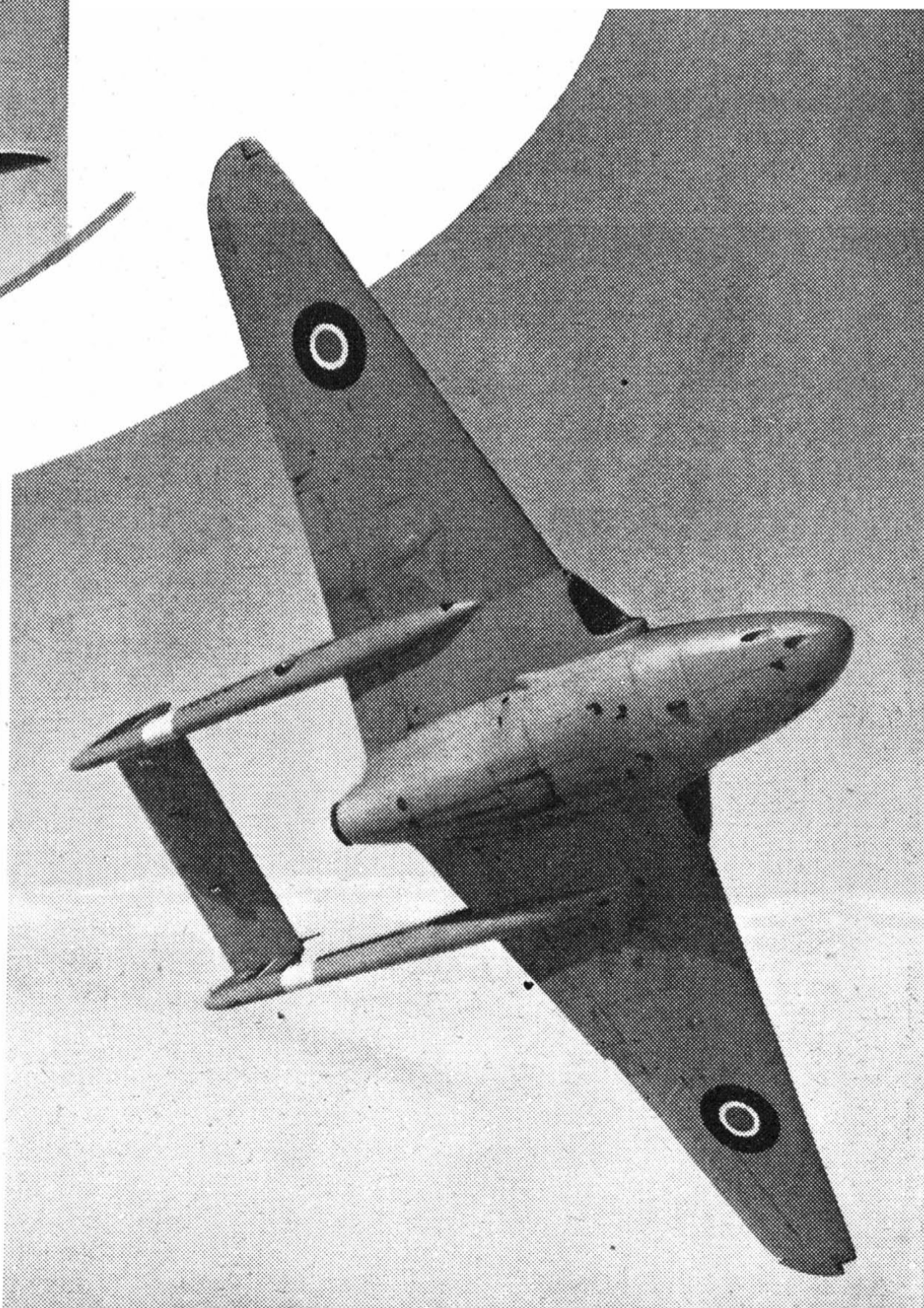
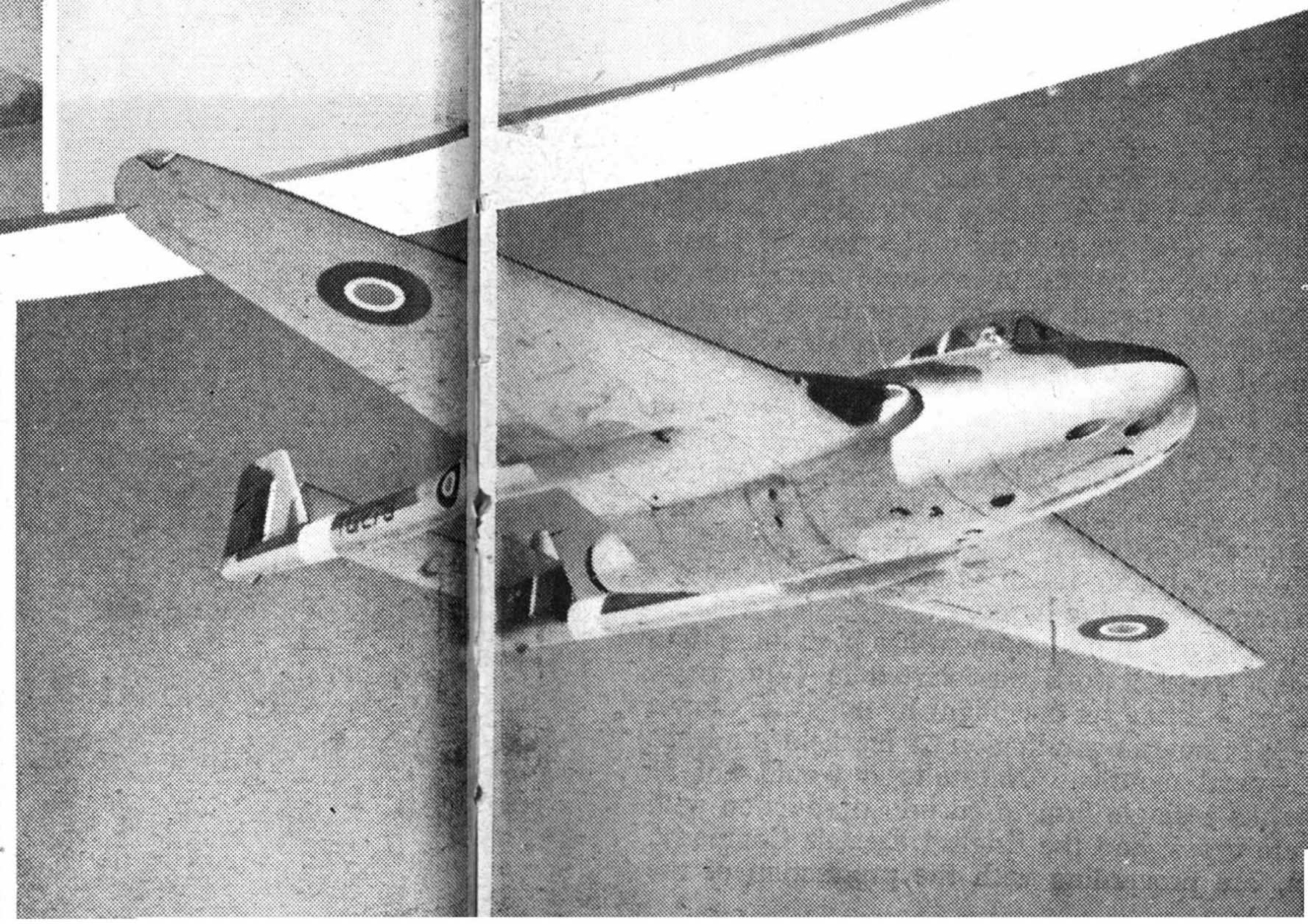
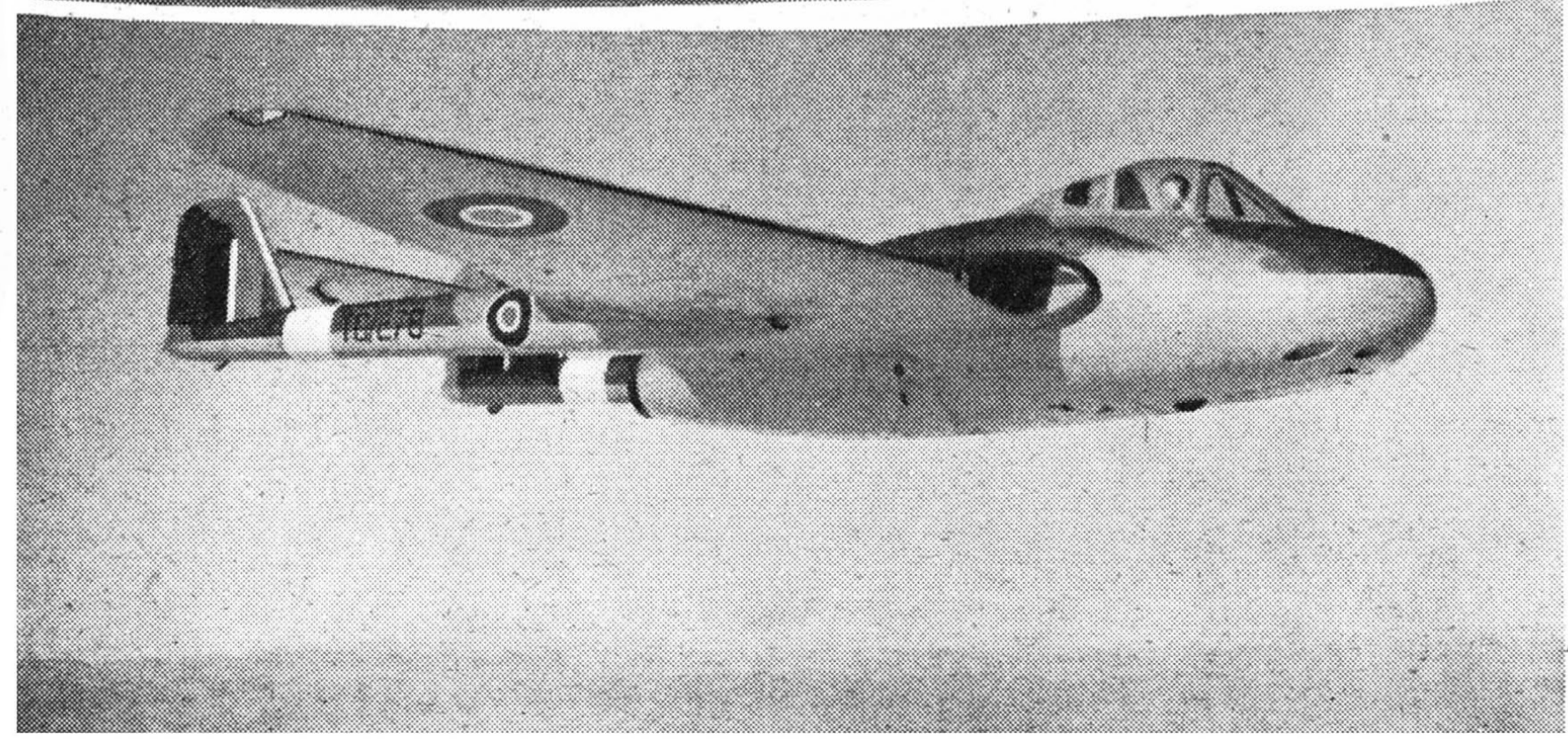
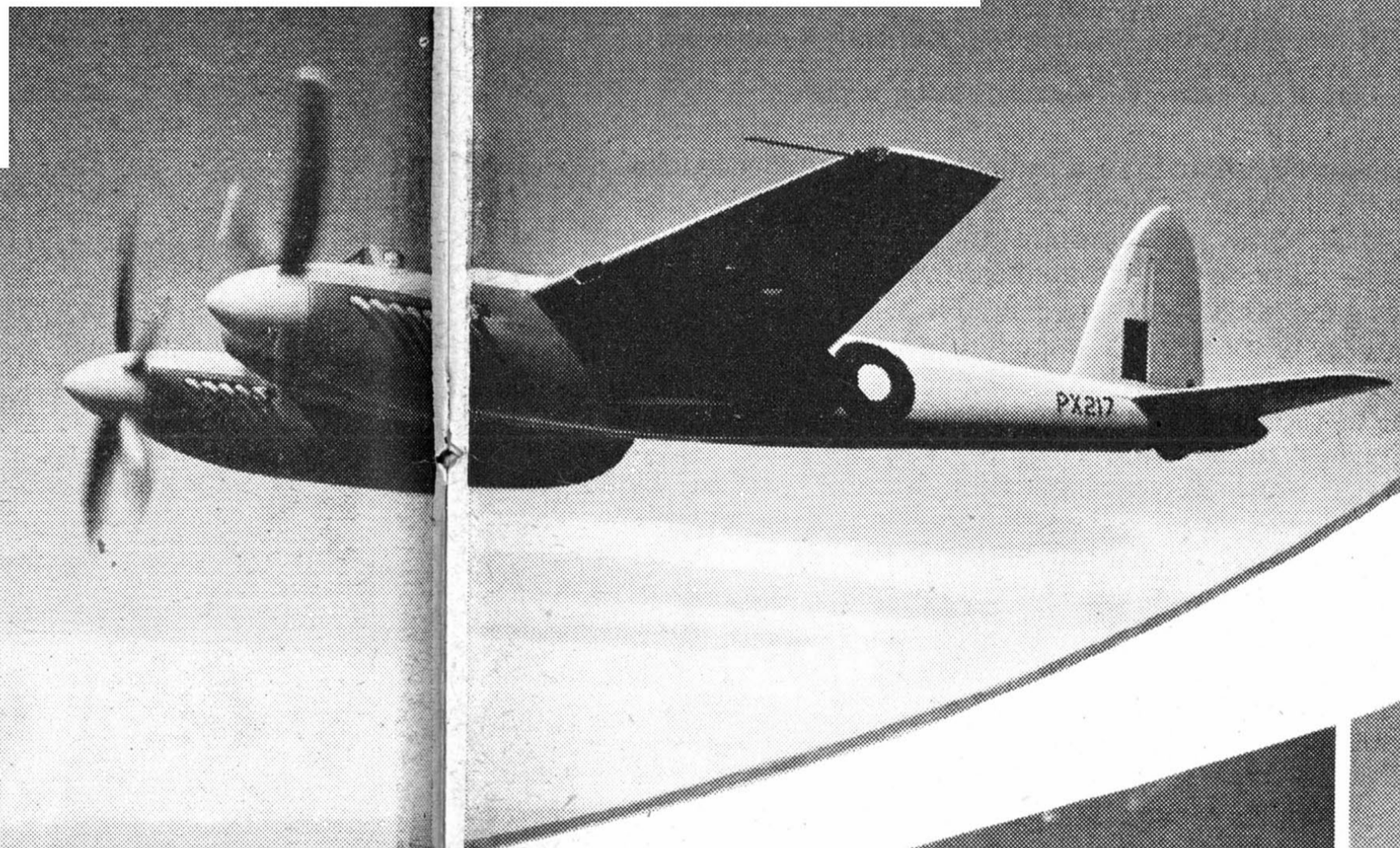
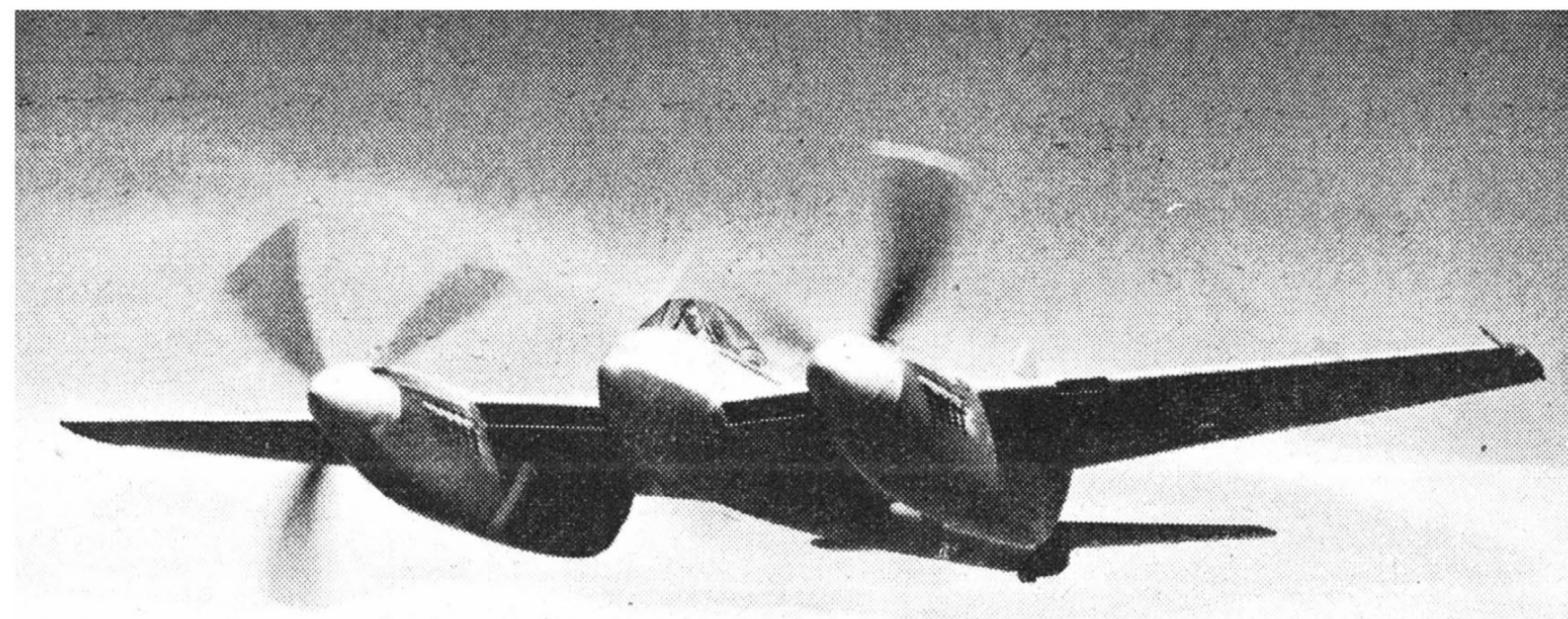
The story of the Vampire and its Goblin jet engine, as far as it can be told, is one of swift development, yet the plans are so comparatively old in aviation history that one is amazed at the way in which wartime secrets can be kept. The work on the power unit's drawings were first started by the D.H. Engine Company as long ago as April, 1941, and the engine was on the test-bed in April, 1942. In March, 1943, before the Vampire was ready, the Goblin made its first flights in the Gloster Meteor II, and, more interesting still, examples of these

engines were flown to America late in 1943 for installation in the prototype Lockheed Shooting Star. In fact, when this aircraft was first credited with a level speed of more than 500 m.p.h. it was powered with this British engine. Meanwhile, the Vampire itself had started its developments tests in the hands of Messrs. Geoffrey de Havilland and Geoffrey Pike at Hatfield, and was probably the first aircraft either here or in America to exceed that interesting mid-thousand figure in level flight, and may at present be the fastest aircraft in production in the world. So much for history.

Unlike the Mosquito, the Vampire is of all-metal construction with the exception of the control cabin—an all-wood carapace structure which can, of course, be pressurised to combat the effects of high-altitude flying on the pilot. No details of the design or structure may be given at present, but it will be seen that, though unconventional in appearance with its boomed tail, it still carries an inevitable D.H.-ness in outline.

Apart from a vague reference

The top three photographs show various aspects of the de Havilland Hornet. Although it is a totally different design, the Hornet bears a strong family resemblance to the Mosquito. Armament is the same; the main difference is that it arrives a good deal faster than that famous aircraft.

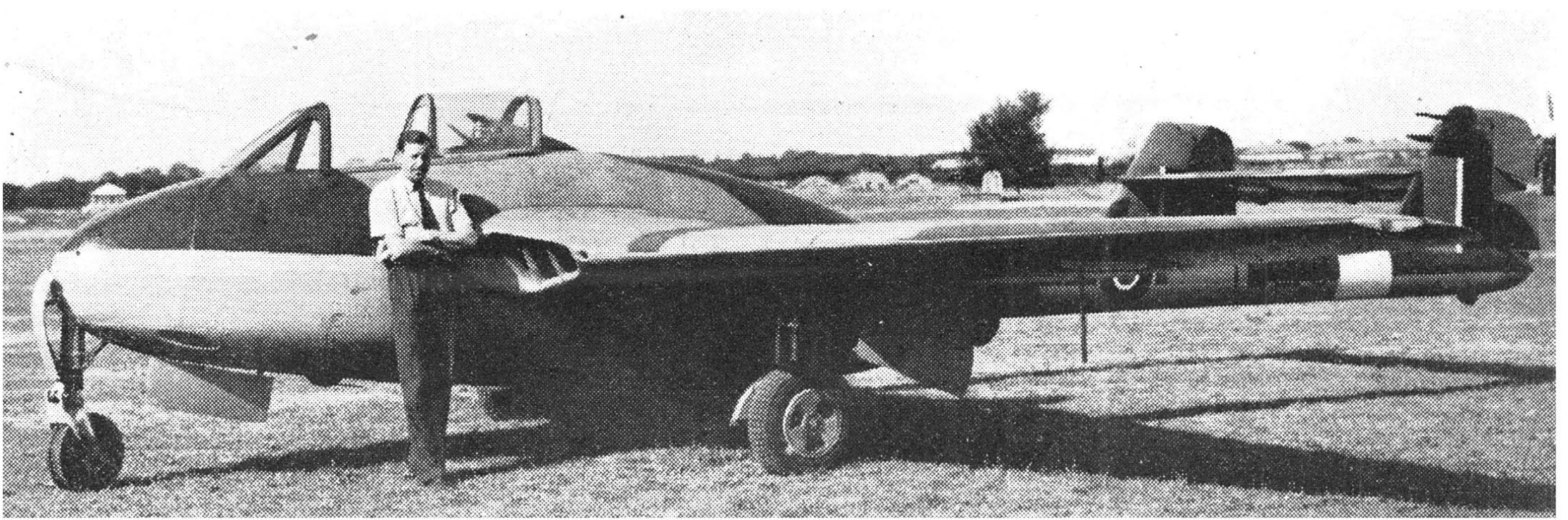


The bottom row shows the Vampire performing for Flight's cameraman. The position of the double air entry on each side of the fuselage and single exit between the tail booms is apparent.

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**VAMPIRE AND HORNET**


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Geoffrey de Havilland standing by the Vampire. He was the first man in this country, and probably the world, to exceed 500 m.p.h. in level flight. This photograph emphasises the smallness of the Vampire which, however, still carries armament of four 20 mm. cannon in the lower fuselage. Other points of interest are the anti-shimmy front tyre and the exceptionally short undercarriage legs which can be used owing to the absence of any airscrew clearance being required.

to speed and to the fact that its operational ceiling is around 50,000ft., no figures can be given, but anyone who has seen the Vampire, on a combination of initial speed and jet power, proceed vertically upwards until it can no longer be seen, will have no doubts about its rate of climb. Incidentally, though jet propulsion, by its very nature, provides less thrust and consequently

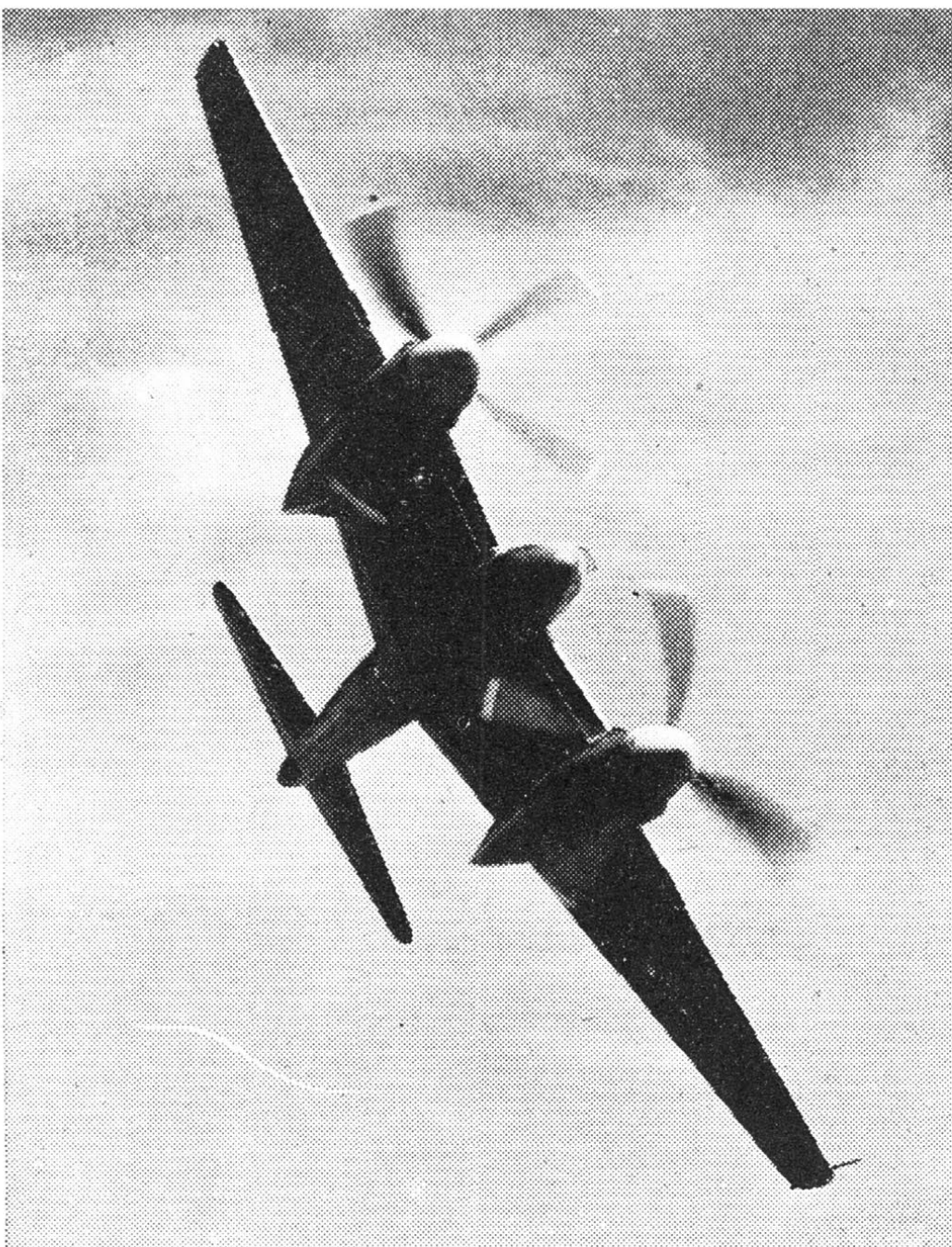
slower acceleration than an airscrew at low speeds, the actual length of take-off run is not excessive by any standards, and the Vampire may have many more operational possibilities than those immediately apparent.

