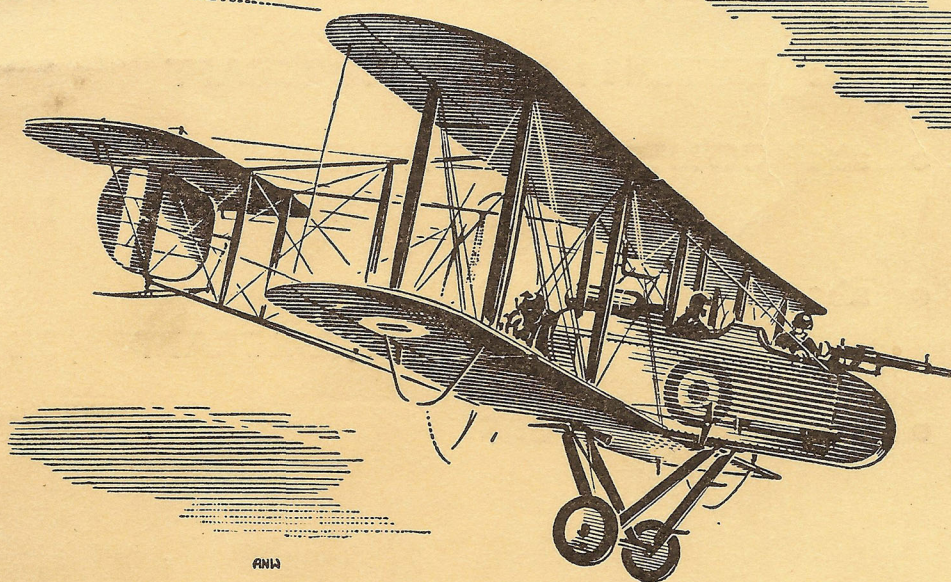


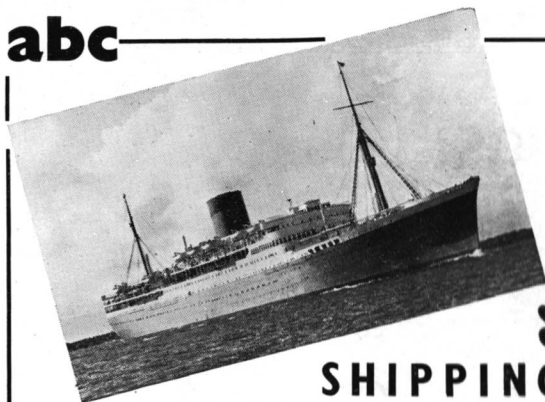
Aircraft - of - World War One



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AIRCRAFT OF WORLD WAR ONE

by

JOHN LLOYD, A.F.C.

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PREFACE to the Second Edition

THE gratifying need for a second edition has made it possible for me to make corrections and amendments. For many of these I have to thank several correspondents who have been interested enough to get in touch with me. Only in this way can the facts of history be properly sifted.

J.L.—1958

Preface

MOST of the readers of this small book will be more familiar with the aircraft of the present and of the war of 1939-1945 than those of the war of 1914-1918, or World War One. It is hoped that the following pages will serve as an introduction to an earlier, but none the less exciting, period of aviation history.

There are, however, several matters relating to terms and expressions of that time which are now no longer used. In the first case it is necessary to remember that the first heavier-than-air flying machine only took the air some eleven years before the war began. In December 1903 the Wright brothers, Orville and Wilbur, of Dayton, Ohio in the United States of America, made four flights in one day varying in duration between 12 and 59 seconds in a glider of their own make powered with a four-cylinder petrol engine, also of their own make. Many experimenters on this side of the Atlantic, and especially in France, where much work was going on in this line, were not very impressed or openly disbelieving of this momentous performance and it was not until 1905 that flights covering any distance or any length of time or deviating much from the straight flight path were achieved. And it was not until Wilbur Wright came to Europe in 1908 and demonstrated at Le Mans in France that the world truly saw the real importance of the Wright brothers' work. But from 1908 to 1914, the period of the most rapid advance in the development of the heavier-than-air flying machine, was only six short years. Remembering this makes the final performance of the fighting aircraft during the war of 1914-1918 all the more amazing.

At first, of course, aircraft were not thought to be fighting machines at all and their functions were laid down as scouting and message carrying in the fashion of super cavalry, with greater speed, range and mobility than the horse variety. A little later still were added tasks such as spotting for artillery fire and contact patrols flown above a battle area to keep contact with forward units and troops during a ground battle. These two tasks came after the general use of wireless in aircraft. Only when it became obvious that the benefits which aircraft gave to the Army Commanders should be denied to the other side if possible, did the aircraft become a fighting machine—fighting to drive away the reconnaissance machines of the other side or fighting to remain over the enemy position in order to carry out useful reconnaissance.

And so the purposes and tasks are slightly unfamiliar to those familiar only with the aircraft of the later war, when the general public came easily to recognise the fighters, medium bombers, heavy bombers and transports of the Royal Air Force. In the 1914-1918 war, at the commencement, all aircraft were 'scouting' aircraft as all aircraft were merely looked upon as an extension of sight for the Army or the Navy, the far-seeing eyes of the Army or Navy commanders. When air fighting began in 1915 the tasks of aircraft were increased and as each task called for different characteristics so different types of aircraft were developed. These can be summarised as:—

● SCOUTS:

At first all aircraft. Later subdivided into fast single-seater scouts and two-seater reconnaissance machines. The former became the single-seater 'fighter' aircraft of World War One, aircraft such as the S.E.5a and the Sopwith Camel. They flew on offensive patrols to deny enemy reconnaissance aircraft the vision they needed and on defensive patrols as escort to bombing or reconnaissance machines, just as single seaters were used on many occasions during the last war to escort daylight bombing raids on both sides.

● TWO-SEATER FIGHTER/RECONNAISSANCE:

The two-seaters, with their ability to take an army observer, became purely reconnaissance and army co-operation machines. They flew sorties to secure information, to spot artillery fire, to keep contact with advanced troops during ground battles, to take photographs and also, in many cases, to drop bombs on enemy concentrations. In the main they were slow and had to operate at medium and low altitudes and were easy prey to fast enemy single-seater scouts. Sometimes they were escorted or used as decoys by single-seaters waiting at higher altitudes up-sun to attack the scouts which might attack the reconnaissance machines. Some of them, the famous Bristol Fighter for example, had sufficient performance and fire power to be able to protect themselves.

● HEAVY BOMBERS:

This category is self-explanatory and really only appeared from 1917 onwards, culminating on the Allied side with the formation of the Independent Air Force for the separate role of attack against industrial and military targets in Germany. This was the equivalent of Bomber Command of the 1939-1945 war, but certainly had insufficient time to reach such size or such effectiveness as that Force.

Another feature of the air fighting in World War One which becomes obvious in studying the history of the period was the way in which technical superiority in the air changed from side to side with the introduction of new and superior aircraft. It is for this reason that the body of this book, Part Two, which details the principal aircraft of the Allied and German forces is laid out in date order rather than in the simpler alphabetical order. In this way it is possible to compare the two subdivisions of Allied and German aircraft by date and so see which machines were in main conflict at any given time.

JOHN LLOYD, A.F.C.

Historical Survey

NONE of the nations which took part in the Great War of 1914-1918 were prepared for war in the air. The early heavier-than-air machines, the aeroplanes as they were then more familiarly called, were unarmed and Service development on both sides had concentrated upon the aspect of what the air arm could do within the Army and Navy as a medium of reconnaissance, rather than what fresh tasks it could carry out as a fighting instrument. This was generally true of both sides.

In this country the beginnings of military aviation were pathetic and significant of the fact that the aeroplane was not looked upon with favour as a weapon, or even a device, of war. This was partly due to typical Service conservatism and partly due to financial considerations. The French as a nation, without doubt, led in the understanding of military aviation, as they had always done with the formation in 1794, a year after the first balloon had sailed into the air, of a "Compagnie d'Aerostiers" for military reconnaissance. With their early Bleriot, Deperdussin, Antoinettes, etc., the French carried out comprehensive manoeuvres in conjunction with their armed forces in the years before the war on a scale not carried out in any other country.

But in Britain, 1914 saw only small air forces in existence, the only dominant feature of which might be put down as the enthusiasm of the officers and men. The R.F.C. had been formed only in 1912 and the R.N.A.S. separated from it shortly before the War began. In Germany the air forces were classed as "communication" troops, with a role secondary to that of the cavalry, and their best machines on the outbreak of war were the *Taubes*, the early Fokker monoplanes and early versions of the L.V.G., A.E.G. and Aviatik reconnaissance two seaters. Against these, four squadrons (Nos. 2, 3, 4 & 5) of the R.F.C. flew to France equipped with Bleriot XIs, Maurice Farman Shorthorns and Longhorns, B.E.2s, B.E.8s and Avro 504s under the command of General Sir David Henderson. It was not an imposing array, some forty-four aircraft, but it was to prove the foundation of a mighty force with even mightier traditions.

The task of reconnaissance, the only one for which the machines were equipped, since this was the only task laid down for them, was opened on August 19th by a patrol flown by Captain P. B. Joubert de la Ferte (now Air Marshal Sir Philip Joubert) and Lieutenant G. W. Mapplebeck in a Bleriot and a B.E. respectively, and from this time onwards the pilots of the R.F.C. were occupied in this task, from ever changing bases, for the length of the retreat from Mons. On August 31st, however, their news was vital. Reconnaissance aircraft reported that von Kluck's drive towards Paris was halted and its direction altered eastwards towards the coast and the Channel ports. It was a tremendous proof of the value of aerial reconnaissance and a turning point, not only of an army, but of the war. By September 6th the great retreat was ending and the R.F.C. was able to consolidate in fixed bases and to organise new ways in which it might operate to help the land battle beneath it. In that month, the pressure of retreat having abated, wireless equipment was fitted experimentally into aircraft, to the great advantage of artillery spotting, which quickly became a major task of the R.F.C.

But if the numbers of this force appeared small, its enthusiasm was not. Moreover, at first the British aircraft of the B.E., R.E. and F.E. types, all of which came from the Royal Aircraft Factory at Farnborough (now the Royal Aircraft Establishment there), had qualities of stability which made them more efficient at their restricted jobs than the enemy machines. And as the ground warfare settled down into the static warfare of the trenches the true position of the aircraft in the war pattern slowly grew up. The observation of enemy positions, the movement of his troops, the overlooking of all that he was and all that he did was the first allotted task. The spotting of artillery fire and its correction by wireless to the gun batteries was the second. But it was found that these tasks were resisted by the enemy, that it became necessary, more often than not, to fight for this information and thus the third task, never really visualised before the war, fighting, became essential. The machine gun provided the answer and the Vickers "Gunbus" F.B.5, a pusher aircraft with a Lewis gun in the front cockpit, was introduced into France.

Air fighting, however, was not to be other than the exception rather than the rule until the middle of 1915, when the first Victoria Cross for aerial combat was awarded to Major L. C. Hawker, who shot down two enemy aircraft and forced a third to land one day in July. But in the Spring of 1915 aircraft co-operated with artillery for the first time in a set ground battle at Neuve Chapelle and St. Eloi when photographs taken

before the battle, and artillery direction during it, proved invaluable. The battles of Loos in the autumn were similarly served by the new arm with considerable success.

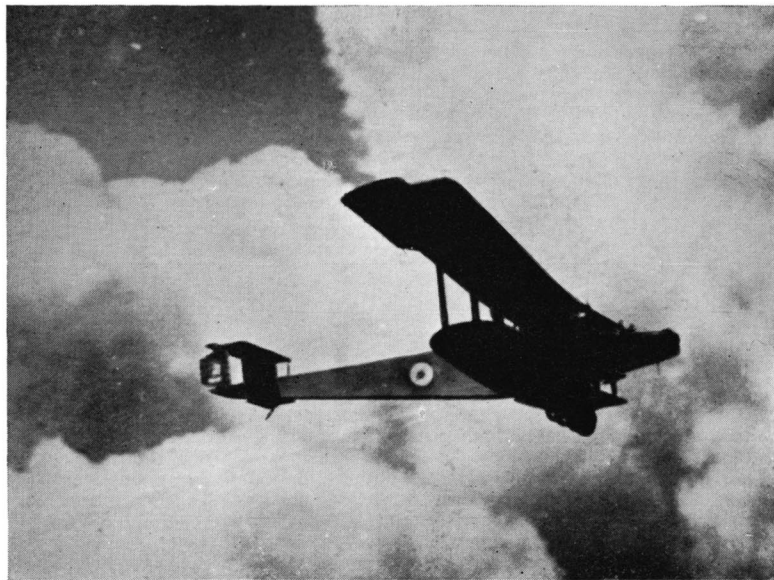
By the summer of 1915, however, the fighting aspect had begun to take on a definite character and this, together with the elevation of General Trenchard (later Marshal of the Royal Air Force Lord Trenchard) to the Command of the R.F.C. in the field, moulded the offensive policy of the R.F.C., which was to carry it through to the end of the war under circumstances of adversity and success alike.

The natural offensive spirit of the pilots had led their machines to pursue the successful termination of their duties in protected or unprotected skies and towards the end of 1915 it was to need the powerful hand of Trenchard and all the faith centred in him by his pilots to maintain that spirit. Anthony Fokker, a Dutch designer of considerable skill, placed his designs at the disposal of the German High Command and the first of these, the monoplane "Eindekker" scout, was already in useful service with the enemy. Then, in December 1915, a French Moirane-Saulnier monoplane fitted with an elementary interrupter gear to enable its gun to fire along the line of flight through the airscrew was shot down and captured by the Germans. Fokker seized upon the importance of this development and immediately designed suitable gear for his own machines, thus giving the German pilots an inestimable advantage over the Allies. Why no comparable vision was available on our side seems difficult to understand at this distance in time.

The increase in German morale when using this new weapon can scarcely be exaggerated. Similarly the decrease in morale of Allied pilots due to the increasing losses in the winter of 1915 and the spring of 1916, entirely as the result of the Fokker Eindekker, with its forward-firing gun, was great and bound to be so. It was a black period for the R.F.C. and its work was increased by the resulting necessity of escorting reconnaissance and artillery sorties which had previously been able largely to look after themselves. It was not only the first real engagement of aerial fighting; it was also the first sign of the changing of fortune in the air war, which depended vitally upon the technical superiority of the actual flying machines and their equipment; and which change of fortune was to swing, pendulum fashion, from one side to the other as each introduced its later and more superior types of aircraft. It became almost as if the initiative of air warfare passed from the pilots and crews to the designers in their offices at home.

Nevertheless, the R.F.C. would not abandon its settled policy (settled both by the character of its pilots and the wisdom of its Commander) of offensive action. Naturally all possible means were adopted to avoid throwing away men and material in the air; but all possible means, also, were taken of carrying the war into the enemy's air.

But in the Spring of 1916, while the Fokker Eindekker was still paramount in the skies, and despite that fact, came one of those battles which presaged final victory in the air for the Allied cause. The very nature of the struggle both on the ground and in the air above Verdun was symptomatic of the triumph of men's spirit against outnumbering odds. It was here that the *Escadrille de Chasse* of the French air forces flew to fame with their Nieuport Scouts and the names of René Fonck, 'Père' Dormé and Georges Guynemer were first heard; it was here also that the squadron of American volunteer pilots, the *Escadrille Lafayette*, first went into action. The gallantry and tenacity of the ground battle in defence of



A Handley Page O/400 heavy bomber setting out on a raid over Germany.



Preparing for a daylight sortie in 1918, armourers bomb up a D.H.4, while an escorting Nieuport and pilot waits in the background.

Verdun was reflected in the air. More, it was an important strategical lesson in the value of offensive action, since the concentrated French air forces were able to prove that the best protection they could provide their ground troops was by offensive action into and over the enemy positions. This was confirmation of the British strategy and the lesson caused General Trenchard to harden his determination to pursue such a policy in the R.F.C. against all difficulties and in face of whatever cost.

By the summer of 1916 the four squadrons which had flown to France in the Autumn of 1914 with forty-four aircraft had increased to twenty-seven squadrons with 410 aircraft and 426 pilots. Moreover, two new types, the D.H.2 and the F.E.2b, both pusher aircraft suitably armed with a forward firing gun, had appeared in France earlier in the year and had begun to dispose of the Fokker menace. Together with the French Nieuport 17 C Scout of rather better performance, these machines challenged, fought and broke the superiority of the Fokker Eindekker in time for the opening of the Somme offensive on 23rd June. In this the R.F.C. contributed its usual reconnaissance and artillery activities and denied the enemy the use of his observation balloons and, indeed, denied him the use of the air above the battlefield since, by July 1st, the R.F.C. were almost completely unchallenged. Their other activities were even wider; bombing sorties using bombs of 112 lb. weight were carried out well behind the German lines; to Headquarters at Baupaume, to Cambrai, to Busigny, to St. Quentin, on road and rail communications everywhere. The German ground forces were to know the meaning of air superiority since the German machines were no match for the new Allied aircraft and throughout the Somme battle they were pinned down to defensive action within their own lines and over their own aerodromes.

In their attempts to re-establish the ascendancy the Fokker had once

given them, the Germans, in July, grouped their single-seater scout aircraft into definite fighter squadrons placed under the command of their best pilots. One such, Jagdstaffeln 2 under the command of Oswald Boelcke, was to do much to invigorate and fortify the lowering morale of the German air units. In addition the technical advantage passed once more to the enemy with the arrival of the Albatros and Halberstadt scouts, which were issued to the new squadrons at the time of the re-organisation. Of these two the Albatros was clearly faster than any British machine at that time and was most popular with German pilots; it was fitted with two forward-firing Spandau guns.

As a result, by mid-September, the supremacy of the R.F.C. was definitely challenged by the enemy and it is doubtful if it ever again existed as thoroughly as over the Somme battlefield in July. Aircraft of No. 11 Squadron, on a bombing raid to Marcoing, were the first to feel the success of the new types grouped into their new units under picked personnel. Nevertheless, the fundamental policy of the two air forces, the offensive of the R.F.C. and the defensive of the German Air Force, was not changed. Although Captain von Ritter wrote in *Der Luftkrieg*:

‘Under the leadership of Boelcke the German Jagdstaffeln accomplished the wonderful feat of gradually checking the activities of the enemy aircraft to such an extent, despite their numerical superiority, that our own reconnaissance machines were eased of their burdens and could work again....’

the situation remained unaltered. Now that they were more frequently molested, the Allied artillery spotting aircraft continued to attempt their



A Bristol fighter F.2.B. airborne over England.



A Sopwith Camel with its nose buried in a communication trench after crashing behind the British lines during the battle of Ypres in 1917.

tasks; it had simply become more difficult and more dangerous. The very formation of the enemy fighter squadrons was a confirmation of the defensive policy of the German air forces, operating as they did within their own lines on formation fighter work which is purely defensive. General Trenchard was well aware that "the moral effect produced by a hostile aeroplane... is out of all proportion to the damage it can inflict" and it was his policy for the R.F.C. "to exploit this moral effect... on the enemy but not to let him exploit it on ourselves."

