
Red Baron
TM

Red Baron™

Historical Overview
&
Control Documentation

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Patrick Henry, a modern day Fokker Triplane pilot, for talking with us about his aircraft and allowing us to photograph it.
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The Beginning of the Great War

PRELUDE TO THE FIRST AIR WAR

"I hope none of you gentlemen is so foolish as to think that the aeroplane will be usefully employed for reconnaissance purposes in war."
— General Douglass Haig, Commander of the British Expeditionary Force in France.

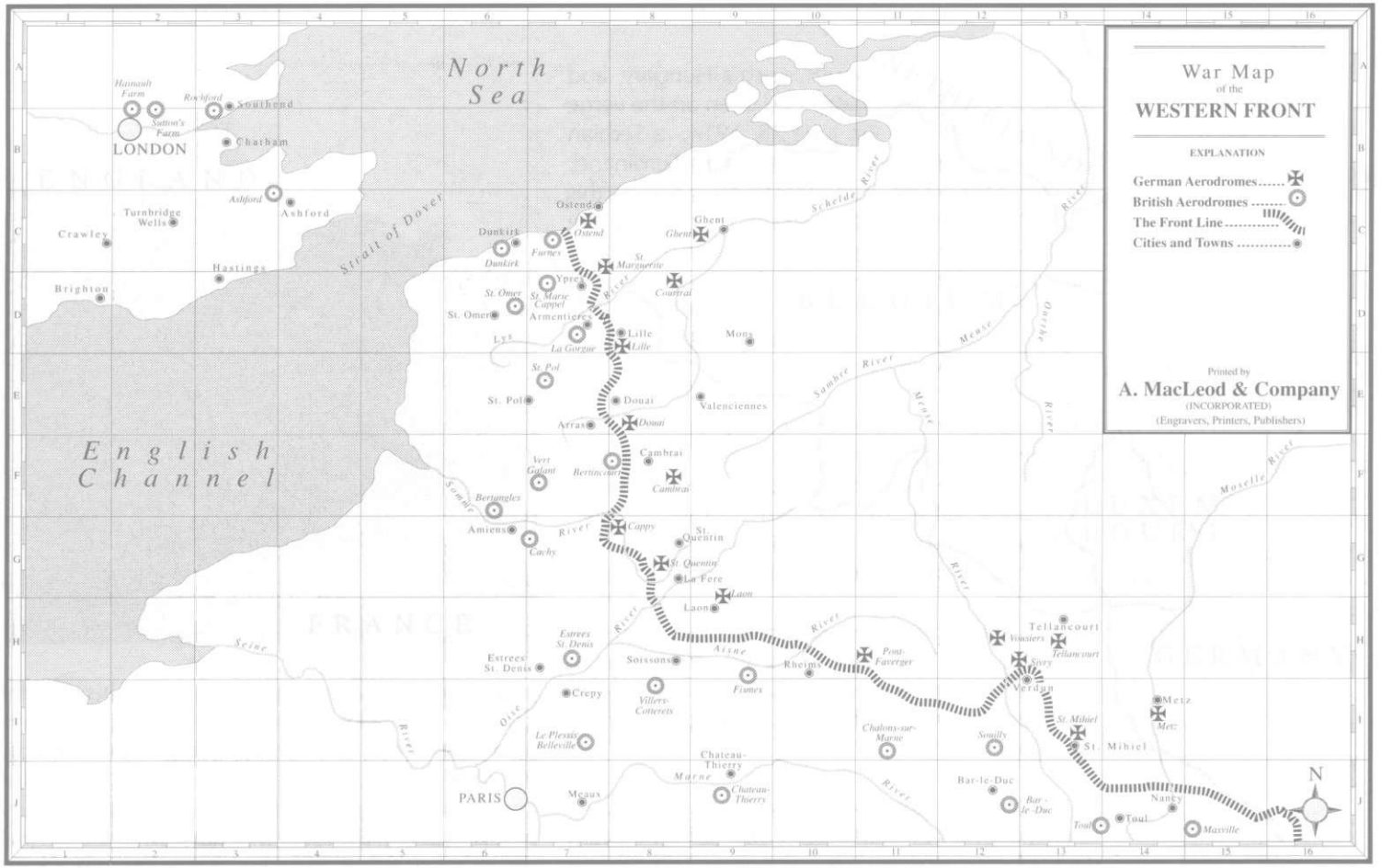
The aces of World War I were heirs to a valiant tradition. Like the lance-wielding warriors who roamed Europe in medieval times, the aviators of the Great War often did battle alone, one man against another. Mounted on magnificent, temperamental steeds, they did the bidding of kings and emperors, fighting for their honor with a spirit that recalled the knights of old.

The Europe these young pilots knew in 1914 hadn't seen a major conflict since 1815, when the British and Prussians defeated French Emperor Napoleon at Waterloo. So many years without a test of military prowess had made it easy for any nation to claim superiority. Patriotic fervor ran high, and centuries-old antagonisms between royal families began to flare.

As the people of Europe tragically discovered, the technological advances made possible by the Second Industrial Revolution had altered the nature of warfare. With the advent of the machine gun, long-range artillery and barbed wire, the cavalry charge had become as obsolete as the Greek phalanx, and the bayonet as useless as the Roman short sword. No longer would mass human-wave assaults decide the course of battles and campaigns. The weaponry had become so destructive that any offensive would produce catastrophic casualties.

In the years preceding the war, the major powers had embarked upon an arms race previously unseen in modern history. Because of this, the looming Great War would become an enormous war of attrition whose victors would be determined not by prowess in battle, but by the quantity of war material their nations could produce and ship to the front.

It took only a few bullets fired from an assassin's pistol to ignite the powder keg Europe had become.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The Front Line
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English Channel
Strait of Dover
LONDON
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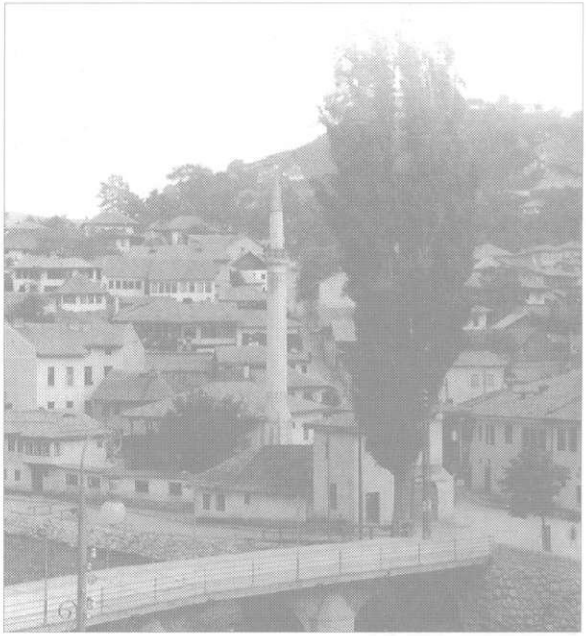
Germany's ally to the south, Austria-Hungary, and Serbia, a small Balkan state, had been on the verge of war for decades. On June 28, 1914, a Serbian nationalist assassinated Archduke Franz Ferdinand, the heir to the Austro-Hungarian throne. Seizing this incident, Austria accused Serbia of plotting the assassination. In late July, Austria issued an ultimatum that demanded unreasonably harsh concessions from the Serbs. Although they agreed to the majority of the Austrian demands, Austria chose to declare war and invade Serbia.

Russia, long the champion of the Balkan Slavic states, mobilized for war against Austria. Germany, Austria's ally, mobilized and declared war on Russia and France. When the Germans violated Belgian neutrality on August 4, 1914, Great Britain entered the war against Germany. World War I had begun.

With the lines clearly drawn, an entire generation of young men paraded off to war with martial songs and the cheers of thousands still ringing in their ears. There would be no such homecoming for many.

In the last few years of the nineteenth century, German Chief-of-Staff Count von Schleiffen had devised a clever plan to wage war against France and Russia simultaneously. Realizing that his country could not win a long war on two fronts, Schleiffen concluded that the best strategy was a quick, decisive attack against France. With a surprise invasion through Belgium, the German Army would outflank the French defenses in the east and sweep around Paris in an envelopment maneuver.



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Quiet Sarajevo, where the Archduke was assassinated on June 28, 1914.

The Miracle of the Marne

In September 1914, when the Allies had discovered that von Kluck's First Army had exposed its flank to an attack from Paris, every available man was mustered for a counterattack. Parts of the French Sixth Army were actually transported from Paris to the battlefields in Parisian taxi-cabs.

With France defeated, the Germans could turn upon an ill-prepared Russia and defeat it easily.

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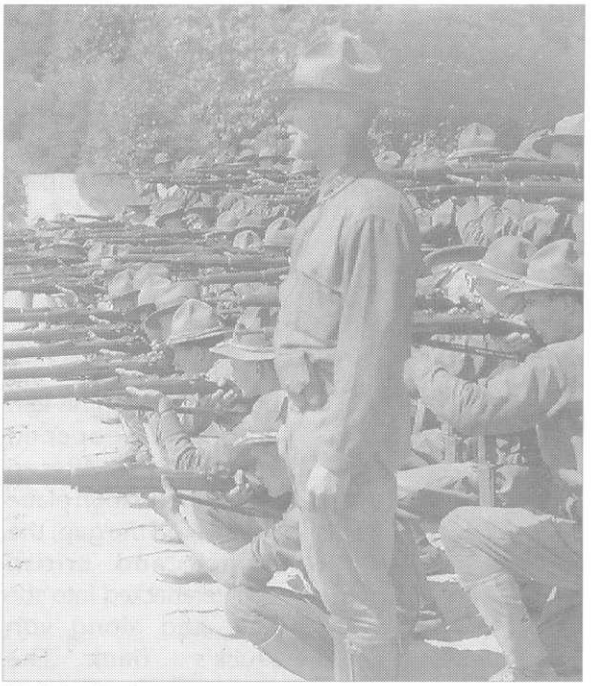
In 1914, Germany implemented von Schleiffen's plan and, to the shock of France and Britain, crushed Belgium with the weight of more than one million German troops. In just a few days, German soldiers were pouring into Northern France.

To the southeast, the French army, resplendent in their brilliant red-and-blue uniforms, spent itself in futile mass bayonet charges in the face of hundreds of machine guns. More than 300,000 Frenchmen fell in the first nine days of this counteroffensive, known as the Battle of the Frontiers. The British sent an army to the battle lines of Northern France. In late August, this army was virtually annihilated at the Battles of Mons and Le Cateau.

Above: Practicing the Napoleonic Boyonet charge.
Right: Americans in the 3 rank Napoleonic Formation.



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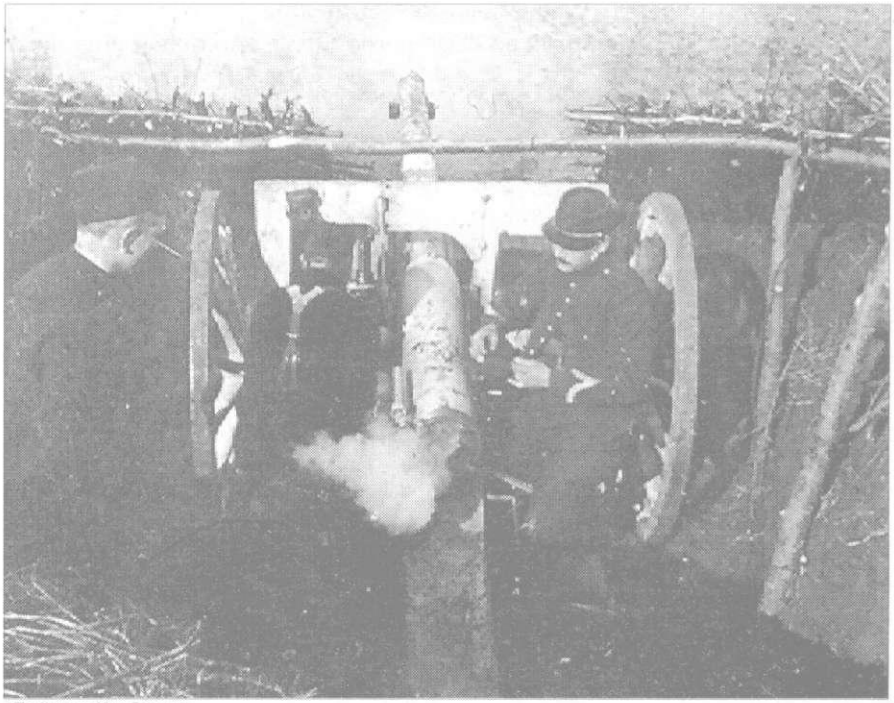
In the final days of August, the world remained breathless, horrified at the sight of the apparent collapse of the Anglo-French Alliance. Soon the advance German units reached the outskirts of Paris. A German victory seemed to be at hand.



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The awesome French 75mm cannon—one of the best weapons of the war.

Then the Germans began to make mistakes. General von Kluck, who commanded one of the two western-most armies, cut inside his assigned path and went east of Paris instead of around its west side. As a consequence, he exposed his right flank to attack. Worse, he lost contact with the neighboring army on his left, and a gap opened between them. After an Allied observation plane discovered the gap, the French and British counterattacked into the hole and along von Kluck's flank. The German advance was stopped at the Marne River and the invaders thrown back. The von Schleiffen plan failed, and with it Germany's best chance to dominate Europe.

Following the "Miracle of the Marne," both sides vainly attempted to outflank each other to the west in what became known as the "Race to the Sea." The whole affair came to an end on the beaches along the North Sea. The Allies and the Germans dug in on a front that stretched from the coast of France

and Belgium all the way to the Swiss border, some 600 miles.

In the course of the next three years, the front remained virtually static. Troops slogged through thigh-deep mud, and disease ravaged the men in the forward trenches. Generals ordered pointless charges across open ground into withering machine gun and artillery fire. The corpses in no man's land piled up, and the promise that "the boys will be home by Christmas" was forgotten. Places such as Verdun, the Somme and Ypres became monuments to carnage and futility.

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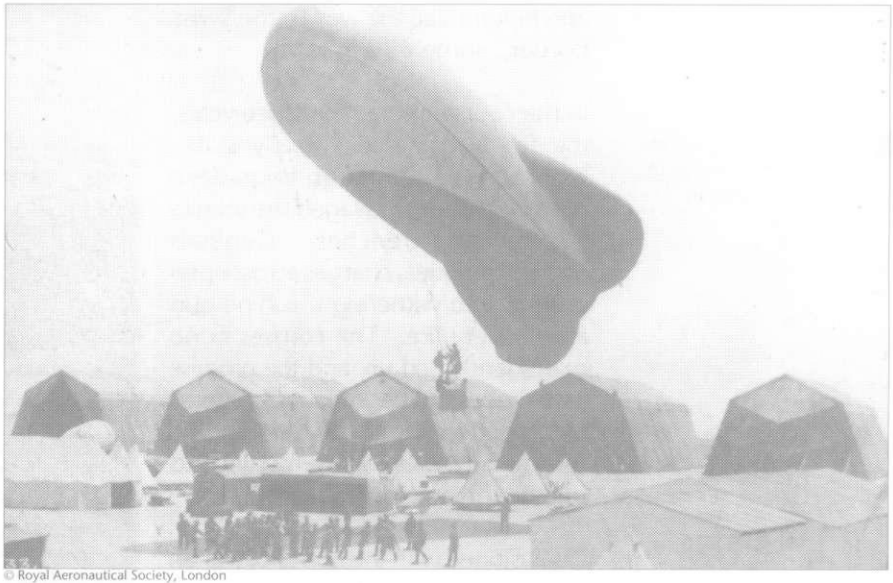
In Flanders Fields...blue-clad Frenchmen dug in awaiting a German assault.

Disillusioned with the horror of war on the ground, the airplane captured the imagination of the people. World War I was the first war where airplanes were used in large numbers. Slow, unwieldy and resembling something akin to an apple crate, the earliest flying machines served the armies of Europe as aerial scouts for the infantry. Unarmed, underpowered and undependable, the Taubes, Bleriots and Farmans crisscrossed the sky, plotting enemy troop movements and concentrations. The aircraft replaced the cavalry as the eyes of the army from the outset. It was a duty these machines performed well. Yet, it would take time for the generals to comprehend the role and importance of the airplane. "The aircraft is all very well for sport," said Marshall Foch the Commander-in-Chief of all Allied forces, "...for the army it is useless." He would shortly have cause to change his mind.

BALLOONS AND ZEPPELINS

It was the moonlit nights that Londoners feared the most. With the moon full, they knew the Zeppelins would make their dreaded appearance and deliver their cargoes of destruction upon the city. These raids foreshadowed the Battle of Britain and the London Blitz, and gave birth to the notion of strategic bombing. Before the Zeppelins flew their deadly missions, civilians and cities were generally isolated from warfare. With the industrialization of war, however, the home front became as important as the battlefield. The Zeppelins were the instruments the Germans used to destroy, or at least disrupt, the British home front and its production of vital war material.

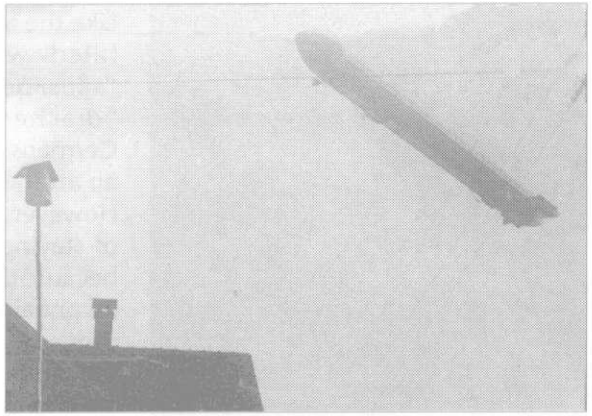


Right: An observation balloon being lowered. The British called them "sausages" the Germans called them "drachen" (dragons).

Zeppelins were huge, rigid airships sometimes longer than 400 feet. Filled with hydrogen, these enormous crafts eventually proved to be extremely vulnerable since the gas was perilously flammable. The sight of a burning Zeppelin falling from a darkened sky was a spectacle that could be witnessed for miles.

Through the course of the war, Zeppelins raided Britain some 40 times, dropping nearly 200 tons of bombs. These were minuscule amounts compared to the city-busting raids undertaken by the British in World War II. Numbers alone however,

cannot tell the story of the panic and fear this new weapon created in England. Most people in the early 1900s had never seen an airplane, and the sight of a monstrous, airborne, bombing platform lurking above them incited fear that later generations cannot even begin to imagine. After



A dreaded Zeppelin as seen from the ground.

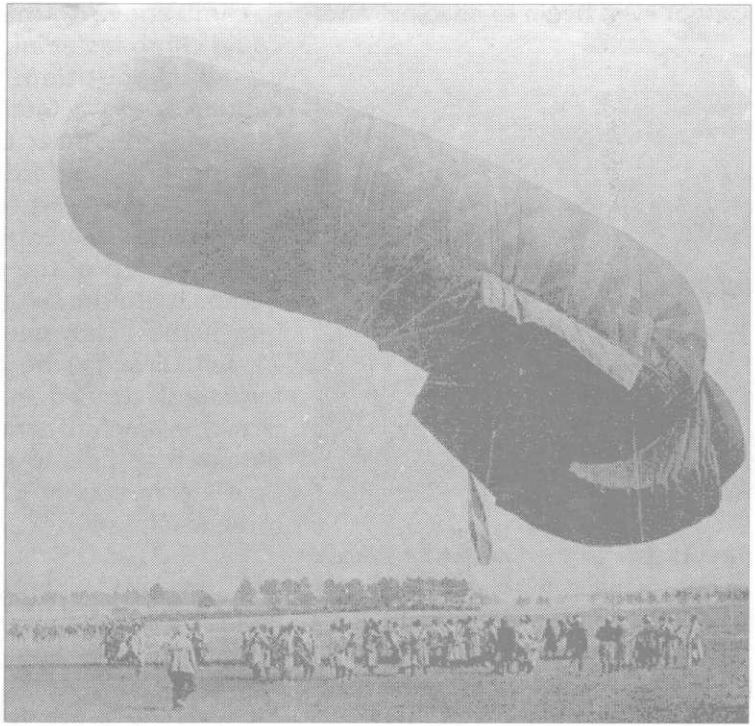
every raid, absenteeism in the war factories rose abruptly. Although this never did have a significant effect on the war, the British government was so alarmed by the raids that they held over 100 planes around London in Home Defense service. Those planes were sorely missed on the Western Front.

The first Zeppelin to fall to an Allied pilot was LZ-37. A British naval pilot, Reggie Warneford, chased the German dirigible along the Belgian coast. Armed with only six 20-pound bombs, his only hope to bring the Zeppelin down was to climb above it. Unfortunately, the dirigible could climb faster and Reggie couldn't get in an attack position. Finally, the Zeppelin captain made a fatal mistake. Approaching his home shed near Ghent, he chose to dive and draw Warneford into the range of the base's antiaircraft defenses. Seizing the opportunity, the Englishman flew above and along the top of the airship and released his bombs. With the sixth hit the LZ-37 exploded into flames. Only one crewman survived when he fell through the roof of a convent and fortuitously landed in an empty bed. For his victory, Warneford earned the Victoria Cross, but did not have time to enjoy his success. A short time later he crashed into a cornfield and died en route to a hospital.

Gradually, the Zeppelin menace was countered and then defeated by increasing the defenses in the British Isles. Bad weather constantly hampered Zeppelin operations as well, and served to make the raids ineffective in many instances. By mid-

1917 it became nearly suicidal for Zeppelins to fly over England. Eventually, the giant Gotha aircraft replaced the Zeppelin as Germany's strategic bombers.

Tethered observation balloons, Gothas, weren't as glamorous as Zeppelins, but they proved to be of greater military value. Throughout the war they provided perfect viewpoints for artillery spotters. Anchored two to five miles inside enemy lines, they floated as high as a mile above the battlefields.



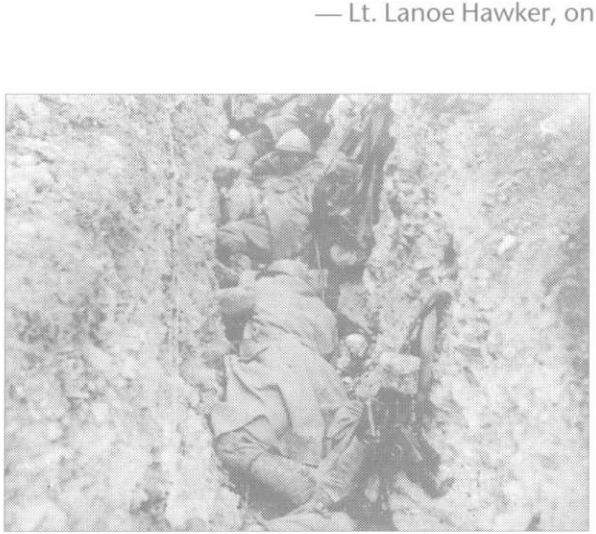
Launching an observation balloon.

Like the airships, the balloons were filled with hydrogen. Called "sausages" by the British and "drachen" or dragons by the Germans, they were easy targets if an attacking plane could get close. However, many pilots made a point of staying away from the balloons because they were heavily defended by antiaircraft fire. For this reason most air services ranked destroying a balloon equal to shooting down an enemy airplane. The observers who rode in the baskets beneath the balloons didn't get much glory, but their job was one of the most dangerous assignments of the war. It was no coincidence that they were the first military aviators to carry parachutes.

Deadlock Below, Freedom Above

DEADLOCK BELOW, FREEDOM ABOVE

"I felt very sorry for him when he fell in flames, but war is war and they have been very troublesome as of late."
— Lt. Lanoe Hawker, on downing his first German



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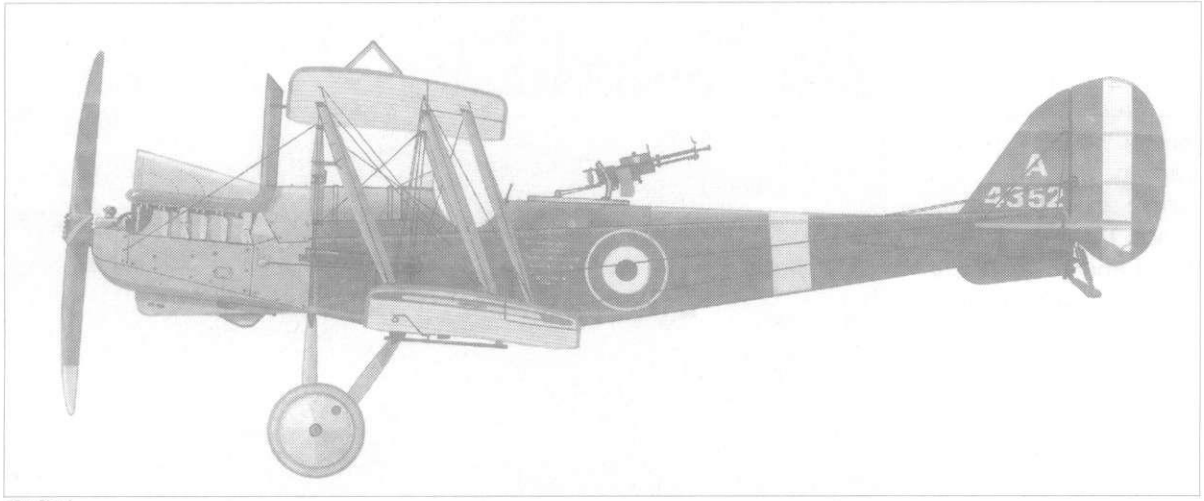
Above: French soldiers, known as Poilus, crouch inside their trenches. Right: Lt. W.B.R. Rhodes-Moorhouse

The land war in the west remained stagnant for most of 1915, but the air war evolved into a duel of technology and tactics. In the trenches, commanders continued to send waves of men over the top to certain death. In the air, the Allies struggled to maintain their advantage. While the Germans sought their own way to fire through the propeller, the Morane-Saulniers with Garros deflector plates easily outflew the first-generation Aviatik two-seaters and other clumsy German craft. The Allies regularly flew behind German lines in search of targets, with little more to fear than small arms fire and the occasional antiaircraft barrage.

Frustrated by lack of progress in the trenches, strategists sought new weapons and tactics to break the stalemate. On April 22, 1915, the Germans first used poison gas in the Second Battle of Ypres, near the northern end of the front. They opened a four-mile gap in the lines and inflicted 70,000 Allied casualties. However, the Germans underestimated the power of their horrible new weapon and did not have adequate reserves to exploit the breakthrough. Once again the fighting had been fruitless.

Courtesy National Air and Space Museum, Smithsonian Institution



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One of the lumbering R.E.8 observation aircraft used by the RFC

During the battle, the British sent a flight of four B.E.2 Quirks to bomb the strategic railyard at Courtrai, about 40 miles down the La Lys River from their base at Merville. Only one plane, piloted by Lt. W.B.R. Rhodes-Moorhouse, reached the target.

Rhodes-Moorhouse carried a single 100-pound bomb in the place where the observer usually sat. He dropped it on the railroad signal box, temporarily shutting down the railyard and slowing German troop movement. With fuel to spare, he circled low over the area and observed the Germans massing for an assault at Ypres.

The German troops repeatedly fired their rifles at Rhodes-Moorhouse, and finally a bullet mangled his left hand. He turned for home as a machine-gunner in a church tower opened fire, hitting him in the thigh and stomach. Passing other friendly airfields where he could have received medical attention, he struggled back to Merville, made his report and lapsed into unconsciousness. He died the next day, and became the first British airman to receive the Victoria Cross.

Another Victoria Cross recipient, the first one "for success in Air Combat," went to Lt. Lanoe Hawker. Eager to bring down a German, he hated flying the two-seaters to which he was first assigned. On several occasions he unnerved his machine

Courtesy National Air and Space Museum, Smithsonian Institution

Above: The English pilot, Lanoe Hawker.
Right: A German soldier, killed at his post.

gunner by firing a rifle over his head at the enemy. In June 1915, Hawker was given a Bristol Scout. A prewar racing machine, the single-seat biplane could reach 100 mph in level flight and could dive at 120 mph without losing a wing. At this point, the British didn't have deflector gears, so Hawker came up with something that would at least be better than his rifle. He and his mechanics mounted a Lewis machine gun to the left of his engine, pointed down just enough for the bullets to clear the propeller. This meant he could attack only from above and to the right of the enemy. On July 25, Hawker prowled near Ypres at about 10,000 feet. At dusk he attacked one German two-seater, fired and watched it disappear in a diving roll. No one learned its fate for sure, but it is believed to have escaped by flying just above the ground to safety. Twenty minutes later Hawker shot at another machine. As darkness fell, Hawker swept down from out of the setting sun and raked a German aircraft with a long burst. It spun into the ground.


National Archives #111-SC-34408R

Allied air superiority lasted from March to August of 1915. By the late summer, the Germans started deploying the first Fokker Eindeckers, a mediocre airplane with a deadly secret weapon. The "Fokker Scourge" had begun.

MEET ARCHIE

"You can laugh at Archie, he's a joke compared to machine guns. You dodge him carefully and roll in derision as you cross the lines and hasten home for tea."
— Anonymous British flier

In a popular British music-hall show of the time, the leading lady fended off a suitor's advances by telling him, "Archibald, certainly not!" British humor being what it is, early pilots used the same phrase to give themselves courage as they sailed through the black-and-white puffs of antiaircraft fire. The antiaircraft weapons became known simply as "Archie."

Like the bombing and strafing pilots inflicted on the ground-bound enemy, Archie was never a decisive factor in World War I. One German report estimated that less than half of the gunners' shells exploded and only one in twenty reached the target.

The first antiaircraft shells were artillery rounds with fuses set to explode after traveling a certain distance. The gunners estimated the altitude of an approaching airplane, set their shells for that altitude and then fired a string of shots in front of the plane. The antiaircraft batteries defending observation balloons were very effective because the gunners knew the altitude of their balloons, knew that the enemy pilot had to fly close to a balloon to shoot it down, so they set their shells for that altitude.

Soldiers on the ground complained that anti-aircraft shrapnel falling back to earth was more dangerous to them than to enemy fliers. Early on, small arms and machine-gun fire from the ground brought down more aircraft than

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An early anti aircraft gun—simply a machine gun mounted on a platform.

the Archie batteries did. Many pilots trying to land airplanes that had been crippled in a dogfight were killed by pot-shooting soldiers as they glided over their positions.

British flier Arthur Gould Lee got both views of Archie one day in November of 1917, above the Battle of Cambrai. Lee had just destroyed an Albatros D V when, "Crump, crump, crump—a clang in the cowling—a thud somewhere up front. My engine stopped dead." Hit by German Archie, he glided to a crash-landing near a British antiaircraft battery. From there he watched as Archie from

THE FIRST FIGHTER PILOT

One of France's most famous prewar pilots, Roland Garros became the world's first true fighter pilot. An inventive character, he and his mechanic mounted a Hotchkiss machine gun on the cowling of his Morane-Saulnier that fired forward through the propeller arc. To keep the blades from getting shot off once the gun was fired, Garros screwed two steel wedges onto the rear of the prop. These deflected the few bullets that wouldn't clear the spinning blades and possibly shatter them. Thus armed, the aircraft became a deadly weapon. Garros only had to point the aircraft at his target and pull the trigger.

Courtesy National Air and Space Museum, Smithsonian Institution

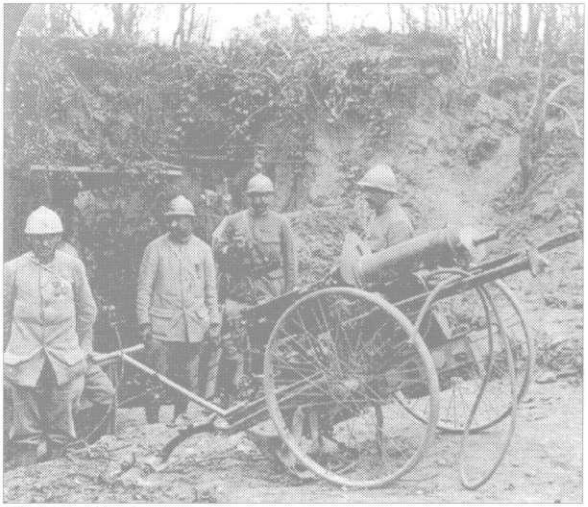
Garros tested his new weapon for the first time in the spring of 1915. Within 18 days, five German two-seaters fell before his gun. "It was tragic, frightful," Garros wrote about his first kill. German pilots started to avoid French monoplanes. Their commanders accused them of having the "hallucinations of old women."

■ Garros posed in the cockpit of his Morane Bullet. He was killed late in the war after returning from a German prison camp.

Luck ran out for Garros, however, on April 9, 1915. He had just completed a bombing run when his engine either malfunctioned or was damaged by ground fire. In any case, he crashed behind German lines and was captured before he could set fire to the Morane.

Garros made an epic escape from a prisoner-of-war camp later in the war and returned to the French Air Service. The man who helped lay the foundation for air combat was overwhelmed by what it had become by 1917-18. He was shot down and killed after only a few more missions.

Courtesy National Air and Space Museum, Smithsonian Institution



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During major offensives, both sides bombarded each other with thousands of artillery pieces. At the height of these bombardments, pilots could actually see the shells arching over the battlefields. To be an artillery spotter above such a concentration proved to be incredibly dangerous. Often, the hapless B.E.2s and Aviatiks were literally torn apart when they flew into a falling artillery shell. It was a peculiar danger unknown to aviators from other wars.

■ Above right: An early French flame thrower—another example of the technological advances made during the war.

both sides contributed to the dogfight: "I saw something I'd never seen before....A machine was hit by a shell and blown to fragments. Bits of it fell quickly, like the engine and pilot's body, but most of it seemed to float down lazily like leaves from trees in autumn."

THE ACE

Courtesy National Air and Space Museum, Smithsonian Institution

Above: Oswald Boelcke, the son of a teacher, became the premier tactician and instructor in the German Air Service. Above right: René Fonck, the best marksman of the war.

Only about five percent of all World War I fighter pilots became aces, and they accounted for about 40 percent of the kills. The remaining 60 percent were spread out among the rest of the pilots. To be an ace in World War I truly set a man apart. More than 1500 pilots shot down five or more enemy airplanes or balloons during World War I, but not all were aces in the eyes of their countrymen. The Germans required ten kills to earn the term. The British, at first, refused to use the term aces at all but eventually gave in and used the French figure of five kills. The French press first applied the term aces to describe brilliant scout pilots. Soon it was accorded to only those pilots with five kills or more. French aces sometimes received gold watches and cash awards; they drew worshipful acclaim in a nation desperate for heroes. The Germans and, eventually, the British, followed suit. In a war with few victories for either side to celebrate, the aces attracted attention far out of proportion to their military significance. Soldiers in the trenches read of ace pilot exploits as if they were fictional superheroes. People on the home front sought their autographs. They were not just soldiers, but chivalrous adventurers who fought a clean war above the muck of the trenches.

©Imperial War Museum, London

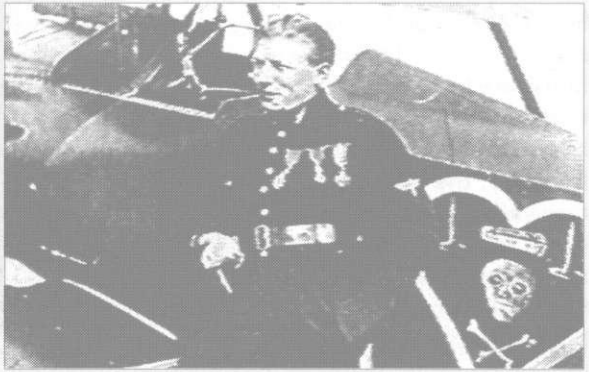
AIRCRAFT MARKINGS OF THE ACES

During the Great War, many of the aces personalized their aircraft. German regulations were very lax when it came to individual color schemes and markings. As a result, the Allies encountered some very exotic looking airplanes.

The British did not allow such individualism, so their aces could usually only be identified by a few letters or numbers on their fuselage sides. There were exceptions of course, such as Raymond Collishaw's Black Flight. The French were a little less rigid than the British in this regard, but some of their most famous aces were allowed enough latitude to paint their own planes. Charles Nungesser, for example, painted a black heart with a skull and crossbones, two candles and a white coffin drawn inside the heart on his fuselage.

The aces personalized their aircraft for different reasons. Manfred von Richthofen painted his Albatros and his Fokker Dr.I scarlet red so that he could be identified by his comrades, as well as his foes. Ernst Udet painted "**LO!**" on the side of his Fokker in memory of his love back home. Some were just plain extravagant. Werner Voss painted a blood-red heart on the side of his lavishly colored Albatros DIII. Hermann Goering went from flying an all black Albatros to an all white Fokker DVII.

*As you gain experience with **Red Baron**, you will learn to recognize the majority of the famous aces' aircraft. If you're patrolling around Lille in early 1916 and you stumble upon a green Fokker Eindecker, you will know that Max Immelmann is behind the stick. If you run into a blue nosed Nieuport 17, you'll discover that Billy Bishop is your adversary. So when you see a uniquely marked enemy aircraft, beware!*

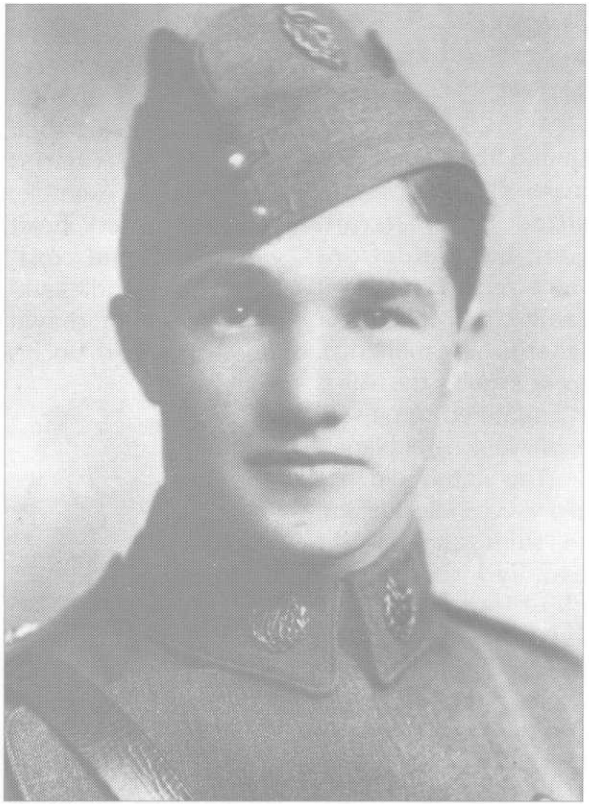


Courtesy National Air and Space Museum, Smithsonian Institution

Charles Nungesser chatting beside his Nieuport. Note the macabre insignia.

ALBERT BALL

"It must be fine to have the sort of guts Ball had, to be completely without fear, to attack regardless of the odds, not giving a damn whether you're killed or not."
— British pilot Arthur Gould Lee



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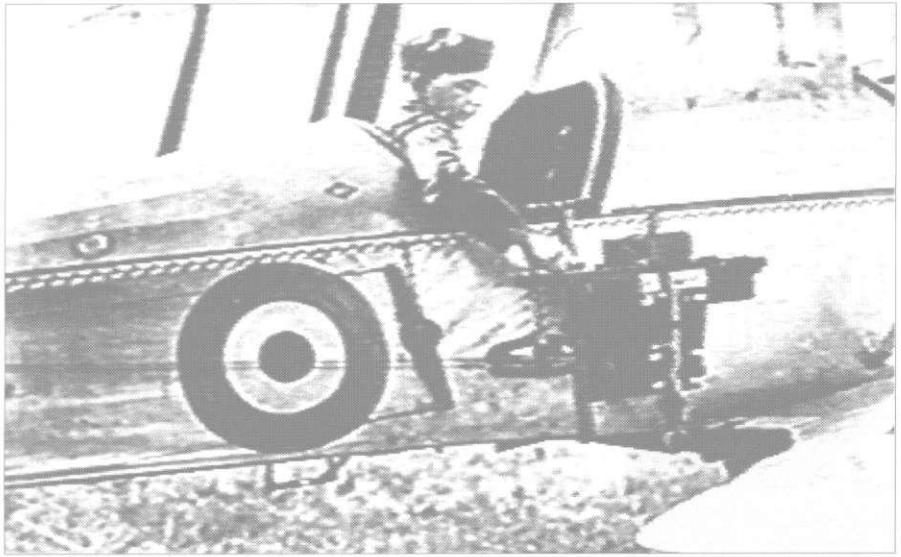
Albert Ball, Britain's first fighter-pilot hero.

Albert Ball was one of a new breed of aerial warriors who was drawn to the fight by news of the first aces. He was the first British ace to be elevated to widespread hero status by his "glorious" exploits. Ironically, the man who received such publicity was a recluse. While on the ground, he kept to himself in his ramshackle hut, playing his violin and breeding rabbits. In the air, he tolerated formation flying, but preferred to hunt alone.

"His favorite after-dinner amusement," wrote fellow aviator Cecil Lewis, "was to light a red magnesium flare outside his tent and walk around it in his pajamas, fiddling."

Once in the air, however, his eccentricities vanished. Ball exhibited absolute fearlessness in combat flying and set the standard for aggressiveness. Often, he would throw himself headlong into formations of German planes even though they outnumbered him five to one. During one such fight, his engine sputtered to a halt after a bullet damaged it. Ball dove out of the fight, but unholstered his pistol and shot at the Germans still on his tail.



Courtesy National Air and Space Museum, Smithsonian Institution

In early B.E.2s, the pilot flew *and* operated the camera as seen here.

Such aggressiveness was intimidating and two enemy pilots abandoned the fight and fled at the sight of Ball waving his revolver. Disgusted with such unworthy behavior by his adversaries, Ball resorted to pencil and paper. He dropped a note challenging the two pilots who had retreated to meet him in the same airspace the next day. They were there when he flew back, but as he engaged them, three more enemy planes dove from above, and Ball realized that he had been trapped. Violently yanking his aircraft across the sky, he could not evade the five Germans, each eager to make a name for himself by downing the hated Briton. Then Ball thought of a ploy that would not only save his skin, but would further humiliate the Germans. He entered a steep dive, made a rough landing and sat still. Certain that such a famous killer would only give up the fight if mortally wounded, the Germans assumed victory. Two pilots headed for home to spread the news, while three landed to inspect the body. However, as the three approached, he fired up his engine, took off and flew away.

While he was totally reckless in combat, he did have a favorite method of attack. When he could, he would dive underneath his victims and pull-up just behind and beneath them. Then he would manually aim his wing-mounted Lewis gun and spray the belly of his quarry. It was quite effective.

After originally serving with his hometown unit, the Sherwood Foresters, Ball paid for private flying lessons and transferred to the Royal Flying Corps (RFC) in 1915. He was sent to France as a B.E.2 pilot whose primary duty was artillery spotting.

Nicknamed the "Quirk," the B.E.2 was hopelessly vulnerable and Ball hated it, complaining to his father that the aircraft was "bloody awful." It wasn't until May 1916, that he was transferred to No. 11 Squadron and given a fragile but highly maneuverable Nieuport 17. It was the beginning of one of the most amazing one-year combat careers of the war.

Ball eventually was credited with 44 victories in all, 30 of which came during the incredible summer of 1916. Usually prowling the skies alone, he preyed upon the Germans with a viciousness that became legendary at aerodromes on both sides of the line.

"I always let them have it all I can," he wrote to his father, "but really I don't think them devils. I only scrap because it is my duty."

Ball was returned to England in October 1916, when his superiors realized that his exploits would eventually get him killed. He trained pilots and fell in love with a 17-year-old girl, getting himself dubbed "The Flying Romeo." Sent back to the front in 1917, he promised to win her the Victoria Cross.

On May 7, 1917, Ball disappeared into a cloud at 8000 feet during a dogfight over the German-held village of Annoeullin. Many historians believe that he was shot down by a machine-gunner hiding in a church tower. Legend has it that he breathed his last breath in the arms of a French farm girl who rushed to the wreckage of his plane. One of the most feared and famous air aces of all time was dead at the age of 21. Having earned three Distinguished Service Orders while he was alive, as well as a chest full of medals from other nations, Captain Albert Ball was posthumously given Britain's highest military honor, the Victoria Cross.

■ Ball in the cockpit of his S.E.5a. He later modified it by mounting a machine gun through the floor of the cockpit.

THE PARACHUTE

The parachute was a prewar invention that only saw widespread use in the German Air Service after 1917. Aside from their balloon observers, the Allies never issued these lifesaving devices to their aviators. The Allied generals reasoned that if the pilots were equipped with parachutes, they would be prone to abandon "government property." Seeing an enemy approaching, the generals argued, the pilot might just jump out and float to safety. Such logic was eventually put to shame, but too late for thousands of Allied pilots. The sight of a pilot jumping from a flaming airplane, then falling beside it to his death, was all too common. As E.R. Calthrop, a British inventor and advocate of a military parachute, put it: "No one in high quarters had any time to devote to investigating the merits of an appliance whose purpose was so ridiculously irrelevant to war as the saving of life in the air."

Courtesy National Air and Space Museum, Smithsonian Institution

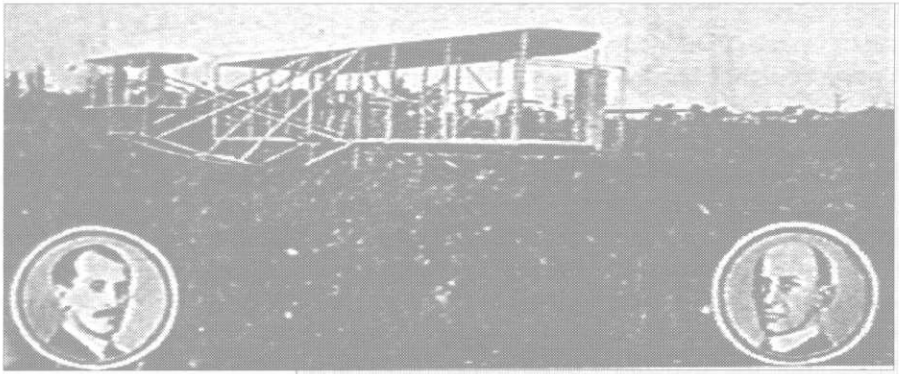
An observer bails out of his balloon.

BEGINNINGS

"The course of the flight up and down was exceedingly erratic, partly due to the irregularity of the air, and partly due to lack of experience in handling this machine."
—Orville Wright, describing man's first powered flight

A new era began on December 17, 1903, when the Wright Brothers took to the skies for the first time. It was not, however, immediately apparent to the people watching the "Wright Flyer" soar across the sands at Kitty Hawk. While practical civilian use of the airplane was a ways off, the military applications were investigated before the end of the first decade of the new century. In 1908, the United States army mounted a machine gun on a Wright Flyer and tested it against a ground target. The results were encouraging, but not spectacular enough to overcome the scepticism of high-ranking officers.

In 1909, Loius Blériot, an enterprising Frenchman, crossed the English channel and crash-landed in sight of the Dover cliffs. One observer, who recognized the military consequences stated, "The day Blériot flew the English Channel marked the end of our insular safety, and the beginning of a time when



Courtesy National Air and Space Museum, Smithsonian Institution

■ The Wright Flyer, harbinger of a revolution.

Britain must seek another defense besides ships."

The combat potential of the airplane was explored in two brush-fire wars, involving the Ottoman Empire. The Italians used aircraft to spot artillery in a war against the Turks in Libya in 1912. Later, in one of the many Balkan conflicts, the Bulgarians dropped primitive, hand-held bombs on Ottoman troops with marginal success.

In the first weeks of the Great War, the airplane was used primarily in liaison and reconaissance roles. The Allies' unarmed observation pilots rarely saw enemy aircraft, and when they did they could do little more than wave. But it wasn't long before it dawned on the Germans that the information carried home by enemy fliers was helping kill their countrymen on the ground. The flyers started attacking each other with bricks, steel darts, rifles and pistols—even grappling hooks, light anchors and hand grenades were tried on occasion.

On October 5, 1914, a Frenchman, Sgt. Joseph Franz, went up in a Voison pusher with his mechanic, Cpl. Louis Quenault, manning a free-aiming Hotchkiss machine gun. They completed a routine bombing raid, and, while returning to base, spotted a German Aviatik two-seater. As Franz bore down on the Germans, the enemy observer shouldered a carbine and began firing. Franz described the mismatch: "The Hotchkiss, well steadied by the tripod, was easy to maneuver, but was subject to stoppages when fired fully automatic. We had therefore decided to shoot one round at a time. Quenault fired, one by one, 47 rounds—at the forty-eighth, the gun jammed. Quenault, whose composure was astounding, commenced to strip the receiver to clear the jam when the German machine lurched before our eyes, began to dive, then turned on its back and smashed into the ground in a cloud of black smoke." Thus fell the first airplane to be downed by an air-to-air machine gun.

The Fokker Scourge

THE FOKKER SCOURGE

"One must not wait until they come across, but seek them out and hunt them down."
— Oswald Boelcke

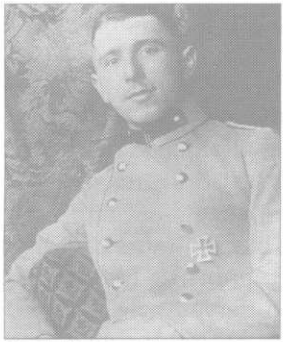
On the morning of August 1, 1915, a squadron of nine British Quirks appeared over a German aerodrome near the city of Douai. The English planes surprised the German pilots, most of whom were sound asleep in their barracks a few hundred yards from the landing field. Max Immelmann, one of the German units' best pilots, sprinted from his quarters and headed for the base. Immelmann and Oswald Boelcke had been assigned to fly the units two Fokker Eindeckers, a new monoplane that had just arrived at the front.

