THE BOOK
OF
WESTLAND
AIRCRAFT

COMPILED BY A. H. LUKINS

EDITED BY D. A. RUSSELL, M.I.Mech: E.

Produced by

AIRCRAFT (TECHNICAL) PUBLICATIONS LTD.

On behalf of the Publishers:

THE HARBOROUGH PUBLISHING CO. LTD.

WITH THE CO-OPERATION OF
ROBERT ANSCOMBE & CO. LTD., & THE DRYSDALE PRESS LTD.

ALLEN HOUSE NEWARKE STREET LEICESTER

COMPILED AND PUBLISHED
WITH THE
CO-OPERATION AND APPROVAL
OF

WESTLAND AIRCRAFT LIMITED

Distributors to the Book Trade—
HORACE MARSHALL AND SON LIMITED
TEMPLE HOUSE, TALLIS STREET
LONDON, E.C. 4

Printed in England by
HENDERSON AND SPALDING
32 SHAFTESBURY AVENUE
LONDON, W.1

"Flight" Photo

CONTENTS

FOREWORD

By

LORD BRABAZON OF TARA

How is he bred ? from whom is he descended ? - are questions asked about all livestock and indeed about "homo sapiens" himself. An incurable evolutionary optimist, I prefer the word "ascended" to "descended", but improvement although slow in the human race is very marked in the modern development of complex machinery such indeed as in the aeroplane.

Although it is right and proper to evaluate the present product on its merits at the time and on no other basis, yet heredity cannot be ignored, for it is the basis upon which everything is built. With the aeroplane substitute experience and brains for blood and the analogy is complete. Let us know, therefore, the parentage and forebears of the great aeroplanes of today that, are bringing us victory, and study and honour the whole family that has brought the modern miracles to their present eminence.

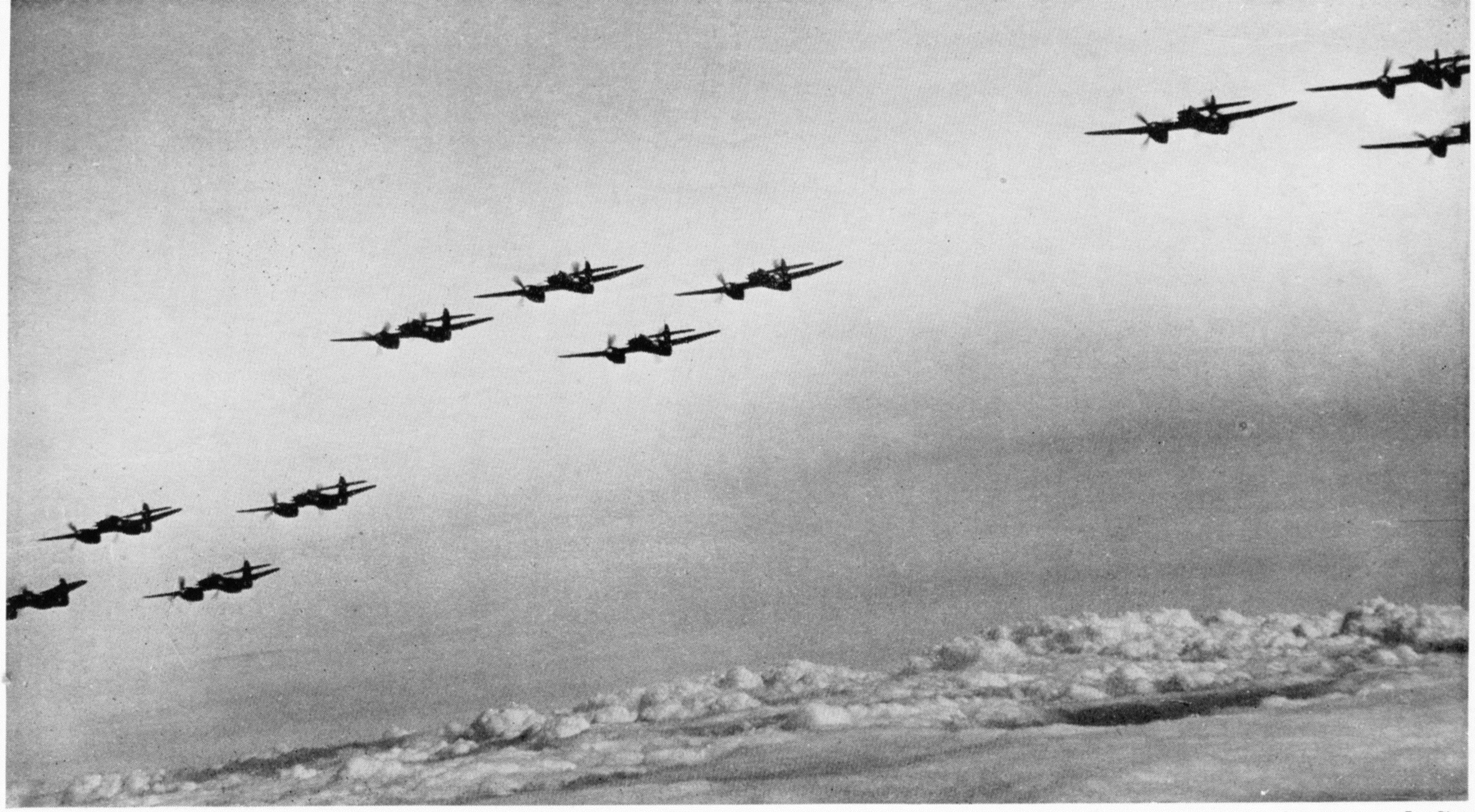
Brabazon of Tara

ACKNOWLEDGMENTS

Grateful acknowledgment is made to the undernoted, for their assistance in the preparation of this book :—

The Staff of Westland Aircraft Limited ; the Publishers of " The Aeroplane," " Flight," and " The Western Morning News " ; Colonel P. T. Etherton, R. H. Burnard, Esq., and Fox Photos Limited.

The photographs appearing on the dust-cover are by courtesy of Westland Aircraft Limited, " Flight," and Fox Photos Limited.



Fox Photo

FIRE-POWER. A Royal Air Force formation of Whirlwinds above the clouds.

Introduction

The busy Somerset town of Yeovil has long had its place in our island story and, in recent years, has played an increasing part in industrial history. Set among picturesque hills on the county's south-eastern border, Yeovil was originally a Roman settlement, being at the junction of the Roman roads from Axminster and Dorchester to Bath. After the removal of the Roman forces in Britain this settlement, which stood on the eastern edge of the present Westland Aerodrome, was pillaged and destroyed by fire, leaving medieval Yeovil to rise a little further to the east, where now stands modern Yeovil.

Towards the end of the last century Yeovil had become an important marketing and manufacturing centre, with glove-making and leather-dressing as the principal industries, in addition to agriculture. The latter industry was then in a state of semi-mechanisation and we find an agricultural engineer, one John B. Petter, established in premises in the Borough, Yeovil, in the year 1895, from which point the story of Westland Aircraft begins to take shape.

In that year of 1895 two of John B. Petter's sons, Ernest and Percival, designed and constructed a " horseless carriage "—the first internal-combustion engined motor-car to be built in this country. Using a converted four-wheel horse-drawn phaeton and a 3-h.p. horizontal oil-engine, they achieved a speed of 12 miles per hour ; but, although national interest was aroused, little financial benefit accrued, so they turned their attention to more remunerative endeavour—the adaptation of the " horseless carriage's " oil engine to industrial use. This move resulted in the world-famous Petter Oil Engine and, on the 7th July, 1910, to the formation of Petters Limited and the construction of the commodious Nautilus works and offices in Reckleford, Yeovil.

The coming of war in August, 1914, found the Company in a position to supply engines and electric lighting plants to the War Office, but nothing more ambitious was considered until April, 1915, when a series of events led to the foundation of the Westland Aircraft Works. In that fateful month Mr. Lloyd George made a speech in Parliament which shook the whole country. He frankly exposed the lack and unsuitability of the munitions then available for the prosecution of the war and called for immediate action.

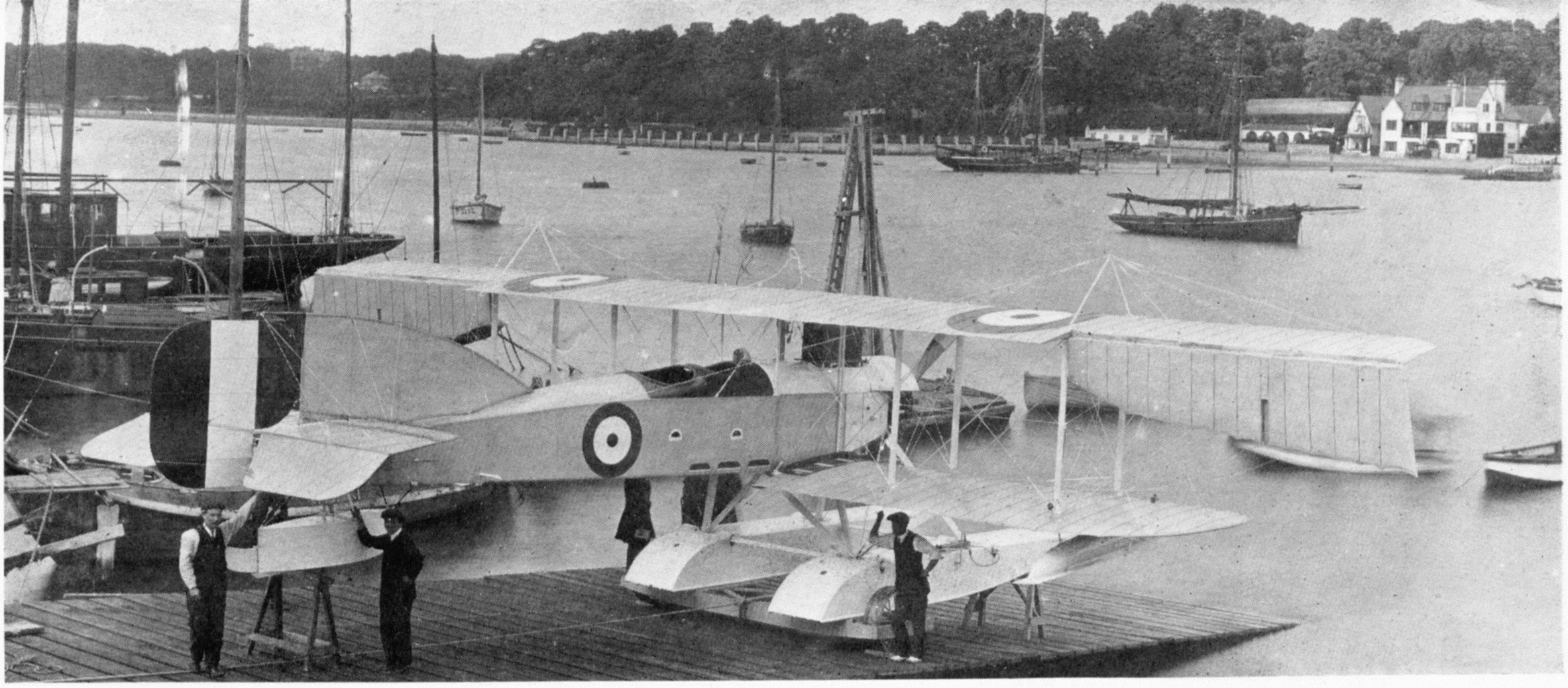
Struck by the gravity of the situation, Ernest Petter, then Chairman of the Company, hastily convened a Board Meeting, which passed a resolution placing the whole of the manufacturing resources of Petters Limited at the Government's disposal, to make anything or everything which might be needed of them.

Copies of this resolution were forwarded, on the same day, to the War Office and to the Admiralty. The War Office made no reply, but the next day the Admiralty telegraphed asking that two representatives might go up for a conference. Accordingly the Chairman and his brother, Percival Petter, went to London and were received by a committee which included three Lords of the Admiralty, who stated that the pressing need of the Navy was for seaplanes. The brothers explained that their experience and equipment could hardly be termed as of an aeronautical character, but that they were willing to attempt anything in the Nation's interest. " Good," said the Naval Lords, " you are the fellows we want ; we will send you the drawings, and give you all the help we can. Get on with it."

It had been realised that aircraft construction would mean an expansion of plant, greater than could be made in the limited area of the old works. Search was made for a new site. One April day in 1915, three men walked down to the corner of a field on the western outskirts of Yeovil. In the corner stood a small farm hut and one of the three, opening the door of the hut, laughingly said, " This is the new Westland Aircraft Works." That man was Ernest—later Sir Ernest—Petter, and the surrounding fields are now the site of one of the best equipped aircraft factories in the country.

A bigger problem, however, still faced the Directors. Staff had to be trained to the new type of work, and an aeronautical engineer competent to do this had to be found. Who should control the new branch of the Company ? Fortunately, early in 1914, a Mr. R. A. Bruce, M.Sc., had applied for the post of Manager at the Nautilus Works ; Mr. Percy Petter, who had originally interviewed him, recollecting that he had had extensive aeronautical experience, at once invited him to assume control of the new branch.

By this time Mr. Bruce had offered his services to the Admiralty and as Commander Bruce, R.N., he was acting as overseer at the Sopwith Aviation Company's factory at Kingston-on-Thames.



BAPTISM. The first Westland-built Short Canton Unne seaplane about to be launched on the Hamble River in 1916.

The Admiralty, appreciative of his designing experience, agreed to his release, and in July, 1915, he commenced his long association with Yeovil.

The influence of Mr. Bruce on the foundation and expansion of Westland Aircraft cannot be too highly stressed. His undivided effort built up a large and important aircraft manufacturing organisation from one small workshop; his engineering genius overcame difficult technical problems; and his outstanding personality secured him a loyal and devoted group of workers, many of whom, after a period of nearly thirty years' service, are still with the Company.

On his arrival at Yeovil Mr. Bruce was faced with a contract to build Short " Two-Two-Five " seaplanes in a single workshop of some 100 feet by 60 feet, with a staff which, with one exception, had never seen an aeroplane at close quarters! Acting quickly, Mr. Bruce put in hand the construction of additional accommodation and organised a group of executives to control the various phases of the work in band. This group, or team, which included Mr. Arthur Davenport, Mr. Seaman, Mr. John Petter, Mr. F. J. Perry, Mr. Percy F. Warren and Mr. R. G. Dellow—the latter having the only previous aircraft experience—spent a fortnight at the works of Short Brothers, Rochester, studying every detail of the " Two-Two-Five's " construction.

Work on the first contract commenced in August, 1915, and the first " Two-Two-Five " seaplane was finished just before Christmas of the same year, but trouble with the fabric doping prevented delivery until the following month, January, 1916.