Thus the R.F.C. offensive continued in the face of the new combination of advantages which lay temporarily with the enemy; but it was obvious in the winter of 1916 that more fast single-seater scouts would be required for escort fighter duties to enable the offensive activities to be maintained. General Trenchard asked for a further twenty squadrons over and above those already planned for the Spring of 1917.

The nature of this offensive can be gathered quickly from figures. The Somme struggle closed in November, 1916 with thirty-five British squadrons having 550 aeroplanes and 585 pilots, despite the losses sustained at the hands of the Jagdstaffeln and their new aircraft. 164 German aircraft had been destroyed and 205 damaged since July 1st and in 298 bombing raids nearly three hundred tons of bombs had been dropped on enemy held territory. Some 8,600 targets had been registered by artillery observation machines.

Fighting was once more fierce over the battlefields of Arras in April of 1917, a month known to the R.F.C. as 'Bloody April' on account of their great losses, for, still awaiting their new types to deal with the Albatros and Halberstadt, their work had to continue as always. It is significant that nearly 90 of the 140 British machines lost in that month were two-seaters of the B.E., F.E. and Sopwith 1½-strutter types. It was a period when the common courage of the R.F.C. pilots caused them to

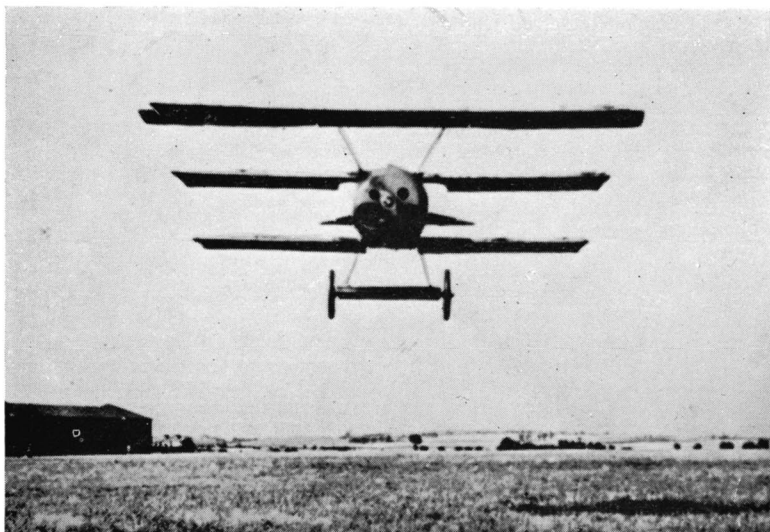
accept combat under all circumstances; it was moreover the period of the great von Richtofen's heyday. The new Bristol fighter, the F2B, had arrived at the front but not in sufficient quantities to make itself felt but in the last week of April the S.E.5 and S.E.5a, to prove one of the most successful single seaters in the R.F.C. until the end of the war, went into action. Together with the Bristol F2B fighter and the Sopwith Camel it was to continue the struggle so nobly maintained by older machines in the face of technical superiority, and to swing the pendulum once more.

The traditional policy of the R.F.C. was not relaxed during the difficult period and had the fighting not been of an offensive nature and therefore over enemy territory many of the 250 casualties of pilots and observers of April, 1917 would have returned to service. The situation was much the same, reversed, as the defensive tactics forced upon the R.A.F. in the Summer and Autumn of 1940. In that case our pilots often escaped from their crashed or damaged machines to fly again; in 1917 they became prisoners of war and it was the German pilots who, when unhurt, returned to the battle. But it is worth remembering that there were no parachutes in use in aircraft in 1917.

The arrival of the new British machines forced the enemy to revise his defensive tactics once more and the Jagdstaffeln of 14 aircraft was replaced by even larger formations which were nicknamed "circuses" by the R.F.C. Increasingly large formations of aircraft were joining battle and much of the old individuality of aerial combat was giving way to new formation tactics. But if the bitter fighting of the Arras period was the most severe testing the R.F.C. was to undergo in the whole war it also did much, by the determination of the crews to carry on their tasks fully and conscientiously in the face of superior equipment, to confirm a moral inferiority upon the enemy by forcing him on to the defensive.

For each of the great, prepared ground battles the R.F.C. commitment grew as its equipment and personnel increased and a fuller appreciation of its capabilities grew upon the Army. The battle for Passchendaele Ridge was no exception and air forces were concentrated on both sides; the Germans had long discovered that it was the British air strength which was to prove their greatest contestant and often enough were able to concentrate forces opposite the British lines at the expense of other fronts. The new Sopwith F.1 Camel scout, with a speed of 118 m.p.h. at 6,500 ft. and the ability to climb to 10,000 feet in six minutes and with twin guns firing forward, was a great acquisition for this period, which was to last until the offensive petered out in December. Only the surprise success at Cambrai on November 20th relieved the scene of its terrible, unproductive slaughter on the ground. In the air the struggle proceeded much the same as it would have done had the ground battle not been taking place, nor of such a frightful nature.

The American Declaration of War following the sinking of the *Lusitania* and the arrival of American forces in France had the effect of committing the German High Command to make one last great offensive and it was obvious to the Allies early in 1918 that the enemy was so planning. But the German break through on the Somme on March 21st, 1918, came as a surprise for the Allied Command and a new experience for the British Army, which had only before been so completely on the defensive in the early months of the war and the Retreat from Mons in 1914. Enemy air activity, by the simple means of concentrating all forces on one Front, had been making the reconnaissance activities of the R.F.C. almost impossible, so that the intelligence of the enemy intentions was wholly



A fitting contrast with modern times—the great von Richtofen brings his all-red Fokker triplane in to land.

inadequate. The reconnaissance machines went out, but as often as not they failed to return and the R.F.C. was hard put to it to avoid being forced from the offensive to the purely unprofitable one of defence. Indeed, when the break through did occur, the single-seater scout squadrons were forced to occupy themselves with low-flying attacks against the enemy ground troops in order to delay the German advance as much as possible. The air fighting was as fierce as that on the ground. If the weather was impossible for flying towards the end of April the R.F.C. made up for that by destroying 130 enemy machines in one week of May. In April, too, on the 21st the great von Richtofen was killed. Moreover the American air effort was at last showing some results. In April one Squadron was in the line; by May 15th that was increased to eight and the struggle was such as to make even these small numbers extremely welcome.

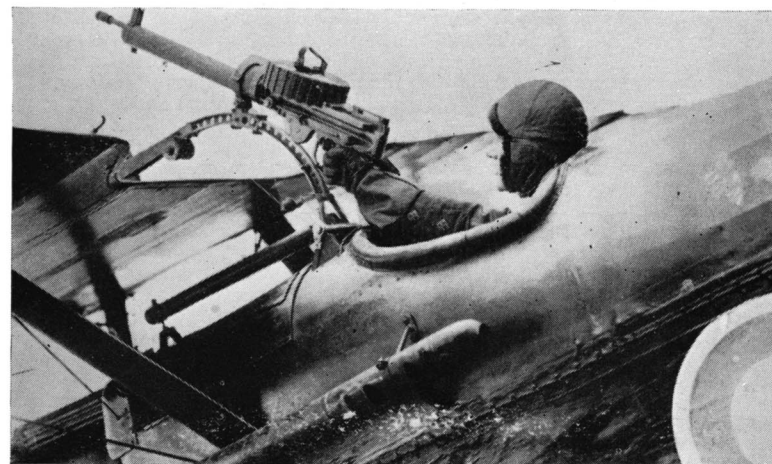
Further proof of the offensive policy of the R.F.C. was given in May 1918 by the appointment of General Trenchard to the command of the Independent Air Force, a striking body intended for the bombing of targets mainly in Germany. The machines were at last available in sufficient numbers to enable this to be done and raids were dispatched against such industrial centres as Metz, Trier, Krewzwald, Diederhofen and other targets. The night bombers of No. 100 Squadron (F.E.'s long since driven from the daylight skies) continued their nightly attacks and a considerable night bombing battle ranged the whole length of the British Front.

The performance of these bombers of the Independent Air Force remains astonishing in view of their inadequate equipment and unreliable machines. In August they went as far afield as Frankfurt and though the formations were attacked by forty fighters not one machine was lost. The American bombing effort was extending also in pace with their increased fighter effort.

The early summer of 1917 saw the renewal of the technical struggle, the results of which so sharply influenced the fortunes of the contesting air forces. The R.F.C. received the Sopwith Snipe and the Sopwith Dolphin and the German forces the Fokker D.VII. But the struggle was nearly over. The final British offensive began on the 8th August and, apart from a quick concentration by enemy air forces which was briefly successful, the struggle in the air reflected the fortunes of the ground battle. Moreover the R.F.C. was growing in strength to enable it to increase daily the striking power of its offensive. In July, the 80th Wing, which included squadrons of S.E.5a's, Camels, Snipes, Bristols and D.H.4's, raided Habourdin aerodrome. In October the same Wing operated over the fast retreating German Armies as far as Ath in Belgium, destroying as many as thirty-two enemy machines in one day. Further afield and with greater audacity and greater effect, the R.F.C. and the Independent Air Force struck almost unmolested. Those four squadrons, which had first flown to France in 1914 now boasted a first line strength of 1,785 machines, while the total number of British aircraft of all types in France at the time was 3,600.

So much for France, the great Western Front, and the R.F.C. There were other aspects of the air war and another service, the Royal Naval Air Service, which, like the R.F.C., had been formed before the war.

The primary role of the R.N.A.S. at the beginning of the war was



A pilot of an S.E.5A demonstrates the use of the Lewis gun mounted on the top of the centre section.

considered to be a purely defensive one, Home Defence. But it could not be limited to this and, indeed, its very name and nature pointed to other roles it could, and did, perform. During the passage of the British Expeditionary Force across the Channel to France, for example, seaplanes, landplanes and airships of the Naval Service provided constant patrols between the North Foreland and Ostend. Furthermore the Service itself was equally determined upon the offensive role and an R.N.A.S. Wing with its H.Q. at Dunkirk did great work by bombing against coastal targets and were responsible for making the Zeppelin bases in Belgium unusable by the enemy, forcing these machines to be based in Germany itself. The anti-Zeppelin work of the naval pilots was invaluable; the first machine to raid London was destroyed in its shed at Evère; Lt. Warneford, R.N., setting out to deal similarly with the shed at Berchem met its occupant on the way to England and destroyed it in the air; in November, 1914, the sheds at Friedrichshaven were attacked by three R.N.A.S. machines; in December the Luxhaven sheds were raided. This defensive arm was always aware of the old adage that offence proves the finest defence and the R.N.A.S. pilots were tireless in seeking out the Zeppelins in their bases rather than waiting to meet them over the North Sea or over this country.

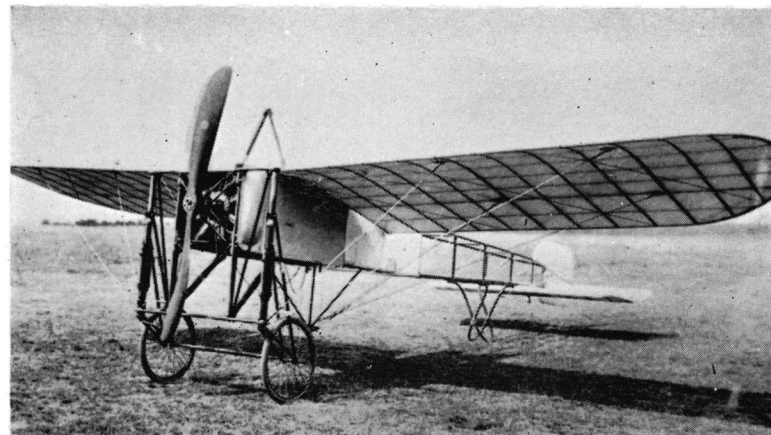
They had this defence job to do (and in doing it they preceded the R.F.C. in the real use of bombing aircraft) and others. For example, the R.N.A.S. was responsible for fleet reconnaissance and artillery spotting at the campaign in the Dardanelles. By April, 1915, they virtually controlled the air over the Straits and proceeded to supply all the support from the air for the ground troops and naval vessels that could, at that time, be carried out. A Turkish transport ship was torpedoed from the air.

In the Summer of 1916 a bombing Wing was sent to Nancy to operate against German industries, such as the Mauser works at Obendorff and the blast furnace of the Meysen Works. Such raids were continued until December of that year.

The year 1916 also witnessed the Battle of Jutland; this was the first major Fleet action in which aircraft took part on both sides. A reconnaissance was made for the British Fleet by a Short Seaplane and several for Admiral von Scheer by Zeppelins. Both were pioneer efforts, if not highly successful.

The difficulty of bases and the limitation of range of the early aircraft was overcome to a considerable extent by the R.N.A.S. by the fitting of flying platforms to light cruisers and to towed lighters, the evolution of the aircraft carrier as we knew it in the Second World War. R.N.A.S. patrols were by these means able to surprise the Zeppelin patrols over the North Sea close to their own coasts. Their work of anti-submarine patrols was also widened considerably by these methods and the contribution of the aeroplane to the breaking of the submarine blockade was of considerable importance.

But in all these many tasks and on the many different fronts of a World War both the R.F.C. and the R.N.A.S. created a tradition of offensive action and offensive spirit that was to form the basic tradition of the combined service, the Royal Air Force, which was formed from the two separate services on April 1st, 1918. Many readers will be familiar with the ultimate value of that as it appeared to us all during World War Two, but it remains of intense historical interest to study the earlier period which formed the single Service and the curious machines in which, in those days, men were prepared to go into the air to fight for their beliefs.



Country of Origin: FRANCE
Purpose: 2-seater Reconnaissance
Makers: L. Bleriot, Paris
Date in Service: 1910

Bleriot XI

The Bleriot XI formed part of the equipment of the R.F.C. and the French air forces at the outbreak of war and at least 23 of these machines went to France from this country with the British Expeditionary Forces. It was used quite extensively for reconnaissance work until the type was withdrawn from active operations in the Spring of 1915.

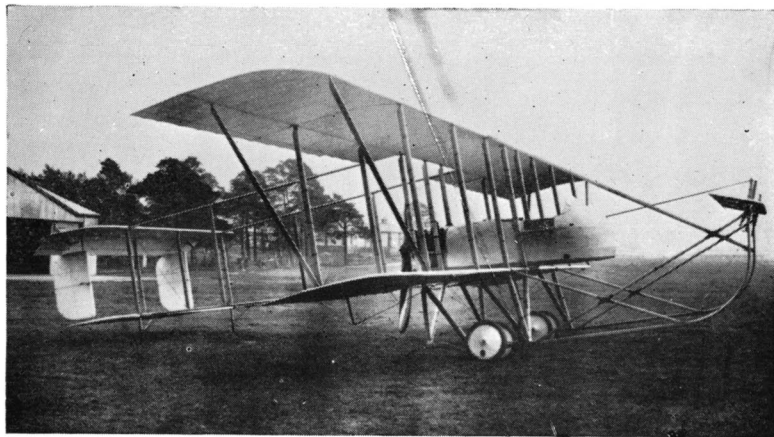
The Bleriot XI was basically similar to the machine in which Louis Bleriot first successfully flew the Channel in 1909. In place of the 25 h.p. Anzani engine which was used on that occasion the Mark XI was fitted with the 80 h.p. Gnome rotary engine, which had done so much to revolutionise flying immediately before the war. There were also

some single-seater versions and some floatplanes which were fitted with the smaller Gnome of 60 h.p. and which, by reason of a shorter length and span and therefore lighter weight, claimed a higher speed of 68 m.p.h. Altogether some 104 Bleriot monoplanes of various types were produced for the R.F.C.

In 1910 and 1911 particularly, the Bleriot was most successful and in the former year it held the endurance record of over 5 hours at the Rheims flying meeting and the speed record of 77.67 m.p.h. at Lanark. In 1911 it won the *Circuit d'Europe* and captured the height record of 13,943 ft.

TECHNICAL DETAILS:

Engine: 60 h.p. Gnome; 80 h.p. Gnome
Span: 34 ft. 3 ins.
Length: 27 ft. 6 ins.
Weights: Empty: 770 lb.
Loaded: 1,388 lb.
Wing Area: 248 sq. ft.
Wing Loading: 5.6 lb./sq. ft.
Armament: None.
No. of Crew: Two (or one).
Maximum Speed: 66 m.p.h. at sea level.
Rate of Climb: 230 ft./min. initially.
14 mins. to 3,000 ft.



Maurice Farman 'Longhorn'

Country of Origin: FRANCE
Purpose: 2-seater recce & training
Makers: Henri & Maurice Farman, Billancourt
Date in Service: 1911.

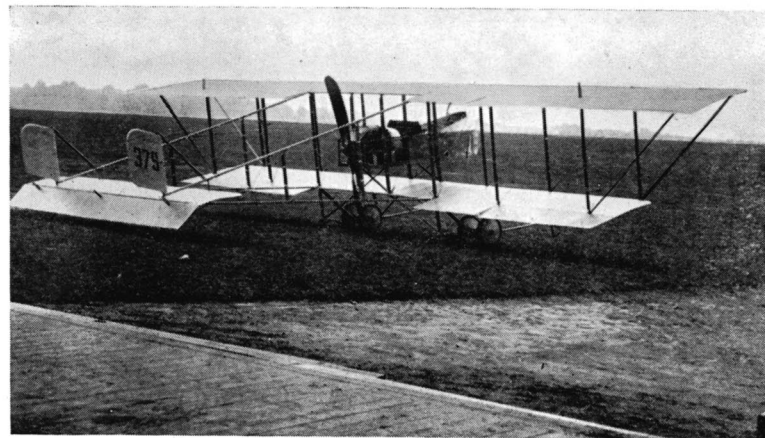
The Maurice Farman first appeared as a military aircraft in this country at the Military Review held at Laffan's Plain, Farnborough on the occasion of the King's Birthday in 1911. It was, therefore, already part of the equipment of the Royal Flying Corps at the outbreak of war on August 4th, 1914, by which time it was used mainly for training purposes. With its forward, Wright-type elevator, it was not really suitable for this job and pupil crashes were very frequent. This was only partly the fault of the machine but principally due to the rather rudimentary form of instruction given in those days. But, although frequent, the crashes seldom resulted in fatality, and the model continued in use for elementary instruction well into the war period.

One look at the photograph above is sufficient to show the machine as unsuitable for war purposes but it was in its day a very successful aeroplane and held a number of important records. Amongst these were a distance record of 350 miles in a closed circuit in 1910 and duration records in 1911, 1912 and 1913; the latter at a figure of 13 hours, 22 minutes.

Most of the 'Longhorns' were built in France and imported into this country but a few were made under licence at Bradford and these were fitted with a 100 h.p. Sunbeam engine in place of the 70 h.p. Renault fitted in France.