Fairly maneuverable but underpowered, the Eindecker was a copy of the French Morane-Saulnier Bullet. Like the Morane, the Fokker carried a single machine gun mounted on the cowling. After examining Roland Garros' aircraft, Anthony Fokker developed a synchronizing gear that allowed the gun to fire only when the blades weren't in its line of fire. The synchronizing gear proved to be far superior to the deflection wedges Garros had invented.

As the Quirks circled the aerodrome and methodically dropped their bombs, Boelcke jumped into his Eindecker clothed only in his flying boots and pajamas. Immelmann raced to the second Fokker and took off a few minutes later. Within a few moments, Immelmann had caught up with Boelcke, who had found two of the British planes. Both Germans began firing runs, but Boelcke's gun jammed, forcing him to retire. Alone, Immelmann pressed his attack. At about 3000 feet, he caught his quarry with a hail of lead spewed from the Fokker's Spandau machine gun. The Quirk staggered under the impact of the bullets, and began a long shallow glide. After firing approximately 400 rounds,

An early version of the Fokker Eindecker.

Courtesy National Air and Space Museum, Smithsonian Institution



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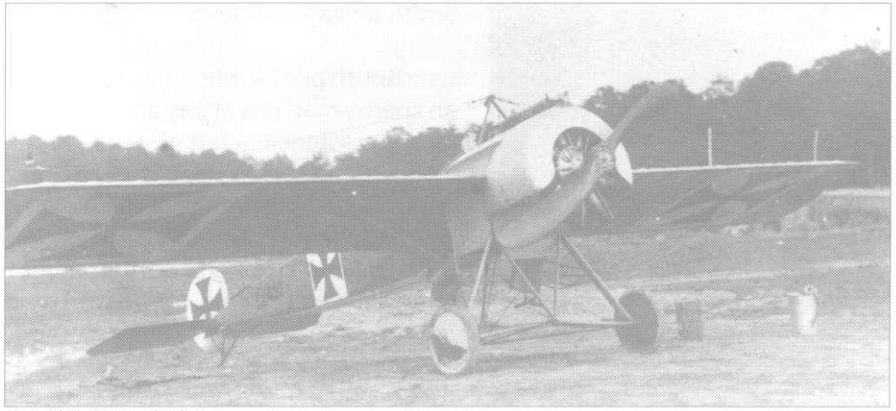
Above: The boyish Eagle of Lille, Max Immelmann. Right: The Spandau-armed Fokker Eindecker, which wrought havoc on Allied planes during 1915-16.

Immelmann's gun jammed. He followed the British plane anyway, until it crashed on the German side of the front.

"When I saw him land," Immelmann wrote to his parents, "I went down beside him, climbed out, and went up to him. I shook hands and said 'Bonjour, monsieur,' but he answered in English. 'Ah,' I said, 'you are an Englishman?' 'Yes, my arm is broken,' the Englishman said. 'You shot very well.'"



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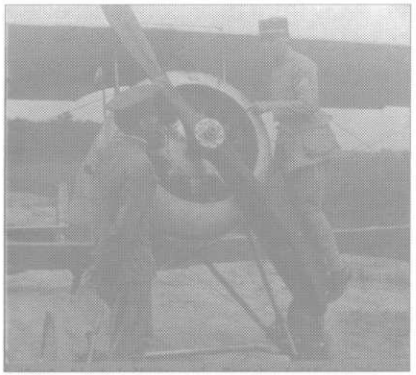
Boelcke, Immelmann and their colleagues soon became masters of the sky. The Allied planes they flew against were hopelessly outclassed by the Eindecker, which the Germans kept improving. Later versions had two or even three Spandaus, along with more powerful engines.

Throughout the fall and winter of 1915-16, German forward observers only needed to telephone a nearby aerodrome and a flight of Fokkers would drive Allied observation planes away from their positions. Allied morale plummeted as the Fokkers took a terrible toll on the poorly armed observation planes. British pilots grimly started referring to themselves as "Fokker Fodder." From August 1915 until the spring of 1916 the stubby monoplanes reigned supreme over the Western Front, giving Germany undisputed air superiority for the first time.

Many aviation historians blame the Fokker Scourge on Allied hysteria. It's clear that, while the Eindecker was an impressive weapon, it was not invulnerable. Several Allied planes had forward-firing guns mounted



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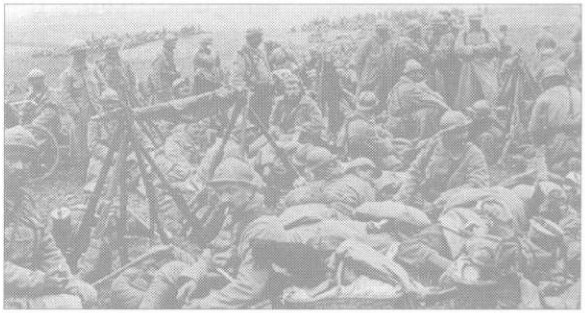
on the upper wing, or on the nose of rear-engine pushers. Despite their qualitative advantage, the Germans still found themselves out-produced by French and British aircraft industries.

One British pilot wrote, "To bring down an enemy machine at any time required luck, persistence, a fast airplane, and a well-aimed machine gun; but to bring down a Fokker or even to defend oneself successfully from it required something much more. It required from the scientist a better war machine." It was only a matter of time before they got them.

■Above: A French aviator explains the mechanisms of the Nieuport airplane. Right: French troops awaiting transport to the front.

Allied pilots begged for a synchronizer, but it took until mid 1916 before they would receive them in quantity. In the meantime, the pushers were forced to hold the line against the Fokker onslaught. It took a full-scale reorganization of the RFC to curb this menace. In February 1916, the first specialized fighter unit, No.24 Squadron, flew to France under the command of Lanoe Hawker. Before his squadron arrived at the front, fighters had been spread around in small numbers to the observation outfits. Equipped with D.H.2s, Hawker and his men helped reestablish air supremacy over British lines.

Meanwhile, the war on the ground heated up again after a short lull. The Germans decided to launch a limited offensive before the fortress city of Verdun in 1915. Their current Chief-of-Staff, Erich von Falkenhayn, wanted to bleed the French white with a massive battle of attrition. The French had to hold Verdun because it served as a fortified hinge on the Allied line. If Verdun fell, the Allied line would be severed—leading to disastrous consequences.



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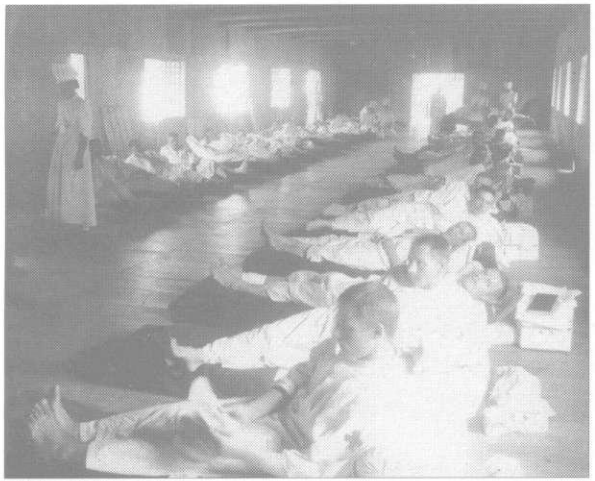
Yet the Germans did not really intend to actually take Verdun. They wanted to draw the bulk of the

French army into the battle and slowly grind it to pieces. They were nearly successful. Two-thirds of the French army eventually passed through the horror of Verdun.



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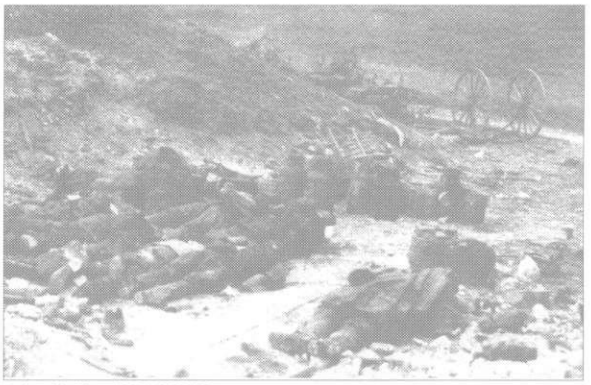
Above: A rather placid hospital scene. Most were horribly overcrowded, understaffed, and underequipped.
Above right: Corpses litter the landscape. A typical scene after any offensive.

On February 21, 1916, the German assault began on a very narrow front on the east side of the Meuse river. The French defenses were ill-prepared to counter the attack. In the ensuing days, the French narrowly averted a catastrophic route. Casualties on both sides defied comprehension. By the end of the year, the French suffered more than 542,000 soldiers killed, wounded and missing. The Germans lost nearly 440,000 men. It is one of the bloodiest battles in history.

After initially losing ground, the French eventually managed to fight the Germans to a standstill. The Allies counterattacked and recaptured all the territory lost to the German assaults by the end of the year.



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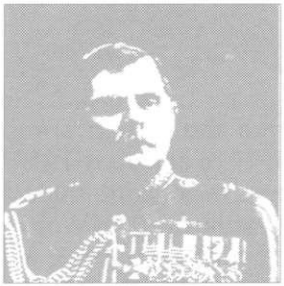
Verdun permanently scarred the French army. Morale steadily fell through 1916 and early 1917. The effects of the battle were a major contributing factor to the mutinies in the spring of 1917. Worse, Verdun altered the French military outlook for generations to come. Before 1916, the French stressed the offensive at any cost. After 1916, they became ardent believers in defense. This attitude can be traced all the way through World War II, their Vietnam War, and the conflict in Algeria.

Airpower came of age at Verdun. Both sides massed air services in the area in an effort to win air supremacy. Both sides struggled to prevent the other from observing their troops movements.



Courtesy National Air and Space Museum, Smithsonian Institution

Above: Hugh Trenchard, known as "Boom" to his men for his thunderous voice.
Right: Tanks were first used in the later phases of the Somme campaign.

Initially, the Germans held the advantage. Their Fokker Eindeckers had no equal, and their aerial tactics were far superior to what the Allies employed. This gradually changed, however, as the French reorganized their air service in the same manner as the British. With the introduction of the Nieuport 16 and later the 17, the German bid to conquer the skies was doomed. Nevertheless, neither side gained a clear victory. Like the land war, the war in the air became a stalemated struggle.

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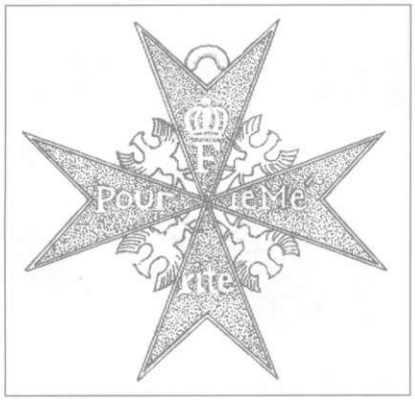
On the British sector of the front, General Hugh Trenchard, the RFC's commander, ordered a change in strategy that would set the tone for the rest of the air war. Instead of keeping his fighters chained to escort and patrol duties on the Allied side of the lines, he ordered them to roam behind the German front, attacking everything that moved. Aircraft, trucks, trains or troop columns—Trenchard's aviators machine-gunned them all.

This change in strategy resulted in enormous Allied losses, but the Germans were slowly worn down.



They simply could not afford as many casualties as the Allies could.

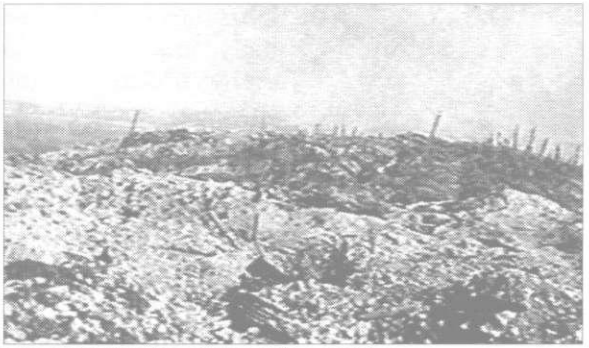
The Germans continued to take a tremendous toll on the Allied air services. In January, a month before Verdun, Immelmann and Boelcke gained eight victories each—unheard of numbers for those times. They were awarded Germany's highest military honor, the Pour Le Merite, also known as the Blue Max. They dined with kings and princes and received fan mail from home. Immelmann went on to score 17 kills by June. He died that month after his synchronizing gear malfunctioned and destroyed his propeller. Boelcke downed 40 planes before he was killed in October. Between these two men, nearly five complete Allied squadrons fell before their guns.

With the arrival of summer, a new generation of Allied planes appeared over the Front. The Nieuport 17, Sopwith Pup and Spad 7 all proved to be far superior to the aging Eindeckers. Before long, the Fokkers were virtually swept from the sky, and it was now the German's turn to look skyward with fear. The Fokker Scourge had ended.

Above: Germany's Blue Max.
Right: No man's land, in what used to be a forest.

THE SOMME

In an effort to take the pressure off the French at Verdun, the British army launched a full-scale offensive in the Somme Valley on July 1, 1916. In the first day alone, the English lost 60,000 men, making it the bloodiest day in their history. Whole battalions were wiped out as they walked the mile-and-a-half through no man's land toward the German trenches. The British commander, Sir Douglass Haig, continued the offensive all the way through the fall of 1916. No significant gains were made despite the introduction and use of the tank in the later phases of the battle. When the smoke had cleared, the British and German losses totaled over one million people. The French, who participated to a lesser degree, lost nearly 190,000 soldiers.

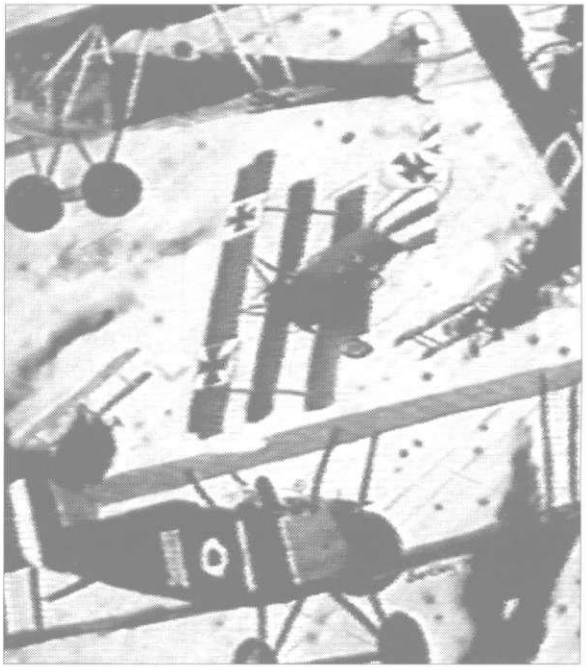


Courtesy National Air and Space Museum, Smithsonian Institution

AN EDGE IN THE SKY

"Of course, Boelcke was the first to see them, for he saw more than most men."
— Manfred von Richthofen

In World War I, the only place where a man could learn the finer points of aerial combat was in the air above places such as Verdun, Ypres and the Somme. The teachers were enemy pilots and the grading system was strictly pass/fail. Today, three-quarters of a century later, the fighter pilot's discipline has evolved to the point that air forces have created fighter pilot training schools that teach Air Combat Maneuvering (ACM). The professors are veteran pilots, and they stress Situational Awareness, or "SA." SA didn't have a name until 70 years after the first fighter pilots faced each other, but it has meant the difference between the victor and the vanquished in *all* air wars. Basically, SA is the ability to discover, store and process the rapidly changing status of an aerial confrontation. Even before the fight begins, SA involves enough questions and answers to befuddle most people: Is there an enemy nearby? How far? How many? What type? Who has the advantage in altitude? Speed? Armament? Aircraft performance? Who has the most fuel? Ammunition? Is it the Red Baron himself, a maniac like Albert Ball or some rookie who's never seen a tracer streak by his cockpit? Should I attack? Defend? Ignore?



Courtesy National Air and Space Museum, Smithsonian Institution

■ Typical dogfight scene circa April-May 1918.

In World War I, with no radar or radio messages to alert the pilots, the first question was always the most important: Is there an enemy in sight? The early

Courtesy National Air and Space Museum, Smithsonian Institution

■ The reclusive Albert Ball in front of one of his aeroplanes.

fighter planes were small. Even on a crystal-clear day, a sharp-eyed observer was lucky to see one at two or three miles. A plane approaching head-on or flying directly away might be invisible at one mile, while a dogfight might be visible for six miles. And this was just spotting the aircraft, not determining if it was friend or foe. Once in a fight, a key part of a World War I pilot's SA involved another factor which didn't get a name until decades later: energy state. Essentially a combination of speed and altitude—the aircraft's energy state—governs which maneuvers it can perform at a given time. For example, a plane approaching its stall speed has a poor energy state. It will fall like a rock if the pilot attempts to do anything but put the nose down or make a shallow turn. The pilot has few options; he's a sitting duck. Conversely, a plane with an advantage in speed and altitude has a great energy state, and its pilot has a wide array of options. Keeping track of your own energy state and the energy states of your opponents is critical to maintaining SA. When a pilot finds himself in a situation where it's impossible to keep track of events, he loses his SA. Much of the air combat folklore of World War I describes swarms of aircraft locked in mortal struggle, but the more common fights were less noteworthy because they were not really fights at all. One pilot with an almost total advantage in SA would roll in on another pilot who was unaware of his presence, getting close enough to fire a deadly burst. Richthofen, the "Red Baron," relied heavily on starting fights with massive advantages in SA. He liked to hide high above a friendly fighter formation, then watch as it approached an enemy squadron and a dogfight developed. As soon as an enemy plane straggled away from the battle, the Red Baron swooped down with deadly advantage.

While World War I fighter pilots had a reputation for tempting fate, many of the most successful

Courtesy National Air and Space Museum, Smithsonian Institution

One of the "million dollar" blazes. After the armistice hundreds of Allied aircraft were piled up and put to the torch.

ones picked their fights carefully. A dogfight typically took place in an aerial arena about 2500 feet across, with the airplanes able to turn at least 90 degrees in less than 300 feet. Consider such a relatively small area with 10, 20 or often 50 planes chasing each other around, and you see why Richthofen seldom entered such a fray. Pilots in huge dogfights spent more time trying not to collide with one another than they did zeroing in on an enemy. They were forced to sacrifice almost all of their SA, and that's an offense that has never been tolerated for long in air combat. British Lt. Heagerty discovered this one day in April of 1917, when he and his gunner, Cantle, unknowingly encountered Germany's Red Baron.

"With six or seven planes all mixed up and diving around, it took all my attention to avoid collisions," Heagerty later reported. "But I managed to rip out several bursts from the forward-firing Vickers.... Cantle's gun was rattling away, when suddenly he ceased firing, and at the same time the pressure on the joystick was suddenly released. It was useless. My controls had been shot away. They must have gone in the same burst that killed Cantle...." Heagerty was lucky to escape with a broken jaw. In an air war with no parachutes, such grievous failure to maintain SA was usually fatal.

Trench Stories

As the war dragged on, Kaiser Wilhelm II, the nominal German head of state, became less and less interested in the realities the war was driving home both inside Germany and at the front. Instead, he delighted in "Trench stories" which were related to him by visitors and advisors alike. The Trench stories were short anecdotes that glorified the German soldiers in the field. In 1918, to avoid revolution, the Kaiser was forced to abdicate and flee to neutral Holland.

THE FLYING DUTCHMAN

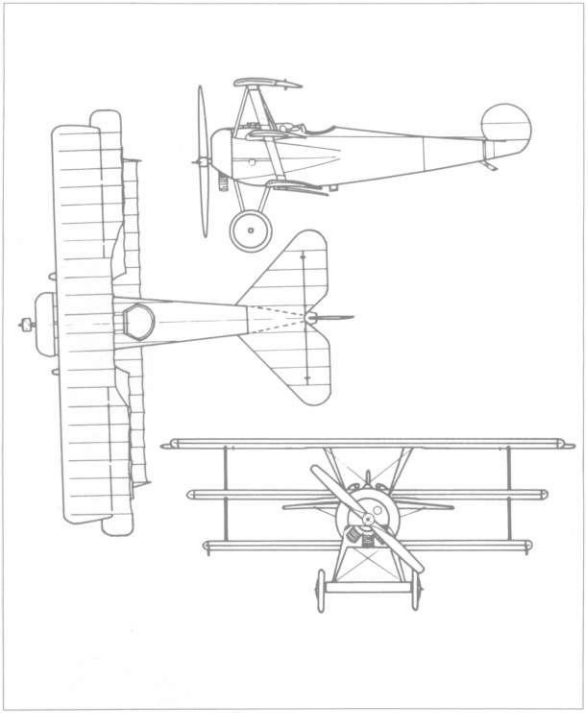
"My mood was to say yes to everyone and to sell to the first buyer who planked down his money on the barrel head."
— Anthony Fokker

Anthony Fokker was both a talented pilot and a brilliant aircraft designer. His inventions did much to make air-to-air combat the deadly business it was by mid 1916. Originally from Holland, Fokker immigrated to Germany before the war began. As early as 1912 the Germans were helping him design airplanes. By 1913 he had his own flying school and manufacturing plant at Schwerin, 100-miles northwest of Berlin. Working from pilfered plans of a Morane-Saulnier Bullet, he built an improved version of the French design, with tubular steel framing instead of wood, and with a more efficient wing. It was the predecessor of the Eindecker. When war broke out, Fokker and his plant were put under control of the German military, and all of his aircraft taken for the army. In May 1915, the Germans brought him the deflector gear captured from Roland Garros' Morane and asked him to duplicate it.

The deflector's crude design convinced him that he could develop something much better. He and his assistants developed a device in which a pushrod kept the machine gun from firing whenever a propeller blade passed before the muzzle. Ordered to demonstrate the effectiveness of his invention, Fokker took off in an Eindecker with a synchronizer and crept up on a French observation plane.

Courtesy National Air and Space Museum, Smithsonian Institution

Anthony Fokker, was both a great pilot and designer. He was also an avid moving-picture photographer.



Three-view line drawing of the Fokker Dr.I Triplane

"By this time I was near enough to open fire," he wrote, "and the French airmen were watching me curiously, wondering, no doubt, why I was flying up behind them. In another instant it would be all over for them." Fokker had the will to produce the tools of war but not to use them. He did not have the heart to pull the trigger and kill the unarmed Frenchmen.

This synchronizing gear wreaked much havoc upon the Allied aviators. In terms of performance, the Eindecker was a mediocre aircraft. Yet Fokker's machines began to arrive at the front where pilots like Boelcke, Immelmann and Kurt Wintgens were more than willing to use the revolutionary machine.

Fokker continued to be a dominating design force throughout the war, but the Germans never really trusted him. Every time one of his products was bested by an Allied breakthrough, he was suspected of collaboration. He had to constantly prove himself as a designer, which drove him to design a long line of World War I classics, including the best fighter of the war, the D. VII.

The most famous Fokker was the Dr.I Triplane flown by Manfred von Richthofen. Twenty-four feet wide and 19-feet long, it had much less power than most of its opponents, yet could outmaneuver anything in the air. Richthofen's bright-red aircraft has been called the best-known single weapon of the war.

BOELCKE: THE FATHER OF FIGHTER TACTICS

"Well it is quite simple. I fly close to my man, aim well and then he falls down."
— Oswald Boelcke

Oswald Boelcke ranks as the most important early aviation pioneer. A natural pilot, he eventually became the mentor and instructor of the entire German Air Service.

After initially flying two-seaters, Boelcke received one of the first Eindeckers to arrive on the front. He quickly ran-up a respectable tally of aerial victories. However, he wasn't satisfied with just fighting. In his spare time, he evolved a series of rules to govern fighter pilot actions in combat. His *Dicta Boelcke* is still considered the foundation of fighter tactics. His influence helped reorganize the German Air Service in the summer of 1916. It was clear to him that his country needed homogenous fighter units just like the British and French had recently created. Traditionally, the Eindeckers had been dispatched in twos and threes to the observation units. The top pilots in each unit were then assigned to fly the fighters as escorts for the reconaissance planes. The Germans didn't use offensive combat patrols until after the reorganization.

Boelcke spent the summer touring all of the German fronts, choosing crack pilots for the unit he was to create. One of those, whom Boelcke found in Russia, was Manfred von Richthofen, later known as the "Red Baron."

In August 1916, the first few Jagdstaffeln were organized and sent to the Western Front. Jagdstaffel literally translates to "hunting group"—and were

Oswald Boelcke as he appeared after months of combat had taken its toll.

Courtesy National Air and Space Museum, Smithsonian Institution

the first German offensive combat patrols. Boelcke's unit was called Jasta 2.

Throughout August and early September, Boelcke kept his men busy by training them to use his combat tactics. It took until mid September for his unit to get the requisite 12 planes to commence operational duty, so the unit had plenty of time to practice. It soon payed off.

Courtesy National Air and Space Museum, Smithsonian Institution

■ A youthful-looking Boelcke photographed just a few months before the shot on the previous page.

Flying the new Albatros D.I and D.II scouts, Jasta 2 found no equals in the sky. On their first combat flight alone, Boelcke and his men downed 8 out of 14 British planes without loss. One of these planes was downed by von Richthofen, his first victory.

For the next two months, Jasta 2 cleared their airspace of Allied aircraft. Among the many aces the unit produced were Werner Voss (48 victories), Manfred von Richthofen (80), Erwin Boehme (24), and Fritz Rumey (45).

Boelcke died after achieving 40 kills, on October 26, 1916. Involved in a dogfight with Major Hawker's 24 Squadron, von Richthofen cut in front of Boelcke while chasing a D.H.2. He swerved upward to avoid Manfred but, in the process, brushed lightly against the lower wing of Erwin Boehme's Albatros. Boelcke's wing collapsed and he plunged to his death.

Later, a British plane flew over Jasta 2's aerodrome and dropped a wreath bearing the inscription, "To the Memory of Captain Boelcke, our Brave and Chivalrous Opponent."

A NEW BREED OF PILOT

Below: Mannock in his flight gear.
Right: The passionate, fanatical, Edward Mannock.

"The swines are better dead. No prisoners!"
— Mick Mannock

Courtesy National Air and Space Museum, Smithsonian Institution

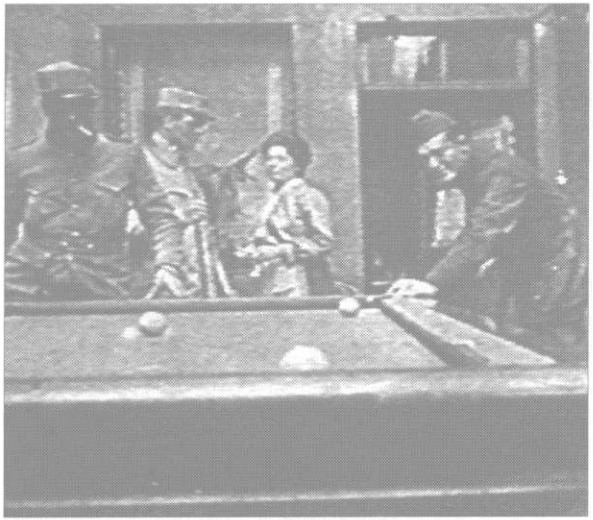
As the war dragged on into 1917, the nature of the air war rapidly changed. In August of 1916, the German Air Service pos-sessed one fighter unit. By January 1917, the Germans had organized another 32. The British and French deployed several times that many. As a result, more and more aircraft participated in dogfights. Sometimes 50 to 100 fighters would be swirling around over the front—all involved in the same scrap. Chivalry and mercy, which sometimes colored the nature of the air war, gradually disappeared as it became necessary to focus on destroying large numbers of the enemy. In the midst of this transition on the Western front, Edward Mannock joined the RFC. He was destined to be Britain's "Ace of Aces."

In 1914, Mannock had been in Turkey working for a British telephone company. When the Turks joined the Central Powers, he was thrown in prison. After months of maltreatment and abuse, he was so emaciated and sickly that he was repatriated to England. After learning of the atrocities the Germans perpetrated upon Belgian civilians, his outrage led him to enlist. He joined the RFC in 1916. No one is sure how he passed the physical exam—he had an obvious cataract in one of his eyes.

Courtesy National Air and Space Museum, Smithsonian Institution

In early 1917, he joined No. 40 squadron in France and soon was flying combat patrols. He flew his first few missions with extreme caution, which led to whispers of cowardice. He quickly dispelled these criticisms a few weeks later when he scored his first victory. By the end of the year, his log showed 23 victories.

Mannock despised Germans with such passion that toward the end of his career it became an obsession with him. He showed no mercy. In fact, he often tried to flame the Germans he shot at, feeling it was the worst fate he could inflict on them. Not surprisingly, Mannock often suffered from nightmares in which he was burned alive in his Nieuport. He swore he would never burn alive, and carried a revolver with him in case this situation developed.



Courtesy National Air and Space Museum, Smithsonian Institution

■ Allied pilots relax between missions.

As Mannock's career continued, he found himself promoted and given more and more authority. His compassion for his men was incredible, and they loved him. On the ground, he organized parties and sport matches to keep morale up. Once, he and his men raided a nearby RFC unit and dropped 200 oranges on their mess kitchen. A few days later, the unit avenged this assault and bombarded Mannock and his men with several hundred bananas. A truce was declared and consummated with a wild party later that night.

Such horseplay was nothing but a facade. At night, when he was alone, Mannock would mourn the loss of his compatriots for hours on end. Crying and moaning, he would repeat dead friends' names over and over. The strain took its toll, and the only real outlet Mannock had was shooting down more Germans. Every time a friend died, he vowed revenge.

He is considered the best flight leader of the war. In the air, his flights were never surprised by the Germans. However, attitude of revenge was his undoing. In July 1918, Mannock's close friend, James McCudden, died in a crash unrelated to combat. Mannock wanted revenge, even though the Germans had nothing to do with his death. A few weeks later, he followed one of his victims down to the deck to watch him crash, a dangerous pastime he had enjoyed in recent weeks. Ground fire struck his SE5A and punctured the fuel tanks. His plane burst into flames and crashed in no man's land. No one knows if he used his revolver before the flames reached the cockpit. His body was never recovered.

With 73 kills, Mannock stands as the third-highest ace of the First World War behind Richthofen and Fonck.

Bloody April

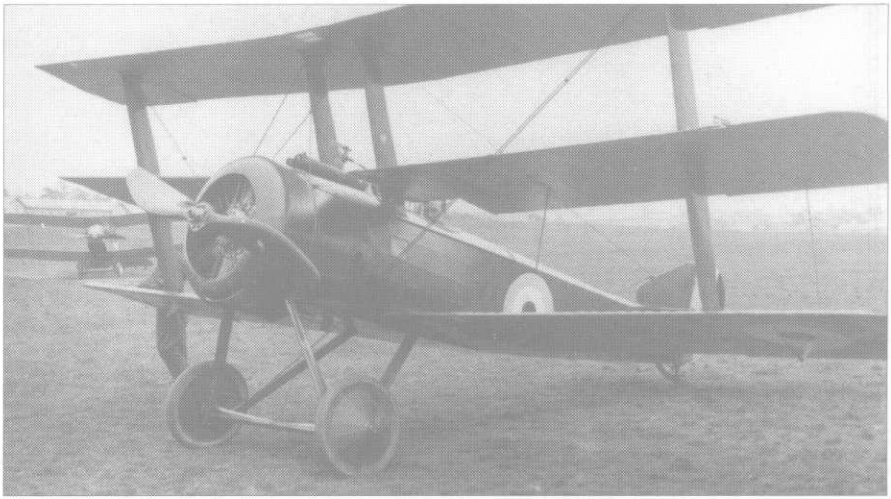
BLOODY APRIL

"An English patrol of five machines was coming our way. We attacked them by a rush as if we were cavalry, and the hostile squadron lay destroyed on the ground. None of our men was even wounded."
— Manfred von Richthofen, April 1917

British fliers came to call the fourth month of 1917, "Bloody April." Over 130 British airplanes fell in those 30 days, making it one of the worst months ever for any air force in any war. At one point the British began to run out of fighter pilots, so they yanked new ones from their training classes and sent them to battle.

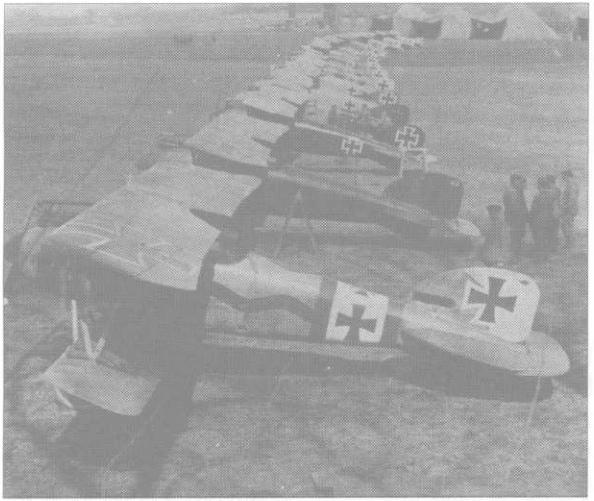
Ironically, the Germans' triumph in the sky came hard on the heels of their failure at Verdun. General von Falkenhayn lost his position as German commander after his offensive produced nothing but more casualties. Field Marshal Paul von Hindenburg, along with General Erich Ludendorf, were appointed in his place. In early 1917, Hindenburg ordered the German lines straightened on the Western Front. In a carefully staged withdrawal, the Germans pulled back to a series of fortified positions 20 miles behind their original positions. This move shortened the front by several miles, and released several divisions for duty elsewhere.

The spring of 1917 was probably the low-point for the Allied cause. As British and French aviators



© Royal Aeronautical Society, London

A Sopwith Triplane similar to the ones the Black Flight flew.



Richthofen's Geschwader lined up at their aerodrome. The planes are Albatros scouts.

suffered severely in the air, Robert Nivelle, the recently-appointed French Commander-in-Chief launched his ill-fated offensive. All through the winter, Nivelle had trumpeted his plans to anyone who would listen. Not surprisingly, the Germans learned the details of the attack, and strengthened their positions. Meanwhile, the French troops were promised an easy break-through and a quick end to the war. Morale soared after it had flagged in the months following Verdun.

On April 16, the French attacked a 40-mile front near the Chemin Des Dames. They failed dramatically and the morale of the French army collapsed. Mutinies broke out in 68 of the 110 total divisions. At one point, several units stole a locomotive and tried to "march" on Paris in order to spark a revolution or peace settlement. Others mounted machine guns on their units' trucks and set forth to blow-up the Schneider-Creusot armaments factory. They were stopped by loyal cavalry and either arrested or shot.

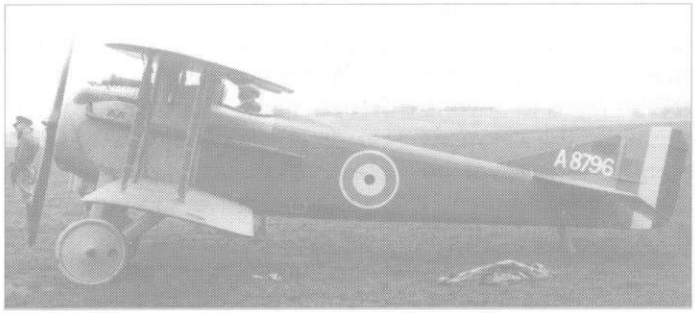
As the troops in the trenches refused to fight, the French home front tottered on the threshold of catastrophe. Inspired by the Russian Revolution, Socialists preached peace and printed antiestablishment fliers with the passive support of the minister of the interior. The people, exhausted by three years of seemingly pointless war and huge casualty lists, were eager for peace at nearly any price.

Marshall Petain and the famous statesman Georges "The Tiger" Clemenceau saved the day. Petain instituted a series of reforms that quelled the mutiny within the army, while Clemenceau reunited the home front and suppressed the Socialist presses. The crisis passed by late June, but it was clear that the nation could not last much longer should the war continue.

On the British sector of the front, the Germans were wreaking havoc among the RFC units. Flying the ancient B.E.2s, Pups and D.H.2s, the English aviators were sitting ducks for the new Albatros D .IIIs that the Jastas had received at the beginning of the year.

In June, the Germans started grouping their Jagdstaffeln into Jagdgeswaders. The first, called JG1, was commanded by Richthofen and consisted

A French Spad 7 in British markings. No. 19 Squadron flew Spads until January, 1918.



of Jasta 4, 6, 10 and 11. These were the elite units in the German Air Service, and probably the best squadrons of the war.

To counter the German bid for air superiority, the British deployed several new aircraft. Among them was the F.2b Bristol Fighter. Known as the "Brisfit," the F.2b was a two-seat fighter armed with three machine guns. At first, the Bristols suffered terrible casualties, but after the pilots changed their tactics, they became formidable opponents. The F.2b's rugged construction and speed were so good that the Brisfit remained in service until 1932.

"Bloody April" had at least one good affect on the Allied war effort. It spurred the British to get better fighters to the front and to reexamine tactics. Nevertheless, pilot skill mattered less and less as the battle of attrition continued. From now on, the capacity to produce large numbers of aircraft would determine the winner of the air war.

The Cult of the Offensive

French military thought before the war stressed the great virtues and spirit, or elan, of the Gaulic soldier. Firepower and numbers could be overcome with this elan. The offensive became an obsession to the French officer corps. Nothing else mattered save the Napoleonic charge culminating in a glorious bayonet assault on the enemy. This semi-mystical nonsense divorced itself even further from reality by stating, "In the offensive, imprudence is the best of assurances.... what the enemy does is of no consequence." Only one soldier, Colonel Petain, disagreed. "Firepower kills," was his philosophy. He later rose to command the French Army in 1917. After the war, the French became equally obsessed with a defensive doctrine, believing that the next war would be a repeat of the last. Technology, however, in the form of the tank had restored mobility to the battlefield, making offensive operations far superior to static defenses. In essence, France went to war in 1914 and 1939 with the *wrong doctrine necessary for victory.*

AN ENEMY TO ALL

"I shall never again fly through a thunderstorm unless the Fatherland should demand this."
— Manfred von Richthofen

Even today air forces lack a true all-weather fighter—one which performs superbly in any condition. In World War I there was nothing even close.

The open cockpit made even a modest squall a dangerous threat to a pilot's vision. The best flight suits couldn't ward off the cold at 15,000 feet above the Somme in February. Even a summer storm might swat the fiercest ace from the sky, as the Red Baron himself determined one day when he challenged a thunderstorm:

"The rain began falling," he wrote in his journal. "I had to throw away my goggles, otherwise I should not have seen anything....Very soon I knew no longer where I was. The gale seized my machine as if it were a piece of paper, and drove it along. My heart sank within me....

"I was surrounded by an inky blackness. Beneath me the trees bent down in the gale....My flight became a jumping competition pure and simple. I had to jump over trees, villages, spires and steeples, for I had to keep within five yards of the ground....The lightning was playing around me. At that time I did not know that lightning cannot touch flying machines. I felt certain of my death...."

Von Richthofen lived to conquer mortal foes, but the greatest fighter ace of the war never again tangled with a thunderstorm.

Courtesy National Air and Space Museum, Smithsonian Institution

A stern Manfred von Richthofen seated in the cockpit of his Albatros Scout.

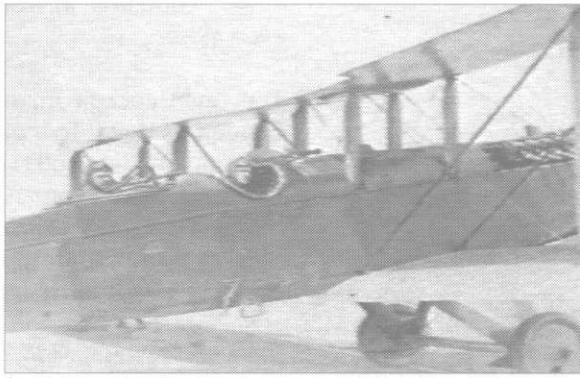
AERIAL COMMUNICATION

"After seeing Bath wagging his wings to signify that enemy machines were near, the whole of the flight commenced to stunt and whirl about in a most disconcerting way."
— William MacLanachan, British pilot

World War I pilots signaled one another in the air mainly by pointing, waving their arms and wagging their wings. While it was possible to communicate with the ground by wireless, the early radios weighed 75 pounds and could transmit only Morse code. Their very weight precluded their use in single-seat fighters, but artillery-spotting aircraft used them throughout the war.

In those two-seaters, in which the pilot and gunner sat back-to-back, the crew used a series of shoulder and head taps to communicate over the engine noise. Reconnaissance pilots communicated with the forward lines by scribbling their observations on paper and dropping them over the friendly position.

Usually messages were conveyed as they had been in the cavalry. A squadron leader's fist swung down from overhead, as if pointing a saber, meant "Attack!"

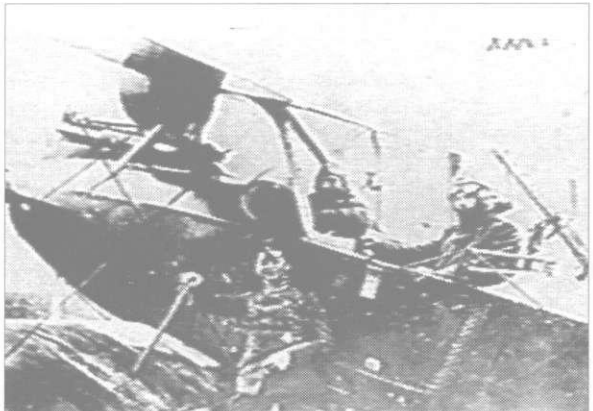


Courtesy National Air and Space Museum, Smithsonian Institution

while his upraised hand waved back and forth meant to hold back.

In the thick of a fight, communication was impossible. No one had time to watch their leader's plane for hand signals while enemy aircraft were zooming about. Consequently, once the aviators found themselves in combat, they were on their own.

Below: A German two-seater with a Parabellum on a ring-mount in the gunner's cockpit.
Right: A British two-seater.



Courtesy National Air and Space Museum, Smithsonian Institution

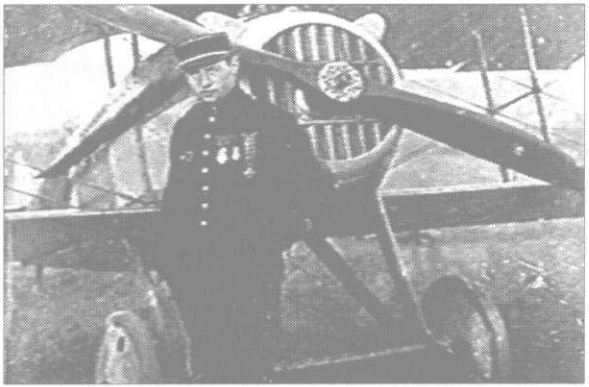
THE FRENCH ACES

"If one has not given everything, one has given nothing."
— Georges Guynemer, French ace

Braggart, show-off and superb pilot, René Paul Fonck was one of the few great aces to live through the war, dying at age 59 in 1953. Officially credited with 75 kills, the most of any Frenchman, he claimed to have shot down 127.

A highly decorated René Fonck poses before his Spad.

Fonck was famous for conserving his ammunition and using his natural flying skill to get so close to an enemy that he could make a killing shot on his first try.



Courtesy National Air and Space Museum, Smithsonian Institution

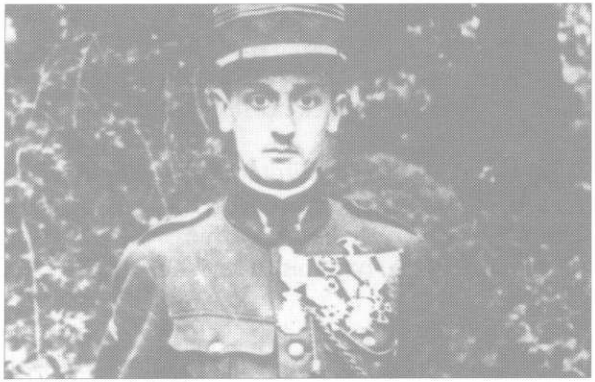
"I put my bullets into the target as if I placed them there by hand," he said. Twice he shot down six Germans in one day. Once he shot down three in ten seconds with three quick bursts.

If Fonck hadn't been so irritating, he would surely have been the most popular Allied ace. As it was, few people could stand to be around him. His best friend, Claude Haegelen, had this to say about him:

"He is a tiresome braggart and even a bore, but in the air, a slashing rapier, a steel blade tempered with unblemished courage and priceless skill....But afterwards he can't forget how he rescued you nor let you forget it. He can almost make you wish he hadn't helped you in the first place."

The second-ranking French ace, Georges Guynemer, could hardly have been more different. Pale, skinny and frail, people often assumed he was dying of tuberculosis, which only increased his fame. He repeatedly attempted to enlist in the French army, but his sickly appearance betrayed his ambitions. Finally he cajoled his way into flight school, helped by family connections.

His ancestors had a tradition of knighthood going back almost 1000 years, to the Crusades. His father



Imperial War Museum, London

Two photos of France's greatest aerial hero, Georges Guynemer.

had graduated from the Ecole Militaire, the French West Point. Everyone had their doubts about young Georges, but once he got into the air, he silenced them.

In July 1915, with his gunner in a two-seat Morane-Saulnier, he scored his first victory:

"At the one hundred fifteenth shot fired by Guerder, I had, I will admit, a very sweet feeling at seeing the enemy slump to the floor of his cockpit, while the 'lookout' raised his arms in a gesture of despair and the Aviatik swirled down into the abyss in flames....I can vouch that I never felt a keener elation."

Guynemer was shot down six times, including once when his trusty Spad, "Vieux Charles," flew into a French artillery shell that had been lofted at the Germans. In the course of his career, he downed 53 German aircraft. He favored hunting alone, and prowled for hours above the lines. His sense of chivalry and honor made him the toast of the French populace. He often displayed mercy to his adversaries if they appeared injured or out of ammunition. Ernst Udet once ran afoul of Guynemer, who outmaneuvered the German at every turn. Then Udet's guns jammed. Seeing this, the Frenchman pulled alongside the German, saluted and headed for home. Typical of Guynemer, perhaps, but a rare action at this point in the war.

Courtesy National Air and Space Museum, Smithsonian Institution

Georges Guynemer failed to return from a mission on September 11, 1917. His plane fell into a massive artillery bombardment and was obliterated.

The third-ranking French ace, Charles Nungesser, first flew an airplane in South America before the

Nungesser meets his C.O.

After he received his first Nieuport scout, Nungesser was so excited that he took to the air and dazzled his new unit, N. 65, with a wide array of aerobatics. When he landed, his new commanding officer berated him for such irresponsible behavior. He finished his tirade by suggesting that Nungesser go show-off over a German airfield if he wanted to impress anybody. This is exactly what Nungesser did. He flew to the nearest enemy aerodrome, strafed it on his first pass, then came around in a climbing turn and crossed the field below the top of the hangers *upside down!* When he returned to his base, his C.O. stormed over and demanded where he had gone. Nungesser simply replied, "It is done, mon Capitan." Furious that this new replacement took him seriously, the harried officer gave Nungesser eight days of house arrest.

■ The wild Charles Nungesser, who once flew inverted across a German airfield—at hangertop level!

war. Without any instruction, he took to the sky and quickly mastered the controls. His landing was rough, but he thoroughly impressed the plane's owner!

With the outbreak of the war, Nungesser joined the French cavalry and saw action at the Battle of the Marne. In one instance, during the retreat in 1914, he and a few men ambushed a German staff car behind enemy lines. After killing the occupants, one of whom was a very high-ranking officer, Nungesser drove the car through throngs of French stragglers and German combat troops to reach the safety of the Allied lines. A French general awarded him the car and a transfer to the Air Service as a result.

Nungesser suffered more wounds than most would consider humanly possible after he started flying. Before the war ended, he had lost most his teeth, had his jaw broken several times, received multiple concussions, and had each knee shattered. After a particularly hazardous crash, he was forced to walk with the aid of a cane. Convalescing in hospitals did not suit his aggressive nature, so he cut a deal with his doctor that allowed him to fly. Each day, his mechanic would take him from his hospital bed and carry him to his plane. After the mission was over, he would return to his hospital room to receive more treatment.

Courtesy National Air and Space Museum, Smithsonian Institution

When he was healthy, Nungesser was quite the *bon vivant*. He was known to fly the dawn patrol suffering from a hang-over, still dressed in a tuxedo. His affairs of the heart were numerous, and included the famous spy, Mata Hari.

Nungesser survived the war with 43 victories. He disappeared trying to cross the Atlantic in 1927 a few weeks before Lindberg succeeded.

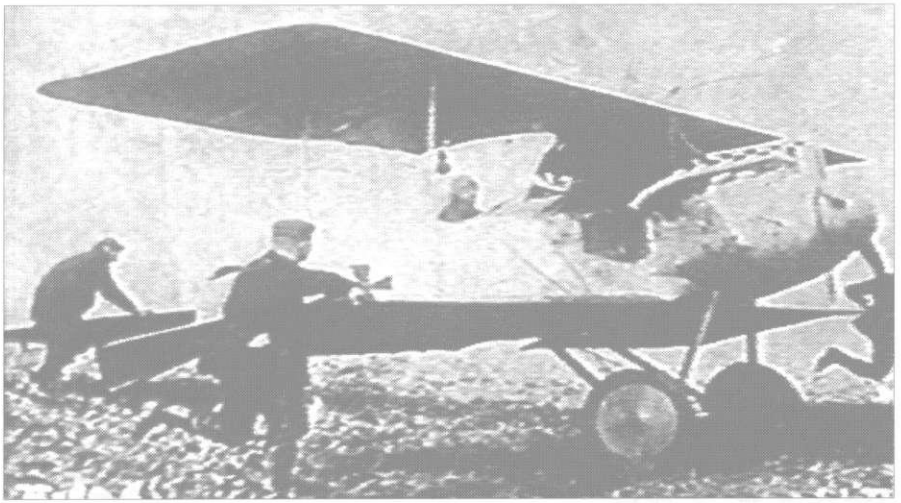
The Red Knight of Germany

ACE OF ACES

"Had I known it was Richthofen, I probably would have fainted."
— Canadian flier Wilford May

Above the Somme on November 23, 1916, the great British pilot Major Lanoe Hawker, flying a D.H.2 pusher, was chasing some lumbering German two-seaters when a formation of single-seat Albatros D.IIs came to their rescue. Hawker turned to face this threat, and engaged the German leader.