Designed as a long-range fighter with, nevertheless, the ability to meet short-range fighters on level or better-than-level terms, the Hornet might, on general appearance, be considered to be a development and refinement of the Mosquito. But it is, in fact, virtually a new design. Most interesting, though not yet to be described, is the composite structure of the wing, wherein metal and wood are "welded" by a new process; it has a double upper skin of ply, an under-surface skin of alloy, and composite spars. The fuselage is of wood monocoque construction and similar to that of the Mosquito, though very much more slender, as befits a single-seater.

#### Rolls-Royce-de Havilland Collaboration

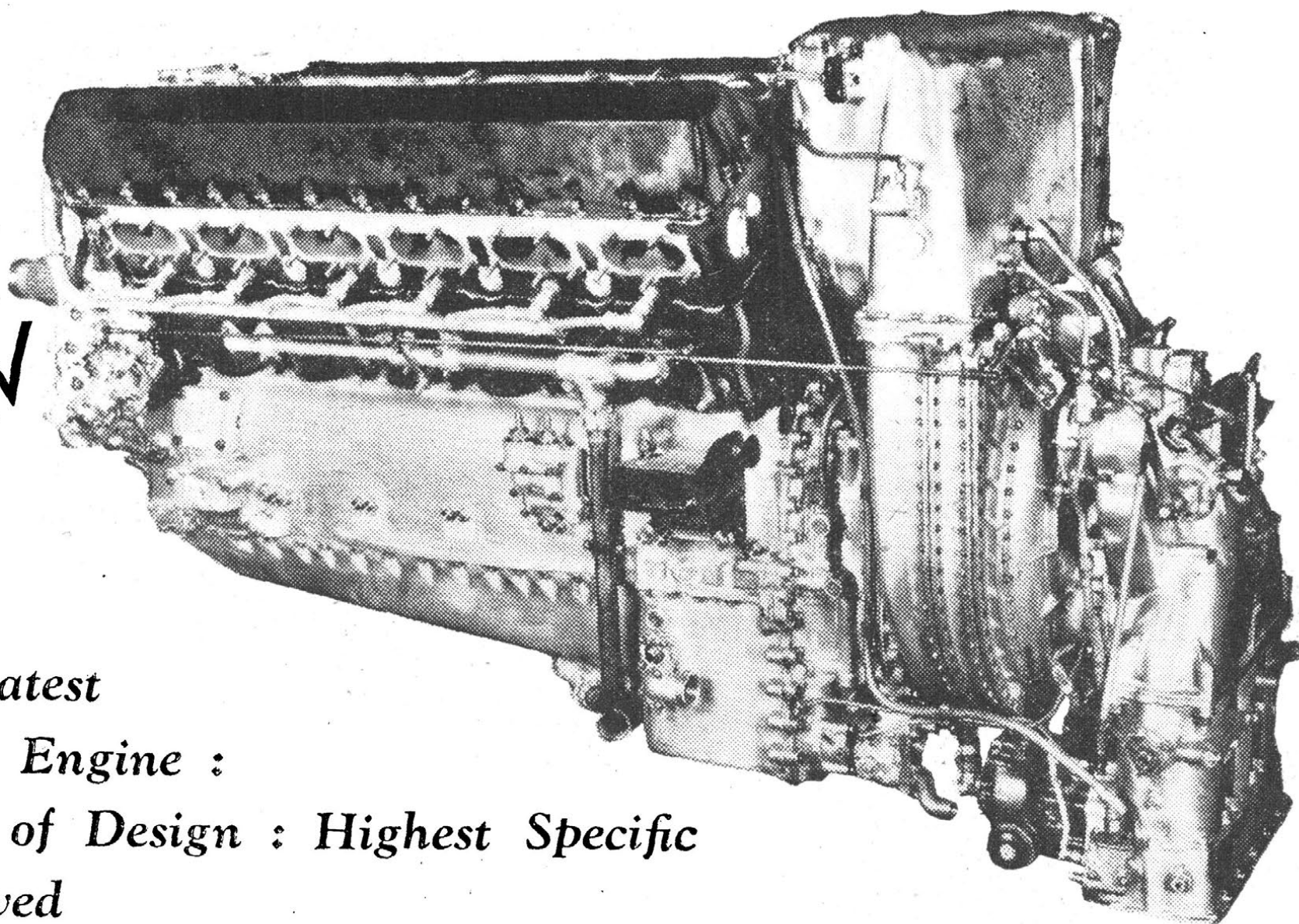
In order to provide a maximum in all-round performance, absolute cleanliness has been a prior consideration, and this is particularly noticeable where the engine nacelles are concerned. The two Merlins—which, incidentally, rotate in opposite directions to cancel torque for special take-off operations amongst other considerations, have been specially developed to reduce frontal area, and protuberances are at a minimum. The two firms worked together to this end, and the results speak for themselves—the top speed exceeds 470 m.p.h. Other figures which it is permissible to give are: A rate of climb better than 4,500 ft./min. at sea level, an operational ceiling of 35,000ft., and an endurance, with special long-range tanks, equivalent to a still-air mileage exceeding 2,500.

Once again, speed in development has been more than remarkable. Design work was started in July, 1943, and the Hornet made its first flight in the same month of 1944. It is now in production at Hatfield, and has been for several months. Naturally it would not be convenient for a single firm to go into production with two separate types, and the English Electric Company, of Preston, are proceeding with the production of the Vampire.



The de Havilland Hornet, with its two "handed" Rolls-Royce Merlins, possesses exceptional manoeuvrability in addition to a high top speed exceeding 470 m.p.h. The Merlins are rated at 2,070 h.p. and drive four-bladed De Havilland airscrews.

# ROLLS-ROYCE GRIFFON (65)



*Review of the Latest  
Rolls-Royce Piston Engine :  
Classic Orthodoxy of Design : Highest Specific  
Powers Yet Achieved*

WHEN confronted with the Rolls-Royce Griffon for the first time, the facile result of an initial rapid appraisal is that the engine is nothing much more than a scaled-up Merlin, and, although there is doubtless a certain amount of justification for this view, it is not wholly accurate. In actual fact, as one's investigations progress, the impression is steadily strengthened that, far from being merely a scale-up of an existing engine, the Griffon is an entirely new engine in its own right. It would, however, probably be pretty accurate to hazard the assumption that the Griffon was born of a desire to redesign the Merlin, eliminating all the snags and, at the same time, increase the capacity to meet the imminent demand for a larger engine whilst retaining the smallest overall dimensions possible.

How well the men of Derby have succeeded in doing what they set out to do may be appreciated in part by a comparison of overall dimensions as between Griffon and Merlin, together with the respective swept volumes and piston areas. In overall length the Griffon 65 is 81in., three inches longer than the 78in. of the equivalent Merlin, the 66; overall heights are respectively, Griffon, 45in., and Merlin, 43.675in., whilst the overall widths are: Griffon

29.5in., and Merlin 29.825in. It would seem well-nigh impossible, on the face of it, that with such similarity of overall dimensions in two engines of the same basic type, the swept volume of one should be 35.9 per cent. larger than that of the other. Such, however, is the case. Piston area of the Griffon is 23 per cent. greater than that of the Merlin, this having been achieved by increasing the cylinder bore to 6.0in.: a figure which is just about verging on the optimum limit.

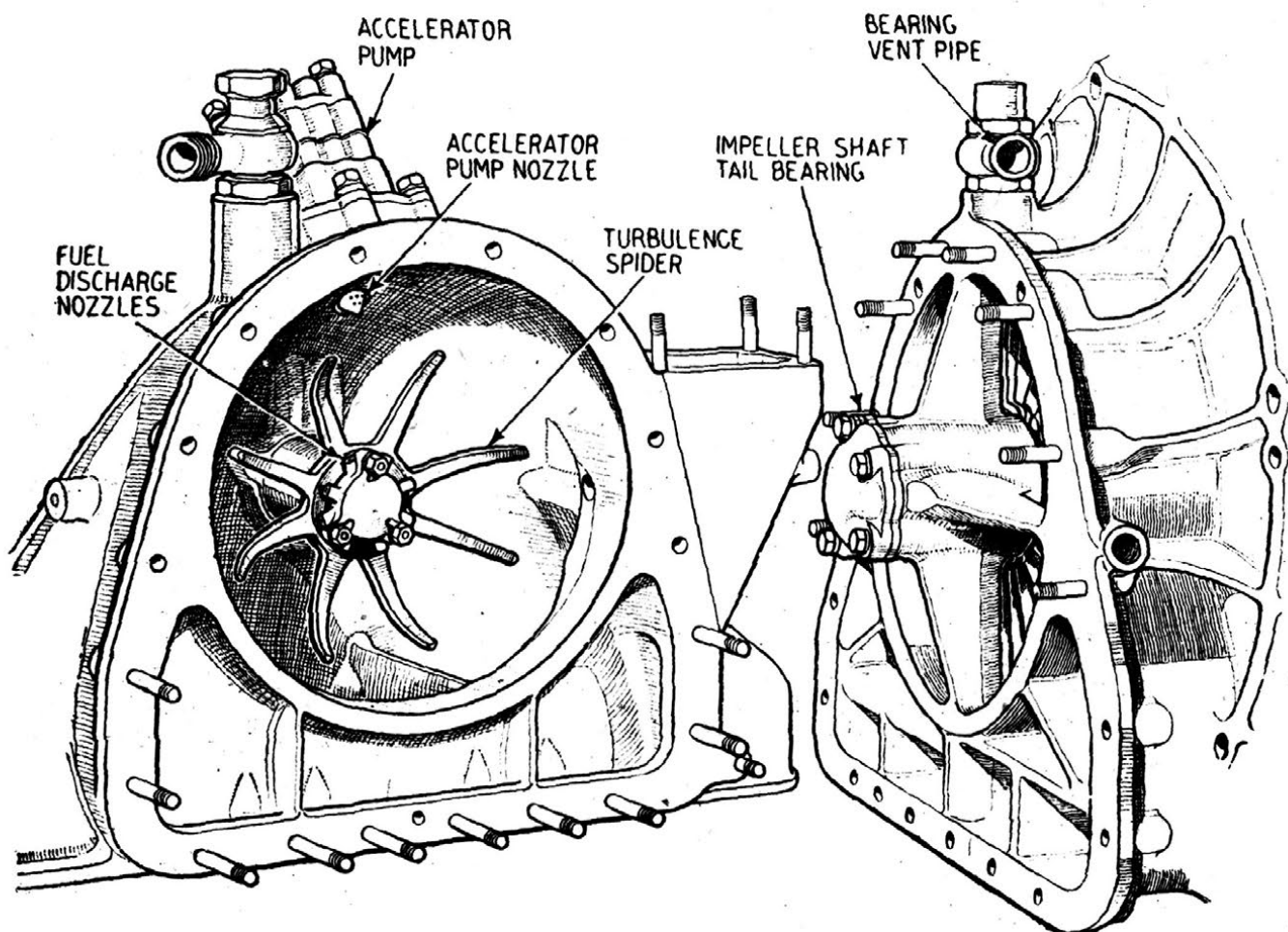
In view of this one is led to wonder what form the Griffon's successor will take; the useful limit of piston diameter having been reached, one is forced to the conclusion that any larger capacity piston engine that Rolls have in mind to follow the Griffon will, of necessity, have more cylinders. It is an interesting speculation which naturally, and on precedent, takes it for granted that Derby *do* intend to produce a new and bigger orthodox engine.

### **Influence of the Racing "Buzzard"**

Before going on to deal with the Griffon, a word should be said on the prevalent and somewhat erroneous assumption that the engine is a counterpart of the famous "R" special Buzzard racing engine which secured the Schneider

Trophy for England in 1929 and 1931, and established a World's Speed Record. Certainly, the bore and stroke size are the same and so is the fundamental layout of the engine—but there the similarity ends. It can truthfully be said that the lessons learned on the "R" engine have had their influence on all the subsequent Rolls engines, but equally, the knowledge gained in the Merlin has resulted in the refinements which distinguish the Griffon. The one particular feature which the Griffon owes directly to the "R" is the crankshaft, for the amount of development put into this member on the racing engine virtually paved the way towards making the Griffon a success from the very beginning of its life.

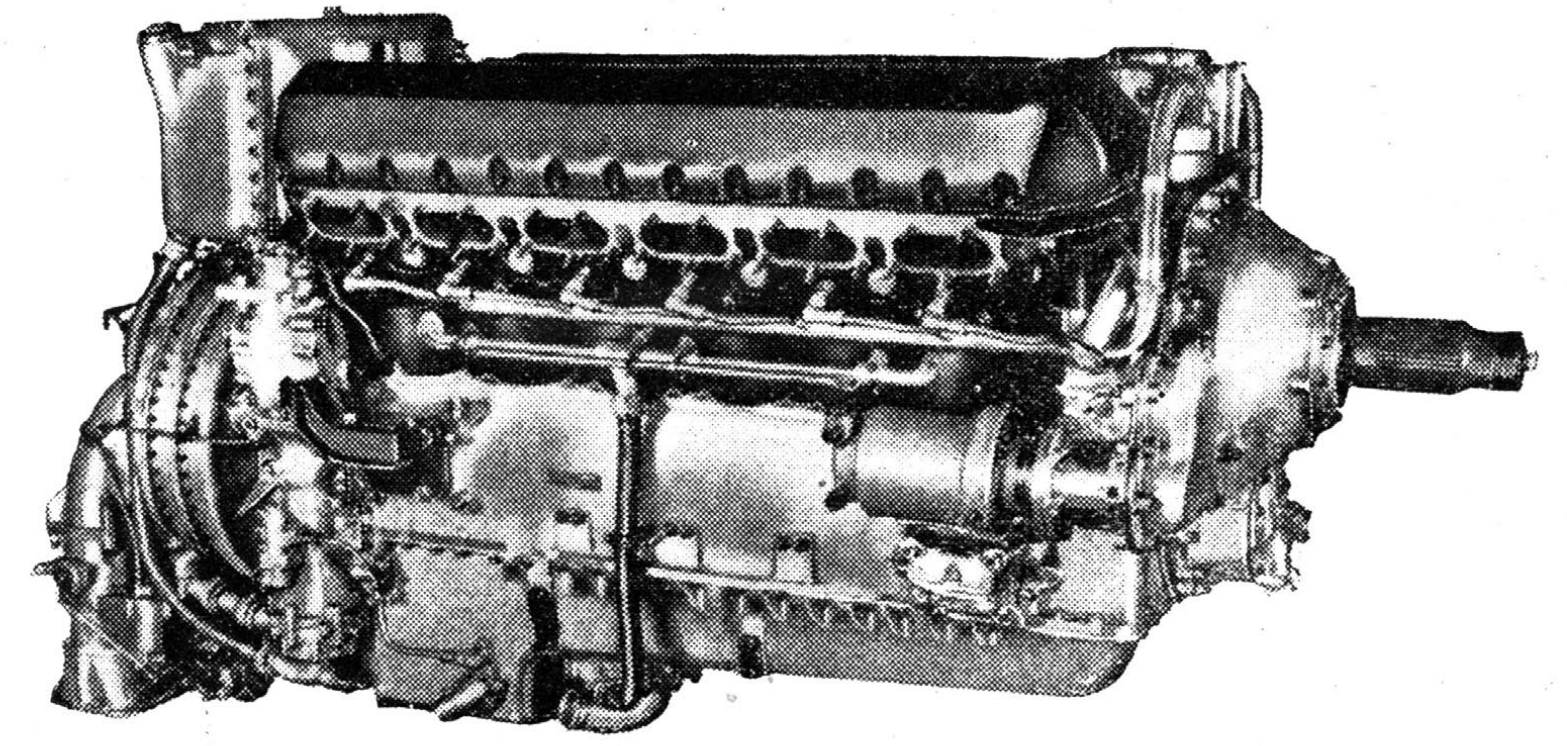
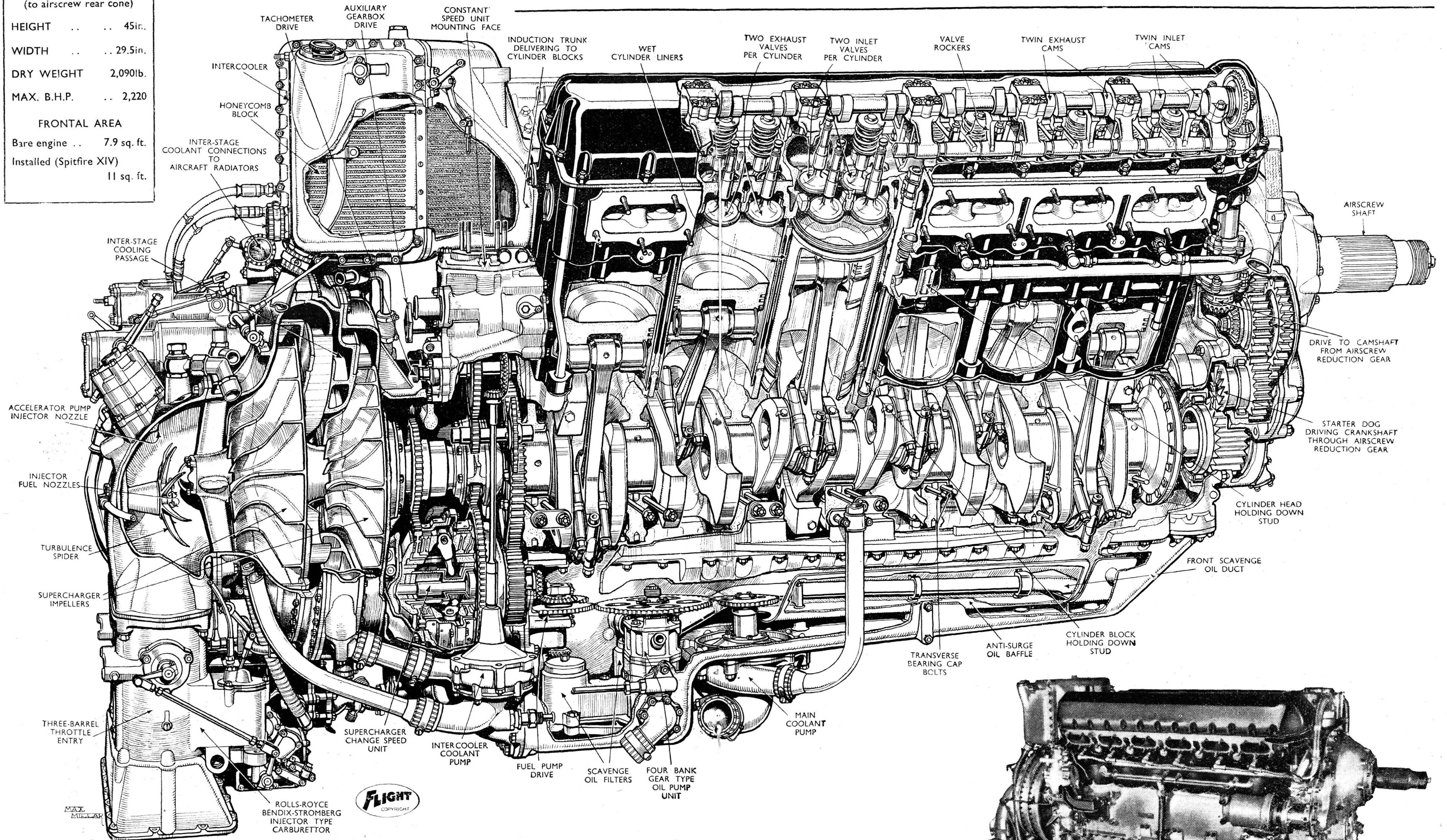
It is not, perhaps, generally known that the Griffon was originally developed primarily to meet the Fleet Air Arm's specific needs—low-altitude power, ease of service, reliability, etc. In the early days of



Induction throat to impellers showing turbulence spider with fuel nozzles.

# ROLLS-ROYCE GRIFFON (65) ENGINE

LENGTH	81 in.
(to airscrew rear cone)	
HEIGHT	45 in.
WIDTH	29.5 in.
DRY WEIGHT	2,090 lb.
MAX. B.H.P.	2,220
FRONTAL AREA	
Bare engine	7.9 sq. ft.
Installed (Spitfire XIV)	11 sq. ft.



This special copyright *Flight* drawing by Max Millar lays bare the component arrangement and structural design of the engine. In no other way can the amazing compactness of this beautiful piece of work be illustrated more effectively, and, further to emphasise this point, the reader may refer between the exterior view on the right and the drawing and so follow the disposition of the various units.