TECHNICAL DETAILS:

Engine: 70 h.p. Renault; 100 h.p. Sunbeam.
Span: (upper) 58 ft. 8 in.
Length: 32 ft.
Height: 11 ft. 4 ins.
Weights: Empty: 1,280 lbs.
 Loaded: 1,887 lbs.
Wing Area: 646 sq. ft.
Wing Loading: 3.2 lbs./sq. ft.
Armament: none.
No. of Crew: Two.
Maximum Speed: 59 m.p.h. at sea level.



Maurice Farman 'Shorthorn'

Country of Origin: FRANCE
Purpose: 2-seater recce & training
Makers: Henri & Maurice Farman, Billancourt
Date in Service: 1913

The reason for the naming of these two famous Farman aircraft, the Longhorn (see page 16) and the Shorthorn, must be self-evident from the photographs—the Longhorn with its front elevator and the Shorthorn without it, and both with, perhaps, the flying characteristics of a cow!

The Shorthorn S.11 was, of course, a later version of the Longhorn S.7 and formed part of the fighting equipment of the R.F.C. which flew into France with the B.E.F. Attempts to fix a free Lewis gun in the front cockpit were not greatly successful as the extra weight of gun and ammunition decreased the performance so much that, thus fitted, there was no German aircraft which the Shorthorn could reach in order to attack it. The standard armament consisted more usually of a revolver or even a rifle for the observer to carry.

During 1915 the Shorthorn was largely relegated to the training role by the R.F.C., but the French air forces continued to use the model operationally on the Western Front until 1917. A number were still in use for training in this country in 1918 and many saw service in the Middle East area long after they were withdrawn from the Western Front; indeed, this was the general pattern of events when operational aircraft were superseded by later types on the battlefields of France.

TECHNICAL DETAILS:

Engine: 70 h.p. Renault.
Span: (Upper) 53 ft.
Length: 30 ft. 8 in.
Height: 10 ft. 4 ins.
Weights: Empty: 1,441 lbs.
 Loaded: 2,046 lbs.
Wing Area: 561 sq. ft.
Wing Loading: 3.3 lbs./sq. ft.
Armament: Revolver or rifle or Lewis Gun.
No. of Crew: Two.
Maximum Speed: 66 m.p.h. at sea level.
Endurance: 3½ hours.
Climb: 15 mins. to 3,000 ft.



Avro 504

Country of Origin: GREAT BRITAIN
Purpose: 2-seater trainer
Makers: A. V. Roe, Manchester
Date in Service: 1914

A. V. Roe (now Sir Alliott Verdon Roe) was responsible in great measure for the development of the tractor type of aircraft in this country. He began his flying with a tractor triplane and later developed a biplane version which was successful in aerial racing in this country before the war. The Series 504, which was a development of the Series 500 racing machine, was possibly the greatest training machine of all times. Some 8,340 machines were manufactured during the war period of which 5,446 were delivered to the R.F.C. mainly for training purposes. It was the 504 which was used as the basis of the special

Gosport System of flying training developed towards the end of the war by Major R. R. Smith Barry. Some 274 machines were fitted as single-seaters and with one fixed machine gun above the centre section were in service with Home Defence units for use against the Zeppelins and Gothas.

There were many different modifications incorporated in the design, which ranged during the war from 504A to 504K. The 504 A to D were all fitted with the 80 h.p. Gnome engine, the 504 E with the 100 h.p. Gnome Monosoupape, the 504 F with a 75 h.p. Rolls-Royce Hawk, the 504 G and H with the 80 h.p. Gnome, the 504 J with the 100 h.p. Gnome Monosoupape and the 504 K with an assortment of engines including the 100 h.p. Gnome Monosoupape, 100 h.p. Sunbeam Dyak, 110 h.p. Le Rhone and 130 h.p. Clerget.

TECHNICAL DETAILS:

Engine: 80 h.p. Gnome; 100 h.p. Gnome Monosoupape; 100 h.p. Sunbeam Dyak; 75 h.p. Rolls-Royce Hawk; 110 h.p. Le Rhone; 130 h.p. Clerget.
Span: 36 ft. Length: 29 ft. 6 ins.
Height: 10 ft. 6 ins.
Weights: (100 h.p. Gnome)
Empty: 1,100 lbs. Loaded: 1,830 lbs.
(130 h.p. Clerget)
Empty: 1,231 lbs. Loaded: 1,829 lb.
Wing Area: 335 sq. ft.
Wing Loading: 5.4 lb./sq. ft.
Armament: Normally none but Home Defence fitted with single Lewis Gun on centre section. Some R.N.A.S. machines fitted for bombing.
No. of Crew: Two (except single seaters for Home Defence).
Maximum Speed: 504—82 m.p.h. 504K (110 h.p.) 95 m.p.h. at sea level.
Service Ceiling: (100 h.p.) 13,000 ft.
Rate of Climb: 504 A to 6,500 ft. in 25 min. 504K to 10,000 ft. in 16 mins.
Endurance: 4 hrs. Gnome; 3 hrs. Le Rhone or Monosoupape.



Country of Origin: FRANCE
Purpose: Single seater Scout
Makers: Morane-Saulnier, Paris
Date in Service: 1914

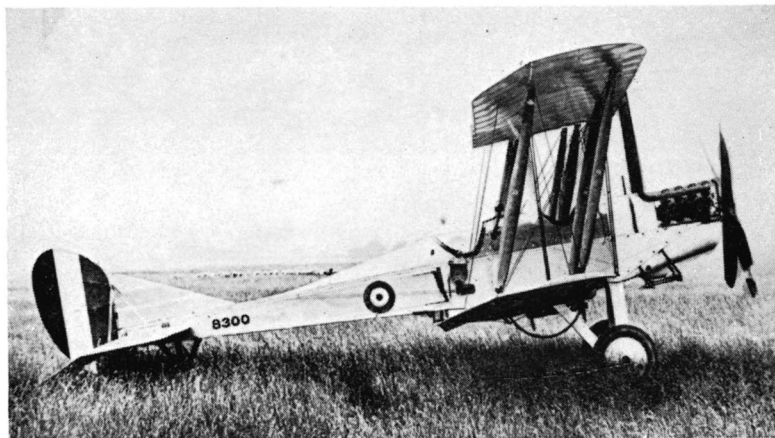
Morane-Saulnier Scout

The early monoplane Morane-Saulnier machines were in service at the beginning of 1914, principally with the French air forces. As early as December 1914 one of these was fitted with a crude interrupter gear enabling a forward firing gun to be fitted. This was designed by a French Engineer, Eugene Gilbert, and it seems a pity that it was not more quickly and more efficiently developed. As events occurred, the machine equipped with Gilbert's gear was piloted with success by Roland Garros but, early in 1915, was shot down and captured. It was this event which led Anthony Fokker to see the importance of the forward firing gun and to design a more efficient gear which was fitted to his Eindekker monoplanes to give them undoubted air supremacy during 1915.

The 1916 version of the Morane-Saulnier, known as the Bullet, had a rounded fuselage in place of the flat-sided section used on the earlier machine and considerable confusion was caused to anti-aircraft gunners in deciding between the Morane-Saulnier and the Fokker E.I which was largely superior to it. The Bullet was replaced by biplane scouts of Nieuport and S.P.A.D. manufacture as these became available.

TECHNICAL DETAILS:

Engine: 80 h.p. Le Rhone; 110 h.p. Le Rhone.
Span: 27 ft. 5 in.
Length: 22 ft. 7 in.
Height: 8 ft. 3 in.
Weights: Empty: 735 lbs.
Loaded: 1,122 lb.
Wing Area: 118 sq. ft.
Wing Loading: 9.5 lb./sq. ft.
Armament: at first, none. Later one fixed forward gun.
Crew: One.
Maximum Speed: (110 h.p., 1916) 102 m.p.h. at 6,500 ft.
Service Ceiling: 13,000 ft.
Rate of Climb: 12 mins. to 10,000 ft.
Endurance: 1½ hours.
Speed: (110 h.p.) 102.4 m.p.h. at 6,500 ft.



B.E.2C.

Country of Origin: GREAT BRITAIN
 Purpose: 2 seater recce
 Makers: Royal Aircraft Factory, Farnborough
 Date in Service: 1914

The B.E.2C was developed by the Royal Aircraft Factory from the B.E.2, which was designed by Mr. Geoffrey de Havilland who was, at that time, working at the Factory. Some B.E.2, B.E.2A and B.E.2B machines went to France with a few B.E.2C machines at the beginning of the war but it was unfortunate for the R.F.C. that the B.E.2C was chosen for mass production. With Farnborough's emphasis on inherent stability it was a delightful machine to handle and its flying characteristics were way above most of its contemporaries. But it was not a fighting aircraft, in the same way that a number of early purchases of American aircraft during World War Two were not fighting machines, being too stable and unsuited to the near aerobatics of evasion or attack. Without doubt the

B.E.2 and its derivatives were responsible for a very great number of R.F.C. casualties in the early part of the war.

TECHNICAL DETAILS:

Engine: [90 h.p. RAF 1a; 90 h.p. Curtis OX5;] 150 h.p. Hispano-Suiza.
 Span: 37 ft.
 Length: 27 ft. 3 in.
 Height: 11 ft. 4 in.
 Weights: Empty: 1,370 lb.
 Loaded: 2,142 lb.
 Wing Area: 371 sq. ft.
 Wing Loading: 5.5 lb./sq. ft.
 Armament: 1 Lewis Gun and small bomb racks.
 Crew: Two.
 Maximum Speed: 72 m.p.h. at 6,500 ft.
 Service Ceiling: 10,000 ft.
 Rate of Climb: 20 mins. to 6,500 ft.
 Endurance: 3½ hours.

The decision, taken in the interests of creating large numbers of aircraft, to mass-produce the B.E.2C was, to say the least of it, unfortunate. And by the end of the war in 1918 there were still more than 1300 B.E.2C and B.E.2D machines in service with Home Defence, training units and units in Egypt, Palestine, Salonika and East Africa.

The earlier aircraft were fitted with the 70 h.p. Renault engines but later models were fitted with the 90 h.p. RAF 1a, the 90 h.p. Curtis OX5 and the 150 h.p. Hispano-Suiza power units.



Country of Origin: GREAT BRITAIN
 Purpose: Single seater Scout
 Makers: British & Colonial Aeroplane Co. Ltd., Filton, Bristol
 Date in Service: Sept. 1914

Bristol Bullet

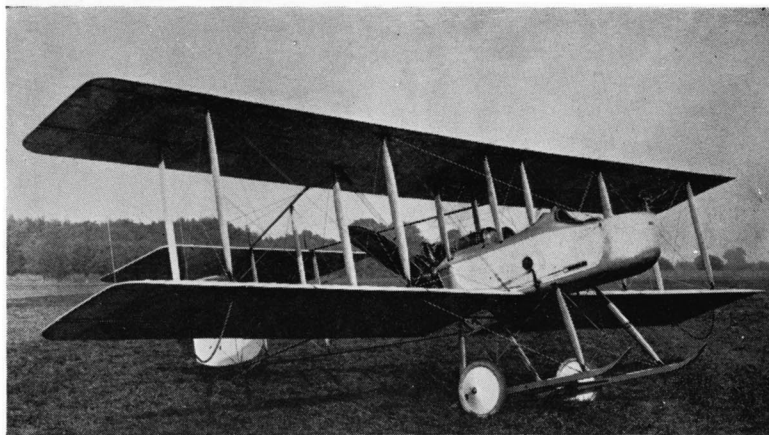
The Bristol Bullet (D-type) is typical of the early war period, inasmuch as it was intended purely as a fast single-seater scout machine for reconnaissance purposes and was not armed in any way. Later in 1915, when the conception of the aeroplane as a *fighting* machine became obvious, it was one of the first British machines to be fitted with interrupter gear enabling a forward-firing Vickers machine gun to be fitted. If compared for performance with the Fokker Eindekker E.1, which gained mastery for the Germans in 1915, it is easy to see that the German supremacy at that time depended more on the earlier design of efficient interrupter gear than on the flying performance of the Fokker E.1.

Before the first full 'Scout', or fighter, squadron was formed in France in early 1916 (see under D.H.2, page 26) most of the squadrons in operational service had a flight of D-type scouts amongst their aircraft complements.

Together with the unfortunate B.E.2C (see page 20) the Bullet was one of the first aircraft of the war to be selected for quantity production and over 200 machines were built before the type was abandoned. A number of modifications were made from time to time and at Bristol's the type was varied from the D-1 to the D-5. Engines varied from the 80 h.p. Gnome and Le Rhone units to the 100 h.p. Gnome Monosoupape, 110 h.p. Le Rhone, and 130 h.p. Clerget.

TECHNICAL DETAILS:

Engine: 80 h.p. Gnome; 80 h.p. Le Rhone; 100 h.p. Gnome Monosoupape; 110 h.p. Le Rhone; 130 h.p. Clerget.
 Span: 24 ft. 5 in.
 Length: 20 ft. 7 in.
 Height: 8 ft. 6 in.
 Weights: (80 h.p.) Empty: 757 lb.
 Loaded: 1,195 lb.
 Wing Area: 198 sq. ft.
 Wing Loading: 6.25 lb./sq. ft.
 Armament: None; later one fixed Vickers machine gun.
 Crew: One.
 Maximum Speed: 80 h.p. 98 m.p.h. at sea level. 100 h.p. 104 m.p.h. at sea level.
 Service Ceiling: (80 h.p.) 15,500 ft.
 Rate of Climb: 385 ft./min. to 6,500 ft.
 Endurance: 2½ hours.



Vickers "Gunbus" F.B.5 & F.B.9

Country of Origin: GREAT BRITAIN
Purpose: 2-seater Fighter/Rece
Makers: Vickers Ltd., London
Date in Service: FB5 1914, FB9 1915

The Vickers F.B.5 was in existence in 1914 and was the only aircraft then in service which made provision for the mounting of a machine gun—hence its familiar name of "Gunbus". The F.B.9, a later development, had rounded wingtips, a vee undercarriage without the skid and improved armament. It was very similar in layout and in purpose to the F.E.2B (see page 25) and appeared at very much the same time and shared with that machine, the F.E.8 and the D.H.2

TECHNICAL DETAILS:

Engine: F.B.5 & F.B.9 100 h.p. Gnome
Monosoupape.
Span: (F.B.5) 36 ft. 6 in.
(F.B.9) 33 ft. 10 in.
Length: (F.B.5) 27 ft. 2 in.
(F.B.9) 27 ft. 10 in.
Height: 11 ft. (F.B.9) 7 ft.
Wing Area: (F.B.5) 382 sq. ft.
Wing Loading: (F.B.5) 5.4 lb./sq. ft.
Weights: (F.B.5) Empty: 1,220 lb.
Loaded: 2,050 lb.
(F.B.9) Empty: 1,029 lb.
Loaded: 1,892 lb.
Armament: (F.B.5) Belt fed Vickers gun
on free mounting for Observer.
(F.B.9) Drum fed Lewis Gun on ring
mounting.
Crew: Two.
Maximum Speed: (F.B.5) 70 m.p.h. at
5,000 ft. (F.B.9) 79 m.p.h. at 6,500 ft.
Service Ceiling: (F.B.5) 9,000 ft.
(F.B.9) 11,000 ft.
Endurance: (F.B.5) 4 hrs. (F.B.9) 5 hrs
Rate of Climb: 19 min. to 6,500 ft.

(see page 26) in successfully overcoming the superiority of the Fokker Eindekker E.1 scouts (see page 42) during the 1916 fighting. Again its success was due to its forward firing machine gun but it gave way to more speedy tractor biplanes just as soon as the British had designed an efficient interrupter gear to enable guns to be fired through the airscrew arc.

The Gunbus was not used operationally on the Western Front after mid-1917 and the remaining machines were withdrawn to training units and other overseas theatres of war. Only some 95 F.B.9 machines were manufactured for the R.F.C. but close on 50 of these remained "alive" to be transferred after operational service.

The photograph above is of the F.B.5 and the picture on the front cover is drawn from a photograph of the F.B.9.



Country of Origin: FRANCE
Purpose: Single seater Scout
Makers: Soc. Anonyme des Etablissements
Nieuport, Issy-le-Molinaire, France
Date in Service: 1915

Nieuport Scout

The Nieuport Scouts (type 17c) formed part of the Allied re-equipment which overcame the menace of the Fokker Eindekker E.1. It was used, of course, extensively by the French air forces and was even introduced into the R.F.C. during 1916 while awaiting the new British types. A Nieuport was the favourite mount of Capt. Albert Ball, V.C., and Capt. W. A. Bishop, V.C., who is shown in the photograph.

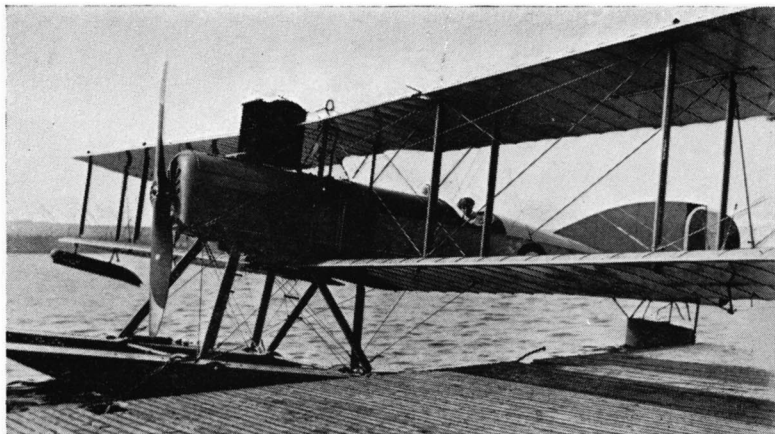
From its introduction on the Western Front in 1915 in the hands of French pilots the design was continuously developed and later forms were the 23.C1, 27.C1 and 28.C1 models, the latter appearing in 1918. The 17C and 23C were basically similar but the later types benefitted by larger power units and better, more streamlined fuselage design. The wing tips and tail plane, square on the two early models, were gracefully rounded on the 27C and 28C.

The early models had one or, in some cases, two machine guns fitted on the top centre section to fire over the airscrew blades; the later models were fitted with a single Vickers gun synchronised to fire through the airscrew arc.

Some criticism on the score of fragility was levelled at the Nieuport and there was evidence that the structure could not stand up to high speed dives. Many of the American squadrons which came to France were equipped with Nieuports but they generally preferred the Spad (see page 29).