Guiding an Albatros D.II into position for takeoff.



Courtesy National Air and Space Museum, Smithsonian Institution

Winner of the Victoria Cross, and commander of the famous No. 24 Squadron, Hawker had taken off with five mates but was now alone behind German lines. His squadron had either aborted the mission because of engine troubles, or were preoccupied by the other Albatros pilots.

The pilot of the Albatros was a 24-year-old Prussian with 10 victories to his credit. Born to a family of rural aristocrats, he displayed a passion for hunting from a very young age. Manfred von Richthofen was about to make a name for himself.

Hawker made the first pass, missing with a burst from behind. The two pilots began chasing one another, the powerful Albatros versus the nimble D.H.2.

"Round and round we go in circles like two madmen, playing ring-around-a-rosie almost two miles above the earth," wrote Richthofen. "I knew at once that I was dealing with no beginner, because he didn't appear to dream of trying to break off the fight and get out of the circling."

The prevailing winds blew the dogfight deeper into German territory. Richthofen was surprised his foe didn't turn for home out of concern for his fuel supply.

Courtesy National Air and Space Museum, Smithsonian Institution

Two portraits of the illustrious Manfred von Richthofen.

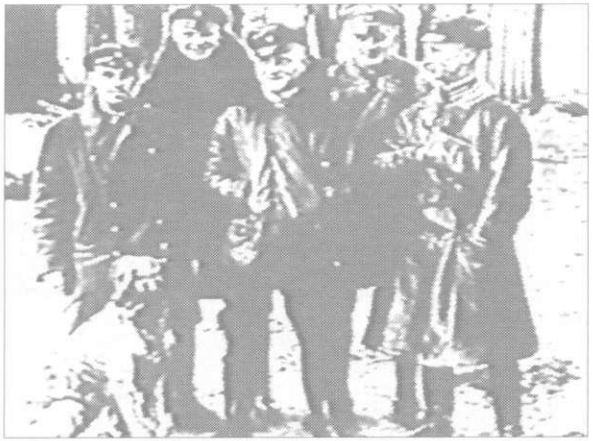
Altitude slipped away as the planes maneuvered in 100-yard circles. Richthofen tried to stay above the D.H.2 but could not get a clear shot. At one point the Englishman gave a jaunty wave. Then, only a few yards above the trenches, Hawker broke for home.

"He knows I am behind him and close on his tail," Richthofen wrote. "He knows my gun barrel is trained on him. He starts to zigzag, making sudden darts right and left, right and left, confusing my aim and making it difficult to train my gun on him. But the moment is coming. I am 50 yards behind him. My machine gun is firing incessantly....Now I am within 30 yards of him. He must fall."

Richthofen's bullets hit home. Hawker fell forward in the cockpit, dead from a head wound. His D.H.2 crashed into a water-filled shell crater just short of the British lines. A German infantry patrol rushed to the wreckage, where they dug the plane's Lewis gun from the mud. Richthofen sent it to his mother. A decade after the war it still hung over the doorway to his boyhood bedroom.

When Hawker fell, Max Immelman had been dead for five months. Oswald Boelcke, Richthofen's mentor

Courtesy National Air and Space Museum, Smithsonian Institution



Courtesy National Air and Space Museum, Smithsonian Institution

The Red Baron, center, with a few of his men and his dog. The dog once ran into a whirling propeller, losing part of his ear but was otherwise unhurt.

and Germany's greatest fighter tactician, had died in late October. By early January 1917, Richthofen was rapidly on his way to becoming Germany's greatest ace. Already he had 16 victories in only five months of combat.

Meanwhile, the German Air Service continued to expand. The German leaders decided to spread the experienced pilots throughout the new units. Richthofen soon found himself the commander of Jasta 11. Since its inception, Jasta 11 had scored only one victory—and it was unconfirmed. It was quite a change from Jasta 2, and Richthofen was less than pleased with his new assignment.

"It was a beastly nuisance," he wrote of the assignment. "Besides, I should have preferred the Orden Pour le Merite."

Before the war Richthofen had been a national champion horseman, and had grown fond of trophies and ribbons. During the war he went so far as to award himself an engraved silver cup for each Allied plane he downed. The Orden Pour le Merite was his nation's highest military honor, and two days after receiving his first command Richthofen learned that he would wear its blue and gold cross. Satisfied, he took firm charge of Jasta 11. On his first mission as leader he scored his seventeenth confirmed victory, the squadron's first.

The Richthofen Dynasty

The von Richthofen family produced several other fighter pilots who never received the acclaim they deserved since they lived in the shadows of the Red Baron's famous career. Lothar von Richthofen, Manfred's younger brother, scored 40 victories during the war. He was killed in the early 1920s in a flying accident. One of Manfred's cousins, Wolfram von Richthofen, became an ace in the closing days of the Great War while serving in JG1. In the Second World War, he rose to the highest echelons of command inside Goering's Luftwaffe. In World War II, a Jagdgeschwader was named in Manfred's honor. It is still active today. The von Richthofen legacy is inseparably linked with the history and tradition of the German Air Force. Through two major wars, the Richthofen family served Germany in the highest capacities.

Richthofen's fame spread slowly. Then, whether to taunt his opponents or to make it easier for his inexperienced squadron-mates to locate him, he had his Albatros painted bright red. Almost instantly, French fliers spoke of "le Diable Rouge," the Red Devil. Others called him the Red Knight, or the Red Baron. Wild rumors sprang up about the red fighter, some even claimed that the plane was piloted by a woman. Morale soared in his unit, and before long Jasta 11 ruled the skies in their sector. Soon his men painted their planes red, although all but the Baron were required to display at least one other color.

The Baron's fighting policy was the same as his mentor, Boelcke: Always begin the encounter with an advantage, don't show-off, and shoot down the target as quickly as possible. Here is Richthofen's account of his twentieth victory, a typical one:

"While flying back from a conference with the Boelcke squadron, I saw an enemy artillery flyer at a height of 6000 feet, west of Loos.

"I approached within 50 yards of him without his noticing me and attacked immediately. After several hundred shots, the plane dashed down, falling into our trenches."

Richthofen was not a naturally superb pilot. He crashed on his first solo, and his own writings contain numerous references to other self-induced mishaps. Once, after forcing a Vickers two-seater to crash-land in flames, his own Albatros began sputtering and he too had to land.

"The result was very comical," he wrote. "My enemy with his burning machine landed smoothly, while I, his conqueror, came down next to him in the barbed wire of our trenches and my machine overturned."

Luckily for Germany, Richthofen was not always so clumsy. By the end of "Bloody April" he had 52 kills and was called home to meet the Kaiser. Blond and handsome, he became his nation's idol. Women asked for his autograph

Courtesy National Air and Space Museum, Smithsonian Institution

Richthofen wearing the Orden Pour le Merite.

Richthofen convalescing after receiving a head wound in July 1917. He was never the same after the injury.

and noblemen jostled one another to be next to him at state functions.

While Richthofen met with royalty and relaxed on the home front, things were going poorly for his colleagues in the trenches. German leadership increasingly turned to pilots to supply the advantage, and Richthofen returned to battle in late June 1917, with a new command and a new strategy.

He would head the first Jagdgeschwader, a group of four Jastas, including Jasta 11. This group of 40 to 50 of Germany's best fighter planes and their crack pilots would become the famous "Flying Circus," known as Jagdgeschwader 1, or JG1. The unit lived in tents so they could move from base to base overnight. They would take to the air in massive V formations with the Red Baron at the point. The British would surely shrink back in fear.

At the same time, the Germans launched intense bomber and airship attacks against London, forcing the British to recall some of their best planes and pilots to defend the home front. Less than a week after his return, Richthofen had four more kills to his credit.

On July 6, 1917, as German ground troops watched in horror, the famous red Albatros began to spin down from a dogfight, out of control. It briefly pulled up at about 500 feet, then dove for the ground and crash-landed.

Richthofen had been grazed in the skull by a British shot and spent nearly a month recovering. Many biographers believe that the wound left him with debilitating headaches and reduced his will to fight. He scored two victories in August, two in September and then only two more in the next six months.

In early September 1917, JG1's Albatros D.IIIs and D.Vs were replaced with the faster-climbing, more maneuverable Fokker Dr.I Triplane. Richthofen was a quieter, sterner man now, a taskmaster with his flyers.

"He who passes his judgment, he backs all the way," wrote one of his students, the ace Ernst Udet. "Whoever fails, he drops without batting an eyelash."

Throughout the winter of 1917-18, Germany prepared for its final, last-gasp offensive of the war. In December,

Right: A casual shot of the Baron seated at his aerodrome.
Below: A triplane on its takeoff roll.

Russian resistance collapsed and the new Bolshevik regime sued for peace. With all the troops from the Eastern Front freed for duty in France, Lundendorf and Hindenburg, the two German leaders, hoped to overwhelm the Allies before the Americans could arrive in large numbers. Richthofen and his men realized that their country's chances for victory were slipping away, but they steeled themselves for the grim fight that the spring would bring.

In March 1918, the Germans launched the first phase of their Ludendorf Offensive. Designed to drive a wedge between the French and British troops, the attack initially succeeded. French and British troops were thrown back.

In the air, Richthofen and JG1 flew mission after mission in support of the ground troops. On April 20, the Baron scored victories 79 and 80.

Courtesy National Air and Space Museum, Smithsonian Institution

"That is really a decent number," he said at the end of the flight, unaware that there would be no more.

DEATH OF THE BARON

"I got a long burst into him, and he went down vertically and was observed to crash by Lieutenant Mellersh and Lieutenant May."
— Capt. Roy Brown

On April 21, 1918, above a German position at the Somme, a group of Fokker Triplanes jumped a pair of lumbering R.E.8 observation planes of the No. 3 Australian Squadron. Allied antiaircraft gunners tried to help the scouts with a quick barrage.

The puffs of white smoke drew the attention of Capt. Roy Brown, who led a flight of eight Sopwith Camels far above the mismatch. Wagging his wings for his fellows to follow, Brown dived into the fray. Soon some Albatros Scouts joined in, as did a new group of Fokkers. Among them was an all-red Triplane.

A young Canadian, Wilford May, was flying his first combat patrol. Brown had told him to stay above any fight, should one develop. May did, but after a couple of Albatros D.Vs swooped by him, he couldn't resist the temptation to join the battle. He quickly became overwhelmed in the tangle of 30 or more planes, and broke away, flying a dangerously straight line away from the fight. Richthofen, flying above the scrap, noticed this sign of weakness and gave chase.

May began evasive maneuvers after the Baron's initial burst. He and his German pursuer screamed along just above the ground, the Triplane steadily gaining.

Brown was still involved in the dogfight above when he noticed May's plight. He knew that unless he distracted the Triplane pilot, his boyhood friend May was doomed. Diving at full speed, he swept in behind the Fokker and fired a distant, desperate burst before May and the German disappeared behind a stand of trees.

Courtesy National Air and Space Museum, Smithsonian Institution

Captain Roy Brown, the man credited with downing the Red Baron. He died in 1944.

Courtesy National Air and Space Museum, Smithsonian Institution

Above: The last photo of Manfred von Richthofen, taken after he was killed. Right: His final resting place.

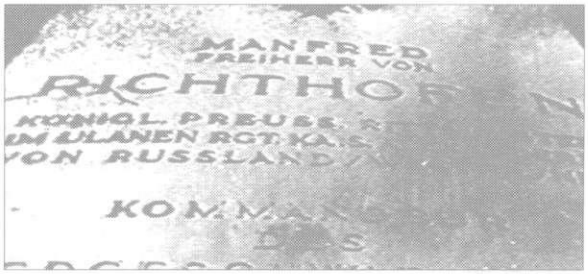
It took Brown a few seconds to find the two airplanes again, but when he did he closed on them quickly, since they were zigzagging wildly. All of a sudden the Triplane swerved away from the chase and descended, snapping off its landing gear as it touched down. May escaped; Brown turned back to the main dogfight.

Australian ground troops had also fired at the Fokker as it came by, and they saw it crash-land in no man's land. When its pilot did not move, several of the Australians rushed out, took hold of the plane and dragged it to a safe place.

At first they could not see why the Triplane had come down. It was unscathed except for the damaged gear. Then one of them noticed a bloodstain on the pilot's jacket, and saw that one bullet had pierced his chest. Examining the dead man's papers, the soldiers were awed to see that he was Manfred von Richthofen. Historians still argue over who fired the single bullet that killed the Red Baron. The Australian gunners tried to claim the kill, but credit is generally given to Brown.

Von Richthofen was buried the next day in the small village of Bertangles. British and Australian troops gave him full military honors, and a British pilot dropped a note in German territory containing the news. Germany went into deep mourning. Richthofen was eulogized throughout the flying world, including this tribute in a British flying journal:

"All airmen will be pleased to hear that he has been put out of action, but there will be no one amongst



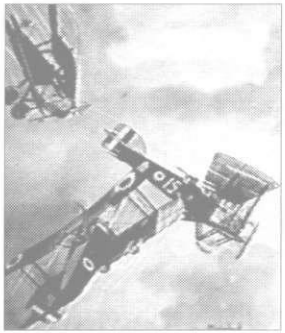
Courtesy National Air and Space Museum, Smithsonian Institution

them who will not regret the death of such a courageous nobleman....Anybody would have been proud to have killed Richthofen in action, but every member of the Royal Flying Corps would also have been proud to shake his hand had he fallen into captivity."

In 1925, Manfred von Richthofen's younger brother Bolko recovered his body and took it from Bertangles to Berlin. Manfred had the largest funeral ever seen in that city.

THE LUCKY FEW

Although Manfred von Richthofen was the deadliest pilot of the war, he was not particularly bloodthirsty. He occasionally passed up the chance to finish off an enemy as long as he was sure that the airplane was going to crash. Consequently, many pilots and observers who are among his "kills" actually lived to tell about it. Here are three such accounts:



Courtesy National Air and Space Museum, Smithsonian Institution.

Point-blank fighting was the rule, not the exception.

• F.J. Kirkham, observer-gunner, British B.E.2c, April 28, 1917:
"I was watching the ground for the arrivals of our shells when a burst of machine fire came to my attention directly behind me. I turned quickly and stood up to man the rear gun. I was too late. The red Albatros had continued its dive downward just in back of our tail and was way out of range. He must have been doing 150 miles an hour. He was away in the flash of an eye."

• H.J. Sparks, gunner, Bristol Fighter, March 12, 1918:
"No sooner had the action signal been given than we were pounced on from above by various types of Hun machines numbering about 20. I could tell from the red undercarriages that they were members of Richthofen's Circus....

"I was just getting into position to try my luck with the all-red machine which I presume was Richthofen's, but the Baron got me before I got him. His first stream of lead went through my left shoulder and arm, rendering me entirely useless. The shock knocked me down into the cockpit." Sparks was captured and the Germans hospitalized him.

"During my second day in the hospital, a German flying officer came in and said he had been sent to see me by Baron von Richthofen, who wished me to accept half a dozen cigars with his compliments. I did, with thanks."

• D.E. Lewis, pilot, Sopwith Camel, April 20, 1918:
"I was attacking a bright-blue machine, which was on a level with me, and was just about to finish my adversary off when I heard the rat-tat-tat of machine guns coming from behind me and saw the splintering of struts just above my head.

"I left my man and wheeled quickly to find that I was face to face with the renowned Richthofen....

"I twisted and turned in the endeavor to avoid his line of fire, but he was too experienced a fighter, and only once did I manage to have him at a disadvantage...and thought I would have the honor of bringing him down, but in a trice the positions were reversed and he set my emergency petrol tank alight, and I was hurtling earthward in flames."

THREE VICTORIES

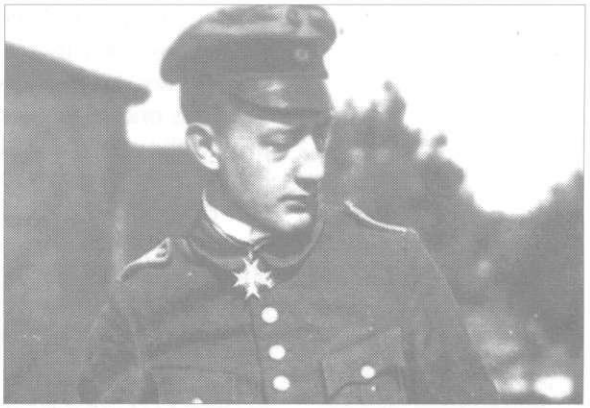
Richthofen's official accounts of his victories were terse, as dictated by military tradition.

• March 25, 1917:
"An enemy squadron had passed our lines. I went up and overtook their last machine. After only a few shots, the enemy's propeller stopped running. The adversary landed near Tilley, thereby upsetting his plane. I observed that, some moments later, it began to burn."

• April 2, 1917:
"Together with Lieutenants Voss and Lothar von Richthofen I attacked an enemy squadron of eight Sopwiths above a closed cover of clouds on the enemy's side of the lines.

"The plane I had singled out was driven away from its formation and tried to escape me by hiding in the clouds after I had put holes in its gasoline tanks.

"Below the clouds, I immediately attacked him again, thereby forcing him to land 300 yards east of Givenchy. But as yet my adversary would not surrender, and even as his machine was on the ground, he kept shooting at me, thereby hitting my machine very severely when I was only five yards off the ground.



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The enigmatic Voss whose main passion was his aircraft. He tinkered for hours on it.

"Consequently, I attacked him already on the ground and killed one of the occupants."

• March 25, 1918:
"With five planes of Staffel II, I attacked several English one-seaters northeast of Albert.

"I approached to within 50 yards of one of the machines and shot it to flames.

"The burning machine fell between Contalmaison and Albert and burned on the ground. Bombs that had apparently been in the plane exploded several minutes later."

THE BLACK FLIGHT

Raymond Collishaw never received the publicity of Ball, Boelcke or Guynemer, yet he stands as one of the best Allied fighter pilots of the war. With 60 kills, he ranks as Britain's third-highest ace. Only Mannock and Bishop scored more. It has been suggested that he did not receive the attention he deserved since he was a pilot in the Royal Naval Air Service (RNAS), a somewhat neglected sister of the RFC.

Courtesy National Air and Space Museum, Smithsonian Institution

Below: Collishaw with his own command in 1918. He's at the center wearing a white cap. Right: Collishaw in a Sopwith Camel. An all but forgotten ace, he scored sixteen more kills than Albert Ball but never received acclaim since he flew with the RNAS.

In April 1917, he joined No. 10 Naval Squadron as the "B" Flight commander. He and his four pilots painted their Sopwith Triplanes black, and painted macabre names on the fuselage sides such as Black Maria and Black Prince. In just a few short months, his flights claimed 87 German aircraft with the loss of only one pilot. Such a low loss rate in an Allied fighter outfit was unheard of during 1917. Without doubt, the Black Flight was one of the most effective units of the war.

Courtesy National Air and Space Museum, Smithsonian Institution

Collishaw was sent back to his native Canada for several months in the late summer of 1917. He returned to command his own fighter squadron during the height of the Ludendorf Offensive. Despite an incredible career, he was never awarded the Victoria Cross.

OTHER GERMAN PILOTS

While Manfred von Richthofen was a disciplined fighter, his brother Lothar was something of a wild man in the air, stunting about, firing at virtually anything. He had come to the front in early 1917, assigned to Manfred's Jasta 11. Manfred ordered him to stay behind his red Albatros on the first few missions, but Lothar peeled away on his third flight and scored his first kill.

Although Lothar's exploits certainly lent power to the Richthofen name, he was never as famous or respected as his brother. He survived the war with 40 kills, only to die in an airplane crash in 1922.

The position of second-ranking German ace of the war fell to Ernst Udet, who survived the war with 62 victories. Born in Munich in 1896, he used to jump off his porch roof with an umbrella to see if he could fly. He entered the war in 1914 as a motorcycle courier, but transferred to the Air Service and became a two-seater pilot.

He scored his first kill in a Fokker Eindecker in March 1916. He rose through the ranks to command Jasta 37 by August 1917. His record impressed Manfred von Richthofen, who invited him to join JG1. In six months Udet scored 42 kills.

The adventurous Ernst Udet. He survived the war and flew all over the world in the '20s and '30s only to be driven to suicide by his former squadron mate, Hermann Goering.

Bound for infamy—Hermann Goering. After a wound he received in the '20s he became a morphine addict. It is believed he originated the idea of the "Final Solution."

Udet was a combination of superb aerobatic pilot and deadly tactician, which may explain why he survived. He has the distinction of being one of the few aces of World War I to escape a crippled airplane via parachute.

After the war he became a famous stunt flyer, and was inspector-general of the Luftwaffe during the first two years of World War II.

The man who commanded Richthofen's Geschwader from July 1918 until the armistice was the infamous Herman Goering. Goering entered World War I as an infantryman but was soon hospitalized with rheumatoid arthritis. He escaped from the hospital and, with a friend, pilot Bruno Loerzer, faked his way into duty as an observation man in a two-seater. He was soon trained as a pilot himself, first in two-seaters, then in single-seat fighters. Only a fair pilot, Goering flew intelligently in combat. He was neither famous nor infamous, and finished the war with 22 kills.

Courtesy National Air and Space Museum, Smithsonian Institution

Udet Goes to Jail

Early in the war, Ernst Udet served in a reconnaissance unit and flew lumbering two-seat Albatros and Aviatik observation planes. One day, just after taking off, Udet attempted to make a shallow turn. The plane twisted into a stall and the machine piled up on the airstrip, a complete wreck. After returning from the hospital, Udet was greeted by his Captain who announced: "This is the dumbhead who, through careless flying, has cost the Fatherland a valuable machine and seriously jeopardized his observer's life." Udet was thrown in the base stockade for seven days, where he received dozens of bedbug bites. Just after he was released, he flew an unauthorized bombing mission. Exasperated, his commanding officer transferred him to a Fokker Eindecker outfit.

After the Great War, he became one of Hitler's most trusted subordinates. In World War II, he commanded the Luftwaffe. It was largely through his mistakes that the Germans lost the Battle of Britain. It is also suspected that he conceived the "Final Solution," the systematic extermination of Europe's Jewish population.

At the end of the war, he stood trial for war crimes and was sentenced to death. A few hours before his execution, he cheated the hangman and killed himself.

Voss: The Teenage Ace

Werner Voss originally served at the front as a two-seater pilot. It was clear from the first days of his flight training that he possessed natural flying skills. In November 1916, he transferred to Jasta 2 for temporary duty. His fellow fliers, as well as his commanding officer were thoroughly impressed with his abilities, and in January they made his transfer permanent. At age nineteen, Voss quickly rose to be one of Germany's premier aces. Having been an observation pilot, the young ace from the outskirts of Dusseldorf sympathized with his two-seater victims. He used his excellent marksmanship to spare the aircrew by aiming for the reconnaissance plane's engine. This at least gave the Allied pilot a chance to crash-land and survive.

Once, after downing an Allied plane, Voss discovered that there were no German ground units in the area, which meant his victory couldn't be confirmed. Determined to get credit for this score, Voss landed in the middle of no-mans-land, and dodged around shell holes and barbed wire to reach the wreck of the Allied plane. He jumped from his Albatros, and pulled a Lewis gun from his victims rear seat, set the plane on fire, then took to the air with machine gun bullets and mortar shells raining down around him. He got confirmation from an impressed C.O.!

Later in 1917, Voss was given command of his own Jasta. Unfortunately, his individualism as well as his youthful nature conspired to make him unfit for command. He was at his best in the air when he hunted alone over the front.

On the ground, Voss could be seen constantly tinkering with his scout, dressed in a musty gray sweater. In combat, he adorned himself in the finest silk shirts. He wanted to look dashing for the "pretty girls" if he should be forced down in Allied territory!

In September 1917, Voss was flying alone in his Fokker Triplane, when a flight from No. 56 Squadron bounced him. In an epic dogfight, Voss held his own against six S.E.5's led by James McCudden. All six of the British pilots were aces, yet Voss outflew them and filled every S.E.5 with lead. Finally, the German received a telling blow from Lt. Rhys-Davids, and the Fokker fell to the ground and exploded. Voss died before he could celebrate his twenty-first birthday.

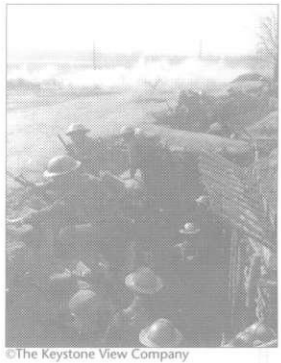
An End to the Great War

THE BEGINNING OF THE END

"Just think what it will be in the future when we attack with one, two or three thousand airplanes at one time. The effect will be decisive."
— American Gen. Billy Mitchell

National Archives #111-SC-22484

The German Spring Offensive slowly ground to a halt after amazing initial gains. The Allies, especially the French, were exhausted, and could not stop the Germans. Seventy divisions pressed forward, seeking to force the British to retreat to the coast, while the French fell back to defend Paris. They nearly succeeded.



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army started to crack after years of warfare. On August 8, the Allies launched a massive counterattack that cracked the German lines on the British sector of the front. It was known as the "Black Day" in the German army.

In the air, the Allies overwhelmed their opponents with sheer numbers. Although the German pilots fought valiantly until the end, their skill could not overcome their numerical inferiority.

Above: Allied troops on the march.
Above right: Over the top!
Right: One of the best scouts of the war—the S.E.5a.

The American Expeditionary Force arrived just in time to save the Allies. Their presence served to give heart not only to the British and French troops, but to the French people as well. Fresh and full of enthusiasm, though inexperienced, the Americans were thrown into the lines and helped blunt the German Offensive at Chateau-Thierry in June 1918.

By August, the Allies had drained the German's last reserves. Their last desperate assault failed. On their home front, revolution was brewing. Worse, their

National Archives #111-SC-22484

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A SPAD 7, one of France's best aircraft. It could out-dive every German plane in its time.

While they lost general air supremecy, they did win local dominance wherever they focused their efforts. By concentrating their Jastas on one section of the front, the Germans inflicted tremendous casualties upon the French, British and American aviators. It was not enough.

The Allies used their numerical superiority to advantage, roaming freely over the lines in areas the Germans could not defend, strafing troop concentrations, artillery pieces and trains. Some of the inexperienced pilots quickly gained skill and proved themselves equal to Germany's best. Veterans such as Mannock and Collishaw, who had survived a year or two in combat, scored victories as impressive as the enemy's victories.

James McCudden was one of the veterans. He had been an observer in unarmed Moranes during the Fokker Scourge of 1915, and in early 1918, he won the Victoria Cross

William "Billy" Mitchell

Billy Mitchell was never one to mince words. Throughout his illustrious career he constantly found himself in hot water with his superiors for the comments he made in public. In World War I, Mitchell was given command of a huge Allied aerial armada which he used in both infantry support and strategic bombing roles. He helped lay the foundations for the American Air Service as well. After the war, he proved to the world that surface ships, including battleships, could be destroyed by aircraft. He did this by sinking several German ships in experiments undertaken in the early 1920s. When he and his men sank the German battleship Ostfreisland before hundreds of international observers, almost everyone witnessing the test agreed that an era had passed. American naval officers, however, were unimpressed and declared the tests invalid. Nevertheless, Mitchell had decisively revealed the vulnerability of surface ships to aerial attack.

In the late 1920s, Mitchell called the Navy and War Departments "criminally negligent" after the dirigible U.S.S. *Shenandoah* crashed in a storm. The Army reacted quickly and court-martialed Mitchell. He was found guilty of insubordination. Soon after, Mitchell retired and faded into obscurity. He died in 1936 a forgotten man.

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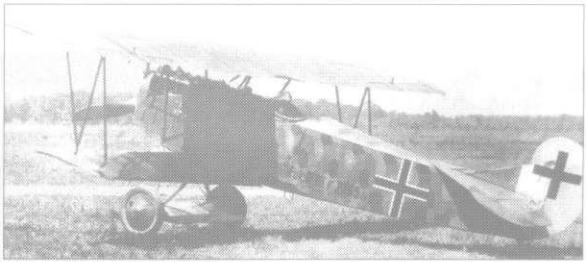
Above: The cautious and patient James McCudden, who would stalk high altitude two-seaters for hours.
Above right: The plane that inspired fear in every Allied pilot—the Fokker D.VII.

and became Britain's fourth-ranking ace by repeatedly knocking German two-seaters from the sky. He often scored two or three victories per day. On January 31, 1918, he shot down two Germans in one pass through a formation of five Pfalz and Albatros single-seaters. He died when his S.E.5a stalled on take-off and crashed into a forest. He had 57 victories.

In April, the new Fokker D.VIIs arrived on the German front. Arguably the best fighter of the war, the Fokker could climb vertically for short distances. Equipped with high-compression BMW and Mercedes engines, its high-altitude performance could not be rivaled by any Allied fighter. They wrought havoc on their inferior adversaries. In June alone, the German Air Service downed 487 aircraft while losing only 150. This figure can be attributed to the quality of German pilots and the superiority of the Fokker DVII.

Meanwhile, on the ground, the war was rapidly coming to a conclusion. One of the last German strongholds on the Western Front was St. Mihiel, southeast of Verdun. The St. Mihiel assault was to be the first American offensive of the war. General Billy Mitchell, America's foremost airpower advocate, was given command of 600 American, French and British aircraft. They streamed over the lines on September 12, against 295 German planes.



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Nothing could counter those odds, and the air and ground battle ended quickly in a German defeat. About 15,000 German soldiers surrendered, while the Americans suffered 7000 casualties. Despite heavy losses, the German Air Service continued to fight fiercely.

On September 26, American troops led the final assault of the war, at Meuse-Argonne. Against hundreds of Allied planes, German pilots continued to win many dogfights, but they were vastly outnumbered and were often grounded for lack of fuel or parts. In fact, the supply situation was so desperate that the Germans routinely cannibalized Allied wrecks for brass fittings and other unattainable items. It was a sure sign that the German home front was running out of raw materials. The pilots knew the war was lost. However, they never wavered in their duties and fought until the end.

THE LAST DOGFIGHTS

By October 1918, the German war effort began to collapse. Allied troops pushed the enemy farther each day. The Americans had mobilized four million fresh soldiers and were producing hundreds of British- and French-designed aircraft, such as the two-seat D.H.4 fighter-bomber.

National Archives #165-6B-8522

Right: Street fighting in a French village. Much of northern France was devastated this way. Below: French Poilus slogging through the trenches. By 1918 French morale could not withstand the strains of major offensives as it had in 1915-16.

At home, the German Navy mutinied after sitting idle in North Sea ports since 1916. Class tensions, always a major stress in German politics, erupted into violent street battles. Food had been scarce in Germany since the British began a naval blockade in 1914, but by 1918, it was nearly unattainable. Food riots broke-out as starvation became a serious threat. People survived on turnips or bread mixed with grotesque ingredients such as sawdust.

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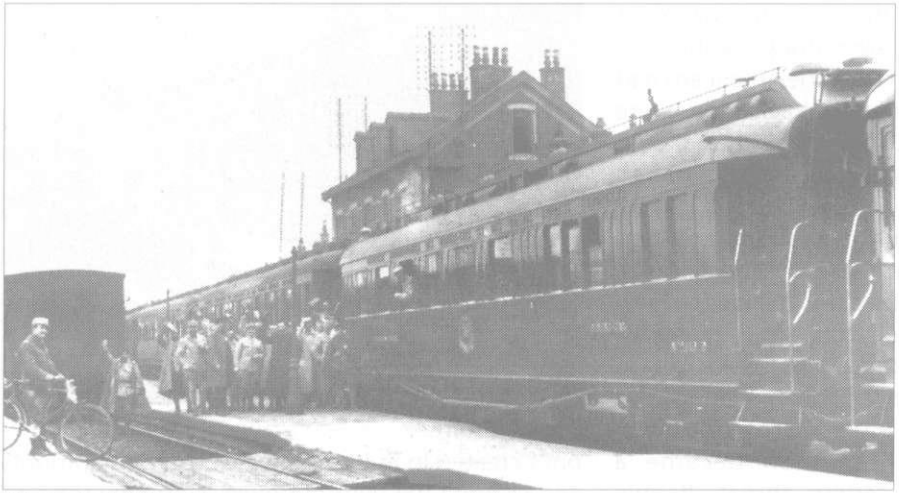
As the German navy mutinies spread, they prompted the German Socialists to take to the streets. In dozens of industrial cities Worker-Councils, much like the ones created in Bolshevik Russia, usurped authority and claimed the reins of power. Germany tottered on the brink of revolution, and its leaders were forced to sue for peace.

Recognizing that the Germans were running out of fighters, fuel and parts, Allied generals predicted that Germany would soon be defenseless in the air. They planned massive bombing raids on Berlin for early 1919. The raids would not be needed. Beaten on the ground, with revolution brewing at home, the Kaiser abdicated and fled to Holland. Democracy was proclaimed and the new government agreed to Allied terms for an armistice.



National Archives #111-SC-31464

Above: Foch's railcar, where the cease-fire was signed at Compiegne. Right: Victory celebrations broke out all over France, Britain and the U.S.

At 5 a.m. on November 11, 1918, in a rail carriage in the Forest of Compiegne, Germany surrendered. Six hours later came the official cease-fire in a war that left 8.5 million combatants dead. In the French Army alone, over 60 percent of their army was killed or wounded during the course of the war. Twenty-one million soldiers were left maimed, and some 8.6 million civilians were killed. Many of these civilian deaths were caused by starvation and diseases such as the great influenza epidemic in 1918-19.

Spontaneous celebrations broke-out in every major Allied city. People openly wept with joy; church bells tolled the victory. Thousands of people danced in the streets of Chicago, New York, Paris and London, overcome with relief that the conflagration had finally ended.

While Allied airmen celebrated with bonfires and parties, Herman Goering led the old Richthofen Circus from the front to Darmstadt, Germany, where rioting civilians and soldiers began to strip the planes. Goering threatened to strafe and bomb the town if more planes were damaged then flew with his men

National Archives #111-SC-50094

Allied troops celebrating.

National Archives #111-SC-33075

to Aschaffenburg. There, in a moment heavy with emotion, the men who carried the legacy of the Red Baron disbanded their squadrons and went home. They told each other they could take pride in the fact that, although they had been outnumbered and their nation had been defeated, they had proven themselves as fighter pilots until the very end.

The Treaty of Versailles

Although Woodrow Wilson wanted peace without any punishment doled out to the defeated powers, the French, British, and Italians needed to convince their people that the war was not fought for nothing. As a result, German and Austrian territory was carved up and given to the various Allied powers. France , Britain and Japan received all of Germany's overseas possessions, and Italy received the Austrian port of Trieste. Further, the Allies imposed huge war reparations payments on the Germans. These payments devastated the German financial structure in the early '20s and contributed significantly to the Great Depression. Various clauses in the treaty outlawed the production of aircraft, relegated the German Navy to a coastal defense force, and allowed Germany only a 100,000-man army without tanks or machine guns. Nationalists inside Germany were appalled at the conditions of the Treaty and vowed revenge. Their primary spokesperson became Adolph Hitler. Soon after he took power, he defied the Versailles Treaty and rearmed Germany. Less than five years later, the Second World War broke out. Many historians call the years between the two World Wars the "long armistice."

THE AMERICANS

"Whenever you're over the lines you have to keep twisting your neck in all directions every minute, or you're sure to be surprised...."
— Eddie Rickenbacker

Courtesy National Air and Space Museum, Smithsonian Institution

The United States came late to World War I, but not too late to begin its own air combat traditions.

The nation where the airplane was invented had no combat airplanes when it declared war on Germany on April 6, 1917. Some American pilots had been fighting for France since the beginning of the war in the Foreign Legion. Eventually, many transferred to the French Air Service, where they were incorporated into an all-American fighter squadron.

Above right: Eddie Rickenbacker in the seat of his pre-war race car. He was nationally known for his driving skills. Below: A Lafayette Spad sporting the unit's famous Indian head marking.

Courtesy National Air and Space Museum, Smithsonian Institution

Originally named the Escadrille American, the French later renamed the unit the Lafayette Escadrille in honor of the famous Frenchman who helped the Americans win the Revolutionary War. The Lafayette was a motley collection of American volunteers. When America joined the war, many of the American pilots transferred to their country's air service. They formed the nucleus of the fledgling air arm in 1918.

Eddie Rickenbacker, a former race-car driver, became America's "Ace of Aces" with 26 victories to his credit. When the U.S. declared war, he had quickly signed up, hoping to become a flyer. Instead he found himself chauffeur to the American commander General "Blackjack" Pershing, who took pleasure in having a famous racer as his driver.

Rickenbacker scoffed at the duty, but Pershing wouldn't budge. Finally General Billy Mitchell, commander of the U.S. flying corps, convinced Pershing that Rickenbacker could better serve his country in an airplane. Pershing was right. Rickenbacker soon became a superb pilot and skillful tactician. On September 25, 1918, he was given command of the 94th Pursuit, the "Hat-in-Ring Squadron."

That day, flying alone in a Spad 13, Rickenbacker spotted two Halberstadt two-seaters escorted by five

Fokker D.VIIs. A brave but not foolish pilot, Rickenbacker patiently worked himself into position high above the formation, with the sun at his back. He planned to dive quickly, get off one burst and then trade his airspeed for altitude, climbing to safety before the Fokkers could react.

When his initial burst killed the pilot of the trailing D.VII, the other Fokkers scattered and left the Halberstadts to fend for themselves. Under heavy fire, Rickenbacker made a sidelong pass and flamed one of the two-seaters. He then turned for home, and by the time the Fokkers regrouped and returned to the scene, he was nowhere to be found. His double victory earned him a Congressional Medal of Honor.

Rickenbacker ended the war with 26 victories. He also served in World War II. After World War II ended he visited a cemetery in Berlin to pay his respects to Boelcke, Richthofen and Udet.

■ Frank Luke, unpopular with his squadron mates, always seemed to have a chip on his shoulder.

Courtesy National Air and Space Museum, Smithsonian Institution

America's second-ranked ace was Frank Luke, the "Arizona balloon-buster." Aggressive to the point of suicide in the air, Luke's specialty was threading his Spad through the formidable antiaircraft fire around observation balloons to shoot them down. He scored his first victory on September 12, and was killed 17 days later. Luke is credited with 21 kills.

Luke was much more aggressive than most of his squadron mates, who called him "Bad-luck Luke" because they didn't like to fly alongside him. After going AWOL several times, his commander grounded him. Disregarding this, Luke took off without permission on September 29, and quickly destroyed three balloons. He was attacked by some Fokkers and soon had so much battle damage that he had to land.

He landed in the German-held village of Murvaux, strafing German infantry as he approached. Wounded in the shoulder, he was leaning against his aircraft as an entire platoon of 40 German soldiers approached to accept his surrender. As they got within range, Luke unholstered his two revolvers and shot seven of the Germans before he was killed. He earned a posthumous Congressional Medal of Honor for this a year later. In memory of this great air fighter, Luke Air Force Base in Arizona was named after him.

The Bizarre Case of Courtney Campbell:

When Courtney Campbell joined the Lafayette Escadrille, no one knew much about his past. Rumors had it that he had been a dance instructor in Illinois and had gotten himself in some sort of trouble which forced him to flee the country. He quickly proved himself to be quite a wild and adventurous person whose slick-talking usually spared him from disciplinary actions after he pulled-off some prank or caper. In the air, he loved to torment his flght leader by flying as close as he could to him. Once, while doing this, he misjudged the distance between his and Captain Maison-Rouge's Nieuport. His landing gear went straight through the top wing of the Frenchman's aircraft. For several minutes, the two airplanes circled the field locked together by Campbell's undercarriage. Finally, the American hauled back on the stick and pulled his scout free. Maison-Rouge landed at once, but Campbell treated everyone to an astounding aerobatics display.

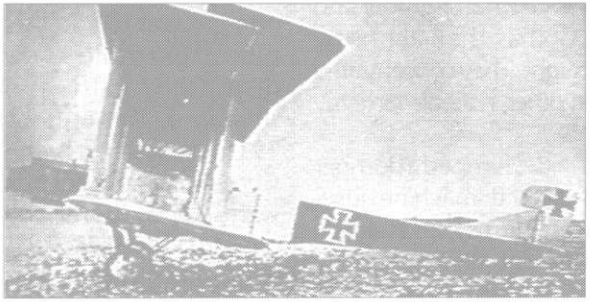
In combat several months later near Soissons, Campbell disappeared. No one ever saw him again and he was listed as "killed in action."

In September 1932, a man claiming to be Courtney Campbell wrote to the American Consulate General in Paris asking for his wartime service record, which he wanted to give to his fiancee. The man claimed that after he was shot down, he spent three years in a German hospital suffering from a spinal injury and amnesia. After the war, he returned to North Carolina so traumatized by his experience that he remained silent for a decade. The love of his fiancee, according to his story, was what convinced him to try and regain his memory. His story was investigated thoroughly, but the results were inconclusive. A few months later, the whole affair dropped from the public eye and the man claiming to be Courtney Campbell faded back into anonymity. Was he really Campbell? No one will ever really know.

THE MONSTERS

On June 13, 1917, in broad daylight high above London, a flight of 14 Gotha bombers circled with impunity until they had dropped nearly 100 bombs, killing 162 people and wounding 438. Ninety-two fighters took off from all over England to give chase, but the bombers were long gone by the time the smaller aircraft reached fighting altitude.

With a 77-foot wingspan and two 260-horsepower engines, the Gothas could carry 1000 pounds of bombs above 20,000 feet. While their appearance over London was not a serious threat in strict military sense, it had a huge impact on the war effort.



A Gotha bomber in the daylight with a green and white paint scheme.

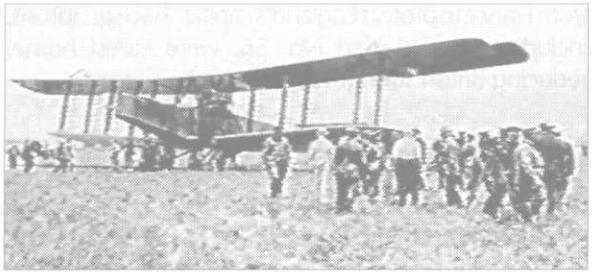
Courtesy National Air and Space Museum, Smithsonian Institution

Reacting to the bombing raids, Parliament demanded that crack fighter pilots and the latest planes be withdrawn from France to protect England's capital. Two squadrons, including the vaunted No. 56, were called home, reducing British strength on the Western Front.

New antiaircraft guns were put into service from London to the coast and, along with the reinforced fighter defenses, brought down so many bombers that the Germans started flying only at night. Soon the Germans deployed even larger bombers, including the Zeppelin Staaken "Giant," which could carry a 2200-pound bomb, the largest of the war. But the massive planes could not maneuver; they had many accidents and were easy prey for night-fighters and antiaircraft fire.

In 27 raids on England between May 1917 and May 1918, the German bomber squadrons dropped 130 tons of bombs and killed 835 Britons. They lost 60 bombers, including 36 to accidents. Historians say that the main effect of this campaign was to psychologically prepare England for World War II's Battle of Britain.

The British copied the German strategy with their own heavy bomber, the Handley-Page 0/100 and later the 0/400. Built in absolute secrecy, the first four Handley-Pages were intended as a nasty surprise for the German home front. Alas, on their first flight



Courtesy National Air and Space Museum, Smithsonian Institution

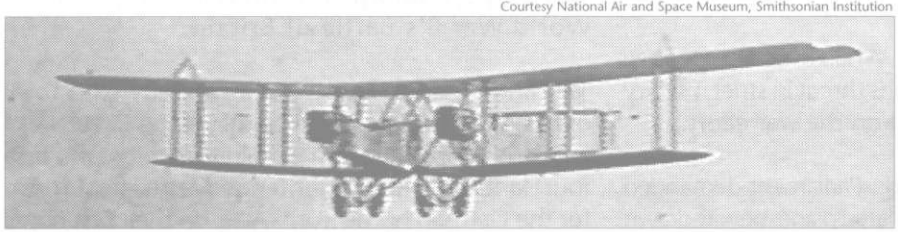
over the English Channel, one British pilot errantly landed at a German airfield, giving the enemy a spanking-new model for study.

The Handley-Page had two 250-horsepower engines and a 2000-pound payload but a ceiling of only 7000 feet. The latter made it easy fodder for German fighters and antiaircraft guns. So, like the Gothas, the British heavy bombers were used mainly at night. They concentrated on U-boat bases, railyards and other strategic targets.

Two photos of the British answer to the Gotha G series—the Handley Page bomber.

Smart fighter pilots from both sides jumped a bomber with care, for most types bristled with machine guns. However, all the big planes were clumsy, and seldom survived an attack by a competent pilot.

Courtesy National Air and Space Museum, Smithsonian Institution



Welcome Home:

When Rudolf Berthold returned home to Germany after the war, he witnessed a nation literally unraveling itself. Chaos reigned in the cities, with armed mobs clashing in the streets. Having been a decorated and respected scout pilot, Berthold was disgusted with the situation. Throughout 1919, he helped battle Communist street gangs with other former military men. In December of that year, Berthold's men were forced to lay down their arms to a local Communist group in the city of Harburg. After negotiating with the Communist leader, Berthold turned around and began to walk back to his men. Someone hit him over the head and strangled him—with the ribbon of his Orden Pour Le Merite.

Another pilot, Ernst Udet nearly started a riot on the platform of a train station when some young revolutionary attempted to tear his Blue Max from his throat.

Incidents such as these were all-too common when the troops returned home to Germany. The war had caused so much dislocation and hardship that anyone in a uniform was seen as responible for the problems the country faced.

EPILOGUE

The Great War profoundly influenced the course aviation history would take for at least 20 years after the armistice. The groundwork for the great air campaigns of World War II was laid by the early pioneers flying their unreliable and clumsy machines. The Zeppelin raids of 1915-16 were the inspiration behind the London Blitz, Dresden and Hamburg, even Hiroshima and Nagasaki. Forward-thinking theorists such as Trenchard, Mitchell and the Italian Guilio Douhet concluded that wars would no longer be won on the ground. The airplane, they reasoned, was the key to success. Destroying the enemy's means of production and terrorizing their population were the only means to ensure victory. A brutal concept, but one that has shaped military strategy ever since.

Today, although the weaponry is far more sophisticated, the basic axioms of air combat developed in World War I remain inviolable. Boelcke's *Dicta*, for example, is still taught to fledgling fighter pilots around the world.

Though their lives were filled with frustration, fear and failure, the aviators of the Great War forged a path which others have followed throughout the years. Today their accomplishments are overshadowed by the other cataclysmic events of this century, yet they still serve as a testament of man's ability to improvise and adapt in an environment both foreign and deadly.

Who Started the Great War?

The irony of the Great War lies behind the question of who started it. At first glance it appears obvious that the Germans and Austrians started it, but deeper investiagtion reveals a much more murky situation. For decades, historians have argued over who bears the responsibility for the war. In the early 1960s, Fritz Fischer, a German historian, published a book entitled *Germany's War Aims in the First World War* in which he tried to prove that Germany diabolically plotted the out break of the war in order to subjugate most of Europe. This touched off an incredible debate that has lasted to this day. Most historians, however, believe that the war was started because of a series of diplomatic blunders and miscalculations. If this is true, it is sobering to realize that so many people had to pay the price for their mistakes.

Aircraft

THOSE NOT-SO-FRAGILE CRATES

"I heard the rattle of machine guns...and saw bullet holes appear as if by magic in the wings of my machine."
— William A. Bishop, Canadian ace

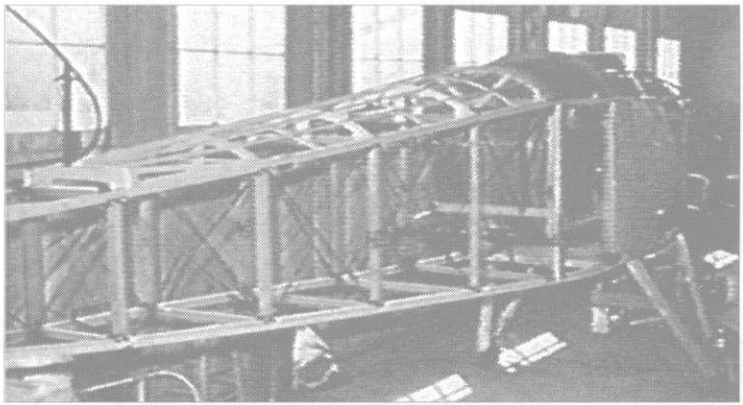
To look at a cutaway drawing of a World War I fighter is to see a simple, somewhat dainty skeleton, which makes it all the more surprising that they sometimes returned safely—albeit perforated with dozens of bullet holes.

Often the very simplicity of the aircraft saved them from being shot down. They were made of wood or aluminum frames, usually covered with silk or fine linen coated with a flammable varnish. This skin provided little resistance to a bullet. An entire burst might pass harmlessly through a wing or fuselage if a spar or control cable wasn't damaged.

Most pilots required hundreds of rounds of ammunition to bring down an enemy aircraft. The most vulnerable areas of the early airplanes were the engine, the fuel tank and the pilot. Invariably these key targets were grouped closely together, so that the attacker's aiming point was the front half of the fuselage. Pilot Arthur Gould Lee made a convincing case for the toughness of these "fragile" aircraft in a letter he wrote June 2, 1917. Flying at 15,000 feet just east of Ypres, he was hammering away on his jammed machine gun when his Sopwith Pup was jumped by six Albatros D.IIIs:

"I heard a loud and rapid crak-ak-ak-ak-ak-ak. I saw and smelt tracers whizzing by me, and there was a splash on the instrument board as my height indicator became a tangle of metal."

He dived away. The Germans followed, guns blazing, until his speed was so great that they broke off fearing their wings would fold.