## ROLLS-ROYCE GRIFFON (65)

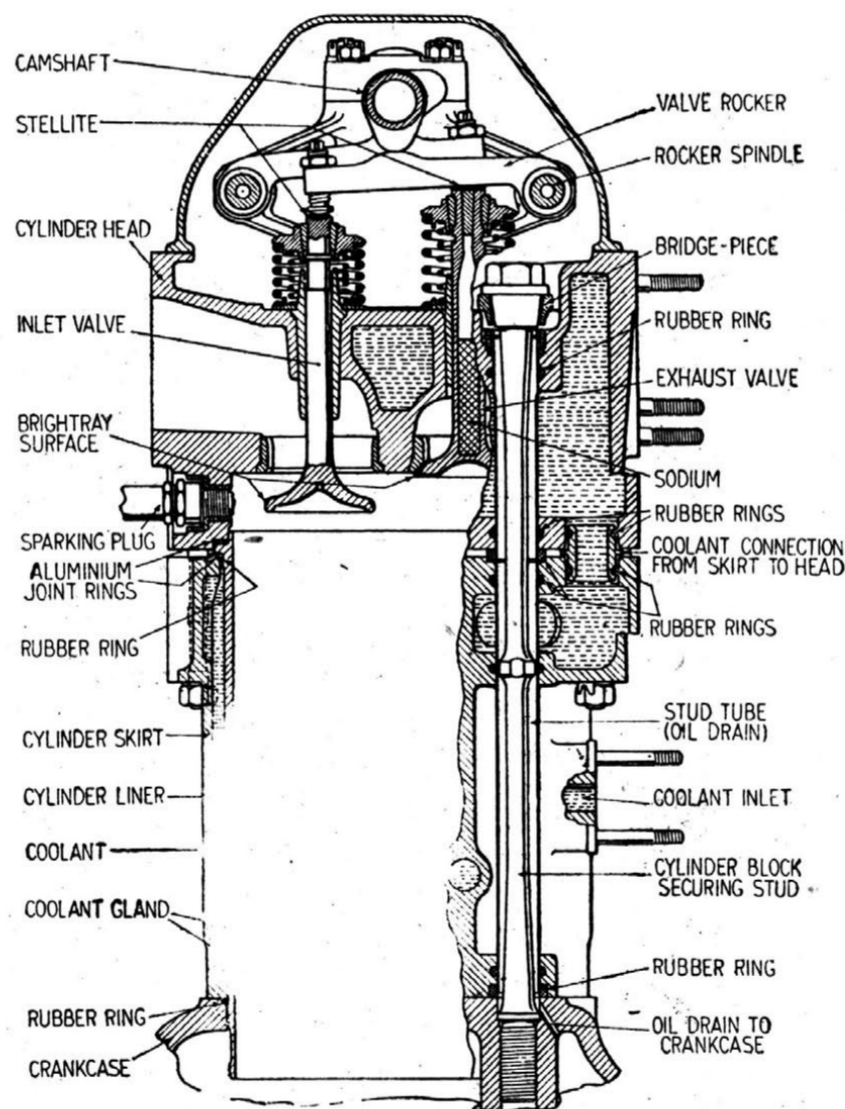
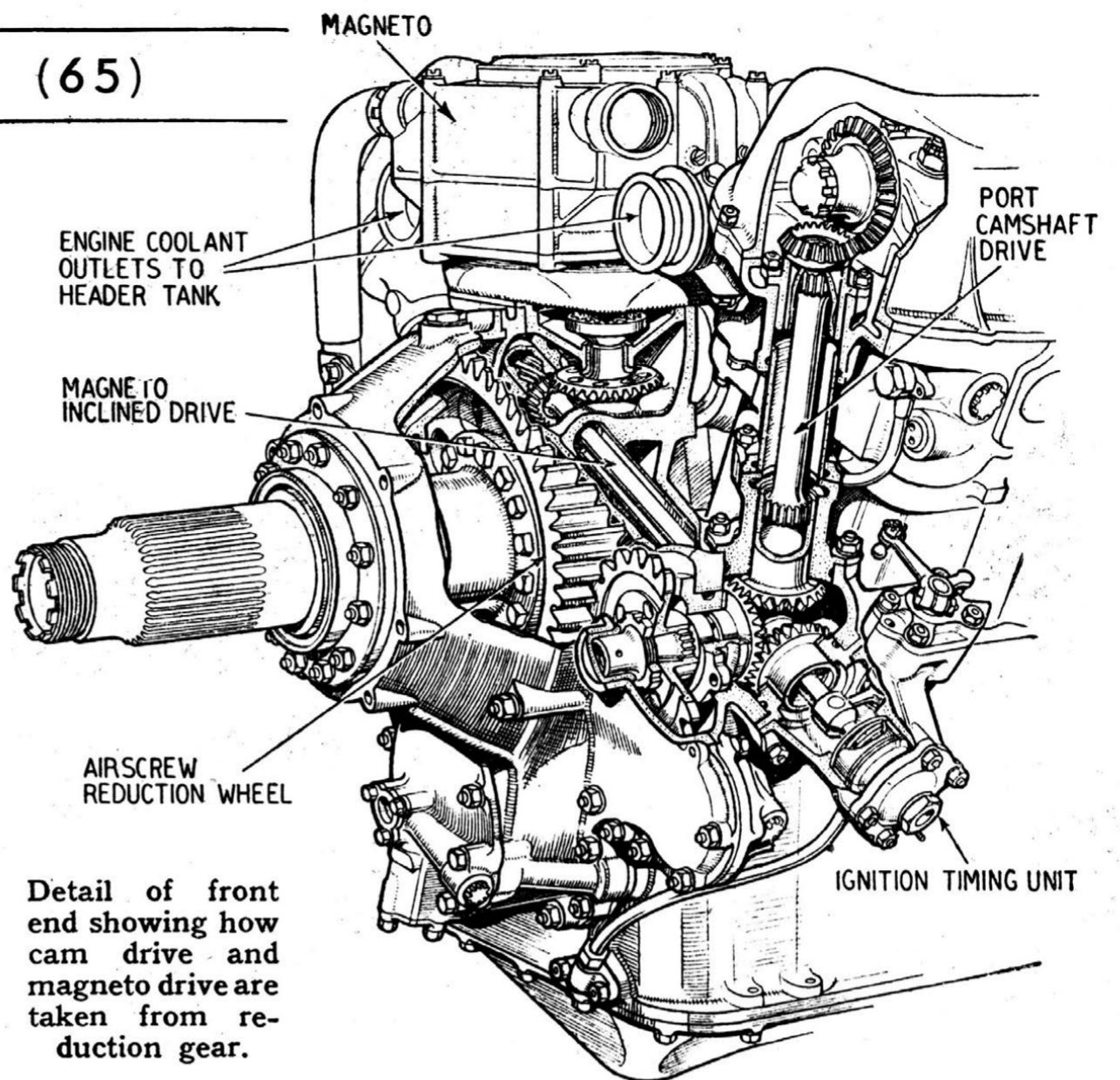
the war the Griffon was rather displaced by the Vulture until the latter was discarded, then the Griffon was resurrected as the need for a larger engine than the Merlin was again realised as a necessity. The various marks of Merlin Spitfires were capable of handling enemy aircraft at height, but when the Fw 190 was de-rated to give maximum performance low down we were somewhat pressed. A quick decision was reached to put the Griffon II into some Spitfire VIII's, which then became the mark XII; these were built in limited numbers, but effectively squashed the opposition.

### F.A.A. and R.A.F. Requirements

These models of the Griffon were all fitted with single-stage, two-speed blowers, and this basic type has progressed for Fleet Air Arm use (*vide* the Fairey Firefly), whilst the special needs of the R.A.F. have been met by the two-speed, two-stage engine for high-altitude use. As may be expected, the Griffon owes a fair amount to Merlin development, but what is peculiarly interesting is that various practices initially proved on the Griffon have been incorporated in the later Merlins.

Basically the engine is, of course, on the same lines as the Merlin, although the detail design is new pretty well throughout. One of the most important innovations is in taking the cam- and mag-drives from the front. This was decided upon in order to relieve the valve operation from as much variation as possible; by interpolating a semi-floating coupling between the crankshaft and the driving wheel of the reduction gearing and, in addition, by taking the cam drives from the airscrew-driving gear, angular variations in crankshaft speed are greatly reduced in their transmission to the camshafts. Further, airscrew inertia results in a reasonably constant rate of r.p.m., and, to top-off the advantages, the front drive allows a comparatively shorter overall length which, in turn, permits the larger and more powerful engine to go into existing fighters.

Whilst on the subject of the crankshaft, we might as well deal with that interesting component. It is, of course, machined all over from a forged billet, and is fully counter-balanced, the front throw of No. 1,



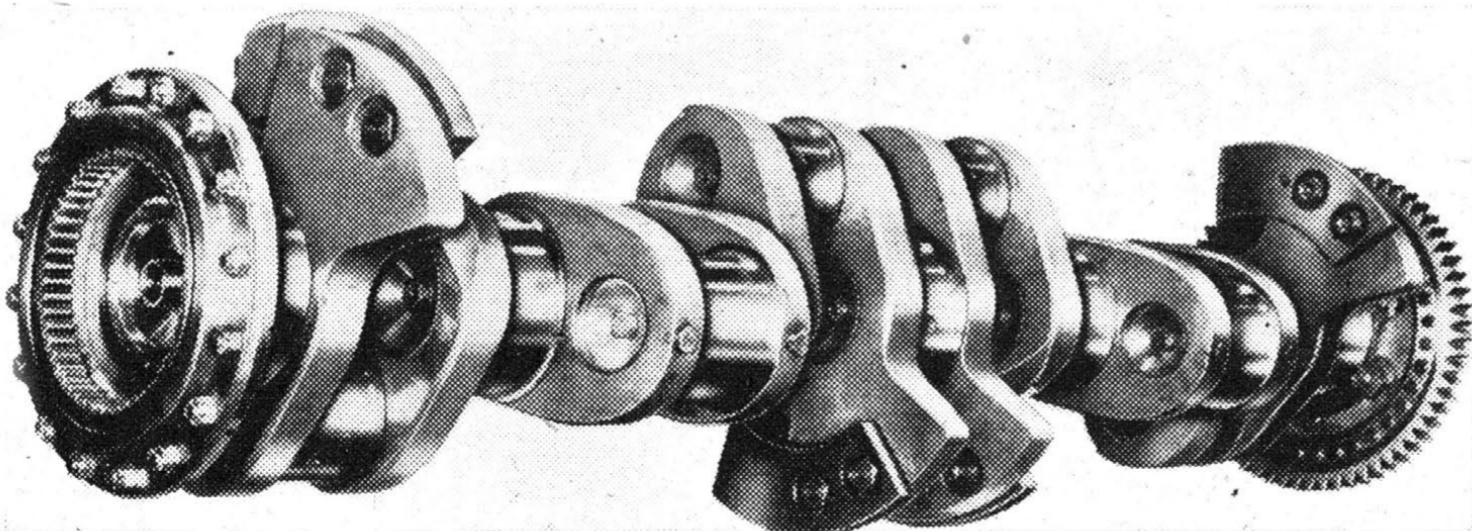
Section through cylinder and head illustrating simple valve gear and large coolant areas.

both throws of No. 4 and the rear throw of No. 6 bearings each having a separate balance weight bolted to them. Vibratory troubles in the crankshaft have been very few, but a pointer to the Derby standard is that the firing order geography was selected to give optimum crankshaft harmonics.

### Crankshaft Lubrication

Perhaps the most novel feature of the crank assembly is that the main bearings and big ends are all lubricated from the hollow interior of the shaft. This scheme, though novel, is by no means new, Rolls having first tried it years ago; however, the Griffon is the first Rolls engine in which it has become practice. Feed is into each end of the shaft and, in addition to the system pressure, shaft rotation provides a "built-in" centrifuge. A great advantage of the system is that the amount of oil supplied to each bearing is not influenced by relative shaft/bearing movement. In addition, each main journal has internal standpipes which act as sludge traps as well as permitting, by a variation in their diameter, a means of metering or controlling the amount of oil supplied to any particular bearing.

Another interesting feature of the crankshaft is that it is rigidly connected neither to the front nor the rear driven members. At the front end an internally toothed annulus is bolted on, this meshing with and housing a semi-floating ring which itself is internally splined to a coupling shaft. The latter is splined at its front end to the driving wheel of the reduction gear so that this mechanism is



Three-quarter front view of crankshaft with semi-floating toothed annulus in front coupling. Note the detachable counterweights on crank throws.

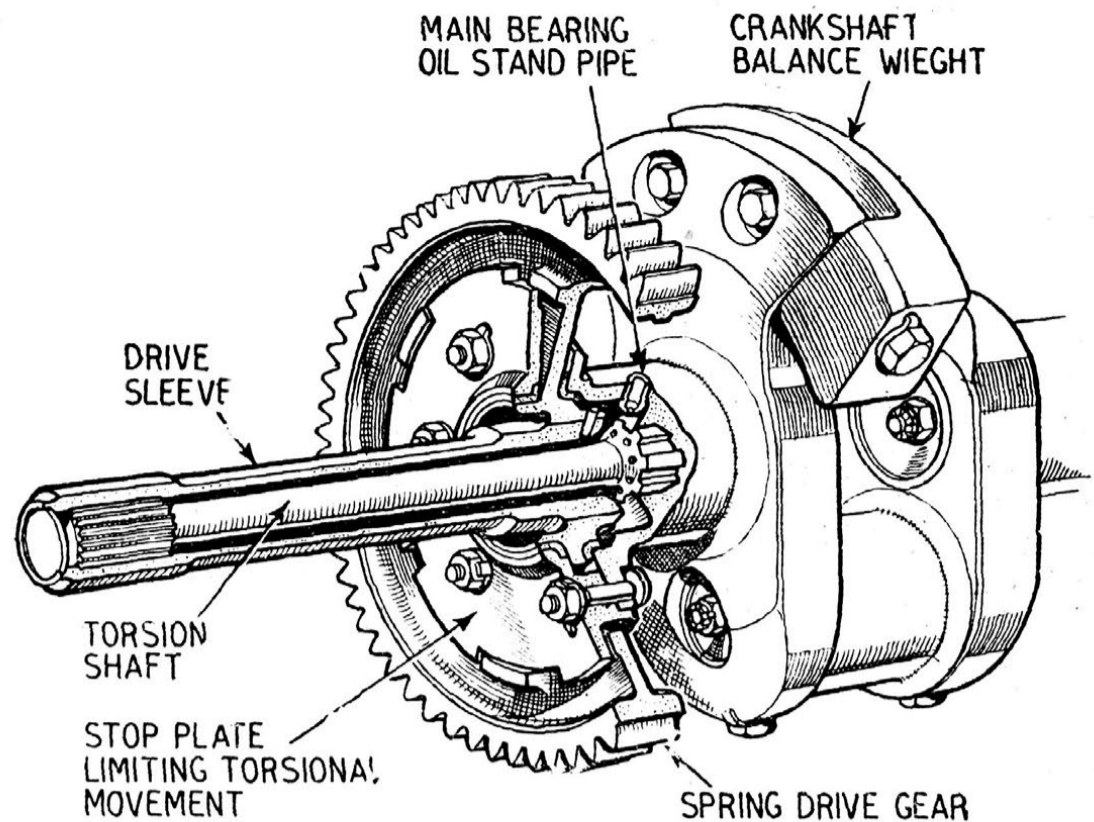
ROLLS-ROYCE GRIFFON (65)

partly relieved from crankshaft rotational variations and totally relieved from end-float effects.

Going to the other end of the shaft, we encounter the beautifully neat torsional spring-drive coupling, the purpose of which is to relieve the crankshaft from impeller inertia. When the throttle is opened quickly the "fly-wheel" inertia of the impellers does not allow them to be accelerated as quickly as is the crankshaft by the pistons, and the resulting lag engenders a tendency to twist the crankshaft. Again, when the throttle is rapidly closed the impellers try to overrun the crankshaft, with reversed but similar twisting effect. To relieve the shaft from these embarrassments a spring drive is embodied between shaft and impellers, which absorbs the initial shock loading resulting from the inertia. The coaxial shaft and sleeve which, splined together, form the springing member, are shown in a detail drawing.

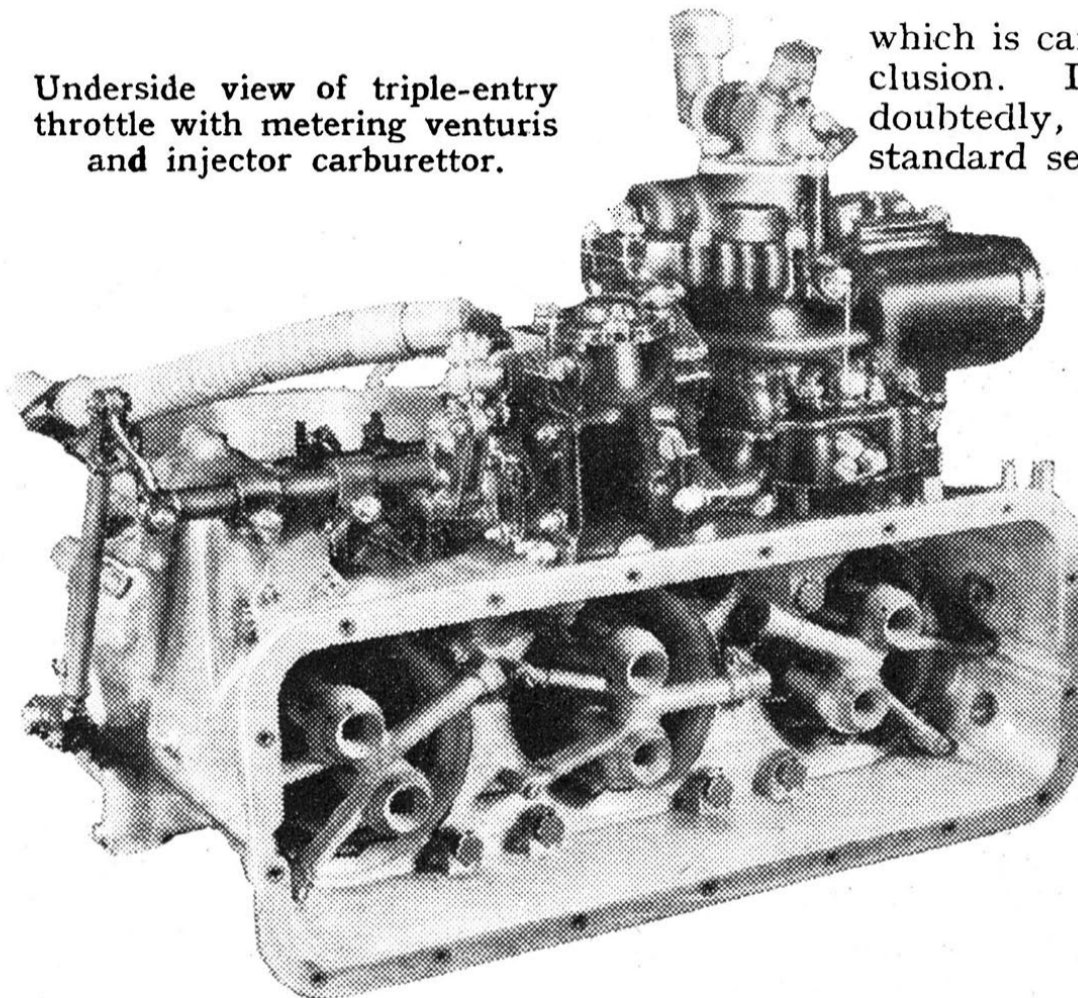
There is not such a number of gears at the rear end of the Griffon as is found in the Merlin, the front-end cam-drive arrangements, etc., being the cause; nevertheless, there is still a goodly number of wheels, bearings and shafts at the back of the Griffon, and to attempt to describe these individually would, as well as being tedious, serve no worthwhile function. They can almost all be traced in the Max Millar drawing and other details; however, it is worthy of emphasis that the nesting of this mass of drives is as compact and neat as the highest order of mechanical design ingenuity can make it.

In the title sub-heading of this article are the words "Classic Orthodoxy of Design," and in the Griffon probably more than in any other Rolls engine is this trait manifest. There is nothing about the engine which is awfully cunning or "super new." It is the epitome of plain, straightforward simplicity of design,



Three-quarter rear detail of torsion spring drive coupling at rear end of crankshaft.

Underside view of triple-entry throttle with metering venturis and injector carburettor.



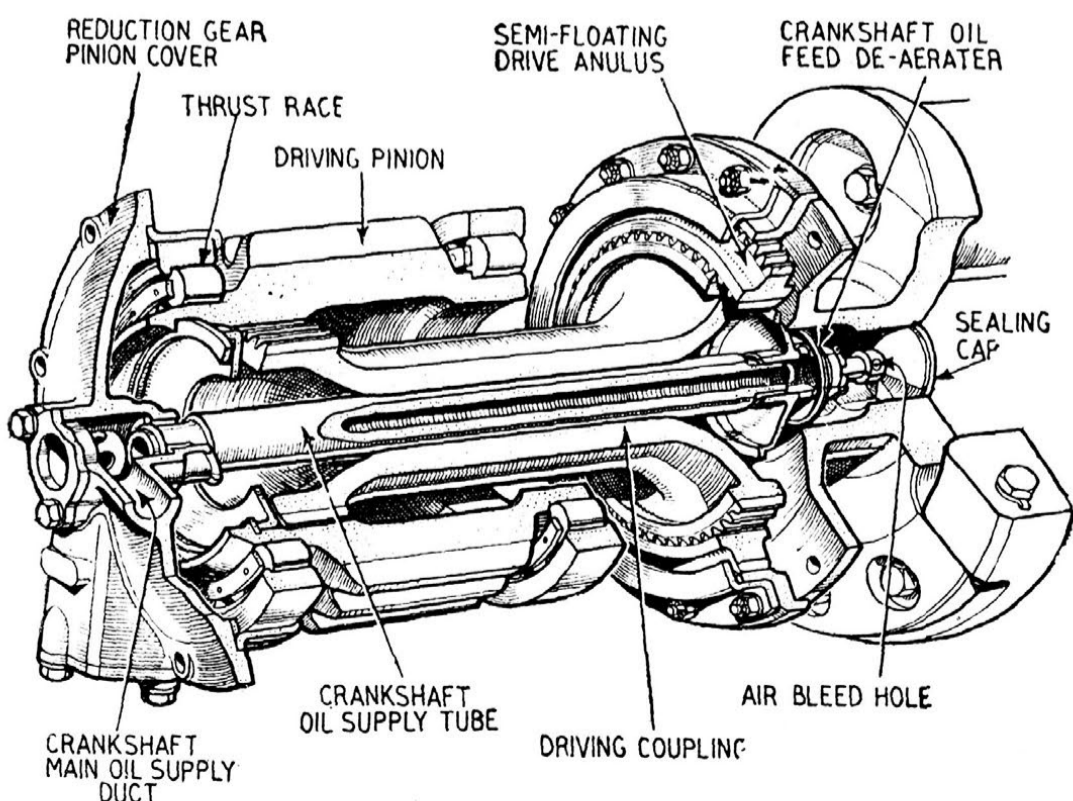
which is carried to the absolute of logical conclusion. It is for this reason, almost undoubtedly, that the Griffon carries further the standard set by the Merlin as being the highest performance engine in existence, for other engines of similar power are larger or, if of the same size, are lower powered. Such a feature, when coupled to great reliability, cannot well be achieved by "mushroom" methods—it comes only by way of lineage of thoroughbreds born of painstaking care and unrivalled experience. It is on this foundation that the name Rolls-Royce rests so securely.

The main body of the Griffon is not unlike the later Merlins in that it has a light-alloy pentagonal-section crank-case, the lower half of which is a dry sump housing the oil pressure and scavenge pumps with their filters in a well at the rear end.

A baffle plate is also embodied in the lower half case to restrict oil surge and prevent excessive breathing under negative G accelerations. Cylinders are floating wet liners fitted in light alloy jacketing blocks, the compressive stress due to the holding-down studs being taken by the jacket. The liners are chromium plated in the bores for about 2½ inches down from the head as an anti-war measure, it being in this area that maximum wear from corrosion and great temperatures occurs. A flange is incorporated round the head of the liner, and, with aluminium sealing rings above and below, is nipped between the cylinder head and jacketing block. Thus all thermal expansion and contraction of the liner takes place relative to the lower end.

This fashion of nipping the liners at the top means that, when tightened down, there is a gap of 0.15 in. between adjacent faces of the cylinder-head block and the jacketing block which, until one knows the reason, looks very queer. To prevent excessive cantilever loading on the joints adjacent to the end studs when at normal running temperatures, flat steel plates are interposed at each end of the cylinder bank between head and jacket, these plates transmitting the load as the engine warms up.

Combustion chambers are machined all over and are quite orthodox in shape. Valve seats are shrunk-in inserts and the porting passages are scurfed—very smoothly indeed on the inlet side (as is to be expected), but fairly roughly on the exhaust side. The valves have Brightray seat facings and, whilst the inlet valves have extended guides, the



Three-quarter front view of semi-floating coupling between crankshaft and reduction gear.

exhaust valves are partially filled in the stems with metallic sodium.

Rocker gear is very similar in design to that of the Merlin, the central camshaft operating the two rows of valves through cantilever rocker arms. The cams themselves are of reasonably quick-lift profile and are designed to give harmonic negative acceleration. Two springs per valve are employed, of opposite helix and differing periodicity, the latter being an anti-surge measure.

The ignition system of the Griffon is well worthy of attention, not so much as a system, for the plugs and screening harness are standard, but in view of the unusual timing arrangement and very efficient magneto. This is a B.T.H. duplex type which runs at half engine speed, being driven through bevel gears from an inclined shaft taken from the base of the port bank camshaft drive. The timing arrangement is "built-in" to the inclined shaft and comprises a hydraulic ram, at the base of the shaft, subject under control to engine oil pressure which is used to alter, as required, the linear position of the inclined shaft. At the top end, the shaft is helically splined to the mag.-driving bevel so that linear motion of the shaft will, via the helical splines, cause a change in the relative positions of the cam and rocker pad in the magneto to achieve the desired timing—i.e., the cam is caused to strike the pad at an earlier or later point of crank angle. Additionally, as the power input to change the timing is provided by oil pressure, the pilot's control loading is extremely light; in fact the only load is that needed to operate a small pilot valve to regulate oil flow to the ram.

Mention of pilot's controls leads one naturally to consideration of what, in the writer's opinion, is most aptly called the "power lever control" system. Briefly, what this means is that, instead of the normal cockpit arrangement comprising separate throttle and airscrew or, rather, r.p.m. controls, a single "power" lever is fitted which governs the boost, r.p.m. and ignition. Maximum performance (that is, max. r.p.m. and max. boost) is obtained at full forward movement of the single power lever, and at intermediate positions of the lever suitable combinations of boost and r.p.m. are obtained for various other flight conditions.

#### Override Essential

There is little doubt that this scheme is a most useful one in that it relieves the pilot from responsibility in ensuring that the engine is always operating under the best conditions. However, it is rather essential that an override control be fitted to allow normal separate settings of boost and r.p.m. when required—for example, when landing or in combat. The Griffon is provided with an override lever for these particular functions, and there is every reason to suppose that, despite the innate conservatism

of pilots, nothing but advantage can result from the use of the power lever control.

Further to ensure the most advantageous and safe operation of the engine, a boost regulator unit is fitted, the purpose of which is to restrict boost pressure below full-throttle height to a safe maximum. As may be realised, although the maximum boost pressure of the Griffon 65 is nominally 21 lb./sq. in., the blower is capable of delivering nearly twice this pressure at low altitudes, and in order that the pilot can slam forward the lever to obtain maximum

power without having to worry about the safe boost limit, and to save the possibility of the engine from disintegration with expensive noises, a regulator unit is installed which limits the delivery below throttle height for whatever boost is being used in the appropriate gear. The regulator comprises an aneroid-controlled relay piston linked to the throttle butterflies by a differential gearing to shut off the degree of throttle opening as necessary. The relay piston is subject to the differentials of blower intake and delivery pressures, so that if, for example, combat climb is required from the ground up, as altitude is gained the aneroid capsule tasting the boost will move a piston valve to admit the pressure difference across the blower to the relay piston to open the throttle progressively and maintain boost up to full-throttle height.