TECHNICAL DETAILS:

Engine: (17C) 110 h.p. Le Rhone; (28C)
160 h.p. Gnome, 130 h.p. Clerget.
Span: (17C) 26 ft. (28C) 26 ft. 9 in.
Length: (17C) 19 ft.
(28C) 20 ft. 3 in.
Height: 7 ft.
Weights: (17C) Empty: 825 lb.
Loaded: 1,232 lb.
Wing Area: (17C) 158.8 sq. ft.
Wing Loading: (17C) 7.7 lb./sq. ft.
Armament: One or two machine guns
on top centre section; later (28C)
one or two fixed forward Vickers.
Crew: One.
Maximum Speed: (17C) 107 m.p.h. at
6,500 ft. (28C) 140 m.p.h. at sea level.
Rate of Climb: (17C) 9 minutes to
10,000 ft.
Endurance: 2 hours.
Service Ceiling: (17C) 17,400 ft.



Short '225' Seaplane

Country of Origin: GREAT BRITAIN
 Purpose: Naval Reconnaissance
 Makers: Short Brothers, Eastchurch, Kent
 Date in Service: 1915

The Short '225' (so called because the first version was fitted with a Sunbeam 225 h.p. motor), or the Type S.184, was designed in 1914. It has the distinction of being the only floatplane which took part in a major Naval battle in the war, as a 225 was used for reconnaissance during the famous Fleet Battle of Jutland in 1916.

The type was used largely for anti-submarine work and convoy patrol duties and could be variously armed. The earlier version could carry one torpedo

between the two floats or 400 lbs. weight of bombs. Later models were fitted out to carry 4 × 112 lb. bombs and the Type D, a single seater version, was equipped to carry 9 × 56 lb. bombs stowed internally in the fuselage.

The type S.184 machines were originally fitted with the 225 h.p. Sunbeam engine, but in 1916 the 240 h.p. Renault-Mercedes power unit was used as replacement in some machines. In 1917 the 260 h.p. Sunbeam Maori engine was fitted and of the 300 machines delivered before the end of the war in 1918, most had the benefit of this more powerful engine.

The 225 has the distinction, also, of successfully torpedoing a large Turkish transport during operations in the Middle East during the Gallipoli campaign.

TECHNICAL DETAILS:

Engine: 225 h.p. Sunbeam; 240 h.p. Renault-Mercedes; 250 h.p. Rolls-Royce; 260 h.p. Sunbeam Maori.

Span: 63 ft. 6 in.

Length: 40 ft. 7½ in.

Height: 13 ft. 6 in.

Weights: (260 h.p.) Empty: 3,479 lb.
 Loaded: 5,123 lb.

Wing Area: 680 sq. ft.

Wing Loading: [(260 h.p.) 7.4 lb./sq. ft.

Armament: 1 Lewis gun on ring mounting in rear cockpit. 1 torpedo or 400 lbs. bombs; later 4 × 112 lb. bombs; Single seater 9 × 56 lb. bombs.

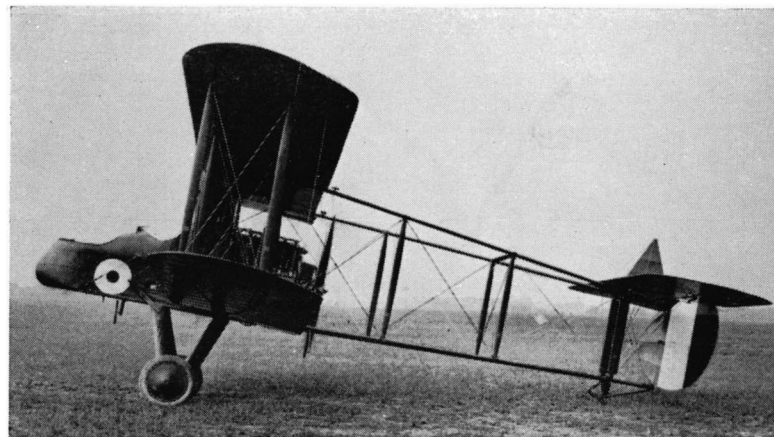
Crew: Two (Type D—one).

Maximum Speed: (260 h.p.) 84 m.p.h. at 2,000 ft.

Service Ceiling: 9,000 ft.

Rate of Climb: 300 ft./min. initially.

Endurance: 4½ hours.



Country of Origin: GREAT BRITAIN
 Purpose: 2-seater Fighter/Rece
 Makers: The Royal Aircraft Factory, Farnborough
 Date in Service: Jan. 1916

F.E.2b

Together with the D.H.2 (see page 26), the F.E.2b appeared on the Western Front in France in January, 1916, and assisted in removing the menace of the Fokker Eindekker E.1, which, with its fixed, forward firing machine gun and efficient interrupter gear, played havoc with the earlier Allied machines. The day of the pusher aircraft however, was fast disappearing and with the introduction by the enemy of the new Albatros and Halberstadt scouts in the late autumn of that year both the F.E.2b and the D.H.2 were outclassed.

This was not the end of the F.E.2b as an operational machine and it continued in service with the R.F.C. and, later, the Independent Air Force on night bombing missions right until the end of the war. It was found to be peculiarly suitable for night flying and was therefore adopted also for the use of Home Defence against Zeppelin and Gotha attacks by night.

It was manufactured in considerable numbers (over 1,600) and it is interesting to note that among the sub-contractors for this machine were the Austin, Daimler and Napier motor car companies. Handley Page and Blackburn aircraft factories also built the F.E.2b and F.E.2b (a slightly later variant). The performance was considerably improved by the substitution of the 160 h.p. Beardmore engine for the earlier unit of 120 h.p.

TECHNICAL DETAILS:

Engine: 120 h.p. Beardmore; 160 h.p. Beardmore.

Span: 47 ft. 9 in.

Length: 32 ft. 3 in.

Height: 12 ft. 8 in.

Weights: (120 h.p.) Empty: 2,105 lb.

Loaded: 2,827 lb.

(160 h.p.) Empty: 2,121 lb.

Loaded: 3,037 lb.

Bomb Load: 520 lb.

Wing Area: 494 sq. ft.

Wing Loading: (120 h.p.) 5.7 lb./sq. ft.

(160 h.p.) 6.1 lb./sq. ft.

Armament: 2 Lewis guns (two for

Observer one free and forward one

backward).

Crew: Two.

Maximum Speed: (120 h.p.) 73 m.p.h. at

6,500 ft. (160 h.p.) 81 m.p.h. at 6,500

ft.

Service Ceiling: (120 h.p.) 9,000 ft.

(160 h.p.) 11,000 ft.

Rate of Climb: (120 h.p.) 19.5 mins. to

6,500 ft. (160 h.p.) 18.9 mins. to 6,500 ft.

Endurance: 3½ hours.



D.H.2

Country of Origin: GREAT BRITAIN
Purpose: Single seater Scout
Makers: The Aircraft Manufacturing Co. Ltd., Hendon
Date in Service: Feb. 1916

The D.H.2, designed by Geoffrey de Havilland, was introduced into squadron service in February 1916 and proved itself at once as the answer to the superiority gained by the Fokker Eindekker E.1 Scout, which had become so marked in the latter part of 1915. It was also the first type of aircraft selected to form a complete single-seater scout or "fighter" squadron—previously all squadrons were mixed units with flights of different aircraft for different purposes—and No. 24 Squadron, under the command of Major L. G. Hawker V.C., had the honour of being that first unit. The success of the squadron was outstanding and the D.H.2, with noble assistance from the F.E.2b (see page 25), the F.E.8 and the Vickers F.B.9 (see page 22), regained technical air superiority for the R.F.C. during 1916, particularly during the period of the Battle of the Somme.

TECHNICAL DETAILS:

Engine: 100 h.p. Gnome Montsouponne.
Span: 28 ft. 3 in.
Length: 25 ft. 3 in.
Height: 9 ft. 6 in.
Weights: Empty: 800 lb.
 Loaded: 1,320 lb.
Wing Area: 255 sq. ft.
Wing Loading: 5.8 lb./sq. ft.
Armament: One Lewis Gun.
Crew: One.
Maximum Speed: 93 m.p.h. at sea level.
Service Ceiling: 14,000 ft.
Rate of Climb: 12 mins. to 6,500 ft.
Endurance: 2½ hours.

The flying qualities of the D.H.2 were particularly praised and made the machine a very popular one with its pilots, but it was obvious that, with the development of reliable interrupter and synchronisation gear for forward firing guns, the design was bound to give way to tractor machines and, indeed, after 1916 there were no more pusher aircraft produced on either side.

Some four hundred of these machines were produced and over half of these saw service on the Western Front.



Country of Origin: GREAT BRITAIN
Purpose: 2-seater Fighter/Recon
Makers: British & Colonial Aeroplane Co. Ltd., Filton, Bristol
Date in Service: 1916

Bristol Fighter F.2B

More generally, and affectionately, known as the "Brisfit", this machine was one of the most successful of the Great War period and like another great Bristol aircraft of the later war, the Beaufighter, it had a variety of uses.

After an unfortunate baptism of fire during the Battle of Arras in 1917, when it was mistakenly used in the tight defensive formation of most two-seaters at that time, it became an excellent fighting machine after its pilots had adopted a more belligerent type of defence. With the pilot and observer close together and able to work in close co-operation it proved a good "single-seater" with a sting in its tail as well as its nose. Its performance in this manner of use gained it enormous respect even from the German single-seaters!

Over 1,700 Bristol Fighters were in use by the end of the war and the aircraft was called upon to carry out offensive patrols, photographic sorties, escort fighting, reconnaissance and, with small bomb racks fitted below the centre section of the lower mainplane, ground attack and contact patrols. In a modified form and known as the Mark IIIa it continued in service with the R.A.F. in Army Co-operation Squadrons and training units until 1931.

A peculiarity of its construction lay in the fact that the lower mainplane was not attached directly to the lower part of the fuselage but was fixed by short vee struts.

TECHNICAL DETAILS:

Engine: 200 h.p. Sunbeam Arab; 200 h.p. Hispano-Suiza; 275 h.p. Rolls-Royce Falcon III.
Span: (Hispano) 39 ft. 3 in.
 (Falcon) 39 ft. 4 in.
Length: (Hispano) 24 ft. 9 in.
Height: (Hispano) 9 ft. 6 in.
Weights: (Falcon) Empty: 1,934 lb.
 Loaded: 2,779 lb.
 (Others) Empty: 1,733 lb.
 Loaded: 2,630 lb.
Wing Area: 406 sq. ft.
Wing Loading: (Falcon) 6.8 lb./sq. ft.
 (others) 6.4 lb./sq. ft.
Armament: One Vickers firing through airscrew; one or two Lewis guns on Scarff ring in rear cockpit.
Crew: Two.
Maximum Speed: (Falcon) 125 m.p.h. at Sea Level.
Service Ceiling: (Falcon) 20,000 ft.
Rate of Climb: 6.5 mins to 6,500 ft. (Falcon). 8.7 mins. to 6,500 ft. (Hispano).
Endurance: (Falcon) 3 hours.



Sopwith 1½-Strutter

Country of Origin: GREAT BRITAIN
Purpose: 2-seater Fighter/Recon
Makers: Sopwith Aviation Co. Ltd., Kingston-on-Thames
Date in Service: May 1916

The Sopwith 1½-Strutter (so called because it had only one pair of outer mainplane struts and short centre section struts on each side) was developed in 1915 for the R.N.A.S. and was not accepted for service with the R.F.C. until May of 1916. It was fitted with trailing edge flaps, which were used then as air brakes, and was the first British machine to be fitted with a fixed forward gun firing through the airscrew arc by means of interrupter gear. It was also the first two-seater to be fitted with the Scarff ring mounting for the Observer's machine gun.

It was an immediate success in its reconnaissance and patrol roles taking the place, as it did, of many of the pusher-type reconnaissance machines which were by 1916 suffering heavy casualties. Throughout the Battle of the Somme it was used for a variety of purposes, which included day bombing of forward enemy strong points.

Some six hundred machines were built for the British forces, but many more were made for the Allied Governments in France, Belgium, Russia and Italy and the type was highly popular as it shared the good flying manners of the Sopwith Pup. By the end of 1916, however, the new German Albatros and Halberstadt scouts were making life difficult for our machines of all types and the 1½-Strutter was no exception.

TECHNICAL DETAILS:

Engine: 110 or 130 h.p. Clerget.
Span: 33 ft. 6 in.
Length: 25 ft. 3 in.
Height: 10 ft. 3 in.
Weights: Empty: 1,305 lb.
 Loaded: 2,150 lb.
Wing Area: 346 sq. ft.
Wing Loading: 6.2 lb./sq. ft.
Armament: One Vickers (fixed forward); one Lewis gun on Scarff ring mounting in rear cockpit.
Crew: Two.
Maximum Speed: 102 m.p.h. at 6,500 ft.
Service Ceiling: 15,500 ft.
Rate of Climb: 540 ft./min. to 6,500 ft.
Endurance: 3½ hours.



Country of Origin: FRANCE
Purpose: Single seater Scout
Makers: Societe Pour Aviation et ses Derives, Paris
Date in Service: Autumn 1916

S.P.A.D. Scout

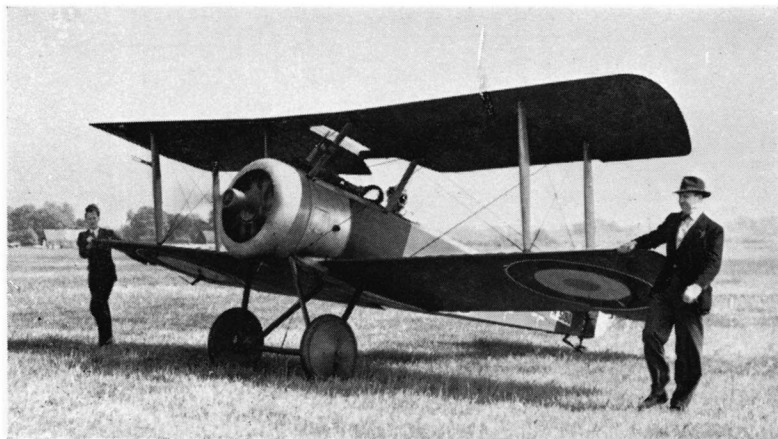
The S.P.A.D. S.7 Scout, and its later more powerful versions, earns its place most nobly in the list of the more successful 1914-1918 aircraft. It was used most extensively by the French air forces and even equipped two British squadrons on the Western Front with machines "swapped" from the R.N.A.S. for the Sopwith Triplanes (see page 32). Many American units were equipped with the S.P.A.D., which, because it had none of the structural weaknesses of the Nieuport, was much liked in that quarter.

It was not easy to fly and its glide angle was exceptionally steep, so that it was necessary to fly it on to the ground with considerable power when landing. Nor was it as manoeuvrable as the Nieuport, but its higher top speed and its ability to remain in one piece after a steep dive was sufficient compensation for its other faults.

Over 5,000 S.P.A.D.s of all types were built, mainly for the French and, as was usual with successful types of the period, it was modified and improved from time to time largely by the fitting of motors of greater power as these became available as the years progressed.

TECHNICAL DETAILS:

Engine: (1916) 150 h.p. Hispano (early 1917) 175 h.p. Hispano (late 1917) 205 h.p. Hispano.
Span: 25 ft. 6 in.
Length: 20 ft. 3 in.
Height: 7 ft.
Weights: Empty: 1,177 lb.
 Loaded: 1,632 lb. (150 h.p.)
Wing Area: 200 sq. ft.
Wing Loading: 8.1 lb./sq. ft.
Armament: One Vickers fixed forward.
Crew: One.
Maximum Speed: (150 h.p.) 119 m.p.h. at 6,500 ft. (205 h.p.) 132 m.p.h. at sea level.
Service Ceiling: 17,500 ft.
Rate of Climb: (150 h.p.) 810 ft./min. initially. 6.5 mins. to 6,500 ft.
Endurance: (150 h.p.) 2½ hours



Sopwith Pup

Country of Origin: GREAT BRITAIN
Purpose: Single seater Scout
Makers: Sopwith Aviation Co. Ltd., Kingston-on-Thames
Date in Service: Late 1916

The Sopwith Pup must bid fair to being the most popular aircraft with pilots, both of the R.N.A.S. and the R.F.C., of the whole war period, 1914-1918. It is well spoken of as having perfect flying manners and no vices. As a fighting machine it was well able to hold its height and remained sensitive to control, being fully aerobatic up to 15,000 feet—a great factor in the days of low-powered aircraft, which were inclined to hang on their propellers and “waffle” at extreme heights.

The Pup was a direct descendant of the Sopwith Tabloid single-seater scout, which appeared in 1913 and astonished the aviation world with its performance. But the Tabloid was never armed and the later Pup was able to take advantage of interrupter gear in order to fit a forward-firing Vickers machine gun.

TECHNICAL DETAILS:

Engine: 80 h.p. Le Rhone; 100 h.p. Gnome Monosoupape.

Span: 26 ft. 9 in.

Length: 19 ft. 7 in.

Height: 9 ft.

Weights: (80 h.p.) Empty: 787 lb.
 Loaded: 1,225 lb.
 (100 h.p.) Empty: 868 lb.
 Loaded: 1,313 lb.

Wing Area: 254 sq. ft.

Wing Loading: 4.8 lb./sq. ft.

Armament: Single Vickers firing forward; R.N.A.S. version had light bomb racks and Lewis Gun.

Crew: One.

Maximum Speed: (80 h.p.) 106 m.p.h. at 6,500 ft.

Service Ceiling: (80 h.p.) 17,500 ft.

Rate of Climb: (80 h.p.) 650 ft./min. to 6,500 ft.

Endurance: 3 hours.

It was originally ordered by the R.N.A.S. and these machines, together with some Sopwith 1½-Strutters (see page 28), pioneered deck landings on the converted cruiser, H.M.S. *Furious*. The R.F.C. began using the Pup in December of 1916 shortly after the introduction by the Germans of the new Albatros Scouts, which were to win back temporary superiority for the other side. At that time the Sopwith Pup was alone among British Scouts in being able to match the performance of the Albatros.



Country of Origin: GREAT BRITAIN
Purpose: 2-seater Recce
Makers: Royal Aircraft Factory, Farnborough
Date in Service: Late 1916

R.E.8

The R.E.8, Reconnaissance Experimental No. 8, to give it its full title, was designed at the Royal Aircraft Factory to take the place of the unpopular and obsolescent B.E.2 variants giving yeoman service in this role. It was, unfortunately, not much more popular with ground or aircrews than its predecessors.

It was responsible, however, for by far the greater part of the artillery observation work from the time of its adoption in service until the end of the war and was sub-contracted for large scale production to a considerable extent; at least

in addition to the Farnborough Factory. Over 3,000 R.E.8 machines were built and more than 2,000 of these saw service on the Western Front in France. Patiently their aircrews awaited squadron re-equipment with Sunbeam-engined Bristol F2B Fighters, which would have eased their tasks and probably reduced their casualties but, although the Bristol (see page 27) was built in quite large numbers, there were not enough to go round and the R.E.8 continued in use to the end of the war.

It seemed invariable during the war that when the Air Board selected a machine for mass production in view of the urgent military needs, their choice fell upon an unfortunate design.