Courtesy National Air and Space Museum, Smithsonian Institution

The internal framework of a W.W.I. Scout. Most were made of wood, but some had steel tubing for their skeleton.

"Then Archie woke up and let me have it. I was still only at 3000 feet, and was hit half a dozen times, as I later found."

Finally he landed at his base where his mechanics went over the Pup.

"Though 12 guns had fired at me at their leisure, my rigger could find only 29 bullet holes—17 in the fuselage, the rest in the wings.

"At first I concluded that the bullet which had smashed the height indicator must have traveled right through me without my noticing it, but when I took off my muffler I found it had gone through that and my flying-coat collar....So I've used up two or three of my nine lives."

The Father of the Royal Air Force

By every estimate, Hugh Trenchard was an amazing man. In 1900 he went to South Africa and fought in the Boer Wars. While there, a wound in his lung paralyzed him from the waist down. Thoroughly disgusted with doctors and hospitals, he set off for Switzerland and learned to bobsled. Absolutely reckless, his hijinks in the Alps earned him several wild crashes. Incredibly, after one such crack-up, Trenchard regained the use of his legs.

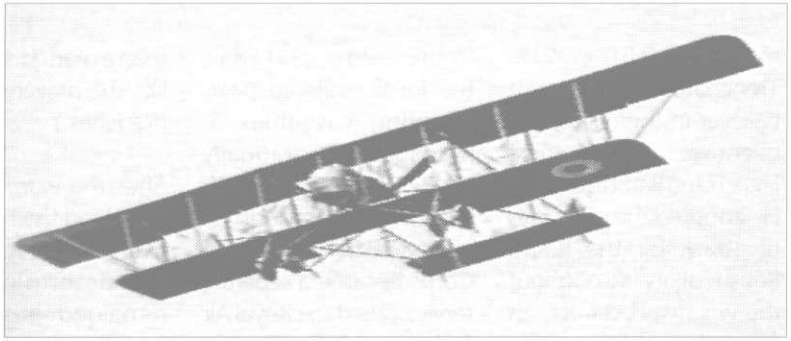
In 1912 he learned how to fly and transferred to the Royal Flying Corps at age 40. He rose through the ranks and gained command of the R.F.C. in 1915. Trenchard was a fervent believer in the cult of the offensive, as were most French and British generals. He adopted the principles of attack for the R.F.C. British pilots throughout the war invaded German airspace on routine offensive patrol. Trenchard's men always carried the war to the enemy, and while the R.F.C. suffered near-crippling casualties, it managed to gradually wear-out the German Air Service. It was through his efforts that the Royal Flying Corps became a separate service called the Royal Air Force in 1918. (During most of the war, the air service was nothing more than a branch of the army, like the artillery or supply branches.)

After the war, Trenchard remained the head of the Royal Air Force. Through his determination, it remained independent from the other services. He retired in the late 1920's.

THE EVOLUTION OF THE FIGHTER

The eleven years between the first powered flight at Kittyhawk, N.C., and the outbreak of the First World War witnessed a rapid development in aviation technology. In 1903 the Wright brothers were able to fly a distance of only 120 feet. Six years later a Frenchman named Louis Blériot flew across the English Channel from Calais to Dover. The first use of an airplane during war occurred in 1912, when Italy used aircraft for observation purposes during their dispute with Turkey. That same year, the airplane was used for observation and bombing during the Balkan Wars.

An early French Farman used later in the war as a trainer.



Courtesy National Air and Space Museum, Smithsonian Institution

At the beginning of the First World War the potential of the airplane in warfare was still unrealized. Prior to the outbreak of the war, the major powers of Europe formed air units as an auxiliary to their armies. By 1910, France employed 30 aircraft. Great Britain formed the Army Air Battalion in 1911 with 5 aircraft. Germany, not wishing to be left out, began to seriously form an air service in 1912. By August of 1914, Germany had the largest air service with 232 aircraft compared to England's 113 aircraft and France's 138 aircraft.

At first the airplane was used in a reconnaissance role to scout enemy positions and troop movements. It also proved very useful for artillery spotting. Occasionally pilots dropped small hand-held bombs on troop concentrations or supply lines.

The first months of the war were marked by peaceful exchanges in the air. Opposing aircrews were known to give friendly salutes or waves as they passed each other in the air. But aircrews quickly realized that the enemy they were waving to was gathering important tactical information, endangering their comrades.

Two-seater aircraft started carrying all kinds of weapons. Some pilots actually dropped bricks on enemy aircraft. Others resorted to using revolvers or shotguns. Obviously such weapons were virtually useless in the air. Even so, some aircraft were actually downed by these methods.

Flexible machine guns started appearing on two-seaters. The chances of downing an enemy aircraft were poor at best, partially because the field of fire was restricted and pilots had a rough time keeping their aircraft in position for good firing passes.

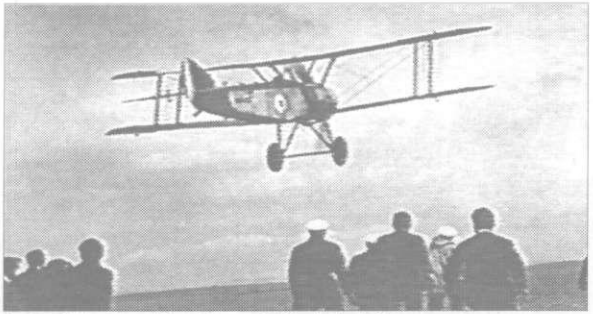
Courtesy National Air and Space Museum, Smithsonian Institution

Cockpit close-up of a Bristol fighter and its Lewis gun firing rearward.

The only reasonable solution to the problem was to mount a forward-firing machine gun. This would allow the pilot to fly and aim the gun at the same time. The gun is aimed by aiming the aircraft. There were three gun-mounting methods to consider. The first was to fix the gun to the fuselage in such a way that the gun fired through the propeller. The second was to attach the gun to the upper wing in order to fire over the propeller. The third was to mount the gun forward of the propeller.

The first successful attack with a forward-firing gun mounted on the fuselage came in April 1915. Roland Garros shot down five German aircraft with his specially fitted Morane scout. Garros was able to fire through the propeller due to the addition of deflection plates on his aircraft's propeller. Most of his bullets passed between the rotating blades; those that did strike the propeller simply ricocheted off the deflector plates. Garros' success created panic among the German pilots *until* his aircraft made a forced landing behind German lines, allowing the Germans access to his secret weapon. It became apparent to both sides that Garros' innovation could use some improvements.

After examining Garros' aircraft, the famous Dutch inventor Anthony Fokker developed the interrupter gear. This allowed a gun to be intermittently-timed to fire through the propeller without striking the blades. The Germans quickly employed this device on their Fokker Eindeckers. Later the English



Courtesy National Air and Space Museum, Smithsonian Institution

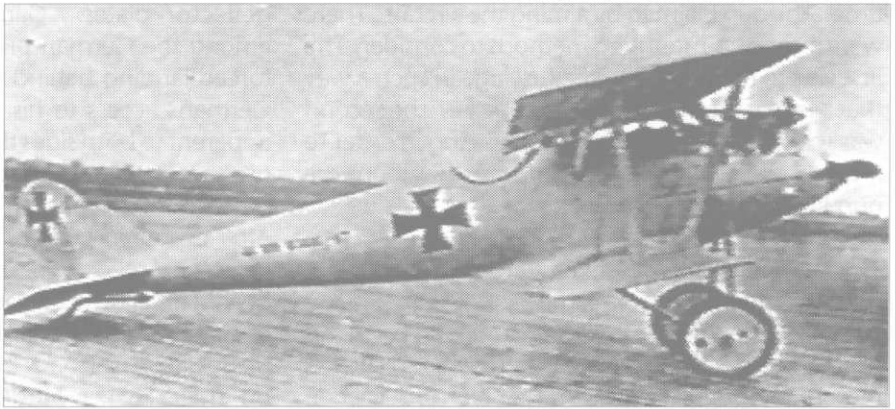
Above: A Sopwith Pup taking off from an aircraft carrier. The Pup was the first scout to achieve such a feat.
Right: The Rugged Pfalz D.III which made up about 25 percent of the German Air Service's scout strength in 1918.

introduced the D.H.2 fighter which relied on the "pusher" configuration, which placed the engine behind the pilot and his machine gun. This enabled the D.H.2 to have a forward firing gun. The French opted to mount a Lewis gun atop the upper wing of their Nieuport scouts in order to fire over the propeller. The British did this later as well.

During the latter half of 1915, the Fokker Eindeckers were used with much success. This period, lasting through the early summer of 1916, is called the "Fokker Scourge" by historians. During these critical months several famous German aces began their careers, including Oswald Boelcke and Max Immelmann.

Boelcke and Immelmann developed the first air-combat tactics during this period. Max Immelmann is generally credited with inventing the Immelmann maneuver. This allowed a fighter to make successive passes at an enemy aircraft. Boelcke, on the other hand, discovered an effective means of downing an aircraft. Boelcke would move in as close as possible to his target before firing into it, ensuring that he hit the target and conserving ammunition.

Courtesy National Air and Space Museum, Smithsonian Institution



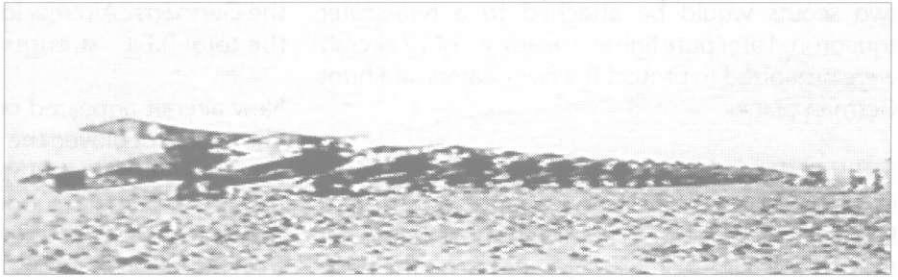
Boelcke is often called the father of air-combat tactics. He quickly formulated some basic principles which became known as *Boelcke's Dicta*. He helped

form one of the first operational Jastas—squadrons consisting solely of fighters. Jastas patrolled an assigned area and destroyed any enemy aircraft encountered. In August 1916, the first seven Jastas were formed. Each Jasta consisted of 6 single-seat fighters, which later increased to 12 aircraft.

The development of German tactics and organizations continued after Boelcke's death (October 28, 1916). During the summer of 1917 the Jastas were concentrated into Jagdgeschwadern (fighter wings) consisting of three or four Jastas. The first Jagdgeschwader, J.G.1, was led by Manfred von Richthofen, the "Red Baron" At the same time the Germans were looking for better ways to gain air superiority over specific sections of the front. Having a highly developed rail network, the German staff came up with the idea of transporting fighter squadrons by rail to areas of the front where they were most needed. In addition, von Richthofen had his squadron's planes painted with exotic schemes as a means to better identify his pilots in battle (von Richthofen's plane was red). This idea was soon adopted by other Jagdgeschwadern. Because they often travelled by rail, and because of the wild color schemes on their aircraft, J.G.1 became known as "the flying circus."

Meanwhile, the French reorganized their air service and formed the successful Escadrilles de Chasse during the battle of Verdun. Four Escadrilles later formed a group called "Les Cigognes"—the Storks. This elite unit included the famous French ace Georges Guynemer. Another famous unit, the Lafayette Escadrille, consisted of American volunteers.

Courtesy National Air and Space Museum, Smithsonian Institution



A Jasta of Fokker D.VIIs lined-up for takeoff.

The English organized their own scout squadrons in early 1916. The success of the Fokker Eindeckers led to the English realization that the two-seater aircraft would have to be escorted by scouts. At first, one or

Courtesy National Air and Space Museum, Smithsonian Institution

A pilot relaxes between missions.

two scouts would be attached to a two-seater squadron. Later pure fighter squadrons of 12 aircraft were organized to protect the two-seaters and hunt German planes.

Early in 1916 the British began to experiment with formation flying. Line Abreast, Line Astern, and Echelon were the most common formations. Of these three, Line Abreast appeared to be the best, but as the war progressed both the Allies and Germans discovered that a "vee" formation was superior.

During the spring of 1916 the English received the D.H.2 scout, which helped end the Fokker Scourge. Later in 1916 the British introduced new types of aircraft, including the Sopwith Pup. With these new types, along with the Nieuport 17, the British gained air superiority during the Summer of 1916.

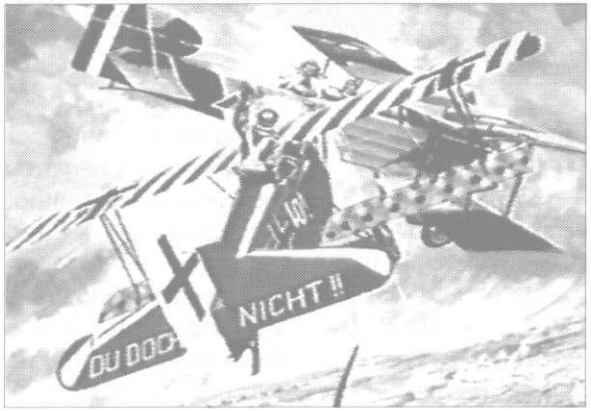
The Germans also developed new aircraft, which were superior to their Allied contemporaries. In particular, the Albatros D.III helped the Germans quickly regain air superiority, which they held until the middle of 1917. April of 1917, known as "Bloody April" to the British, was one of the greatest ordeals ever endured by the R.F.C./R.A.F. The Allied two-seater aircraft were easy prey for the Germans. Aircrew losses totaled 40 percent of the total R.F.C. strength.

New aircraft appeared on both sides during 1917. The French deployed the Spad 7 in mid 1916, which was superseded by the Spad 13 in 1917. The Spads proved extremely rugged and fast. Their only drawback was that they were less maneuverable than the German scouts. The British introduced the

S.E.5a and the Sopwith Camel. The S.E.5, like the French Spad, was a fast and durable aircraft. The Sopwith Camel proved to be very agile, especially at lower altitudes. The Germans introduced the Albatros D.III and D.V variants, as well as the new Fokker Triplane, which became a favorite of many German aces. Although slow, it possessed marvelous maneuverability. Famous aces such as Manfred von Richthofen, Werner Voss, and Ernst Udet flew the Fokker Triplane.

During 1918 the Royal Air Force (formed from the combined R.F.C and R.N.A.S. in April 1918) developed the concept of Combined Offensive Patrols. Two to four squadrons would fly together to perform missions. Not all of the squadrons would be of the same aircraft type. For instance, one squadron might consist of Camels, while another might consist of S.E.5s and another might be made up of Bristol F.2bs. A Combined Offensive Patrol would exploit the best qualities of each aircraft by flying them at different levels. The S.E.5s would fly at a higher altitude than the Camels, being better suited to combat at higher altitudes; the Bristol F.2bs would fly at lower altitudes. This allowed them to perform ground attack or bombing missions. The German formations faced a dilemma in attacking a Combined Offensive Patrol. If they attacked a lower squadron, the other squadron would dive upon the attacking German aircraft. This placed the Germans at a disadvantage. If the Germans attacked the higher squadron, the lower squadrons would be able to continue the mission at hand.

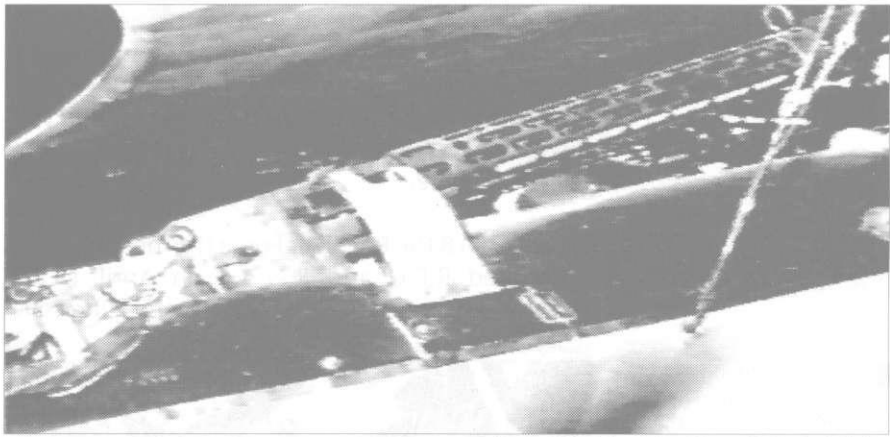
Courtesy National Air and Space Museum, Smithsonian Institution



Udet parachuting out of his Fokker D.VII. The German phrase on the elevators translates, "Certainly not you!"

The German formations grew larger throughout the war. Beginning in late June 1917, they would at times fly in strengths of 40 to 50 aircraft. By the end of the war the Germans increasingly flew in Jagdgeschwader strength. When a Jagdgeschwader and a Combined Offensive Patrol met huge dogfights developed.

Even though huge formations would end up dueling each other, these battles usually broke up into a series of one-on-one encounters. Duels between small units would sometimes become large dogfights as other aircraft from both sides would spot the air battle (the smoke from downed aircraft was visible for miles) and join the fray.



Courtesy National Air and Space Museum, Smithsonian Institution

A Spandau machine gun in a Fokker D.VII.

In May 1918, the Germans began to employ a new fighter—the Fokker D.VII. This aircraft was the best fighter of the First World War. The Fokker D.VII became the main fighter of the Germans until the end of the war.

Many new types of aircraft were still being designed when the war ended. The Germans had been developing the Fokker D.VIII, which was an extremely agile monoplane. In addition, the Germans had just introduced the Siemens-Schuckert D.IV interceptor. This particular aircraft possessed an extremely fast rate of climb. The British produced the Sopwith Snipe to counter the Fokker D.VII. Few of this type, however, saw action during the final months of the war. The United States' aircraft industry began developing combat aircraft of their own design, although most were inferior to their European counterparts.

By the end of World War I, the fighter had come of age. The fundamentals of air combat had been laid down through bloody trial and error. The lessons they learned still hold true today.

AIRCRAFT ENGINES OF WWI

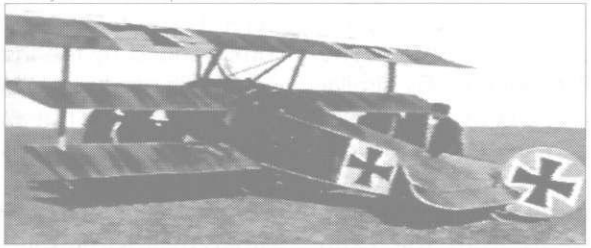
Two main types of power plants equipped the aircraft in World War One.

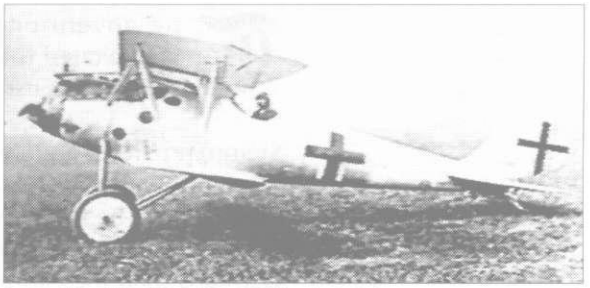
Right: The Pfalz D.III used an in-line engine.
Below: The Fokker Dr.I used a rotary engine.

The rotary engine was an air-cooled device used in many of the scout aircraft. Small and lightweight, the rotaries made excellent power plants for nimble scouts. Generally, a rotary-equipped aircraft was very maneuverable, but a little under-powered. Most air-frames with snub noses are rotary powered airplanes. Aircraft with rotary engines exhibited some strange flight characteristics. The rotary engine actually rotated with the propeller around the crankshaft. This huge spinning mass of metal creates what is known as the gyroscopic affect. An aircraft with a rotary engine will try to nose down in a right-hand turn, and will nose up in a left-hand turn.

This effect was most pronounced in the Sopwith Camel. Many novice Camel pilots would make a right-hand turn once they got airborne. This would send them straight into the ground.

Courtesy National Air and Space Museum, Smithsonian Institution





Courtesy National Air and Space Museum, Smithsonian Institution

The other major powerplant type was the in-line, water-cooled, automobile-style engine. These were fitted to most observation aircraft, as well as a significant number of fighters. They were more powerful than rotaries. Unfortunately, they were very heavy. Any airframe mounting one would not be as maneuverable as a rotary-powered plane. They could usually climb very well, however. One disconcerting factor the in-lines possessed was a radiator. Occasionally, if the radiator was hit, the pilot would be severely scalded as boiling water splashed on him. Later in the war this was solved by placing the radiator in a location away from the cockpit. Many in-line powered airplanes had rounded noses as their distinguishing characteristic.

THE MACHINE GUN

The invention of the machine gun precipitated the slaughter in the trenches during the First World War.

Stemming from designs of the late 1800's, the machine guns could fire at a rate of 600-1000 rounds per minute. The British and French mounted both the Vickers and Lewis guns on their aircraft, while the Germans used the Parabellum and the Spandau in theirs.

The business end of Eddie Rickenbacker's Spad 13.

The Lewis and the Parabellum were both drum-fed guns which, under combat conditions constantly needed reloading. The early Lewis gun held only 47 rounds. Later versions could carry about a hundred, but reloading in the middle of a dogfight was a hazardous prospect at best. The Parabellum was similar to the Lewis gun except it was used almost exclusively by two-seater gunners. The name stems from the Latin proverb, "Si vis pacem, para bellum," which means, "If you wish for peace, prepare for war."

Courtesy National Air and Space Museum, Smithsonian Institution

All of the German fighters produced during the war were armed with Spandaus . Both the Vickers and the Spandau were air-cooled, belt-fed derivations of the late nineteenth-century Maxim gun. Usually fighters on both sides could carry about 500 rounds for each Vickers or Spandau they carried.

In combat several problems materialized with these guns. All of them were prone to jams of one sort or another, usually occurring when the pilots fired long bursts. Good pilots learned to snap out quick bursts, conserving ammunition and keeping their weapons from jamming. Pilots often carried small mallets to whack the guns with if they jammed.

The other major problem with the early machine guns was their inaccuracy. Even on the ground they weren't very precise weapons. In the air, this flaw was compounded by the instability of the aircraft. The aircraft vibrated, wind buffeted it about, and the pilot had nothing but a steel ring to guide his aim. All of this served to make aerial gunnery a very difficult art, which few mastered. Skilled pilots did not take any chances, and would sometimes close to within 20 yards to ensure victory. Maximum accurate

range was never longer than 100 yards for these weapons.

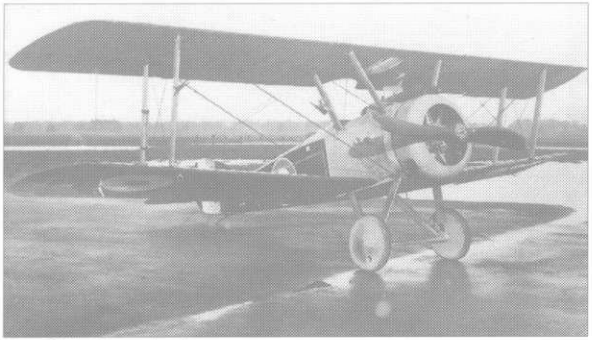
Werner Voss and Rene Fonck were arguably the best aerial shots of the war. Voss used his talent to spare the crews of his two-seater victims by aiming for the engine. This gave the Allied pilot a chance to glide to a safe landing. Fonck, on the other hand, used his marksmanship to down German planes with the lowest possible expenditure of ammunition. He was renown for scoring victories with less than 20 bullets. Most pilots, von Richthofen included, used between 100 and 500 rounds to bring down their opponents.

Flight

A BRIEF HISTORY OF FLIGHT

For centuries men dreamed of one day being able to fly through the sky like the birds. Many dreamers, such as Leonardo da Vinci, attempted to conquer the mysteries of flight. Da Vinci even went so far as to draw sketches of birds in flight and proposed flying machines based on these drawings. In 1783, two Frenchmen, the Montgolfier brothers, made a balloon that carried the first men in free flight. The success of the balloon led to continued development of this craft. During the American Civil War balloons were used by the Union army for observing the battlefield.

Two legendary products of Thomas Sopwith's factory: below, the Camel; below right, the Triplane.



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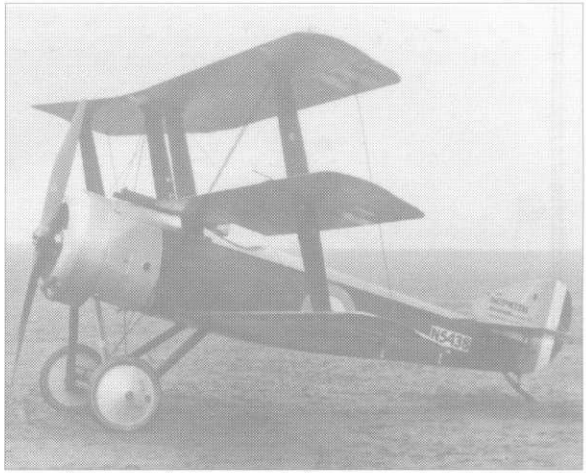
Meanwhile, other inventors turned their attention to gliders. In 1804 an English inventor, Sir George Cayley, invented the first glider. During the 1890's Otto Lilienthal of Germany continued to develop the glider.

During the late 1800's various inventors attempted to invent powered aircraft. The most common approach involved the application of a steam engine. But steam engines were much too heavy. It wasn't until 1903 that the first powered flight occurred. Two American brothers, Orville and Wilbur Wright, had experimented with various glider designs. In 1903 they added a gasoline-powered engine to a



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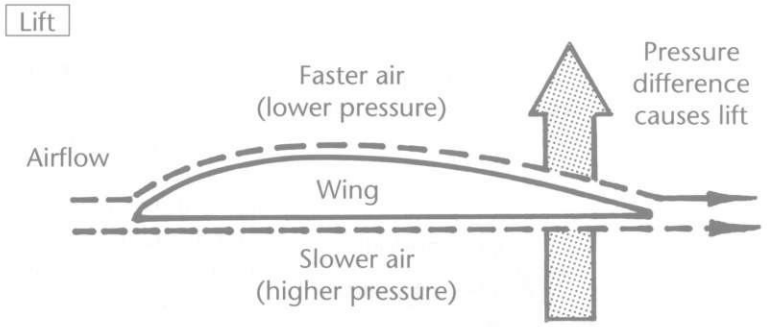
bi-winged plane and flew 120 feet. Development continued throughout the first decade of this century. Alberto Santos-Dumont developed an aircraft patterned after a box kite and became the first person in Europe to fly. In 1907, Louis Bleriot developed the first monoplane complete with a tail for balance at the rear.

THE PHYSICS OF FLIGHT

There are four basic forces acting upon an aircraft in flight: lift, thrust, gravity and drag.

Lift is achieved through the design of the wing. As an aircraft moves, air flows over the surfaces of the wing. Wings have a special shape that forces the air to move faster over the top of the wing than on the bottom. This creates more pressure on the bottom than on the top. Known as the Bernoulli effect, this air pressure difference pushes up on the bottom of the wing, and lift is generated.



The angle at which the wing meets the airflow also affects the amount of lift generated. As this angle (known as the angle of attack) increases, more lift is created. However, if the angle of attack is too great, the air flowing above the wing will be disrupted, causing a sudden decrease in lift. This condition, a stall, occurs when the aircraft is either flying too slowly, or flying at too steep of an angle. When an aircraft stalls, the sudden loss of lift will force it into a dive. This is especially dangerous if the aircraft is at a low altitude. The aircraft will recover from a stall when it has regained sufficient airspeed.

Increasing airspeed increases lift. The more airspeed, the greater the difference between the air pressure above the wing and below, creating more lift.

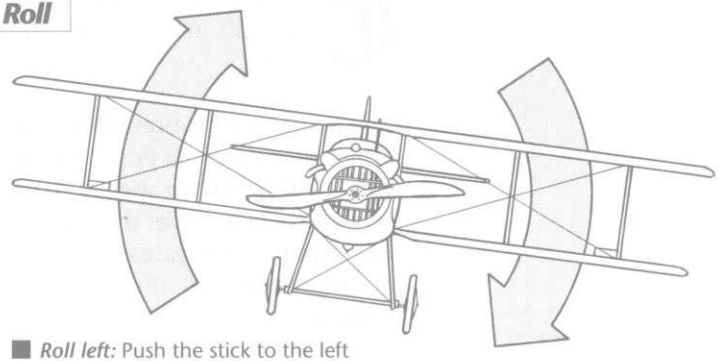
Thrust is generated by the rotation of the propeller. Propeller blades are curved in the same way as wings. However, instead of lift being generated (ie., a movement upward), thrust (a movement forward) is created. To create more thrust, increase your throttle. Generally more throttle will increase your airspeed.

Drag is the friction caused by the aircraft's surfaces moving through the air. The more streamlined an aircraft, the less drag produced.

When an aircraft is in level flight at a constant airspeed, all four forces (lift, thrust, gravity, and drag) are in balance.

The control surfaces of the aircraft are used for maneuvering it. With these control surfaces, the pilot can perform three basic movements: pitch, roll and yaw.

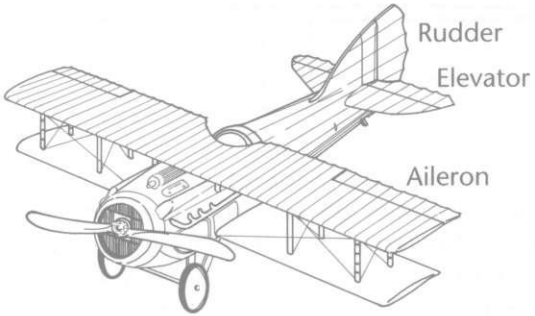
Roll



■ ***Roll left:*** Push the stick to the left

Pitch is the rotation of the aircraft up or down. Roll is the motion of the aircraft banking left or right. Yaw is the motion of the aircraft rotating either left or right.

The "elevators" are located on the tail assembly, and control the aircraft's pitch. When the elevators move down, the nose will pitch down, and vice-versa. The pilot controls the elevators with the stick. To nose the aircraft down, push forward on the stick. Pulling back on the stick will pull the nose of the aircraft up.

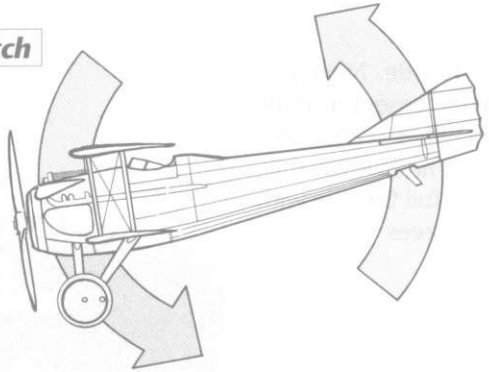


■ Control Surfaces on an aircraft.

The rudder is located on the tail assembly. It controls the aircraft's yaw. When you move the rudder left or right, your aircraft's nose will yaw in the corresponding direction.

The ailerons, located on the wings, control the rolling motion of the aircraft. When the left aileron is raised or lowered, the right wing aileron moves in the opposite direction. This causes the aircraft to bank. The ailerons are controlled by the stick. To

Pitch



■ ***Pitch down:*** Push forward on the stick

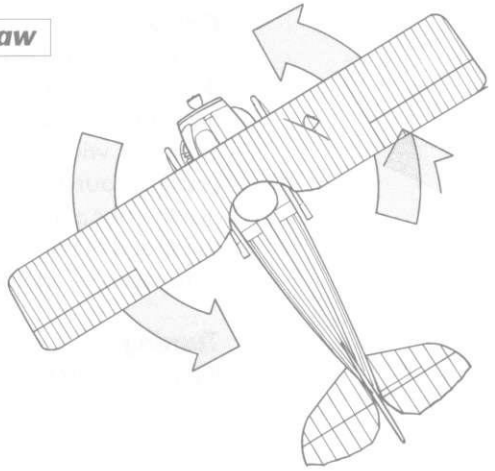
bank to the left, move the stick to the left; to bank to the right move the stick to the right.

The throttle controls the rotation speed of the propeller. By increasing the throttle, the pilot increases the speed of the propeller, thereby increasing the speed of the aircraft.

The aircraft of World War One did not have flaps or brakes. Keep this in mind when you land.

Many of the WWI aircraft were equipped with rotary engines. The entire engine would spin along with the propeller. This huge spinning mass of metal caused a powerful, gyroscopic effect. This meant that a rotary-equipped aircraft would try to nose down in a right-hand turn, and would attempt to nose up in a left-hand turn. Therefore left rudder had to be vigorously applied for both left and right-hand turns to keep the aircraft's nose level with the horizon. The Sopwith Camel had the most pronounced gyroscopic tendencies.

Yaw

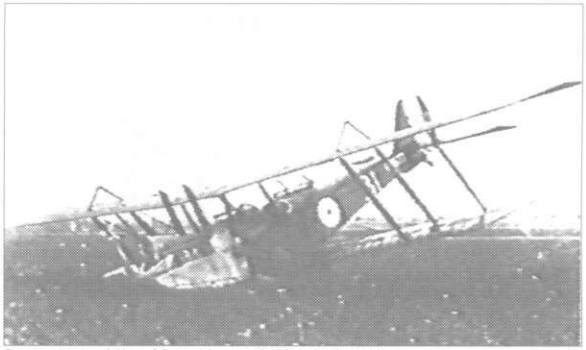


■ ***Yaw left:*** Apply left rudder

BASIC FLIGHT SKILLS

Climbing

To begin climbing increase your throttle. Next, pull the nose of your aircraft up. This increases the angle of attack of your wings, increasing lift. Be careful not to bring the nose up too far or your aircraft will stall. To achieve the best climb rate use full throttle with your aircraft's nose about 20 degrees above the horizon.



Courtesy National Air and Space Museum, Smithsonian Institution

An R.E.8 that has seen better days.

Descent

To descend you either decrease the throttle or nose down into a dive. If you wish to descend without gaining more speed, decrease the throttle. Your aircraft's wings will lose lift as you slow down, causing your aircraft to gently lose altitude. Nosing down your aircraft into a dive will greatly increase the speed of your aircraft. Be careful not to descend at to steep of an angle, or your wings may break.

Turning

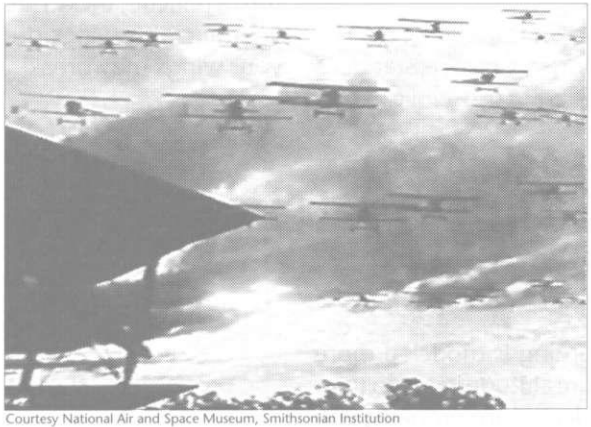
Bank your aircraft by using the ailerons. This will cause your aircraft to slip sideways. Since the airflow will now strike the tail on one side more than the other, the aircraft will turn. Turning is *not* accomplished with the rudder, but with the ailerons. You also need to increase the throttle, as a turn will bleed off speed. The greater the bank, the faster the turn rate. More altitude is lost during a tighter turn, so keep your nose above the horizon during the turn. With the standard or expert flight model selected (see pg. F-8), you have to also apply a little rudder and some back pressure (by pulling back on the stick) to maintain a good turn.

The Take-Off

The take-off procedure is performed a little differently for World War One aircraft than for modern aircraft. The aircraft of World War One were tail draggers—they were equipped with a tail skid rather than a wheel. First, apply full throttle. When the aircraft has picked up speed, push the stick forward. This will lift the tail off the ground. Be careful to avoid pushing too far forward on the stick, or you may find your propeller plowing into the ground! Now that the tail

is off the ground, the aircraft is more streamlined and will gain speed rapidly. When your aircraft gets up to about 40 mph, gently pull back on the stick to lift your aircraft into the air. Do not attempt to climb at too steep of an angle or your aircraft will go into a stall (with no room for recovery!).

A huge Allied formation buzzing an aerodrome.



Courtesy National Air and Space Museum, Smithsonian Institution

Landing

When you begin the landing procedure, reduce the throttle. Approach the landing field with as little speed as possible (it is best to be slightly above stall speed). As you get close to the landing area, bring the nose of the aircraft up and reduce throttle some more. Keep the nose of your aircraft up, which allows you to come in at a lower speed. Do not try to land with your nose below the horizon. The best landing is a three-point landing—that is, when the wheels and tail skid all meet the ground simultaneously.

Recovery from a Stall

Allow your aircraft to nose down. Don't fight the stall by pulling back on the stick. When the aircraft picks up enough speed, it *will* recover from the stall. Pull back on the stick gently to level out.

Recovery from a Spin

A spin is a very nasty type of stall. Your aircraft will go into a spin when one wing stalls before the other. This immediately forces your aircraft to spin very rapidly. The natural instinct of a pilot is to fight the spin by applying opposite aileron. Unfortunately, this only makes the spin worse (many World War One aviators died this way). The safest way to recover is to let the stick return to the neutral position. Your aircraft will eventually stabilize itself. If you wish to come out of a spin more quickly, move the ailerons as if you were trying to roll the aircraft with the spin. But be careful—it's easy to get confused when you see the ground spinning around rapidly, and ,consequently, move the stick to the wrong side!

FLIGHT MODEL SETTINGS

In Red Baron, novice pilots can experience the thrill of WWI air combat and veteran flight enthusiasts can be challenged. Also, as novice pilots progress in skill, they have the opportunity to learn more about flying. Red Baron has an option that allows you to choose the level of flight realism.

On the *realism menu*, you select the level of realism of the flight model. The settings are novice, standard and expert. Novice is the easiest to use, while expert is for experienced pilots.

On the novice setting, flying is easy. Turns are straight forward. If you bank the aircraft, it will turn. Your aircraft will lose little or no altitude, and it will not nose down.

On the standard setting, turning is modeled more realistically. You will lose more altitude in a turn than on the novice setting. In order to turn properly, you will have to apply back pressure (pulling back on the stick) to keep the aircraft turning and keep the nose above the horizon. Some rudder may be needed as well. Unlike novice, if you bank the aircraft without using back pressure or rudder, your turn will quickly degenerate into a slow, spiral dive. Landing is also more difficult.

The expert setting will test your flying abilities. Not only are turns modeled realistically, but the danger of going into a spin is also present. Your aircraft will be affected by wind gusts and turbulence. In addition, the various quirks of certain aircraft are included. For instance, the gyroscopic effect of the Sopwith Camel's rotary engine will make a simple turn a difficult, tricky maneuver. Too much stress on your aircraft's wings during a high speed dive and your wings may break!

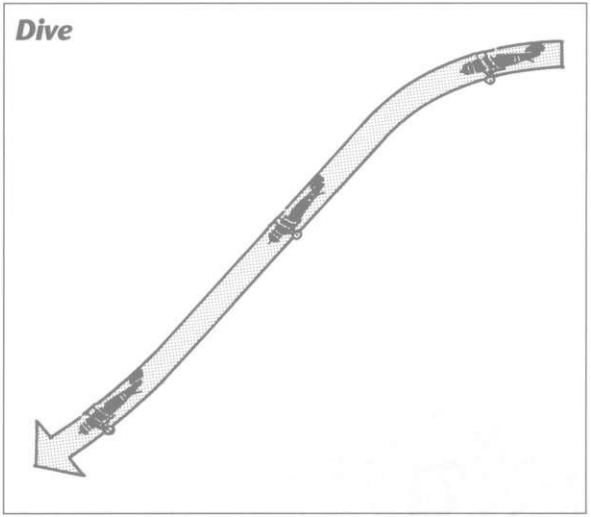
Flight Maneuvers

FLIGHT MANEUVERS

Dive — Tape name: DIVE

In World War I, even simple maneuvers such as steep dives and climbs were considered acrobatic—not surprising since aircraft were prone to stall and many had structural flaws.

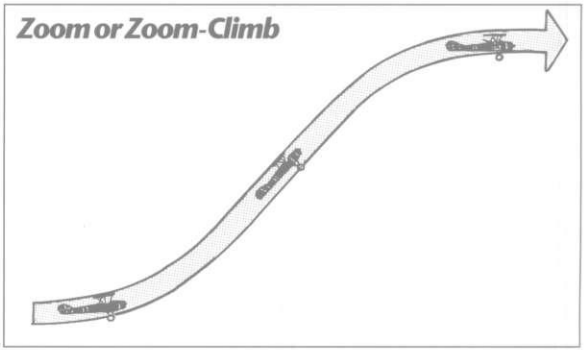
A steep dive can be used to get out of combat quickly, especially when your aircraft can dive safely at a higher speed than your pursuer's. Keep an eye on your altimeter and, if an enemy follows you into the dive, jink your aircraft left and right with the rudder.



Diving is simple. Point the nose toward the ground and your crate will gain speed very quickly. Be careful because some aircraft have weak wings, and a high-speed dive may shear them off!

Zoom or Zoom-Climb — Tape name: ZOOM

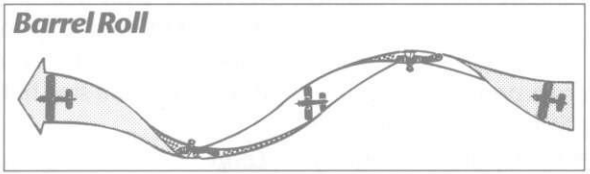
A very steep climb at high speed, the zoom-climb is usually performed after a dive. Sacrificing speed for higher altitude, it was used by the aviators of the Great War after they made a diving attack on an enemy aircraft to pull up beyond the reach of the enemy.



When zooming skyward, keep an eye on your airspeed. When it gets below 50 mph, level off before you stall your aircraft.

Barrel Roll — *Tape name: BAR_ROLL*

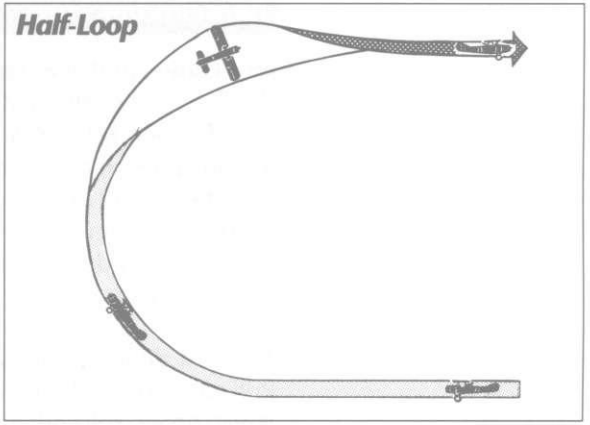
The barrel roll is useful for confusing an attacker on your tail.



To perform a barrel roll, bank hard while pulling back on the stick slightly. Your aircraft will take a corkscrew path through the sky. Be warned—you will lose altitude.

Half-Loop — *Tape name: HALFLOOP*

Today this maneuver is called an Immelmann turn. However, in World War I the Immelmann turn was an entirely different maneuver (see next page).



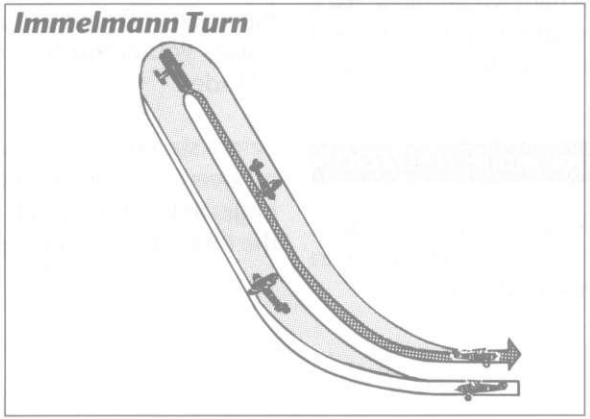
Perform a half-loop when you want to reverse direction and gain altitude. Use it when an enemy passes you going the other direction at a higher altitude.

Before starting a half-loop, make sure you have a lot of speed. Pull up as if you were going to loop, but begin rolling the aircraft before you reach the top of the loop. Level out when you reach the top.

Immelmann Turn — *Tape name: IMMEL*

Also known as Renversement by the French pilotes de chasse, the World War I Immelmann turn was used frequently by Max Immelmann. After making a diving pass on an enemy, Immelmann zoomed up past the enemy aircraft, and before stalling used full rudder to bring his aircraft around. This put his aircraft facing down at the enemy aircraft, making another pass possible.

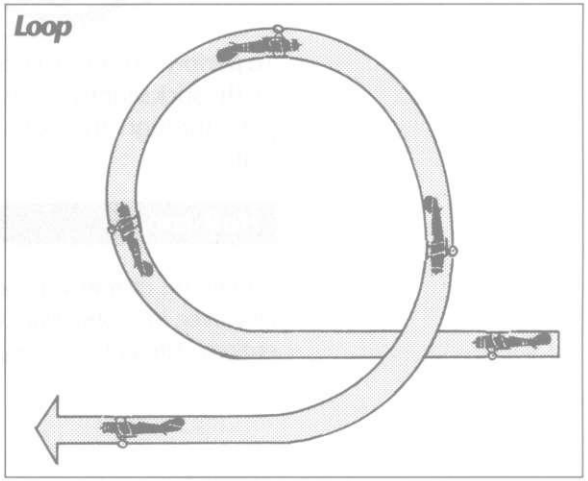
This is a difficult maneuver to perform properly. Pull up into a climb, apply full rudder as your speed drops, roll your aircraft and pull back slightly on the stick. With good timing, you will be diving back down in the opposite direction.



Loop — *Tape name: LOOP*

An impressive maneuver at an airshow, the loop is not very useful in combat. While looping, a pilot has no options until the loop is finished. In addition, you will lose a great deal of altitude.

Before starting a loop, make sure you have a lot of airspeed (generally accomplished by diving first) otherwise you'll stall halfway through the loop!

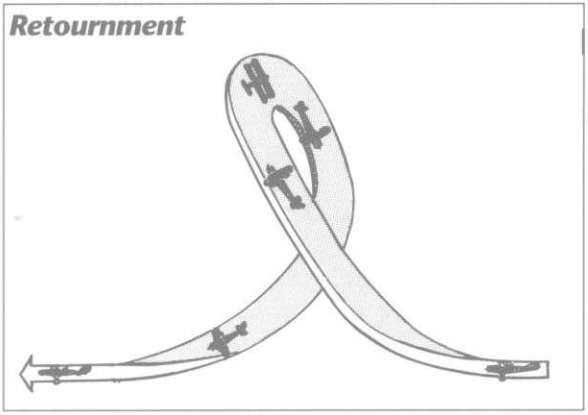


Retournment — *Tape name: RETOURN*

This offensive maneuver is similar to the Immelmann. Continue to apply rudder and roll the aircraft after you have looped and come over the top. Instead of reversing direction, you'll be flying in the same direction you were going before you started climbing.

A retournment is used after a diving pass on an enemy. If the enemy continues in a straight path, not veering off to the side, a well-executed retournment will put you on the tail of your enemy.

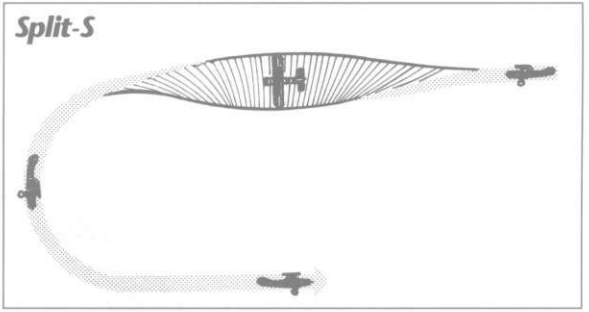
Retournment



Split-S — *Tape name: SPLIT_S*

The split-s is an excellent way to escape an attacker on your tail. To perform a split-s, roll your aircraft until it's inverted, then pull back on the stick to perform the last half of a loop. When you level off, you may repeat this maneuver. Be aware that altitude is rapidly lost in this maneuver.

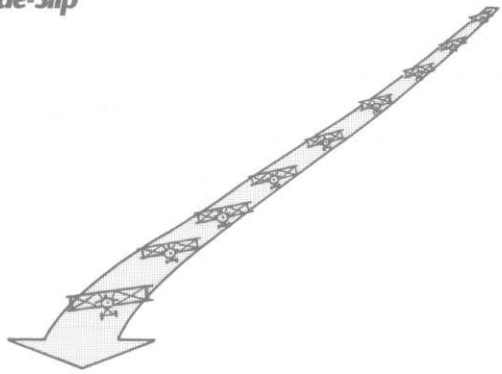
Split-S



Side-Slip — *Tape name: SIDESLIP*

A side-slip is used to lose altitude quickly without gaining speed. To side-slip, dip one wing down and apply enough reverse rudder to keep your aircraft from turning. You may need to push forward slightly on the stick to maintain your heading.

Side-Slip



Slip-Turn — *Tape name: SLIPTURN*

The slip-turn is a flat turn performed exclusively with the rudder. Unlike a normal banked turn, the slip-turn uses no ailerons.

Most aircraft cannot perform an effective slip-turn. However, the Fokker Triplane did not have a vertical stabilizer, and could yaw very quickly with hard rudder applied. Although the Triplane would slip during the turn, losing a great deal of speed, it could revers direction in about half the time of other fighters performing a normal turn. To execute an effective slip-turn, don't bank your aircraft's wings.