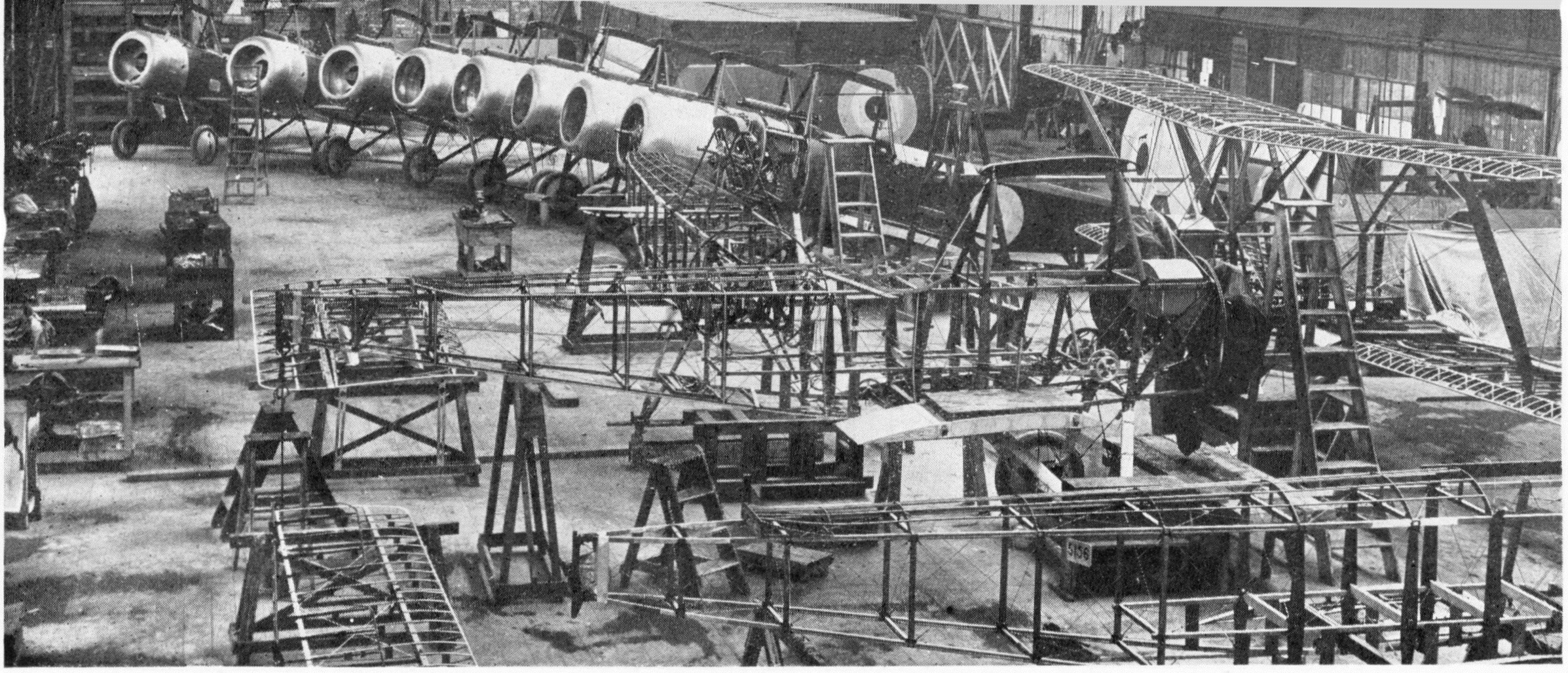
A point of interest is that Mrs. Bruce assisted her husband in marking out the jigs for the first machine, thus becoming one of the first of the many women who played a vital part in British aircraft construction in the First World War.

Large numbers of women, however, were not immediately taken into the aircraft industry, and the early days of Westland saw cabinet-makers, plumbers, joiners and cycle-mechanics joining forces with skilled men from the Petter organisation, in a field of engineering new to all of them.

Following the initial Short " Two-Two-Five " contract came further Admiralty orders for Short Canton Unne seaplanes and Sopwith One-and-a-Half Strutter biplanes. These machines were crated and delivered by rail, as was a portion of an order for De Havilland 4 biplanes. With the construction of the latter type the need for an aerodrome became pressing and led to the purchase of Northover Fields—part of the present aerodrome—from the Yeovil and District Hospital Board. Considerable work was involved in removing hedges, levelling and draining, but a fair-sized aerodrome was eventually obtained.

From this new aerodrome, on a showery evening in April, 1917, the first machine—a D.H.4 biplane—was flight-tested by the late B. C. Hucks, and early the next morning it was airborne again, bound for the Western Front! This first flight created tremendous interest and enthusiasm in the district, and it is on record that one of the Borough Councillors left his supposed death-bed to witness this historic event! The fact that he continued to live to a ripe old age is attributed to the rejuvenating effects of aviation.

WOMEN AT WAR, I. Girls making wing ribs at Westland in 1918.



PRODUCTION. Sopwith One-and-a-Half Strutters on the Westland assembly line, 1917.

History had also been made by a Westland machine before this date, for the only aircraft used by the Royal Navy at the Battle of Jutland, May 31st—June 1st, 1916, was a Westland-built Short " Two-Two-Five " seaplane. This machine, No. 8359, was a particularly reliable aircraft and was carried, with others of the type, on board H.M. Seaplane Carrier *Engadine*, then attached to Sir David Beatty's First Battle Cruiser Squadron. When the enemy was sighted early in the afternoon of the 31st, the senior officer of the seaplane Squadron, Flight Commander Rutland, R.N., chose No. 8359, whose normal pilot was Flt-Lt. Graham Donald, R.N., in which to carry out a successful reconnaissance of three-quarters of an hour's duration. The German High Seas Fleet, incidentally, used Zeppelins for their reconnaissance flights on this occasion.

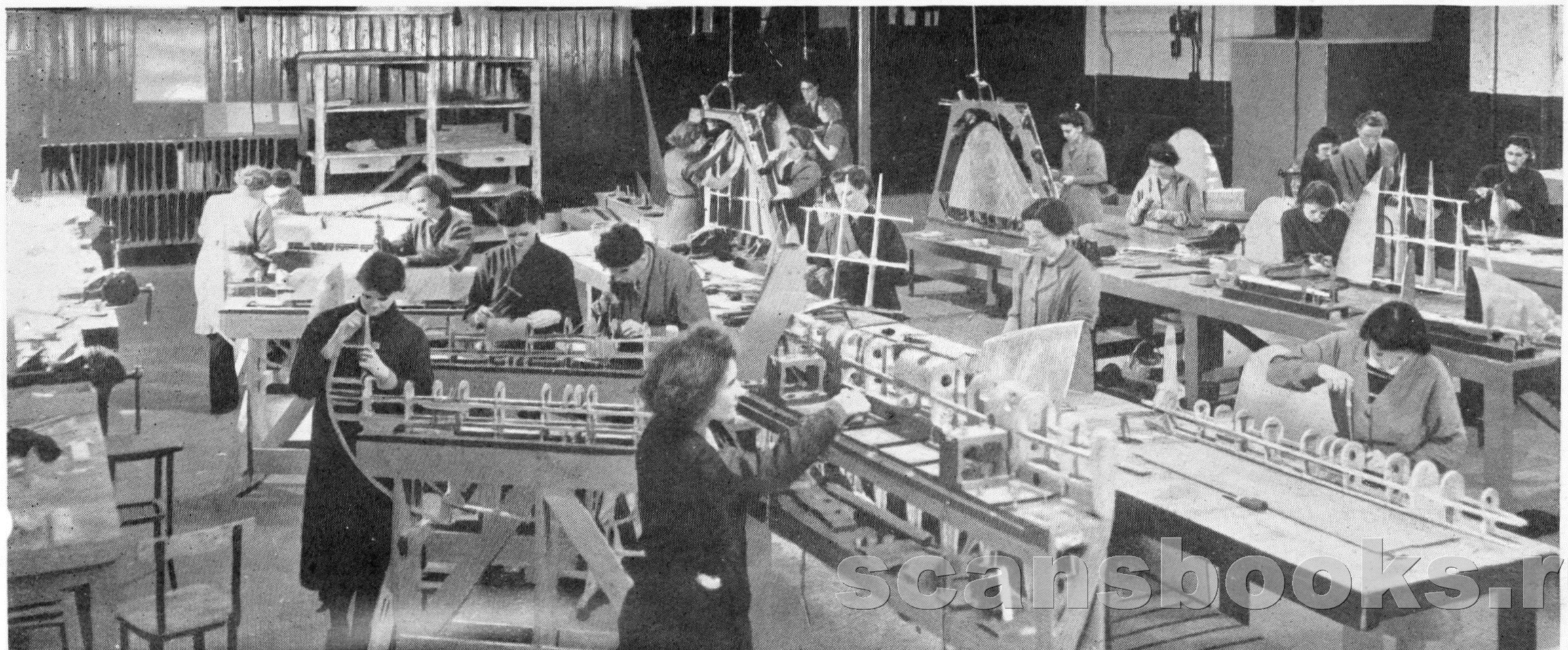
Altogether Westland built thirty-four seaplanes before concentrating exclusively on landplane construction, this total including two interesting machines of Westland design. The first, the N.16, was a single-seat scouting biplane, intended for shipboard use and fitted with a patent variable wing cambering device, designed by Mr. Bruce. The N.17, second machine of the type, was basically similar, but with improved flotation gear. Although a successful design they were not produced in series, owing to the introduction of fast carrier-borne landplanes for the class of operation for which they had been designed.

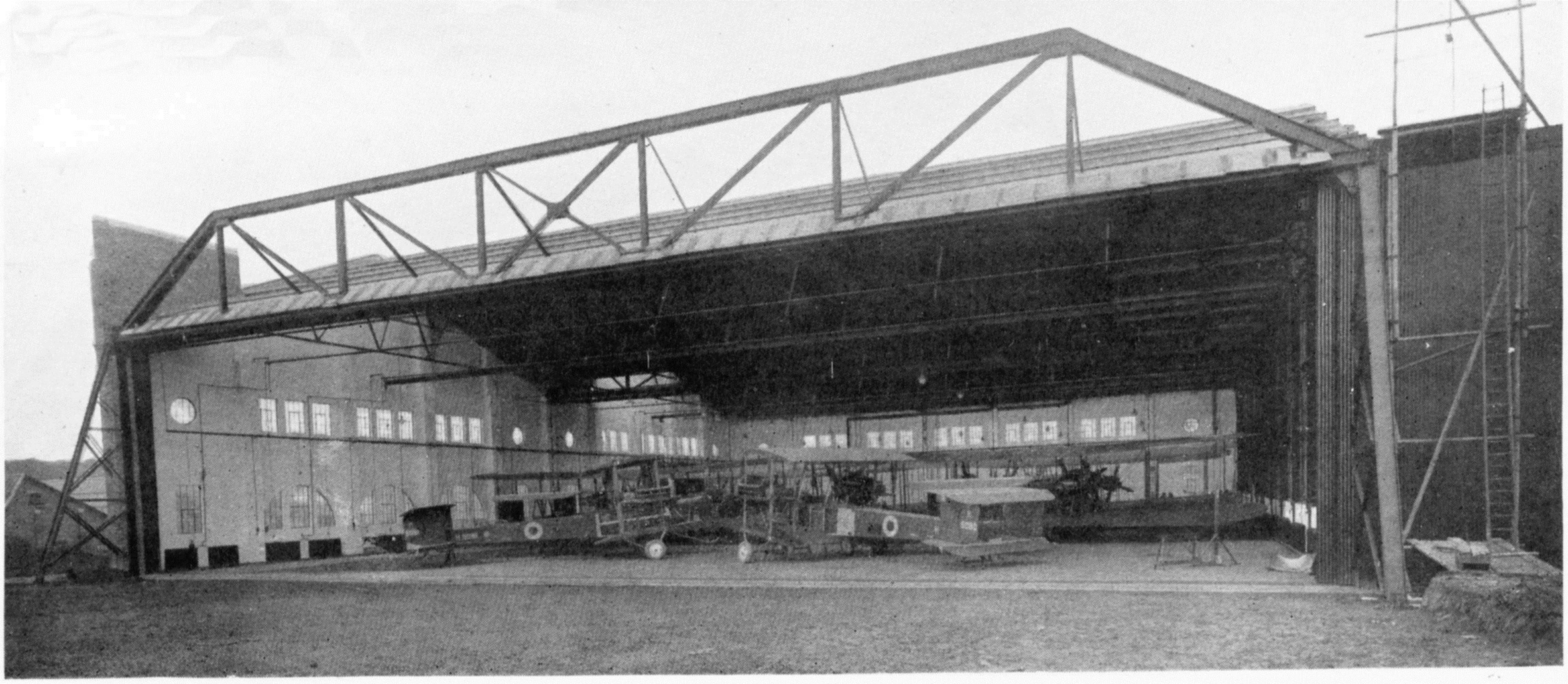
The second landplane type to be built, the D.H.4, was produced first with the 250-h.p. Rolls Royce engine and, later, the 200-h.p. B.H.P. engine, the latter machine having minor improvements to the rear gunner's accommodation.

After constructing one hundred and fifty D.H.4s, attention was turned to a contract for a similar number of D.H.9 biplanes, powered with the Siddeley " Puma " engine, and it was during this period that the famous 400-h.p. Liberty engine began to be delivered here from the United States. This engine was the product of the best motor engineering brains in America, and had been designed after a special conference in Washington in a matter of weeks. Its production and delivery were equally speedy, and the Air Board found it a matter of urgency to modify the D.H.9 to accommodate it. At this time the Aircraft Manufacturing Company, parent firm of the D.H.9, was fully occupied with the design and production of the D.H.10 twin-engined bomber, and it was decided that Westland Aircraft should be responsible for the modifications and re-design entailed by the installation of the new engine, an action which produced the world-famous D.H.9A —an aeroplane which remained in service until 1927.

This decision gave the Westland staff a considerable number of technical problems to solve, and it is of interest to record that Mr. John Johnston, who later became the Chief Draughtsman of the Westland Works was loaned by the Aircraft Manufacturing Company to assist with the work. All difficulties, however, were successfully surmounted and the Company, in addition to producing the first Liberty-engined aeroplane, was able to issue duplicate drawings to other constructors, so enabling large numbers to be produced. Westland Aircraft alone built nearly

WOMEN AT WAR, II. Girls assembling wing and rudder details at Westland in 1940.





OUTSIZE FOR 1918. The large Westland erecting shop, and some of that year's Vickers Vimy bomber sub-contract.

four hundred D.H.9As and the type played a decisive part in the final stages of the war, performing very useful services over the Western Front during the summer and autumn of 1918.

As a result of the development of the D.H.9A Westland Aircraft had built up an efficient design organisation which produced, in 1918, a compact little single-seat scouting biplane, known as the Westland Wagtail. Five of these machines were built, but trouble with their engines, and the end of hostilities, prevented mass production.

The Wagtail was followed by the Weasel, a two-seater reconnaissance biplane, which suffered a similar fate. Four Weasels were built and, fitted with alternative engines, they gave excellent performances in tests carried out during 1919 ; but by this time the demand for military aircraft had given place to one for civil types, and in this sphere Westland Aircraft again led the field.

The closing months of the war had seen a tremendous expansion of workshops and offices at Westland, notably the construction of a very spacious erecting shop in which, in 1919, a contract for twenty-five Vickers Vimy twin-engined bombers was completed. These particular aircraft had been intended for bombing raids on Berlin, but the Armistice reserved this privilege for other machines —at a much later date !

From 1916 until the end of hostilities seven hundred and sixty-five production landplanes, together with nine experimental aircraft of Westland design, were produced. With the thirty-four seaplanes this brought the grand total of Westland war production to eight hundred and eight aircraft.