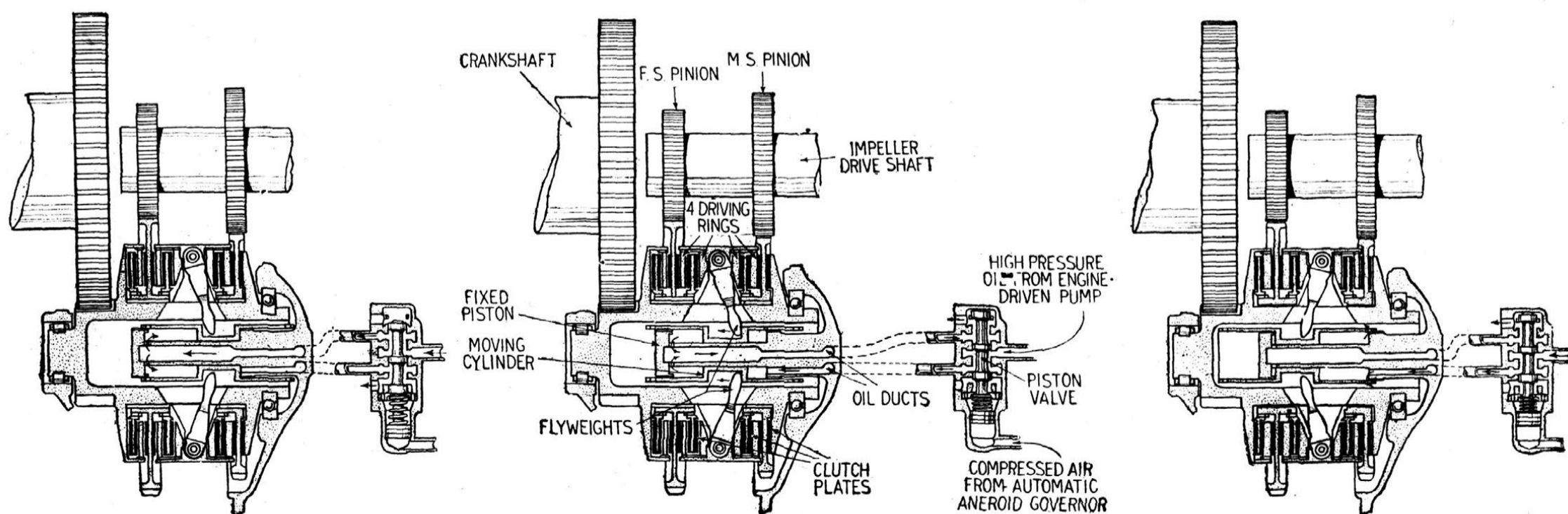
#### Powers and Future Use

Whilst on the question of powers it is noteworthy that the *continuous cruising* powers of the Griffon 65 are well over 1,000 h.p. from sea level up to over 30,000ft. Compare this with the original Merlin at the outbreak of war which had a maximum S.L. power of 880 h.p. (at 6½ lb. boost) rising to 990 at 12,250ft., the maximum rated height.

Although the Merlin is such a magnificent engine—the outstanding engine of all time—as an alternative for future air liners, it would surely be sensible to instal a derated Griffon to give similar performance more economically and, at the same time, gain all the benefits of advanced development. It is not without significance that the Griffon is one of the very, very few engines ever to have succeeded to general service without experiencing modifications necessitating grounding. There is, too, a good deal of advantage the Griffon has over the Merlin on the subject of servicing and maintenance.

We have mentioned that the maximum boost of the Griffon 65 is 21 lb./sq. in., but there are other models in existence which have been passed for 25 lb./sq. in. maximum boost (with 100/150 grade fuel) and the maximum powers in the respective moderate and full supercharge gears have thus been stepped up to: MS, 2,375 b.h.p. at 1,250ft., and FS, 2,140 b.h.p. at 15,500ft.

## ROLLS-ROYCE GRIFFON (65) (CONTINUED)



Diagrammatic illustration of supercharger change-speed unit showing (left) MS gear engaged; (centre) changing from MS to FS gear; and (right) FS gear engaged.

**LEADING PARTICULARS**

Type .. .. .	Pressure liquid-cooled, in-line 60 deg. V.
No. of cylinders ..	12, arranged in two monobloc banks of six with detachable heads.
Bore and stroke ..	6.0in. x 6.6in.
Unit capacity ..	186.6 cu. in.
Total swept volume ..	2,239 cu. in. (36.7 litres).
Reduction gear ..	Direct spur gear—Ratio: 0.5102 : 1.
Rotation ..	Left-hand tractor.
Airscrew shaft size ..	No. 5 S.B.A.C. Standard.
Valve type ..	Poppet—exhaust valves sodium cooled.
No. of valves/cylinder ..	Four, quadrantly disposed.
Supercharger ..	Centrifugal two-speed two-stage with inter-cooler.
Carburettor ..	Rolls-Royce Bendix-Stromberg pressure injection type 9T/40/1 triple-entry up-draught.
Magneto .. .	B.T.H. C.S.H. 12-125/3 duplex type with integral distributors.
Plug positions ..	Two/cyl. diametrically opposite and radially disposed one each to inlet and exhaust sides.
Firing order ..	(P = port; S = starboard) 1S, 4P, 3S, 2P, 5S, 1P, 6S, 3P, 4S, 5P, 2S, 6P.
Ignition timing ..	Fully advanced: Inlet plugs 45 deg. before T.D.C. Exhaust plugs 51 deg. before T.D.C. Fully retarded: Inlet plugs 10 deg. before T.D.C. Exhaust plugs 16 deg. before T.D.C.
Crankshaft type ..	Counterbalanced six throw.

**BEARINGS**

Main bearing diameters ..	3.75in.
Main bearing areas ..	Centre, 5.45 sq. in. Ends and inters, 5.12 sq. in.
Big-end diameter ..	Fork rods, 3.10in.; plain rods, 3.773in.
Big-end areas ..	Fork rods, 6.28 sq. in.; plain rods, 2.61 sq. in.
Gudgeon diameter ..	1.50in.
Total gudgeon bearing area ..	6.83 sq. in.
Rod/gudgeon bearing area ..	2.976 sq. in.
Piston/gudgeon bearing area ..	3.854 sq. in.
Con. rod length, centre to centre ..	10.65in.
Ratio of con. rod length to stroke ..	$1.614 : 1 \frac{L}{R} = 3.228.$
Max. angularity of con. rod ..	18 deg.
Cam base circle dia. ..	1.150in.
Cam major axis length ..	1.5308in.
Valve lift ..	0.570in.

**WEIGHT**

Power/weight ratio ..	0.941 lb./b.h.p.
Weight/sq. in. piston area ..	6.159 lb.
Max. mean piston speed ..	3,025 ft./min.
Weight of piston and rod ass'y/cyl. ..	12.23 lb.

**ASPIRATION**

Valve timing ..	Inlet opens 24 deg. before T.D.C.; closes 44 deg. after B.D.C. Exhaust opens 64 deg. before B.D.C.; closes 4 deg. after T.D.C.
Inlet port area (valve throat) ..	5.54 sq. in./cyl.
Exhaust port area (valve throat) ..	4.12 sq. in./cyl.
Piston area to inlet valve area ratio ..	5.103 : 1
Piston area to exhaust valve area ratio ..	6.867 : 1.
Ratio of piston area to frontal area ..	0.298 : 1.
Cylinder compression ratio ..	6 : 1.
Max. internal compression ratio of blower ..	5.3 : 1.
Impeller diameters ..	1st stage, 13.4in.; 2nd stage, 11.3in.
M.S. gear ratio ..	5.84 : 1.
F.S. gear ratio ..	7.58 : 1.
Equivalent tip speeds ..	M.S. cruising, 1,071 ft./sec.; M.S. max. power, 1,228 ft./sec. F.S. cruising, 1,391 ft./sec.; F.S. max. power, 1,594 ft./sec.
Eye area of 1st impeller ..	56.1 sq. in. free, 40.5 sq. in., restricted by tail bearing support.
Rich mixture ratio ..	11 : 1 by weight.
Weak mixture ratio ..	14 : 1 by weight.

**POWER**

Max. boost pressure ..	21 lb./sq. in.
Max. cruising boost pressure ..	7 lb./sq. in.
Max. b.h.p. ..	2,220.
Max. r.p.m. ..	2,750.
Cruise r.p.m. ..	2,400.
Max. b.m.e.p. ..	286 lb./sq. in.
Altitude to which 1 ata manifold pressure is maintained ..	39,500ft. in F.S. gear.
Power/cu. in. swept volume ..	0.992 h.p.
Power/litre ..	60.5 h.p.
Power/sq. in. piston area ..	6.54 h.p.
Power/sq. ft. frontal area ..	281 h.p.
Power ratio/sq. in. piston area to sq. in. frontal area ..	3.35 : 1.

**AUXILIARY DRIVES**

Auxiliary drive speeds (ratio relative to crankshaft)—	
Tachometer ..	0.250 : 1.
Gearbox input ..	0.984 : 1 (Accessory drive faces: hydraulic pump, electric generator, air compressor, vacuum pump).
Magneto ..	0.50 : 1.
C.S.U. ..	0.82 : 1.
Fuel pump ..	0.887 : 1.
Oil pumps ..	0.984 : 1.
Engine coolant pump ..	1.793 : 1.
Inter-cooler coolant pump ..	1.799 : 1.
Starter ..	1 : 1.
Type of starter ..	Coffman combustion type L5.

The very high output of the engine would not be possible without the two-speed two-stage supercharger which, although of greater capacity, seems to be smaller than that of the equivalent Merlin; nevertheless, a price of no less than 600 h.p. is paid in driving the supercharger and, even more amazing, this power is transmitted through relatively small friction clutches in the speed change unit. A driving wheel on the spring drive coupling at the rear of the crankshaft meshes with a hollow layshaft in the change-speed unit, this layshaft housing a stationary piston and sliding cylinder assembly. Mounted on the layshaft are a series of clutch plates and driving rings on each side of a driving member in which are pivoted six fly-weights; the clutches on the crankshaft side of the central weights are for full supercharge drive (F.S.), whilst those on the impeller side of the weights are for moderate supercharge (M.S.), the respective clutches transmitting the drive through gears which mesh with pinions on the impeller shaft.

When, for example, M.S. drive is in operation, the fly-weights are held inclined rearwards by centrifugal force to engage the clutch plates of the M.S. gear, and, as the F.S. clutches are disengaged and doing no work the driving

gears can both be in constant mesh with the impeller pinions.

**Automatic Blower Gear Change**

If the aircraft climbs into an altitude range where F.S. gear is required, the change of speed is effected automatically by a selector mechanism which actuates a piston valve so that oil delivered by the special pump in the crankcase is directed to the appropriate side of the change-speed unit piston. The pressure exerted against the piston reacts on the cylinder causing it to move, and by so doing, push the fly-weights away from the M.S. clutches towards the F.S. clutches; as the weights move beyond the neutral plane centrifugal force again takes hold and forces them to engage the F.S. clutches which thereupon transmit the drive through the high-speed F.S. gear.

The automatic selector mechanism which effects the blower speed change comprises an aneroid capsule which operates a micro-switch to open a valve in the aircraft's air supply, and so pass compressed air to a ram on the end of the piston valve which directs the distribution of oil to the change-speed unit. However, the pilot is provided

## ROLLS-ROYCE GRIFFON (65)

with a change-speed switch to by-pass the aneroid and thus permit a change in blower speed for emergency use, to allow of retaining low gear for formation flying, or to allow of ground testing.

In order that no ill effects result from small axial movement as between the driving gears of the speed-change unit and also to preclude the effects of an overhung drive, the respective drive pinions on the impeller shaft are not integral. In point of fact, only the M.S. pinion is mounted on the impeller shaft itself, the F.S. pinion being supported in a housing around the spring-drive sleeve, with a bell coupling separating the pinions and splined to each.

Induction is updraught through a triple-barrel throttle in the mouths of which are the venturis for fuel metering balance. The carburettor is a Rolls-Royce modification of the Bendix-Stromberg metering injector, and supplies a governed measure of fuel to a series of discharge nozzles arranged in a "hub" from which project eight "spokes." On the downstream side of these is created a depression or turbulent area into which the fuel nozzles discharge, and from here the mixture is taken straight into the eye of the first-stage impeller. Rectifying and diffuser vanes are interposed between the first and second impellers, and in this inter-stage area the blower casing is cooled by its own little coolant system. From the second-stage impeller the charge is passed through a further diffuser ring and

so to the volute delivering to the intercooler. An accelerator pump is located in the up-draught throat between the nozzle spider and the impeller eye, and discharges through a single nozzle.

The inter-stage impeller case cooling has the effect of increasing the charge density as an intermediate measure, and by so doing increases the capacity efficiency of the second stage. This principle lies behind the use of the main intercooler, for an increase in charge density for a given volume enhances the volumetric efficiency, and although this leads to a large flow through the carburettor and, thus, a higher consumption, relative to the power increase, the step-up in consumption is well worth while.

For the future, Rolls-Royce have evolved a metering pump to supplant the present system, and it also seems likely that water/methanol injection will be introduced before very long, not necessarily only as an emergency measure but as a normal running condition. Direct injection to individual cylinders will also, without doubt, eventually be incorporated. There is this to be said for the new metering pump: it is an extraordinarily simple unit of great reliability and meters so accurately throughout the whole performance range that it is not too much of an exaggeration to state that flights could be planned to within a half-gallon of fuel endurance. With this is naturally linked a control and pre-knowledge of specific consumption such as has never before been known.

## Sir Arthur Tedder's Promotion

### Deputy Supreme Commander Becomes Marshal of the Royal Air Force

THE *London Gazette* of September 11th announced the promotion of Air Chief Marshal Sir Arthur Tedder, G.C.B., to Marshal of the Royal Air Force.

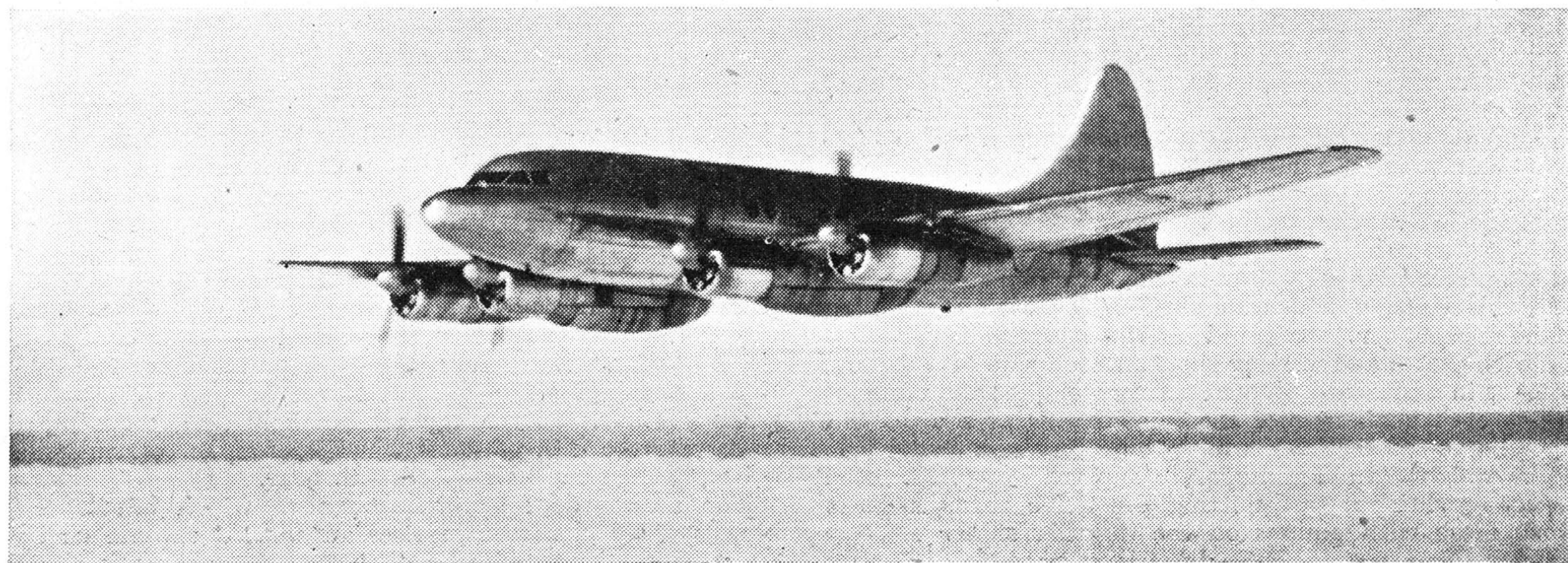
The public remembers Sir Arthur chiefly as having been A.O.C.-in-C. the Mediterranean Air Command from 1943 until he was appointed Deputy Supreme Commander of the Allied Armies of Liberation under General Eisenhower. But his earlier career had been full of promise. He entered the Army in 1913 with a University commission from Cambridge, where he was at Magdalene College. As an undergraduate he gained a University



Marshal of the R.A.F.  
Sir Arthur Tedder,  
G.C.B.

prize for an essay on the Navy of the Restoration, which was favourably reviewed in *The Times*. His first commission was in the Dorset Regiment, and with it he went to France in 1914. Thus he belongs to the honourable company of "Old Contemptibles." In 1916 he was seconded to the Royal Flying Corps, and during the war was mentioned several times in despatches. At the battle of Arras in 1917 he commanded No. 70 Squadron which was equipped with 18 Sopwith two-seaters.

Since the 1918 Armistice Tedder saw service during the Chanak crisis in 1922. In 1928 he attended a course at the Imperial Defence College—a very good preliminary for his subsequent post as Deputy Supreme Commander of British and American forces of all Services. In 1936 he was appointed A.O.C. Far East Command, with headquarters at Singapore. He has also held various important posts at the Air Ministry, including that of Director-General of Research and Development and Director of Training.



LINCOLN'S CIVIL SISTER: A new photograph of the Avro Tudor I doing a little overweather flying. The wing arrangement of the Lincoln and the Tudor I is identical.

# Germany's War Aircraft

## A Synoptic Survey of Enemy Designs—Past, Present and Projected

**F**OLLOWING examination of enemy aircraft in Germany, and the capture of official enemy material, it is now possible to add materially to the general knowledge of German types and trends.

Last week's issue of *Flight* contained an article dealing with the jet power units devised by Germany in her efforts to counter the ever-increasing Allied supremacy in the air. As a logical follow-up, we now give a survey of Germany's military aircraft, some of them in the experimental stage. As a chronological sequence of development in the separate aircraft categories might be somewhat confusing, it is thought best to deal with the types in alphabetical sequence.

### Arado

First on the list are the Arado types. The Ar 196 seaplane and Ar 232 transport being fairly familiar, the type Ar 234B is the most interesting. This aircraft, the fastest bomber in the world, was referred to in the last issue, and its maximum speed of 546 m.p.h. at 20,000ft., coupled with good inherent aerodynamic stability, have shown it to be an unusually efficient aircraft.

Another Arado machine is the type Ar 240, a low-wing twin-engine aircraft intended for high altitude reconnaissance or as a heavy fighter. Early sub-types had DB 601 engines, later sub-types DB 603s or 605s. It saw very limited operational service.

### Blohm and Voss

Of the Blohm and Voss machines the most unconventional was undoubtedly the type Bv 141B asymmetric aircraft which was especially produced to afford maximum visibility. Powered with a single BMW 801, only a few of these machines were completed, and the type was not used as standard operational equipment.

Two prototypes of the interesting

*INCLUDED in this further review of German aircraft are some of the jet-propelled types.*

*The first articles, dealing authoritatively with Germany's jet aircraft, were published in "Flight" of June 14th and September 13th. Rocket propelled aircraft and directed missiles will be reviewed in succeeding issues.*

high-wing twin-engine Bv 144 were constructed for the Germans by the Societe Louis Breguet, of France. The main feature of this aircraft is a variable incidence mechanism for changing the effective angle of attack during flight, a project in which we might well see further developments. The machine accommodates a crew of three together with 18 passengers and 1,000 lb. of freight, and has a range of 930 miles; all-up weight is 28,900 lb.

A high altitude single seat fighter, originally designed by Messerschmitt, was entrusted to Blohm and Voss and given the title of Bv 155. Although quantity production was contemplated the aircraft never became operational. There were two versions, the Bv 155B with a DB 603 engine and TKL 15 turbo-supercharger, and the Bv 155C with DB 603U engine and TKL 15 turbo-supercharger. Maximum speed for both types was calculated to be 428 m.p.h. at 54,000ft. for type B and at 50,000ft. for type C.

The latest Blohm and Voss aircraft is the Bv 238, only one or two prototypes of this having been built. It bears a general resemblance to the familiar Bv 222 but is considerably larger and heavier. It was intended that operational aircraft should be powered by six Jumo 222 engines. Span is 197ft., and at the junction of centre section and outer wing panels,

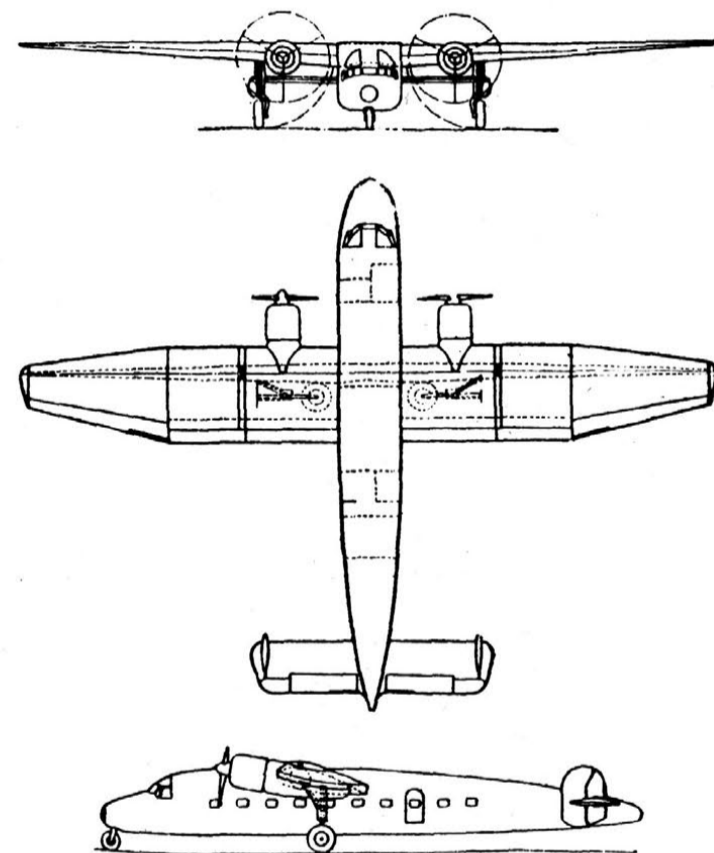
long nacelles each with two gun turrets were to be fitted, one forward of the leading edge and the other aft of the trailing edge. The designed all-up weight of this aircraft is 198,000 lb.

### D.F.S.

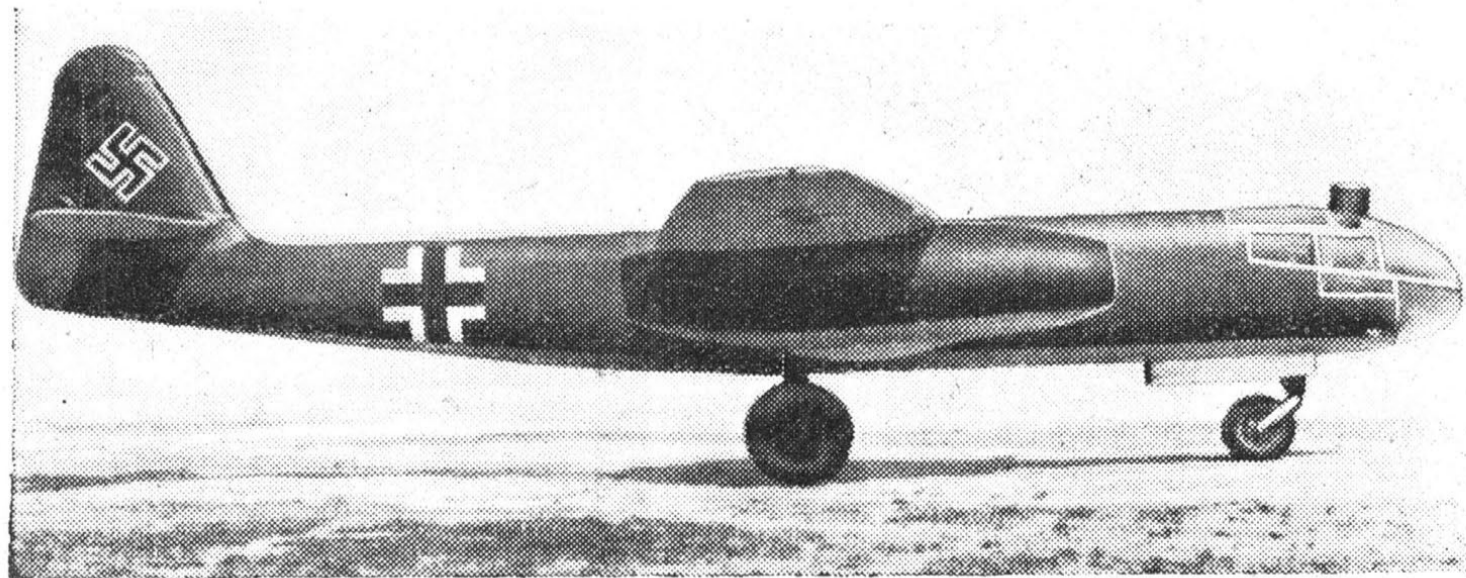
First in the D group comes the D.F.S. 322 glider which was developed for testing full-scale wing sections at high speed. It is a twin fuselage design of 49ft. 2in. span, the wing section to be tested being mounted between the fuselages, and the angle of attack of the test section made variable in flight by an electric motor. The pilot's cockpit is in the starboard fuselage and there is accommodation for the observer in the port fuselage.