Scout Tactics

BOELCKE'S DICTA

Boelcke's Dicta

1. Try to secure advantages before attacking. If possible, keep the sun behind you.

2. Always carry through an attack when you have started it.

3. Fire only at close range, and only when your opponent is properly in your sights.

4. Always keep your eye on your opponent, and never let yourself be deceived by ruses.

5. In any form of attack it is essential to assail your opponent from behind.

6. If your opponent dives on you, do not try to evade his onslaught, but fly to meet it.

7. When over the enemy's lines never forget your own line of retreat.

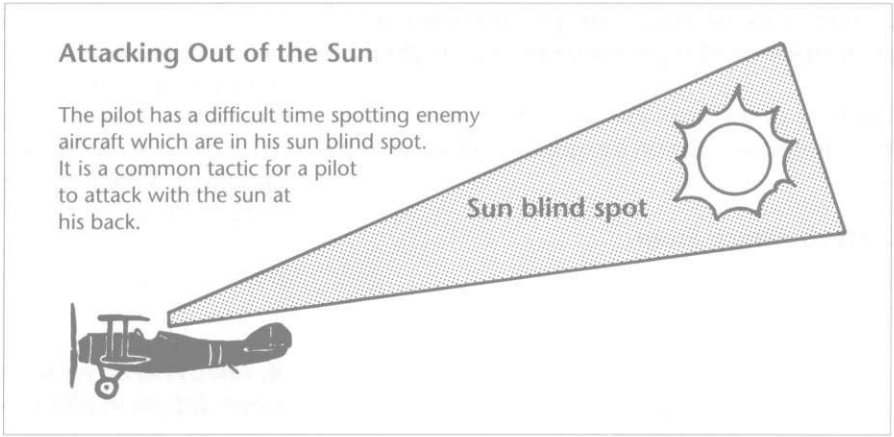
8. For the Staffel: Attack on principle in groups of four or six. When the fight breaks up into a series of single combats, take care that several do not go for one opponent.

The sky above the trenches was a deadly place to be. During Bloody April some British squadrons suffered 60 percent losses. During the more routine months of the war the attrition rate was still very high. Most novice pilots never lived long enough to call themselves veterans. Those who did survive month after month rarely showed any inclination to coach the new replacements.

Oswald Boelcke was the exception. Boelcke possessed a rare combination of tactical brilliance and keen flying technique. Nothing escaped his eyes in the air, and as his experience grew, he began to teach his men how to survive in the air. Eventually, he put to paper his advice and circulated it among the Jagdstaffeln. His advice became known as *Boelcke's Dicta*. Its principles still form the foundation of fighter combat today.

1. Try to secure advantages before attacking. If possible, keep the sun behind you.

If you want to emulate the reckless fighting style of flamboyant pilots like Albert Ball or Lothar von Richthofen, attack before evaluating the situation. While you may score some spectacular victories, chances are you'll be flamed before the armistice.



swoop down behind the target and attack before he can react. Unless you possess all three of these advantages (surprise, altitude and having the sun behind you), it is probably wise to avoid dogfighting against superior numbers.

Exercising caution, however, will increase your odds for survival. Before you attack, try to secure as many advantages as possible. Attack out of the sun, for it is every pilot's blind spot. Try to attack from a higher altitude. This way, you'll have the initiative as well as superior speed and momentum. The pilot below can only react to your moves, so you've forced him to defend himself, and not go on the attack. Surprising your foe is the best way to minimize risks to yourself. Sneak up on your opponents by staying above them and in the sun. Be patient, and when a favorable moment arises,

2. Always carry through an attack when you have started it.

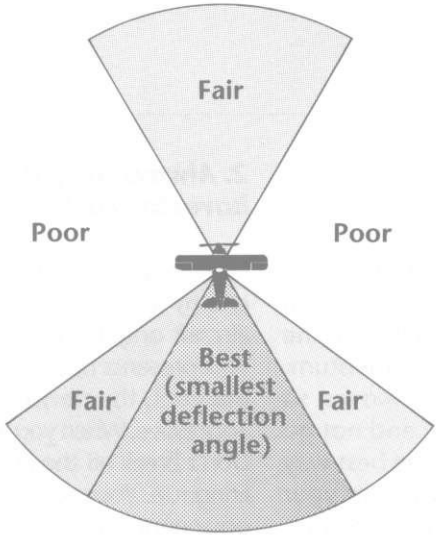
Often a green pilot, in his first engagement with an enemy aircraft, will start a firing pass on an enemy aircraft only to get cold feet and try to disengage. This presents his tail to the enemy, and, more often than not, the novice is shot down. The key is to be aggressive. When you are in the air, commit to a target. Don't break off the attack until you've completed the firing run. Your aggressiveness will often frighten your opponent into making a mistake. Many a novice pilot will freeze up when an enemy is on his tail.

3. Fire only at close range, and only when your opponent is properly in your sights.

Machine guns from the Great War were terribly inaccurate weapons on the ground, let alone in the air. Successful pilots closed to point-blank range before opening fire. When you find yourself in a dogfight, don't waste precious ammunition on long-range shots. Instead, choose your targets carefully, then close the range until you're within about 30 yards of your opponent. When you open fire, don't hold the trigger down too long. Snap out short, well-aimed bursts. Long bursts are likely to jam the machine guns and will waste ammunition.

Shot Selection—Best Areas to Attack From

The higher the deflection angle, the harder the shot. The best shot is from directly behind the target. The worst is from either side of it.



4. Always keep your eye on your opponent, and never let yourself be deceived by ruses.

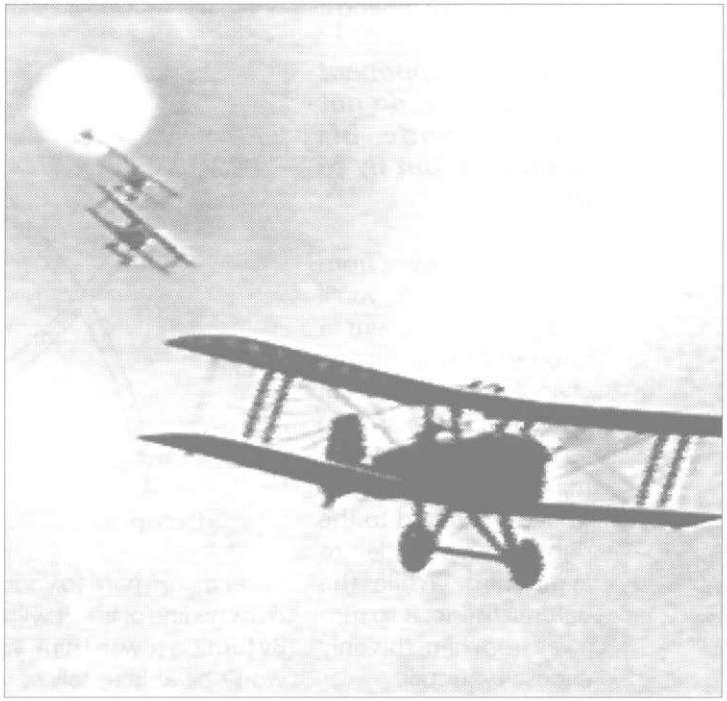
Occasionally, a pilot who is outmatched will feign death by going into a seemingly uncontrolled spin. At treetop level, the pilot will pull-up, level off and head for home.

5. In any form of attack it is essential to assail your opponent from behind.

The art of deflection shooting was so difficult to master during the Great War, that many pilots didn't even bother to try. A few of the great aces, most notably Mannock and Fonck, successfully made deflection shots in combat.

A deflection shot is made when the target aircraft is flying in a different direction than the attacker. To make a deflection shot, the attacker must lead the target since the target is not flying along the path of the bullets. For example, say you are traveling north and your target is in front of you heading west. This is a 90 degree deflection shot, since the target is perpendicular to you. This is the most difficult shot to make. Deflection requires leading the target; how much to lead depends on the speed of the target and the angle of the shot. A 90 degree deflection shot demands a great deal of leading.

Courtesy U.S. Air Force Collection, National Air and Space Museum, Smithsonian Institution



Hundreds of aviators were flamed when they neglected their tail. "Beware of the Hun in the sun" was a common expression.

If you do try a deflection shot, put the cross hairs well forward of the nose of the target plane. Squeeze off a short burst, and watch the tracers. Then adjust your aim accordingly. *If* you have time that is. Chances are, you'll have already passed the target. Rather than trying to adjust your aim for the speed of the enemy, the deflection angle of the shot, and the distance to the enemy, most pilots fired from a position where there was no deflection. This meant attacking head-on or from the rear. Attacking head-on has many disadvantages. First, because of the closure rate, you don't have much time to aim and shoot. Also, your target will probably be shooting at you too, while you're making your pass. Finally, you run the risk of a collision if one of you does not swerve.

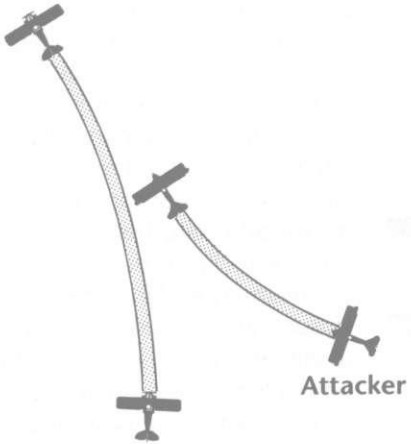
Attacking from the rear is much better. Often your target won't see you. If you are stalking a single-seat scout, attacking from the rear denies him the ability to shoot at you. Furthermore, there is no deflection angle from a stern shot, which greatly increases your chance of scoring a hit.

6. If your opponent dives on you, do not try to evade his onslaught, but fly to meet it.

Don't break away from an attack. If you do, you'll give your opponent a choice target and a chance to get on your tail if you do. For example, if you spot a Fokker making a pass at you from behind and to the right, don't break left to avoid him. While the natural instinct is to turn away from him, this only exposes your tail.

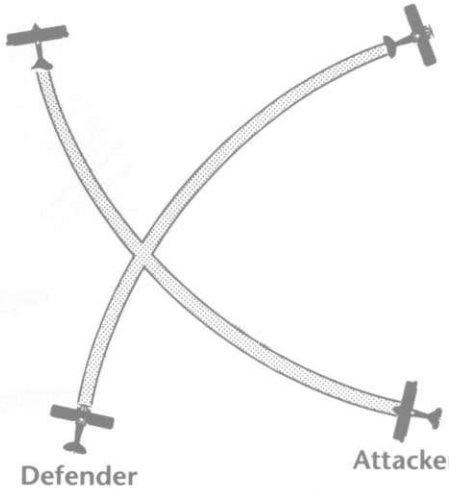
Turning Away from an Attacker

The defender has chosen to go with his natural instinct—to turn away from the attacker. The end result is that the attacker ends up on the tail of the defender with a relatively easy shot.



Turning Toward an Attacker

In this situation the defender has correctly chosen to turn toward his attacker. Although he will pass through the line of fire of the attacker, it will only be for an instant. The attacker will not be able to follow the defender through his turn.



Instead, turn hard to your right. Even though you will cross his line of fire, it will only be for a brief moment. By turning toward him, you cut inside his turn and he won't be able to follow you.

If a Fokker dives on you from the rear, don't try to dive straight down to get away. That gives him a clear stern shot. Instead, break left or right and turn toward him.

If your aircraft is sturdier than the enemy's, you may try diving to get away. In other cases, however, it's best not to dive away as this only gives the enemy a clear stern shot.

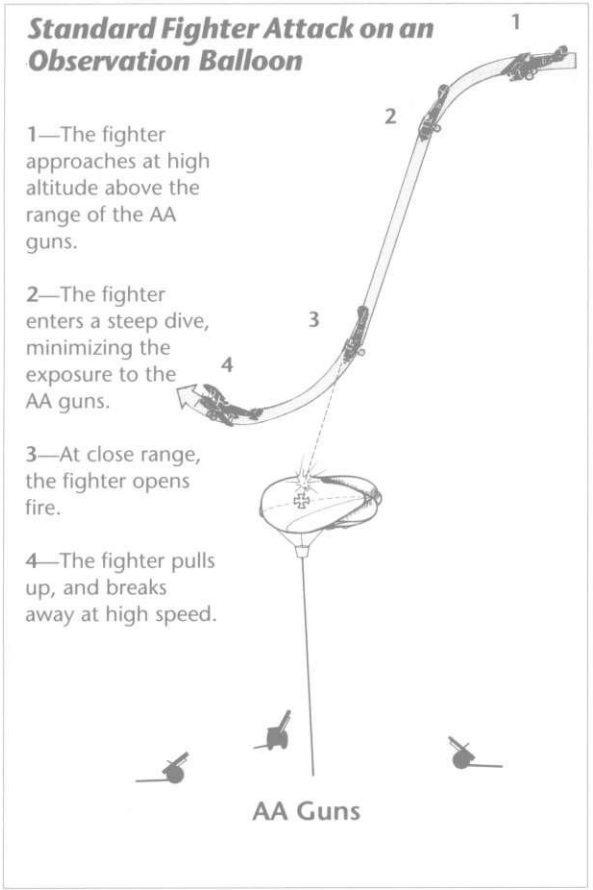
7. When over the enemy's lines never forget your own line of retreat.

Always make sure you can run for home when you need to. Many pilots found themselves cut off from their lines with a damaged plane and had to land in enemy territory. Make sure you know where you are and where the front is.

8. For the Staffel: Attack on principle in groups of four or six. When the fight breaks up into a series of single combats, take care that several do not go for one opponent.

To retain the advantage in combat, it is essential to attack *every* enemy aircraft if the odds are even. If three Eindeckers bounce three Nieuports the odds are even, right? This is true *only* if each Eindecker engages a different Nieuport. This way, all three Nieuport pilots are forced to defend themselves with evasive flying. However, if all of the Eindeckers attack a single Nieuport, it leaves the other two Nieuports free to attack the Eindeckers.

SPECIALIZED ATTACK TACTICS



Two-seater aircraft

Attacking two-seaters was difficult. The best strategy was to stay in the two-seater's blind spot at all times. This is behind and underneath the two-seater (see illustration). The rear-gunner's field of fire is interrupted by the tail and the fuselage, so he can't shoot at someone in this region. Albert Ball dove under his victims, and then pulled up sharply to spray the belly of his target. This tactic required extreme precision, but, if executed properly, shielded the scout pilot from the rear-gunner's machine guns. If the two-seater has no forward-firing machine gun, a descending head-on attack can also be very successful.

Observation balloons

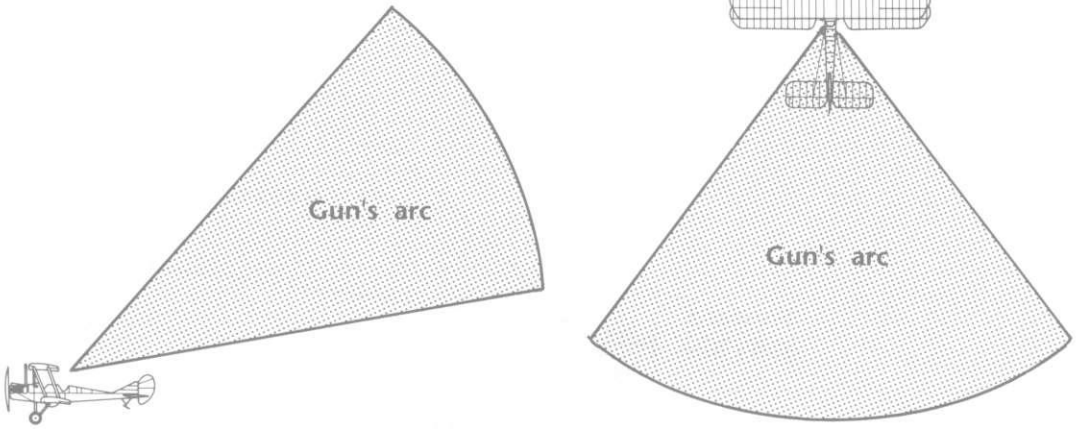
Although observation balloons were very vulnerable to air attack, most were heavily guarded by rings of anti-aircraft guns deployed on the ground. As in scout fighting, surprise was essential to flaming a balloon. Usually, attacking aviators dove steeply, shot at the gas-bag, and flew out of range as quickly as possible. This minimized exposure to ground fire. Some of the more daring pilots switched their engines off just before they began their dives, so that the Archie gunners could neither see nor hear their planes.

Zeppelins

Only a few Zeppelins were actually shot down by Allied fighters. The best tactic was to fly behind the zeppelin and attack it from the rear. This shields the plane from the German gunners and their machine guns positioned above and below.

■ On these aircraft, the gunner was seated in front of the pilot. His gun, however, fired to the rear *over the head of the pilot.* This resulted in a very limited arc. These aircraft did not mount a forward-firing gun.

Firing Arcs for Two-seater Aircraft with a Front-seat Gunner
(Includes the B.E.2c and Aviatik C.I.)

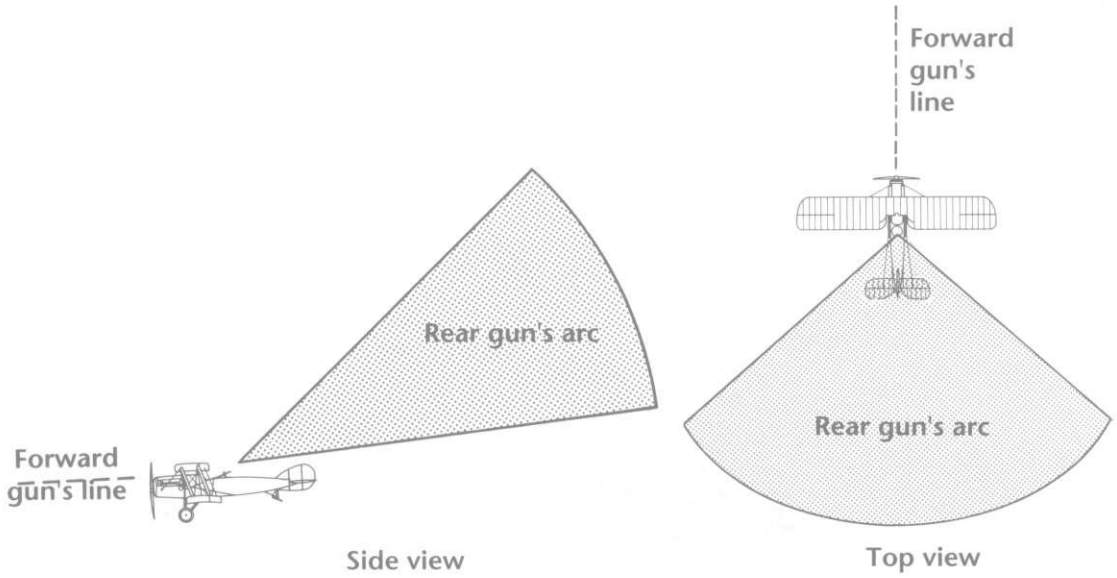


Side view

Top view

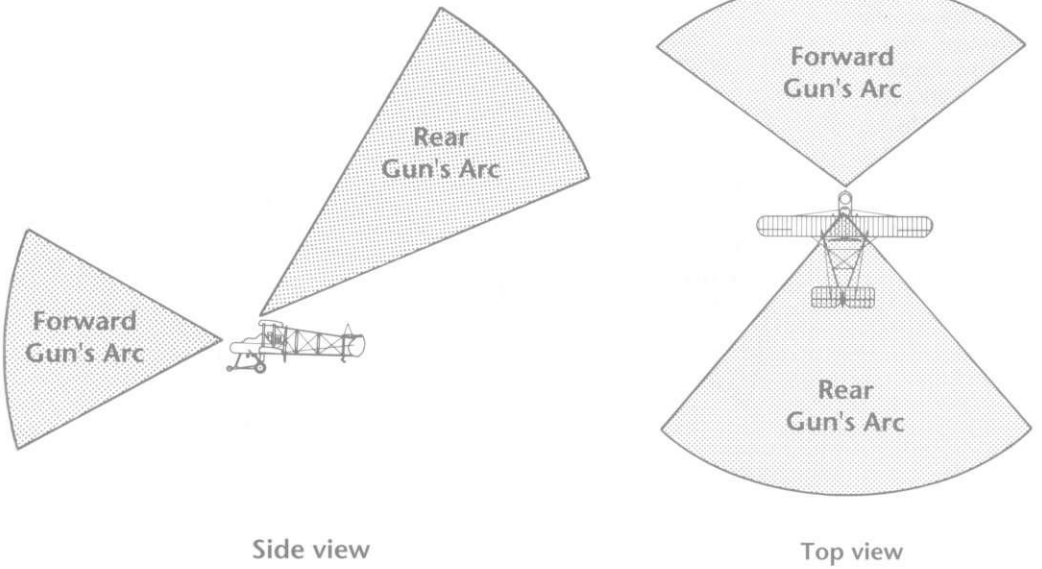
■ On these aircraft, the rear gun was mounted on a swivel, whereas the forward-firing gun was fixed. The standard attack tactic against two-seaters was to approach from its blind spot—from behind and below the two-seater.

Firing Arcs for Standard Two-seater Aircraft
(Includes the R.E.8, Bristol Fighter, D.H.4, Roland C.II, Rumpler C.IV, and Junkers J.I.)



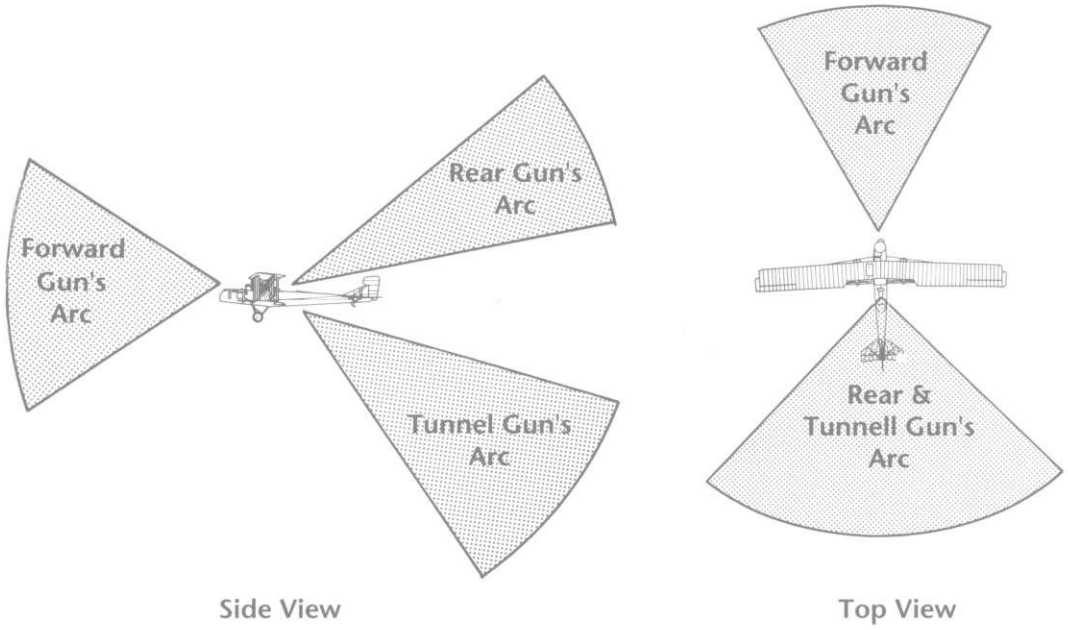
The F.E.2b has a unique gun configuration. The gunner can operate two separate machine guns. Both are mounted on a swivel. The rear gun has a limited arc, as its line of fire must clear the top wing of the F.E.2b. This results in a large vulnerable area directly behind the aircraft.

Firing Arcs for the F.E.2b



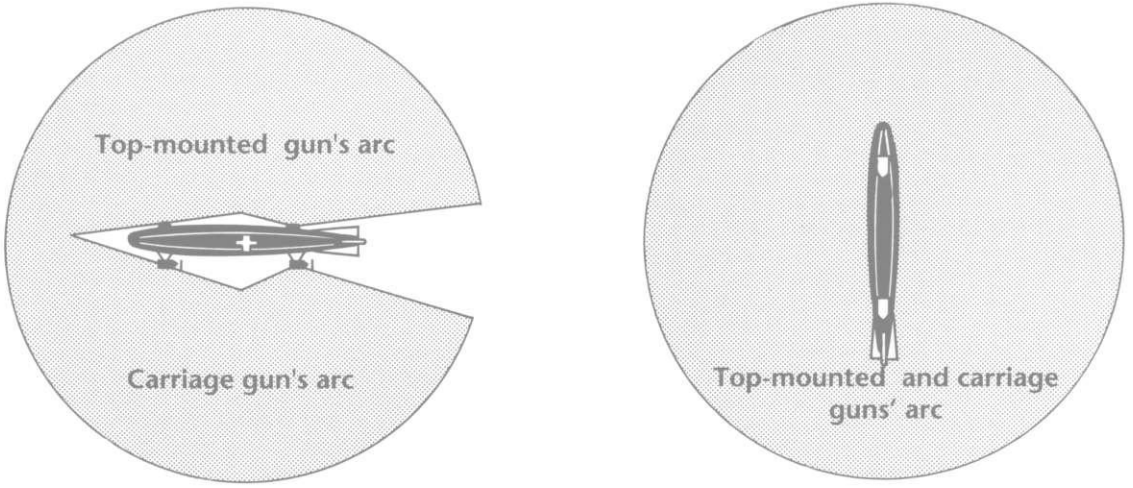
These large bombers were bristling with machine guns. They carried three separate gunners.
The forward and rear guns were mounted on a swivel. They also included a "tunnel gun" which fired through a hole in the fuselage out the rear of the bomber. This gun removed the usual blind spot that existed on two-seater aircraft. The Handley Page was more heavily armed than the Gotha, as it mounted dual guns on each gun swivel.

Firing Arcs for Heavy Bombers
(Includes the Gotha G.IV and Handley Page 0/100 and 0/400)



The Zeppelins were heavily armed with machine guns. There were guns mounted in each carriage and guns mounted on the top of the Zeppelin. These guns could effectively cover all regions of the sky except directly behind or directly to the side of the Zeppelin.

Firing Arcs for Zeppelins



Side View

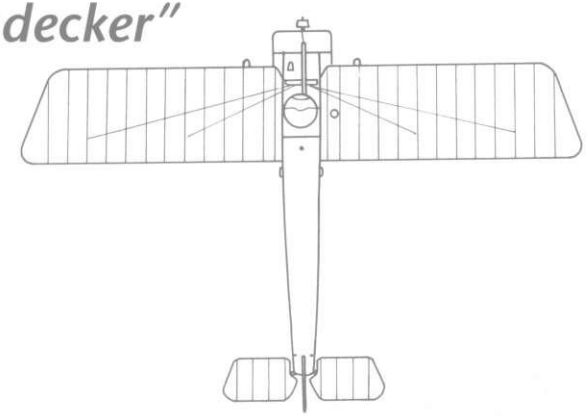
Bottom View

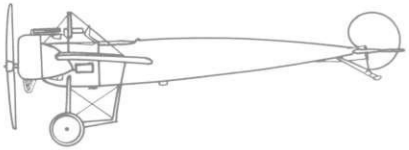
Aircraft Specifications

Note: Figures for total built are approximate. The introduction date given for each aircraft indicates when it was deployed in substantial quantities to the front.

Fokker E.III "Eindecker"

Length: 23 ft. 11 in.
Wingspan: 31 ft.
Engine: 100 hp Oberursel rotary
Armament: 1 Spandau
Climb rate: 28 min. to 9,840 ft.
Ceiling: 11,500 ft.
Max. speed: 88 mph
Total built: 150
Introduction date: August 1915

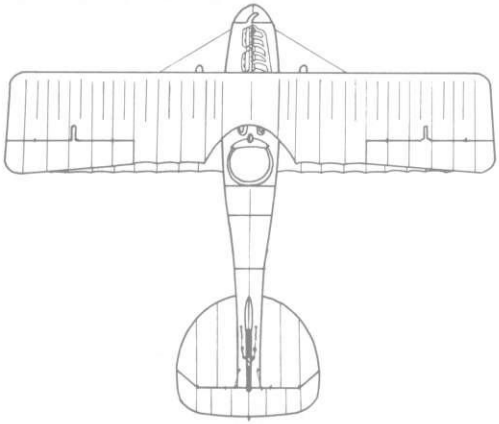


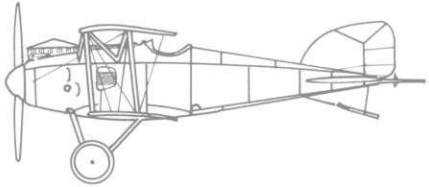


The Eindecker, which simply means "monoplane", revolutionized the air war in August of 1915, as it was the first plane to be armed with a synchronized machine gun. The Eindecker suffered from being both underpowered and difficult to fly. It had no ailerons, but used the wing-warping system invented by the Wright Brothers to control it in flight. The Eindecker was the perpetrator of the "Fokker Scourge" of 1915-16. By mid 1916 however, the Eindecker found itself hopelessly outclassed by the latest generation of Allied fighters. By the end of the year, almost all of the Fokker E.IIIs had been withdrawn from the front.

Albatros D.II

Length: 24 ft. 3 in.
Wingspan: 27 ft. 10 in.
Engine: 150 hp in-line
Armament: 2 Spandau
Climb rate: 6 min. to 3,280 ft.
Ceiling: 17,000 ft.
Max. speed: 109 mph
Total built: 275
Introduction date: September 1916

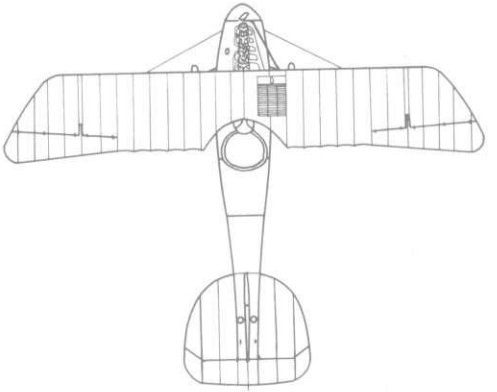


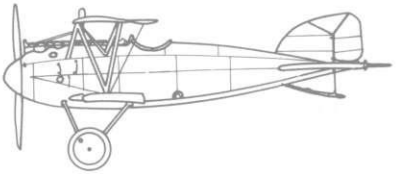


The first in one of the wars most successful design series, the Albatros D.II re-established parity in the air in late 1916. Fast, maneuverable and heavily armed with twin Spandau machine guns, the D.II served as Germany's primary scout plane until the arrival of the Albatros D.III in early 1917. Oswald Boelcke, Manfred von Richthofen, and Werner Voss all flew the D.II at some point in their careers.

Albatros D.III

Length: 24 ft.
Wingspan: 29 ft. 8 in.
Engine: 160 hp in-line
Armament: 2 Spandau
Climb rate: 4 min. to 3,280 ft.
Ceiling: 18,000 ft.
Max. speed: 109 mph
Total built: 1,350
Introduction date: February 1917

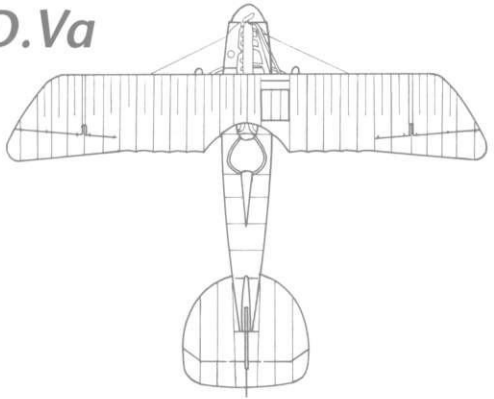


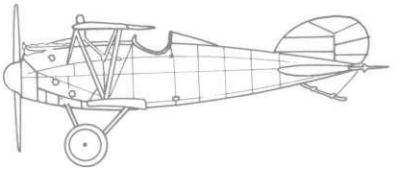


The D.III was a major improvement on the D.II as it was much more agile. It first arrived at the Front in February and March 1917. Its performance was so superior to its Allied contemporaries that it swept them from the skies for the next several months, culminating in "Bloody April." Fast, well-armed and highly maneuverable, the Albatros was an excellent dogfighting machine. It could turn inside nearly every Allied fighter except the Sopwith Pup. However, steep dives would often tear the lower wings off.

Albatros D.V and D.Va

Length: 24 ft.
Wingspan: 29 ft. 9 in.
Engine: 200 hp in-line
Armament: 2 Spandau
Climb rate: 4 min. to 3,280 ft.
Ceiling: 20, 000 ft.
Max. speed: 116 mph
Total built: 1,660
Introduction date: June 1917

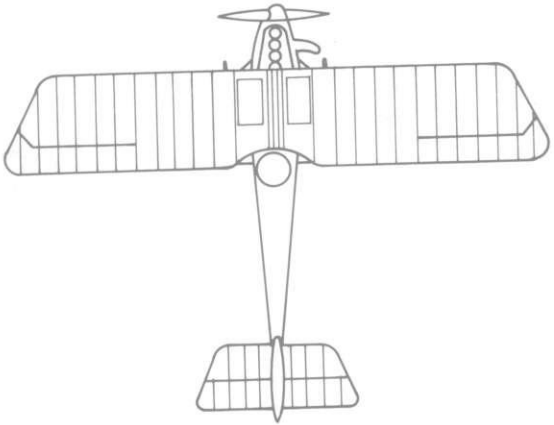


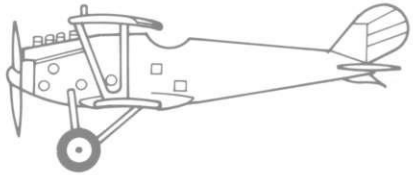


This was the replacement for the Albatros D.III. It appeared in large numbers during the summer of 1917. Most German pilots were disappointed with it since it was not a major improvement on the Albatros D.III. In fact, the D.V was heavier and could not climb as fast as its predecessor. In combat, the Camels, Spads and S.E.5s all demonstrated their superiority over the D.V. Despite its mediocre performance, this aircraft served until the Armistice in many German units. While it wasn't an outstanding aircraft, it was very easy to fly. This was a definite advantage at a time when German pilots were coming out of training schools with less and less flight time.

Pfalz D.III

Length: 22 ft. 10 in.
Wingspan: 30 ft. 10 in.
Engine: 160 hp in-line
Armament: 2 Spandau
Climb rate: 7 min. to 6,562 ft.
Ceiling: 17, 000 ft.
Max. speed: 102 mph
Total built: 600
Introduction date: July 1917

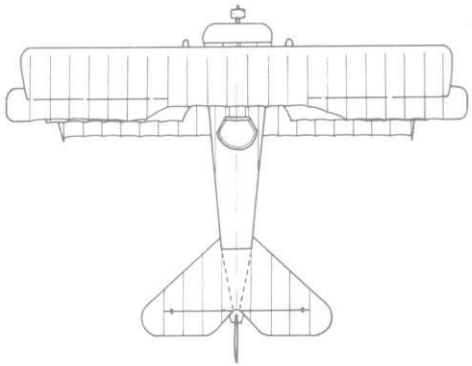


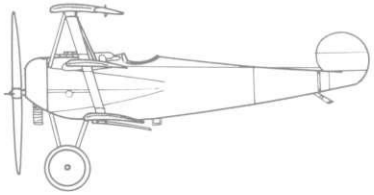


The Pfalz D. III was used by nearly a quarter of the German Air Service, yet it never gained the recognition it deserved. It was fast, sturdy, and durable — much more so than the Albatros D.III. It could not turn as tightly as the Albatros D.III or D.V. The Pfalz supplied most of the Bavarian Jagdstaffeln at one point or another from summer 1917 until mid 1918. Aces such as Werner Voss and Rudolf Berthold preferred this aircraft over the Albatros D.V since it could dive faster and was more rugged.

Fokker Dr.I "Triplane"

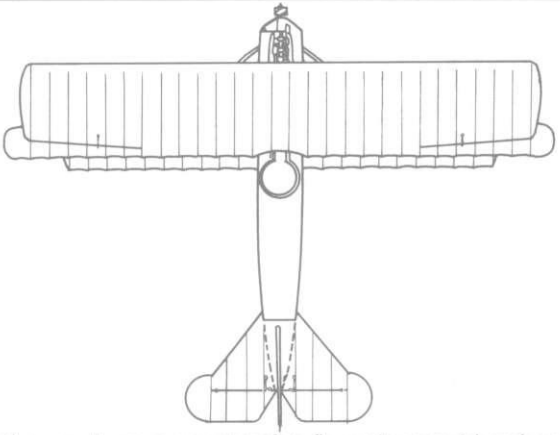
Length: 18 ft. 11 in.
Wingspan: 23 ft. 7 in.
Engine: 110 hp Oberursel rotary
Armament: 2 Spandau
Climb rate: 3 min. to 3,280 ft.
Ceiling: 20, 000 ft.
Max. speed: 103 mph
Total built: 320
Introduction date: August 1917

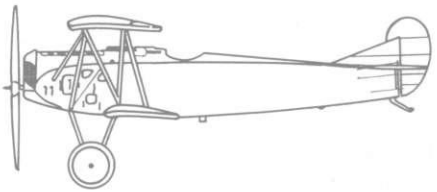




Inspired by the Sopwith Triplane, the Dr.I was very effective in the swirling dogfights of late 1917 and early 1918. Stubby and slow, the Triplane had so much wing area that it could out-turn and out-climb all Allied aircraft. It did not, however, possess great speed or structural integrity, so the Dr.I pilots could not out-dive or out-run their opponents. Though it was incredibly maneuverable, it proved to be very difficult to fly. Only the top aviators and the best Jastas received the Triplanes until spring of 1918 when they were allocated to some of the lesser units. A total of just over 300 were built. It's large rudder and lack of a vertical stabilizer allowed it to make tight turns without banking the wings, a maneuver called a slip-turn.

Fokker D.VII



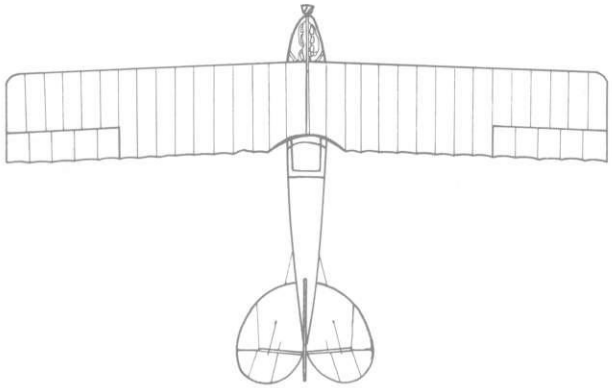


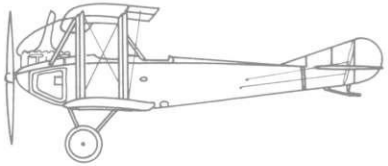
Length: 23 ft.
Wingspan: 29 ft. 10 in.
Engine: 185 hp in-line
Armament: 2 Spandau
Climb rate: 4 min. to 3,280 ft.
Ceiling: 22,900 ft.
Max. speed: 114 mph
Total built: 1, 000
Introduction date: May 1918

Without a doubt, this was the best scout of the war. It was an easy aircraft to fly, yet it was quick and rugged. A pilot could dive a D.VII without fear of losing a wing. It's high compression BMW and Mercedes engines gave it unrivaled high-altitude capabilities. Fokker pilots routinely stood their D.VIIs on their tails and climbed vertically in combat. For short periods, the Fokkers could maintain this attitude and fire the twin Spandaus without fear of stalling. It served in dozens of Jagdstaffeln by the end of the war after first arriving at the Front in April 1918. The Fokker D.VII was so respected by the Allies that they specifically demanded the destruction of all of them in the Treaty of Versailles.

Aviatik C.I

Length: 26 ft.
Wingspan: 41 ft.
Engine: 160 hp in-line
Armament: 1 Parabellum
Climb rate: 12 min. to 3,280 ft.
Ceiling: 11,480 ft.
Max. speed: 89 mph
Total built: n/a
Introduction Date: Early 1915

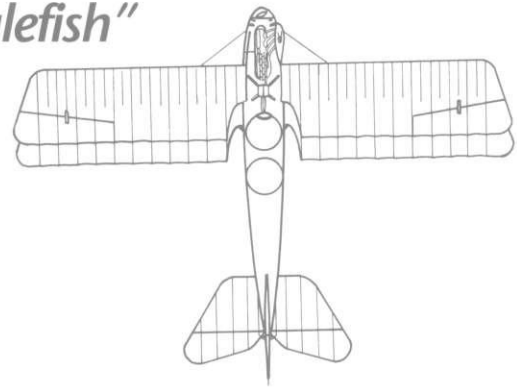


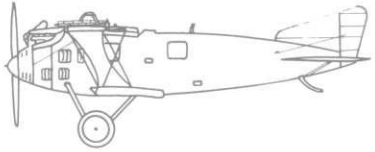


Appearing in early 1915, the Aviatik C.I served as a two-seat observation and artillery spotting aircraft . Like the B.E.2c, the gunner sat in front of the pilot. This arrangement restricted the arc of the gunners machine gun, since the struts blocked his vision in certain directions. Slow and awkward in the air, it revealed itself to be highly vulnerable to fighter attacks. In 1916, an upgraded version appeared at the Front and was designated the C.III. It was only modestly successful.

Roland C.II "Whalefish"

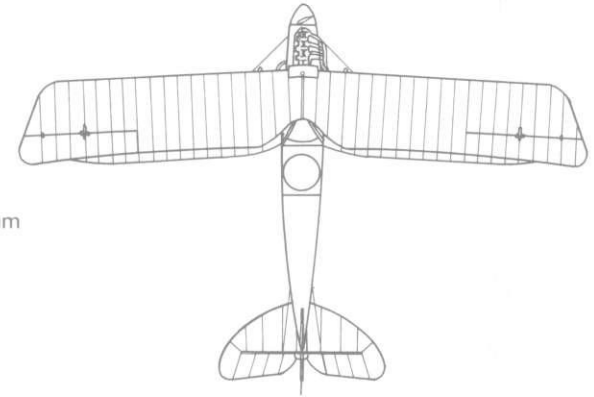
Length: 25 ft. 3 in.
Wingspan: 33 ft. 9 in.
Engine: 160 hp in-line
Armament: 1 Parabellum, 1 Spandau
Climb rate: 6 min. to 3,280 ft.
Ceiling: n/a
Max. speed: 103 mph
Total built: 350
Introduction date: April 1916

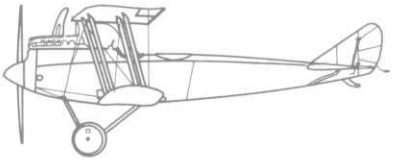




The Roland was a very tough opponent since it was one of the first two-seaters to be armed with both a rear-firing and a forward-firing machine gun. While it was fairly maneuverable, it was very tricky to fly. For its time, it was one of the fastest two-seaters in service. Its speed made the Roland a perfect long-range reconnaissance aircraft. It was not an exceptionally maneuverable plane, and it had a tendency to spin in tight turns. It remained in front-line service from April 1916 until early 1917.

Rumpler C.IV

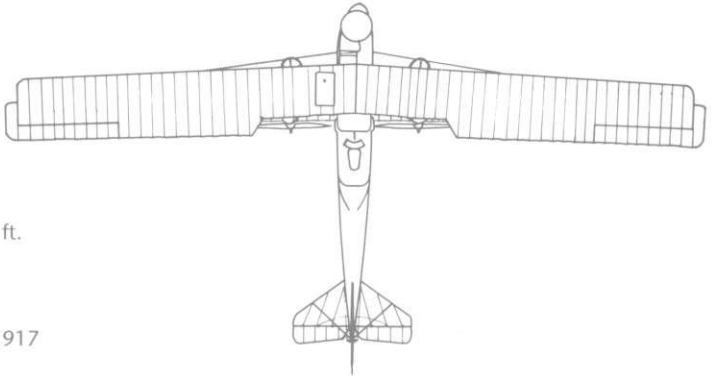


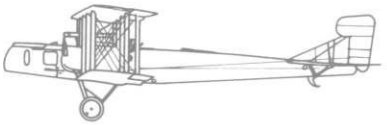


Length: 27 ft. 7 in.
Wingspan: 41 ft. 6 in.
Engine: 260 hp in-line
Armament: 1 Spandau, 1 Parabellum
Climb rate: 4 min. to 3,280 ft.
Ceiling: 21, 000 ft.
Max. speed: 106 mph
Total built: 1,000
Introduction date: March 1917

One of the mainstays of the German long-range photographic reconnaissance units, the Rumpler was a fast two-seater armed with two machine guns. It first appeared at the Front in March 1917 and served until the end of the war. Average pilots had a difficult time with the C.IV since it was a quirky, tough machine to fly. Its high altitude performance, including its climb rate, was exceptional.

Gotha G.IV

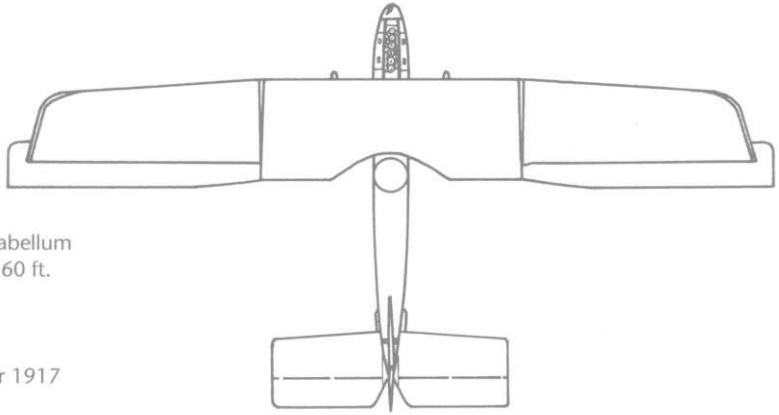


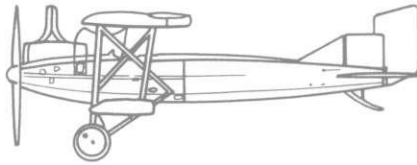


Length: 38 ft. 11 in.
Wingspan: 77 ft. 9 in.
Engines: 2 x 260 hp in-lines
Armament: 3 Parabellums
Climb rate: 28 min. to 9,840 ft.
Ceiling: 21, 320 ft.
Max. speed: 87 mph
Total built: 230
Introduction date: February 1917

The Gotha G.IV was Germany's principle strategic bomber during the Great War. It was used extensively in raids over England and France. Its long range allowed it to bomb London from bases in Belgium, a feat that few other German aircraft could undertake until late 1918. The first Gotha raid on London occurred on May 25, 1917 in broad daylight. Through the course of the war, only eight Gotha G.IVs were lost to British fighters, twelve were lost to ground fire, and thirty-six were destroyed in accidents. An extremely difficult plane to fly, Gotha pilots often crashed on landing since the plane was so unstable. A total of three machine guns were carried during daylight raids. One was located in the nose, one in the upper rear fuselage, and one in a tunnel facing down to the rear.

Junkers J.I



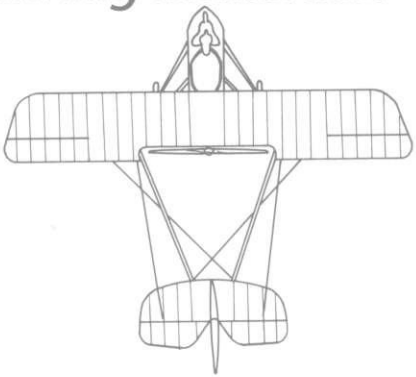


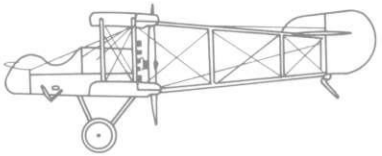
Length: 29 ft. 10 in.
Wingspan: 52 ft. 6 in.
Engine: 200 hp in-line
Armament: 2 Spandau, 1 Parabellum
Climb rate: 32 ft. min. to 6,560 ft.
Ceiling: n/a
Max. speed: 97 mph
Total built: 227
Introduction date: November 1917

The Junkers J.I was a two-seat attack bomber used by the Schlastastaffeln (ground attack squadrons) throughout 1918. The vital areas of the plane were covered with armor plating, making it a very difficult aircraft to shoot down. It carried two forward-firing Spandau's and one Parabellum for the gunner as its main armament. Unfortunately, it was an extremely heavy aircraft. This greatly impaired its maneuverability and general handling characteristics.

Airco D.H.2 "The Spinning Incinerator"

Length: 25 ft. 2 in.
Wingspan: 28 ft. 3 in.
Engine: 100 hp Gnome rotary
Armament: 1 Lewis gun
Climb rate: 12 min. to 6,500 ft.
Ceiling: 14, 500 ft.
Max. speed: 93 mph
Total built: 400
Introduction date: February 1916

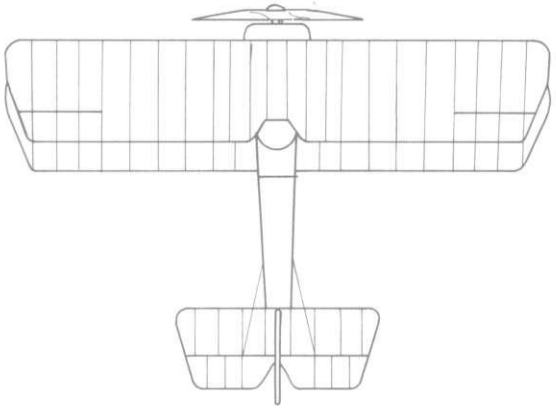


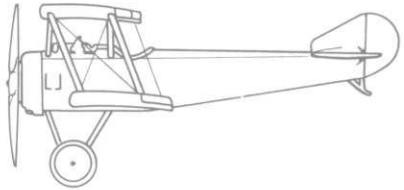


The D.H.2 was a nimble, highly maneuverable bi-plane that helped end the Fokker Scourge in 1916. It was one of the earliest fighters to have an engine mounted behind the pilot in a pusher-type design. Unfortunately, the engine was totally unreliable, and often several D.H.2s out of each patrol would have to abort because of engine trouble. Nevertheless, it served well into 1917. By this time, however, the D.H.2 was hopelessly outclassed by the newer German aircraft.