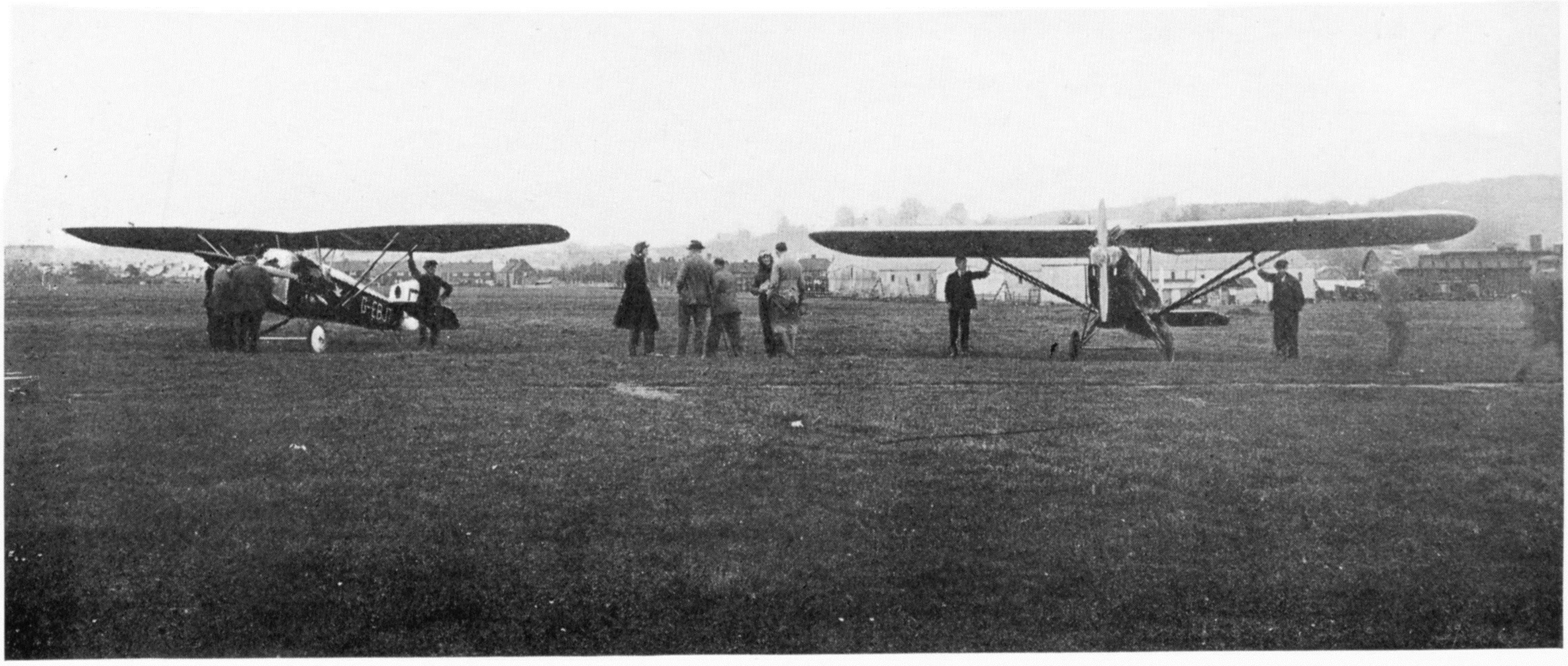
With the end of hostilities came an opportunity to take stock and the Company's records reveal that Petters Limited, the parent firm of the Westland Aircraft Works, then had a capital of half a million pounds. Mr. Bruce, who had been elected to the Board of Petters Limited and was Managing Director of the Aircraft Works, was assisted by Mr. Robert J. Norton, Commercial Manager, who had joined the organisation in January, 1916. Mr. Arthur Davenport, later to be Chief Designer, then held the post of Chief Draughtsman, while Mr. Frank Chandler was the Works Manager.

The first official Test Pilot of the Company was Captain A. S. Keep, M.C., B.Sc. After a distinguished career with the R.F.C., R.A.F., and the Independent Air Force, during which he took part in the big daylight raid on Cologne, Captain Keep had been posted to Westland Aircraft, in December, 1918, as an Air Ministry test pilot and, on being demobilised, he joined the staff.

In the summer of 1919 Captain Keep flight-tested the first Westland civil machine, the Limousine, a four-seater cabin biplane which had been designed and built in a few months following the Armistice. This aeroplane was very successful, but was not built in any quantity because the design was developed into a larger machine, the Six-seater Limousine which, piloted by Captain Keep, won the first prize of £7,500 in the Small Aeroplane class of the Air Ministry Civil Aircraft Competitions, held at Martlesham in the early autumn of 1920.

The next design work undertaken by the Company was made under the necessity of national retrenchment. In the immediate

PREDICTOR. The Westland wind-tunnel, built during the First World War, and one of the first to be installed by a manufacturer.



DEVELOPMENT. Widgeons Mark II and Mark III. The group between the machines includes Sqd. Ldr. T. H. England, Mr. R. A. Bruce, Captain A. S. Keep, Major L. P. Openshaw and Captain G. T. R. Hill.

post-war period the Navy urgently required a deck-landing reconnaissance machine, and gave Westland Aircraft the unenviable task of modifying the D.H.9A to meet their specification. The result, known as the Walrus, of which thirty-six were built, was a weird contraption ; rather vicious to fly, and by no means a thing of beauty ! Had the Westland design staff been permitted to produce a special machine to meet the specification, there is no doubt that a much more efficient aeroplane would have been made, but nevertheless the machine was of value in showing the possibilities of adaptation—an experience later made use of in producing the Wapiti.

Concurrently with the Walrus contract work had been proceeding on the design and construction of an extremely interesting aircraft, a forerunner of the " flying-wing " type of monoplane, based on a model produced by M. Woyevodsky, a Russian engineer. The design, known as the Dreadnought, incorporated a very thick wing section, merging into the fuselage, the idea being to maintain the aerofoil section over the whole of the aircraft. The passengers were placed partly within the wing roots.

In the spring of 1923 high-speed taxying tests of the new machine, in which Captain Keep was accompanied by Mr. Bruce, resulted in short hopping flights and there was every reason to believe that the initial test flight would be successful. However, control difficulties developed shortly after the Dreadnought was really airborne for the first time and it stalled and was damaged beyond repair.

This unfortunate accident ended Captain Keep's flying career, but his work and interest in aviation did not cease and he continued to act in a technical and managerial capacity until his retirement in 1935.

In the years following the Dreadnought experiment Westland was mainly concerned with reconditioning and rebuilding D.H.9A biplanes for the R.A.F., and while this work was important it was not sufficient to provide employment for the full Westland staff. This state of affairs, coming at a time of acute trade depression, led the Directors to investigate the manufacture of such articles as pianos and dairying equipment, in an endeavour to keep intact their highly trained personnel. This gallant attempt to beat the sword into a ploughshare was not a complete success, but served the purpose intended.

Towards the end of this period of retarded development an event occurred which had an important effect upon the fortunes of Westland Aircraft and, although the story is a little involved, here it is :

The Air Ministry had, at this time, realised that aeroplanes then in operation were of absolutely no use to the air-minded " man-in-the-street," chiefly because they were mostly converted military types and rather expensive to fly and maintain. Consequently it was decided to invite aircraft manufacturers to produce their ideas of a suitable light aeroplane, within a certain specification, and to hold a competition of the various machines at Lympne, in the autumn of 1924.

The announcement of the competition was received with

RESEARCH. The first Westland-Hill Pterodactyl, before final covering.

CLOSE-UP. Westland constructional methods are aptly illustrated by this detail shot of the Lysander wing vee-bracing joint with the undercarriage leg.

enthusiasm at Westland, but a division of opinion arose as to the type of aeroplane which should be entered. One school of thought favoured a biplane, the other a monoplane, and as advantages could be claimed for both it was finally decided to enter two machines—one of each type.

The Woodpigeon, as the biplane was named, was of normal design, with a No. 64 wing section, while its companion, the Widgeon high-wing monoplane, was of a distinctly unconventional design and had a thick wing section. Both machines were to have been fitted with a 32-h.p. Bristol Cherub engine, but the Widgeon eventually arrived at Lympne with a Blackburne Thrush engine. Unfortunately the Widgeon had a heavy forced landing on its first circuit of the trial course and, as the Woodpigeon also failed to distinguish itself, the relative merits of the two machines had to be found by tests at the home aerodrome. The trials at Lympne, however, had clearly demonstrated the fact that ideas regarding engines would have to be revised, most of the entries having little power reserve to meet an emergency.

This fact was also brought to light during the further tests at Westland and both machines were modified to take more powerful engines, the Woodpigeon being fitted with an Anzani and the Widgeon with an Armstrong Siddeley Genet. Extended trials definitely proved the superiority of the monoplane design and from that time Westland Aircraft steadily developed the type, even in spite of the official reluctance to encourage monoplanes for Service use, a reluctance they eventually overcame in no uncertain manner!

However, this biplane *v.* monoplane struggle was only one side of Westland activity in the early twenties, and we find two interesting military types under construction at this time. The first of these, the Yeovil Bomber biplane, powered with a single Rolls Royce Condor engine, was designed and built to an Air Ministry competition specification and, although the production order was obtained by the Hawker Horsley biplane, a considerable amount of useful experimental work was carried out on the three Yeovil Bombers produced.

The second military type of this period was the Westbury biplane, a twin-engined three-seater fighter of orthodox design, and of which two specimens were built. The chief feature of the machine was its unusual armament, for the Westland design staff, impressed by the potentialities of offensive fire power, here started a school of thought which was eventually vindicated by the eight-gun fighters of the Battle of Britain. The armament of the Westbury consisted of two 37 mm automatic shell-firing

CIVILIAN COMFORT. The Widgeon Mark III as a cabin machine.

PRODUCTION. Wapitis in the final assembly shop, 1928.

guns, one mounted amidships and firing ahead, at an elevated angle, over the centre-section, while the other was mounted in a rotating nose-turret. These guns fired one-and-a-half pound shells at the rate of 100 per minute, and it is of interest to note that the nose-turret gun, which had a 2,000 lb. recoil, was successfully fired broadside in flight !

The patent rights of the Westbury gun-mountings were eventually acquired by Messrs. Vickers and later used on the Blackburn Perth flying-boats, but the Westland ideas of fire power developed, through a series of machines, to the four-canon Whirlwind fighter monoplane of the Second World War.

During the later stages of the Yeovil and Westbury period, in 1926, a first attempt was made to profit by the success of the Widgeon high-wing monoplane, and the design of a high-speed single-seat fighter monoplane was initiated.

This machine, powered with a Rolls Royce Falcon engine and named the Wizard, was unfortunately damaged before sufficient information of its capabilities could be ascertained and it was decided that, in rebuilding it, all-metal construction should replace the composite method previously used. The version, known as Wizard Mark I, had a top speed of nearly 200 m.p.h., and a rocket-like climb and was, at that time, the fastest single-seat fighter in the world. These highly desirable qualities, however, did not break down the official reluctance to countenance monoplanes, so Westland endeavoured to overcome this prejudice by the introduction of certain modifications. The result, Wizard Mark II, had a centre-section which gave the pilot an improved view, but as the machine's performance was adversely affected, the design did not pass into production.

As protagonists of the monoplane, Westland Aircraft next produced the Witch, a single-engined two-seat high-wing day bomber. This machine had a wide-track divided-type undercarriage and was the first single-engined aeroplane to have an internal bomb stowage compartment ; but, after protracted tests and modifications, official circles were still not interested in monoplanes and the only example of this design was relegated to a parachute training school, where it had a long and useful career.

The Witch brings us to the years of 1927 and 1928, but steps must now be retraced a little to inspect other work which had been maturing. The Widgeon monoplane which, with the Genet engine, had been known as Mark II of the series, had now been developed into Widgeon Mark III, an attractive light aeroplane powered with a Cirrus in-line engine. The Mark III, however, bore only a basic resemblance to the original Widgeon of 1924,

SEABORNE. The Wapiti as a seaplane.

DETAIL. A standard Wapiti before covering.

the wing and fuselage structures having been redesigned for ease of production by jigs. In this form the Widgeon found a ready market both at home and overseas and, in the course of production, the design was developed still further, the Mark IIIA having an improved divided type undercarriage and the more powerful Hermes engine, while another model was fitted up as a cabin machine—the first light aeroplane to be so equipped. Eventually, however, Widgeon production had to be abandoned in favour of Air Ministry production work of a more urgent character.

And here begins a further important phase in the history of Westland Aircraft—the era of the Wapiti biplane. The story of the Wapiti really begins with the Air Ministry's decision to replace the D.H.9A—another Westland production, then still in service —with a more up-to-date general purpose machine. The official specification of the new machine stressed the importance of using as many components of the D.H.9A as possible, the object being to utilise the large stocks of D.H.9A spare parts which then existed, therefore the original Wapiti incorporated 9A wings, tail unit and undercarriage, but with a more commodious fuselage behind its Bristol Jupiter VI engine.

The initial flight test of the Wapiti revealed an almost complete absence of rudder control, and this led to modifications, eventually resulting in the large rudder and fin which was a prominent recognition feature of the Wapiti.

The exacting trial of the prospective replacement machines was held at Martlesham and the original Wapiti, J.8495, secured the production order in the face of some redoubtable competition.

Following the trials, a development order for twenty-five Wapitis was placed by the Air Ministry, in the autumn of 1927, and while these were under construction further experimental work on the prototype went forward.