TECHNICAL DETAILS:

Engine: R.A.F.4a 150 h.p.

Span: (upper) 42 ft. 7 in.
 (lower) 32 ft. 7½ in.

Length: 27 ft. 10 in.

Height: 11 ft. 4 in.

Weights: Empty: 1,803 lb.
 Loaded: 2,678 lb.

Wing Area: 377.5 sq. ft.

Wing Loading: 7.6 lb./sq. ft.

Armament: One Vickers fixed forward; one or two Lewis guns on Scarff ring in rear cockpit.

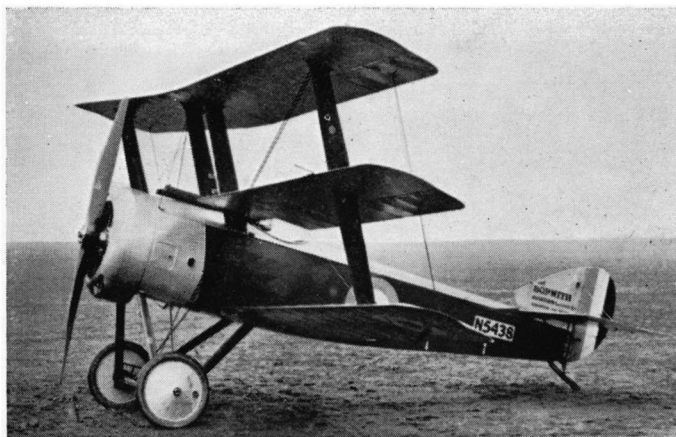
Crew: Two.

Maximum Speed: 102 m.p.h. at 6,500 ft.

Service Ceiling: 13,000 ft.

Rate of Climb: 340 ft./min. to 6,500 ft.

Endurance: 4½ hours.



Sopwith Triplane

Country of Origin: GREAT BRITAIN
Purpose: Single Seater Scout
Makers: Sopwith Aviation Co. Ltd., Kingston-on-Thames
Date in Service: Early 1917

It is generally supposed that the Fokker Triplane Dr.1, beloved mount of the famous German ace von Richtofen, was the only successful triplane of the war. The existence of the Sopwith Triplane in service with the R.N.A.S. several months before the Fokker disproves this and also lends colour to the theory that the Fokker design was inspired by the earlier British machine.

The design was originally ordered for the R.F.C., but when deliveries began at the end of 1916 that Service had changed its mind and expressed a preference for the Spad S.7 machines then being flown by Scout units of the R.N.A.S. Since the Navy had become interested in the Triplane and developed a fondness

for it, and a belief in its advantages of rapid climb and outstanding manoeuvrability, the two Services simply swapped machines and everybody was happy.

Although structural deficiencies were expected in some quarters these never appeared in use and the Naval pilots became extremely fond of their "three-deckers"—so much so that many were loth to exchange them for the Bentley-engined SF.1 Camel when that machine came along. Nor were they unsuccessful; one flight of No. 10 (Naval) Squadron on the Western Front accounted for 87 enemy aircraft in only four months. The design was not continued with, no doubt on the score of complication of production.

TECHNICAL DETAILS:

Engine: 130 h.p. Clerget.
Span: 26 ft. 7 in.
Length: 19 ft. 6 in.
Height: 9 ft. 9 in.
Weights: Empty: 993 lb.
 Loaded: 1,415 lb.
Wing Area: 257 sq. ft.
Wing Loading: 5.5 lb./sq. ft.
Armament: One Vickers gun fixed forward.
Crew: One.
Maximum Speed: 116 m.p.h. at 6,500 ft.
Service Ceiling: 20,500 ft.
Rate of Climb: 10.5 mins. to 10,000 ft.
Endurance: 2½ hours.



Country of Origin: GREAT BRITAIN
Purpose: Day Bombing
Makers: Aircraft Manufacturing Co. Ltd., Hendon
Date in Service: March 1917

D.H.4.

The D.H.4 proved to be the most effective daylight bomber. Its good service ceiling enabled it to proceed to its target out of reach of most enemy single-seaters

and; when it did have to come down, its speed and its armament both demanded respect from the enemy. Unfortunately the unusually widely-spaced cockpits caused difficulties in the really skilful co-operation between pilot and observer which aerial fighting of those days required. But the D.H.4 remained a powerful fighting machine for all that and earned a considerable reputation in the bomber squadrons of the R.F.C. and, later, the Independent Air Force.

At the end of the war over one thousand were in service with the various units, not least the R.N.A.S., which always had a high reputation in the bombing field and was the real instigator of bombing raids.

Numerous modifications were made, largely to accommodate other engines of increasing power which improved the performance considerably; the increase from the 200 h.p. R.A.F. engine to the 375-400 h.p. Rolls-Royce alone bringing the maximum speed up from 120 m.p.h. to 136 m.p.h.

TECHNICAL DETAILS:

Engine: 200 h.p. R.A.F. 3a; 240 h.p. B.H.P.; 250 h.p. Rolls-Royce; 375 h.p. Rolls-Royce Eagle.
Span: 42 ft. 6 in. *Length:* 30 ft.
Height: 10 ft.-5 in. (11 ft. with 375 h.p. engine)
Weights: (200 h.p.) Empty: 2,304 lb.
 Loaded: 3,340 lb.
 Bomb Load: 545 lb.
 (250 h.p.) Empty: 2,303 lb.
 Loaded: 3,313 lb.
 Bomb Load: 545 lb.
 (375 h.p.) Empty: 2,403 lb.
 Loaded: 3,472 lb.
 Bomb Load: 545 lb.
Wing Area: 436 sq. ft.
Wing Loading: (200 h.p.) 7.6 lb./sq. ft.
Armament: One Vickers fixed forward; two Lewis guns in rear cockpit.
Crew: Two.
Maximum Speeds:
 (200 h.p.) 120 m.p.h. at 6,500 ft.
 (250 h.p.) 117 m.p.h. at 6,500 ft.
 (375 h.p.) 136.5 m.p.h. at 6,500 ft.
Rate of Climb:
 (200 h.p.) 650 ft./min. to 6,500 ft.
 (375 h.p.) 1,042 ft./min. to 6,500 ft.
Service Ceiling: (200 h.p.) 19,500 ft.
 (375 h.p.) 22,000 ft.
Endurance: (200 h.p.) 4 hours,
 (375 h.p.) 3½ hours.



S.E.5 and S.E.5a

The S.E.5 and S.E.5a share with the Sopwith Camel the top honours as single-seater Scouts of British manufacture and design. They were the "Hurricanes" and the Camels the "Spitfires" of World War One.

As designs of the Royal Aircraft Factory at Farnborough they incorporated much of the inherent stability, which was a feature of all Factory products. This made them less easily manoeuvrable than the Camel, but they had a slightly higher speed and their very steadiness provided a better gun platform for aerial fighting.

TECHNICAL DETAILS:

Engine: (5) 150 h.p. Hispano; (5a) 200 h.p. Wolseley Viper; 200, 220, 240 h.p. Hispano.

Span: (5) 28 ft. (5a) 26 ft. 8 in.

Length: (5) 21 ft. 4 in. (5a) 21 ft.

Height: (5) 9 ft. 5 in. (5a) 9 ft. 6 in.

Weights: (5) Empty: 1,309 lb.

Loaded: 1,930 lb.

(5a) Empty: 1,531 lb.

Loaded: 2,048 lb.

Wing Area: (5) 249 sq. ft. (5a) 247 sq. ft.

Wing Loading: (5) 7.7 lb./sq. ft.

(5a) 7.8 lb./sq. ft.

Armament: One Vickers fixed forward; one Lewis gun on top of centre section.

Crew: One.

Maximum Speed: (5) 119 at 6,500 ft. (5a) 132 m.p.h. at 6,500 ft.

Service Ceiling: (5) 17,000 ft. (5a) 20,000 ft.

Rate of Climb: (5) 650 ft./min. (5a) 765 ft./min.

Endurance: (both) 2½ hours.

Country of Origin: GREAT BRITAIN

Purpose: Single seater Scout

Makers: Royal Aircraft Factory, Farnborough

Date in Service: March 1917

The S.E.5 was fitted with a 150 h.p. Hispano engine with direct drive to a two bladed airscrew. The S.E.5a was modified and had a smaller windscreen, a wider undercarriage and a geared 200 h.p. Hispano engine driving a four bladed airscrew. This proved unreliable and later S.E.5a machines were fitted with the 200 h.p. Wolseley Viper with direct drive and two bladed airscrew. The main difference between the 5 and 5a is best determined by the undercarriage, the smaller windscreen and the difference in exhausts. The 5 had stub exhausts and the 5a a pipe extending back to the pilot's cockpit.

Despite the fact that the Camel held the highest number of victories over enemy aircraft some of the greatest of the British fighter pilots scored many victories using the S.E.5a. Among these were Mannock (73 victories), Bishop (72) and McCudden (57), all of them holders of the Victoria Cross.



Country of Origin: GREAT BRITAIN

Purpose: Heavy Bombing

Makers: Handley Page Ltd., Cricklewood, London

Date in Service: Spring 1917

Handley Page O/400 Bomber

Oddly enough the R.N.A.S. was the first of the two British air services to concern itself with offensive bombing and it is thus to the Admiralty that we owe the initial development of the large night bomber which was so familiar in World War Two.

The Handley Page O/400 was developed from the O/100, which was built to Admiralty requirements drawn up as early as December, 1914. The O/100, of which three prototypes were built, was powered either with Sunbeam Cossack motors or with 250 h.p. Rolls-Royces and flew in the last month of 1915. Development work continued throughout 1916 and ironed out the early troubles. The result was the O/400, which went into production during that year with the larger Rolls-Royce Eagle power units of 275 nominal horsepower but with a maximum output of 322 h.p.

The machine was used in Squadron service early in 1917 and was given the daylight role of North Sea patrols at first, probably while "working up" the squadrons on the new type. Later in the year it was used for its intended night bomber roles in raids on Ostend and Zeebrugge and in retaliatory raids against the aerodromes of the Gothas, which were bombing London at that time. Only in September 1917 did the R.F.C. order the machine and these were mainly used in 1918 by the newly formed Independent Air Force for raids on Germany in the Rhineland until the end of hostilities.

TECHNICAL DETAILS:

Engines: 2 x 275 h.p. Rolls-Royce Eagle.

Span: (Upper) 100 ft. (Lower) 70 ft.

Length: 63 ft.

Height: 22 ft.

Weights: Empty: 8,480 lb.

Loaded: 14,022 lb.

Bomb Load: 1,792 lb.

Wing Area: 1,630 sq. ft.

Wing Loading: 8.5 lb./sq. ft.

Armament: 2 or 4 guns in nose and rear cockpits; one gun firing down and behind through trap door in fuselage. Internal bomb stowage for 16 x 112 lb. or 8 x 250 lb. bombs.

Crew: Three

Maximum Speed: 79.5 m.p.h. with full bomb load.

Rate of Climb: 30 mins. to 6,500 ft.

Service Ceiling: 7,000 ft.

Endurance: 8 hours.



Sopwith Camel

Country of Origin: GREAT BRITAIN
Purpose: Single seater Scout
Makers: Sopwith Aviation Co. Ltd., Kingston-on-Thames
Date in Service: July 1917

As a successor to the Sopwith Pup, so beloved of pilots, the Sopwith F.1 Camel was welcomed on the Western Front for its increased performance. It became a great favourite with the scout or fighter pilots of the period and has the distinction of shooting down the greatest number of enemy aircraft by any one type of Allied aircraft. From July, 1917, when No. 70 Squadron was the first Camel equipped squadron to go into action, until the end of the war, F.1 Camels accounted for 980 aircraft.

TECHNICAL DETAILS:

Engine: (F.1) 110 h.p. Le Rhone; 130 h.p. Clerget. (2F.1) 150 h.p. Bentley B.R.1; 150 h.p. Gnome Monosoupape.
Span: 28 ft. *Length:* 18 ft. 8 in.
Height: 8 ft. 6 in.

Weights: (110 h.p.) Empty: 889 lb.
 Loaded: 1,422 lb.
 (130 h.p.) Empty: 929 lb.
 Loaded: 1,453 lb.
 (150 h.p.) Empty: 962 lb.
 Loaded: 1,471 lb.

Wing Area: 231 sq. ft.
Wing Loading: (110 h.p.) 6.1 lb./sq. ft.
 (130 h.p.) 6.4 lb./sq. ft.
 (150 h.p.) 6.5 lb./sq. ft.

Armament: 2 fixed forward Vickers.
Crew: One.

Maximum Speeds:
 (110 h.p.) 118½ m.p.h. at 10,000 ft.
 (130 h.p.) 113 m.p.h. at 10,000 ft.
 (150 h.p.) 121 m.p.h. at 10,000 ft.

Service Ceiling: (110 h.p.) 24,000 ft.
 (130 h.p.) 19,000 ft.
 (150 h.p.) 20,000 ft.

Rate of Climb:
 (110 h.p.) 1,000 ft./min. initially.
 (130 h.p.) 880 ft./min. initially.
 (150 h.p.) 995 ft./min. initially.
Endurance: 2¼/2½ hours.

It has been described as the most manoeuvrable aircraft ever to be built, but it had its drawbacks for the fledgling pilot and it required to be treated with both knowledge and respect. Over 4,000 of this little fighter, which might be described as the Spitfire of World War One, were manufactured up to the end of the war.

The 2F.1 Camel, built to the order of the R.N.A.S., was equally successful and 500 of these were in existence at the Armistice. This later type was powered with the 150 h.p. Bentley B.R.1 or the 150 h.p. Gnome Monosoupape. The span was reduced to 26 ft. 11 in., but the performance was not greatly increased as far as top speed was concerned.



Country of Origin: GREAT BRITAIN
Purpose: Day Bombing
Makers: Aircraft Manufacturing Co. Ltd., Hendon
Date in Service: Late 1917

D.H.9.

The D.H.9 was a typical example of bad Staff planning related to mass production methods. After the success of the D.H.4 it was decided to produce a new version redesigned principally to improve the speed of production and to take the 200 h.p. B.H.P. engine which was already in series production. All that was achieved was an aircraft with inferior performance to the D.H.4 but with an increased bomb load. Moreover, the B.H.P. engine proved to be an unfortunate selection as it appeared to be hopelessly unreliable.

The D.H.9 went into service with the Independent Air Force, despite that Force's dislike of the type, simply because production planning had made it the only type available in sufficient numbers. Because it was there it had to be used and the machine was responsible for a great weight of bombs being dropped on German industrial targets. Many aircraft were forced to leave their formations as the B.H.P. motors went wrong, or simply could not maintain height and station with the remainder of their squadrons.

Over 2,000 were built and many, consequently, were kept in use for years after the war or converted to the later D.H.9a, which was a much more successful machine.

TECHNICAL DETAILS:

Engine: 200 h.p. B.H.P.; 230 h.p. Siddeley Puma; 250 h.p. Fiat.

Span: 42 ft. 6 in.

Length: 30 ft. 6 in.

Height: 10 ft.

Weights: (200 h.p.) Empty: 2,203 lb.
 Loaded: 3,669 lb.
 Bomb Load: 931 lb

Wing Area: 436 sq. ft.

Wing Loading: 8.4 lb./sq. ft.

Armament: 1 Vickers fixed forward; 1 or 2 Lewis guns on Scarff ring in rear cockpit.

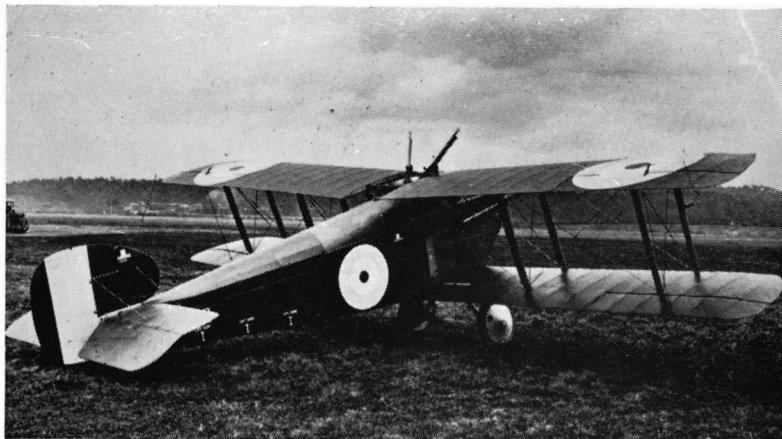
Crew: Two.

Maximum Speed: 111.5 m.p.h. at 10,000 ft.

Service Ceiling: 17,500 ft.

Rate of Climb: 500 ft./min. to 6,500 ft.

Endurance: 4½ hours.



Sopwith Dolphin

Country of Origin: GREAT BRITAIN
Purpose: Single seater Scout
Makers: Sopwith Aviation Co. Ltd., Kingston-on-Thames
Date in Service: Jan. 1918

The Sopwith 5F.1 Dolphin is unique among the successful Sopwith scouts of the war period in having an in-line engine in place of the more usual rotary. It was intended primarily for high altitude work and must go down in history as the first of the four-gun fighters. Two fixed Vickers firing forward through the airscrew arc were supplemented by two Lewis guns, which fired upwards, mounted on the main spar in front of the pilot. These were not considered popular and were frequently removed according to the individual taste of the pilot or squadron.

TECHNICAL DETAILS:

Engine: 200 h.p. Hispano-Suiza.
Span: 32 ft. 6 in.
Length: 22 ft. 6 in.
Height: 7 ft. 9 in.
Weights: Empty: 1,391 lb.
 Loaded: 2,000 lb.
Wing Area: 262 sq. ft.
Wing Loading: 7.5 lb./sq. ft.
Armament: 2 Vickers fixed forward;
 2 Lewis guns mounted on main spar
 top.
Crew: One.
Maximum Speed: 131.5 m.p.h. at 6,500
 ft.
Service Ceiling: 21,000 ft.
Rate of Climb: 6.5 mins. to 6,500 ft.
Endurance: 2½ hours.