### Dornier

Of the Dornier designs the one revealing the greatest technical interest is the Do 335A tandem-engined fighter, night fighter and fighter-bomber. Although available in small numbers



**BLOHM AND VOSS 144:** This interesting transport design has as its main feature a variable incidence wing. Extensive use is made of electrics and the cockpit is neat and modern.



**ARADO 234B:** This very clean bomber-reconnaissance machine with periscope gun and bomb sight above cockpit is Jumo 004 jet propelled, with a speed of 470 m.p.h. at 19,700ft.

towards the end of the war, this aircraft was not encountered on operations. The cockpit is above the leading edge of the wing between the nose and tail engines. In the two-seater version a second seat is in a separate cockpit behind and above the pilot, a separate enclosure giving forward vision. A further unusual feature is the cruciform tail. Two DB 603 engines power the machine, the nose engine driving a tractor airscrew and the rear engine a pusher. On some versions the nose airscrew is of reversible pitch type. Maker's performance figures are: maximum (emergency)

## GERMANY'S WAR AIRCRAFT

speed 477 m.p.h. at 21,000ft., economic cruising range 1,280 miles, service ceiling at mean weight 37,400ft.

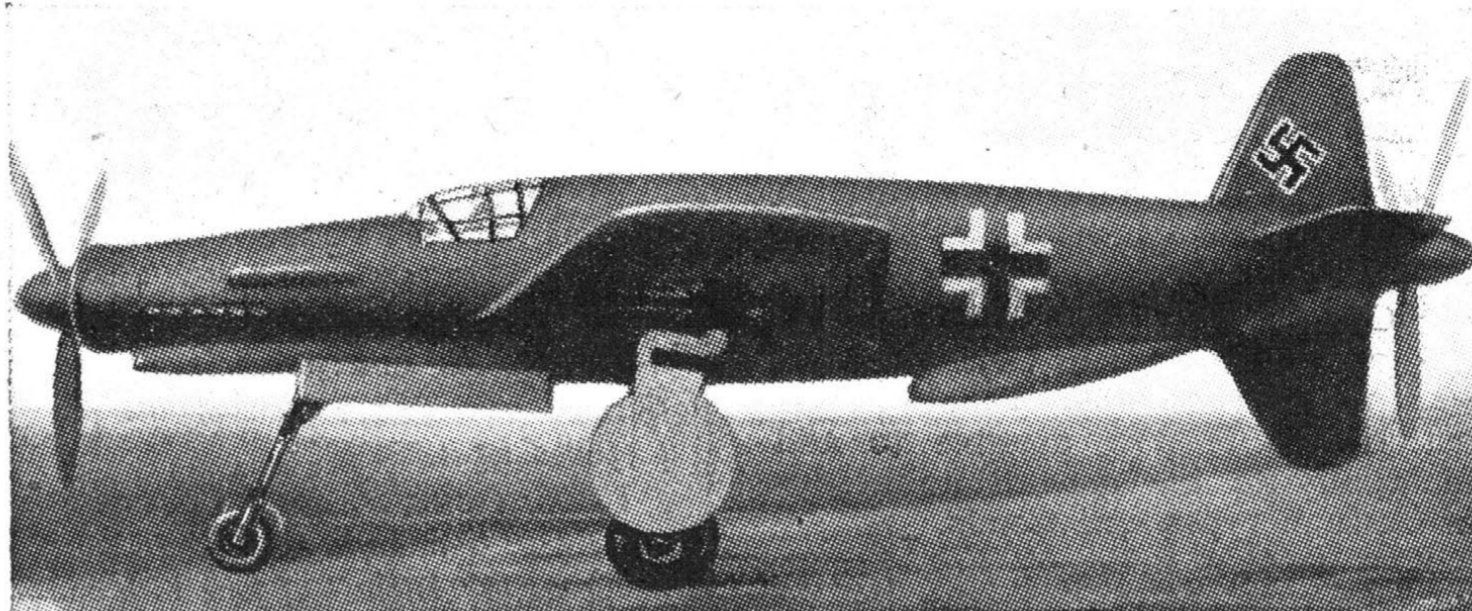
### Focke-Wulf

Of the Focke-Wulf range of aircraft the famous Fw 190 types subsequent to the "long nose" version were re-designated by Kurt Tank, the chief designer, as the Ta 152. Of these there were five sub-types of which the most interesting are the 152c which, using MW 50 (methanol) boost, attains a maximum speed of 467 m.p.h. at 35,000ft. The 152H is a high-altitude version with a wing span of 48ft. 6in. and, by carrying 18.6 gallons of GM I (nitrous oxide) as well as 15.4 gallons of MW 50, a maximum speed of 465 m.p.h. using MW 50 injection is possible at 30,000ft., and a speed of 472 m.p.h. is attained at 41,000ft. using GM I.

Following on this range of aircraft the next Tank design was the Ta 154A short-range night fighter and bad weather fighter. Principally of wood construction this machine has a one-piece shoulder wing and a tricycle undercarriage. Fitted with two Jumo 211R engines, maximum speed is 394 m.p.h. at 26,300ft.

Next comes the Ta 183 single-jet machine which was Tank's latest single-seat fighter project. At the end of hostilities it was in the advanced development stage. Of composite wood and metal construction and designed for the He SO 11 power unit, an endurance of up to three hours and a maximum speed of 590 m.p.h. were expected.

As distinct from single-seat fighters and carrying on their interest in very large aircraft emphasised by the Condor, Focke-Wulf had in hand a development of a new type six-engined aircraft, the Ta 400. Wing



**DORNIER 335A**: Engined front and rear, with a cruciform tail and tricycle undercarriage, this machine was patented as a design in 1937. It is capable of an emergency speed of 477 m.p.h. at 21,000ft. and a maximum continuous cruise speed of 428 m.p.h. at 23,300ft.

span was 137.8ft. and maximum bomb load 22,000 lb. One version was to have had two Jumo 004 turbo-jet units, arranged one in each of two nacelles behind the normal engines. With this assistance the aircraft was calculated to have a maximum speed of 450 m.p.h.

### Heinkel

The Heinkel concern, after producing the He 111, produced the "Siamese twin" He 112, the intended function of which was a glider tug, although consideration was given to using it as a bomber. They were also developing, early on, a high-speed monoplane with a Daimler-Benz double engine in the fuselage with shaft drive to a tractor airscrew. A two-seater, this aircraft was of very clean design. Another interesting Heinkel machine was the He 162A "Salamander," popularly called "Volksjaeger," or People's Fighter, a one-piece shoulder-wing machine of composite construction which was very clean aerodynamically. Alternative turbo-jet unit power plants were the BMW 003E-1, the Jumo 004, Heinkel-Hirth 011 or BMW 003E-2. Mounted centrally above the fuselage the jet is above the tail and between the fins. Maximum

speed was 485 m.p.h. at 36,000ft. It is rather curious that the He 162, which was the standard service version at the German collapse, should have an earlier designation number than the He 178 which was actually the first jet-propelled aircraft to fly (August 27th, 1939).

The latest aircraft with which Heinkel were concerned as an actual machine was the He 280 single-seater low-wing monoplane with twin fins and rudders and tricycle undercarriage. The development of this design was parallel to that of the Me 262, but the machine was slower and generally less efficient than the Messerschmitt product and was eventually abandoned. Power plants of the most recent versions were two BMW 003A turbo-jet units situated under the wing.

### Henschel

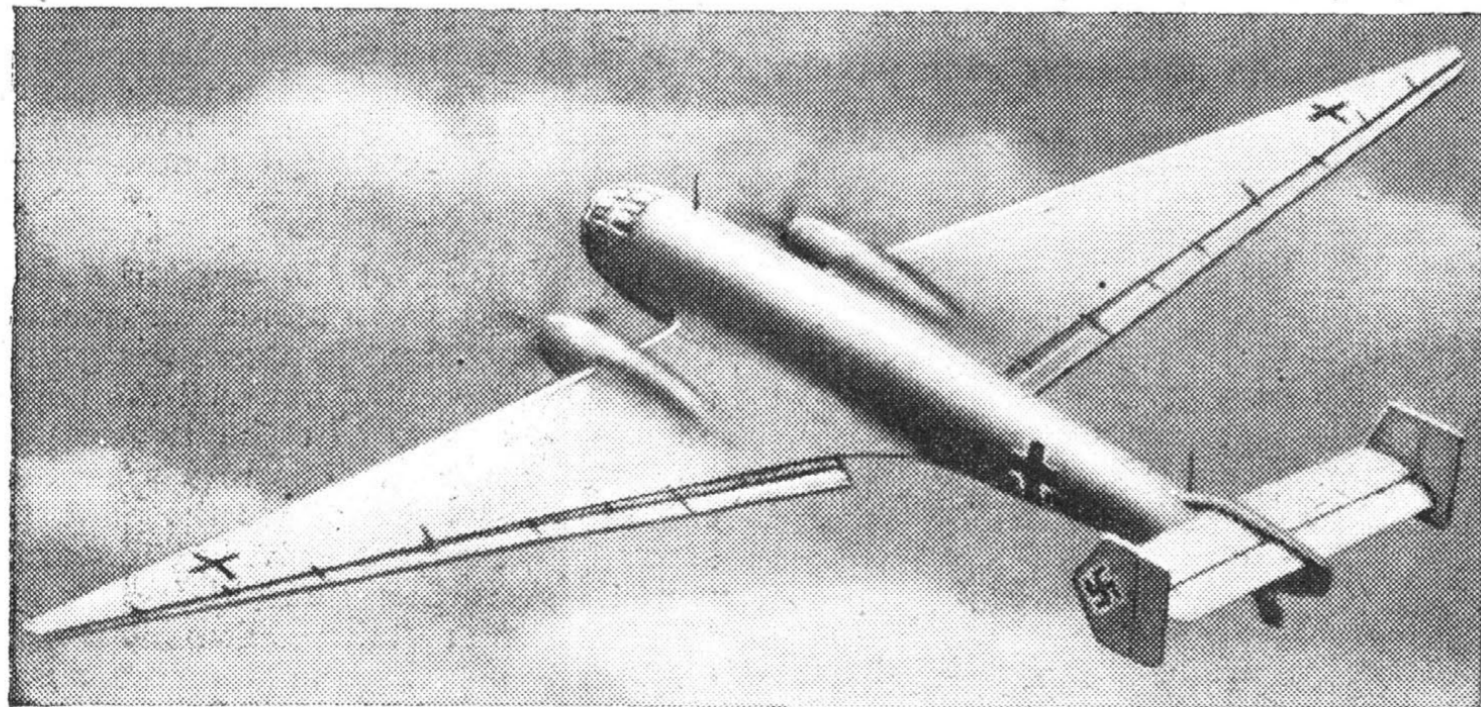
Most interesting of the Henschel machines is the Hs 132 experimental single-jet dive-bomber and ground attack aircraft. Wings are of wood and fuselage of metal and the pilot lies prone. One Jumo 004 jet unit was to give a maximum designed speed, without bombs, of 495 m.p.h. at 3,000ft.

### Junkers

The outstanding Junkers aircraft was undoubtedly the Ju 88 which, first flown as a bomber in 1936, was subsequently adapted for a wide variety of duties. This machine, in various forms, was in operation throughout the entire period of the European war and was, in fact, still in production when hostilities ended.

The first jet-propelled heavy bomber ever to fly was the Ju 287. Although it had not progressed beyond the prototype stage it was intended to use two large turbo-jet units made by BMW or Junkers, each developing a static thrust of approximately 5,500-7,000 lb. The aircraft would have had a crew of three and a maximum bomb load of 9,900 lb.; maximum speed at 16,400ft. was 537 m.p.h., a worthy complement to the Arado 234B.

An interesting Junkers type was the



**JUNKERS 86P**: The original high-altitude reconnaissance type with 105ft. span and two flaps and a divided aileron per wing. Jumo 207 or 208 turbo-supercharged diesel engines give an absolute ceiling of 49,000ft. for which the aircraft has a pressure cabin.

## GERMANY'S WAR AIRCRAFT

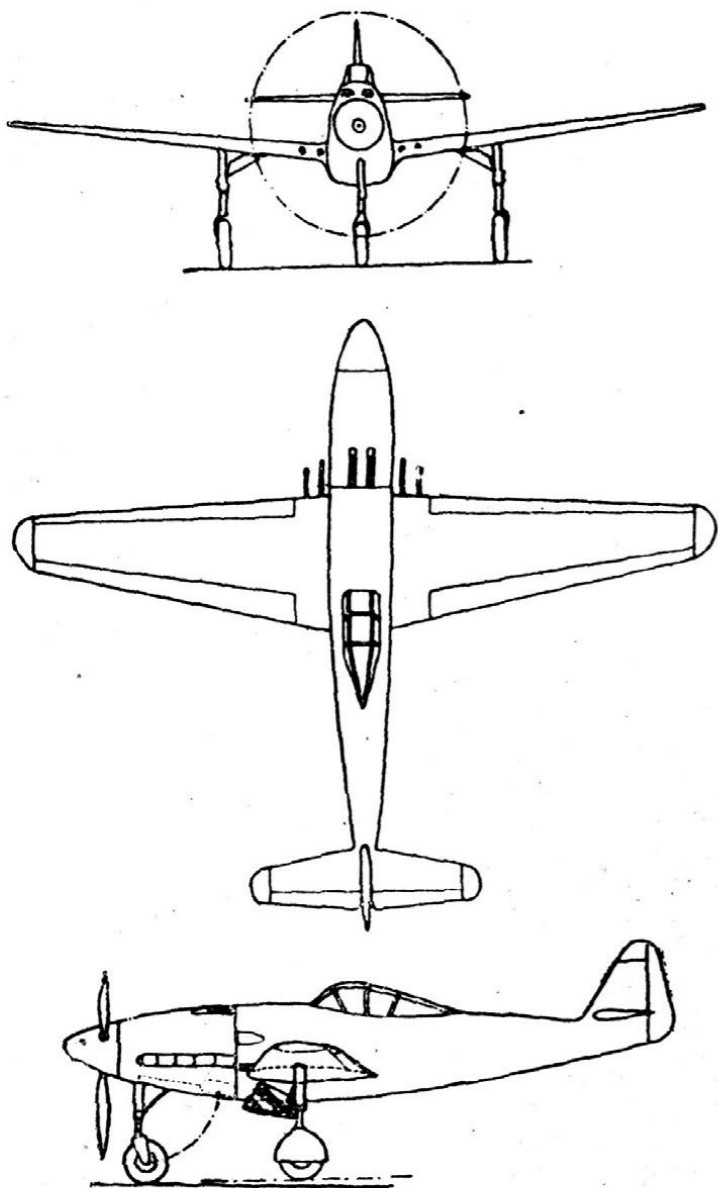
8-635 which, although based on a Dornier design and composed two Do 335s connected side by side by a new centre section (as in the He 111z), was allocated to Junkers, but at the cessation of hostilities only wind tunnel experiments had been made.

Another composite machine was the "Mistel," the lower component being a Ju 88 and the upper component a Me 109 or Fw 190. The Ju 88 was modified to incorporate a large warhead and became in effect a flying bomb for operation at short ranges. Another projected Junkers design was a flying wing type with stabilising fins and rudders mounted on the trailing edge of the wing. Gross weight: 77-84,000 lb. Designed speed and range respectively 630 m.p.h. and 3,700 miles.

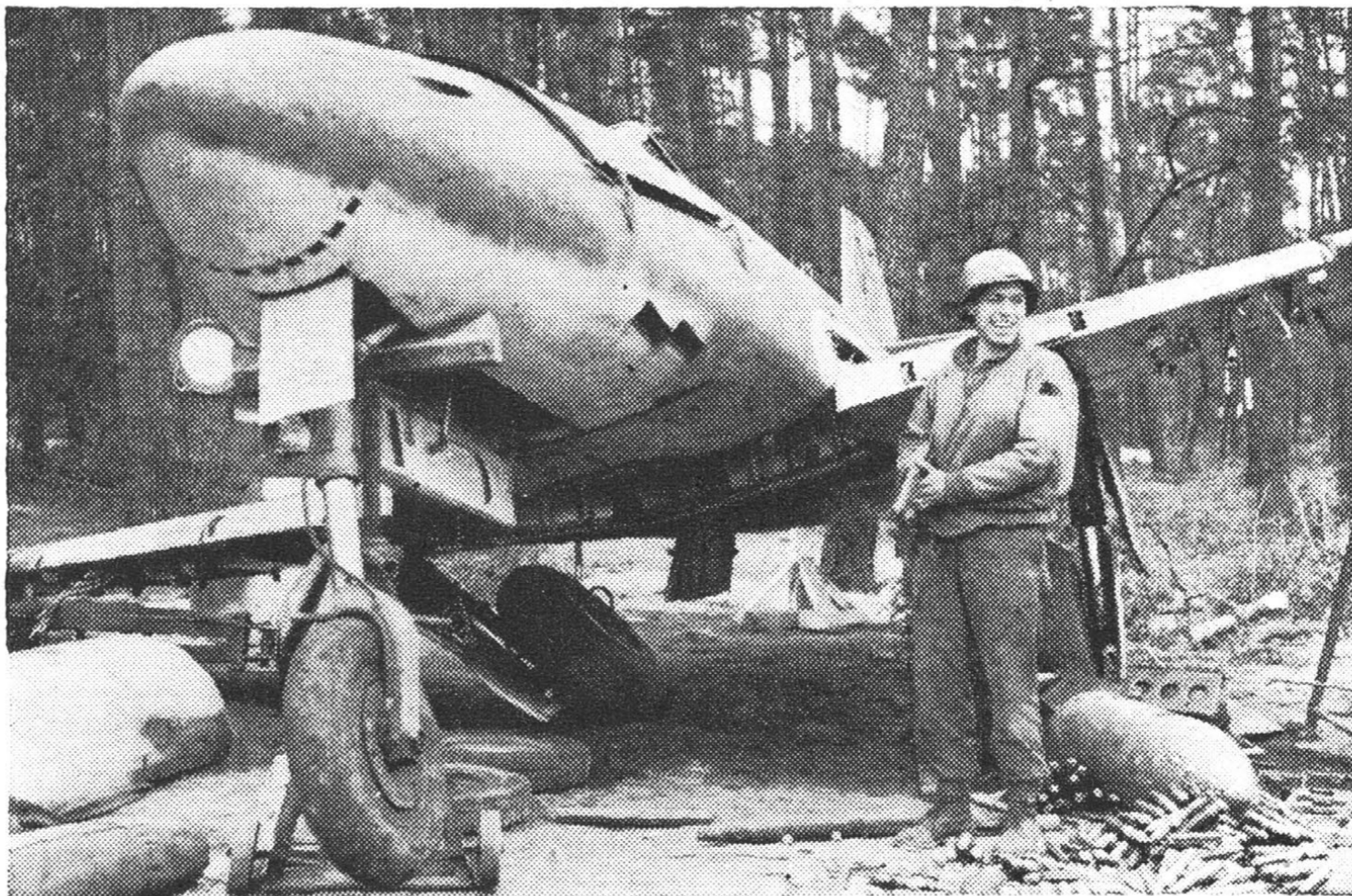
Junkers were also interested in a jet-propelled, tailless, single-seat, single-jet fighter, the EF 128, which was intended for a designed maximum speed of 590 m.p.h. at 19,700ft.

### Messerschmitt

Of the Messerschmitt range it is interesting to note that the fastest sub-type of the 109G, the G-10, fitted with a DB 605D engine and MW 50 injection possessed a maximum speed of 428 m.p.h. at 24,250ft.; had a range of 350 miles, endurance of 55 minutes and climbed to 20,000ft. in six minutes



**MESSERSCHMITT 309** : Another Messerschmitt single-seater fighter development with tricycle undercarriage and a DB 603 or Jumo 213 engine. It was only experimental.



**MESSERSCHMITT 262** : This photograph is chiefly interesting in that it shows a close-up of the mountings of the absent jet units, with fuel and control leads, in addition to various other details.

The Me 262 was designed in 1938 and first flown in 1940 with a Jumo 211 engine. The airframe proved satisfactory and in 1942 the prototype flew with Jumo 004A turbo-jet units. In January, 1944, the ninth prototype was completed which was the forerunner of the production aircraft. Two Jumo 004B jet units, one under each wing, gave the machine a top speed of 525 m.p.h. at 23,000ft. A later design, the Me 264, intended for bombing and long-range reconnaissance was extremely promising. This machine had a very high aspect ratio wing of 141ft. span and was intended for two BMW 801 or Jumo 213 power units. Two supplementary BMW 003 turbo-jet units were also visualised for bursts of high speed.

An endeavour to produce a cheap high performance fighter and ground attack aircraft was made by Messerschmitt with the jet-propelled Me 328. After the "A" sub-type had successfully passed static destruction tests the "B" was made for flying trials. Series B have two As 014 propulsive ducts slung beneath the wing, but considerable difficulty arose from vibra-

tions initiated by the pulsation of these (flying bomb) units and the project was finally abandoned.

### Helicopters

The Germans have taken considerable interest in helicopters, two firms being chiefly concerned, namely Focke-Achgelis and Flettner. The Fa 223, which was first flown in 1940, is powered by a BMW 323 engine of about 1,000 h.p.; it has two large overlapping rotors driven through reduction gearing, and for an all-up weight of 8,600 lb. has a useful load of 1,760 lb. A very ambitious project, the Fa 284 with BMW engines and an all-up weight 33,000 lb., has never been completed.

An interesting development is a helicopter with a jet-actuated rotor. The aircraft has an all-up weight of 1,400 lb. and a 135 h.p. engine drives an ordinary centrifugal supercharger which delivers a petrol vapour mixture through the rotor blades to burners at the tips. The burnt gas is ejected through tangential nozzles causing the blades to rotate by reaction. No details of performance are available.

### EXHIBITION OF ENEMY AIRCRAFT

**I**N connection with London's Thanksgiving Week a public exhibition of enemy aircraft, opened on September 16th, is being held in Hyde Park.

Seven aircraft are on view, among them the Heinkel 162A "Volksjaeger," and Londoners will be interested to see that this aircraft has a remarkable resemblance to the doodle-bug flying bomb, this being due chiefly to the mounting of the power unit above the fuselage immediately aft of the cockpit. A rather unpleasant aspect (for the pilot) of this aircraft is that the breech mechanisms of the two 20 mm. cannon are not insulated from the cockpit interior.

A Fieseler Storch is contrastingly placed quite near an Me 163B liquid-

rocket propelled single-seater fighter (which will be dealt with in a later issue), and also among the aircraft exhibited is a Focke-Wolf 190A, which, in contrast to English fighters, is chiefly remarkable for the very wide blades of its airscrew.

The two largest aircraft in the exhibition are respectively a Ju 88G and an Me 110G, both of which aircraft were concerned with doing a certain measure of damage to London.

Other than the purely military machines a very interesting little aircraft on exhibition is the Me 108B "Taifun," a four-seater low-wing cabin monoplane used chiefly for the transport of high-ranking German officers.

# CIVIL AVIATION NEWS

## MORE AIR MAIL

**A**IR-MAIL facilities from this country are now extended to France and Switzerland.

## AIRPORT FOR PARIS

**T**HE construction of a modern airport for Paris has been approved by the French Cabinet.

The site is the present Orly airfield, and with ten more runways to be constructed the new airport will cater for services to and from North and South America and for the Continental network.

## FINANCE

**D**URING the financial year 1944-45 the Eire Government received a contribution of £6,000 towards the cost of the Transatlantic Air Service, according to Finance Accounts which have just been issued in Dublin. The source of the contribution is not stated. Fees under the Air Navigation Act yielded the Government a total of only £58.

Total cost of Transport and Meteorological Services operated by the Department of Industry and Commerce during the year was £159,747.

## CLOSING DOWN

**P**ERSIA'S air communication with the outside world will be sharply reduced by September 29th, when the B.O.A.C. service operated for the British Government between Cairo and Teheran is to cease.

Simultaneously, Russian and American services will discontinue with the evacuation of their forces. The services which served military needs came under facilities provided by the tripartite treaty of January, 1942.

The only remaining air connection with the outside world will be the bi-weekly Teheran-Baghdad service of the Iranian State Airline.

## FIRE-FIGHTING NORSEMAN

**F**OUR Norseman V aircraft, a new post-war type of Noorduyn aircraft, are now on fire-patrol duty over Ontario's 100,000,000 acres of forest-lands, operating from the Ontario Provincial Air Service's headquarters at Sault Ste. Marie and from Timagami.

All-Canadian in design and construction, these machines are used by the O.P.A.S. for fire patrol work over Ontario's bush country and for carrying fire-fighters and fire-fighting equipment direct to the scene of fires.

This is a "repeat order" from the Ontario Government, which already has four other Norsemen in its service.

The Norseman V has had 400 pounds added to its payload: It carries a pilot, co-pilot and eight passengers, or can be adjusted, by means of folding, bench-type seats, to accommodate fewer men and more cargo. Folding seats, similar to those used in theatres, have also been installed for the crew.



**THE MINISTER AND THE CAPTAINS:** (Left to right) Sitting: Mr. Vernon G. Grudge, Lord Winster, Viscount Knollys, Capt. J. C. Kelly Rogers. Standing: Mr. L. C. Ifould, Capt. L. V. Messenger, R. Allen, B. O. Prowne, S. W. A. Scott, J. Woodman, J. T. Percy, D. Anderson, Mr. M. Stuart Shaw and Capt. W. L. Stewart.

## THE BRAZILIAN MINISTER

**S**ENHOR J. P. SALGADO FILHO, Brazilian Air Minister, was the guest of honour at a dinner party given by the Chairman and Board of Directors of British Latin-American Air Lines.