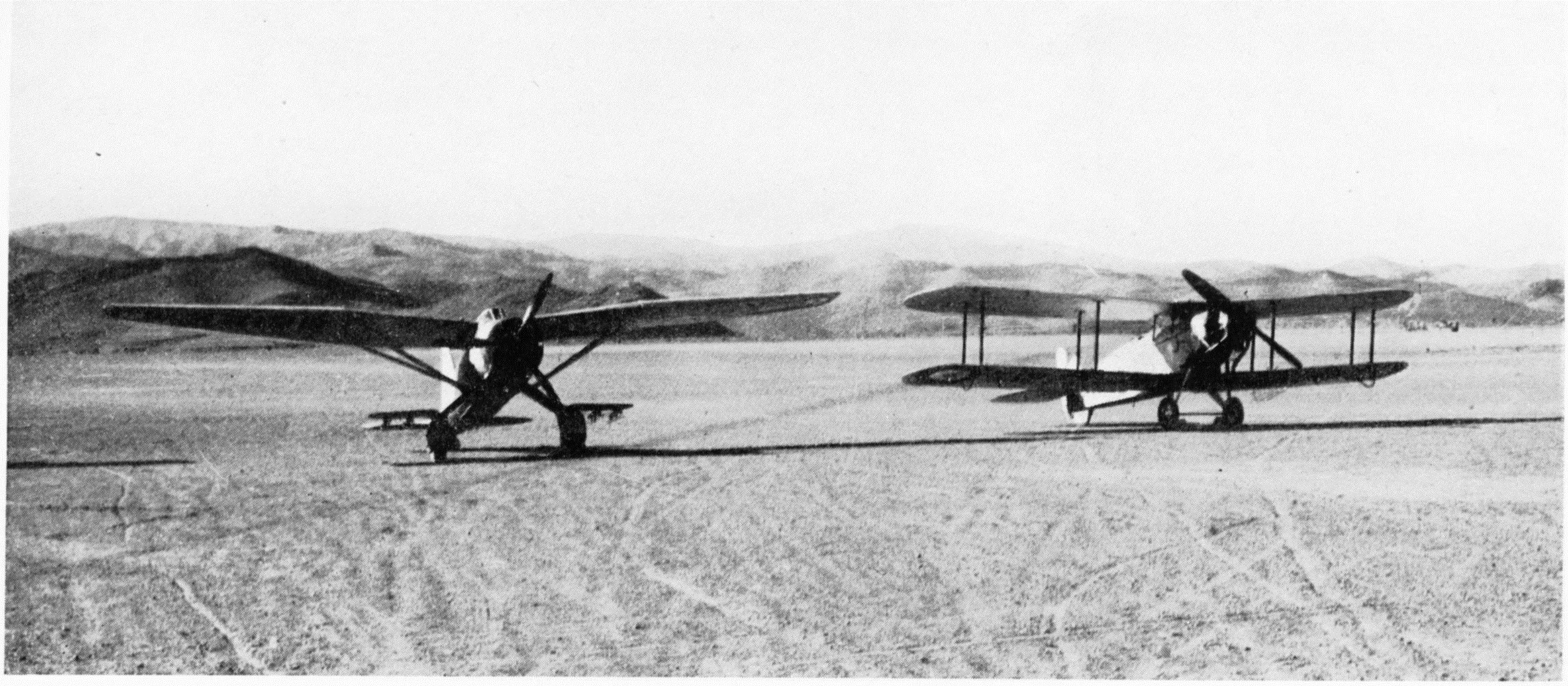
First came the addition of the Handley Page automatic slots in the leading edge of the upper main planes ; these were built into a set of D.H.9A wings, and successfully tested on a standard machine of that type before being fitted to the Wapiti. Then, from this point, a series of modifications and improvements developed the Wapiti into a first-class general purpose machine.

The prototype Wapiti, and the first twenty-five production machines, were of composite wood and metal construction, but this was soon abandoned in favour of all-metal wings and fuselages, which, with the geared Bristol Jupiter VIIIF engine, a slightly modified undercarriage and lengthened fuselage, is the most widely known version of the Wapiti.

The 500th Wapiti was delivered in 1931 and before production ceased well over 1,000 of the type and its final development, the Wallace, had been built, and it is probable that in the early thirties there were more Wapitis in service in various parts of the world than any other single design of aircraft.

So popular was the Wapiti that one machine, J. 9095, was specially modified for the Prince of Wales' personal use, while the King of the Hedjaz bought a private air force of four of them. Even further afield the strength and reliability of the Wapiti was appreciated and, while thirty-eight were supplied to the Royal Australian Air Force, the South African Air Force acquired

MILITARY COMFORT. The glazed cabin top of the Wallace Mark II.



R. H. Burnard

OLD AND NEW. The second prototype Lysander meets a Wapiti at Miramsha Fort, North-west Frontier of India.

a constructional licence to build them. Other Wapitis were supplied to the Royal Canadian Air Force, and Armstrong-engined versions were used by the Chinese Air Force. Wapitis, in addition, were the standard equipment of the various R.A.F. Auxiliary Squadrons and, with the regular R.A.F., the type saw considerable active service, especially on the North-West Frontier of India.

Although Wapiti and Wallace production accounted for the major portion of Westland activity from 1927 to 1934, steady progress was also made in experimental work and we find the development of the monoplane being pursued in the Interceptor fighter, which made its first flight in 1929. The Interceptor was a single-seat low-wing monoplane designed, as its name implied, to have a quick rate of climb, with ability to operate at high altitudes and, although these qualities were secured in good measure, the design was not developed beyond the prototype. Certain important research work, however, was carried out as a result of discoveries made during the machine's test flights.

In the Westland experimental shop, alongside the Interceptor, a light tri-motor passenger monoplane had been taking shape, and this machine, known as the Westland Four, took the air on its first flight in the spring of 1929. Designed as a small air-liner, for internal routes or charter operation, it had a comfortable four-seat cabin and accommodation for the pilot and flight mechanic.

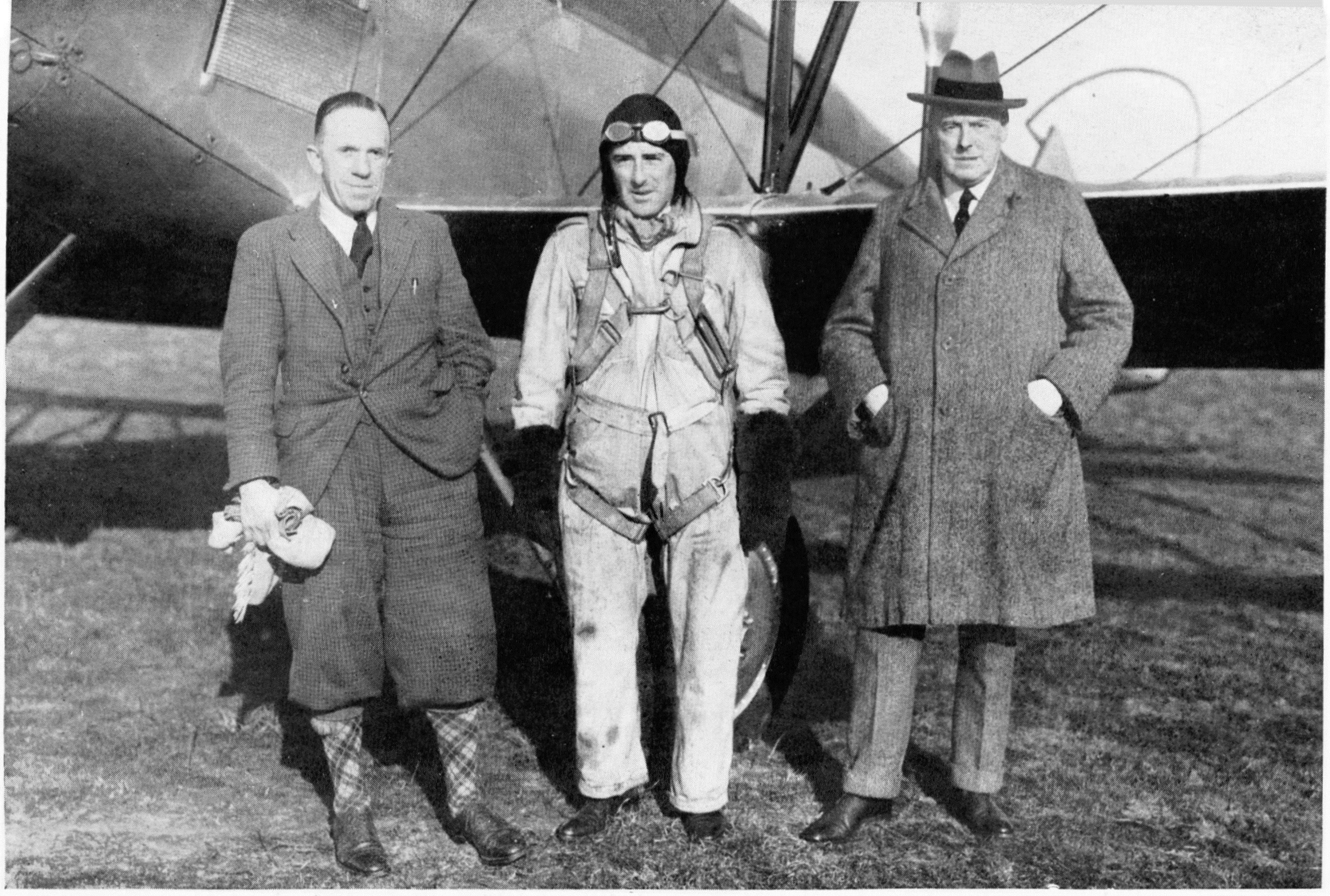
After successful tests of the original Four, G-EBXK, a second machine, G-AAGW, was put in hand for exhibition at the International Aero Show at Olympia, London, in July, 1929. Westland was also represented at this event by a Wapiti and a Widgeon Mk. IIIA.

From the tri-motor machines, which had A.D.C. Cirrus Mk. III and A.D.C. Hermes engines respectively, the type was developed into the Wessex, in which Armstrong Siddeley Genet radial engines replaced the original in-line power units. Small quantity production followed in this form and gave excellent service with Imperial Airways, the Belgian airline SABENA, Railway Air Services, and with Sir Alan Cobham's Air Circus. The final machine produced, G-ABVB, was specially modified for operation on the short Portsmouth-Isle of Wight air-ferry, the fuel tankage being cut down and the fuselage re-designed to accommodate ten persons, including the pilot.

In the early thirties the question of heavier air armament was engaging the attention of the Air Ministry, and many experiments were made with small calibre automatic shell-firing guns, both mounted on airframes and projecting through the airscrew shafts of geared in-line aero-engines. Of the airframe range of experiments Westland contributed the C.O.W. Gun Fighter—the initials standing for Coventry Ordnance Works and the gun being a 37 mm automatic weapon, similar to those used in the earlier Westbury experiments.

The design of the C.O.W. Gun Fighter was almost identical with that of the Interceptor, the main differences being increased wing span and length of fuselage. The gun was mounted as a fixture in the starboard side of the fuselage, alongside the pilot,

PRODUCTION. Hawker Hectors, part of the air rearmament programme, in the Westland final-assembly shop, 1937.



" Flight " Photo

CONQUEST, I. Left to right : Mr. Arthur Davenport, Mr. Harald J. Penrose and Mr. Robert A. Bruce, on the occasion of the 35,000 feet test climb of the Houston-Westland (P.V.3) at Yeovil, in January, 1933.

and fired forward and upward at an angle, aiming, of course, was effected by manœuvring the whole machine.

Only one example of this type was constructed, but it had an excellent performance, and research work carried out with it proved most useful at a later date.

For the next facet of Westland history, we must return to the year 1926, when Captain G. T. R. Hill, M.C., M.Sc., successfully tested a tailless glider which he had designed and constructed, with the assistance of Mrs. Hill, at his own home. After successful flights on the South Downs the Air Ministry became interested, having realised that, although the main object of the type was stability and control at low speeds, there were obvious military advantages in the design.

The next step, therefore, was the installation of a 34-h.p. Bristol Cherub engine in the original glider, successful power flights with which took place at the Royal Aircraft Establishment, Farnborough, before Sir Samuel Hoare, Secretary of State for Air. From this point Captain Hill continued his development work in co-operation with the Westland Works, the first production, known as the Westland-Hill Pterodactyl Mk. IA, being a two-seat side-by-side shoulder-wing tailless monoplane, powered by a Bristol Cherub engine. This machine was later modified to take

PRODUCTION. The Lysander assembly line.

CONQUEST, II. The Houston-Westland (P.V.3) about to pass over Mount Everest.

Col. P. T. Etherton

the Armstrong Siddeley Genet engine, and then designated Mark IB.

Development of Captain Hill's ideas next produced a number of designs, including a high-wing cabin monoplane powered by a 120-h.p. D. H. Gipsy engine. Known as the Pterodactyl Mk. IV, the machine was equipped with a gear which enabled the pilot to move the wings forward and backward—in flight or on the ground—to trim the aircraft at varying loads and speeds. All the Pterodactyls, incidentally, were flown at the annual R.A.F. Displays at Hendon, the Mark IV appearing at the 1931 event.

The final product of the Westland-Hill combination was Pterodactyl Mk. V, a fast tractor sesquiplane two-seater fighter, in which the military objective of the series was achieved. In 1934 Captain Hill became Professor of Engineering at London University, but his research in the tailless aircraft field did not cease and, no doubt, more will yet be seen of his work.

While ardently fostering the monoplane vogue, Westland did not neglect the more conventional biplane, now nearing the peak of its career as a military type, and the final phase of Wapiti development is a most interesting story.

In the spring of 1931 Mr. H. J. Penrose, F.R.Ae.S., demonstrated a Panther-engined Wapiti, G-AAWA, in Argentina and

LINE-UP. A batch of production Lysanders awaiting collection by the R.A.F.

ROYAL INTEREST. H.R.H. the late Duke of Kent, accompanied by Mr. Eric Mensforth, tours the Westland plant in wartime.

Uruguay, in connection with the British Empire Exhibition at Buenos Aires and, as a result of the experience then gained, the machine was later modified to bring its performance into line with contemporary military types, but without losing the advantages which the original Wapiti possessed. This particular machine was, for a time, known as the P.V.6, but after successful trials at Martlesham it was named the Wallace, and the type went into quantity production for the Royal Air Force in the spring of 1933.

The prototype, which had started its career as Wapiti G-AAWA, was again modified to take part in the highly successful Houston-Mount Everest Expedition of 1933, and in this form was given the registration letters G-ACBR. On returning from the Expedition this veteran was converted back to a standard Wallace and sent out to a R.A.F. Squadron! It is rather a pity that its subsequent career is hidden away in Service records.

Before going over exclusively to monoplane design Westland produced two more interesting biplane types, and the first of these, the P.V.3, also took part in the Houston-Everest Expedition. Originally designed to conform with an Air Ministry Specification, for a carrier-borne torpedo-plane with folding wings, the P.V.3 was modified for the Expedition by the conversion of the open rear cockpit to a closed cabin, as was that of the Wallace G-ACBR. The P.V.3, which was registered as G-ACAZ for the Himalayan flights, subsequently had a useful career as a flying engine test-bed with the Bristol Aeroplane Company.

The Houston-Mount Everest Expedition, in which these two machines featured, was a complete triumph for the Westland

ANCIENT AND MODERN. An Army Co-operation Lysander of the R.A.F. Middle East Command over the Pyramids.

R.A.F. Official

" *Western Morning News* "

ROYAL INTEREST. H. M. King George VI, with Mr. W. E. W. Petter, Air Marshal Sir Wilfred Freeman and Mr. Eric Mensforth, sees Westland " stressed-skin " production methods.

design and production staffs and details of the epic flights over the peak, 29,141 feet high, make interesting reading. At 8 a.m. on April 3rd, 1933, the Wallace, piloted by Flt.-Lt. J. McIntyre and carrying Mr. S. R. Bonnett, photographer of the Gaumont-British Film Corporation, took off from the town of Purnea, about 150 miles south of the Himalayan range. At the same time the Houston-Westland (P.V.3), piloted by Lord Clydesdale, with Lt.-Col. L. V. S. Blacker as observer, took off, and the two machines climbed steadily towards their objective. At 19,000 feet they flew out of swirling mists into brilliant sunshine and, after further laborious climbing amid a wonderland of crystal glaciers and icy pinnacles, successfully cleared the summit of Everest, reaching base again after a round trip of nearly three and a half hours.

The photographs and information obtained on this and a further flight, on April 19th, proved of the utmost scientific and meteorological value, and reflected great credit on the daring crews and their sturdy machines.

In 1934, the production Wallace was further improved by enclosing the cockpits with a transparent hood, thus giving the Royal Air Force its first cabin-type machine capable of fighting at maximum speed.