In order to increase forward vision the Dolphin featured a pronounced backward stagger of the mainplanes and, in addition, the top mainplane was lowered and left uncovered in its centre section so that the pilot sat with his head above it. This was unpopular with pilots until crash bars were fitted above the struts and a quick exit panel provided in the side of the cockpit to cope with those occasions (not infrequent in those days of soft, muddy fields) when bad landings finished in the upside down position! In addition to its role as a high altitude fighter, the Dolphin, fitted with light bomb racks, was used for low level ground attacks, to which its good pilot visibility added success



Country of Origin: GREAT BRITAIN
Purpose: Single seater Scout
Makers: Sopwith Aviation Co. Ltd., Kingston-on-Thames
Date in Service: Aug. 1918

Sopwith Snipe

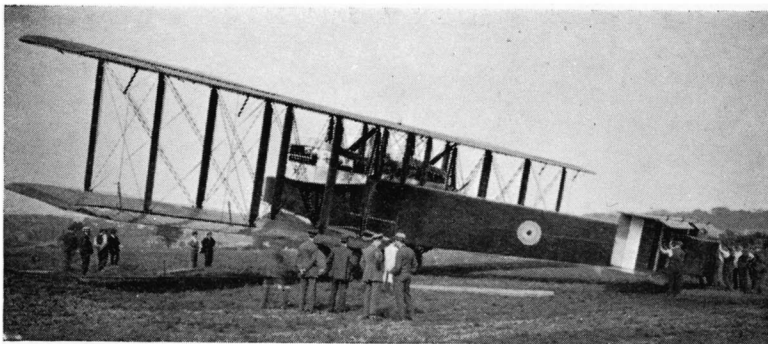
Developed to follow logically the highly successful Camel, the Sopwith 7F.1 Snipe with its 230 h.p. engine represented the last of the Sopwith scouts fitted with rotary engines. It remained in service with the R.A.F. for many years after the war, when its period of service of only three months was cut short by the signing of the Armistice in November 1918.

If anything, it was easier to handle than the Camel and it must undoubtedly have been the best single-seater scout of the Allied air forces. Nevertheless, there is some reason to suppose that it had disadvantages against the famous enemy Fokker D VII which, although slightly slower and less high powered (see page 53), had peculiar advantages in control at low speeds and at high altitudes. In the context of the last hurried German retreat the test of these two machines was never definitely proved either way.

It is noticeable that, of the Sopwith scouts, the simply constructed, slab-sided fuselage had been abandoned for the Snipe and replaced by a more complex structure of plywood bulkheads and stringers. This gave the machine a greatly improved and much more modern appearance over the earlier models. The Snipe forms a recognisable bridge in the transition to the single-seater biplane fighters of the late 1920s and early 1930s. Of the 264 Snipes which were built before the war ended only 97 saw service on the Western Front.

TECHNICAL DETAILS:

Engine: 230 h.p. Bentley Rotary.
Span: 30 ft. 1 in.
Length: 19 ft. 9 in.
Height: 8 ft. 9 in.
Weights: Empty: 1,312 lb.
 Loaded: 2,020 lb.
Wing Area: 270 sq. ft.
Wing Loading: 7.4 lb./sq. ft.
Armament: 2 Vickers fixed forward.
Crew: One.
Maximum Speed: 121 m.p.h. at 10,000 ft.
Service Ceiling: 20,000 ft.
Rate of Climb: 5.2 min. to 6,500 ft.
Endurance: 3 hours.



Handley Page V/1500

Country of Origin: GREAT BRITAIN
Purpose: Heavy Bombing
Makers: Handley Page Ltd., Cricklewood, London
Date in Service: November 1918

It was not until early in 1918 that the policy of long range bombing on industrial targets in Berlin and other German cities by home-based aircraft was decided upon—a decision which was the natural outcome of the formation of the Independent Air Force in April of that year.

It is not surprising, therefore, with the war ending with the armistice of November 11th, 1918, that the Handley Page V/1500 never carried out the tasks for which it was created. For all that, the first prototype flew in May 1918, but it crashed in June and so delayed the development programme. Nevertheless

a Flight was formed at Bircham Newton and received its three machines early in November just prior to the end of hostilities.

But as the oak grows from the acorn the policy which was responsible for the creation of the V/1500 remained in force in the R.A.F. (and was adopted by the other air forces of other nations); it culminated in the enormous night bombing weight of R.A.F. Bomber Command in the 1939-1945 war. The V/1500 was, therefore, important and significant as the forerunner of the big four-engined Handley Page Halifaxes, Short Stirlings and Avro Lancasters of the later conflict.

TECHNICAL DETAILS:

Engines: 4 x 350 h.p. Rolls-Royce Eagle VIII.

Span: 126 ft.

Length: 62 ft.

Height: 23 ft.

Weights: Empty: 15,000 lb.

Loaded: 30,000 lb.

Bomb Load: 7,500 lb.

Wing Area: 3,000 sq. ft.

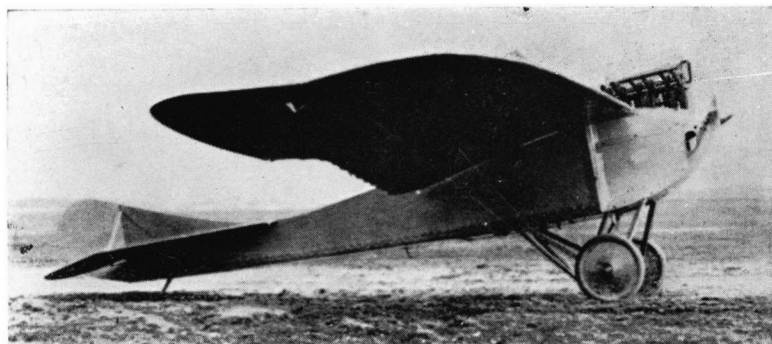
Wing Loading: 10 lb./sq. ft.

Armament: Three or five guns. Bomb racks internally for 30 x 250 lb. bombs.

Crew: Three.

Maximum Speed: 103 m.p.h. at Sea Level.

Endurance: 12/14 hours.



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Country of Origin: GERMANY
Purpose: Single or 2-seater Scout
Makers: E. Rumpler Luftfahrzeugbau G.m.b.H., Berlin-Lichtenburg
Date in Service: 1913

Rumpler Taube

The original *Taube* ("Dove") design was originated in Austria by Joseph Etrich as early as 1908 and, after considerable early flying successes, the rights were sold to the German Government, who commissioned the Rumpler concern to produce 20 machines. These were so successful that the design was standardised for issue to the German Armies and *Taubes* were manufactured by at least eight other aircraft factories. It is worth noting, therefore, that not all *Taubes* are Rumpler *Taubes*, but may well be the product of other makers.

The *Taubes* were particularly noted for their high-flying qualities at the beginning of the war and it is significant that before the war began a Rumpler *Taube* broke the then record by reaching a height just below 20,000 ft. Moreover, with clear doping on their fabric-covered wings they were relatively invisible when observing over our lines at considerable height.

When the war began more than half of the total of aircraft serving with the German armies were of this type, which was totally unarmed. As early as August 13th, 1914, however, an adventurous *Taube* pilot dropped two 4 lb. bombs by hand in a Paris suburb and shortly afterwards a second, none other than a Lt. Max Immelman, later to become a German 'ace', dropped a note on Paris calling upon its people to surrender.

TECHNICAL DETAILS:

Engine: 100 h.p. Daimler; 120 h.p. Austro-Daimler.

Span: 46 ft.

Length: 27 ft. 3 in.

Height: 9 ft. 9 in.

Weights: Empty: 682 lb.

Loaded: 1,323 lb.

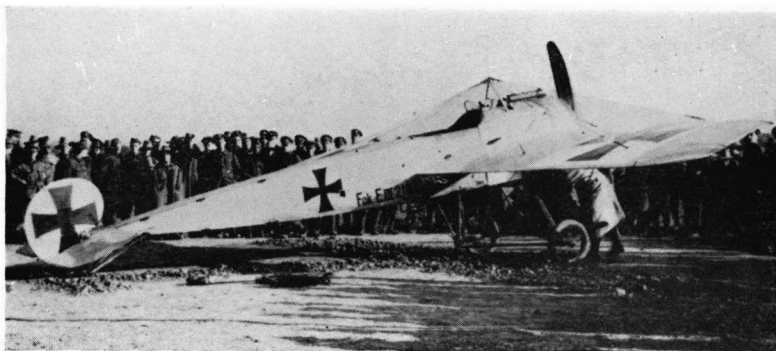
Wing Area: 301 sq. ft.

Wing Loading: 4.3 lb./sq. ft.

Armament: None.

Crew: One or two.

Maximum Speed: (1914) 75 m.p.h. at sea level.



Fokker Eindekker Scout

Country of Origin: GERMANY
Purpose: Single seater Scout
Makers: Fokker Flugzeugwerke, Schwerin
Date in Service: 1914

When air fighting began to get into its stride in the summer and autumn of 1915 the German forces found themselves in the ascendancy, due largely to the Fokker Eindekker E.I, to which the designer had fitted a workable interrupter gear to enable a forward firing gun to be fixed along the line of flight and fire through the airscrew arc. The idea for this was presented to Anthony Fokker, a Dutch designer who made his services available to the Germans, when in April, 1915, a French machine was captured with a rudimentary form of interrupter gear fitted experimentally.

TECHNICAL DETAILS:

Engine: (E.I) 80 h.p. Oberursal, (E.II) 100 h.p. Oberursal, (E.III) 130 h.p. Oberursal.

Span: (E.I and II) 36 ft. 6 in. (E.III) 37 ft. 9 in.

Length: (all) 24 ft.

Height: (E.I) 9 ft. 6 in. (E.II & III) 7 ft. 6 in.

Weights: (E.I) Empty: 787 lb.
Loaded: 1,242 lb.
(E.II) Empty: 880 lb.
Loaded: 1,340 lb.

Wing Area: 217 sq. ft.

Wing Loading: (E.I) 5.7 lb./sq. ft.
(E.II) 6.1 lb./sq. ft.

Armament: One, later two, fixed front guns.

Crew: One.

Maximum Speeds: all at 6,000 ft., (E.I) 80 m.p.h., (E.II) 85 m.p.h., (E.III) 98 m.p.h.

The power of the E.I was increased from 80 h.p. to 100 h.p., which compensated for the extra weight of the gun and its equipment (two guns were finally fitted to the E.II) and then began the first period of German ascendancy over the Western Front. It was not until the spring and summer of 1916 that the D.H.2, F.E.2b, F.E.8 and Vickers F.B.9 (all pusher types with a forward-firing gun) were able to overcome the so-called Fokker scourge. A later version was fitted with the 130 h.p. Oberursal power unit and designated the E.III.

Among others, the famous German aces Boelcke and Immelmann began their successful fighting careers on the Fokker Eindekker scouts and the latter was shot down in one in the summer of 1916 when the command of the air had swung back in favour of the allies.



Country of Origin: GERMANY
Purpose: 2-seater Recce & bomber
Makers: Luft Verherhs Gesellschaft, Johannistal
Date in Service: 1915

L.V.G. Recce/Bomber C.II

A few early L.V.G. biplanes formed part of the equipment of the German air units at the outbreak of the war in 1914, although all the earlier models were more probably fitted with the 135 h.p. Mercedes engine in place of the 175 h.p. Mercedes unit which powered the C.II of 1916. A later variation still, the C.IV, was fitted with a 225 h.p. Benz power unit which, while not increasing its flying qualities particularly, enabled the machine to carry a much heavier bomb load.

The main claim to fame of the L.V.G. C.II is that it made the first heavier-than-air bombing raid on London. It appeared at noon on November 28th over Victoria Station and proceeded to drop six bombs which caused both damage and some casualties before making for home. The machine was fortunate to escape all units of our Home Defence but it was shot down by French Anti-Aircraft battery just outside Dunkirk. This was the first daylight raid by an aeroplane on London and it was followed in 1917 by similar raids carried out by the giant Gotha bombers (see page 50).

Although an early type, it remained in use as late as 1917.

TECHNICAL DETAILS:

Engine: 130 h.p. Mercedes; 175 h.p. Mercedes; 225 h.p. Benz.

Span: (upper) 42 ft. 9 in.

Length: 26 ft. 6 in.

Weight: Empty: 1,860 lb.

Armament: One fixed forward gun, one free gun in rear cockpit; also bomb racks in rear cockpit.

Crew: Two.

Maximum Speed:

(175 h.p.) 90 m.p.h. at sea level.
(225 h.p.) 95 m.p.h. at sea level.



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Aviatik C.II

Country of Origin: GERMANY
Purpose: 2-seater Recce/bomber
Makers: Automobil & Aviatik A.G., Mulhausen
Date in Service: 1915

The Aviatik C.II was largely contemporary to the Albatros C.III (see page 45) and not dissimilar from it in appearance. It was used also for reconnaissance, artillery observation and short range bombing sorties in daylight. Although of lesser performance than the Albatros it was not without success as a fighting machine and was never considered as easy prey to Allied machines in the earlier stages of its appearance on the Western Front.

It was used in attempts to bomb Paris, and the French ace René Dormé made his name first by dispersing a flight of six Aviatik machines on the way to Paris on April 3rd, 1916.

There was a considerable measure of standardisation among machines of specific types for specific purposes in the German air forces and comparison of the Aviatik C.II with the Albatros C.III (see page 45) and the L.V.G. C.II (see page 43) shows this to be much more than the use of similar power units. All three of these two-seater biplanes show similar characteristics of layout and it is only in detail that the differences become more obvious. Without doubt, the Albatros remained the most handsome of the three.

TECHNICAL DETAILS:

Engine: 160 h.p. Mercedes.
Span: (upper) 40 ft. 8 in.
(lower) 37 ft. 5 in.
Length: 26 ft.
Height: 10 ft. 5 in.
Weights: Empty: 1,863 lb.
Loaded: 2,831 lb.
Wing Area: 430 sq. ft.
Wing Loading: 6.6 lb./sq. ft.
Armament: One forward fixed gun;
one free gun for observer.
Crew: Two.
Maximum Speed: 82 m.p.h. at sea level.
Service Ceiling: 11,500 ft.
Endurance: 4½ hours.
Rate of Climb: 22 mins. to 6,000 ft.



Country of Origin: GERMANY
Purpose: 2-seater Recce/Bomber
Makers: Albatros Werke, Johannistal, Berlin
Date in Service: 1916

Albatros C.III Scout

The Albatros C.III 2-seater reconnaissance aircraft was used on numerous duties from 1916 until the end of the war in 1918. Many famous German pilots began their careers in these machines, including von Richtofen, Udet and Goering, who was to lead the German Air Force in the Second World War.

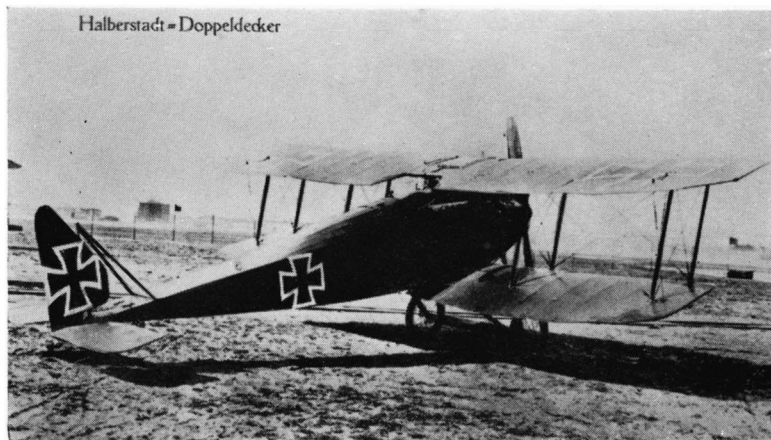
Earlier versions of this machine were in use in 1914 and 1915 and in January, 1915, two Albatros 2-seaters carried out the first night bombing operation of the war with a raid on Dunkirk. An even later version, known as the C.V., was fitted with a more powerful Benz power unit of 225 h.p. and given a slightly increased span.

Constructed of wood covered with fabric, the Albatros C.III and others of the series were notable for the well streamlined entry at the nose of the fuselage and the large spinner over the airscrew boss. Compare this, for example, with the ugly and blunt nose entry of the L.V.G. C.II (see page 43). It is, moreover, a family likeness and is to be seen as a feature on other Albatros types and on the Albatros single seater scouts (see page 47).

The aircraft was successfully used for day and night bombing, artillery spotting and all general reconnaissance duties, and was a popular mount with its pilots.

TECHNICAL DETAILS:

Engine: 170 h.p. Mercedes; (C.V.) 225 h.p. Benz.
Span: 38 ft. 6 in.
Length: 27 ft. 6 in.
Height: 8 ft. 4 in.
Weights: Empty: 1,928 lb.
Loaded: 3,044 lb.
Wing Area: 405 sq. ft.
Wing Loading: 7.4 lb./sq. in.
Armament: One fixed gun forward; one free gun in rear cockpit.
Crew: Two.
Maximum Speed: 87 m.p.h. at sea level.
Service Ceiling: 12,000 ft.
Rate of Climb: 9 mins. to 3,000 ft.; 22 mins. to 6,000 ft.
Endurance: 4½ hours.



Halberstadt Scout

Country of Origin: GERMANY
Purpose: Single seater Scout
Makers: Halberstadter Flugzeugwerke, Near Hartz.
Date in Service: 1916

The Halberstadt D.II and the Albatros D.I (see page 47) scouts came on the scene after the D.H.2 and other British pusher types had wrested supremacy from the Fokker Eindekker monoplanes. And despite the fact that the Halberstadt was slightly the earlier of the two, and therefore the first German biplane to be fitted with interrupter gear and a forward-firing gun, it was the Albatros which became most popular with the German pilots.

Nevertheless the Halberstadt was treated with full respect by Allied pilots, from whom it did much to wrest the hard won superiority gained largely by the D.H.2, which was no match for the new German machines.

It was not easy to fly and many German pilots considered it extremely unsafe on account of its peculiar tail layout. This is well shown in the photograph above. The complete absence of any fixed fin or tail plane surfaces resulted in extremely sensitive controls in elevation and azimuth and must have required a high order of skill and concentration from its pilots. It was withdrawn from active operations on the Western Front in mid-1917, by which time it was badly outclassed by Allied fighters and later German types, notably the later marks of Albatros and the Pfalz.

TECHNICAL DETAILS:

Engine: 120 h.p. Argus; 160 h.p. Mercedes.

Span: (upper) 28 ft. 8 in.
(lower) 25 ft. 8 in.

Length: 23 ft. 10 in.

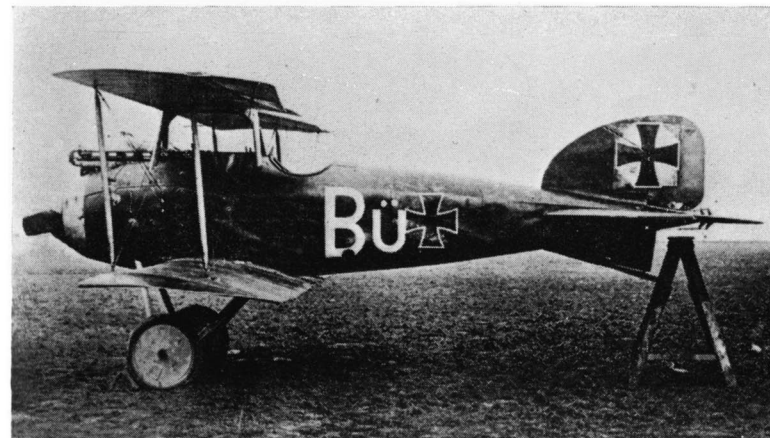
Height: 7 ft. 9 in.

Wing Area: 256 sq. ft.