The guests included: Brigadier Vasco Alvez Secco (Vice-Chief of Air Staff); Colonel Casimiro Montenegro (Director, Technical Services); Major Luiz Raphael De Oliveira Sampiao (Officer of Minister's Cabinet); Lieutenant Newton Neiva De Figueriedo (A.D.C.); Second Lieutenant Antonio Firizola (A.D.C.); Colonel A. Hecksher (Brazilian Air Attaché); Senhor Hugo Gouthier (1st Sec., Embassy); Mr. Kenneth G. Grubb, C.M.G. (M.o.I.); Mr. R. G. Stone (Press Attaché, Rio); Mr. A. B. Henderson (Press Attaché, São Paulo); Mr. W. C. G. Cribbett; Major J. R. McCrindle, O.B.E., M.C. (B.O.A.C.); Wing Commander R. A. Wellington, D.S.O., D.F.C.; Flight Lieutenant R. M. Smith.

The Directors of British Latin-American Air Lines present were: Mr. John W. Booth, Chairman; Air Vice-Marshal D. C. T. Bennett, C.B., C.B.E., D.S.O.; Mr. S. W. Black; Mr. S. H. Mercer and Mr. G. H. Trott.

## RUSSIAN EXPANSION

**S**OVIET factories are reported to have begun large-scale production of civil air liners.

Great attention is paid to the problems of peacetime civil flying developments, the foundations for which were laid during the war when, in spite of the demands on military aviation, the fleet of heavy passenger aircraft was increased more than tenfold.

At present the Soviet civil air fleet operates scheduled and courier services to Belgrade, Budapest, Bucharest, China, London, Paris, Prague, Sofia, Warsaw and Vienna. A service linking up Moscow and Stockholm is expected to be established shortly.

## T.W.A.

**B**RIGADIER-GENERAL THOMAS B. WILSON, Chairman of Transcontinental and Western Airways, is in Dublin for discussions with the Eire Department of Industry and Commerce and Aer Rianta (Irish Air Lines) on the future of his company's operations through the Shannon Airport.

After an inspection of the land base at the Shannon (Rineanna) he said that he was very favourably impressed, and when the constructional works now in operation were completed it would be one of the finest land bases in the world. He added that all Transcontinental's flights to Europe and the East through Rineanna would be made with Lockheed Constellations.

It is understood that after completing negotiations in Dublin General Wilson will go to Paris for discussions with the French Government. Mr. R. Jordan, European representative of Trans-

continental and Western Airways, Mr. H. F. Blackburn, director, North Atlantic Region, T.W.A., Mr. G. Shater, Legal Adviser, and Mr. John Logan, Eire representative, are among the officials taking part in the transatlantic airway negotiations in Dublin.

It will be recalled that the C.A.B. authorised T.W.A. to operate from U.S. via Newfoundland, Foynes, Paris, Berne, Rouen, Athens, Cairo, Jerusalem, Basra and Bahrein to

## CIVIL AVIATION NEWS

Bombay. While landing rights are still the subject of negotiations, the company propose to start the service early in November with three or four daily frequencies. England being by-passed, the Irish Airways are to operate a connecting shuttle service.

### TO THE FAR EAST

THE conviction that trade and travel between the United States and the Far East and Pacific area will greatly expand in post-war years was expressed by the U.S. Civil Aeronautics Board in a review of proposed airline routes across the Pacific.

C.A.B. examiners, in a preliminary report which will be considered later by the five-man board, recommended that present services of Pan American Airways across the Central Pacific be expanded. The examiners recommended establishment of a link from Midway Island to Tokyo, Shanghai, Hong Kong, Bangkok and Calcutta, and another link from Manila to Singapore and Batavia. The examiners also recommend the extension of air services from Noumea, New Caledonia to Sydney, Australia.

Pan American is already authorised to fly the Central Pacific from San Francisco and Los Angeles by way of Honolulu. From Hawaii the present Pan American route divides into a northern segment through Midway, Wake and Guam Islands to Manila and Hong Kong, and a southern segment through Canton and Suva Islands to Noumea and Auckland, New Zealand.

Following a policy of regulated competition laid down by the board, the examiners also recommended the establishment of a northern Arctic route to the Orient by North-West Airlines, a cross-country domestic line which has been flying to Alaska and the Aleutian Islands during the war.

On the proposed northern route, North-West Airlines would operate aircraft between Chicago, Hong Kong and Manila on a route through Canada, Alaska, the Aleutians, Paramushiro, in the Kurile Islands, Tokyo and Shanghai.

The examiners pointed out that military operations already had established the safety of the northern route which will be in easy reach of landing fields most of the way, and that the northern route would cut more than 1,500 miles from the pre-war routes between the Far East and the large eastern industrial areas of the United States.

The report says that air service, which will bring even Calcutta to within two days of the United States, will open up an entirely new tourist market, and business trips to the Far East which were not economically feasible by surface travel could easily be made by air at a saving in cost and time. Entirely apart from the general increase in traffic to the Far East which can be expected in the post-war period, the ability of air service to create its own traffic will enlarge the travel market to this part of the world.

Pan American Airways, in a study of Pacific air travel, estimated that 34,132 passengers each year would cross the Pacific by air in each direction, after services had been established.

North-West estimated a total of 29,200 passengers a year in both directions. The North-West estimate was based on a survey by Dr. Edward P. Warner, vice-chairman of C.A.B., who estimated a total of 80 passengers a day across the Pacific.

### HELICOPTER FREIGHTER

A HELICOPTER with a top speed of 130 m.p.h., cruising at 90 m.p.h. and designed for a freight payload of 800 lb., is to be built in Canada.

A Montreal syndicate sponsoring the venture has already arranged for the mass production of the type by Engineering Products, Ltd. The aircraft is the SG Mk VI designed by B. W. Szyner and Gottlieb, of New York, and is described as an improved, simplified and cheaper version of the original machine, incorporating results of flight tests and ready for mass production.

The first prototype may cost some \$80,000, after which production costs are expected to decrease sharply.

### CHANNEL ISLAND SERVICES

CHANNEL ISLANDS AIRWAYS, LTD., will continue to operate their London-Guernsey-Jersey service throughout the forthcoming winter period. Up to date, 2,154 passengers and 44 tons of freight have been carried on this route. In addition, 1,104 local passengers have been conveyed between Jersey and Guernsey.

The service between Channel Islands and Southampton, which, as reported in *Flight*, September 13th, was recently resumed, carries mail and passengers. Air schedules are as far as possible designed to provide convenient connections with the Southern Railway's services to and from Waterloo, and arrangements are being made for air and rail-steamer tickets to be interchangeable.

Until larger aircraft become available seven-seater DH Rapides will be employed on this service.

### NEGOTIATING

THE commercial use of Kindley airfield, the big flying base built by the U.S. in Bermuda—one of the two defence bases leased by Britain—is the subject of negotiations in Washington.

A delegation going from Bermuda will be accompanied by Mr. W. J. Bigg, Adviser on Civil Aviation to the Secretary of State for the Colonies, who was a member of the British delegation to the Empire Air Conference at Montreal last December, and by Wing Cdr. E. N. Ware, C.O. of R.A.F. Transport Command at Bermuda.

Lord Burghley, Governor of Bermuda, will also be in Washington for the talk, and Messrs. J. W. Buchanan and E. V. P. Miller, of the British Ministry of Civil Aviation, will participate in the talks to advise on air control measures.

### MOVEMENT

THE greatest mass movement of aircraft in aviation history was concluded when the European Division of the U.S. Army Air Force

Transport Command completed the re-deployment from the European and Mediterranean Theatres of 5,615 aircraft belonging to the 8th, 9th, 12th and 15th Air Forces and 9th Troop Carrier Command.

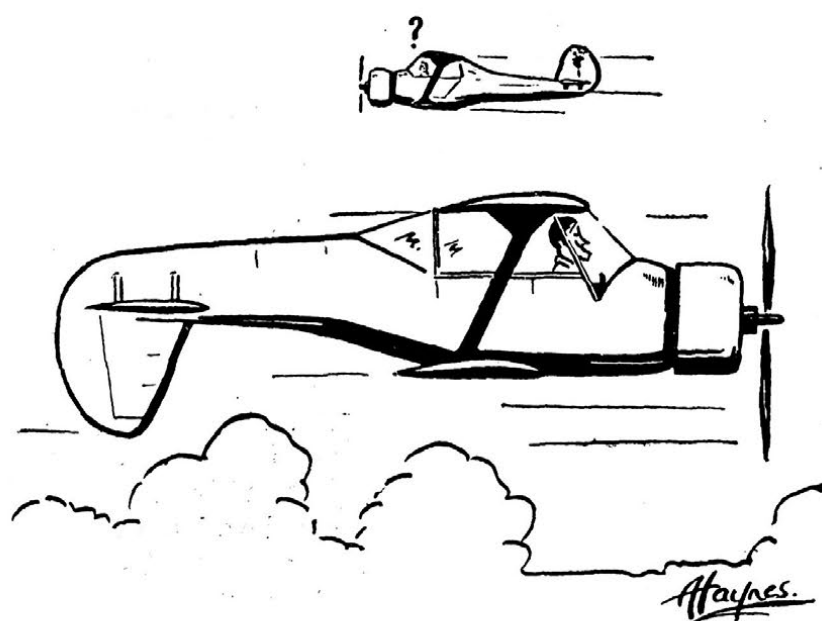
Under the code name of "White Project" the re-deployment schedule was put into operation on May 17th, just nine days after VE-Day, and 86,077 crew members and passengers were flown out of the European Theatre. Seven major accidents occurred during the operation, involving the loss of seventy-two lives. Since May 12th, 66,524 American veterans of the European campaigns have been flown back to the U.S. by the European Division of Air Transport Command.

### ON POLICY

IN a dinner speech during his recent visit to Montreal, Lord Winster said that the Government is now engaged on shaping British air policy. He referred to the White Paper on Civil Aviation, the plan of the last Government which set up three corporations with a qualified interest reserved for private enterprise within the State control. He could not be specific about what future British air policy would be, but emphasised that the Labour Government was not bound by any previous commitments or statements of the Labour Party or its members.

### TRIBUTE

SCOTTISH AIRWAYS have received a letter of appreciation from Lord Winster, Minister of Civil Aviation, in which he pays tribute to the air communications maintained by Scottish Airways between the mainland, Orkney, and Shetland, and the Hebrides throughout the war. Capt. Fresson, who pioneered the Orkney-Shetland air services in 1933-34, has commented on the amazing regularity with which Scottish Airways have carried out their services during six years of war. Frequently the services have been run to 100 per cent. regularity, while the worst year is recorded as high as 97 per cent. In the early part of the war their unarmed aircraft had several narrow escapes from enemy machines.



# 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.

## BEFORE THE ARK Hermes Built for Job

IN your edition of September 6th you print an article by B. J. Hurren concerning aircraft carriers. In this article the statement is made that H.M.S. *Hermes* was one of the aircraft carriers which was "a conversion, adaptation or compromise," H.M.S. *Hermes* was none of these things. She was the first aircraft carrier built as such for the Navy and was, I believe, designed by Sir Dennis Burney. She was a very successful ship and all officers who have served in her say that she had excellent seakeeping qualities.

It is a common error that H.M.S. *Ark Royal* was the first carrier designed as such for the Royal Navy, and one that should be corrected.

MICHAEL DAWSON.

## REFUELLING IN THE AIR Fundamental Principles

IN answer to your correspondent's letter under the above heading contained in the August 30th issue of *Flight*, we are hoping to deal fully with the operational and economic aspects of flight refuelling in one or more articles, which we trust you will be kind enough to publish shortly in your journal.

In most cases flight refuelling does double the payload of an airliner, though in many instances the payload is multiplied by several times.

Briefly, the fundamental principle is this: An aircraft designed for long-distance operation must carry a vast quantity of fuel, probably three or four times the weight of payload. This in turn requires a considerable weight of structure to carry the fuel load, which in turn calls for powerful engines and high fuel consumption. By halving the fuel weight, the engine and structural weight components are drastically reduced also. Conversely, if the size of the airliner is unchanged, but the quantity of fuel is halved (by refuelling in flight), the payload may be doubled or trebled.

Clearly, the cost of conveying the balance of fuel required, over a relatively short distance, by means of a relatively small tanker aircraft, is only a fraction of the expenses of running a duplicate airliner.

C. H. LATIMER-NEEDHAM,  
Chief Engineer, Flight Refuelling, Ltd.

## THE GOVERNMENT AND CIVIL AVIATION Quantity Production Required

IN the King's Speech it was said that a measure will be laid before Parliament for the reorganisation of air transport. What this measure will be is of vital concern to the future of this country. If the vast aircraft industry, built up during the past six years, is allowed to collapse like a burst balloon it will mean that our country will at once be relegated to the position of a second-class Power.

Aircraft, whether we like them or not, have come to stay. Long years ago a foolish and ignorant legislation did its very utmost to kill the growth of the motor industry. Will the Government, in the same manner, "control" the great aircraft industry out of existence, or will it by wise direction keep this country in the van of the great Air Powers?

There seems to be a widespread idea that the atomic bomb immediately abolishes the need for armies, navies, or air forces. I have heard many people, both civilians and from the Services, who say, "Of course, there is no need now to waste any more money on armaments. If any country starts aggression against the World Powers they will merely be vapourised by a rocket carrying an atomic bomb." This sort of talk is just stupid nonsense.

England, America and Russia now have the job of policing the whole world and restoring order out of chaos. The world police force will need the Army, the Navy, and, above all, the Air Forces, to enforce law and order in a humane way. Mr. Churchill's bold experiment of 1922, when he used air power to police the unruly tribes of Mesopotamia proved not only economical but humane. Very little bombing was necessary and much potential trouble was stopped by the mere mobility of the air.

Sheer necessity of war has forced us to neglect civil aviation so that, although we are one of the greatest of Air Powers, we

are also one of the weakest in air transport. It is like having a great Navy but no mercantile marine.

Civil aviation may be divided broadly into three classes. First we need the great transcontinental and transoceanic air lines corresponding to those run by the great steamship companies. To-day, as never before, is it essential to get these great lines into operation. The first thing is to order the great aircraft and to order in quantity. We have the skilled men, but we have few aircraft. Hundreds of these will be needed, but manufacturers cannot plan production on economical lines if they are given orders by penny packets.

Lord Brabazon's Committee has made its recommendations about the types to be built. These recommendations are sound. Surely the taxpayer is entitled to know how many such aircraft have been ordered.

Second to the great airliners come the medium-sized aircraft, designed for internal routes and the short external routes to the Continent. Aircraft companies have been officially "requested" to design and build new types in this class. They are spending their brains and money in evolving medium-sized transports and freight-carrying aircraft which will lead the world. Yet no quantity orders have been given. These companies are expected to design and build new designs, but do not yet know whether they will be able to sell their products.

The third class of civil aircraft is the light type corresponding to the private car. Again in this class the brains of the aircraft industry has evolved designs which lead the world. Both at home and abroad there is a fine market for such light aircraft. Orders and export trade are there for the asking. Yet so far the Government has not allowed aircraft firms building this type to demonstrate their products abroad. Neither has it given any indication as to whether private flying is going to be encouraged or whether it will be hedged round by so many restrictions that it will not be worth while. The Treasury say, "Export or expire," but one cannot export unless one can show one's products to the customer.

After the last war England, as now, led the world in the design and manufacture of fine aircraft, and a stupid and short-sighted Government destroyed a great industry. Is this mistake to be repeated?

Transport is civilisation. Trade follows in the wake of ships and on the track of the railway and the motor road. Just as surely trade will follow the slipstream of aircraft. Now is the Government's chance and we all look to them to take it.

H. V. ROWLEY, A.F.R.Ae.S.,  
Air Commodore.

## CIVIL STIRLING Cost to the Passenger

FROM the interesting article (*Flight*, August 23rd) an impression is gained of the price the intending passenger may have to pay per mile of air travel.

This article shows under the heading "Price per Passenger Mile" the price of 2.84d. for each of the 18 passengers.

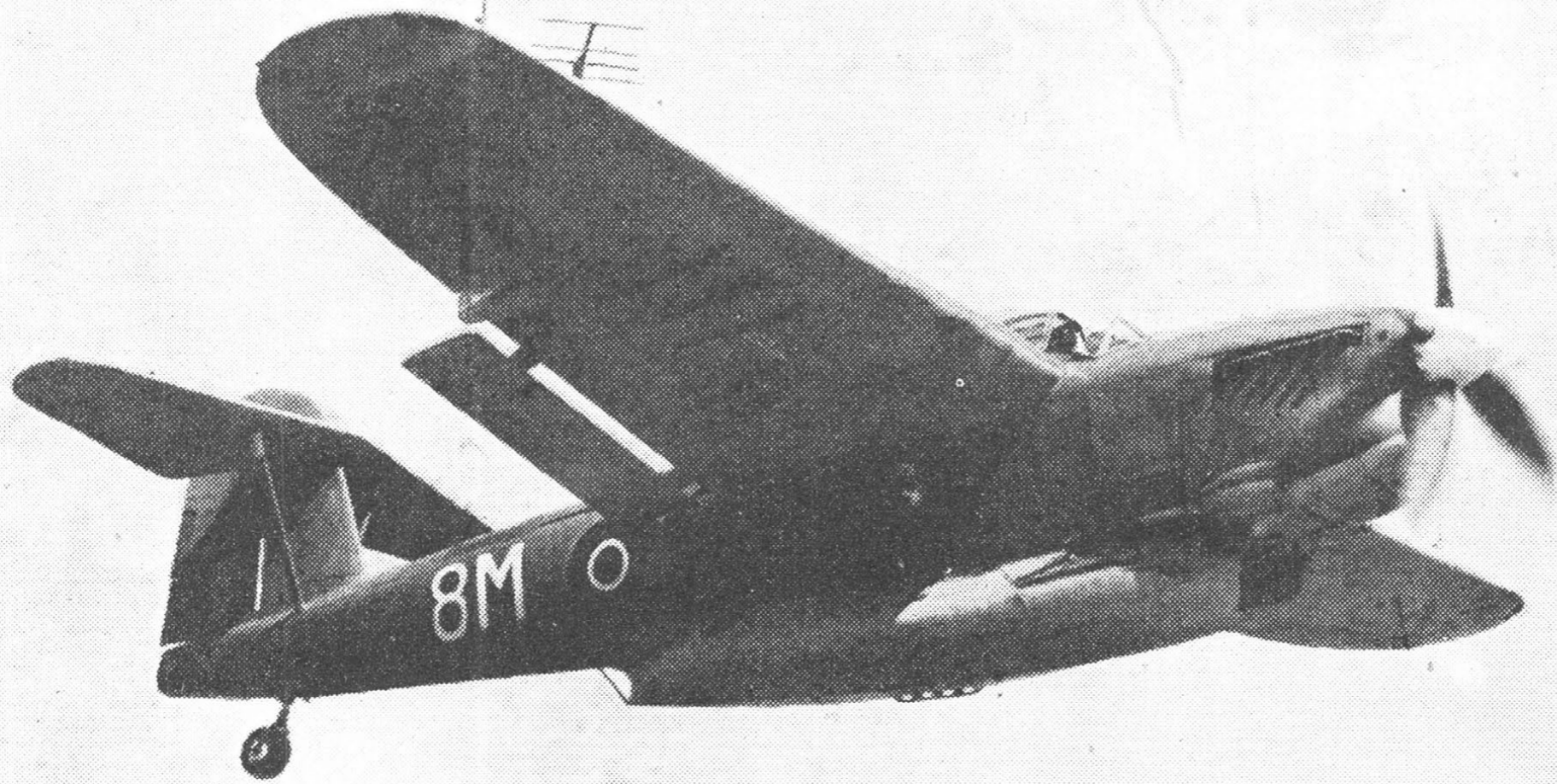
This figure is arrived at by dividing 18 into 51.2d. (the total operating cost per mile of the laden aircraft), from which it would appear that the additional 4,900 lb. of mail and freight mentioned in case "B" is carried free!

I don't think your contributor intended to convey this impression, but knowing the proclivity of the lay Press to jump to conclusions, I may be forgiven for asking for further information.

In short, may we now have a forecast of what per mile the passenger may have to pay for his ticket in this aircraft on the basis of the figures given in your article?

W. MAITLAND HAROLD.

[As our correspondent points out, the figure of 2.84d./pass./mile is incorrect where mail and freight are also carried. When 850 lb. of freight and 2,700 lb. of mail are carried in addition to 18 passengers, each with 30 lb. of luggage, the price per mile for each passenger works out at 1.43d. In the other case proposed, where 1,300 lb. of freight and 3,600 lb. of mail are carried in addition to 18 passengers each with 30 lb. of luggage, the corresponding price per mile for each passenger becomes 1.204d.—Ed.]



**ANOTHER BULGE:** This time it is a Naval airborne lifeboat carried under the fuselage of a Barracuda. The boat has a range of 120 miles at 4 knots, and is self-righting and self-baling.



# SERVICE AVIATION



## Royal Air Force and Naval Air Arm News and Announcements

### New Coastal Command Group

THE Air Ministry announces that No. 15 Group, Coastal Command and R.A.F., Northern Ireland, have been amalgamated into one group in Coastal Command to be called R.A.F. Northern Ireland. No. 15 Group was heavily engaged in the battle of the Atlantic and co-operated with the C-in-C., Western Approaches, to smash the enemy submarine menace and help to win the battle of the Atlantic.

Air Officer Commanding No. 15 Group from early 1943 until June, 1945, was Air Marshal Sir Leonard H. Slatter, K.B.E., C.B., D.S.O., D.F.C., now Air Officer Commanding-in-Chief Coastal Command.

R.A.F. Northern Ireland will be commanded by Air Commodore A. R. Churchman, D.F.C., who has been in command at R.A.F.N.I. since August, 1944.

### Awards

#### Royal Air Force

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

#### Distinguished Service Order

Lt. Col. E. G. CATTON, D.F.C., S.A.A.F., No. 19 (S.A.A.F.) Sqn.—This officer has led his squadron on numerous sorties against a variety of well-defended targets in Yugoslavia and Greece. He has attacked enemy transport, strongpoints and petrol dumps, harassing the enemy and inflicting considerable damage to his lines of communication. In addition Lt. Col. Catton has led several attacks in close support of partisan operations. He achieved particular success in November, 1944, when he led an attack against the enemy occupied town of Danilovgrad and in the following month when he led an attack against an enemy strongpoint at Gracac, which resulted in the enemy evacuation of the town. At all times this officer has displayed a fine fighting spirit and set an

inspiring example by his courage, determination and devotion to duty.

Lt. Col. C. S. MARGO, D.F.C., S.A.A.F., No. 24 (S.A.A.F.) Sqn.—Now on his third tour of operational duty, Lt. Col. Margo has served in East Africa, the Western Desert, North Africa and Italy. Since the award of the D.F.C. he has led a large number of operational sorties. Lt. Col. Margo is a skilful leader, who, in the face of the enemy has always displayed cool courage and great determination, inspiring confidence in all. This was particularly evident during an attack on a landing ground in Crete, when his formation was attacked by enemy aircraft. Largely owing to his fine leadership, only one aircraft was slightly damaged and the mission was successfully completed.

Lt. Col. G. T. MOLL, S.A.A.F., No. 34 (S.A.A.F.) Sqn.—This officer assumed command of his squadron shortly after its formation and arrival in the Italian theatre of war operations. Under his inspiring leadership his squadron has reached a high standard of operational efficiency and made a substantial contribution to the effectiveness of the operations of the Italian-based R.A.F. night bomber force. Lt. Col. Moll has flown on a large number of operational sorties and has always pressed home his attacks with determination and accuracy.

Lt. Col. R. H. ROGERS, D.F.C., S.A.A.F., No. 40 (S.A.A.F.) Sqn.—Since the award of a Bar to the D.F.C. Lt. Col. Rogers has completed a large number of photographs, tactical and artillery reconnaissances. In April, 1945, in response to a request from the 8th Army, he flew on an artillery reconnaissance between the Po and Adige rivers. This mission was a particularly hazardous one and had to be flown at 5,000ft. through a heavily defended area at a constant speed of 230 miles per hour. Lt. Col. Rogers achieved excellent results and obtained some fine photographs. An outstanding leader, this officer has never failed to complete a mission, however heavy the opposition, and, both in the air and on the ground, he has set an inspiring example by his steadfast courage and devotion to duty.

Wing Cdr. P. R. W. WICKHAM, D.F.C., R.A.F.—Since the award of a bar to the D.F.C., Wing Cdr. Wickham has completed a large number of operational sorties. Throughout his long operational career this officer's leadership has been of the highest order. He has at all times oper-

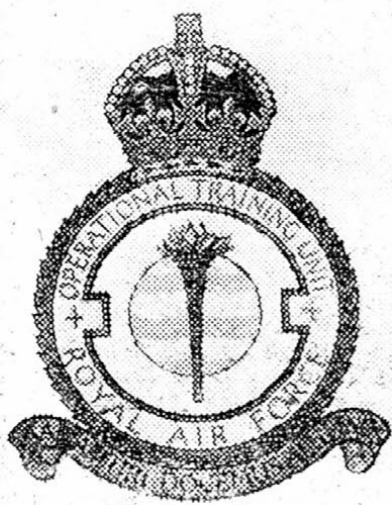
ated with great success, and has destroyed at least 17 enemy aircraft and damaged many others. In addition, he has inflicted considerable damage on the enemy's mechanical transport and on other ground targets. His enthusiasm and devotion to duty have always been outstanding, while his courageous leadership has inspired confidence in the pilots who have followed him.