The final biplane production—incidentally it started life on the drawing-board as a monoplane—was a single-seat fighter, built to an Air Ministry Specification and designated the F.7/30. This machine was fitted with a rather unorthodox power unit, the 600-h.p. Rolls Royce Goshawk engine, housed in the fuselage between the wings and driving the airscrew by means of a long

PRODUCTION. Whirlwinds on the assembly line.

shaft. The pilot's cockpit was immediately forward of the leading edge of the upper planes, the airscrew and engine connecting shaft running beneath him. Due to the concentration of weight around the machine's centre of gravity it was highly manœuvrable in flight and, in the opinion of pilots who flew it, the range of vision from the cockpit was everything that could be desired. Although both the machine and the novel engine installation successfully completed the most arduous tests, the specification was shelved and the type was not put into production.

The period covered by the years from 1934 to the outbreak of hostilities in 1939, was one of far-reaching change, reorganisation and expansion at Westland. Mr. R. A. Bruce, who had guided the organisation through the trials and successes of the first twenty years of its being, resigned his Managing Directorship and retired in 1934, although he continued to act in a consultative capacity. With Mr. Bruce's departure, Sir Ernest Petter became Chairman and Managing Director, assisted by Captain A. S. Keep as General Manager, and Mr. W. E. W. Petter, B.A., as Technical Director.

On the 4th July, 1935, the Westland Aircraft Works ceased functioning as a branch of Petters Limited and was reorganised as a separate company, with the title of Westland Aircraft Limited. The directorate of the new company was: Sir Ernest Petter, M.I.Mech.E., Chairman and Joint Managing Director; Captain P. D. Acland, Joint Managing Director; Air Vice-Marshal N. D. K. MacEwen, C.B., C.M.G., D.S.O.,; Mr. W. E. W. Petter, B.A., Technical Director; and Mr. John Fearn, M.I.Mech.E., Works Superintendent.

This directorial combination, which handled the pre-Munich expansion production at Westland, continued until July, 1938, when the noted steel and shipbuilding firm of John Brown, Ltd., acquired a controlling interest in Westland Aircraft. Also, in the autumn of 1938, Petters Limited—original parent organisation—amalgamated with the Brush Electrical Company, and removed to Loughborough, the premises at Westland vacated by them being taken over, adapted and expanded into the aircraft manufacturing plant.

A further change occurred at the close of 1938, when the Associated Electrical Industries group of companies also acquired an interest in Westland Aircraft, the present directorate being composed as follows: Lord Aberconway, C.B.E., Chairman; Eric Mensforth, M.A., M.I.Mech.E., M.I.P.E., Managing Director; W. E. W. Petter, B.A., A.F.R.Ae.S., Technical Director; J. Fearn, Esq., M.I.Mech.E., Works Director and Deputy Managing Director; Alan P. Good, Esq., Air Vice-Marshal Sir Norman D. K. MacEwen, C.B., C.M.G., D.S.O., Sir Holbery Mensforth, K.C.B., C.B.E., Sir Felix J. C. Pole, and S. W. Rawson, Esq., Directors.

Returning to the aeronautical side of Westland history, we find monoplane design once more in the ascendant with the P.V.7, a high-wing general-purpose machine capable of torpedo-carrying, intended to replace the Wallace, and designed to Air Ministry Specification G.4/31. Trials of the P.V.7 proved it to be an excellent type, with a very satisfactory performance, but it was wrecked during diving tests at Martlesham by a series of unforeseen mishaps. Mr. Penrose, who was piloting the machine at the time, was admitted to the Caterpillar Club as a result of his experience.

During the early thirties yet another branch of Westland activity had been flourishing in the form of experimental rotating-wing aircraft, of which two were constructed. The first of these was a large five-seat cabin model, dsigned under the personal supervision of the late Señor Cierva, but technical difficulties prevented the completion of its trials.

The second of the series, known as the Westland C.L.20 Autogiro, was a successful two-seat side-by-side cabin machine powered by a Pobjoy Niagara "S" engine. This design was produced in co-operation with the Cierva Company and M. Lepere, but increasing production of military types caused this interesting phase of research to be abandoned.

In the year 1934, the Air Ministry issued a Specification numbered A.39/34 and, as a result, secured an aeroplane whose name is now permanently interwoven in the history of air operations in the Second World War. The design was a two-seat high-wing monoplane intended for army co-operation work, and it was based not only on the ideas of the Westland engineers, but also those of Service pilots then engaged on Army Co-op. work. The prototype had been originally designed to feature a retracting chassis, but eventually it was fitted with a spatted and faired fixed undercarriage and, after completely successful trials, was named the Lysander.

Of the world-famous Lysander's exploits over Calais and Dunkirk in 1940, and its subsequent sterling work in the Battle of Britain and with the Air-Sea Rescue units, much has already been told. More must of necessity remain untold until a later date, but there is not the least doubt that this outstanding Westland product played a star role in staving off defeat and making victory possible in those dark and dismal years.

The Air Ministry outlook by this time was based on the monoplane, which Westland had so consistently advocated. Although the low-wing type had become conventional, nevertheless the next Westland type had many original features. It was a twin-engined single-seat fighter, originally known as the P.9 (and sometimes as "Crikey"), and it was first flown by Mr. Penrose in October, 1938, but did not make an operational appearance until two years later, when it had been named the Whirlwind—the first Westland single-seat fighter ever to go into production.

The Whirlwind, and its development, the Whirlibomber, were mainly used on sorties across the wider parts of the Channel, but the former has also featured as a bomber escort as far into enemy territory as Cologne, which Westland-built D.H.9As had raided twenty-three years before. Here, again, much more may be written of these machines at a later date.

Prior to the outbreak of war Westland handled a major share of the vast air rearmament programme and built, among other types, the entire production of Hawker Hector biplanes. With the outbreak of hostilities the tempo and scope of Westland activities quickened considerably, but must, of course, remain unwritten for the present. It can, however, be stated that the services of Mr. Eric Mensforth, Managing Director, have been lent by the Board to the Minister of Aircraft Production, as Chief Production Adviser to Air Marshal Sir Wilfred Freeman, Chief Executive, M.A.P. This appointment, which was made in June, 1943, and is unpaid, is a mark of the esteem in which Westland progress is held.

While yet engaged on all-out production for the Air Forces of the United Nations, plans have been formulated by the Company with the combined objects of enhancing their position in the world of aeronautical design and production, and helping to provide the means of quelling any future attempts at aggression. The latter objective can only be achieved by the maintenance of complete and highly trained aircraft industrial personnel and, to ensure this desirable state of affairs, Westland Aircraft Ltd. has in operation a very complete apprenticeship scheme.

Two sections of the scheme are in operation and one, for "trade" apprentices between the ages of 14 and 16 years, offers a five-year course in such branches of the aircraft industry as sheet-metal working, fitting, machining and wood-working. The other section, for "engineering" apprentices between the ages of 16 and 18 years, demands a high standard of education, and covers a wide range of aeronautical technical and executive activities during a course of three years.

Owing to war-time conditions prevailing when the Scheme was inaugurated the apprentices, who work a 47-hour week, attend three classes per week in the last two hours of their working day and, in addition to this generous concession, the Company pays a bonus for good attendances and examinations taken—whether a pass is secured or otherwise.

As a mark of the Board's confidence in this scheme, and the future prosperity of the Industry, a valuable engineering scholarship, tenable at Cambridge University for three years, is awarded annually to the most suitable apprentice, while ten apprentices are offered a further two years general training in the London and Sheffield areas.

These facts, when considered in relation to the aeronautical training facilities available—or lacking—at the end of the First World War, demonstrate the amazing growth of the British Aircraft Industry in general and Westland Aircraft in particular—and a determination that Britain's air supremacy shall be maintained.

"*Flight*" *Photo*

LOCATOR (on opposite page). An Air-sea Rescue Lysander circles a "ditched" fighter-pilot, to indicate his position to approaching rescue launches.

THE N.16 AND N.17 SEAPLANES

The N.16 and N.17 seaplanes were the first Westland-designed aircraft to be built, Mr. R. A. Bruce and his assistant, Mr. A. Davenport, having begun the initial drawings in 1917, in response to an Admiralty request for a fast fighter-reconnaissance floatplane capable of operating from a ship at sea. Before the type could be sufficiently developed, however, a change of tactics, involving the use of fast carrier-borne landplanes, was introduced, and the design was shelved, although successful test flights had already taken place at the Isle of Grain, where the prototype had been piloted by Commander Seddon.

An interesting feature of the N.16 was the patent wing cambering device, an invention of Mr. Bruce, by which the pilot could alter the camber of the wing whilst in flight. The armament also is interesting, in the light of modern practice, for, in addition to two externally slung bombs and a fixed Vickers gun, a free swivel-mounted Lewis gun was carried on the centre-section of the upper main planes. The fitting of a gun in this position was a feature of several fighter aircraft of the First World War, and gives the impression that designers of those days regarded pilots as ambidextrous multi-limbed beings, although, no doubt, it was a result of pilots demanding more armament.

The N.17, second and final version of the design, differed from N.16 in that it had longer pontoons, slightly swept up at the rear, thus dispensing with the tail float.

SPECIFICATION

TYPE.—Single-seat fighter-reconnaissance float biplane.

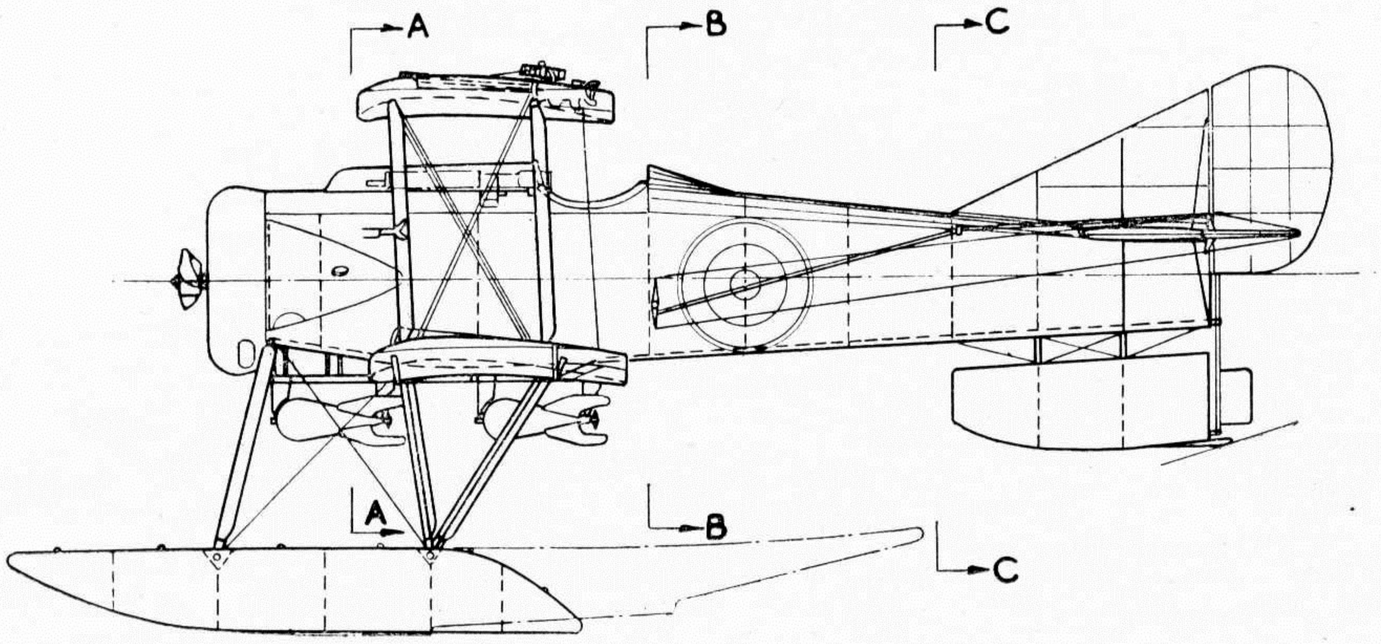
POWER.—One 150-h.p. Bentley A.R.1 nine-cylinder air-cooled rotary engine.

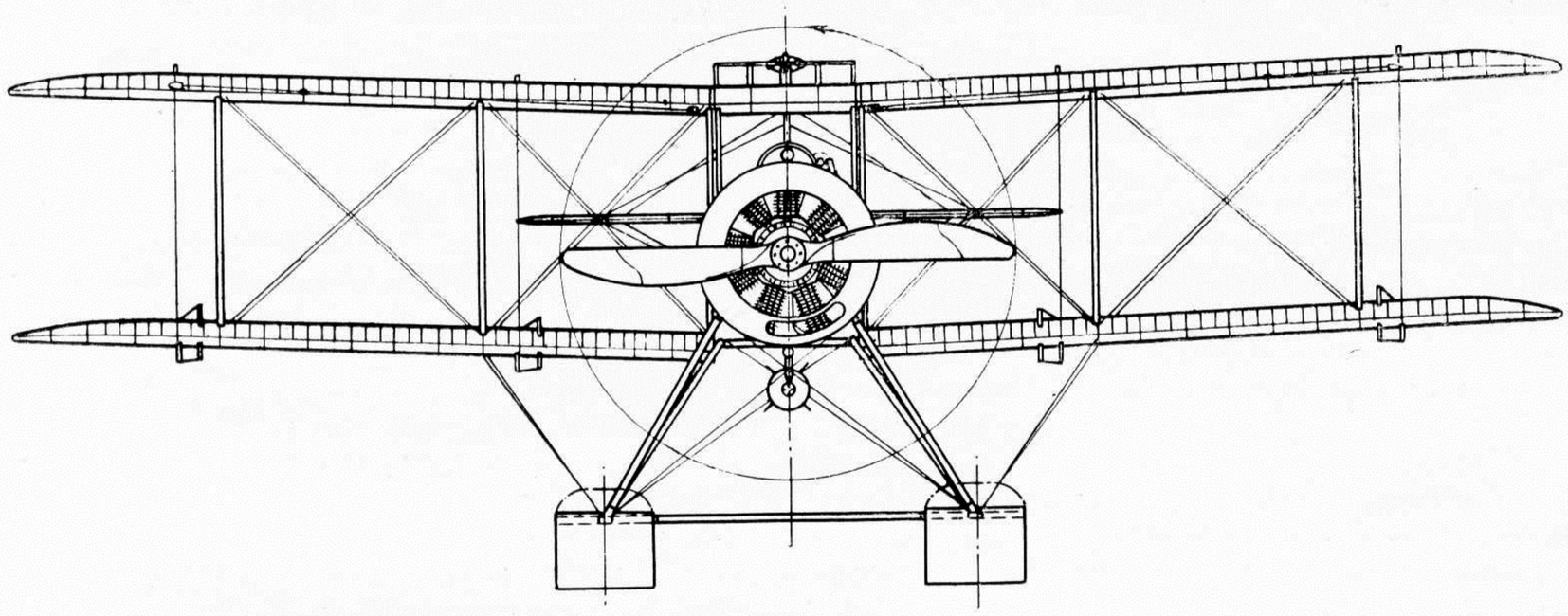
CONSTRUCTION.—The standard wooden construction of that period was employed throughout, the wings and fuselage structures being built up of wire-braced wooden members and fabric covered. Trailing-edge flaps were fitted along the whole span and the main planes could be folded for shipboard stowage, without using a jury strut at the front spar roots. The pontoons were of wood, internal bulkheads forming a series of watertight compartments.