Armament: One or two Maxim guns fixed forward.

Crew: One.

Maximum Speed: 90 m.p.h. at sea level.



Country of Origin: GERMANY
Purpose: Single seater Scout
Makers: Albatros Werke, Berlin
Date in Service: Sept. 1916

Albatros D.I. Scout

The first of the Albatros scouts, the D.I., was selected by the great German ace, Oswald Boelcke, to overcome the British pusher types which had, in their turn, overcome the Fokker Eindekker scouts during the 1916 fighting. Only the Sopwith Pup (see page 30) and the S.P.A.D.7 (see page 29) could meet it on anything like equal terms, but these were not in service in sufficient numbers to affect the issue materially. Together with the Halberstadt scouts (see page 46), the Albatros regained for Germany a large measure of air superiority.

Study of the photograph (which is of the D.I.) will show that the Albatros had a fuselage shape unusually rounded and smooth for its period and no British fighter shows anything similar until the much later Sopwith Snipe (see page 39). Boelcke used the Albatros for the first of his big *jagstaffeln*, or fighter wings, and led his first "circus" as early as September 16th, 1916, with disastrous results on that occasion to six F.E.2d and two B.E.2c aircraft, which he met and totally destroyed.

The D.II Albatros was a slightly modified version of the D.I., but with the Benz motor in place of the Mercedes. The D.III was more considerably modified and the plan form of the main planes, and their struts, showed considerable changes. The power units were more powerful still and the type became a serious menace to the Allied air forces, since its improved performance made it more effective and responsible during April, 1917, for the destruction of 368 British aircraft.

TECHNICAL DETAILS:

Engine: (D.I) 160 h.p. Mercedes. (D.II) 160 h.p. Benz. (D.III) 175 h.p. Mercedes; 200 h.p. Austro-Daimler.

Span: (D.I) 28 ft. 3 in. (D.II) 29 ft. 7 in.

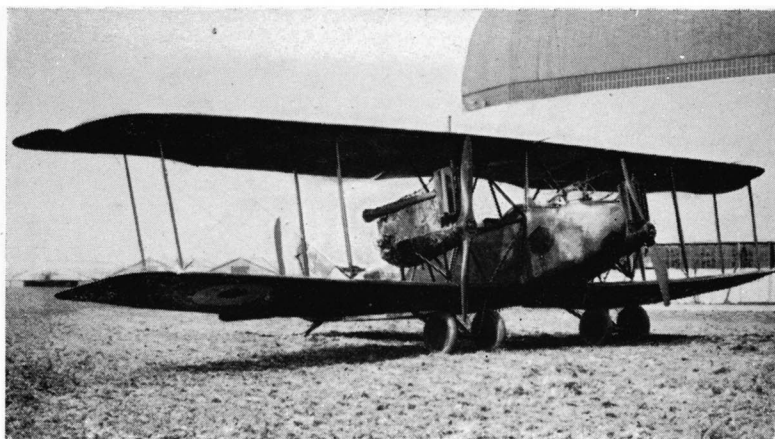
Length: (D.I) 24 ft. (D.II) 24 ft. 2 in.

Height: (D.I) 9 ft. 6 in. (D.II) 9 ft. 3 in.

Armament: (all) Two Spandau guns fixed forward.

Crew: One.

Maximum Speeds: (D.I) 110 m.p.h. at sea level. (D.II) 120 m.p.h. at sea level.



A.E.G. G IV Bomber

Country of Origin: GERMANY
Purpose: Heavy Bombing
Makers: Allgemeine Elektricitäts Gesellschaft, Berlin
Date in Service: Early 1917

Like the type C.IV (see page 52) from the same factory, the A.E.G. G.IV was another early example of the use of metal construction for aircraft. The main spars in the wing structure and their compression members were made from steel tube and the shape achieved with light wooden formers. The longerons for the fuselage were also of steel tube as was the tail unit.

The G.IV belonged to the category that the German forces called 'battle-planes'. It went first into service on the Macedonian Front, where it came up against only obsolescent R.F.C. machines and therefore caused great bomb damage. On the Western Front from the summer of 1917, however, it secured

less startling results as it found the opposition both in planes and anti-aircraft defences, considerably tougher meat.

An example was captured almost intact by the Allied forces and evaluated in flight in this country, where it was found to be deficient in elevator control and extremely difficult to land. The absence of a passenger in the front gunner's cockpit apparently made the machine almost uncontrollable. It is certainly an ugly machine, but it is interesting to note the two two-wheel undercarriage units.

TECHNICAL DETAILS:

Engines: 2 x 260 h.p. Mercedes.

Span: (upper) 60 ft. 2 in.
 (lower) 56 ft. 11 in.

Length: 32 ft. 4 in.

Armament: Single free Parabellum gun in front and in rear cockpits; heavy bombs beneath fuselage, lighter bombs beneath centre section.

Crew: Three.

Maximum Speed: 86 m.p.h. at 9,000 ft.

Rate of Climb: 24 mins. to 9,000 ft.



Country of Origin: GERMANY
Purpose: Single seater Scout
Makers: Pfalz Flugzeugwerke, Speyer-on-Rhine
Date in Service: Mid-1917

Pfalz Scout

The Pfalz D.III scout was considered as a replacement for the Albatros and Halberstadt scouts on the Western Front in mid-1917 but the sudden success of the Fokker Triplane (see page 51) seriously outclassed it. It was used, however, as re-equipment for lesser squadrons and with the sudden withdrawal of the Triplane due to technical snags the Pfalz and the later versions of the Albatros formed the major equipment of the German units until the arrival of the Fokker D.VII (see page 53) in May of 1918.

Although largely outclassed for speed by the new Allied types such as the Camel, S.E.5a and later S.P.A.D. machines, the Pfalz scored successes with its extreme aerobatic qualities. It was also proved particularly successful in attacking observation balloons and was used frequently in this role.

Study of the performance details show immediately its main disadvantage; it took some 17 minutes to reach 10,000 feet in comparison with the 5-6 minutes for the Camel and S.E.5a types. Nevertheless, in the early months of 1918, before the successful D.VII came on the scene, the DXII was a great part of the German fighter force and shared with the Albatros the same type of clean, rounded fuselage design, the smooth transfer at the lower mainplane root being particularly noticeable.

TECHNICAL DETAILS:

Engine: 160 h.p. Mercedes.

Span: (upper) 30 ft. 11 in.
 (lower) 26 ft. 8 in.

Length: 23 ft. 2 in.

Height: 8 ft. 8 in.

Weights: Empty: 1,532 lb.

Loaded: 2,056 lb.

Wing Area: 240 sq. ft.

Wing Loading: 8.56 lb. sq. ft.

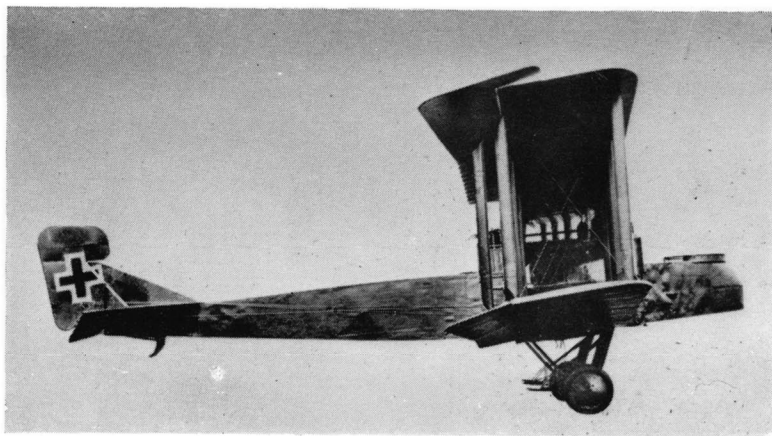
Armament: Two Spandau guns fixed forward.

Crew: One.

Maximum Speed: 103 m.p.h. at 10,000 ft.

Service Ceiling: 17,500 ft.

Endurance: 2½ hours.



Gotha Bomber

Country of Origin: GERMANY
 Purpose: Heavy Bombing
 Makers: Gothaer Waggonfabrik, Berlin
 Date in Service: June 1917

Towards the end of 1916 it was obvious to the German High Command that the Zeppelin airships were far too vulnerable to continue in use for air raids on London and other targets in Britain. As a result of this appreciation a number of heavy bombers were developed to take over this role from the lighter-than-air machines. By far the most successful (and the name Gotha became a household word in Britain, the receiving end of their raids) were the twin-engined Gotha machines.

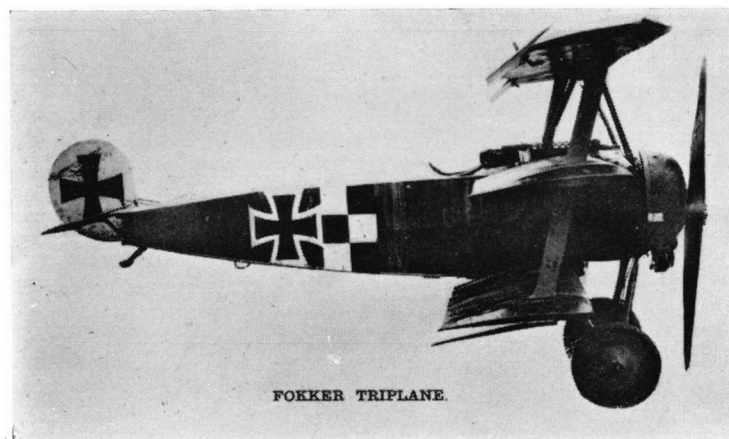
The earlier Gotha G.I was fitted with 160 h.p. Mercedes engines with a span of only 71 ft. It was not until the G.IV and G.V models that the span was increased to 77 ft. and the power units replaced by the 260 h.p. Mercedes engines.

Daylight raids on London began with the G.V in June, 1917, causing two squadrons of British scouts to be withdrawn from the Western Front to supplement Home Defence in Britain. By August, therefore, resistance was such that the policy was changed again and the machines were used only for night raids. These continued until May 1918, by which time night defences here had made even these raids too expensive for the Germans to continue.

Nevertheless the raiding by Gotha and giant aircraft caused great disruption to industry in this country out of all proportion to the number of machines used or the weight of bombs dropped. Much was learned from it which was put to use by us in the 2nd World War.

TECHNICAL DETAILS:

Engines: 2 x 260 h.p. Mercedes.
 Span: (upper) 77 ft. 8 in.
 (lower) 71 ft. 10 in.
 Length: 40 ft. 9 in.
 Weights: Empty: 6,039 lb.
 Loaded: 8,763 lb.
 Bomb Load: 900 lb.
 Wing Area: 971 sq. ft.
 Wing Loading: 8.9 lb./sq. ft.
 Armament: One free Parabellum machine gun in front and in rear cockpits; one fixed Parabellum under fuselage firing to the rear; racks for 12 bombs in fuselage and two externally.
 Number of Crew: Three.
 Maximum Speed: 87.5 m.p.h. at sea level.
 Endurance: 4 hours.



FOKKER TRIPLANE.

Fokker Triplane

Country of Origin: GERMANY
 Purpose: Single seater Scout
 Makers: Fokker Flugzeugwerke, Schwerin
 Date in Service: Aug. 1917

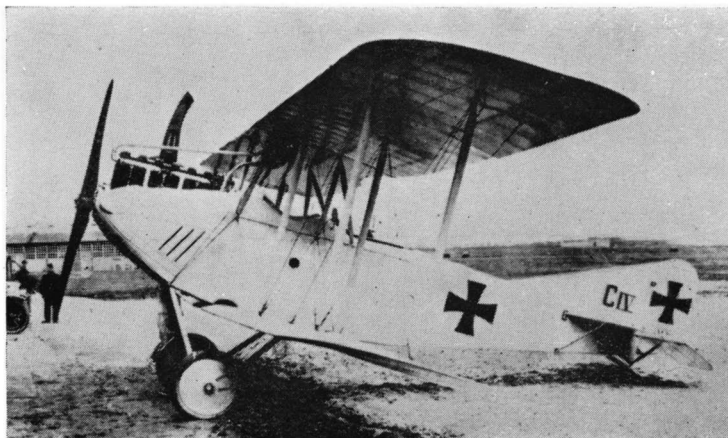
The career of the Fokker Dr.I Triplane was brief but effective. First used in August, 1917, by Werner Voss who proceeded to shoot down 22 British machines in 21 days over Ypres, it was taken up by von Richtofen and used by him to equip his famous Richtofen Circus.

Not particularly fast, it gained a temporary supremacy by reason of its handsome rate of climb and extreme manoeuvrability. In a dive, however, it had a nasty habit of losing the fabric from its upper mainplane and sometimes the whole structure collapsed. This fault caused its withdrawal from service at the end of 1917 after only a brief period of use. Von Richtofen himself, who was devoted to the type, continued to use a specially modified and strengthened Triplane which was personally presented to him by Anthony Fokker. He was killed in this in April, 1918 and Voss, who initiated the early success of the type, was killed in September, 1917, also in a Triplane.

It is thought that Fokker gained the idea of the Triplane from the Sopwith version (see page 32) which appeared first on the scene. It is also thought possible that Voss's early success might well be due to the fact that his Allied victims over Ypres mistook his Fokker for a friendly R.N.A.S. Sopwith Triplane and refrained from evasive action until it was too late.

TECHNICAL DETAILS:

Engine: 110 h.p. Oberursel.
 Span: (upper) 23 ft. 7 in., (middle) 20 ft. 6 in., (lower) 18 ft. 9 in.
 Length: 19 ft.
 Height: 9 ft.
 Weights: Empty: 982 lb.
 Loaded: 1,259 lb.
 Armament: Two Spandau guns fixed forward.
 Crew: One.
 Maximum Speed: 121.5 m.p.h. at 8,000 ft.
 Service Ceiling: 20,000 ft.
 Rate of Climb: 6 mins. to 10,000 ft.
 Endurance: 2½ hours.



A.E.G. C.IV

Country of Origin: GERMANY
Purpose: 2-seater Reconnaissance
Makers: Allgemeine Elektrizitäts Gesellschaft, Berlin
Date in Service: Late 1917

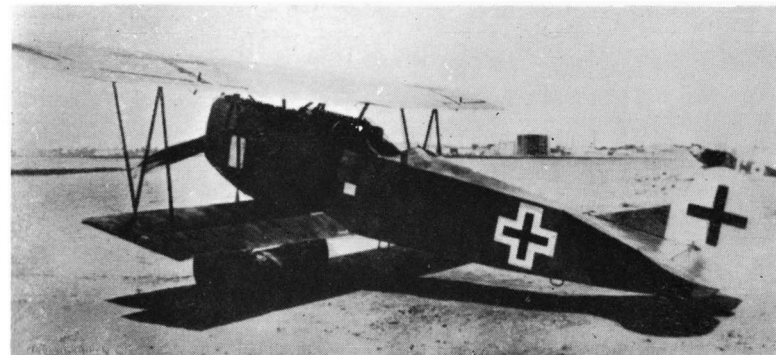
The makers of this machine did much to sponsor the use of metal in aircraft construction and the Germans were in advance of the Allies in this structural feature. The A.E.G. C.IV reconnaissance 2-seater, like the A.E.G. G.IV heavy bomber (see page 48), had wings the main structure of which was welded steel tube (including main spars of 40 mm. tube) with wooden ribs which were fabric-covered. The fuselage was a primary box structure of welded steel tube decked on the top with plywood and covered at the sides and bottom by fabric.

TECHNICAL DETAILS:

Engine: 175 h.p. Mercedes; 200 h.p. Benz.
Span: (upper) 42 ft. 7 in.
 (lower) 41 ft. 2 in.
Length: 20 ft. 8 in.
Wing Area: 425 sq. ft.
Armament: One forward fixed gun; one free gun in rear cockpit (plus one rear downward gun on J.I.); racks for 4 small bombs under centre section.
Crew: Two.
Maximum Speed: 86 m.p.h. at sea level.

An armoured type of the C.IV, known as the J.I, was specially developed for ground attack roles and during 1918 all the German ground attack units were equipped with these machines. They were remarkably successful and fairly immune to attack with machine gun bullets, thanks to over 800 lb. of armour plate protecting the crew and other vital parts. They were nicknamed "Flying Tanks" by our airmen and ground troops.

The J.I version, in addition to its protective armour, also carried an extra machine gun firing backwards and downwards at 45 degrees.



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Country of Origin: GERMANY
Purpose: Single seater Scout
Makers: Fokker Flugzeugwerke Co., Schwerin
Date in Service: May 1918

Fokker D.VII

The early success of the Fokker Triplane in August and September of 1917 were short lived and did little to give back to Germany the dominance in the air which the S.E.5 & 5a, Camel and Spad types were holding for the Allies. Consequently the German High Command ordered all German aircraft manufacturers to produce new fighter prototypes. These were all tested together by both test pilots and front line combat pilots from the squadrons in December, 1917. By far and away the most superior design was the Fokker D.VII, which was put into quantity production immediately, not only at Fokker's own factory but also in the Albatros and A.E.G. works.

A conventional-looking machine, with wings of wooden construction and a fuselage built of tube steel covered with fabric, the D.VII went a long way to recapturing air supremacy for Germany in the last months of the war by reason, not of its maximum performance figures (which were not unusually impressive), but of its ability to retain good control at heights where Allied aircraft were "soggy" to handle.

By the end of the war almost every Scout Squadron on the Western Front had been equipped with this fine machine, the qualities of which earned special recognition in the Armistice Agreement, which specifically named the D.VII to be handed over to the Allies.

TECHNICAL DETAILS:

Engine: 160 h.p. Mercedes; 180 h.p. Mercedes; 185 h.p. B.M.W.; 220 h.p. Mercedes; 220 h.p. Mercedes.
Span: (upper) 29 ft. 4 in.
 (lower) 22 ft. 10 in.
Length: 25 ft.
Height: 9 ft. 3 in.
Weights: (160 h.p.) Empty: 1,540 lb.
 Loaded: 1,936 lb.
Wing Area: 236 sq. ft.
Wing Loading: 8.33 lb./sq. ft.
Armament: Two Spandau guns fixed forward.
Crew: One.
Maximum Speeds:
 (160 h.p.) 120 m.p.h. at sea level.
 (185 h.p.) 124 m.p.h. at sea level.
 (220 h.p.) 135 m.p.h. at sea level.
Service Ceiling: (160 h.p.) 18,000 ft.
 (185 h.p.) 21,000 ft.



Fokker D.VIII

Country of Origin: GERMANY
 Purpose: Single seater Scout
 Makers: Fokker Flugzeugwerke Co., Schwerin
 Date in Service: Oct. 1918

The Fokker D.VIII, another outright winner at the second of the German High Command's 'competitions' at Johannisthal, reverted to the monoplane design of the earlier successful Fokker type but had many features common to the Fokker D.VII (see page 53). The wing was once more made with box spars of wooden construction and the fuselage of tube steel covered with fabric.