Act. Wing Cdr. E. L. ARCHER, A.F.C., R.A.F.V.R., No. 664 Sqn.—Wing Cdr. Archer is now on his third tour of operations. He has taken part in airborne operations into Sicily, Normandy, Arnhem and the Rhine crossing. His exceptional ability and determination in the face of difficulties have enabled him to complete many difficult missions successfully. More recently this officer has been in command of his squadron, and, in that capacity, he has displayed great organising ability and, both in the air and on the ground, set an inspiring example to the other members of his squadron.

Act. Wing Cdr. L. J. C. MITCHELL, R.A.F.V.R., No. 25 Sqn.—In 1943 Wing Cdr. Mitchell served as Chief Flying Instructor and was later transferred to a night fighter operational squadron as flight commander. In September, 1944, he participated in attacks against the flying bombs, during which period he destroyed at least two enemy aircraft. This officer has trained his squadron to a high standard of operational efficiency. His gallantry and devotion to duty have set a fine example to all members of his squadron.

Flt. Lt. H. W. W. BERRIDGE, D.F.C., R.A.F.V.R., No. 125 Sqn.—This officer has completed two tours of operational duty. Since the award of a bar to the D.F.C. he has flown on a large number of operational sorties, in the course of which considerable damage has been inflicted on the enemy's mechanical transport. He has also destroyed four more enemy aircraft, bringing his total victories to at least 12 enemy aircraft destroyed and others damaged. Throughout his long operational career Flt. Lt. Berridge has displayed a fine fighting spirit, outstanding skill and great devotion to duty.

Act. Wing Cdr. R. BANNOCK, D.F.C., R.C.A.F., No. 406 (R.C.A.F.) Sqn.—As a squadron commander, Wing Cdr. Bannock has proved to be an outstanding success. Since the award of the D.F.C. he has destroyed a further seven enemy aircraft, bringing his total victories



(Left) Badge of No. 4 O.T.U., R.A.F.—"Maria Turi Docemus Alumnos" (We Teach the Young Fledglings to Guard the Seas). (Right) Badge of No. 172 Sqn., R.A.F.—"Insidiantibus Insidiamur" (We Ambush the Ambushers).

to at least 11 enemy aircraft destroyed and others damaged. He has also destroyed nineteen flying bombs by night. In addition, he has caused considerable disruption to the enemy's lines of communication. Under this officer's inspiring leadership, his squadron have obtained a fine record of successes and reached a high standard of operational efficiency.

#### Bar to Distinguished Flying Cross

Wing Cdr. C. P. RUDLAND, D.F.C., R.A.F.V.R., No. 64 Sqn.  
Act. Wing Cdr. C. Y. WINN, D.S.O., D.F.C., R.A.F., No. 141 Sqn.  
Flt. Lt. R. A. W. SCOTT, D.F.C., R.A.F., No. 141 Sqn.

#### Distinguished Flying Cross

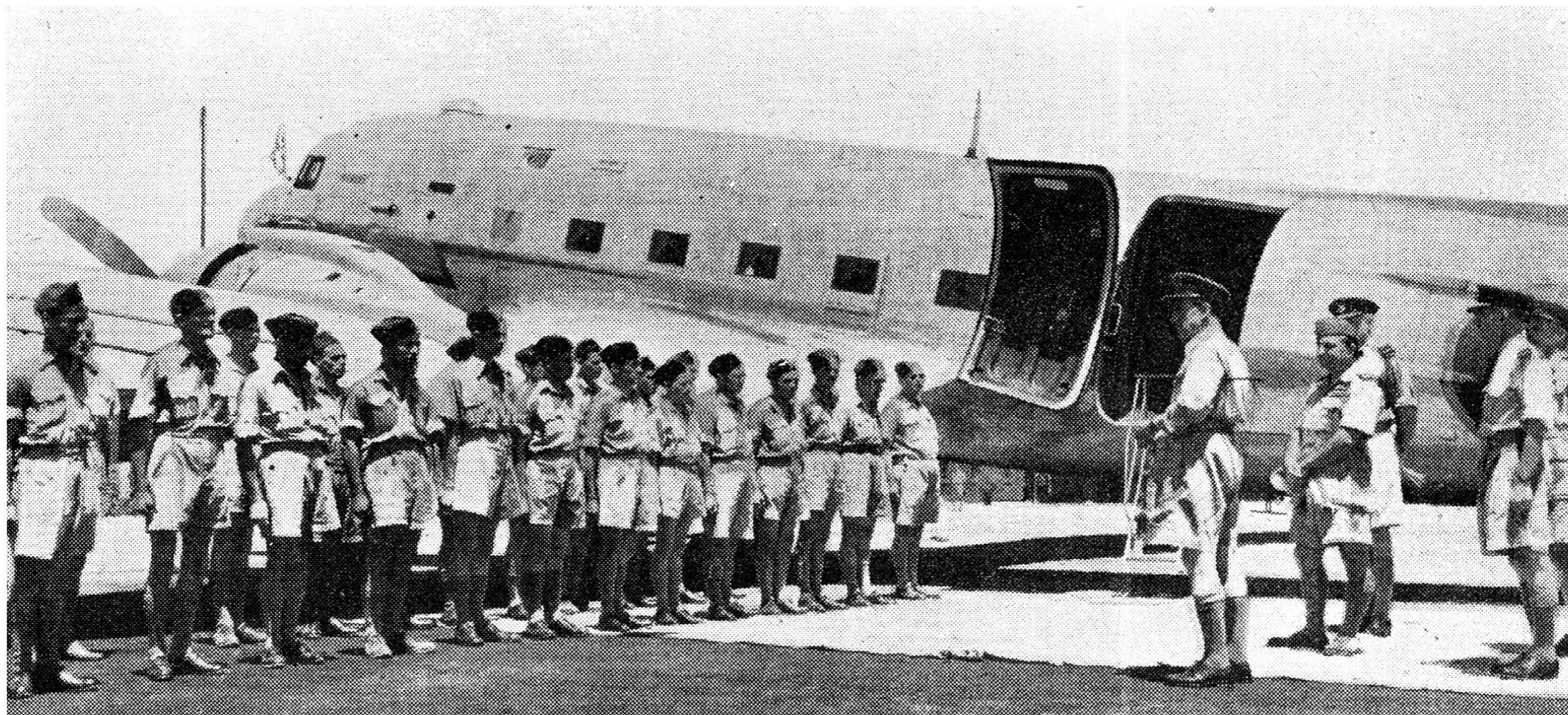
F/O. J. D. A. ROBERTSON, R.A.F.V.R., No. 160 Sqn.  
W/O. L. T. SUTTON, R.A.F.V.R., No. 160 Sqn.  
Flt. Lt. M. W. DAVIDSON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.  
Flt. Lt. D. L. DWORKIN, R.C.A.F., No. 432 (R.C.A.F.) Sqn.  
Flt. Lt. K. I. ELLSON, R.C.A.F., No. 428 (R.C.A.F.) Sqn.  
Flt. Lt. L. K. FIRTH, R.C.A.F., No. 153 Sqn.  
Flt. Lt. H. G. FRANKS, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
Flt. Lt. W. A. GARDINER, R.C.A.F., No. 427 (R.C.A.F.) Sqn.  
Flt. Lt. C. G. GIFFORD, R.C.A.F., No. 7 Sqn.  
Flt. Lt. J. D. HAIG, R.C.A.F., No. 195 Sqn.  
Flt. Lt. J. C. HENRY, R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
Flt. Lt. J. K. JARDINE, R.C.A.F., No. 625 Sqn.  
Flt. Lt. W. H. LEHMAN, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
Flt. Lt. J. J. MACNEIL, R.C.A.F., No. 427 (R.C.A.F.) Sqn.  
Flt. Lt. T. C. MEARS, R.C.A.F., No. 415 (R.C.A.F.) Sqn.

Flt. Lt. J. F. NESS, R.C.A.F., No. 514 Sqn.  
Flt. Lt. G. S. PATCHET, R.C.A.F., No. 7 Sqn.  
Flt. Lt. C. A. RHUDE, R.C.A.F., No. 550 Sqn.  
Flt. Lt. W. L. RUSSELL, R.C.A.F., No. 625 Sqn.  
Flt. Lt. L. K. SOUTHWARD, R.C.A.F., No. 76 Sqn.  
Act. Flt. Lt. N. S. MCPHERSON, R.A.F.V.R., No. 105 Sqn.  
Act. Flt. Lt. J. MOLLISON, R.A.F.V.R., No. 97 Sqn.  
Act. Flt. Lt. E. S. MÜLHOLLAND, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.  
Act. Flt. Lt. J. A. MURRELL, R.A.F.V.R., No. 35 Sqn.  
Act. Flt. Lt. E. J. NEW, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.  
Act. Flt. Lt. D. H. OLORENSHAW, R.A.F.V.R., No. 115 Sqn.  
Act. Flt. Lt. J. R. O'DONNELL, R.A.F.V.R., No. 35 Sqn.  
Act. Flt. Lt. C. R. PARKER, R.A.F.V.R., No. 625 Sqn.  
Act. Flt. Lt. G. E. PARKES, R.A.F.V.R., No. 7 Sqn.  
Act. Flt. Lt. L. S. REES, R.A.F.V.R., No. 462 Sqn.  
Act. Flt. Lt. E. J. SHARP, R.A.F.V.R., No. 7 Sqn.  
Act. Flt. Lt. L. STILLE, R.A.F.V.R., No. 622 Sqn.

Act. Flt. Lt. F. E. WILSON, R.A.F.V.R., No. 227 Sqn.  
Act. Flt. Lt. M. T. WILSON, R.A.F.V.R., No. 156 Sqn.  
Act. Flt. Lt. R. J. WITCOMB, R.A.F.V.R., No. 582 Sqn.  
Act. Flt. Lt. N. W. WRAY, R.A.F.V.R., No. 156 Sqn.  
F/O. S. AGNEW, R.A.F.V.R., No. 166 Sqn.  
F/O. J. N. ASHTON, R.A.F.V.R., No. 156 Sqn.  
F/O. J. W. ATKINSON, R.A.F.V.R., No. 61 Sqn.  
F/O. P. J. Q. BACK, R.A.F.V.R., No. 692 Sqn.  
F/O. C. A. BASSANTT, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.  
F/O. G. E. BLACKLER, R.A.F.V.R., No. 550 Sqn.  
F/O. J. S. F. BLUNDELL, R.A.F.V.R., No. 7 Sqn.  
F/O. J. R. G. CAKEBREAD, R.A.F.V.R., No. 115 Sqn.  
F/O. E. CHANDLER, R.A.F.V.R., No. 223 Sqn.  
F/O. A. J. H. COCKERILL, R.A.F.V.R., No. 153 Sqn.  
F/O. D. E. COOK, R.A.F.V.R., No. 51 Sqn.  
F/O. B. T. F. COVENTRY, R.A.F.V.R., No. 44 Sqn.  
F/O. K. DOUGLAS, R.A.F.V.R., No. 51 Sqn.  
F/O. G. W. H. DUFFEE, R.A.F.V.R., No. 78 Sqn.  
F/O. G. H. EAKINS, R.A.F.V.R., No. 106 Sqn.  
F/O. C. G. K. EDLUND, A.F.M., R.A.F.V.R., No. 550 Sqn.  
F/O. A. W. ENGLAND, R.A.F.V.R., No. 15 Sqn.  
Flt. Lt. J. F. ASHBY, R.N.Z.A.F., No. 78 Sqn.  
Act. Flt. Lt. M. R. CROKER, R.N.Z.A.F., No. 227 Sqn.  
Act. Flt. Lt. B. I. HUNTER, R.N.Z.A.F., No. 51 Sqn.  
Capt. A. E. S. HOWES, S.A.A.F., No. 106 Sqn.  
Capt. C. P. C. PECHAY, S.A.A.F., No. 106 Sqn.  
Act. Sqn. Ldr. J. R. BROWN, R.A.F.V.R., No. 109 Sqn.  
Act. Sqn. Ldr. K. E. FRANCIS, R.A.F.V.R., No. 109 Sqn.  
Act. Sqn. Ldr. B. S. B. JOHNSTON, A.F.C. R.A.F.V.R., No. 163 Sqn.

## SERVICE

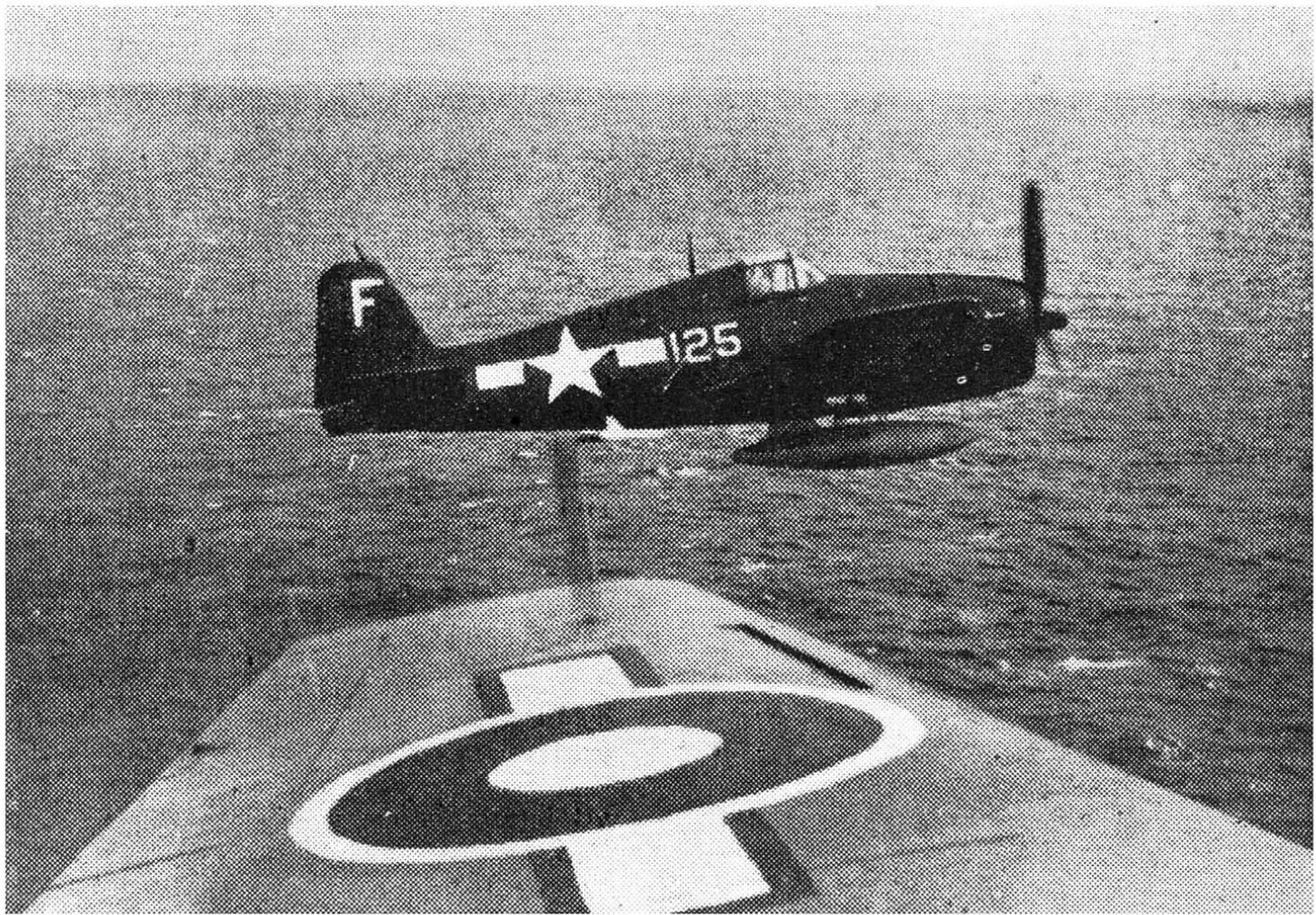
Act. Sqn. Ldr. A. J. D. MACLACHLAN, R.A.F., No. 550 Sqn.  
Act. Sqn. Ldr. A. G. SALTER, R.A.F.O., No. 158 Sqn.  
Act. Sqn. Ldr. D. W. SKILLMAN, R.A.F.V.R., No. 139 Sqn.  
Act. Sqn. Ldr. E. G. WARD, R.A.F.V.R., No. 57 Sqn.  
Flt. Lt. G. G. ABRAHAM, R.A.F.V.R., No. 162 Sqn.  
Flt. Lt. H. D. ARCHER, R.A.F.V.R., No. 630 Sqn.  
Flt. Lt. I. L. BERRY, R.A.F.V.R., No. 142 Sqn.  
Flt. Lt. K. R. BRAZIER, R.A.F.V.R., No. 78 Sqn.  
Flt. Lt. J. G. BREWSTER, R.A.F.V.R., No. 75 (N.Z.) Sqn.  
Flt. Lt. W. F. BRYANT, R.A.F., No. 7 Sqn.  
Flt. Lt. A. L. BUTCHER, R.A.F.V.R., No. 12 Sqn.  
Flt. Lt. B. G. CARR, R.A.F.V.R., No. 102 Sqn.  
Flt. Lt. W. R. COPPIN, R.A.F., No. 582 Sqn.  
Flt. Lt. T. DIXON, R.A.F.V.R., No. 142 Sqn.  
Flt. Lt. F. P. HENDY, R.A.F.V.R., No. 514 Sqn.  
Flt. Lt. R. T. HOYLE, R.A.F., No. 100 Sqn.  
Flt. Lt. N. JACKSON, R.A.F.V.R., No. 156 Sqn.  
Flt. Lt. J. T. JAMES, R.A.F.V.R., No. 156 Sqn.  
Flt. Lt. J. W. G. JAMES, R.A.F.V.R., No. 142 Sqn.  
Flt. Lt. G. A. KENNERLEY, R.A.F.V.R., No. 223 Sqn.  
Flt. Lt. D. D. LEGG, R.A.F.V.R., No. 153 Sqn.  
Flt. Lt. W. E. LUCAS, R.A.F.V.R., No. 162 Sqn.  
Flt. Lt. W. E. MARTIN, R.A.F., No. 163 Sqn.  
Flt. Lt. N. D. NIMMON, R.A.F.V.R., No. 142 Sqn.  
Flt. Lt. R. H. PAYNE, R.A.F.V.R., No. 75 (N.Z.) Sqn.  
Flt. Lt. D. W. RHYS, R.A.F.V.R., No. 162 Sqn.  
Flt. Lt. J. D'A. SEPTON, R.A.F.V.R., No. 138 Sqn.  
Flt. Lt. R. E. SKITCH, R.A.F.V.R., No. 109 Sqn.  
Flt. Lt. F. O. SPARROW, R.A.F.V.R., No. 78 Sqn.  
Flt. Lt. L. F. SPOONER, R.A.F.V.R., No. 625 Sqn.  
Flt. Lt. L. F. TITCUMB, R.A.F.V.R., No. 608 Sqn.  
Flt. Lt. P. T. WAGNER, R.A.F.V.R., No. 101 Sqn.  
Flt. Lt. J. C. WALL, R.A.F.V.R., No. 75 (N.Z.) Sqn.  
Flt. Lt. T. C. WALMSLEY, R.A.F.V.R., No. 105 Sqn.  
Flt. Lt. H. F. WATSON, R.A.F.V.R., No. 158 Sqn.  
Flt. Lt. R. A. J. YATES, R.A.F.V.R., No. 578 Sqn.  
Act. Flt. Lt. H. BINNS, R.A.F.V.R., No. 51 Sqn.  
Act. Flt. Lt. G. F. BLACKWELL, R.A.F.V.R., No. 10 Sqn.  
Act. Flt. Lt. F. J. BOND, R.A.F.V.R., No. 7 Sqn.  
Act. Flt. Lt. R. J. F. CANN, R.A.F.V.R., No. 582 Sqn.  
Act. Flt. Lt. J. M. DANIEL, R.A.F.V.R., No. 106 Sqn.  
Act. Flt. Lt. W. G. DOUGLAS, R.A.F.V.R., No. 35 Sqn.  
Act. Flt. Lt. G. W. EDWARDS, R.A.F.V.R., No. 105 Sqn.  
Act. Flt. Lt. J. FEAKINS, R.A.F.V.R., No. 149 Sqn.  
Act. Flt. Lt. A. F. FORREST, R.A.F.V.R., No. 578 Sqn.  
Act. Flt. Lt. D. H. CANNON, R.A.F.V.R., No. 162 Sqn.  
Act. Flt. Lt. R. GILBERT, R.A.F.V.R., No. 199 Sqn.  
Act. Flt. Lt. H. GREEN, R.A.F.V.R., No. 199 Sqn.



General Sir Bernard Paget, C.-in-C., Middle East, has received a Dakota as his personal aircraft. At an informal handover, Air Marshal C. E. H. Medhurst, A.O.C., R.A.F., Middle East, presented the men who carried out modifications to the Dakota to General Paget who is seen thanking the R.A.F. men.

AVIATION

Act. Flt. Lt. F. B. HANDLEY, R.A.F.V.R., No. 109 Sqn.  
 Act. Flt. Lt. G. S. HARTLEY, R.A.F.V.R., No. 7 Sqn.  
 Act. Flt. Lt. L. W. HAYLER, R.A.F.V.R., No. 44 Sqn.  
 Act. Flt. Lt. G. E. HEROD, R.A.F.V.R., No. 35 Sqn.  
 Act. Flt. Lt. J. HUXLEY-PARLOUR, R.A.F.V.R., No. 170 Sqn.  
 Act. Flt. Lt. A. B. LANDELLS, R.A.F.V.R., No. 7 Sqn.  
 Act. Flt. Lt. R. E. LIND, R.A.F.V.R., No. 199 Sqn.  
 F/O. N. APPLETON, R.A.A.F., No. 166 Sqn.  
 F/O. E. R. BARTON, R.A.A.F., No. 186 Sqn.  
 F/O. D. N. BAIN, R.A.A.F., No. 166 Sqn.  
 F/O. J. M. COX, R.A.A.F., No. 460 (R.A.A.F.) Sqn.  
 F/O. C. D. EDGE, R.A.A.F., No. 156 Sqn.  
 Wing Cdr. H. C. LEDOUX, R.C.A.F., No. 425 Sqn.  
 Sqn. Ldr. C. H. MUSSELLS, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 Act. Sqn. Ldr. C. E. L. HARE, R.C.A.F., No. 150 Sqn.  
 Act. Sqn. Ldr. C. H. PORTER, R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
 Act. Sqn. Ldr. H. J. REEVES, R.C.A.F., No. 408 (R.C.A.F.) Sqn.  
 Act. Sqn. Ldr. R. W. SWARTZ, R.C.A.F., No. 428 (R.C.A.F.) Sqn.  
 Flt. Lt. F. F. ARMSTRONG, R.C.A.F., No. 76 Sqn.  
 Flt. Lt. S. BEST, R.C.A.F., No. 419 (R.C.A.F.) Sqn.  
 Flt. Lt. W. M. BUCK, R.C.A.F., No. 35 Sqn.  
 Flt. Lt. P. E. BURDEN, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 Maj. M. J. ADENDORFF, S.A.A.F., No. 15 (S.A.A.F.) Sqn.  
 Maj. C. G. ARMSTRONG, S.A.A.F., No. 34 (S.A.A.F.) Sqn.  
 Maj. R. F. ASCHAM, S.A.A.F., No. 15 (S.A.A.F.) Sqn.  
 Maj. G. H. BLACK, S.A.A.F., No. 19 (S.A.A.F.) Sqn.  
 Maj. R. P. S. CRAMPTON, S.A.A.F., No. 34 (S.A.A.F.) Sqn.  
 Maj. A. L. JONES, S.A.A.F., No. 30 (S.A.A.F.) Sqn.  
 Maj. R. H. C. KERSHAW, D.S.O., S.A.A.F., No. 7 (S.A.A.F.) Sqn.  
 Maj. C. J. LAUBSCHER, S.A.A.F., No. 11 (S.A.A.F.) Sqn.  
 Maj. W. J. O. MUSGROVE, S.A.A.F., No. 21 (S.A.A.F.) Sqn.  
 Maj. B. M. SHAW, S.A.A.F., No. 178 Sqn.  
 Maj. W. M. SMITH, A.F.C., S.A.A.F., No. 24 (S.A.A.F.) Sqn.  
 Capt. R. J. BARNWELL, S.A.A.F., No. 1 (S.A.A.F.) Sqn.  
 Capt. M. S. BASSETT, S.A.A.F., No. 15 (S.A.A.F.) Sqn.  
 Capt. D. J. BOTES, S.A.A.F., No. 87 Sqn.  
 Capt. E. D. COSTEUIZEN, S.A.A.F., No. 112 Sqn.  
 Capt. A. J. COUTTS, S.A.A.F., No. 12 (S.A.A.F.) Sqn.  
 Capt. D. C. DOVE, S.A.A.F., No. 11 (S.A.A.F.) Sqn.  
 Capt. R. GEIB, S.A.A.F., No. 24 (S.A.A.F.) Sqn.  
 Capt. H. G. HEUGH, S.A.A.F., No. 4 (S.A.A.F.) Sqn.  
 Capt. R. P. JONES, S.A.A.F., No. 21 (S.A.A.F.) Sqn.  
 Capt. R. T. JOYNER, S.A.A.F., No. 40 (S.A.A.F.) Sqn.  
 Capt. H. G. MANNHEIM, S.A.A.F., No. 25 (S.A.A.F.) Sqn.  
 Capt. J. O. NEWTON-THOMPSON, S.A.A.F., No. 4 (S.A.A.F.) Sqn.  
 Capt. V. B. RUITER, S.A.A.F., No. 260 Sqn.  
 Capt. J. F. J. STONE, S.A.A.F., No. 2 (S.A.A.F.) Sqn.  
 Capt. T. F. SUSSMAN, S.A.A.F., No. 24 (S.A.A.F.) Sqn.  
 Capt. W. A. R. THOROGOOD, S.A.A.F., No. 31 (S.A.A.F.) Sqn.  
 Capt. C. VAN BLOMMESTEIN, S.A.A.F., No. 30 (S.A.A.F.) Sqn.  
 Capt. R. E. YEO, S.A.A.F., No. 1 (S.A.A.F.) Sqn.  
 Lt. R. F. ASHDOWN, S.A.A.F., No. 16 (S.A.A.F.) Sqn.  
 Lt. J. F. BOSCH, S.A.A.F., No. 15 (S.A.A.F.) Sqn.  
 Lt. H. C. CHANDLER, S.A.A.F., No. 4 (S.A.A.F.) Sqn.  
 Lt. T. J. RITCHIE, S.A.A.F., No. 185 Sqn.  
 Lt. G. G. ROSE, S.A.A.F., No. 40 (S.A.A.F.) Sqn.  
 Lt. S. J. STEVENS, S.A.A.F., No. 99 (S.A.A.F.) Sqn.  
 Lt. T. E. WALLACE, S.A.A.F., No. 1 (S.A.A.F.) Sqn.  
 W/O. F. R. ADENDORF, S.A.A.F., No. 31 (S.A.A.F.) Sqn.  
 Lt. S. ARMSTRONG, S.A.A.F., No. 43 Sqn.  
 Flt. Lt. D. E. BOCKUS, R.C.A.F., No. 67 Sqn.  
 Flt. Lt. F. L. EXEL, R.C.A.F., No. 122 Sqn.  
 Flt. Lt. M. KAZAKOFF, R.C.A.F., No. 406 (R.C.A.F.) Sqn.  
 Flt. Lt. A. A. SMITH, R.C.A.F., No. 441 (R.C.A.F.) Sqn.  
 F/O. W. L. BLACK, R.C.A.F., No. 65 Sqn.  
 F/O. D. J. MCCONNELL, R.C.A.F., No. 406 (R.C.A.F.) Sqn.  
 Flt. Lt. H. N. CHATTERJEE, R.I.A.F., No. 1 (R.I.A.F.) Sqn.  
 F/O. N. K. SHITOLEY, R.I.A.F., No. 1 (R.I.A.F.) Sqn.  
 Act. Sqn. Ldr. W. M. MURRAY, R.N.Z.A.F., No. 684 Sqn.  
 Flt. Lt. C. G. ANDREWS, R.N.Z.A.F., No. 684 Sqn.