Sopwith Pup

Length: 19 ft. 4 in.
Wingspan: 26 ft. 6 in.
Engine: 80 hp Le Rhone rotary
Armament: 1 Vickers
Climb rate: 7 min. to 5,000 ft.
Ceiling: 17, 500 ft.
Max. speed: 99 mph
Total built: 1,770
Introduction date: April 1916

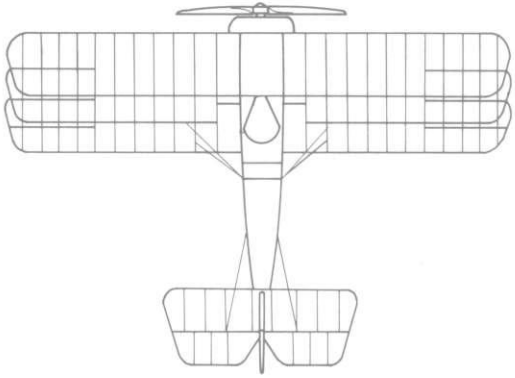


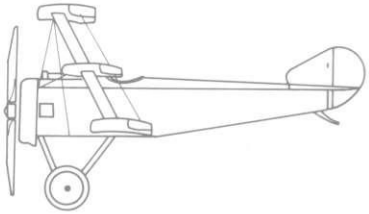


The Pup was a lightweight, graceful biplane whose docile flight characteristics earned the affection of its pilots. Though it was underpowered, it could outmaneuver many German aircraft it faced in 1916-17 above 10, 000 feet. It was so nimble that it could loop dozens of times in a row, a feat not many of its contemporaries could achieve. Unfortunately, it carried only one machine gun. This was a great disadvantage by mid 1917. The Pup served with primarily R.N.A.S. and Home Defense units until they were replaced by the Sopwith Triplane and Camel.

Sopwith Triplane "Tripehound"

Length: 18 ft. 10 in.
Wingspan: 26 ft. 6 in.
Engine: 130 hp Clerget rotary
Armament: 1 Vickers
Climb rate: 10 min. to 10,000 ft.
Ceiling: 20,500 ft.
Max. speed: 113 mph
Total built: Equipped about 5 squadrons
Introduction date: January 1917

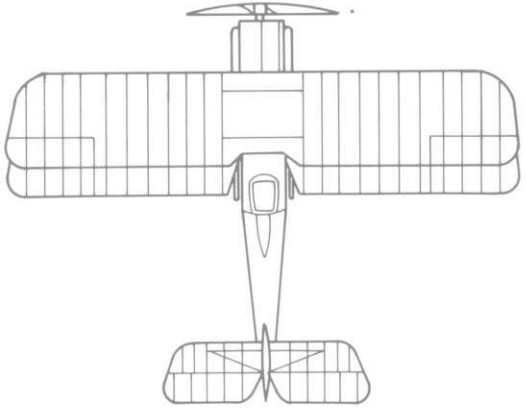


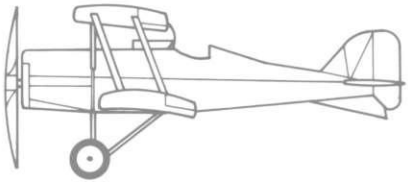


The inspiration behind the Fokker Dr.I, the Sopwith Triplane served only with Royal Navy squadrons for just a few months in 1917. It's maneuverability was phenomenal, especially its rate of climb. Like the Pup, it was both under-powered and under-armed, so it was replaced by the Camel by November of 1917. The Black Flight of Naval 10 Squadron, led by Raymond Collishaw, flew the Triplane and gained tremendous success with it until they converted over to the Camel in the summer of 1917.

S.E.5a

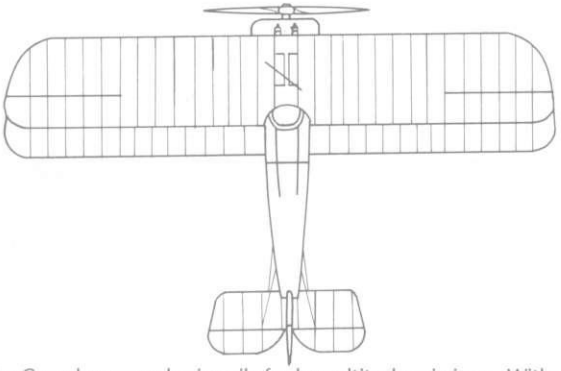
Length: 20 ft. 11 in.
Wingspan: 26 ft. 7 in.
Engine: 200 hp Viper in-line
Armament: 1 Vickers and 1 Lewis gun
Climb rate: 8 min. to 6,500 ft.
Ceiling: 19, 500 ft.
Max. speed: 138 mph
Total built: 5,100
Introduction date: May 1917

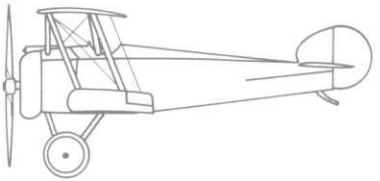




S.E.5a was probably the best British scout of the war. Easy to fly, stable and very effective at high altitude, the S.E.5a made even a mediocre pilot look good. Its stability made it an excellent gun platform, and three of the top four British aces flew the S.E.5a for at least part of their careers. Though it was not as maneuverable as the Camel or the Fokker Triplane, it could outdive anything the Germans flew. It could also climb better than most other aircraft. The S.E.5a carried one Vickers gun on the cowling and one Lewis gun on the wing as armament. It served with both the British and American air services. It ranks as one of the fastest scouts of the war.

Sopwith Camel

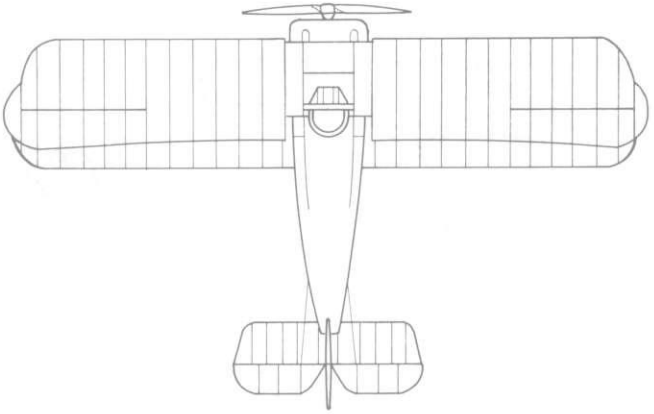


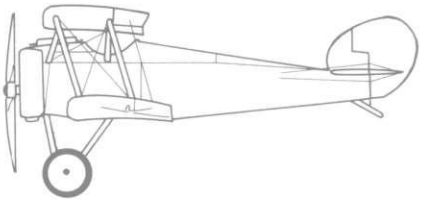


Length: 18 ft. 9 in.
Wingspan: 28 ft.
Engine: 130 hp Clerget rotary
Armament: 2 Vickers
Climb rate: 16 min. to 15,000 ft.
Ceiling: 19,000 ft.
Max. speed: 115 mph
Total built: 5,400
Introduction date: June 1917

One of the better Allied scouts of the war, the Camel was used primarily for low-altitude missions. With most of its weight concentrated in the nose, the center of gravity was well forward. This made the plane extremely unstable in the air. Further, the Camel was extremely light, while its engine was very powerful. As a result, the engine's torque was brutal. Many inexperienced pilots died as their mounts twisted to the right and then fell into a spin. Yet this seemingly damning flight characteristic was exactly what made the Camel so deadly in combat. In the hands of a veteran pilot, the Camel could turn more sharply to the right than any other aircraft (except perhaps the Fokker Dr.I). To the left, the plane had a tendency to climb. The Camel served as both a fighter and a ground attack aircraft in both the R.F.C. and the American Air Service until the end of the war.

Sopwith Snipe



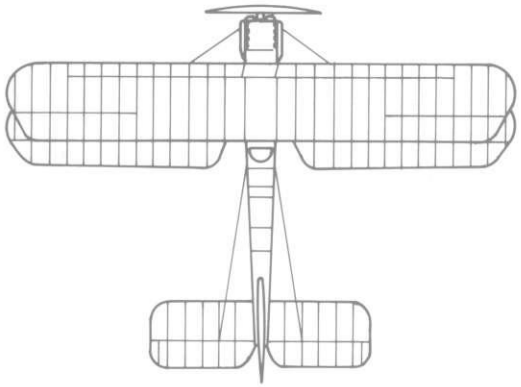


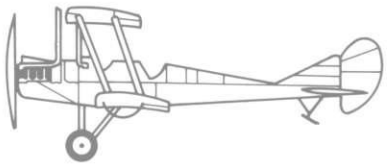
Length: 19 ft. 10 in.
Wingspan: 31 ft. 6 in.
Engine: 230 hp. Bentley rotary
Armament: 2 Vickers
Climb rate: 16 min. to 16,500 ft.
Ceiling: 20, 500 ft.
Max. speed: 121 mph
Total built: 1,500
Introduction date: September 1918

The Snipe was essentially an improved Camel. Fast, highly maneuverable and durable, the Snipe represented the peak of World War One fighter development. It arrived at the front in September and October 1918, and then in only small numbers.

B.E.2 "Quirk"

Length: 27 ft. 3 1n.
Wingspan: 37 ft.
Engine: 90 hp in-line
Armament: 1 Lewis gun
Climb rate: 24 min. to 6,500 ft.
Ceiling: 10, 000 ft.
Max. speed: 72 mph
Total built: 1,801
Introduction date: August 1914

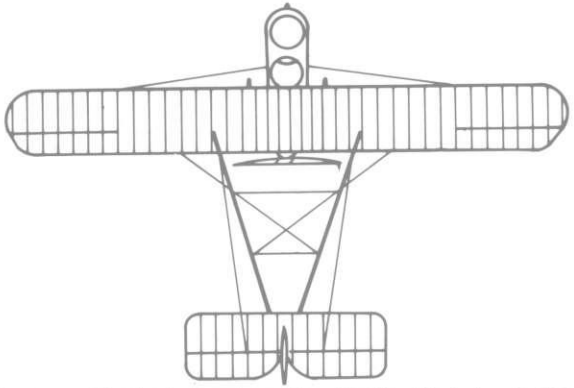


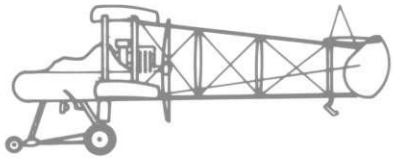


The Quirk was the standard British observation and light bombing plane through a large portion of the Great War. Although it was very stable in the air, it was slow, terribly unmaneuverable and virtually defenseless. The gunner actually sat in front of the pilot under the top wing. This severely restricted his field of fire. It stayed in service long after it became hopelessly obsolete, which resulted in crippling losses in the units flying this aircraft type

F.E.2b "Fee"

Length: 32 ft. 3 in.
Wingspan: 47 ft. 9 in.
Engine: 160 hp Beardmore in-line
Armament: 2 Lewis guns
Climb rate: 8 min. to 3,000 ft.
Ceiling: 11, 000 ft.
Max. speed: 91 mph at sea level
Total built: 1,700
Introduction date: October 1915

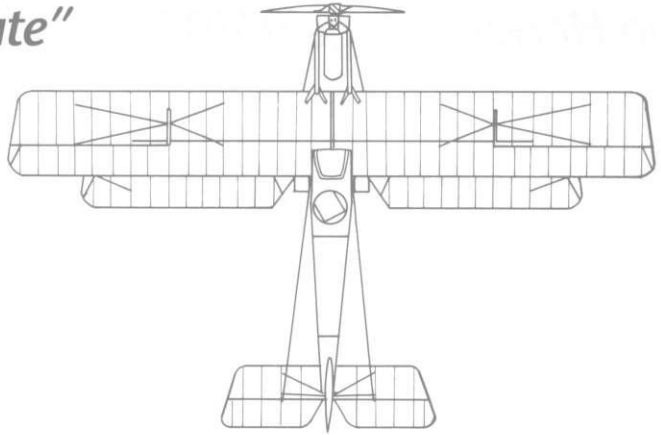


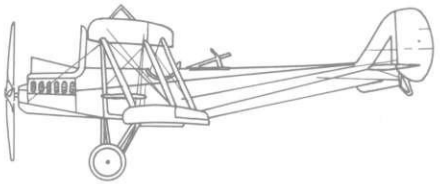


Known as the Fee by its pilots, the F.E.2b was an effective two-seat scout against the Eindeckers in 1916. By early 1917, the Fee was obsolete as a fighter, so it was employed as a night bomber and reconnaissance aircraft. It served throughout the war in this capacity. It carried two machine guns, both of which were operated by the gunner. One fired forward on a flexible mount, and the other was mounted between the gunner and the pilot firing rear-ward over the top wing. In order to fire the rear-facing gun, the gunner had to stand on a small platform facing the pilot with his back to the nose of the aircraft. More than one F.E.2b gunner fell to his death while trying to repulse an attack.

R.E.8 "Harry Tate"

Length: 27 ft. 10 in.
Wingspan: 42 ft. 7 in.
Engine: 150 hp in-line
Armament: 1 Lewis gun, 1 Vickers
Climb rate: n/a
Ceiling: 13, 500 ft.
Max. speed: 103 mph
Total built: 4,000
Introduction date: October 1916

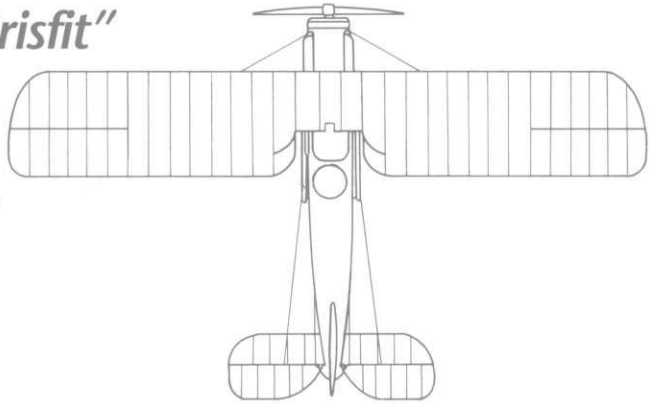


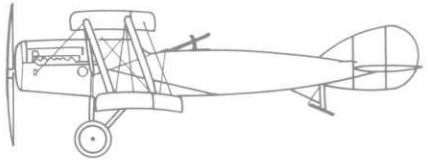


The R.E.8 was another reconnaissance aeroplane used by the Royal Flying Corps that entered operational service in 1916. It remained active at the Front until the Armistice. It was a lumbering, unmaneuverable beast that had a nasty habit of falling into spins quite suddenly. Structurally, the R.E.8 was weak, as its upper wing extensions were not terribly strong. As if this weren't enough, the early versions possessed a power plant prone to failures.

Bristol Fighter "Brisfit"

Length: 25 ft. 10 in.
Wingspan: 39 ft. 3 in.
Engine: 275 hp Rolls-Royce in-line
Armament: 1 Vickers and 2 Lewis guns
Climb rate: n/a
Ceiling: 20, 000 ft.
Max. speed: 125 mph
Total built: 3,101
Introduction date: April 1917

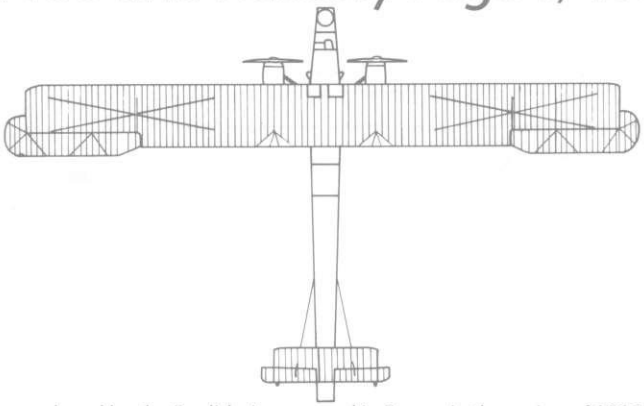


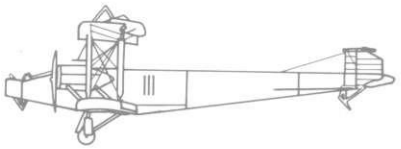


Known as the "Brisfit" to its pilots, the two-seat Bristol F.2B Fighter proved to be an incredibly tough opponent in the air. Sturdy, stable and maneuverable for a two-seater, it saw service from April 1917 through the Armistice and all the way through the 1920's. They were finally retired from active duty in 1932. Armed with one forward-firing Vickers and twin Lewis guns in the rear, the Brisfit could be more than a match for any German scout if handled well.

Handley Page 0/100 and Handley Page 0/400

Length: 62 ft. 10 in.
Wingspan: 100 ft.
Engines: 2 X 250 hp in-lines
Armament: 3-5 Lewis guns
Climb rate: n/a
Ceiling: 7,000 ft.
Max. speed: 85 mph
Total built: 500
Introduction date: November 1916

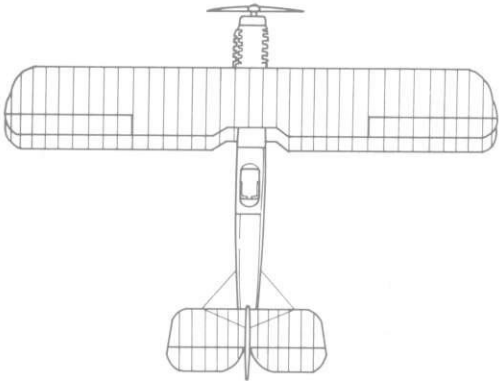


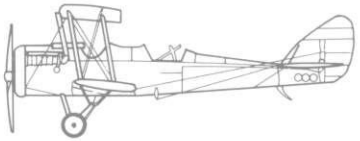


This was the first true strategic bomber produced by the English. It appeared in France in the spring of 1917 and began raiding deep within German-held territory. Originally conceived as a daylight bomber, the 0/100 was reassigned to night raiding a few months after reaching the combat zone. They were eventually superseded by the larger and more powerful 0/400s.

Airco D.H.4

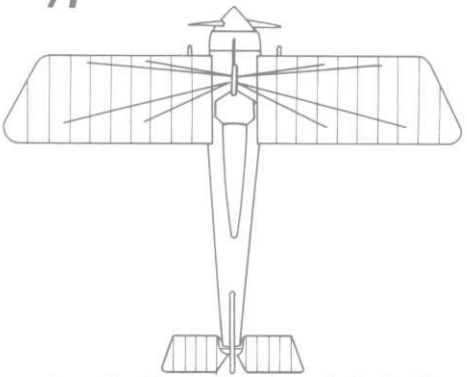
Length: 30 ft. 8 in.
Wingspan: 42 ft. 4 in.
Engine: 375 hp in-line
Armament: 2 Lewis guns, 2 Vickers
Climb rate: n/a
Ceiling: 16,000 ft.
Max. speed: 117 mph
Total built: 1, 449
Introduction date: May 1917

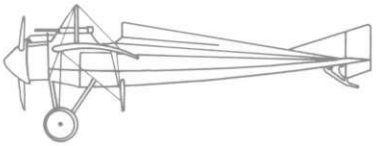




The D.H.4 was a two-seat bomber used by the British and American air services in the latter portion of the war. It was an excellent aircraft for its time, and they served on all major fronts during the war. For a bomber, the D.H.4 was a comparatively fast, achieving a maximum speed of 117 mph. By the end of the war, over 7, 000 had been built in the United States and Great Britain. Some D.H.4s remained in service with American units until 1932.

Morane-Saulnier Type N Bullet

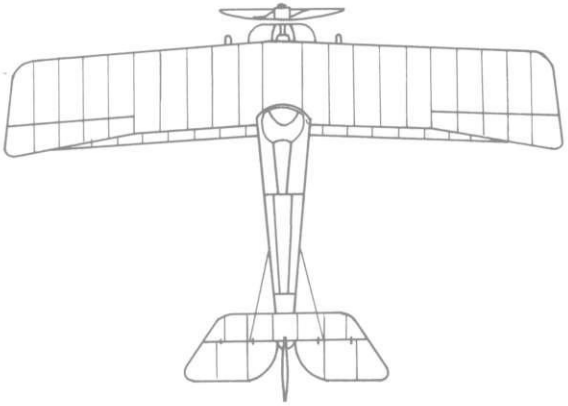


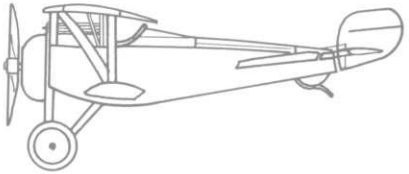


Length: 19 ft. 1 in.
Wingspan: 26 ft. 8 in.
Engine: 80 hp Le Rhone rotary
Armament: 1 Vickers or Hotchkiss
Climb rate: n/a
Ceiling: 13,123 ft.
Max. speed: 90 mph
Total built: 50
Introduction date: April 1915

A modified version of a pre-war race monoplane, the Morane Bullet saw limited action with both the French and British throughout 1915 and early 1916. While it was extremely fast for its time, the controls were very stiff since it used wing-warping instead of ailerons for movement. It's small wing area made a rather unmaneuverable aircraft as well. Nevertheless, it was one of the first single-seaters to mount a forward-firing machine gun. By the end of the summer of 1916 almost all had been withdrawn from frontline units. Roland Garros flew this as well as a Morane Parasol during his brief career.

Nieuport 17

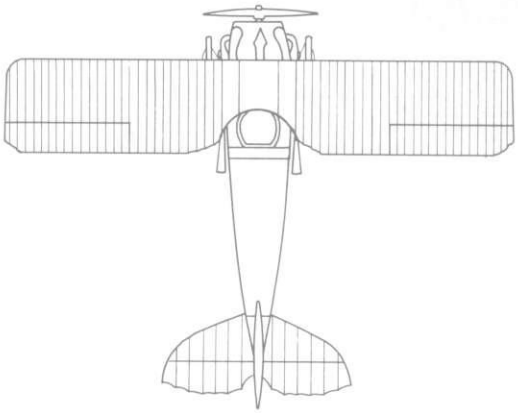


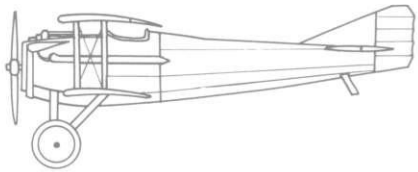


Length: 18 ft. 10 in.
Wingspan: 27 ft.
Engine: 110 hp Le Rhone
Armament: 1 Vickers or Lewis guns
Climb rate: 7 min. to 6,500 ft.
Ceiling: 17, 400 ft.
Max. speed: 110 mph
Total built: several thousand
Introduction date: April 1916

The Nieuport was one of the classic designs to emerge from the Great War. Light, powerful, and incredibly nimble, this aeroplane had no equal in the sky until the advent of the Albatros D.III. first arriving in the spring and summer of 1916, the Nieuport 17 equipped most French units and many British ones also until mid 1917. Unfortunately, this type had a nasty habit of shedding its lower wings after violent maneuvers or steep dives. Nevertheless, it was one of the best Allied fighters of 1916-17.

Spad 7

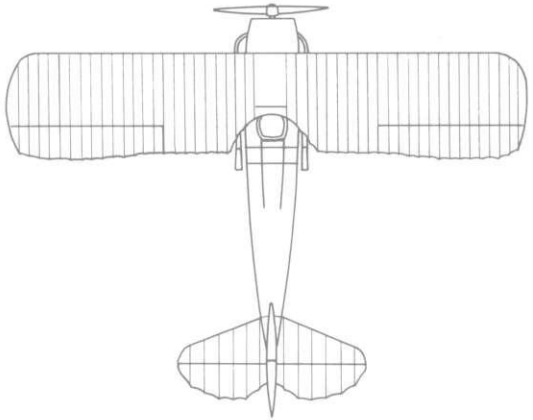


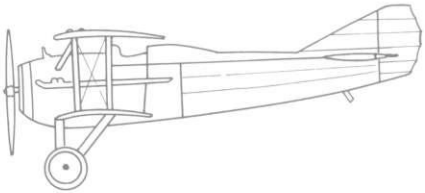


Length: 20 ft. 3 in.
Wingspan: 26 ft. 8 in.
Engine: 175 hp Hispano-Suiza in-line
Armament: 1 Vickers
Climb rate: 6 min. to 6,560 ft.
Ceiling: 18, 000 ft.
Max. speed: 119 mph
Total built: 6,000
Introduction date: July 1916

First appearing in the summer of 1916, the Spad 7 combined speed and strength into a business-like airframe. Though it couldn't out-turn the Nieuport 17 or many of the German aircraft, it could handle very steep dives without losing a wing. It's solid construction made it a durable and reliable aeroplane. The early engines they were equipped with, however, suffered originally from all kinds of teething troubles. Eventually, these were ironed out and the Spad became a deadly adversary in the air.

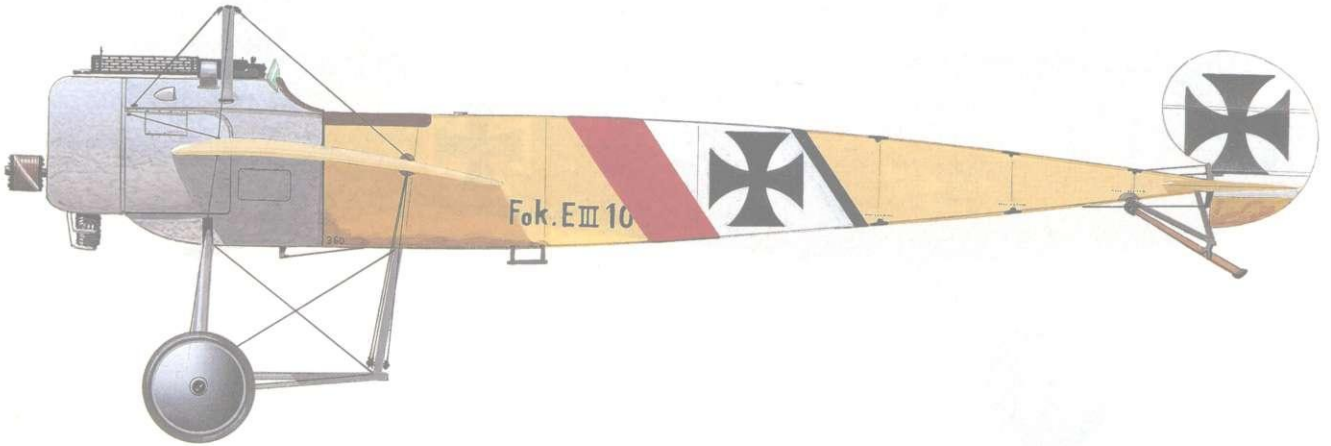
Spad 13





Length: 20 ft. 8 in.
Wingspan: 26 ft. 11 in.
Engine: 235 hp Hispano-Suiza in-line
Armament: 2 Vickers
Climb rate: 5 min. to 6,560 ft.
Ceiling: 21,800 ft
Max. speed: 133 mph
Total built: 8,400
Introduction date: September 1917

This was simply an improved Spad 7. It mounted a more powerful engine, and two Vickers machine guns instead of just one. The Spad 13 became one of the classic designs of World War One. Nearly every Allied nation flew this type at some point in the war. Most American units used the Spad toward the end of the war, as did the Belgians and some British and Italian units. Fast, sleek, and robust, Spads were capable of dives exceeding two hundred miles per hour.

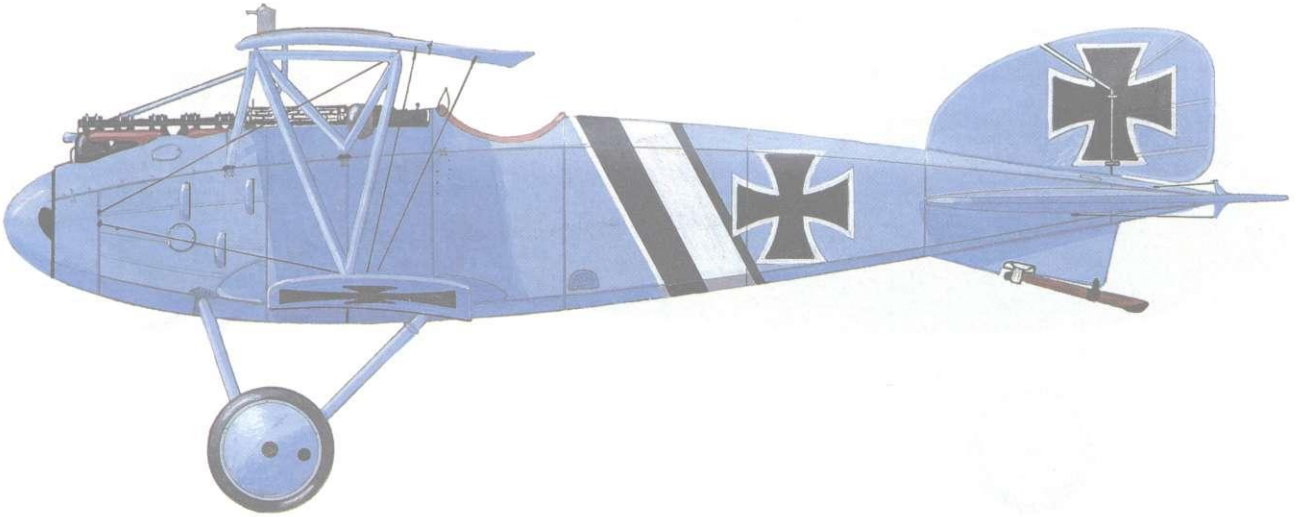


This particular Eindecker was flown by Ernst Udet in March of 1916. The Eindecker was the first aircraft to mount synchronizer gear allowing the machine gun to fire safely through the propeller arc. The Fokker Scourge was a result of the E.III's superiority over the Allied scouts of the time.

Fokker E.III

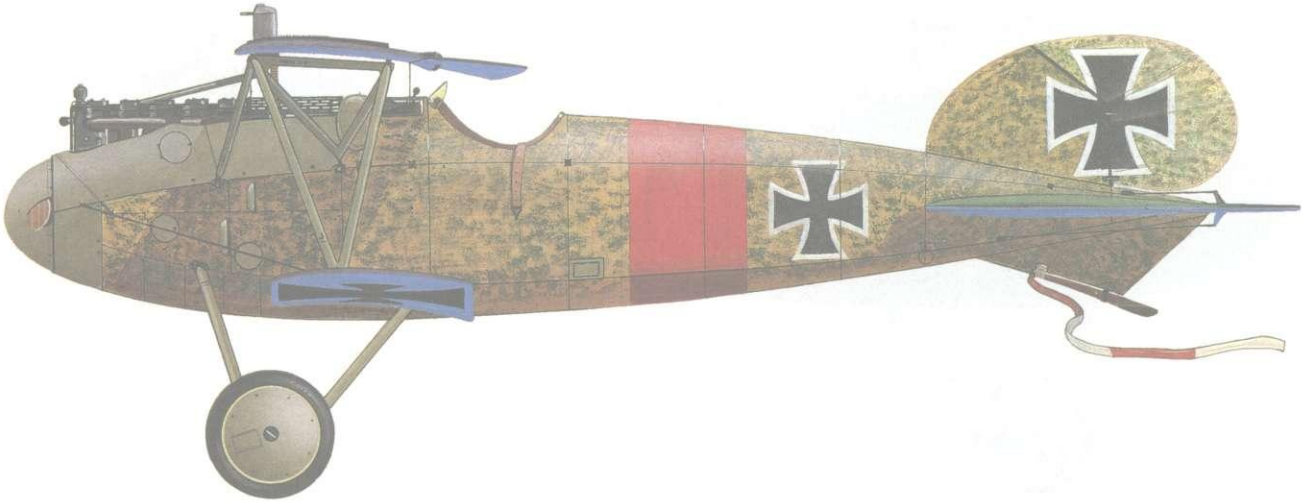
The D.II saw action for the first time in September of 1916. They were deployed in modest numbers until the arrival of the Albatros D.III in early 1917.

Albatros D.II



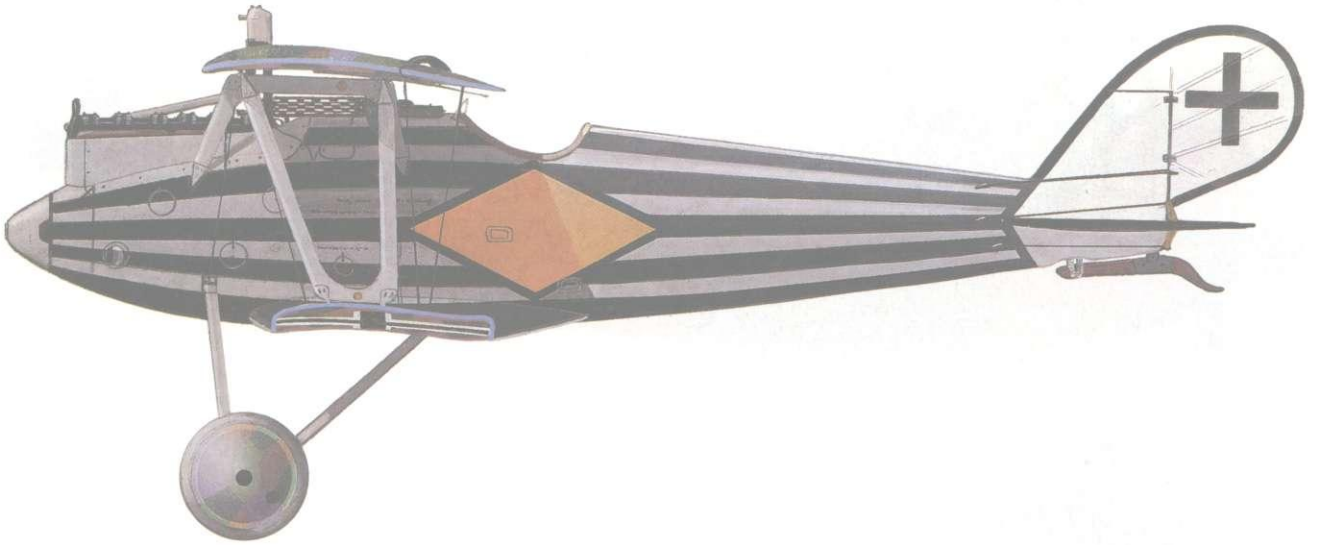
The D.III was Germany's best scout during the early part of 1917. It was fast and maneuverable for its time. Bloody April was in large part due to the superiority of the D.III over its Allied contemporaries.

Albatros D.III



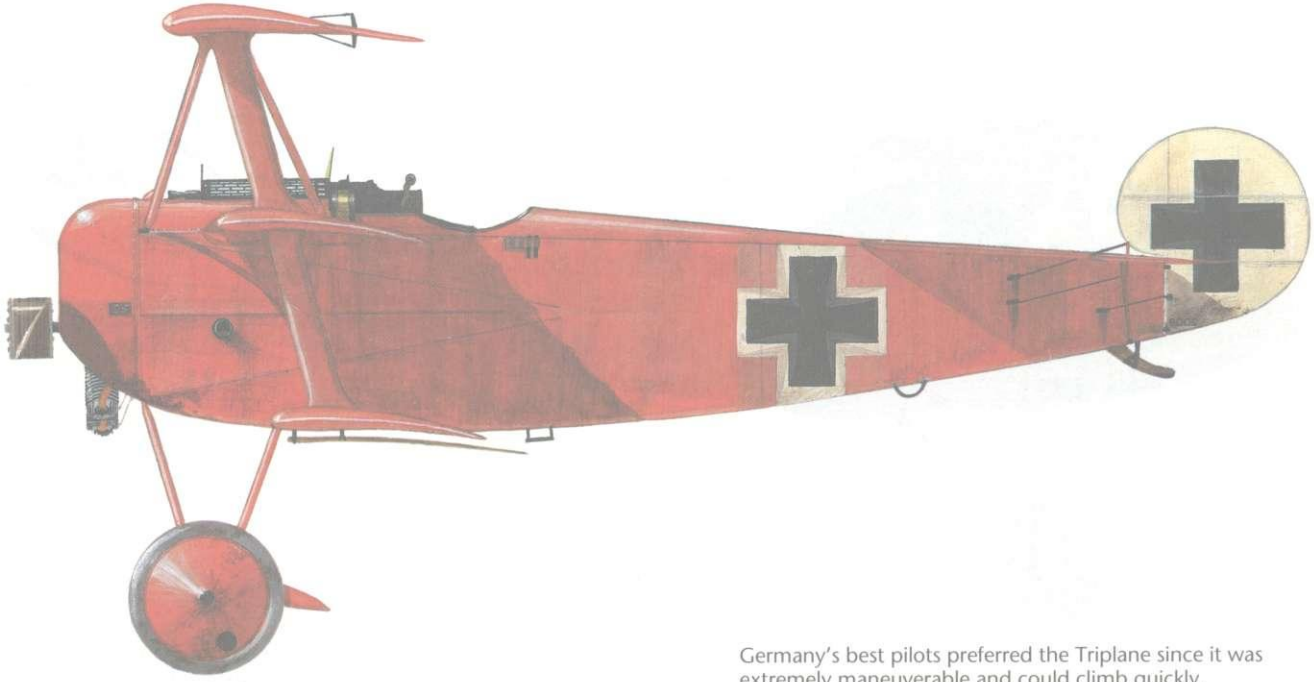
Only a modest improvement on the Albatros D. III, the D.V was a disappointment to its pilots who expected the D.V to be far superior to its predecessors.

Albatros D.V



This exotically decorated Pfalz was the personal mount of Lt. Erich Kaus of Jasta 30. The Pfalz equipped about a quarter of the Jagdstaffeln from the summer of 1917 to the summer of 1918.

Pfalz D.III

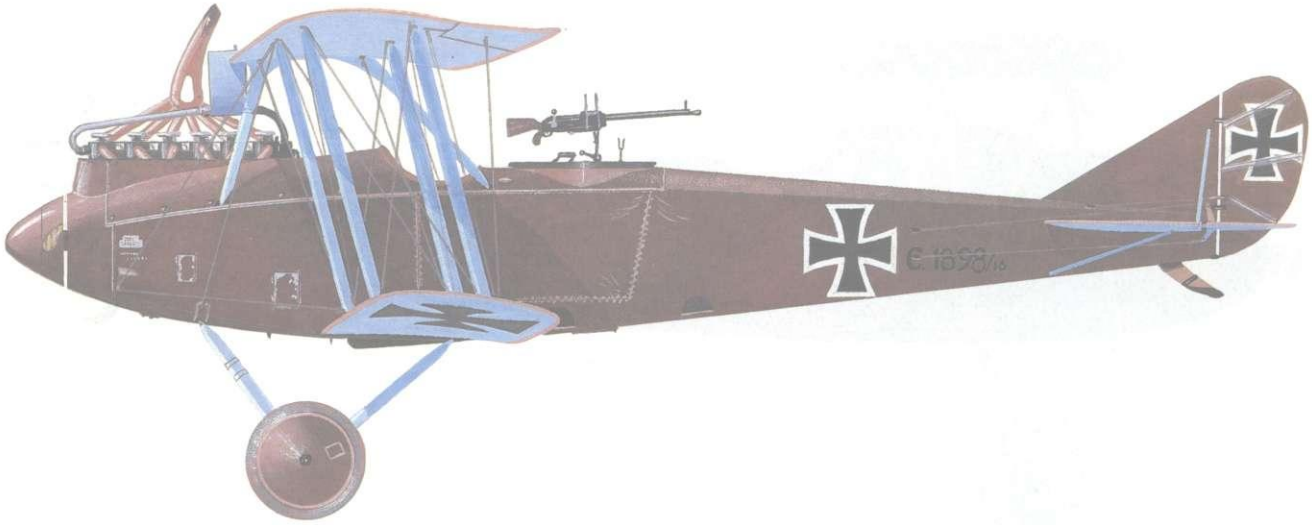


Germany's best pilots preferred the Triplane since it was extremely maneuverable and could climb quickly.

Fokker Dr.1

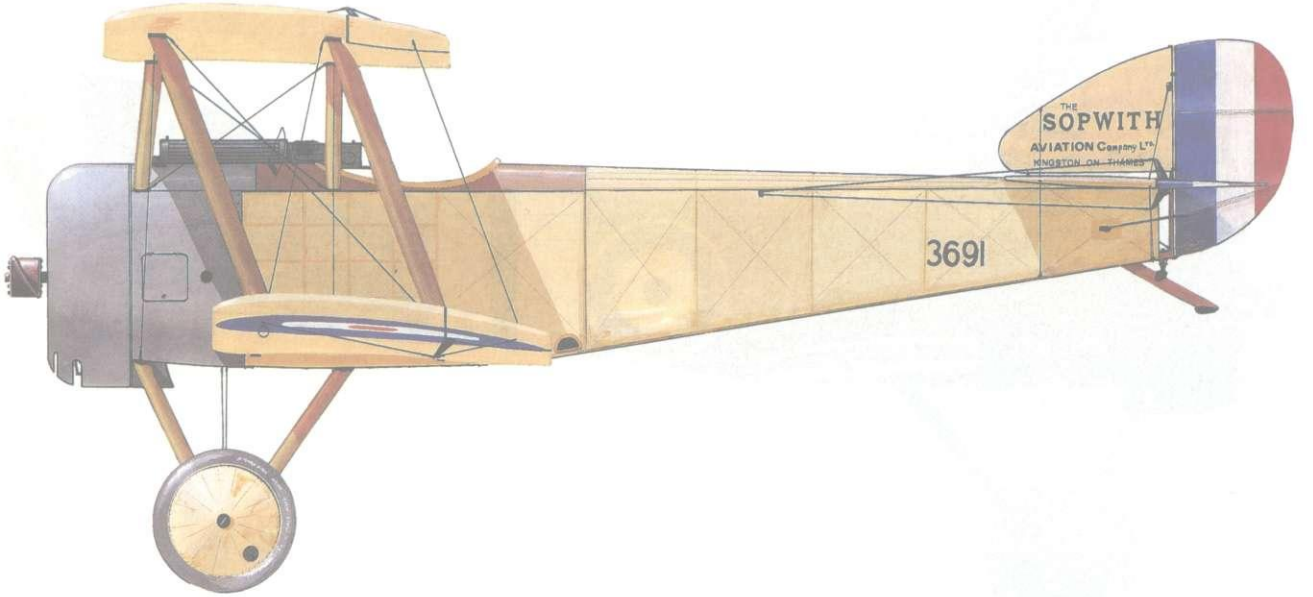
The Fokker D.VII was the best overall fighter of the first world war. It was extremely fast, and its high-altitude performance could not be matched by any Allied plane.

Fokker D.VII



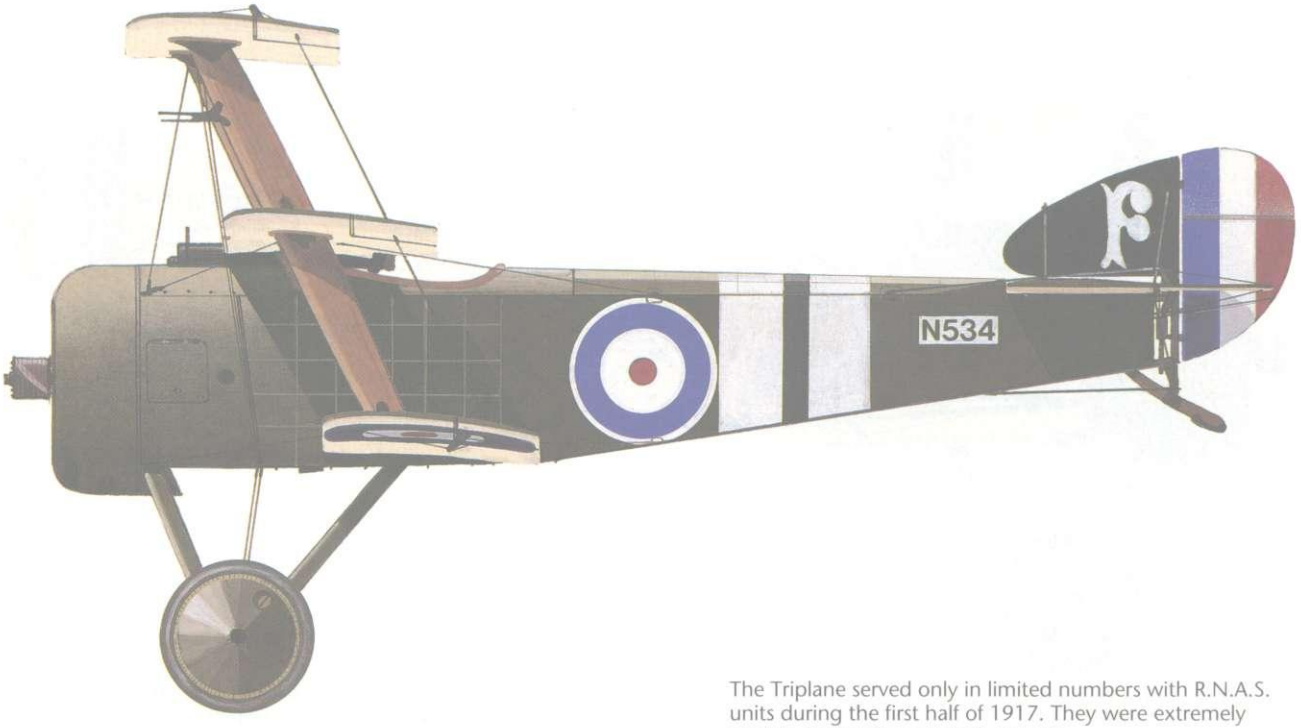
For a two-seater, the C.IV possessed an outstanding climb rate. They were used for high-altitude, long range photo-recon missions.

Rumpler C.IV



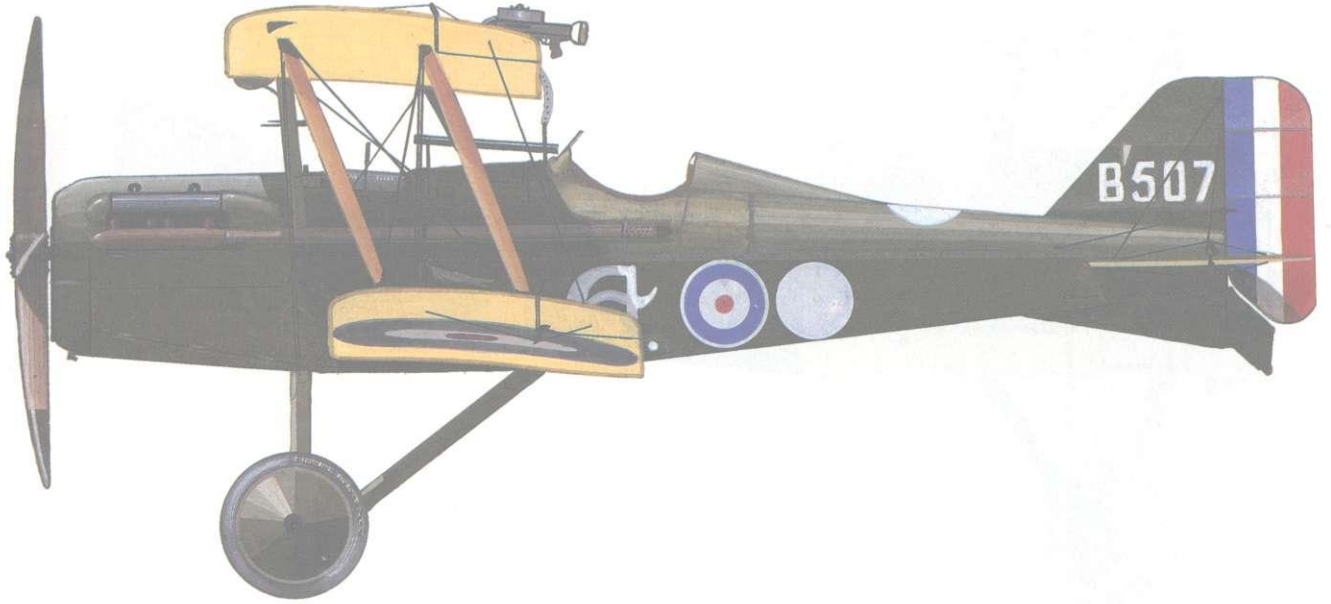
The Pup was an incredibly maneuverable, lightweight scout used by the R.N.A.S. and Home Defense squadrons throughout 1916.

Sopwith Pup



The Triplane served only in limited numbers with R.N.A.S. units during the first half of 1917. They were extremely nimble, but underpowered, aircraft.

Sopwith Triplane



The S.E.5.a was probably the best Allied scout of the war. Although it was not as maneuverable as the Camel, it was much faster, and could climb higher and more quickly than the Camel. Most of Britain's top aces flew the S.E.5a at some point in their careers.

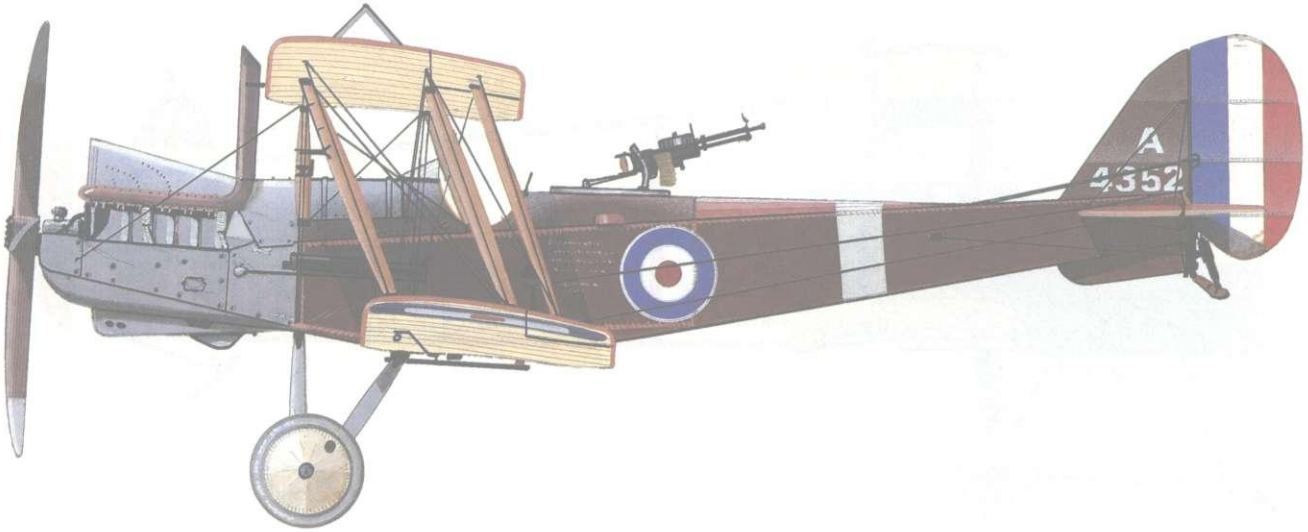
S.E.5a

In the hands of a novice, the Camel was likely to stall or careen out of control. But in the hands of an expert, the Camel became a highly maneuverable, and extremely effective fighter.