Only about thirty six Fokker D.VIII machines saw any service on the Western Front before the Armistice was signed on November 11th, 1918, but it held the distinction of being the last type of German aircraft to shoot down Allied machines. In an action on November 6th, 1918, the Fokker D.VIII machines of von Richtofen's old 'circus' destroyed three S.P.A.D. scouts.

As well as returning to the monoplane design for the D.VIII, Fokker reverted to the use of the rotary engine which he had not used since his earlier Eindekker E type machines. This had advantages to the German supply position since the general adoption throughout the factories of the in-line Mercedes, Benz and Austro-Daimler engines as a matter of High Command policy left almost un-

touched the large source of Oberursel rotary engines (Le Rhone units which had been manufactured under licence in Germany from before the war) still being made in small numbers. The production of the D.VIII was further delayed by Government insistence on the fitting of a stronger rear spar in the mainplanes. This caused unexpected wing distortions and only reversion to Fokker's original design cured the trouble.

TECHNICAL DETAILS:

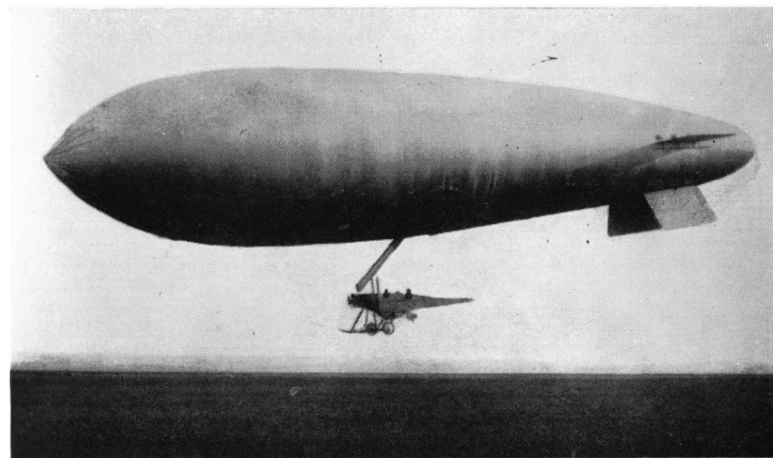
Engine: 140 h.p. Oberursel Rotary;
 200 h.p. Goebel Rotary.
 Span: 27 ft. 6 in.
 Length: 19 ft. 6 in.
 Armament: Two Spandau guns fixed forward.
 Crew: One.
 Maximum Speed: 124 m.p.h. at sea level.
 Endurance: 1½ hours.

Lighter-than-air machines

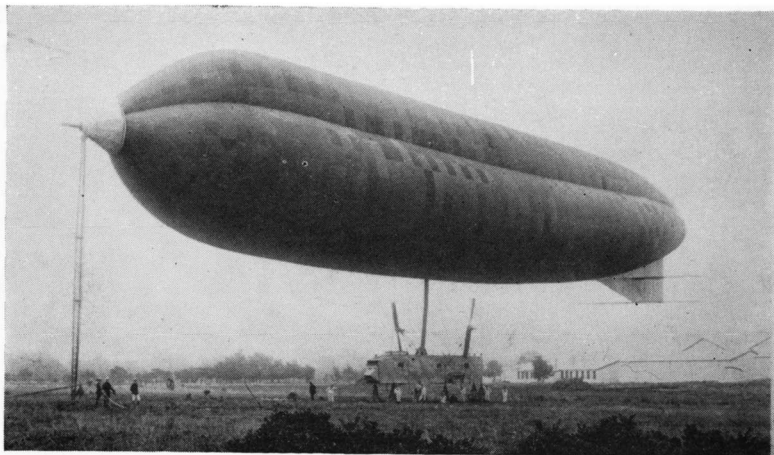
ON January 1st, 1914, several months before the declaration of war, all the official British Airships which existed or which were under construction were handed over to the Admiralty, which became solely responsible for the operation and development of airships in this country. The machines handed over included the *Willows IV*, a Parseval machine acquired in 1913, and three ships designed and produced at the Royal Aircraft Factory at Farnborough, the *Delta*, *Gamma* and *Eta*.

The Admiralty were quick to appreciate the role that airships could play in war as supplementary vessels for sea patrols. In fact, Naval Airships Nos. 3 and 4 were used on such duties to cover the crossing of the British Expeditionary Force to France in August, 1914.

Production, however, was the key to the situation and for that reason the building programme was at first confined to pressure airships (i.e. those airships the shape of which was maintained by the pressure of the gas within the main, flexible envelope) and to expedite this programme normal aeroplane fuselages were employed as airship cars in the first series of thirty new Naval Airships. The prototype of the S.S. (Sea Scout) type flew its trials in March 1915 and consisted of the gas bag of the *Willows IV* with the fuselage of a B.E.2c aeroplane, fitted with its normal engine and airscrew, slung beneath as car. Something in the nature of 150 of these simple craft were built during the war years, all of



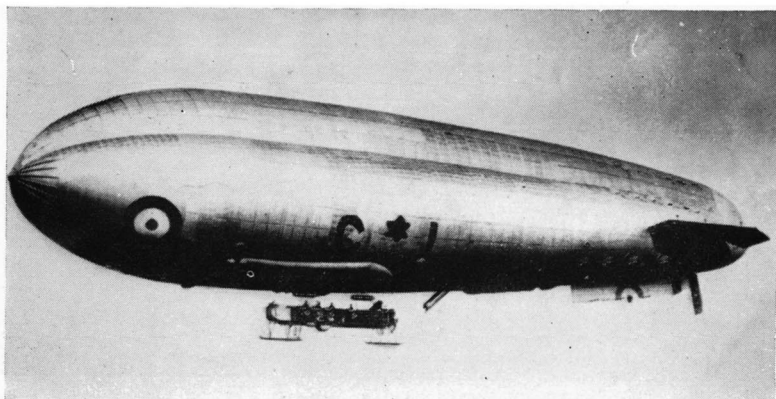
One of the S.S. (Submarine Scout) series of naval airships built early in the war. Note the B.E.2c aircraft fuselage complete with engine, used as crew car.



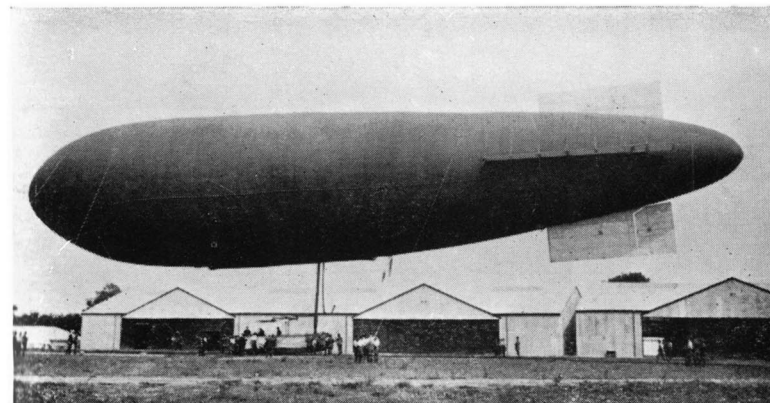
H.M.A. *Astra Torres* (Naval airships No. 3) shows well the trefoil structure of these types.

slightly varying sizes and specifications. The S.S.1 had a gas capacity of only 20,500 cubic feet but later machines varied considerably up to 60,000 and 70,000 cubic feet. These machines were intended to have a cruising speed of 40 m.p.h. and an endurance of 16½ hours and a patrol of eighteen hours is recorded.

The S.S. type was followed in 1917 by the S.S. "P", which had a slightly improved performance. The latter type was quickly followed by the S.S. "Zero",



The first of the C star airships which were so successful on naval patrol work.

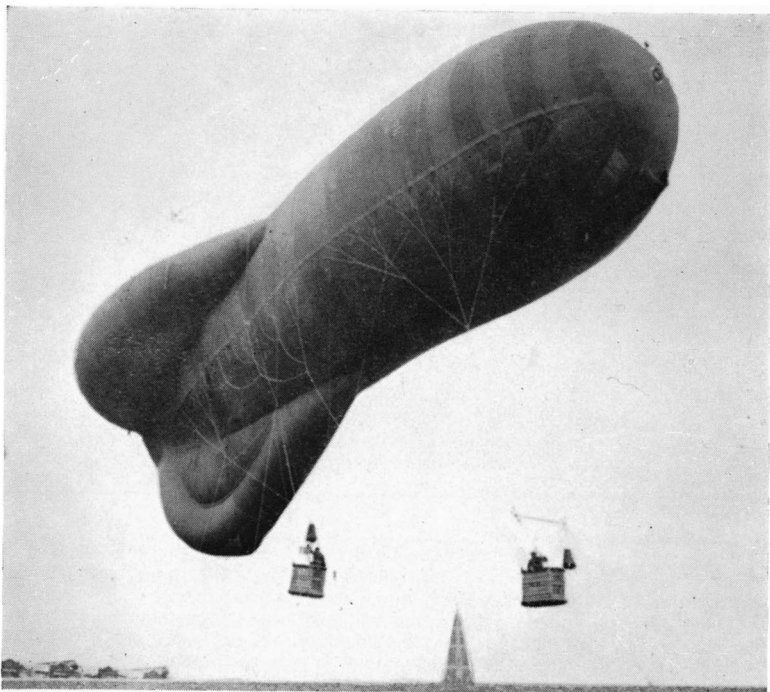


The non-rigid airship *Delta* built in 1913.

which normally combined a gas capacity of 70,000 cubic feet with a speed of 45 m.p.h. The S.S. Z.39, however, completed a cruise of fifty hours and fifty-five minutes during the summer of 1918; an exceptional performance. Development was very rapid in those days and the S.S. "Z" series was superseded by the S.S. "Twin", which incorporated the streamlined car of the S.S. "Z" with two engines in order to reduce the dangers and difficulties due to engine failure, which was not infrequent in those days.

In another branch of development another new type-made its appearance towards the end of 1915. These, the "C" (Coastal) Class of machines, were designed with a three-bag section (similar to the *Astra-Torres* Trefoil design in France before the war) and a cubic capacity of 170,000 cubic feet of gas. They were therefore considerably larger than the S.S. machines and were designed for greater speeds and greater ranges. The design incorporated the use of two engines in the car, a much strengthened nose and the fitting of defensive armament, which included the mounting of a machine gun on top of the envelope. The performance was outstanding and one of these machines remained in commission for two years and seventy-five days continuously; in that period it flew more than 66,000 miles, averaging three hours' flying each day. In 1917 these aircraft were followed by the "C Star" class, which were of similar design but had increased range and speed. Twelve hours endurance at 60 m.p.h. was a frequent performance and two flights are recorded which lasted well over 30 hours each.

The ultimate development of the pressure type of airship in this country was reached with the production of the "N.S." (North Sea) machines which were intended for Fleet co-operation and general convoy duty. Using once again the "*Astra-Torres*" type of trefoil section for the envelope, they had a gas capacity of 360,000 cubic feet, a length of 262 feet with a width of 57 feet and a height of 69 feet. Great advances and improvements were the separate engine cars, the fully enclosed car for the operating crews, and the suspension of these



The Caquot kite balloon which was used for artillery and other observation purposes. Two observers were carried. The cone-like attachments above the basket are parachute packs.

and other items such as fuel tanks, etc., directly from the envelope, thus distributing the loads more evenly. Previously all such items were concentrated in the single car, which was both crowded and the sole focal point of all extra-envelope weights.

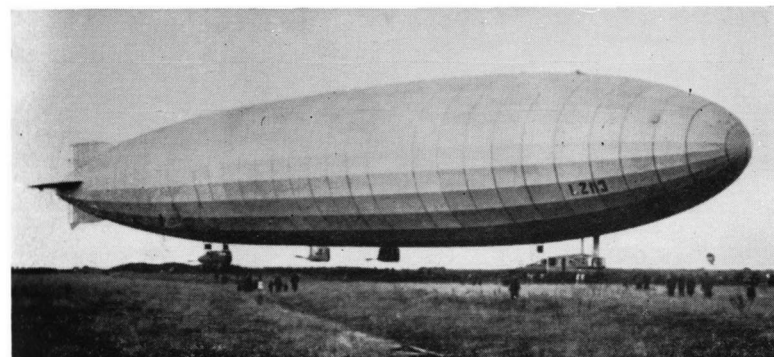
These machines were the last of the non-rigid airships developed in this country and probably, even today, represent the best of their type, the only improvements which could contribute to them now being the increase in modern engine and airscrew efficiency. Their endurance was normally 24 hours and in 1919 the N.S.11 completed a flight of 4,000 miles in 101 hours.

In Germany interest and enthusiasm centred round the Zeppelins and great faith was put in their powers as units of destruction. At least one "Gross" non-rigid machine, however, is stated to have been used on patrol duties in the Baltic and the German Parseval airship, P.L.19, built early in 1914 had the doubtful honour of being the first airship used in the war. It was later destroyed on a bombing trip.

Before the war had even begun, twenty-five of the rigid Zeppelins had been constructed. The programme of building and development was taken over by a Dr. Arnstein at the declaration of war and during his period of control he was responsible for the building of a further 88 aircraft of this type. These progressed in gas capacity from one million cubic feet to over two and a half million cubic feet, in engine power from 700 h.p. to 2,100 h.p., in ceiling from 6,000 feet to nearly 30,000 ft. and in length from 520 feet to 745 feet. These were enormous advances from the early days; indeed sufficient advance had been made in the years between 1900 and 1914 to persuade the German Government (and through them, the German people) that the destruction of the Allied war industries in air raids by these machines could be, and would be, decisive. That this was not, in fact, the case was largely due to the tremendous advances made within the same period which gave the aeroplane greater advantages of speed, fire power and manoeuvrability. The size of its enormous envelope filled with an easily inflammable gas proved too great a handicap to the airship in combat with the less vulnerable aeroplane.

Nevertheless the Zeppelin achievement was considerable. It was quickly appreciated in Germany, as in England, as a vehicle suitable for sea patrol work and the Zeppelins were as active, or more active, in this task than in bombing. The first bombing raid took place over Antwerp on August 25th, 1914, and the first on this country over Essex on January 19th, 1915. In all there were some fifty-three operations over this country, which had to be carried out under cover of darkness, and at no time can the bombing results be held to have justified the expenditure of such large and expensive aircraft.

An improved type of Zeppelin was produced in 1915 which incorporated several new ideas. It had an internal keel gangway; three cars, of which the foremost was for crew and control purposes only; four engines driving four two-bladed airscrews; a much shorter parallel envelope length; and balanced monoplane rudders and elevators. It was followed in 1916 by the "Super Zeppelins", of which the first was the L.30. These were fitted with six engines driving two-bladed airscrews and used a considerably modified girder construction in the hull.



LZ 113, one of the super class of Zeppelins of 1917. The difference in outline of the rigid type can be clearly seen.

In 1917, on March 8th, Count Zeppelin died, but his death in no way curtailed the enormous building programme which the war had brought about. In all some 113 Zeppelins were built between 1898 and 1919 and their contribution to general reconnaissance work and sea scouting was considerable. In November, 1917, the L.59, one of the "Super Zeppelins", carried out a record flight. It left Jamboli in Bulgaria to go to the assistance of the German East African colonies with ten tons of stores and equipment for delivery. It left on November 21st, but after passing Khartoum, was informed by wireless of the surrender of the remaining forces in German East Africa and so turned back, landing at Jamboli again on November 25th. It was a performance of considerable credit, since the machine had journeyed about 4,000 miles in 97 hours with a large load and returned to its base with fuel sufficient for a further cruise of two or three days.

Although the Zeppelin was unrivalled for its class and its uses as a military and naval weapon, development and construction on rigid machines was carried out in Britain. The contract for the building of the first British rigid airship, the R.9, was placed in 1914 but as it was not completed until 1917 it was of little use, being completely out of date and outclassed by much earlier Zeppelins. A speed of 45 m.p.h. compared ill with the 60-70 m.p.h. of the 1917 Zeppelins or the 60 m.p.h. of our own "C Star" non-rigid machines. Four other aircraft, R.23, R.24, R.25 and R.26, were built in the same year that saw the completion of the R.9, but they were merely successors to that machine incorporating numerous improvements and refinements. There was no doubt of their poor showing in comparison with the Zeppelins and it was the capture of LZ.65, one of the "Super Zeppelins", after a forced descent in this country in 1916, which provided our designers with the fullest details of Zeppelin design and construction. With some of this important information as a basis the R.34 Class (two machines—the R.33 and R.34) was put in hand but was not completed until after the war when, in 1919, the R.34 became the first lighter-than-air machine to cross the Atlantic successfully. The only other machines to be completed before the end of the war in this country were the R.27, R.29 and R.31, but none of these could be considered a success either in contrast to enemy machines or in comparison with the non-rigid types being successfully flown by the R.N.A.S

ACKNOWLEDGEMENTS

Information on this historic period of aviation history has been sought and garnered from many sources. It is necessary to record a great debt of gratitude for such books as The Clarendon Press six volume history of *The War in the Air* by Sir Walter Raleigh and H. A. Jones; to several volumes of Janes *All the World's Aircraft* and to *Aircraft of the 1914-1918 War* by O. G. Thetford and D. A. Russell. In addition, wide reading of all the various biographies, autobiographies and books of reminiscences by those who served in the flying services at that time has helped to pin down facts and to paint in the scene as background. Old copies of the early periodicals have also been invaluable.

The Author also freely acknowledges the willing co-operation he has received in his search for photographic material. Messrs. Short Brothers and Harland Ltd., Handley Page Ltd., The De Havilland Aircraft Co. Ltd., the Hawker Aircraft Ltd. (successors to the Sopwith Aviation Co. Ltd.), Bristol Aircraft Ltd. (successors to the British & Colonial Aeroplane Co. Ltd.), Vickers-Armstrongs (Aircraft) Ltd., and A. V. Roe & Co. Ltd., who have all provided photographs of some of their own machines.

By far the greater number of illustrations have been made available by the permission of The Director General of The Imperial War Museum, London. Co-operation here was freely and courteously given and has done much to enhance the value this book may have. Imperial War Museum photographs are to be found on the following page.

J.L.

LIST OF IMPERIAL WAR MUSEUM PHOTOS

PART I.

All photos except ' Bristol F2B in Flight '
' Handley Page O/400 setting out

PART II.

Bleriot XI
Maurice Farman Longhorn
" " Shorthorn
Morane-Saulnier Monoplane
B.E.2c
Nieuport Scout
F.E.2b
S.P.A.D. Scout
R.E.8
Sopwith Triplane
S.E.5
Fokker E.1
L.V.G. C.II
Albatros C.III
Halberstadt Scout
Albatros Scout
A.E.G. G IV
Pfalz Scout
Gotha Bomber
Fokker Triplane
A.E.G. C IV
Fokker D.VIII

PART III.

All photographs.

abc

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