EQUIPMENT.—One synchronised Vickers gun, mounted on the fuselage immediately in front of the pilot, and a Lewis gun, with swivel mounting, on top of the centre-section, within reach of the pilot. Two 65-lb. bombs were also carried.

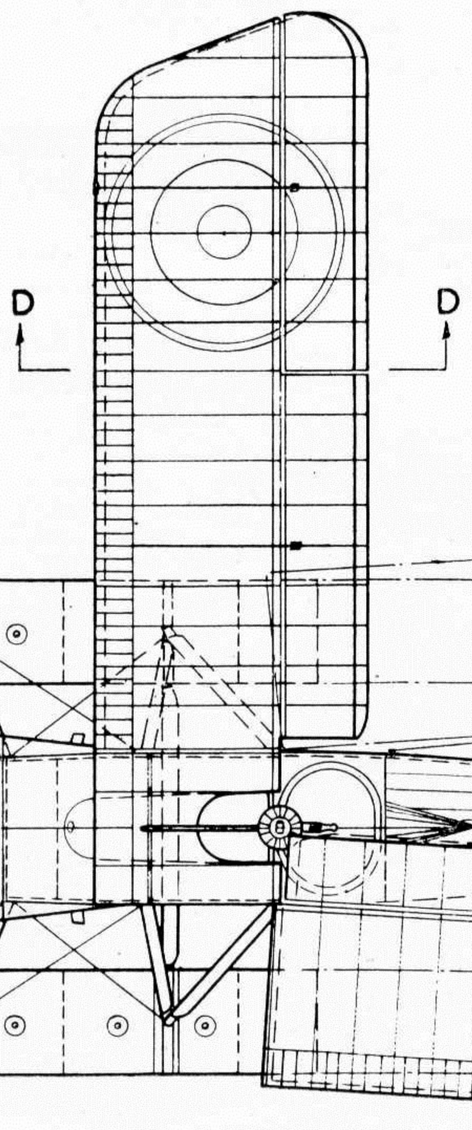
DIMENSIONS.—Span : 31 ft. 3½ ins. (9.5 m.). Length : 26 ft. 5½ ins. (8.06 m.). Height : 11 ft. 2 ins. (3.4 m.). Chord : 5 ft. (1.5 m.). Wing area : 278 sq. ft. (25.8 sq. m.). Wing section : R.A.F. 14. Stagger : 3 deg. Dihedral : 2½ deg. Incidence : 1 deg. Weight, empty : 1,460 lbs. (662.6 kg.). Weight, loaded : 2,133 lbs. (967.5 kg.).

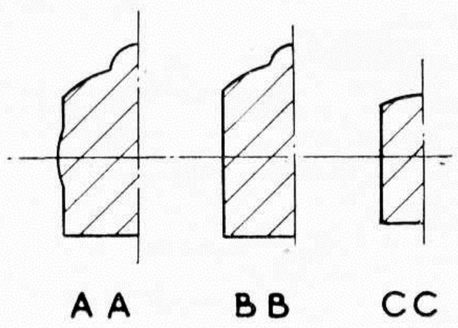
PERFORMANCE.—Speed : 108 m.p.h. (173.8 km./h.) at sea level. Alighting speed : 50 m.p.h. (80.4 km./h.).
Climb : To 5,000 feet. (1,525 m.) in 10 minutes.





D D

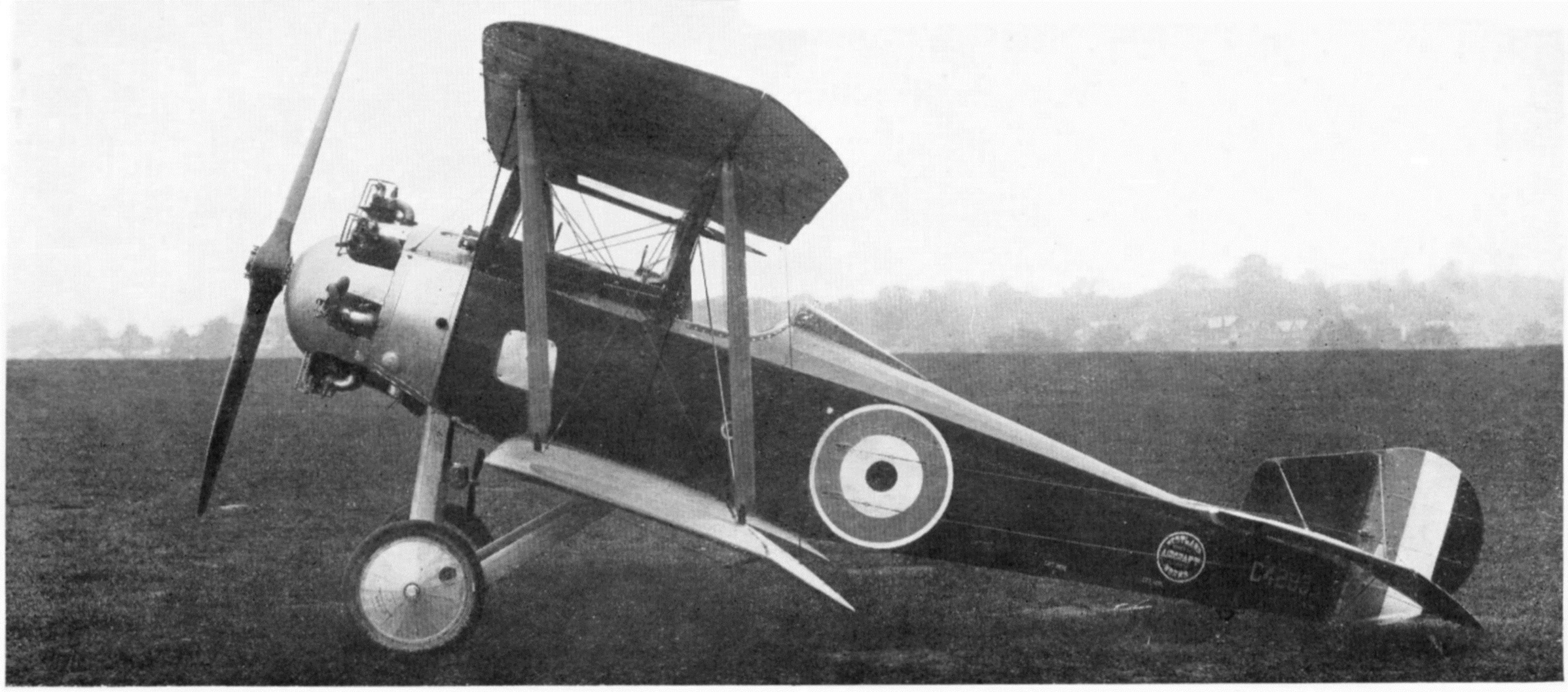




A A B B C C

WESTLAND N.16 & N.17.

F.T.



THE WAGTAIL

Having built up an efficient design team during the work on the N.16 and N.17 seaplanes, and now having an aerodrome at their disposal, Westland naturally turned their attention to landplanes and, in 1917, work was commenced on a small biplane which eventually became known as the Wagtail—the second all-Westland production.

The Wagtail was intended to operate as a high-altitude reconnaissance machine and particular attention was paid to the pilot's range of vision, the cockpit being placed near the centre of the lower main plane chord, giving a good forward and downward view, while a clear space between the spars of the wide top centre-section gave an excellent upward view.

Although the design was at first in the nature of a private venture, an order for a further four machines was placed, but mass production was prevented by recurring trouble with the ABC Wasp engine—a new and untried wartime product—and the end of hostilities.

In performance the Wagtail compared very favourably with its contemporaries, especially in climbing ability and, but for the circumstances mentioned, it might have taken its place in history, with the famous types of that period.

An interesting sidelight on aircraft testing in the First World War is the fact that the initial test flight of the Wagtail took place at Yeovil in the early hours of a morning in 1918, under conditions of great secrecy, and that Captain Alexander, who flew it on that occasion, was so impressed by its handling that he looped it ! It is rather hard to imagine a modern test pilot taking such a liberty on the initial flight of a prototype.

SPECIFICATION

TYPE.—Single-seat reconnaissance biplane.

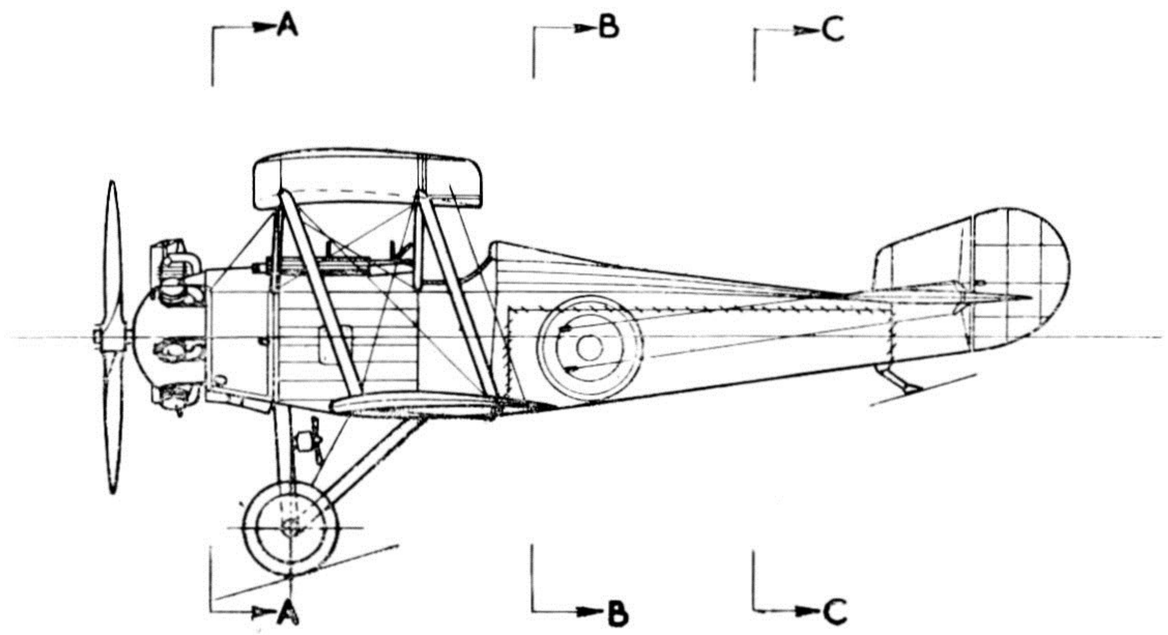
POWER.—One 170-h.p. ABC Wasp seven-cylinder air-cooled radial engine.

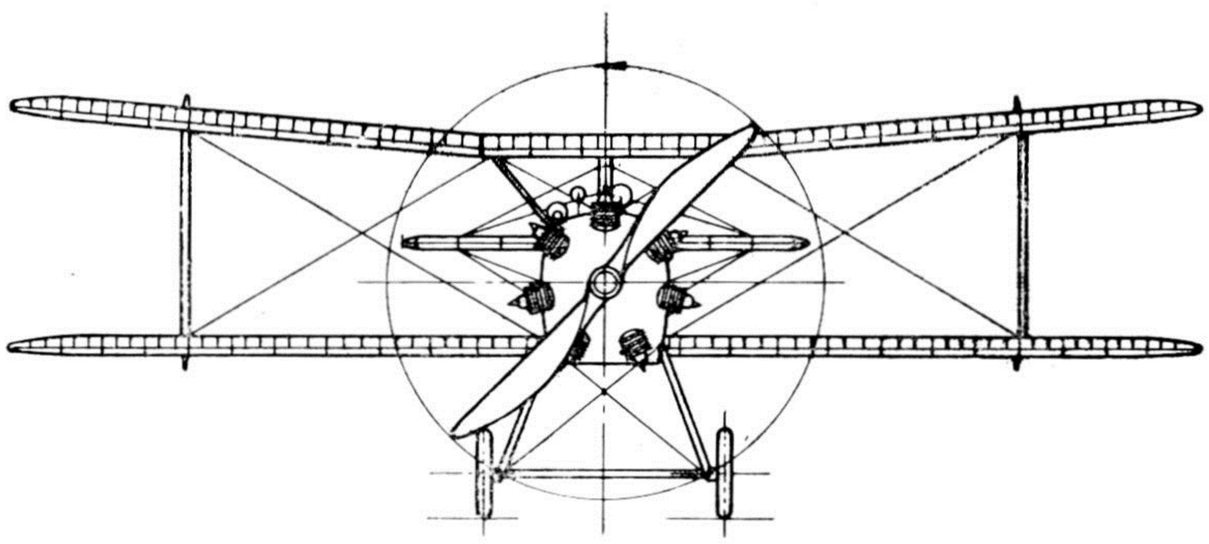
CONSTRUCTION.—The fuselage and wings, following the standard practice of the period, were wooden structures, wire-braced and fabric-covered. The undercarriage was of simple design, corded rubber taking the taxying shocks.

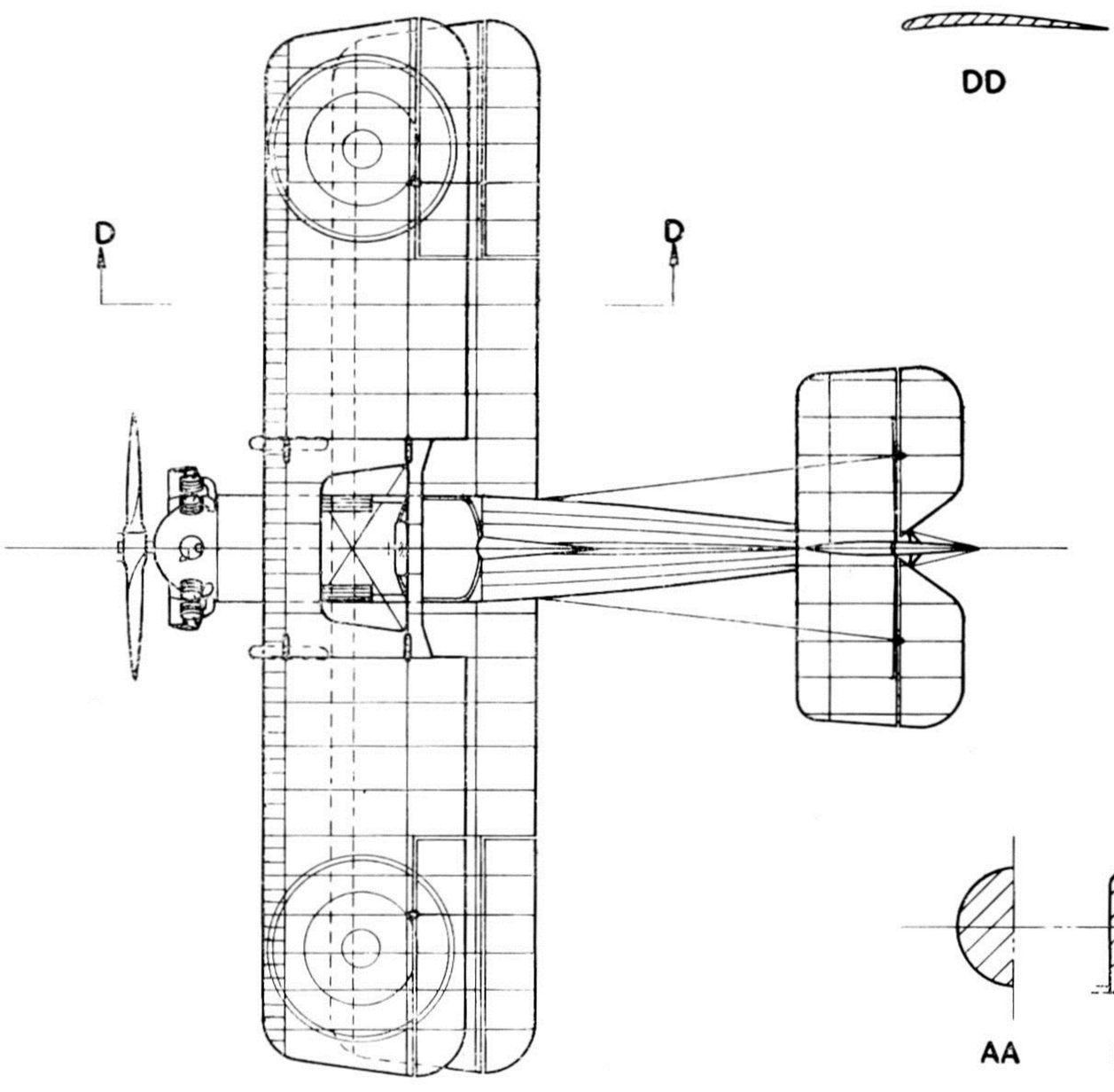
EQUIPMENT.—Two synchronised Vickers guns were mounted on top of the fuselage, immediately in front of the pilot. Oxygen equipment was also carried.