BEFORE THE SURRENDER : A U.S. Hellcat flying off the Japanese coast. The photograph was taken from a British aircraft bearing the latest Pacific markings.

Flt. Lt. C. McG. SIMPSON, R.N.Z.A.F., No. 67 Sqn.  
 Maj. A. C. HOWE, S.A.A.F., No. 196 Sqn.  
 Flt. Lt. L. G. LEWIS, D.F.M., R.A.A.F., No. 357 Sqn.  
 Flt. Lt. D. B. LUDBEY, R.A.A.F., No. 99 Sqn.  
 F/O. B. M. RIDGWAY, D.S.O., R.A.F.V.R., No. 240 Sqn.  
 F/O. H. V. SMITH, R.C.A.F., No. 358 Sqn.  
 Act. Sqn. Ldr. R. H. FLETCHER, R.A.F.V.R., No. 261 Sqn.  
 Act. Sqn. Ldr. J. C. PARRY, R.A.F.V.R., No. 240 Sqn.  
 Act. Sqn. Ldr. R. A. WEIR, R.A.F.V.R., No. 146 Sqn.  
 F/O. E. S. ALEXANDER, R.A.F.V.R., No. 60 Sqn.  
 Flt. Lt. E. V. FISHER, R.A.A.F., No. 206 Sqn.  
 Flt. Lt. J. H. LANYON, R.A.A.F., No. 10 (R.A.A.F.) Sqn.  
 Flt. Lt. O. OLSON, R.C.A.F., No. 407 (R.C.A.F.) Sqn.  
 Flt. Lt. W. M. THORVALDSON, R.C.A.F., No. 547 Sqn.  
 F/O. A. A. BRUNEAU, R.C.A.F., No. 547 Sqn.  
 F/O. A. L. LYTTLE, R.C.A.F., No. 502 Sqn.  
 F/O. J. R. SAVARD, R.C.A.F., No. 404 (R.C.A.F.) Sqn.  
 W/O. A. M. NETREFA, R.C.A.F., No. 311 Sqn.  
 Flt. Lt. R. C. MCCOLL, R.A.A.F., No. 455 (R.A.A.F.) Sqn.  
 Flt. Lt. W. K. WATSON, R.A.A.F., No. 540 Sqn.  
 Flt. Lt. W. F. WOOD, R.A.A.F., No. 612 Sqn.  
 Act. Flt. Lt. M. F. C. JACKSON, R.A.A.F., No. 455 (R.A.A.F.) Sqn.  
 P/O. W. S. KRUGER, R.A.A.F., No. 542 Sqn.  
 Sqn. Ldr. J. C. WADE, R.C.A.F., No. 162 (R.C.A.F.) Sqn.  
 Flt. Lt. J. A. ELVISS, R.C.A.F., No. 206 Sqn.  
 Flt. Lt. J. N. FARREN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 Flt. Lt. K. S. GOODMAN, R.C.A.F., No. 407 (R.C.A.F.) Sqn.  
 Flt. Lt. F. J. GRANT, R.C.A.F., No. 423 (R.C.A.F.) Sqn.  
 Flt. Lt. J. K. GUTTORMSON, R.C.A.F., No. 162 Sqn.  
 Flt. Lt. E. B. A. LE MAISTRE, R.C.A.F., No. 53 Sqn.  
 Flt. Lt. P. J. McMANUS, R.C.A.F., No. 502 Sqn.  
 Act. Sqn. Ldr. K. A. SAWYER, R.N.Z.A.F., No. 489 (R.N.Z.A.F.) Sqn.  
 W/O. F. E. BAILEY, R.N.Z.A.F., No. 53 Sqn.  
 Act. Sqn. Ldr. D. L. BUCHANAN, R.C.A.F., No. 420 (R.C.A.F.) Sqn.  
 Flt. Lt. G. H. Low, D.F.M., R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
 Flt. Lt. R. McNAMARA, D.F.M., R.C.A.F., No. 415 (R.C.A.F.) Sqn.  
 Flt. Lt. E. C. STEWART, D.F.M., R.C.A.F., No. 427 (R.C.A.F.) Sqn.  
 Flt. Lt. C. L. WENZEL, R.C.A.F., No. 78 Sqn.  
 Act. Flt. Lt. J. N. R. BEAUCHAMP, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 Act. Flt. Lt. J. E. CARTWRIGHT, R.C.A.F., No. 83 Sqn.  
 Act. Flt. Lt. R. H. DAVIDSON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.  
 Act. Flt. Lt. R. B. GRANT, R.C.A.F., No. 10 Sqn.  
 Act. Flt. Lt. E. F. LACKMAN, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 Act. Flt. Lt. J. B. MACHALE, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 Act. Flt. Lt. L. T. MURPHY, R.C.A.F., No. 10 Sqn.  
 Act. Flt. Lt. D. L. MURRAY, R.C.A.F., No. 431 (R.C.A.F.) Sqn.  
 Act. Flt. Lt. D. H. SIMPSON, R.C.A.F., No. 97 Sqn.

Act. Flt. Lt. C. O. P. SMITH, R.C.A.F., No. 100 Sqn.  
 Act. Flt. Lt. J. L. St. LAURENT, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 F/O. J. L. R. BEAUVAIS, R.C.A.F., No. 425 (R.C.A.F.) Sqn.  
 F/O. G. H. K. BEGG, R.C.A.F., No. 405 (R.C.A.F.) Sqn.  
 F/O. V. E. BRIMICOMBE, R.C.A.F., No. 425 (R.C.A.F.) Sqn.

Distinguished Flying Medal

Flt. Sgt. A. D. CRICKMORE, R.A.F., No. 296 Sqn.

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

Air Force Cross

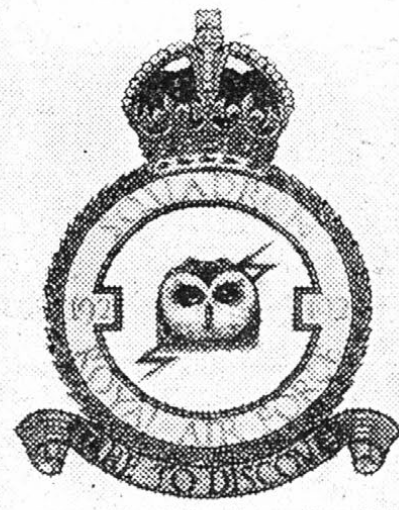
Flt. Lt. J. R. BUTLER, R.A.F.V.R.

Polar Flight Awards

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

Bar to Air Force Cross

Act. Wing Cdr. D. C. MCKINLEY, A.F.C., Empire Air Navigation School, Shawbury.—Wing Cdr. McKinley is a brilliant pilot who has captained the Lancaster aircraft "Aries" on two of the most outstanding missions ever undertaken in aircraft of the R.A.F. In October and November, 1944, he conducted a liaison and good will flight to New Zealand, Australia, New Guinea and the S.W. Pacific in the course of which he faultlessly maintained an intricate and exacting schedule of visits. This flight was the first full-length circumnavigation of the globe undertaken by the R.A.F., and the return flight from Australia was made in the remarkably short time of 72 hours, almost halving the previous record. This officer has since captained the same aircraft on the first exploratory flight ever made by the R.A.F. to the North Pole, which was reached on May 17th, 1945. By the time Wing Cdr. McKinley had landed again at Reykjavik he had flown 28 hours out of a period of 30¼ hours, having been previously forced back owing to severe icing. On May 20th, 1945, he carried out a flight from the Labrador coast to the Boothia Peninsula, where the North Magnetic Pole is at present charted. As



(Left) Badge of No. 192 Sqn., R.A.F.—"Dare to Discover," (Right) Badge of No. 42 Sqn., R.A.F.—"Fortiter in Re" (Strongly in Action).

## SERVICE AVIATION

he failed to locate it there he proceeded north-westwards to verify certain calculations of the Astronomer Royal, which he was able to corroborate before returning to Montreal. Finally, on May 26th, 1945, Wing Cdr. McKinley flew non-stop from Whitehorse, Yukon Territory, to Shawbury, passing over the North Magnetic Pole and well into Arctic regions, a distance of 4,100 miles, thus accomplishing a practical demonstration of the possibility of exploiting Polar air routes. In all, the aircraft "Aries" was flown 25,300 miles on the expedition. By his latest flights this officer has attracted world-wide admiration of, and confidence in, British aviation, and by his exceptional prowess and gallantry he has materially contributed to the prestige of the R.A.F. It is indicative of his perseverance and skilful piloting that these flights have been accomplished almost entirely under manual control, the automatic pilot having failed very soon after leaving Shawbury on both occasions.

### Air Force Cross

Act. Wing Cdr. K. C. MACLURE, Empire Air Navigation School, Shawbury.  
Act. Wing Cdr. E. W. ANDERSON, Empire Air Navigation School, Shawbury

### Air Force Medal

L.A./C. E. M. WIGGINS, Empire Air Navigation School, Shawbury.  
L.A./C. H. J. B. DEAN, Empire Air Navigation School, Shawbury.

THE KING has also been graciously pleased to give orders for the publication of the names of the following personnel, who have been commended for valuable service in the air.

## Commendations

Act. Wing Cdr. R. H. WINFIELD, D.F.C., A.F.C., R.A.F., Empire Air Navigation School, Shawbury.  
Sqn Ldr. A. J. HAGGER, Empire Air Navigation School, Shawbury.  
Flt. Lt. S. T. UNDERWOOD, Empire Air Navigation School, Shawbury.  
F/O. S. BLAKELEY, Empire Air Navigation School, Shawbury.  
W/O. A. S. SMITH, Empire Air Navigation School, Shawbury.  
Cpl. W. S. GARDNER, Empire Air Navigation School, Shawbury.

## Roll of Honour

Casualty Communiqué No. 538.

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

### Royal Air Force

KILLED IN ACTION.—Sgt. C. A. J. Church; Sgt. P. Cooley; Sgt. G. A. Cope; Sgt. W. J. Dee; Sgt. T. E. Jenkins; Sgt. M. F. Matthews.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. R. Anthony; Sgt. W. F. Carter; F/O. J. D. Cox; Sgt. J. MacD. Craig; Sgt. A. L. Curphey; F/O. W. G. F. Filby; Sgt. J. Goodall; Flt. Sgt. H. L. Heason; F/O. A. G. Henriquez; Flt. Sgt. P. W. Jarvis; Sgt. G. A. Levy; Sgt. A. McKenzie; F/O. D. S. Monard; Sgt. C. V. Plant; Group Capt. J. A. Powell, D.S.O., O.B.E.; F/O. J. R. F. Reid; Sgt. P. D. Secretan; Sgt. P. R. Smith; Sgt. R. E. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. E. Adams; Flt. Sgt. M. E. Agar; P/O. R. C. Alexander; Sgt. D. R. Allen; P/O. A. L. Anderson; Sgt. W. S. Anstey; Flt. Sgt. E. R. N. Barrell; Sgt. T. E. E. Benjamin; Flt. Sgt. R. F. Bickford; Flt. Sgt. T. Blacklock; Sgt. R. Boffey; Sgt. J. Booth; F/O. J. Bradburn; Sgt. G. R. Carr; Sgt. J. W. Carter; P/O. J. D. Carter; Sgt. D. G. Champkin; Sgt. M. L. Chaundy; Sgt. K. L. Cheeseman; Flt. Sgt. A. D. Chew; Sgt. D. W. Chick; Sgt. A. Clarence; F/O. A. G. Clarke, D.F.M.; P/O. D. P. Coltart; Sgt. D. K. Cook; Sgt. W. J. Cooper; Sgt. G. L. Copeland; Sgt. J. R. Cuthbert; Sgt. S. Dickinson; Sgt. F. F. Dring; Flt. Sgt. R. J. Eastabrook; Act. Group Capt. E. C. Eaton, D.F.C.; Flt. Lt. P. J. Edwards; Sgt. M. Evans; F/O. J. Farnhill; Sgt. N. E. Fay; Flt. Sgt. L. Fielding; Sgt. R. Fowis; P/O. D. C. Fraser; Act. Sqn. Ldr. F. E. Fuller; Sgt. R. A. Gale; Sgt. C. S. Gilbert; Sgt. A. J. Gill; P/O. G. P. Gillard; Sgt. J. C. Glancey; Sgt. D. A. Godden; Sgt. A. Green; Flt. Lt. D. N. Greenhalgh; Flt. Sgt. O. G. Griffiths; Flt. Sgt. R. J. Harman; Sgt. C. A. Harris; Sgt. T. S. Hayhurst; Act. Sqn. Ldr. G. C. Hemmings; Sgt. L. Henderson; Sgt. R. E. Hickling; Flt. Sgt. J. Hill; F/O. T. H. A. Hill, D.F.M.; F/O. D. H. Holdsworth; Sgt. J. R. Johnston; Sgt. G. B. Jones; Sgt. P. W. Jones; F/O. P. C. Jones; P/O.

T. G. Jones; Flt. Lt. J. A. Keard; Sgt. J. E. Kearney; Flt. Lt. H. C. Knight; Flt. Lt. W. B. Laidlaw; Sgt. A. A. M. Langridge; Flt. Sgt. S. Levy; Sgt. G. H. Lilley; Sgt. G. Long; W/O. R. W. Long; Sgt. F. R. Loveridge; Flt. Sgt. J. McFarlane; Flt. Sgt. W. J. McIntosh; Sgt. B. McLeod; F/O. F. H. T. McNally; Sgt. A. A. MacPherson; Sgt. T. E. McVittie; Sgt. G. W. C. Mabbott; Flt. Sgt. E. F. Maidment; Flt. Sgt. R. A. Menday; Flt. Lt. G. E. Mortimer, D.F.M.; Act. Flt. Lt. A. E. Napier; Sgt. C. G. Nash; Sgt. G. P. Nicolson; P/O. G. H. Norman; Sgt. A. B. Norris; Sgt. H. Ogley; Sgt. A. Osborn; Sgt. R. Padgett; Flt. Sgt. A. Pearson; Flt. Sgt. F. J. Pinch; F/O. C. K. Plunkett; Sgt. J. R. Presland; Flt. Lt. T. J. Pye; Sgt. K. N. Read; Sgt. R. C. Reid; F/O. S. J. Richards; P/O. E. Richardson; Flt. Sgt. C. B. Robertshaw; Flt. Sgt. E. Rosenfield; Sgt. E. W. Rushton; F/O. C. Sacker; P/O. F. E. Salmon; Flt. Sgt. P. A. Scott; Flt. Sgt. R. Seddon; F/O. R. V. Selenyi; Sgt. J. H. Senior; P/O. M. Sharp; Sgt. A. P. Simpson; Sgt. F. J. Smith; Sgt. R. E. Snelling; P/O. R. L. Squires; Sgt. J. G. F. Toll; Flt. Sgt. H. Tonge; Sgt. F. A. Towse; Flt. Sgt. F. T. Tyler; Sgt. B. R. Vince; Sgt. F. B. Walker; F/O. R. J. Ward; F/O. S. G. A. Warner; Sgt. R. Webster; Flt. Sgt. C. P. Whalley; Flt. Sgt. R. F. Whinfield; Flt. Sgt. E. C. Whittall; Sgt. A. Wilson; Sgt. J. H. Woodcock; P/O. C. L. Woolley; Flt. Sgt. C. Wray.



TO SEE FOR HIMSELF: Over here at the invitation of the Air Ministry is General Bengt Nordenskiöld, C.-in-C. of the Swedish Air Force. He is seen on arrival at Hendon, being greeted by Air Comdre. M. F. West, V.C.

WOUNDED OR INJURED IN ACTION.—F/O. J. D. Rees, D.F.C.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. A. R. S. Drake.

MISSING, BELIEVED KILLED IN ACTION.—F/O. E. A. Barnett; F/O. G. Bell; Sgt. S. C. Biggs; F/O. K. Gill, D.F.C.; Flt. Lt. J. C. Randon.

MISSING.—Sgt. P. Ackland; Sgt. D. L. Agnew; Flt. Lt. W. D. Allies; F/O. J. M. Aylieff, D.F.C.; Sgt. A. C. Bacon; P/O. F. E. Baker; Sgt. J. D. Baker; Flt. Sgt. H. W. Bishop; W/O. I. H. Bond; Flt. Sgt. C. R. W. Braithwaite; Sgt. H. Brooke; Act. Flt. Lt. E. G. Brown; Sgt. W. Canning; Sgt. D. Y. Carter; Flt. Lt. R. C. Chapman; Sgt. D. H. A. Chitticks; Sgt. F. E. Clark; Flt. Lt. F. G. Cliffe; W/O. N. Cooper; Flt. Sgt. W. J. Cooper; Flt. Sgt. J. H. Croucher; F/O. W. J. Cunningham; Sgt. A. J. M. Davies; Flt. Sgt. W. F. G. Dawson; Sgt. E. K. Day; Sgt. W. T. Dean; Sgt. D. Dickinson; Sgt. H. H. Dunkerley; Sgt. L. W. Dunn; Act. Sqn. Ldr. D. B. Everett; F/O. A. Frost; Sgt. H. J. Frowe; F/O. R. T. Gawthrop; Sqn. Ldr. R. M. V. Gibbon; Sgt. W. J. Goodwin; Sgt. G. Green; Sgt. K. H. Greenfield; F/O. R. F. Greer; Flt. Sgt. H. G. Harding; F/O. E. T. G. Harris; Sgt. K. R. Haw; Sgt. T. Helstrip; Sgt. K. J. Holmes; F/O. C. Horne; Flt. Sgt. I. T. R. James; Sgt. R. Jeffery; Sgt. R. A. D. Jones; P/O. W. T. Jones; Sgt. W. J. Keeble;

F/O. B. F. Kerr, D.F.M.; Sgt. G. J. A. Kervin; Sgt. W. Lane; F/O. C. F. Leese; Sgt. J. Lennane; F/O. J. W. Lewis; Sgt. J. F. Logan; F/O. D. G. McCreech; Sgt. A. J. MacDonald; W/O. J. McFarlane; Sgt. A. F. Matthews; Sgt. F. Maxted; Flt. Sgt. A. Michaels; Sgt. D. L. Mould; Sgt. G. Murray; Sgt. P. Newman; Sgt. N. Nimmo; Sgt. J. M. O'Connell; Sgt. T. Orr; F/O. A. H. J. Pidgeon; P/O. D. I. Plumb; Sgt. C. E. Preston; Sgt. E. L. Punnett; Sgt. B. C. Ricketts; Sgt. D. Robinson; Flt. Sgt. R. W. Robson; Flt. Lt. C. O. Russell, D.F.C.; F/O. C. H. Saunders; Sqn. Ldr. M. Savage; P/O. E. F. Seear; Sgt. H. P. C. Seignot; F/O. S. H. G. Sinclair; Flt. Sgt. R. W. H. Smith; Sgt. H. Smither; Sgt. N. J. Stringfield; Flt. Sgt. R. Taylor; Sgt. T. Torney; P/O. A. C. Trotter; Sgt. L. F. Tyrrell; F/O. W. H. T. Underwood, D.F.C.; Sgt. C. H. Watkins; F/O. R. M. Weller; Flt. Sgt. R. W. Wight; Sgt. R. S. Wilkins; Sgt. G. O. Willer; Sgt. E. G. Wilson.

KILLED ON ACTIVE SERVICE.—L.A./C. W. A. Greatrix; L.A./C. A. M. Phillips; L.A./C. R. Preston; Cpl. A. E. Shalless; Sgt. W. L. Watson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. K. Flanagan; Cpl. W. V. Goodwin; L.A./C. H. K. Harman; Cpl. R. H. Henley; Flt. Sgt. F. Marlor; W/O. R. D. Smart, A.F.M.; F/O. W. H. Wagstaff.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. B. E. Bridger; Flt. Sgt. G. C. Brightwell; F/O. J. A. D. Caines; Sgt. A. R. Docker; Flt. Sgt. L. Fairclough; Sgt. J. McA. Hutchens; Sgt. H. J. Hutchinson; Flt. Sgt. J. Ingham; Act. Flt. Lt. J. Morgan; Sgt. A. Pearson; Sgt. E. Pook; Sgt. E. E. W. Raddan; Sgt. G. B. Wright.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Cpl. W. Brown; A/C.1 J. G. Woodward; L.A./C. J. W. Yarwood.

DIED ON ACTIVE SERVICE.—Act. Sqn. Ldr. D. H. Fenton; P/O. J. J. Haines.

### Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A./CW. E. M. Christie.

### Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. L. M. G. Baker; Flt. Sgt. C. A. Barlow; F/O. C. M. Clarey; P/O. V. L. Humphrey; Flt. Sgt. D. J. MacKenzie; P/O. A. W. Nolan; Flt. Sgt. K. A. Pavey; W/O. J. A. Siebert; Flt. Sgt. L. J. Smith; W/O. R. D. Williams.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. W. J. C. Spry.

MISSING.—Flt. Sgt. K. W. Binder; W/O. R. P. Cantwell; Flt. Sgt. D. M. Easton; F/O. V. J. Hedley; Flt. Sgt. J. L. Isles; Flt. Sgt. M. K. Jurd; W/O. M. E. Margules; F/O. G. Moses; P/O. K. G. Munro; Flt. Sgt. G. J. P. O'Brien; Flt. Sgt. M. J. Parry; Flt. Sgt. J. W. Prouse; F/O. P. F. Swales; F/O. E. W. Thomas.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. I. W. Hunter.

### Royal Canadian Air Force

KILLED IN ACTION.—P/O. H. A. Davey.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—P/O. A. J. Collett; P/O. L. Holloway; F/O. J. D. Lancaster; F/O. H. Rabkin.

WOUNDED OR INJURED IN ACTION.—P/O. J. H. Taggart.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. W. J. Klememtoski.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. D. T. Steele.

MISSING.—F/O. T. D. Copeland; F/O. E. L. Easton; F/O. J. P. Farrell; Flt. Lt. R. J. Fern; Flt. Sgt. H. Gil-

lender; Flt. Sgt. D. W. Hodge; P/O. G. A. Kennedy; F/O. J. R. Latremouille; Sgt. R. W. Mahr; Flt. Lt. C. G. Mitchell; F/O. R. J. O'Sullivan; Flt. Sgt. T. C. Pierson; Flt. Lt. A. G. Rowe, D.F.C.; F/O. G. Scott; Flt. Sgt. J. H. Wilson.

### Royal New Zealand Air Force

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

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. J. R. Tones.

MISSING.—Flt. Sgt. A. E. Robson; Flt. Sgt. J. H. Wood.

### Indian Air Force

DIED ON ACTIVE SERVICE.—A/C.2 A. Ramachandram

### Air Transport Auxiliary

FIRST Officer JAMES RICHARD BURTON, A.T.A., killed in an air accident in Yorkshire on August 30th, 1945.