Sopwith Camel

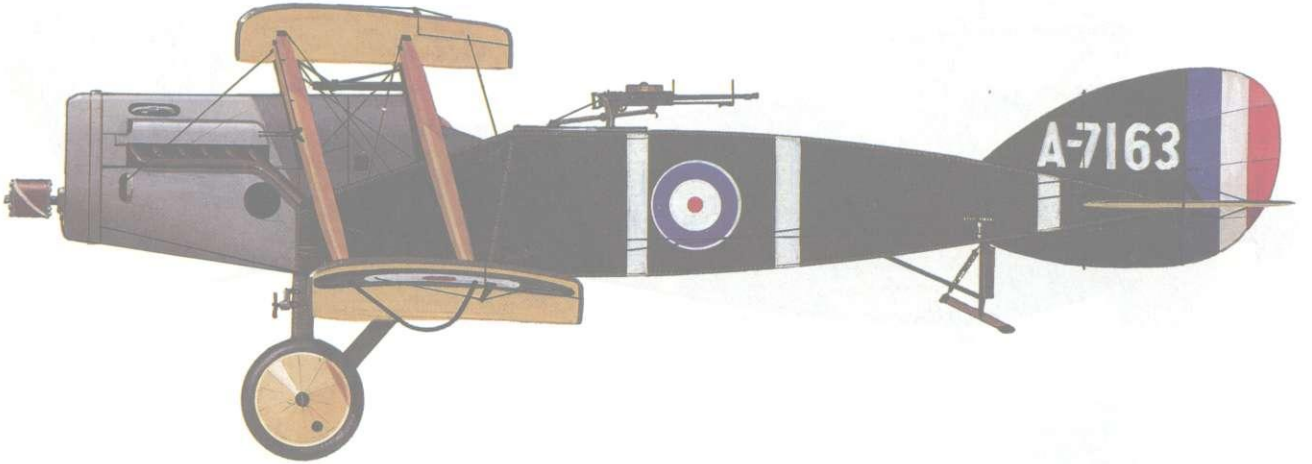
The "Fee" was an ungainly two-seat aircraft. The propeller was located behind the pilot.

F.E.2b



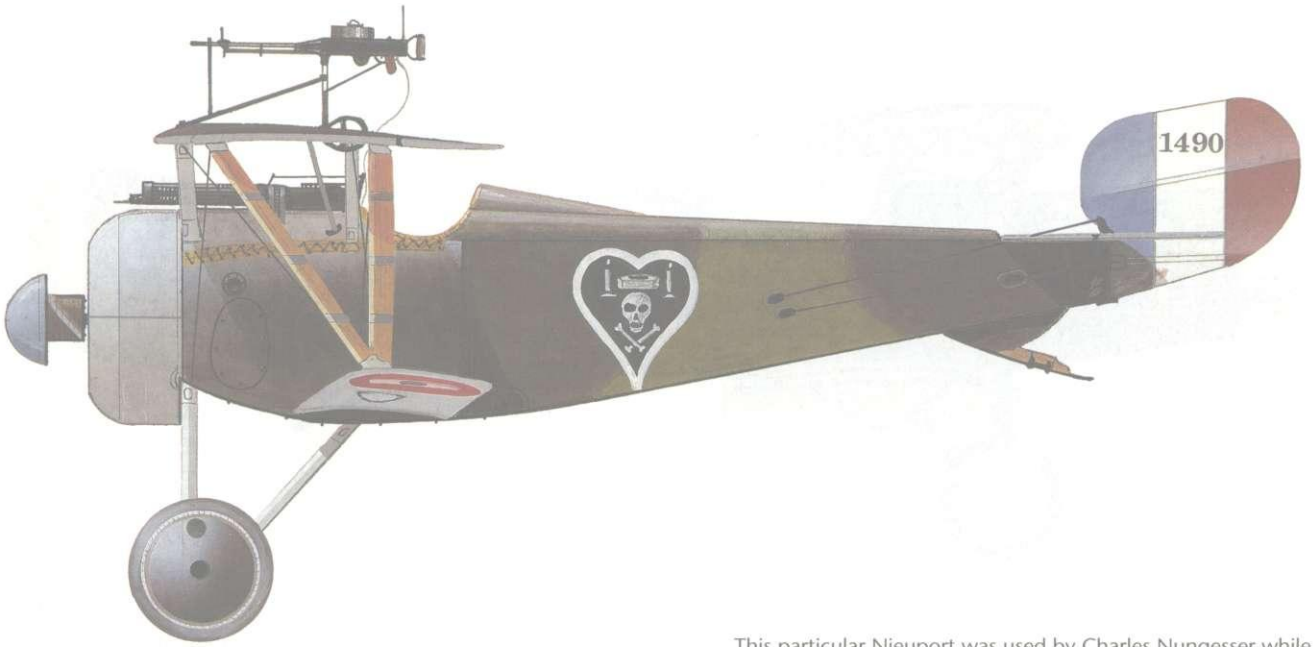
One of the standard British reconnaissance and artillery-spotting two-seaters, the R.E.8 entered service in 1916 and served until the end of the war.

R.E.8



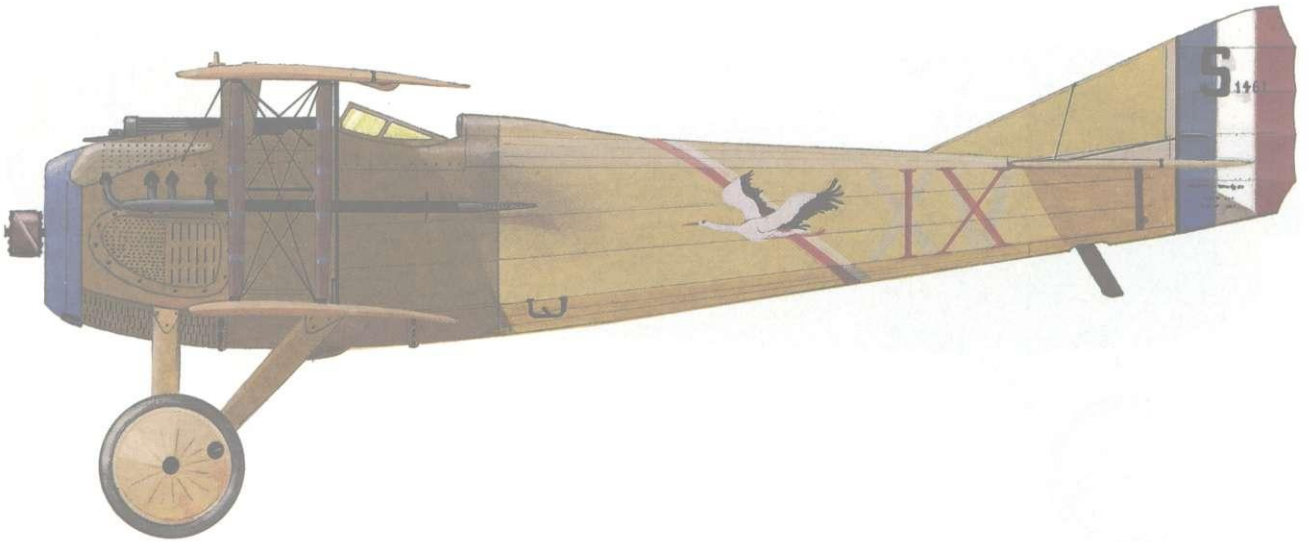
The Bristol Fighter was one of the best two-seat scouts of the war. Carrying three machine guns, it proved itself to be more than a match for most single-seat German scouts.

Bristol F.2B



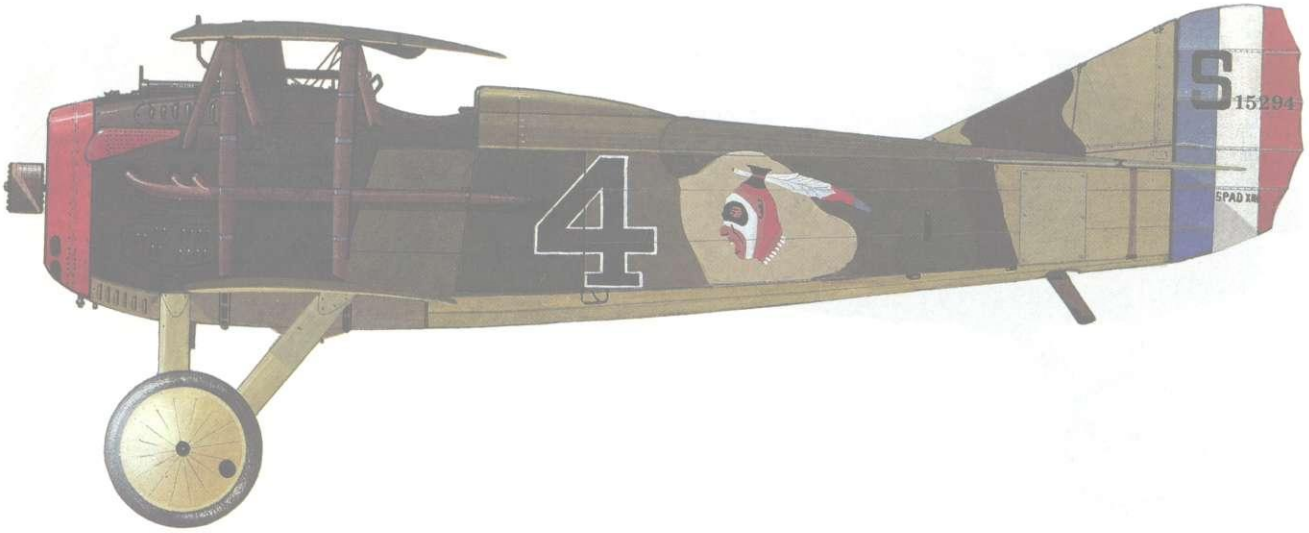
This particular Nieuport was used by Charles Nungesser while he was flying with the Lafayette Escadrille. The Nieuport was superior to most German aircraft of 1916.

Nieuport 17



When the Spad 7 entered service in 1916, it quickly earned a reputation for being both rugged and durable. Spad pilots could out-dive any of their adversaries, though they could not turn as quickly as most German scouts.

Spad 7



The best French scout built during the war, the Spad 13 was so sturdy it could out-dive any German scout it faced.

Spad 13

Historical Missions

HAWKER MEETS HIS MATCH

Date: November 23, 1916
Location: Over the Somme

Battle Synopsis:

Major Lanoe Hawker and one other pilot from 24 Squadron sighted five Albatros D.IIs on patrol one morning over the Somme. Being slightly below the D.H.2s the Albatros pilots, led by von Richthofen, decided to circle away and get altitude. Before they were successful, Hawker and Andrews, the other Brit, had each chosen a target and started a firing pass.

Hawker picked von Richthofen, and the two were soon mixed-up in a wild turning melee that spanned every altitude from 9000 feet to 100 feet. Andrews, meanwhile, found himself the object of attention of the other four Albatros pilots. After his engine was hit, he half-rolled and dove for home with the eager Germans apparently chasing him all the way to the front. Hawker realized that the wind was blowing against him and his return westward, and soon found himself pushed deeper and deeper into German territory. Low on fuel, he had no choice but to break for home. Going into a series of loops, he surprised von Richthofen, piercing the Red Baron's plane with several well-placed bursts. Hawker then dove to the deck, zigzagging all the way. Determined not to lose his prey, Richthofen followed behind, snapping out burst after burst. Finally, after wasting approximately 900 rounds, the German ace hit Hawker in the head, downing his plane within 50 yards of the front line. Hawker was Richthofen's eleventh victory.

Courtesy National Air and Space Museum, Smithsonian Institution

The strapping L.G. Hawker.

IMMELMANN'S FIRST VICTORY

Date: August 1, 1915
Location: Douai.

Battle Synopsis:

On the morning of August 1, 1915, the British completely surprised the Germans at the Douai aerodrome when 10 B.E.2 Quirks arrived and began a leisurely, almost insolent bombing attack. Furious, Oswald Boelcke jumped into his Eindecker and took-off in pursuit of Brits. Max Immelmann followed a few minutes later in the squadron's second Fokker.

Immelmann quickly reached 10,000 feet and discovered two of the Quirks. Boelcke had found them as well, but his gun jammed so severely he had to disengage and return to the airfield. Immelmann pressed on alone. He swept down on one of the Quirks and poured round after round into it with his quick-firing Spandau. The B.E.2 staggered and started a long, shallow descent towards the Allied lines. But the Quirk was too badly damaged to make it and crashed in German territory. Elated, Immelmann landed next to the wreck and struck-up a conversation with the wounded English pilot. It was the first of seventeen victories Immelmann scored before his death.

Immelmann poses next to the wreckage of one of his victims.

FRANK LUKE, BALLOON-BUSTER EXTRAORDINAIRE

Date: September 29, 1918
Location: North-east of Verdun

Battle Synopsis:

After his commading officer grounded him for going AWOL twice, Frank Luke decided to steal a Spad and go balloon hunting. (A few days earlier his best friend had saved his life and died in the process. Luke never really recovered from this loss and became totally reckless in combat.)

Late in the afternoon, Luke got his Spad into the air, headed north and dropped a note to an American observation-balloon unit. It read "Watch three balloons on Meuse. Luke." The lone American headed for the three German drachen and succeeded in flaming the first one. As he turned to make a run at the second one, ground fire peppered his Spad. Undaunted, he pressed his attack on the second balloon just as a flight of Fokker D.VIIs arrived on the scene. Dodging the German scouts, Luke destroyed the second drachen. By now, his plane was full of holes, and he had received a wound to his shoulder. The Spad clearly could not remain airworthy much longer, but the American attacked and flamed the last balloon. Then his engine began to falter and he sputtered down to the deck, looking for a place to crash land. He flew over a tiny village full of German troops, and even though his plane was virtually a flying wreck, strafed the enemy soldiers. Moments later his Spad crashed into a church cemetery. Luke pulled himself from his mount and leaned against the tail assembly shaken and wounded. Soon an entire platoon of 40 Germans arrived to accept his surrender. Surrendering was not on Luke's mind. He unholstered his two revolvers and killed 7 of the Germans before they killed him.

In 1919, when the details of his last mission came to light, the United States awarded Luke a posthumous Medal of Honor.

Courtesy National Air and Space Museum, Smithsonian Institution

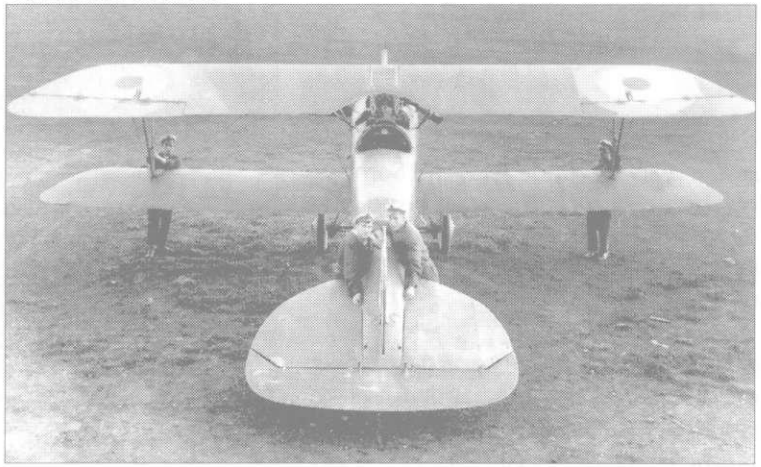
The usually unmilitary Frank Luke. Luke hated the Army and only enlisted after his sister had coerced him.

RICHTHOFEN CHEATS FATE

Date: July 6, 1917
Location: Between Ypres and Armentieres

Battle Synopsis:

On a routine sweep behind German lines, 20 Squadron found itself in a particularly unenviable position on the morning of July 6, 1917. Between the British planes and their lines intervened Manfred von Richthofen's Jasta 11. Worse still for the F.E.2 pilots, the Germans had an altitude advantage. Diving to cut the British off from their escape route, Richthofen and his men forced the pushers into a Lufberry defensive circle. Undaunted by this defensive maneuver, the Jasta 11 pilots closed in on the hopelessly outmatched British. Soon 2 Fees wavered out of formation and fell to the battleground below. At this point, several Triplanes from Naval 10 Squadron appeared on the scene and went to the rescue of the hard-pressed British pilots. Within a few minutes another Jasta arrived and the dogfight took on epic proportions. Still concentrating on the two-seaters, Richthofen swept down on Captain Connel and his gunner. Connel jinked the Fee wildly, trying to throw the Red Baron's aim off while the gunner sprayed the sky with lead. Suddenly, the German disengaged and tumbled down toward the trenches.



A captured Albatros D.III in R.N.A.S. hands.

Richthofen had been grazed by a lucky shot from the Fee's rear-firing Lewis gun. Wounded in the head and partially paralyzed, he barely managed to crash his fighter on the German side of the lines. Richthofen spent several weeks recovering from this injury, but he never regained his thirst for battle.

THE MASTER MEETS HIS END

Date: April 21,1918
Location: St. Quentin, Somme Valley

Battle Synopsis:

Manfred and Lothar von Richthofen pose beside a Fokker Triplane.

No. 209 Squadron ran into a mixed patrol of Jasta 5 and 11, led by Manfred von Richthofen, who had come across two R.E.8s flying a photo-recon mission. No. 209 Squadron dove to the rescue of the two-seaters and a wild melee quickly developed in which several German planes were downed. Richthofen at some point detached himself from the fray and began to chase a rookie Camel jockey named May. Seeing this, the British flight commander, Roy Brown, disengaged from the main battle to rescue his close friend.

According to Brown's combat report, he caught the Red Baron at a very low altitude near the Somme. Brown's first burst completely surprised the Rittmeister, who slumped forward in his cockpit after the bullet pierced his side. The mighty Red Baron's plane crashed soon after.

The legendary pilot was dead, but controversy over who shot him down rages to this day. Brown is given official credit, while many believe that an Australian flak team brought him down. No one will ever know for sure. However, the fact remains that Germany's best pilot had finally met his end.

LT. ROTH GOES BALLOON HUNTING

Date: May 29,1918
Location: Behind Ypres

Battle Synopsis:

On the morning of May 25, 1918, Lt. Roth of Jasta 16 took to the sky to do some routine balloon strafing. He ended up getting more than he bargained for.

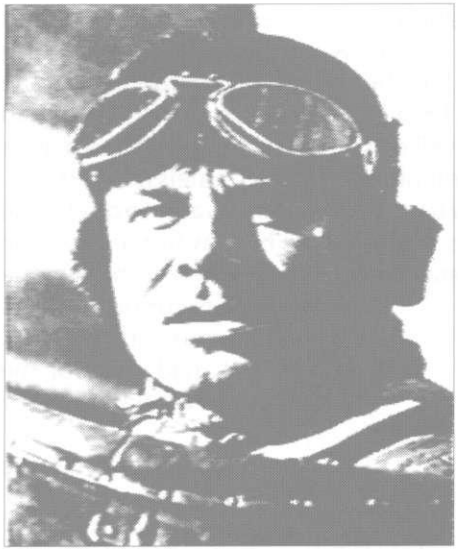
Starting behind and to the north of Ypres, Roth discovered and blew-up three balloons. Flying south-westerly, he was pounced upon by a lone Spad. In a brief but furious fight, Roth managed to rattle the Allied pilot so severely that he dove for home. Moments later, three Camels jumped him. Using every trick he knew, he was able to disengage and lose his attackers. On his way home, he came across several more balloons. Before he left the area, two more balloons had gone up in flames. That made five for the day. Not bad.

Roth scored 28 victories during the war.

Courtesy National Air and Space Museum, Smithsonian Institution

A clash of eras—a cavalry patrol encounters a downed camel.

UDET DEFENDS A DRACHEN



Courtesy National Air and Space Museum, Smithsonian Institution

Udet in his fighter.

Date: August 22, 1918
Location: Near Arras

Battle Synopsis:

Ernst Udet received a frantic call for help from a nearby German balloon unit. Several Allied planes were in the area, and the Drachen observation balloons needed protection. Taking to the air, Udet and his men arrived on the scene just in time to witness five S.E.5s close in on the balloons. Staying between the British scouts and the gas-bags, the Germans hoped to discourage their opponents from pressing their attack on the Drachens. Initially, the ploy worked. However, in a sudden move the British flight leader detached himself from his formation and plunged down on the balloons. Udet hurtled after the daring British pilot to save the balloons, but before he could reach the S.E.5 one of the last two balloons burst into flames.

Meanwhile, the other S.E.5s had engaged Udet's men and a wild dogfight developed. Udet, hard on the heels of the British flight leader, dove down to the deck and closed the range. The S.E.5 dodged around trees and hedges in an effort to escape the German ace. Finally, the British pilot made a mistake and was forced to climb to avoid a grove of trees. Udet saw his chance, and fired a burst which struck the S.E.5 squarely. It exploded into flames and plunged to the ground. Udet glanced behind him as he flew over the downed Englishman and, to his dismay, discovered three S.E.5s above him. He couldn't climb and he couldn't turn for home, so he chose to hedge-hop straight ahead.

The tables had turned, and the chase took Udet deep into Allied territory. One of the S.E.5s closed to about 30 yards but did not open fire. It was obvious the pursuer was waiting for a clear shot. The other two S.E.5s spaced themselves a few hundred yards off each side of Udet's plane. He was trapped and began to think that this might be his end. Then Udet discovered his phosphorus ammunition had ignited itself. In a matter of seconds, his plane could burst into flames. He immediately depressed the trigger in an effort to clear the ammo trays. White smoke poured out of the barrels as his tracers pierced the empty sky. To Udet's amazement, his adversaries broke for home, thinking that he had fired backward at them. The odd white smoke of the smoldering phosphorous rounds must have confused them. Udet returned to his aerodrome so shaken that his ground crew had to haul him out of the cockpit.

Medals and Awards

BACKGROUND ON MEDALS

Charles Nungesser displays his chestfull of medals.

Courtesy National Air and Space Museum, Smithsonian Institution

Both the Central Powers and the Allies had their own awards structures that came into play during World War I and which were given for gallantry and military merit to natives and others deemed deserving. Among higher ranking officers and royalty there was much exchange of awards as a customary military nicety. But the fighting man, both officer and man alike, was also recognized not only by his own country but if his bravery was sufficient, by the other nations allied with it in war.

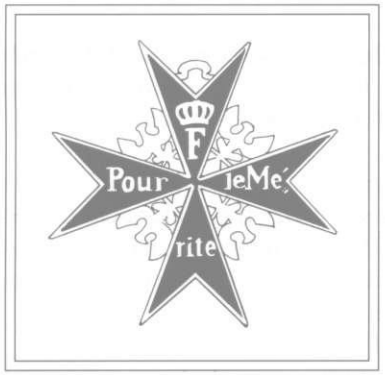
While many nations had highly developed and complex awards structures, especially in countries with long dynastic histories like the Romanovs in Russia and the Hohenzollerns in Prussia, none was quite as extensive as that which existed in Imperial Germany during World War I. The reason was that even though Prussia was the lead entity in the empire and its king was the emperor (Kaiser), the other states still retained certain military privileges. These included their own individual awards. Since Germany was still a collection of four kingdoms, many grand duchies, duchies, principalities, the three free cities of the old Hanseatic League and the Imperial Domain of Alsace-Lorraine (only the latter did not make awards), a fighter pilot of the prominence of Manfred von Richthofen could amass a truly staggering array of such awards.

One point regarding Imperial German awards needs to be made. There were no "German," or empire, awards for bravery and military merit in World War I. Each came from an individual state. Thus it is not correct to call the famous Orden Pour le Merite, the so-called "Blue Max," *Germany's* highest recognition for officers on the battlefield. It was *Prussia's*. However, because of its pre-eminent position within the empire, Prussia was called upon to make its awards throughout all contingents, not just its own. So, in effect, they became empire awards while still retaining their specific identity and origin.

AWARDS

GERMAN AWARDS

Order for Merit (also known as "The Blue Max")
Prussian name: Orden Pour le Merite



Founded in 1740 by Friedrich the Great of Prussia, he used French terminology for the words "for Merit" rather than the German because he was a great admirer of French court customs and insisted that language be used in his court. It was Prussia's highest recognition to officers for courage on the battlefield and for superior military performance in time of war. Thus it was rewarded in large numbers to senior military leaders and royalty as well as to officers for bravery in actual conflict with the enemy. In that respect it differed from the Victoria Cross and the U.S. Medal of Honor.

Courtesy National Air and Space Museum, Smithsonian Institution

The Red Baron wearing his Blue Max and Iron Cross 1st Class.

The order came in one class, that of knight, and was worn from the neck on a cravat. There was also a separate and higher award of the order, the Orden Pour le Merite mit Eichenlaub (the Order for Merit with Oakleaf). The oakleaf did not indicate a second award of the same order as a bar or an oak leaf cluster would in the case of a British or U.S. award respectively.

No combat flier received the order with Oakleaf during the war although von Richthofen was proposed for it (see the Red Eagle Order description).

There were 81 awards of the Orden Pour le Merite within the various air services in world War I. The Prussian awards system valued the consistent performer more so than a man who might perform a single act, however brave. It usually took repeated acts of bravery or continued good work over time to earn a high award like the Pour le Merite. For the combat airmen then, this got translated into the number of victories for a fighter pilot or in the case of the men in the multi-place aircraft, many successful missions across enemy lines.

The first aviation awards of the Pour le Merite went to Oswald Boelcke and Max Immelmann on January 12, 1916, the day each scored his eighth confirmed victory. For the rest of that year, it took eight victories for the other fighter pilots who had been flying for some time before they received their awards. For the newer fighter pilots, a higher requirement was adopted in November 1916. The first to feel its effect was Manfred von Richthofen who was made to wait until he had 16 victories before his award was approved on January 12, 1917. Thereafter, it usually took at least 20 victories before the award would be approved but there were a few exceptions (Goering was one of them). In the last months of the war with scoring at a rapid rate among the leading German aces and paperwork breaking down, the award sometimes did not reach a man until he had considerably more than 20 victories. The last two aviation recipients of the order, for example, had 30 victories when the award caught up with them.

Royal Hohenzollern House Order with Swords
German name: Ritterkreuz des Koeniglichen Hausorden von Hohenzollern mit Schwerten

Founded on December 5, 1841 by King Friedrich Wilhelm IV of Prussia, it was the major award used by Prussia in World War I to recognize bravery and distinguished military service by officers after they had received the Iron Cross, 1st Class. It thus became the customary intermediate award between an Iron Cross, 1st Class and the Orden Pour le Merite. It is important to note that unlike Great Britain and the U.S., Imperial Germany did not engage in making multiple awards of the

same order or decoration. To recognize a man for repeated acts of courage or superior performance it was necessary to go to a higher and separate award.

The order came in three classes with the lowest, that of Knight, being the one going to the young combat officers. Since the order could also be given in peacetime for service to the House of Hohenzollern, when awarded in wartime, a pair of crossed swords were placed between the arms of the cross on the insignia. It was then said that the order had been given "with Swords."

The first airmen to receive the Knight's Cross with Swords of the order were, again, Boelcke and Immelmann. They received it in November 1915 after their sixth confirmed victories. Throughout 1916 it usually took fighter pilots six victories before they, too, received the award. In 1917 and thereafter it usually took at least 10 victories before a man would be favorably considered. In total, 8,291 Knight's Crosses with Swords were awarded for service in World War I.

The Red Eagle Order
German name: Roter Adler-Orden mit Schwerten

Prior to World War I, this order, founded in 1705, was used to reward junior officers for bravery in action and for meritorious service. Its usage in these ways was dropped in World War I and the Royal Hohenzollern House Order was employed instead.

However, one combat airman received the order. He was Manfred von Richthofen who received the Red Eagle Order, 3rd Class with Crown and Swords on April 6, 1918 in recognition of his 70th victory and his nearly three years of service in the air. It was thus a unique award within the Imperial German Air Service in World War I.

Actually, von Richthofen had been proposed for the award of the Pour le Merite with Oakleaf instead. This was turned down on the basis of the archaic criteria for that award among which was that a recipient had to have forced the enemy to withdraw from a battlefield, i.e., to have won a battle. When General Ludendorff heard that von Richthofen had been denied the award because of this narrow interpretation, he is alleged to have snorted, "Richthofen has won many battles!"

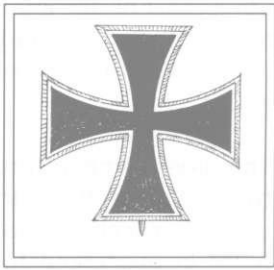
Iron Cross 1st Class, Iron Cross 2nd Class

German Name: Eisernes Kreuz I. Klasse and Eisernes Kreus II. Klasse

The Iron Cross was established on March 10, 1813 by King Friedrich Wilhelm III of Prussia as the main award to be used in the war then being fought against the French under Napoleon. There were three classes, Grand Cross, 1st Class and 2nd Class. Originally, it was a very prestigious award and temporarily replaced many other Prussian bravery awards that might otherwise have been used.

After the Napoleonic Wars the Iron Cross was discontinued but renewed again on July 19, 1870 by King Wilhelm I of Prussia for the war that had again broken out with France. After the war, it again lapsed and was not renewed until August 5, 1914 when Emperor (Kaiser) Wilhelm II did so for World War I.

In the first years of the war, the award still retained much of its original prestige but large numbers awarded in the later years of the war, particularly in the 2nd Class, caused it to lose much of its meaning. It is estimated that for service in World War I, about 218,000 1st Class awards and over 5 million 2nd Class awards were made. No figures for aviation awards are known to exist although it can be said that any successful airman would undoubtedly have possessed both the 1st and the 2nd Class by the time the war ended.



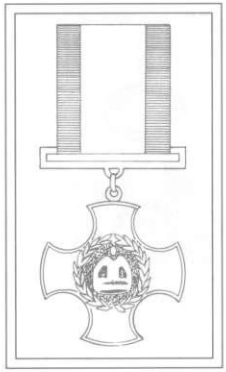
BRITISH AWARDS

The Victoria Cross

Instituted by Queen Victoria in 1856, it takes precedence over every other honor in the British Empire including such illustrious orders of knighthood and chivalry such as the Order of the Garter, Order of the Thistle, Order of St. Patrick, Etc. It was meant to recognize some signal act of valor or devotion to the country that was performed in the presence of the enemy.

The Distinguished Service Order

Established in 1886 to recognize distinguished or meritorious service in war, it was awarded to officers only. It generally went to more senior officers for superior work. It was also awarded as a recognition for valor or merit of a superior kind which did not warrant the award of the Victoria Cross.

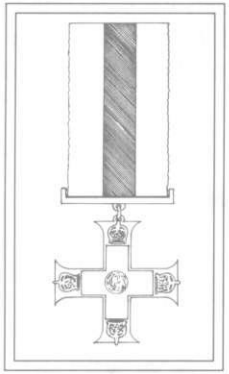


As with other British awards, bars were awarded to represent subsequent awards of the same decoration. Albert Ball is believed to be the first officer to receive the D.S.O. with 2 Bars.

The Distinguished Flying Cross

When the Royal Flying Corps and the Royal Naval Air Service were combined to create the Royal Air Force with an effective date of April 1, 1918, it had been decided to found a new range of awards for the service which were meant to replace the Army and Navy awards previously bestowed.

The Distinguished Flying Cross was meant to reward officers and Warrant Officers of the R.A.F. for an act or acts of valor, courage or devotion to duty performed while flying in active operations against the enemy. It was meant to replace the M.C. There were 889 awards of the D.F.C. to pilots in the R.A.F..



The Military Cross

This decoration was established on December 31, 1914 as an Army award to commissioned officers from the rank of Captain and below and to Warrant Officers. It was meant to recognize distinguished and meritorious service in time of war by men of these ranks. There were 1,077 awards of the M.C. for service by men in the R.F.C. / R.A.F.

FRENCH AWARDS

Legion of Honor

Founded by Napoleon Bonaparte on May 19, 1802, it was France's highest honor. It came in five grades. The two lowest, the Officer's Cross and Knight's Cross, could go to the younger combat officers and the Knight's Cross could also go exceptionally to non-commissioned officers and men.

It was awarded to French citizens and foreigners for outstanding services of a civil or military nature. There was, however, no distinction on the insignia to differentiate between an award won, for example, on the battlefield versus one that might have been given for a distinguished career in civil life.

Croix de Guerre

This decoration was established on April 8, 1915 as a means to mark individuals who had been mentioned in dispatches. It could go to both officer and man alike.

For a mention in an Army Dispatch (or the corresponding unit in the navy), a bronze laurel wreath, called a palm, was affixed to the ribbon of the cross. An Army Corps dispatch mention rated a gilt star. A Divisional dispatch mention was marked by a silver star and a Brigade, Regimental or Unit mention in a dispatch by a bronze star.

Game Play

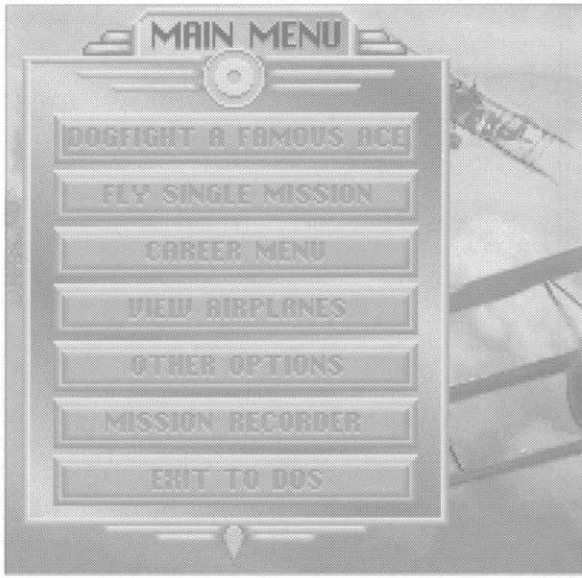
INTRODUCTION

Red Baron is a historically accurate and detailed recreation of flight during the era that launched aerial combat, World War I. The controls available to the great Aces were few and primitive. However, as a computerized simulation Red Baron is capable of offering you controls unlike anything the Aces would have ever dreamed. This portion of the Red Baron manual outlines and describes these controls. It does not describe the elements of flight such as take-off and landing, maneuvers, or tactics. These elements are discussed in detail in previous chapters. Please refer to the table of contents for specific page references.

For installation instructions, see the Smart Start™ section on the Quick Reference card.

Following are the sections described in this chapter:

-Flight Controls
-View Commands
-Machine Gun Controls
-Time Compression
-Game Play Preferences
-Realism Panel
-Weather
-Your Flight Group
-Simulation Overview
-Fly Single Mission
-Fly Single Mission Conditions
-The Mission Assignment Screen
-The Flight Assignments Screen
-Navigation
-Ending the Mission
-Career Play
-Career Menu
-Aerodrome Menu
-Career Sequences
-The Mission Recorder



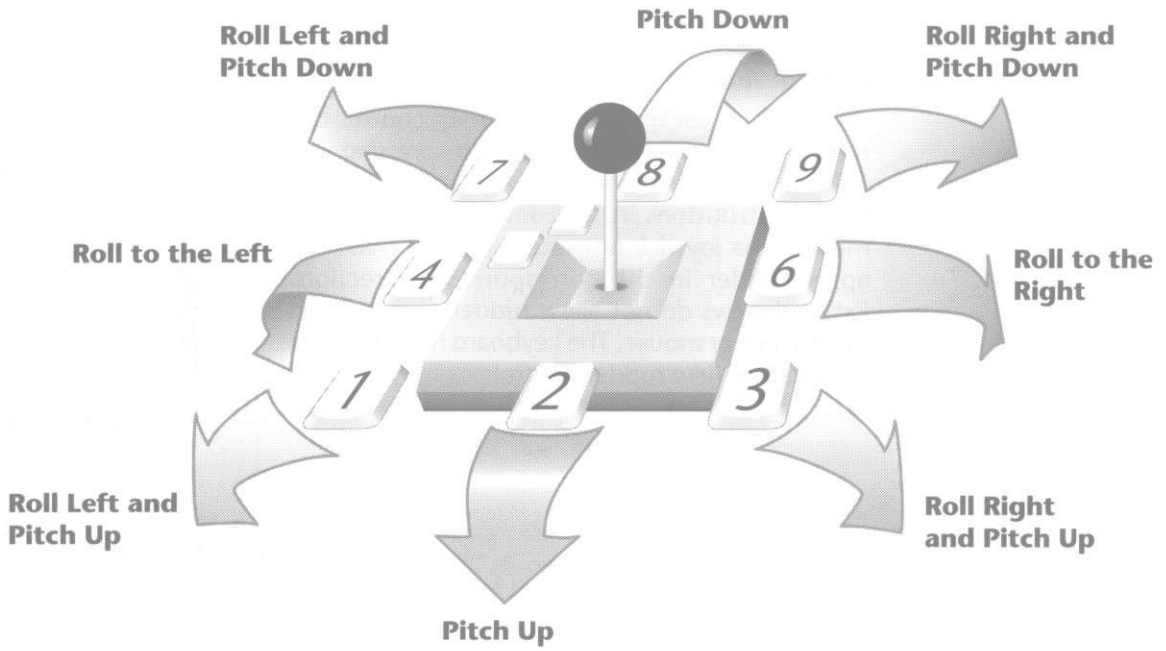
FLIGHT CONTROLS

Movement

You use the control surfaces and the throttle to maneuver your aircraft (for more detail see the Flight Section). These include the ailerons, the elevators, the rudder, and the throttle.

From the Preferences Panel (activated from the simulation by pressing **F10**), you may select which peripherals you have attached. You may select: keyboard, joystick and mouse control.

The mouse controls are identical to those of the joystick. For movement controls, the mouse is self-centering. This means that it will automatically recenter itself after each movement command.



FLIGHT CONTROLS

Rudder

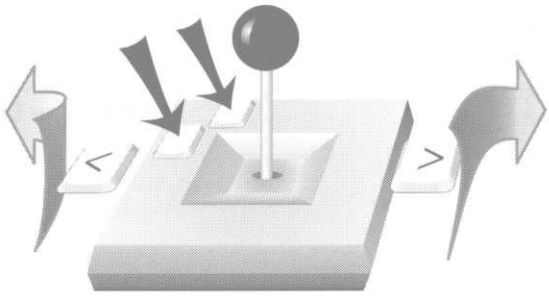
The rudders can be controlled from the keyboard at any time. They can also be controlled from the joystick or mouse *while in the cockpit view*.

Keyboard Rudder Controls

<	left rudder
>	right rudder

Joystick Rudder Controls

While in the cockpit view, you may control the rudder with the joystick or mouse by *pressing* and *holding* both buttons on the joystick or mouse. When both buttons are held down simultaneously, moving the joystick or mouse left and right will apply rudder in the corresponding direction. External views do not allow rudder control from the joystick or mouse. The keyboard must be used for external view rudder control.



Hold both buttons & move joystick or mouse left or right to control rudder.

Throttle

The throttle can be controlled by mouse, joystick or keyboard.

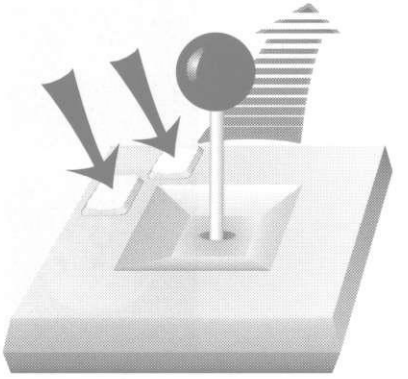
Keyboard Throttle Controls

1..9	controls throttle. **1** = idle **9** = full throttle
+	increase throttle
-	decrease throttle

Joystick Throttle Controls

Within the cockpit you may control the throttle with the joystick by holding and pressing both buttons on the joystick. When both buttons are held down simultaneously, moving the joystick forward will increase throttle, and moving it backward will decrease it. This will not work if your view is outside the aircraft. The keyboard must be used for throttle control while in external views.

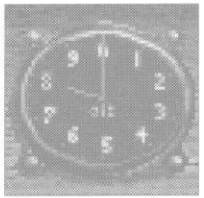
NOTE: Airplanes with rotary engines had no throttle control. The power was always at full. The pilot could cut throttle with a blip-button, essentially cutting all power and giving the pilot an on/off speed control. If you wish to simulate this experience, use only the **1** and **9** keys to control throttle.



Hold both buttons & move joystick or mouse forward & backward to control throttle.

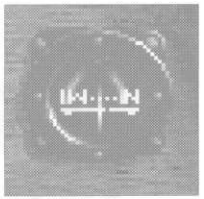
FLIGHT CONTROLS

Instruments

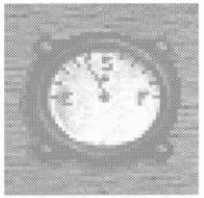


Altimeter
Indicates the altitude in feet. The large needle indicates 100s of feet, and the small needle indicates 1,000s of feet. It is set to 0 at ground level.

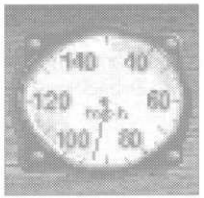
From the Realism Panel, if you turn on Realistic Instruments the only instruments you will see will be the ones that existed on the original WWI aircraft.



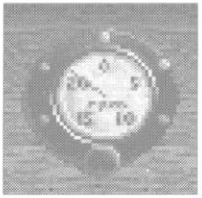
Compass
Indicates your current heading. The readings are N for North, S for South, E for East, and W for West. Also included are NW, NE, SW, and SE.



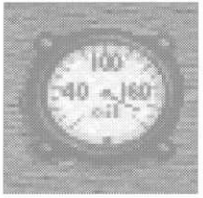
Fuel gauge
Indicates how much fuel you have left.



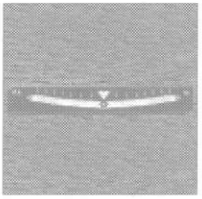
Air Speed Indicator
Indicates your current air speed in miles per hour (m.p.h.).



Tachometer
Indicates how many revolutions per minute the engine is making. The needle indicates r.p.ms x 100. Generally, this corresponds to your current throttle setting.



Oil pressure gauge
Indicates your current oil pressure. If your airplane is damaged and has an oil leak, the needle will drop.



Inclinometer
Indicates the current bank of your aircraft. The instrument is simply a ball bearing inside a curved groove. If the ball is to the left of center, it means you have banked left. It's a crude ancestor of the artificial horizon equipped in aircraft today.

VIEW COMMANDS

While patrolling the front, you'll find it necessary to look around often to avoid being surprised. The best pilots of WWI were always looking around for enemy fighters.

Controlling View Commands with the Keyboard

Switching betweeen cockpit and external view
Press the **Return** key.

From within your aircraft (cockpit views)

F1 Look forward (your instrument panel will be visible)
F2 Look back
F3 Look left
F4 Look right
F5 Look up
F6 Look down (lean out and look straight down)

From outside your aircraft (external views)

F1 View the Front of your aircraft
F2 View the Rear of your aircraft
F3 View the Left Side of your aircraft
F4 View the Right Side of your aircraft
F5 View the Bottom of your aircraft (Look up at your plane from a lower altitude).
F6 View the Top of your aircraft (Looks directly down at your plane from a higher altitude).

F7 View from a Chase Plane (the view follows your aircraft in a chase plane). **F7** works from within the cockpit and outside your aircraft.

Controlling View Commands with the Joystick

You may control the current view without touching the keyboard.

From within the Cockpit

Holding down **button #2** and moving the joystick forward will switch to Look Forward (**F1**), to the left will switch to Look Left (**F3**), etc. Pressing and releasing **button #2** with the joystick centered will switch from the cockpit to the outside rear view.

From outside the Aircraft

Holding down **button #2** while moving the joystick will pan the view smoothly around the aircraft: moving the joystick to the left will pan the view clockwise around your aircraft, moving the joystick forward will pan the view up around the aircraft, etc. Holding down both buttons while moving the joystick forward/backwards will move the camera closer to/away from the aircraft. Pressing and releasing **button #2** with no joystick movement will switch to the front cockpit view.

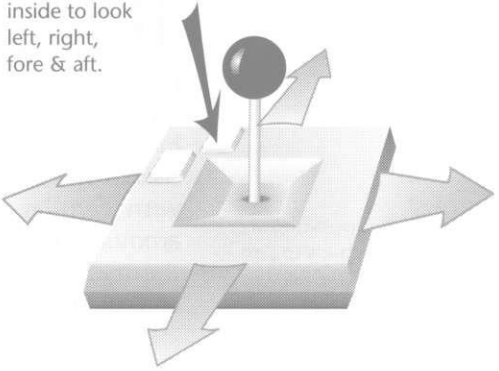
These commands may be duplicated without a joystick. The keypad will function like the joystick, the **Space Bar** will function like **button #1**, and the **Enter** key will function like **button #2**.

From any outside view, press **Ctrl-F1.. F10** to save off the current view. To switch to any of these saved views, use **Alt-F1.. F10.**

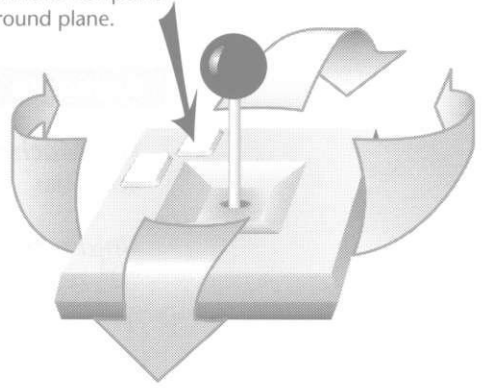
Mouse controls for view commands are identical to those of the joystick.

Joystick		*Mouse*
Button #1	=	Left Button
Button #2	=	Right Button

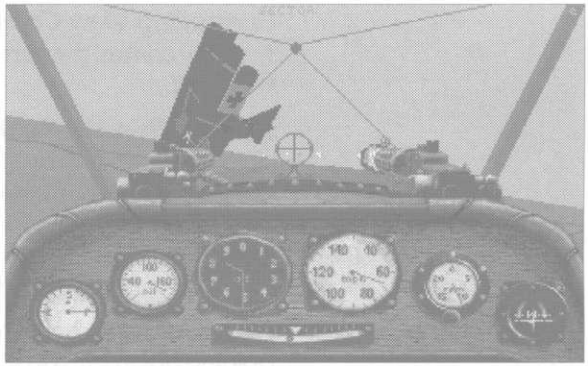
Press & hold button #2 while inside to look left, right, fore & aft.



Press & hold button #2 while outside to move viewpoint around plane.



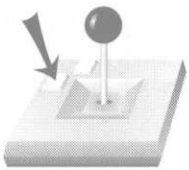
MACHINE GUN CONTROLS



You are armed with one or two forward-firing machine guns (depending upon the plane). That's all the WWI combat pilots needed. Before going up on the mission, you may select what type of ammo to use: *incendiary* or *regular*. Incendiary ammo is used to attack Zeppelins and balloons. It is extremely difficult to ignite a dirigible with regular ammunition. However, regular ammunition is more accurate and less likely to jam the machine guns. Regular ammunition is also better against enemy airplanes than incendiary.

NOTE: it is possible for your machine guns to jam permanently. You will receive an on-screen message indicating this if your attempts at unjamming are unsuccessful.

Occasionally, your machine guns will jam. Firing a long burst from your machine gun has a greater chance of jamming your guns than a short burst. This is why the good pilots would fire short bursts in their attacks. If your guns are jammed, you may try to unjam them by **repeatedly** pressing the **U** key. This won't always work, but keep trying.

Keyboard	Joystick	Mouse
Fire Machine Gun: Spacebar *Unjam Machine Gun:* "U" key	 Button #1 = fire machine gun	 Left Button = fire machine

TIME COMPRESSION

There may be periods of simulation play where there's not a lot of action going on. Often this is after taking off as you make your way to the front or after the mission is complete and you are making your way back to your aerodrome.

As a convenience, Red Baron contains a time compression mode which will speed up the simulation to many times it's normal speed. Time compression is activated by pressing the **C** key.

■ To Activate/Deactivate Time Compression, press the **C** key.

Time compression will be automatically deactivated when you press the **C** key again, when you fire your machine guns, when you come near enemy aircraft, balloons, Zeppelins, or AA guns, and when you fly near the ground.

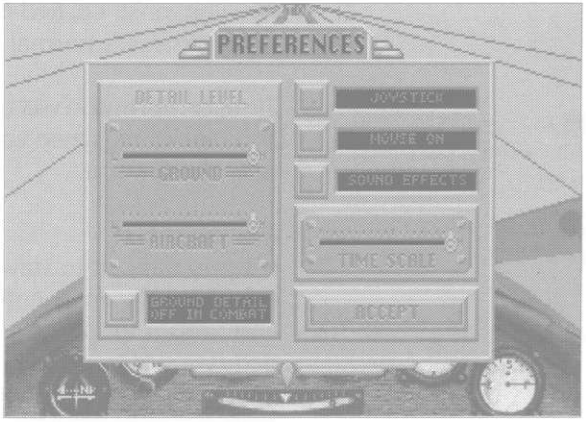
IMPORTANT!
It's very difficult to stay in formation when time compression is active. Because of this, Red Baron will automatically enter Auto-Formation when time compression is activated. This will control your aircraft and keep it locked into formation until time compression is deactivated. **Auto-Formation will NOT activate when you are the flight leader unless you are escorting another flight.**

STARTING LOCATION

On some missions a menu will appear, giving you a choice of where you start your flight. You may chose **Start Near the Action** or **Start at Your Aerodrome**. For most missions, it is recommended that you start near the action. The missions will be shorter and more exciting. However, if you want to try your hand at navigating as the WWI pilots did, begin the mission near your aerodrome.