DIMENSIONS.—Span : 23 ft. 2 ins. (7.06 m.). Length : 18 ft. 11 ins. (5.76 m.). Height : 8 ft. (2.43 m.). Chord : 4 ft. 6 ins. (1.37 m.). Wing area : 190 sq. ft. (17.65 sq. m.). Stagger : 1 ft. 6 ins. (0.45 m.). Dihedral : top 5 deg., bottom nil. Incidence : 2 deg. Track : 4 ft. 8 ins. (1.42 m.). Weight, empty : 746 lbs. (338.3 kg.). Weight, loaded : 1,330 lbs. (603.27 kg.).

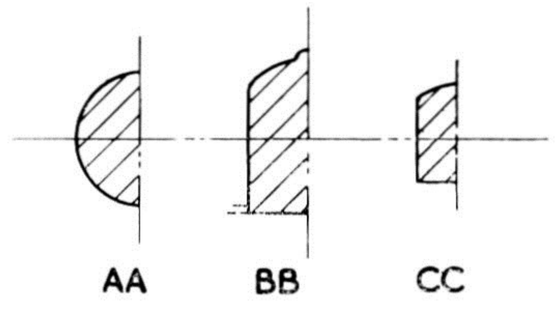
PERFORMANCE.—Speed : 125 m.p.h. (201.17 km./h.) at 10,000 feet. Landing speed : 50 m.p.h. (80.46 km./h.).
Climb : To 5,000 feet (1,525 m.) in 3½ minutes.
To 10,000 feet (3,050 m.) in 7½ minutes.
To 17,000 feet (5,184 m.) in 17 minutes.







DD



WESTLAND WAGTAIL

FT

THE WEASEL

The Weasel, first produced in late 1918, may be considered as the two-seater development of the little single-seat Wagtail biplane. Although it had the appearance and handling qualities of a really first-class machine, its early tests were marred by constant difficulties with the 320-h.p. A.B.C. Dragonfly engine with which it was fitted. This power unit, incidentally, was a hurried wartime product and suffered from a variety of teething troubles.

On one occasion, when the Weasel was being piloted by Captain A. S. Keep, M.C., with Mr. Bruce as passenger in the rear cockpit, the engine failed at some distance from the Westland aerodrome and a spectacular dead-stick landing had to be effected, the machine brushing through the top of the aerodrome boundary hedge, with Mr. Bruce leaning out of the cockpit frantically cranking the starter magneto fitted on the starboard side of the fuselage.

Such incidents led to the fitting of the more reliable 350-h.p. Jaguar engine and, later, an early model of the famous Bristol Jupiter engine. With these power units the Weasel proved an ideal machine, but the First World War was over and thoughts were centred on commerce by that time, so the five Weasels which had been constructed were handed over to the Air Ministry for research test-flying purposes.

SPECIFICATION

TYPE.—Two-seater fighter reconnaissance biplane.

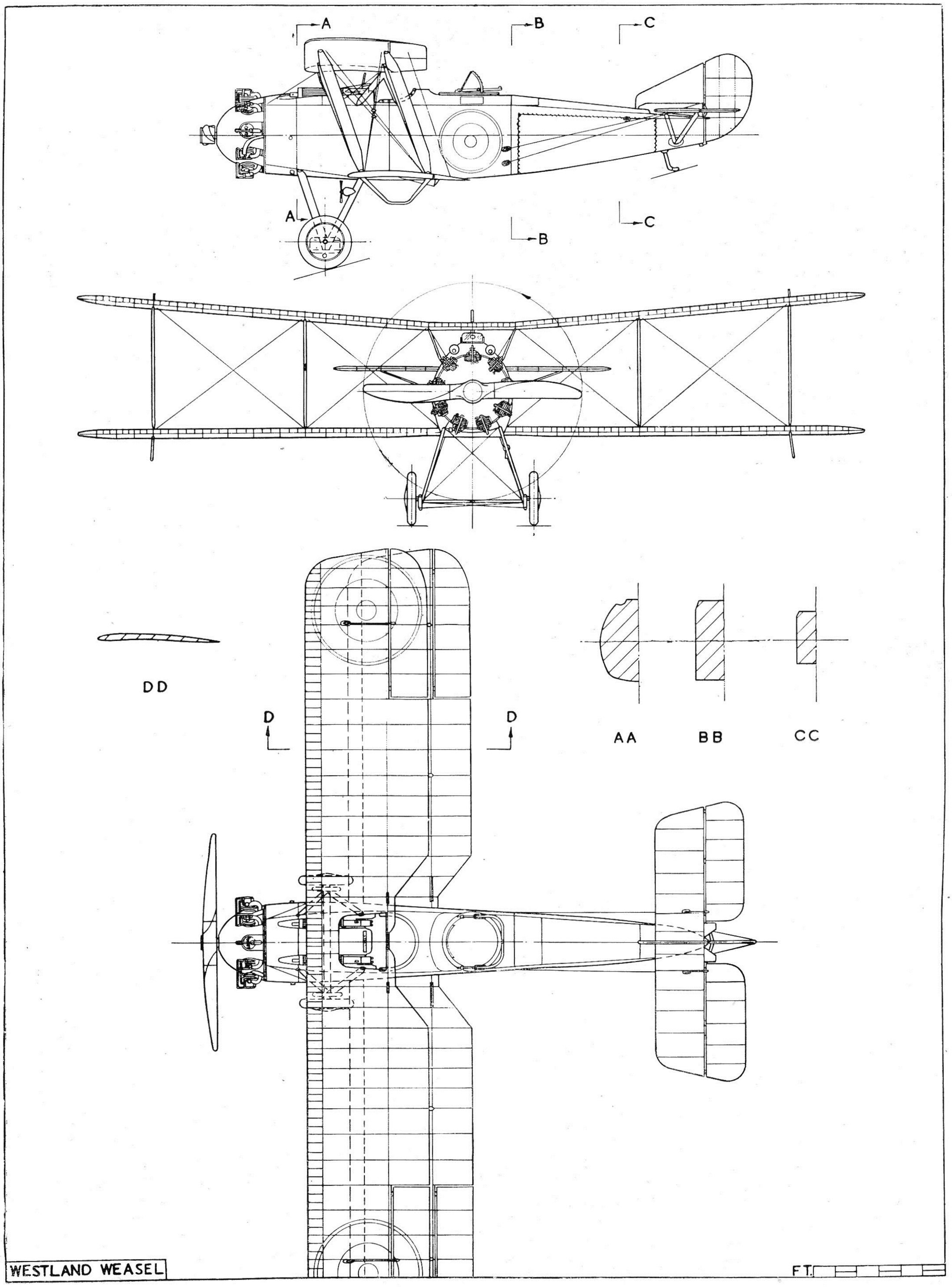
POWER.—One 320-h.p. A.B.C. Dragonfly nine-cylinder air-cooled radial engine.

CONSTRUCTION.—The fuselage was of wooden members, wire-braced and fabric-covered, the wings being of a similar structure. The patent adjusting gear was fitted to the tail-plane, while a large opening was left in the upper centre-section, to increase the pilot's range of vision.

EQUIPMENT.—Two synchronised Vickers guns, operated by the pilot, were fitted in shallow troughs on the top front fuselage, and a Lewis gun was fitted on a Scarff ring over the rear cockpit. Oxygen supplies for three hours and electrical heating equipment were also carried.

DIMENSIONS.—Span : 35 ft. 6 ins. (10.8 m.). Length : 24 ft. 10 ins. (7.5 m.). Height : 10 ft. 1 in. (3.06 m.). Wing chord : 5 ft. 6 ins. (1.67 m.). Stagger : 1 ft. 11 ins. (0.58 m.). Wing area : 368 sq. ft. (34.18 sq. m.). Dihedral : top plane 5 deg., bottom nil. Incidence : 2 deg. Weight, loaded : 3,046 lbs. (1,381.1 kg.).

PERFORMANCE.—Speed : 120 m.p.h. (193.1 km./h.) at ground level.



THE LIMOUSINE

Immediately after the signing of the Armistice, in November 1918, Mr. Bruce and Mr. Davenport directed their accumulated design experience into more peaceful channels and produced, in the summer of 1919, the first Westland commercial aircraft.

This machine was the four-seat Limousine, and was one of the first efforts to introduce an element of luxury to flying, the well-ventilated and upholstered cabin being comparable to the accommodation of the most expensive motor-cars, while the running costs of its 275-h.p. Rolls Royce Falcon engine made it an attractive proposition to air-line operators and business executives.

The Limousine, unfortunately, suffered from having been introduced at a time when public interest in air travel was almost a minus quantity and, although a few were constructed, Westland activity was soon switched to the design of a larger version, the Six-seat Limousine, which seemed to offer better prospects.

The original Limousine, however, created tremendous interest in the aeronautical world and a demonstration of its commercial possibilities, in which one of the company's directors, Mr. R. J. Norton, dictated letters to his secretary, Miss Stanfield, and had them typed while in flight, was widely publicised.

The handling qualities of the Limousine were once ably demonstrated by Captain Keep during a cross-country flight, with an Air Ministry official and Miss Jean Bruce as passengers. While flying over the Dorset Hills they noticed, in a field below, an extraordinarily large crop of mushrooms and, without further ado, Captain Keep made a landing in the field, a rugful of mushrooms was gathered and the flight resumed with the greatest ease !

Of the Limousines produced, one was used in Newfoundland by Mr. Sidney Cotton, while the original model had a long period of useful service as the Westland communication machine, the latter being finally written off in a remarkable accident at Netheravon. Major Openshaw had flown Mr. Bruce to the R.A.F. Station there on business, and they had just parked the Limousine in a " safe " space, on the aerodrome, when the outer machine of a flight of R.A.F. Fairey Fawn biplanes, then taking off, collided with the rear fuselage. The resulting crash was quite spectacular, wreckage being scattered over a considerable area and no part of the R.A.F. machine's remains was more than two or three feet above the level of the grass. The amazing feature, however, was that the Service pilot and his observer were quite unharmed !

SPECIFICATION

TYPE.—Four-seat commercial biplane.

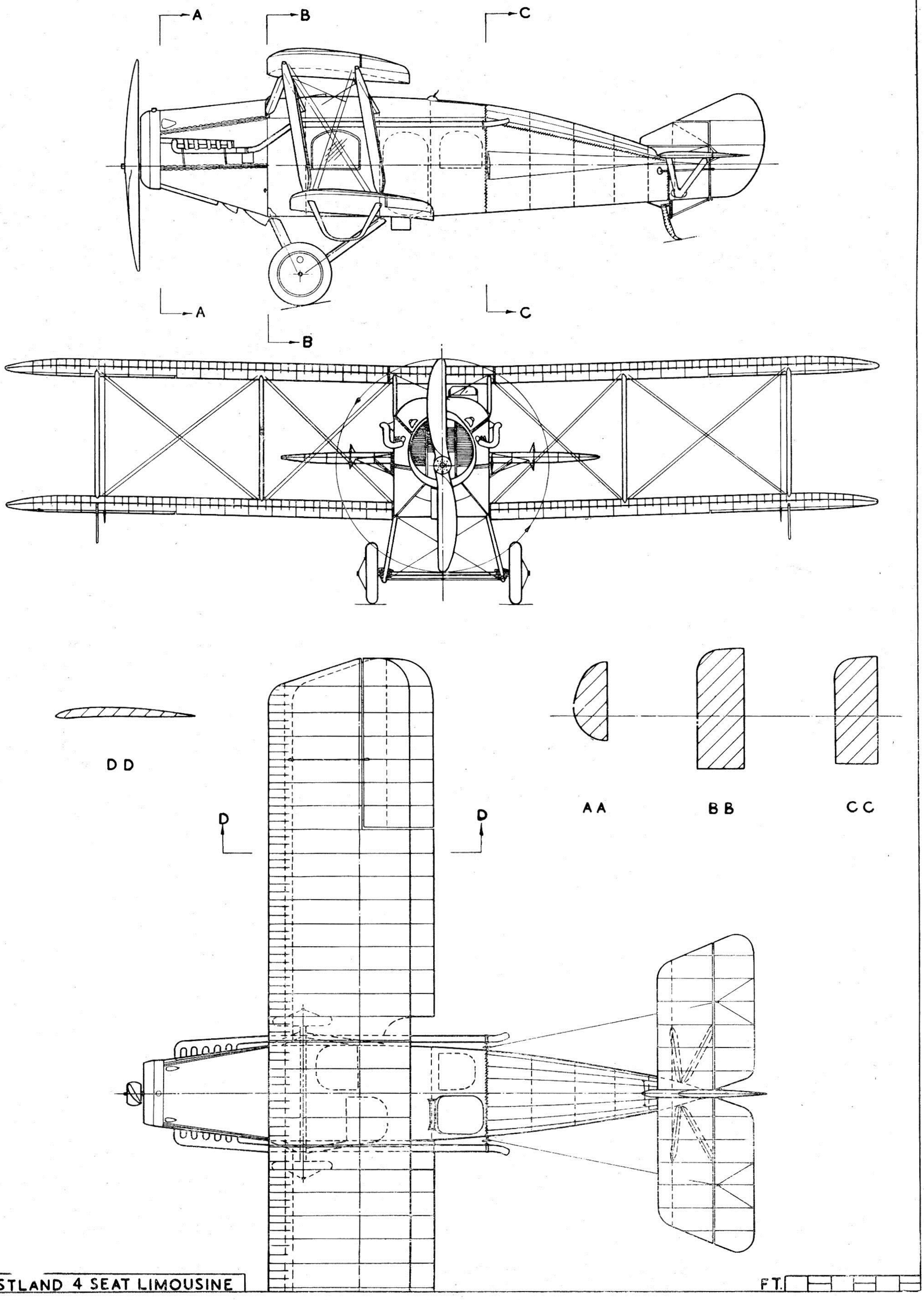
POWER.—One 275-h.p. Rolls Royce Falcon liquid-cooled engine, or one 300-h.p. Hispano Suiza liquid-cooled engine as an alternative power unit.

CONSTRUCTION.—The fuselage, built in three sections, was of wood, the cabin being a ply-covered structure, insulated from the engine by asbestos sheeting, while the rear portion was of fabric-covered wire-braced wooden members. The cabin was arranged to accommodate three passengers and the pilot, the latter's seat being raised thirty inches above the level of the others. The Westland patent tail plane adjusting gear was also incorporated in this machine. A larger fin and rudder was fitted to the Hispano Limousine.

ACCOMMODATION.—The seating plan was somewhat unusual, the port seat—in front of the pilot—faced forward, with a small folding table immediately in front. The forward starboard seat faced aft, while the third seat, alongside the pilot, faced forward. This arrangement was unconventional, but worked very well in practice. With the removal of the seating a pay-load of 540 lbs. could be carried.

DIMENSIONS.—Span : 38 ft. 2 ins. (11.6 m.). Length : 27 ft. 9 ins. (8.4 m.). Height : 10 ft. 9 ins. (3.26 m.). Chord : 6 ft. 3 ins. (1.89 m.). Wing area : 440 sq. ft. (40.8 sq. m.). Stagger : 12 ins. (0.304 m.). Dihedral : 2½ deg. Incidence : 2 deg. Weight, empty : 2,183 lbs. (990.12 kg.). Weight, loaded : 3,383 lbs. (1,533.79 kg.).

PERFORMANCE.—Speed : 100 m.p.h. (160.93 km./h.). Landing speed : 50 m.p.h. (80.46 km./h.).
Climb : To 5,000 ft. (1,525 m.) in 8.35 minutes.
To 10,000 ft. (3,050 m.) in 19.6 minutes.
To 15,000 ft. (4,575 m.) in 37.5 minutes.
Ceiling : 17,000 feet (5,184 m.).



SIX-SEAT LIMOUSINE

The second Westland venture in civil aircraft was the Six-seat Limousine, a development of the original Limousine, but much bigger, and fitted with the more powerful Napier Lion engine. It was specially produced to take part in the Air Ministry Competition for large and small commercial aeroplanes, which was held at Martlesham in the autumn of 1920.

The object of the Competition was to discover the most suitable design, in each category, to replace the converted military machines then operating on the European air routes, and the various tests were devised with safety and comfort of the passengers as the main consideration. From this angle the Westland machine was ideal and Captain Keep, who flew it at Martlesham, rather shook his passengers by leaving the controls when cruising about 80 m.p.h. at 3,000 feet, and entering the cabin for a chat and a smoke! The Limousine, meanwhile, continued on an even keel and the risk of fire was negligible, the main fuel tanks being placed well outboard beneath the lower main planes.

After an exciting contest with its nearest rival, the Sopwith Antelope flown by Harry G. Hawker, the Westland entry finally won the £7,500 first prize in the small aeroplane class. An amusing story is told in connection with the final stage of the tests, when both the Limousine and the Antelope had secured an almost equally high number of marks and only one test remained. This was the emergency landing, and the competitors had to approach over a row of small balloons, tethered about the height of tall elms, touch down and pull up in the shortest possible distance beyond. This manœuvre had to be performed three times, the average of the three distances from the "hedge" giving the required performance figure, the only snag being that if the machine was damaged in landing automatic disqualification followed.

Keep and Hawker, with the prize within reach, were both a little anxious about this test and decided to spin a coin—with interesting results. Keep won the toss and elected to let Hawker make the first attempt. Hawker then proceeded to make two very good landings, but cut it a little fine on the third and final approach, with disastrous results to the Antelope's undercarriage. From that point the issue was never in doubt, and Keep simply went on to make his landings and to win the prize. There is little doubt, however, that the Limousine would have taken the prize in any case.

Several Six-seat Limousines were built, but the original competition machine, G-EARV, had the most interesting career. It was sold to Sidney Cotton, of "Sidcot" suit fame, and used by him as a spotter with the Newfoundland sealing fleets. Piloted by Mr. T. K. Breakell, G-EARV was used in a gold-rush to a reported "strike" at Stag Bay, Labrador, where, landing on thin ice on the shore of the bay, the pilot had to keep taxying to prevent the machine sinking.

SPECIFICATION

TYPE.—Six-seat commercial cabin biplane.

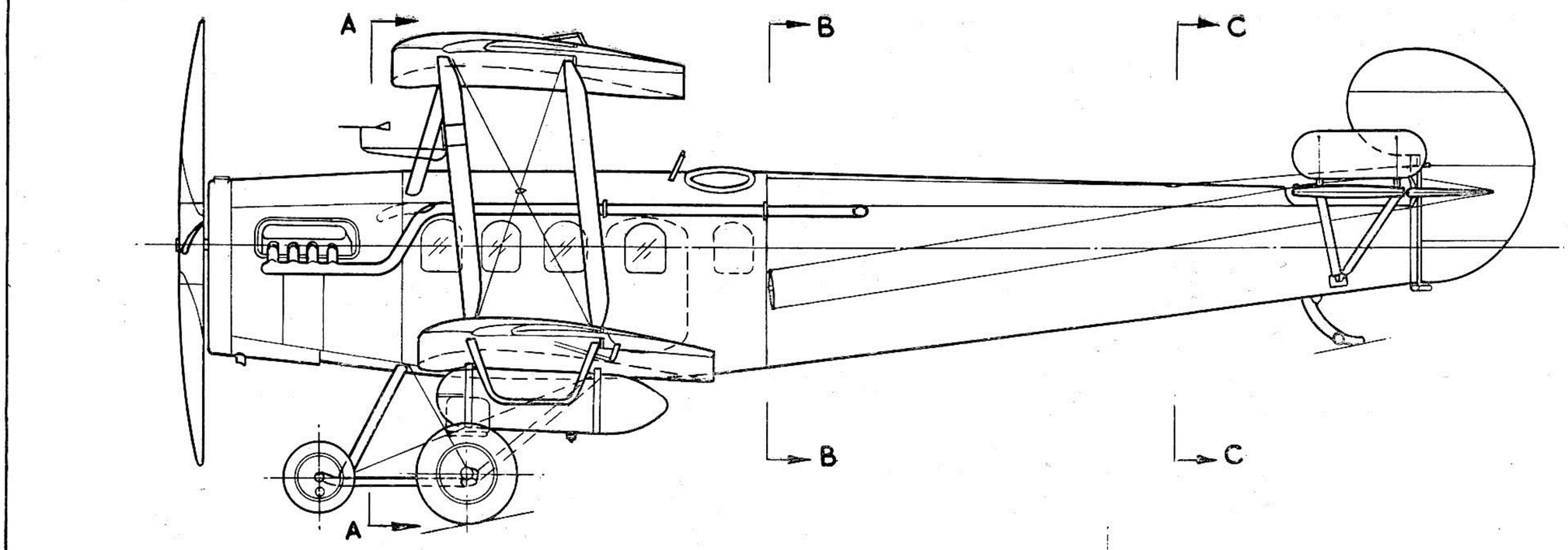
POWER.—One 450-h.p. Napier Lion liquid-cooled engine.

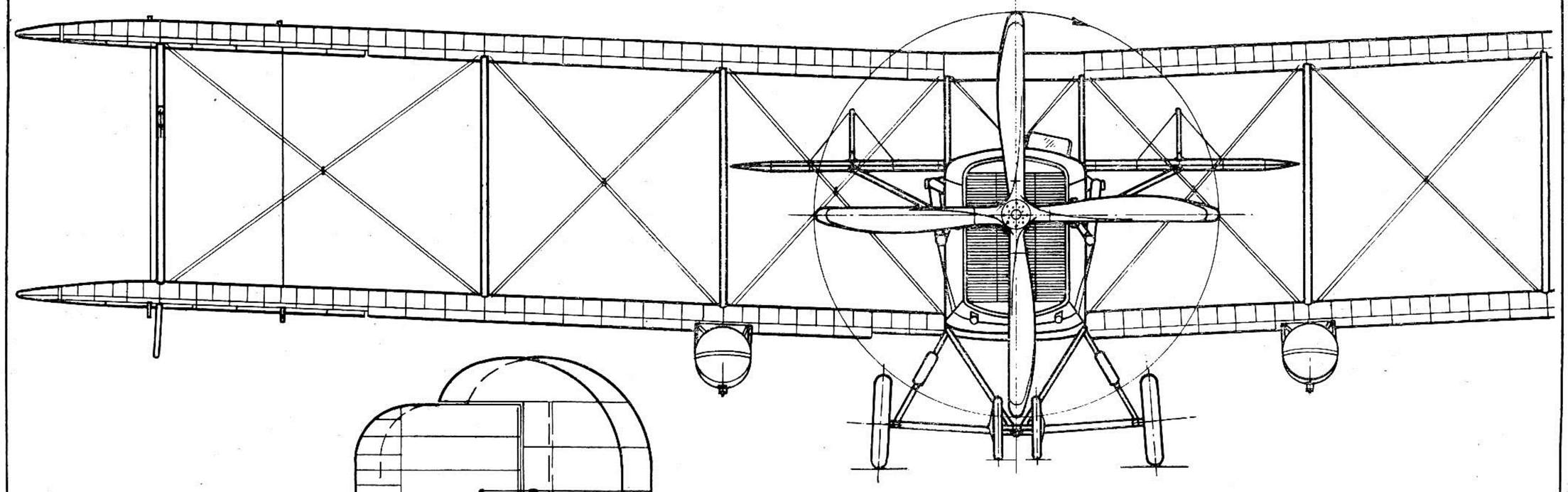
CONSTRUCTION.—The fuselage was built in three sections, the engine mounting being of steel tubes, and insulated from the second section, the cabin, by a fireproof bulkhead. The cabin, a ply-covered structure of wooden members, was fitted with nine windows and upholstered in grey Bedford cord. The third section, the rear fuselage aft of the cabin, was a fabric-covered structure of wire-braced wooden members. The wings were of fabric-covered wooden construction, and the lower planes were fitted with 44-gallon fuel tanks, attached on the underside at the location of the inboard interplane struts. The four-wheel undercarriage was somewhat in the nature of a tricycle, the forward pair of wheels being close together, acting as a precaution against nosing over, while the larger main wheels were fitted with band brakes.

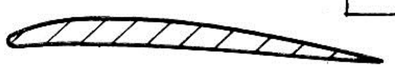
ACCOMMODATION.—Seating was arranged in three pairs, facing forward, the after left-hand seat, the pilot's, was raised so that his head projected through the cockpit opening. Without passengers a pay-load of over 1,000 lbs. (453 kg.) could be carried.

DIMENSIONS.—Span: 54 ft. (16.4 m.). Length: 33 ft. 6 ins. (10.2 m.). Height: 12 ft. 6 ins. (3.8 m.). Chord: 7 ft. 3 ins. (2.2 m.). Wing area: 726 sq. ft. (67.4 sq. m.). Weight, empty: 3,823 lbs. (1,734 kg.). Weight, loaded: 5,850 lbs. (2,653 kg.).

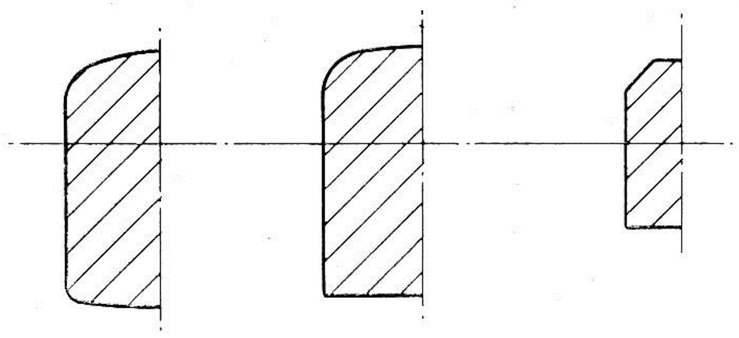
PERFORMANCE.—Speed: 118 m.p.h. (189.9 km./h.) at ground level. Landing speed: 46 m.p.h. (74.03 km./h.).







D D



A A B B C C

WESTLAND 6 SEATER LIMOUSINE

FT

THE WALRUS

The years following the conclusion of the First World War were notable for an official lack of attention to the needs of the fighting services; in fact, a "make-do-and-mend" attitude appeared to be the order of the day—presumably for reasons of economy—and it was in this spirit that the Westland design staff was asked to produce, in the year 1920, a carrier-borne fleet reconnaissance biplane for the Royal Navy.

The machine required had to be, basically, a D.H.9A, but was to have a 450-h.p. Napier Lion engine in place of the 400-h.p. Liberty motor, and to be equipped with the various items of gear without which no naval aircraft is considered complete. Actually, the procedure in such a case would be to issue the manufacturer an outline of the duties to be performed by the machine, a list of the equipment to be carried and the class of performance expected. With these details in mind a satisfactory design can be produced, but when an existing type has to be adapted the result is frequently unsatisfactory both to the designer and the operator.

However, within the limits imposed on them, Westland Aircraft produced thirty-six aircraft of the type demanded. The machine, which was given the rather apt name of Walrus, was an unpleasing affair of bulges and projections and carried a crew of three. As in the D.H.9A, the pilot's cockpit was situated immediately aft of the wing trailing edge, with a Scarff-mounted Lewis gun over the cockpit behind him. The floor of the rear fuselage was fitted with a glazed observation blister, for use in the prone position, while a radio transmitter—operated by the observer—was situated in a third cockpit, aft of the rear gunner's position.

Interesting features of the machine included rubber flotation bags, which could be inflated from compressed air bottles; a patent jettison valve, on the main fuel tank, which allowed the petrol to be discharged in a few seconds and then, if the machine alighted on the sea, would automatically re-seal the tank into an additional flotation chamber. The aircraft had folding wings to facilitate storage. Another special feature was the undercarriage, capable of being dropped by the pilot in the event of an emergency and fitted with a set of curious jaws for gripping the carrier's deck arresting-wires. These wires, incidentally, ran along the length of the flight-deck and not, as on modern carriers, across the beam of the ship.

The prototype Walrus, and the subsequent production machines, were flight-tested by Captain A. S. Keep, M.C., who reported the aircraft as being somewhat vicious in its behaviour—a not altogether surprising verdict. In Service use the Walrus did not shine and the type was not produced beyond the original contract number—which in those days was regarded as a big order.

SPECIFICATION

TYPE.—Three-seat naval reconnaissance biplane.

POWER.—One 450-h.p. Napier Lion liquid-cooled engine.

CONSTRUCTION.—The method of construction was similar to that of the D.H.9A biplane.

ARMAMENT.—One synchronised Vickers gun, operated by the pilot, and a Scarff-mounted Lewis gun over the midships cockpit.

DIMENSIONS.—Span: 46 ft. 2 ins. (14.06 m.). Length: 30 ft. (9.14 m.). Height: 11 ft. 7 ins. (3.52 m.). Wing chord: 5 ft. 10 ins. (1.77 m.).