PREFERENCES

There are two main panels that allow you to control game play preferences, the PREFERENCES panel and the REALISM panel. The displayed PREFERENCES panel is available *only* from within the simulation. OPTIONS from the Main Menu will bring up an abbreviated version which does not contain detail level controls.



PREFERENCES PANEL

Press **F10** from the simulation to activate.
Press ACCEPT or the **ESC** key to exit.

With the Preferences panel you may tailor some of the technical aspects of Red Baron to your own tastes and computer configuration. You may customize the following game controls:

Joystick ON/OFF
Sound ON/OFF
Mouse ON/OFF
Time Scale Adjustment LOW-HIGH
Ground Detail Level Adjustment LOW-HIGH
Aircraft Detail Level Adjustment LOW-HIGH
Combat Button REGULAR/OFF

NOTE: Settings and adjustments made to either the PREFERENCES or REALISM panels are automatically saved to disk. The new settings remain even if you quit and restart Red Baron later.

PREFERENCES:
F10 Key from simulation. Allows the customizing of elements such as active controls, sounds, music, detail levels and game speed.

Detail Levels

The smoothness of simulation play is dependent upon two things: the speed of your computer and the amount of graphic detail displayed. The first of the two, the speed of your computer, cannot be changed. However, with the graphic detail controls, you can reduce the amount of graphic detail displayed. The detail sliders give you control over the amount of graphic detail that your computer is required to display. You may trade off detail for smoother animation according to your tastes. When you first install Red Baron, it will set the detail slider's positions based upon the speed of your computer.

Detail Levels (cont.)
There are three controls that allow you to select the amount of graphic detail in the simulation. Depending on the speed of your computer, you may want to increase or decrease the amount of graphic detail to control the smoothness of the simulation play.

Aircraft Detail controls how detailed the aircraft displayed will be.

Ground Detail controls how many terrain features (trees, mountains, etc.) are displayed at once.

Combat Button controls the amount of ground detail displayed during combat sequences. When set to *normal ground detail,* the ground detail will remain the same when you enter aerial combat. When set to *no ground detail,* the ground detail will be cut back during combat. This will increase the smoothness of animation during combat.

Time Scale

Time Scale slider settings
LOW = Slower& easier to control.

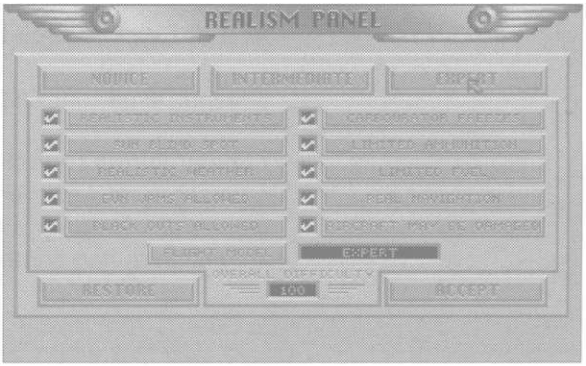
HIGH = Faster& more difficult to control. Best for slower computers.

Time Scale control is provided to help in customizing the pace of simulation play to best fit your tastes. If battles are moving too fast for you, move the Time Scale slider towards LOW. This will slow the action down. If you're playing on a machine that runs slow *even with the Detail Levels turned down,* try moving the Time Scale slider towards HIGH. This will speed up the action.

REALISM PANEL

*Press **Alt-R** to access*
*Press **ACCEPT** or the **ESC** key to exit*
*Press **RESTORE** to cancel*

REALISM
Alt-R from simulation. Allows the customizing of elements that control gameplay such as difficulty levels, flight model, instrumentation display and pilot/world realism.



You may change any of the realism settings from either the Mission Assignment screen or from within the simulation itself. The settings allow you to customize certain features of the game to your own tastes. In most cases, each setting gives you a choice between ease of use, and realism.

There are 11 settings you may switch from *realistic* to *nonrealistic*. When a setting is set to *realistic*, a red check mark appears beside it. Pressing the button for the setting will switch it between its available states (in the case of the Flight Model, there are 3 possible settings). For convenience, we've included three buttons at the top of the **REALISM** panel to allow you to change all the settings at once. Each has default settings for different skill levels including **Novice**, **Intermediate**, and **Expert**. Following are descriptions of the REALISM settings available.

Realistic Instruments. When **turned on**, the only instruments seen from the cockpit will be the ones that existed on the original WWI aircraft. When **turned off**, all possible instruments will be displayed.

Sun Blind Spot. When **turned on**, the Sun Blind Spot will cause a glare whenever your view is placed directly at the sun. Enemy aircraft which are in the sun will not be visible until they are very close.

Realistic Weather. If **turned on**, the weather conditions will vary from mission to mission. If **turned off**, the weather will always be perfect: the sky will be clear with no clouds, and there will be a light wind.

Gun Jams Allowed. The machine guns of WWI were very unreliable and would jam frequently. The longer the gun was fired, the greater the chance it would jam. Pilots would often carry a hammer or mallet with which to hit their machine guns in case of jamming. When **Gun Jams Allowed** is **turned on**, your guns will periodically jam when fired too frequently. When **Gun Jams Allowed** is **turned off**, your machine guns will operate perfectly, never jamming.

Blackouts Allowed. The pilots of WWI didn't have oxygen masks, and consequently a pilot who flew above 20,000 feet for too long would get dizzy and occasionally even blackout from lack of oxygen. Hopefully, when the pilot's aircraft went into a dive, the pilot would wake up before hitting the ground. When **Blackouts** is **turned on**, blackouts are possible. When **turned off**, blackouts will never occur.

Carburetor Freezes. At high altitudes, it gets very cold. The carburetors would often freeze, especially during winter months. This would cause a complete loss of power until the carburetor would thaw out, which could only come about if the aircraft was brought to a much lower altitude. When **Carburetor Freezing** is **turned on**, your plane's carburetor will freeze at higher altitudes. When **turned off**, the carburetor will never freeze.

Limited Ammunition. The great pilots would fire their guns sparingly, closing to within 30 yards and firing a short, decisive burst. This takes skill, but it can be mastered. If **Limited Ammunition** is **turned on**, your ammo supply will be limited. If **turned off,** you can spray the sky with bullets for as long as you like, assuming your guns don't jam.

Limited Fuel. Most of the aircraft had enough fuel to fly for two and a half hours. When **Limited Fuel** is **turned on**, your air time will be limited to your plane's fuel capacity. When **Limited Fuel** is **turned off**, your fuel supply will be indefinite.

REALISM PANEL

Real Navigation. When **Real Navigation** is **turned on**, you will fly as the WWI pilots did... without sector coordinates displayed. You will have to navigate with the map, and by viewing natural landmarks on the ground below. When **turned off**, your sector coordinates will be displayed on the screen. This is useful when you are acquainting yourself with navigation.

Aircraft May Be Damaged. When **Aircraft May Be Damaged** is **turned on**, your aircraft will be susceptible to damage. When **turned off**, your aircraft will become invulnerable. We recommend the **off** setting for beginning Red Baron players only. Your score will be very low if this is turned off.

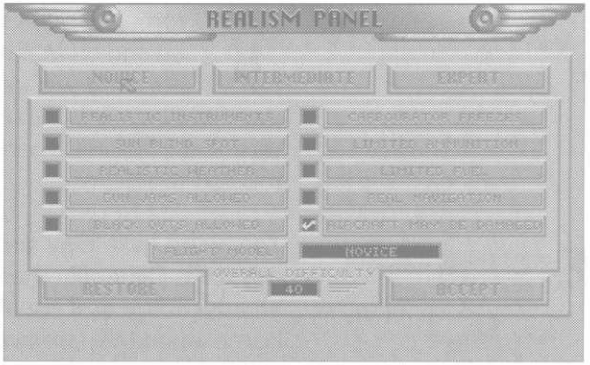
Flight Model. Flight Model allows you to select the level of realism your airplane can handle. The settings are: **Novice**, **Intermediate**, and **Expert**. Novice is the easiest to use, while expert is for experienced pilots.

Novice setting: flying is easy, turns are straight forward. If you bank the aircraft, it will turn. Your aircraft will not nose down in a turn.

Intermediate setting: turning is modelled more realistically. In order to turn properly, you will have to apply back pressure (pulling back on the stick) to keep the aircraft turning and keep the nose above the horizon. Some rudder may be needed as well. Unlike novice, if you bank the aircraft without using back pressure, your turn will quickly degenerate into a slow spiral dive. Landing is also more difficult.

Expert setting: this will test all of your flying abilities. Not only are turns modelled realistically, but the danger of going into a spin is present. The various quirks of certain aircraft are also included. For instance, the gyroscopic effect of the Sopwith Camel's rotary engine will make a simple turn a difficult, tricky maneuver. And, if too much stress is put upon your aircraft's wings during a high speed dive, your wings may break!

Score Factor:

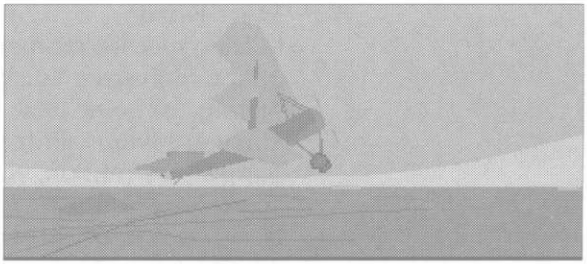


Mission success, promotions and your placement on the high score listing are all based upon your scoring, or point total, at the end of a mission. There are two main factors in determining your score after a mission; **your performance** and **the score factor**. Scoring for mission performance is based upon how well you achieved the goals of the mission, how valiant your moves were and whether you survived the mission intact. Your overall score for the mission is derived by multiplying your **mission score** by the **score factor**. The **score factor** is displayed at the bottom, center of the REALISM panel under the OVERALL DIFFICULTY heading. It reflects the difficulty of the current REALISM settings. Increasing the number of *realistic* settings on the REALISM panel will increase your **score factor**.

IMPORTANT! Once you enter the simulation, a 30 second 'grace' period begins. Any changes to the REALISM settings must be made before this period is up in order for the changes to be reflected in the **score factor**. Settings turned on after the first 30 seconds of simulation play will be displayed in lightened text to reflect that they were changed after the 'grace' period and have no bearing on the **score factor**.

WEATHER

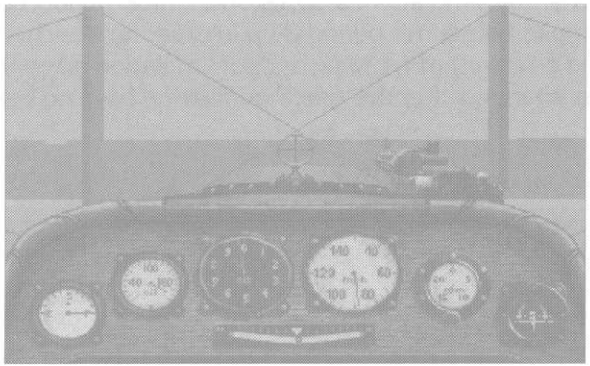
From the Realism panel you may turn on and off realistic weather. With it turned off, there will be no clouds in the sky and there will be a light wind blowing eastward. If you turn it on, the weather conditions will vary from mission to mission.



Top: heading for cloud cover.
Bottom: Losing visibility in the cloud bank.

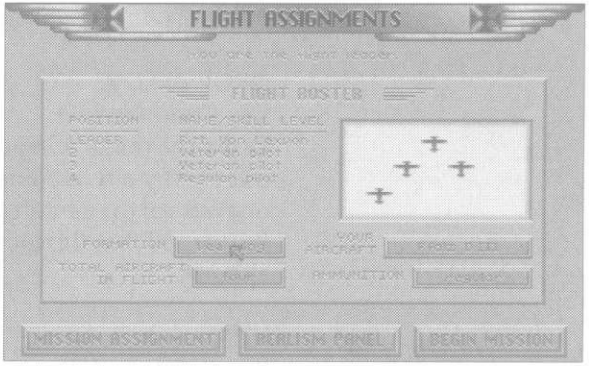
The wind will play an important part in your missions. Generally the wind gives German pilots an advantage as it usually blows toward the German side. This makes it difficult for Allied pilots to fly home when they are over German territory. The stronger the wind, the more advantage German pilots will have.

Clouds will add to the complexity of the combat tactics. Diving into a cloud is a good way to lose a pursuer. On the other hand, clouds may be hiding enemy aircraft waiting to strike. Clouds may also obstruct the sun, thus taking away the ability to dive out of the sun on an enemy.



YOUR FLIGHT GROUP

The group of 1 to 4 aircraft that you fly with is called a *flight*. Your *flight* will travel together and protect one other.



Formations

When a *flight* goes on a mission, it will fly in formation. If you are the *flight* leader, the rest of your *flight* will fall into formation. The types of formations that you may fly include: solo, line abreast, line astern, vee, box, echelon and diamond.

If you are not the *flight* leader, fly with the rest of the formation. Do not stray from the rest of your *flight*.

Flight Leader Commands

Once airborne, WWI pilots would communicate with arm gestures. As a member of a formation, you will be given orders by your *flight* leader during the mission. These will be indicated as a text message that appears on your screen.

If you are the *flight* leader, you will have the opportunity to give orders to the members of your *flight*. However, keep in mind that once you enter combat your commands will go unnoticed — the rest of the *flight* will be busy keeping their eyes on the enemy. If there are three or more aircraft in your *flight*, some aircraft will make up the 'minor wing'. The *flight* leader may give orders to the minor wing separately from the rest of the *flight*. With three aircraft, the third aircraft in the formation makes up the minor wing. With four aircraft, the third and fourth aircraft make up the minor wing.

YOUR FLIGHT GROUP

Flight Leader Commands

DROP BELOW
Key Command: **D**
Order the minor wing to drop about 500 feet below the rest of the flight. This tactic can be used to flush out enemy aircraft. Enemy aircraft will often attack the seemingly helpless aircraft of the minor wing, unaware of the aircraft above them. When they do so, the aircraft above may swoop down on the enemy. Be warned that this tactic leaves the minor wing exposed. This order will be ignored if the flight is at low altitude.

JOIN
Key Command: **J**
Order the minor wing to rejoin the rest of the flight. If the flight descends to a low altitude, then the minor wing will automatically rejoin the rest of the flight.

ATTACK!
Key Command: **A**
Order the entire flight to attack the enemy.

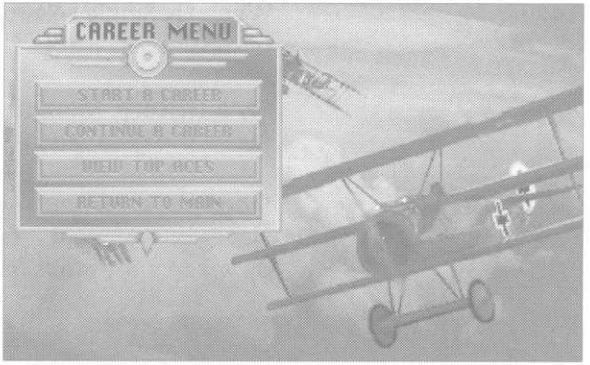
MINOR WING ATTACK!
Key Command: **M**
Order the aircraft in the minor wing to attack the enemy.

WARNING!
Key Command: **W**
Alert the rest of the flight that enemy aircraft have been spotted. If you issue this warning when there are no enemy aircraft around, then the rest of the flight will ignore your warnings for the rest of the mission. You may issue a Warning even when you are not the flight leader.

SIMULATION OVERVIEW

Red Baron has two play options, Fly Single Mission and Career. Single Mission offers you the choice of ten randomly generated mission types and allows you to custom tailor your squadron and the conditions of simulation play. Career allows you to enlist as an officer of either the German Air Service or the Royal Flying Corps. You will fly multiple missions, progressing through the war until you are either killed, grounded or the war ends. In Career play, you are given much less control over the mission conditions. You must earn the right to command, transfer and change plane types.

Missions in both Fly Single Mission and Career can be recorded and saved to disk. These saved missions, or tapes, can then be replayed with the Mission Recorder. You can record, save, playback and manipulate any of your missions. You can even *re-enter* a saved mission, completely altering the mission's outcome. Altered missions can then be saved to disk for later viewing or manipulation.



On the following pages, you will find in depth descriptions of Single Mission, Career and Mission Record.

FLY SINGLE MISSION

The first of the two options of simulation play is Fly Single Mission. Single mission play allows you to tailor many elements of your mission: the type of mission you'll go on, on who's side you'll fly, the conditions you'll encounter, who you fly with (and against) and the type of planes used. Fly Single Mission is the quickest way to get into the simulation. You simply select the type of mission you want to fly, set the conditions and play! After your custom mission is completed, you'll receive an evaluation of your performance and a score based upon the REALISM settings, goals achieved and number of kills.

Mission Types

When Fly Single Mission is chosen from the Main Menu, a new menu will pop-up displaying the types of missions available.

Fly a Historic Mission

Relive the great aerial battles of the war.

Dogfight a Famous Ace

Have you got what it takes to go head-to-head with the mighty Red Baron himself? Find out as you go up against the war's greatest pilots.

Dogfight a Squadron
Engage an enemy flight of fighters and try to clear them out of the sky. Just remember that they're trying to do the same to your flight.

Patrol the Front
Patrol the front and engage any enemy recon or fighter airplanes you come across.

Escort a Bombing Raid
Your bombers are about to penetrate deep into enemy territory to bomb strategic targets like RR yards, factories, and supply dumps. It's your mission to see that they succeed.

Stop a Bombing Raid
Intercept enemy bombers who are trying to bomb your side.

Hunt a Zeppelin
Locate one of these high flying dirigibles and send it down in flames. It's best to use incendiary ammo.

Escort Reconnaissance
Protect a recon plane on its mission to take aerial photographs. Enemy fighters will be gunning for both the recon plane and you.

Balloon Defense
Protect your observation balloons from the enemy!

Balloon Busting
Take out the eyes of the enemy. These large gasbags of hydrogen burn easily. It's best to use incendiary ammo.

FLY SINGLE MISSION CONDITIONS

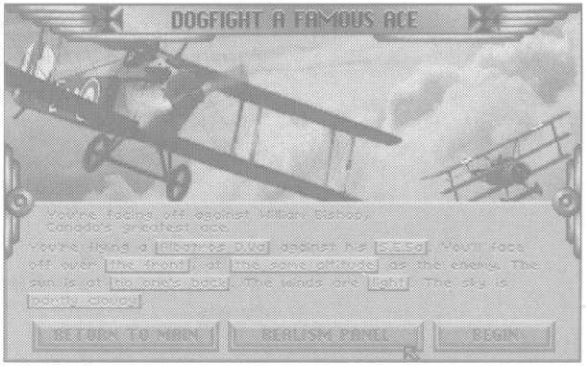
Once a mission type has been chosen, you will be able to tailor the conditions of the mission. The number and type of conditions available for change vary from mission to mission. Following is a breakdown of mission types and their available options.

Dogfight a Famous Ace is the quickest way to enter dogfighting. Because of this it is also available as an option from the Main Menu.

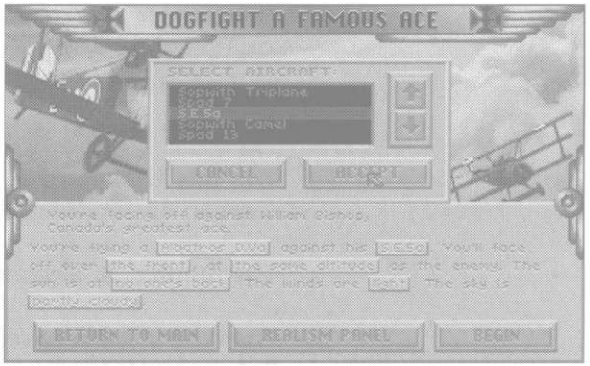
Dogfight A Famous Ace

After selecting DOGFIGHT A FAMOUS ACE, you will be asked to select the ace you wish to dogfight. Pressing the Up and Down arrows will scroll through the selection window. As each ace is highlighted, a description will be displayed showing the ace's name, alliance, total credited victories in the war and a description of their known tactics. Pressing the SELECT button will accept the currently highlighted ace.

Once an ace has been selected, the Mission Setup screen will be displayed. The Mission Setup screen will display the name of the mission type and a text area in which you may set up your mission. In the text area, changeable options are displayed as a button in the text. Clicking on one will bring up a menu with your possible options. Select the option you want. All buttons except those on the pop up menu will be inactive when a pop up menu is displayed.



The following options are available under Dogfight A Famous Ace. Press the ACCEPT button when you've set the conditions to the desired settings.



Your Aircraft Type: you may select any aircraft from either side of the war.

The Ace's Aircraft Type: the selected ace will default to his preferred aircraft, including any historical markings and insignias. You may choose any type for the selected ace. If you want, you can put the Red Baron into a Sopwith Camel and see how he handles it!

Where You Will Battle: you can chose from *over the front, over German territory,* and *over Allied territory.* It is an advantage to meet over your own territory as it's easier to land.

Altitude: it's an advantage to start higher than your opponent. This allows you to decide when combat begins. If you want more of a challenge, start at a lower altitude than your opponent.

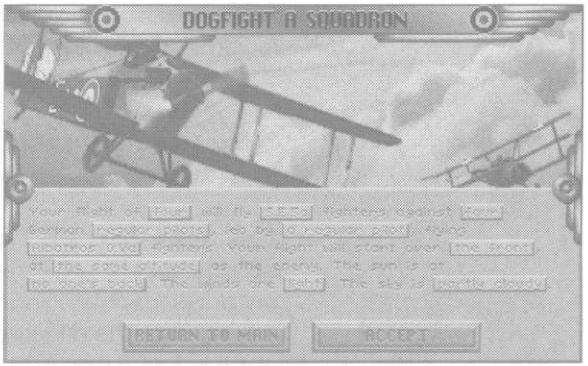
Sun: you may choose the positioning of the sun at the start of combat. Your choices are *at no one's back, at your back, at his back.* The pilot who starts with the sun at his back has an advantage, being able to "hide" in the sun's glare.

Wind And Sky: you may set the weather conditions.
Wind: *still, light, strong.*
Sky: *clear, partly cloudy, cloudy, overcast.*

FLY SINGLE MISSION CONDITIONS

DOGFIGHT A SQUADRON

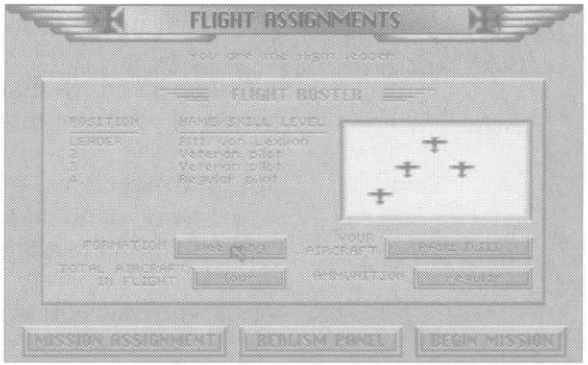
The Dogfight a Squadron mission is similar to DOGFIGHT A FAMOUS ACE, except you may also select:



The side that you will fight for: you may select German Air Service or Royal Flying Corps.

The number of aircraft in your flight group.

The type of ammo used: you may select between Regular and Incendiary. In a Dogfight it is assumed that Regular ammo will be used. This may be changed in the Flight Assignments screen.



The type of aircraft your flight group will use: you will only be able to select aircraft available to your selected alliance.

The formation your flight group will fly in: depending upon the number of aircraft in your flight group, you may choose between *line abreast, line astern, echelon, vee wing, diamond* and *box* formation.

The number of aircraft in your opponent's flight group.

The type of aircraft your enemy's flight group will use: you will only be able to select aircraft available to the enemy's alliance.

The quality of your pilots: Novice, Regular or Veteran (see below).

The quality of the enemy pilots: Novice, Regular or Veteran (see below).

The leader of the enemy pilots: This may be any of the famous aces or an anonymous pilot of any quality.

Pilot Quality:

Novice— Just out of flight training. They are the poorest pilots, prone to be paralyzed in combat. They often take impossible shots. A novice will never use a maneuver in combat. They are the guys with a one in ten chance of surviving their first dogfight.

Regular— Pilot with some combat experience. He doesn't make stupid mistakes in combat, but does nothing brilliant either. Will occasionally do some of the simpler maneuvers: Zoom climbs, Wing-Overs, and Barrel Rolls.

Veteran— A good pilot that flies and fights intelligently. He is skilled at many maneuvers and will pose a serious challenge to even the best of opponents.

FLY SINGLE MISSION CONDITIONS

FLY A HISTORIC MISSION

From Fly a Historic Mission, you can choose to fly a famous, historical air battle. All conditions of this single mission are preset to match the actual historic event.

Once selecting Fly Historic Mission, you will be asked to select the historic mission you wish to participate in. Pressing the Up and Down arrows will scroll through the selection window. As each Historical Mission is highlighted, text will be displayed describing the mission. In the upper right corner of the screen a picture of the famous ace featured in the mission will be shown.

Below the selection window are buttons marked *British* and *German*. These allow you to decide which side you wish to fly for in the mission. If you choose the side that the featured ace flew on, you will take his place in the mission. Choosing the other side will pit you against the featured ace. The text description of the mission will change to reflect your mission, depending upon which side you choose to fly on.

Pressing *Begin* will start the mission.

ALL OTHER MISSION TYPES

This section describes the conditions available for all missions other than Dogfight a Famous Ace and Dogfight a Squadron.

The side that you will fight for: you may select German Air Service or Royal Flying Corps.

The number of aircraft in your flight group: you may select up to four aircraft.

The type of aircraft your flight group will use: you will only be able to select aircraft available to your selected alliance.

The type of ammo used: you may select between Regular and Incendiary.

The formation your flight group will fly in: depending upon the number of aircraft in your flight group, you may choose between *line abreast, line astern, echelon, vee wing, diamond* and *box* formation.

Time: you may select between *daytime, dawn, dusk* and *night.*

Wind And Sky: you may set the weather conditions.
Wind: *still, light, strong.*
Sky: *clear, partly cloudy, cloudy, overcast.*

Pressing *Accept* will take you to the Mission Assignment screen.

THE MISSION ASSIGNMENT SCREEN

For all missions except Dogfight a Famous Ace, you will receive all data regarding your upcoming mission from the Mission Assignment Screen. From the Mission Assignment screen you will receive the following information:

The Date: The date that the current mission takes place on.

Map Reference: There are 5 off-line maps used for navigation in Red Baron. Each mission will require you to use a specific map. The name of the map needed for the current mission is listed below the date.

Situation: Supplies you with any information available on your current mission. This will include your orders and the specific goals that you are to achieve.

Mission Plan: The Mission Plan lists the recommended sequence to carry out your mission. This includes necessary map coordinates of your starting point, your flight path, and where to engage enemies.

If you are following a flight leader, he will follow the Mission Plan exactly as specified. However, if *you* are the flight leader, you may come up with your own mission plan.

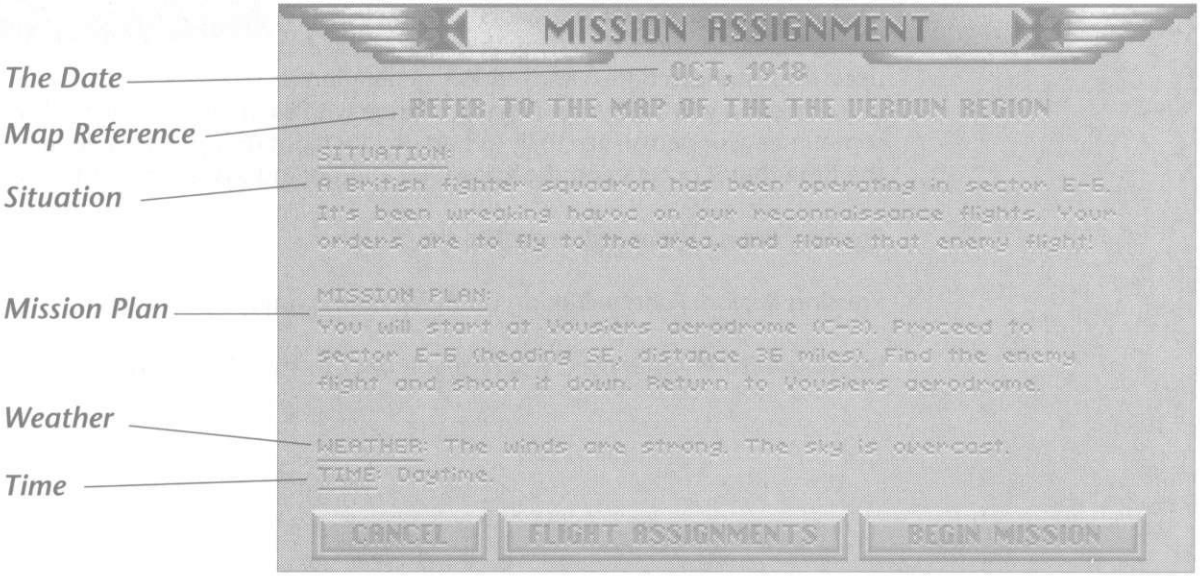
Weather: Gives you a description of the weather conditions in the area where your mission will be carried out. This includes descriptions of wind conditions and visibility.

Time: Describes the time of day when the mission begins.

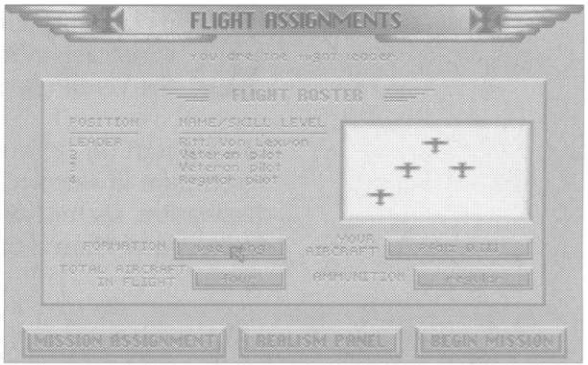
Buttons: FLIGHT ASSIGNMENTS goes to the FLIGHT ASSIGNMENTS screen. BEGIN MISSION will start your mission. CANCEL returns you to the Main Menu.

To carry out your mission, you'll first refer to the Mission Assignment screen. In the below example, it indicates where the enemy fighter squadron has been spotted, sector E-6. Refer to the map of the Verdun Region to locate this position.

You are starting at Vousiers aerodrome. Look at the map of the Verdun Region. You will find Vousiers aerodrome in sector C-3. According to the flight plan you will be flying 35 miles SE to reach your destination, sector E-6. Once there, you are to locate the enemy flight and dogfight it. After you've destroyed or chased off all the enemy fighters, you are to return to your aerodrome, Vousiers.



THE FLIGHT ASSIGNMENTS SCREEN



Available from within the Mission Assignment screen, the Flight Assignments screen gives you a complete breakdown of the settings for your flight group. You can change settings for *Formation*, *Total Aircraft in Flight*, *Your Aircraft* and *Ammunition*. Along with a graphical representation of your currently selected formation, you will receive a listing of the position for all pilots in your flight. This will indicate the flight leader (this will always be you in Fly Single Mission) as well as the skill levels of all other pilots. The pilots, and their skill levels, that are assigned to fly with you are based upon the historical context and random generation of the mission you are flying. This will change with each mission you fly. You may also find that you are sometimes assigned an ace to fly as part of your flight group. This is dependent upon the mission type, the time that it occurs and the known location of individual aces at the time.

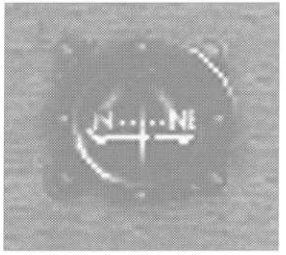
Pressing *Begin Mission* will enter the simulation.

Pressing *Realism Panel* will bring up the Realism panel.

Pressing *Mission Assignment* will take you back to the Mission Assignment screen.

NAVIGATION

Once you have your orders, you'll be required to navigate your way through the world. You will be required to find the enemy on many missions, and to find your way back to your own aerodrome. To navigate, you will use one of the 5 maps supplied with Red Baron. Use the compass to fly on your desired heading. To locate yourself on the map, watch the natural landmarks below.



On the REALISM panel you may turn Realistic Navigation off. When off, the current sector you are in will be displayed on the screen. This will make navigation much simpler because you will always know where you are.

Directional Abbreviations

N ..... north
NNE ..... north-northeast
NE ..... northeast

SE ..... southeast
SSE ..... south-southeast
S ..... south
SSW ..... south-southwest
SW ..... southwest

ENE ..... east-northeast
E ..... east
ESE ..... east-southeast

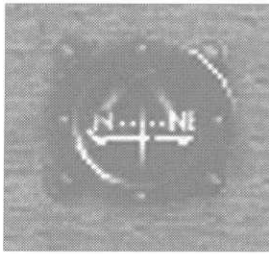
WSW ..... west-southwest
W ..... west
WNW ..... west-northwest
NW ..... northwest
NNW ..... north-northwest

How to Fly to a desired location

On some missions you will start in the air near the enemy. On these missions, you will not be required to navigate to find the enemy aircraft. They will be within visual range. On escort missions you will not need to navigate (unless the aircraft you are escorting are shot down, and you must find your way back to your home aerodrome). You will only need to follow the aircraft you're escorting.

However, on some missions you will start out on the ground at your aerodrome and will be required to fly to a specified sector to find the enemy. On these missions, the Mission Assignment screen will tell you on what heading you must fly to reach the sector. It will also tell you how far away your destination is. The standard direction abbreviations (as displayed on left) are used. The abbreviations N, NE, E, SE, S, SW, W, and NW correspond directly to the compass in your aircraft. Flying in these directions is easy. For example, to fly NE (northeast), line up your aircraft so that the compass reads NE.

The other abbreviations, NNE, ENE, ESE, SSE, SSW, WSW, WNW, and NNW do not appear on your compass. You may still fly in these directions. For example, if your mission plan instructs you to fly NNE (north-northeast), then line up your aircraft so that the compass reading is halfway between N and NE.



As you make your way to the sector, you should keep an eye on the map and watch natural landmarks below. These serve as checkpoints to let you know you're going in the right direction and are not off course. For example, to fly from Toul aerodrome to sector D-5, you may follow the Meuse until you cross the front. Once across the front you'll be in sector D-5.

You need not always fly just by compass. Sometimes it's easier (as in the above example) to fly by following a river, road, or rail-line. For example: if you are flying in the Verdun region and your mission requires you to fly from Toul aerodrome to the city of Metz, then you will only need to follow the Moselle river North until you find Metz.

Flying from Toul to the city of Tellancourt is a little more difficult. You may fly North until you come to the front. You should find the city of St. Mihiel. Once there, you may follow the northern-running road until you reach Tellancourt.

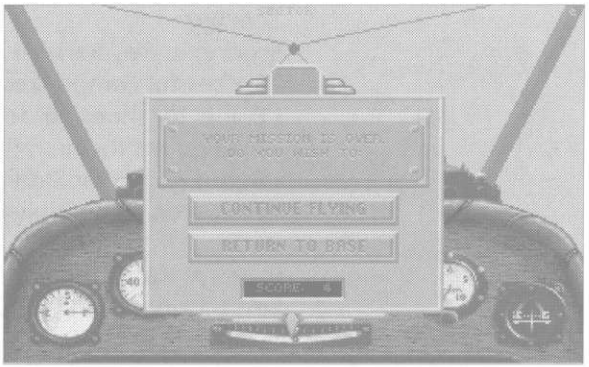
If you get lost, the first thing you should do is try to determine your present location by looking at the ground below and matching up the landmarks against the map. Large, obvious bends in rivers, bends in the front, as well as landmarks like cities and aerodromes can be used to place your location on the map.

If you still can't determine your location, find the front (which is generally easy), and fly to your side of the lines. Land at the first friendly aerodrome you find. As a last resort, you may land in a field on your side of the lines.

ENDING THE MISSION

Quitting

You may quit at anytime during your mission as long as your aircraft is not fatally damaged and you are not near an enemy. However, you will receive more points for landing at your aerodrome. When your mission is complete, a message will be displayed asking if you want to quit. You may quit now without penalty, however, **if you quit before the mission is complete, you'll leave any friendly aircraft and balloons at risk!**



Endings

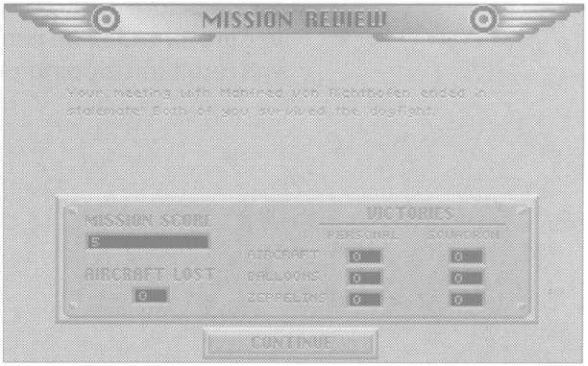
If you crash, you may either walk away with no injuries, end up in a hospital or be killed, depending upon the severity of the crash. If you are hospitalized, you will remain there until you recover from your injuries. If you land or crash (and survive) in enemy territory, you may end up in an enemy prisoner of war camp.

Mission Review

If you do well in your mission review, you may have a chance to enter your name in the Best Missions top 10 listing.

Following every mission will be the Mission Review screen. On it you will see:

-A text description with the results of your mission.
-Your mission score.
-How many aircraft from your flight were lost.
-How many victories (aircraft, balloons, Zeppelins) that you shot down personally, and how many your squadron shot down.



ENDING THE MISSION

Scoring

Scoring in Red Baron is based upon a number of different factors:

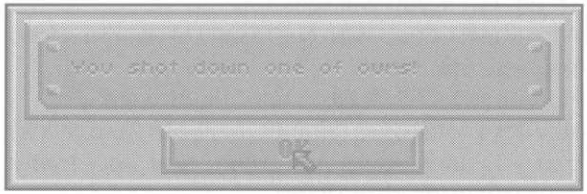
- Successful completion of your mission.
- Points for shooting down enemy aircraft and balloons. Zeppelins are worth a lot of points.
- Lose points for aircraft in your flight being shot down.
- Bonus points for landing at your own aerodrome upon completion of your mission.
- Your score is multiplied by the score factor, specified in the Realism panel.

In any of the missions available under Fly Single Mission, your score will determine your standing in the Best Missions listing. In Career mode, your score has a great impact upon your ability to advance in rank.

Board of Inquiry

If you screw up and shoot down a friendly aircraft during your mission, you'll come before the board of inquiry.

Going before the Board of Inquiry during Fly Single Mission mode of play will be reflected in your score. In Career mode, the penalties are much more severe. While playing a career, the third visit to the Board will result in stripping of your wings and permanent grounding.



CAREER PLAY

The most challenging game play option is to fly an entire career as either a German pilot or a British pilot. You will enlist in either the Royal Flying Corps or the German Air Service as a fighter pilot. Your career will start in December, 1915, carry you through the Fokker Scourge when Eindeckers ruled the skies, and through to the end of the war on November 10, 1918.

As your career progresses, you'll see the advantage swing back and forth between the German and the Allied pilots as new aircraft are introduced. You will have a chance to fly during Bloody April of 1917 when the Albatros D.III swept the allies from the air, and, in the summer of 1917, to see the allies regain the advantage with the S.E.5a and the Sopwith Camel.

As a fighter pilot you will fly many different missions, including attacks against balloons, Zeppelins and reconnaissance aircraft. You'll also escort missions of bombers and recon planes and dogfight against enemy fighters. Your total victories will increase when you shoot down enemy balloons, Zeppelins, and airplanes.

Of course, your greatest challenges will come when you face off against the famous aces like Mick Mannock, Rene Fonck, and Rittmeister Richthofen. These aces are extremely good, and they are trying to add you to their total victories.

As your victories mount, you will receive promotions in rank. As a British pilot you will start out as a Second Lieutenant, and may be promoted to First Lieutenant and finally Captain. As a German flyer, you will start with the rank of Leutnant, and may be promoted to Oberleutnant, and finally Rittmeister. With greater rank comes more privileges.

As a First Lieutenant (Oberleutnant if playing the German side), you will become a flight leader. When you start your career, you will not be the flight leader and will have to obey your flight leader's orders and follow him in formation. As a flight leader, your flight will follow you and your orders. However, your flight size will be small: only you and one other fighter.

CAREER PLAY

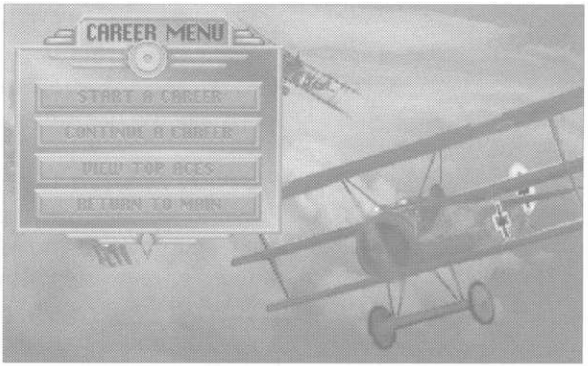
When you are promoted to Captain, you will be given command of flights of up to four aircraft. You will also be given a personal aircraft of your own choice, which you may paint.

As your reputation as a flyer increases, you will have a chance to fly with better squadrons. If you are extremely successful, you'll receive invitations from the most elite squadrons of the war, including the "Storks", the R.F.C's No. 56 Squadron, the legendary "Black Flight", and the most elite squadron of the German Air Service, Jagdgeschwader 1 (J.G.1).

You will be awarded medals in recognition of your bravery and gallantry. As an Allied pilot, the most prestigious award to try for is the Victoria Cross. As a German, you will try to attain the Order for Merit, or "Blue Max." Even more difficult to obtain is the Red Eagle Order. Only one German pilot was awarded it, Rittmeister Manfred von Richthofen.

When you finish your career by surviving to the end of the war, your final standing will be displayed. You could end up as a respected ace, or as a crop duster. The ultimate challenge is to end the war with more victories than the historic totals of the famous aces. If you do this, you'll be the war's "Ace of Aces." The highest scoring Allied ace was the Frenchman Rene Fonck with 75 victories. The highest scoring German ace was none other than the Red Baron with 80 victories.

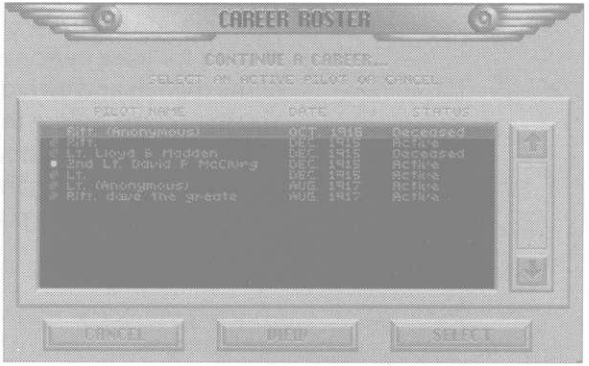
CAREER MENU



START A CAREER

You will be asked to select your alliance and to enter the name of your pilot. The career roster will track 15 pilot careers at once. If it is full, you will be asked to delete another pilot from the roster or cancel.

Once you've chosen your alliance and typed in your name, you'll be presented with a synopsis. You many change at what time during the war you will start. Options: early in the war, middle of the war and late in the war. You may also change your alliance or your name. Press ACCEPT to begin your career. Good luck!



CONTINUE A CAREER

Select which pilot you wish to continue with. Pressing *View* while a pilot is selected will display the Pilot's Record.

VIEW TOP ACES

Displays the top ten career performances to date, ordered by number of victories. Pressing *View* while a top ace is selected will display their Pilot Record.

RETURN TO MAIN

Cancels the Career menu, returning to the Main Menu.

AERODROME MENU

All career play is based from the Aerodrome menu. Between missions you will return to the Aerodrome menu. From this point you will make the decisions that will direct your career.

Fly Next Mission

Pressing *Fly Next Mission, y*ou will be given your next assignment and will fly the mission. These activities are described in the FLY SINGLE MISSION section. If you end up in the hospital or in prison, time that could be used to score victories will be lost. You can lose up to six months if you are hospitalized or jailed.

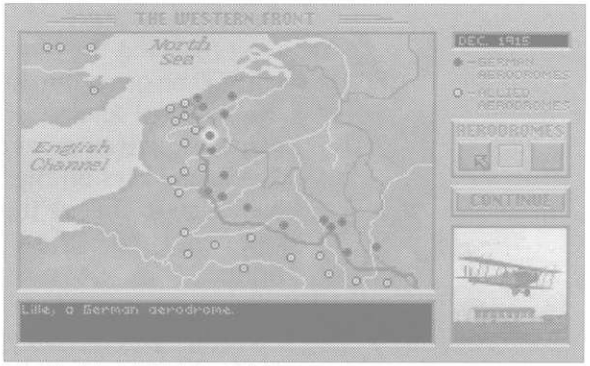
Career mode has a few options that are not available in Fly Single Mission. The first is that you may receive medals for your performance. See the Medals and Awards section of this manual for a full description of the medals and awards available. Along with honors, you will also be held responsible for your errors. You may come before the Board of Inquiry after a mission if you've committed some error. The first time you come before the board, you'll be given a mild reprimand. If you commit the same offense a second time, you'll be reprimanded strongly. And if you commit the same offense three times, the board will strip you of your wings and you'll be grounded permanently!

Squadron Info

Pressing *Squadron Info* will show your current station, the date and any famous Aces flying with the squadron.

Map of the Front

Shows the Western Front and the location of the primary aerodromes. You may highlight each aerodrome by pressing the left or right arrows located on the center, right hand side of the screen. Highlighting an aerodrome will display its name and list any squadrons or aces stationed there at the current time.



Request Transfer

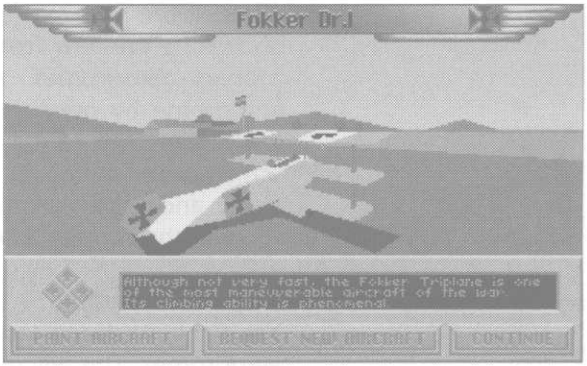
You may transfer to squadrons stationed at other aerodromes. This will give you an opportunity to fly with other aces in different regions of the Front. You'll also face off against different enemy aces on your missions depending on which region you're in. As you progress in rank you'll have the opportunity to transfer to better squadrons. If you're doing very well on the British side, you may have the chance to fly with No. 56 Squadron of the R.F.C. and fly with some of the great British aces including Mick Mannock and James McCudden. As a German pilot, you may attain enough clout to fly with J.G.1, home to many of Germany's greatest aces, including Ernst Udet and Manfred von Richthofen.

When you transfer, the map of the Western Front will be displayed, and it will show you where your new squadron is stationed. Once transferred, you'll have to remain at your new aerodrome for at least four months before transferring again. The R.F.C. and the German Air Service won't let their pilots transfer willy-nilly all over the front.

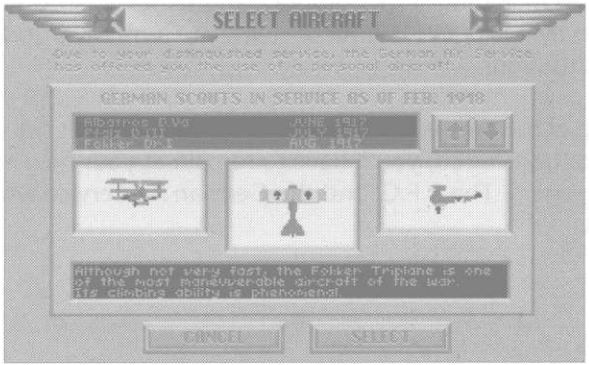
AERODROME MENU

Personal Aircraft

After reaching the rank of Captain or Rittmeister, you will be given the use of a personal aircraft. On the Personal Aircraft screen you may view your plane, request a new aircraft and paint your plane. The arrow keys on the bottom left of the screen allow you to change the view of your aircraft. You can zoom the camera in/out and rotate it left/right.



Pressing *Paint Aircraft* will bring up the painting menu. You may paint two sections of your aircraft: Wings and Fuselage. Select which part of your plane you wish to paint and then the color you wish to paint it.



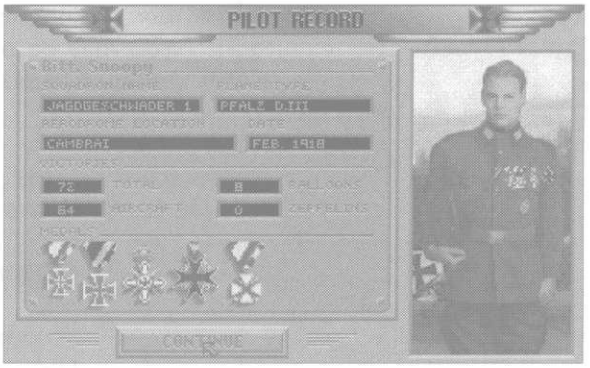
Pressing *Request New Aircraft* will bring up the Select Aircraft screen. Your choices of aircraft will be dependent upon the side you are flying on and the progression of the war. As time progresses and airplane design improves, you will be allowed to choose more sophisticated aircraft.

NOTE: you must use your current aircraft for at least three months before requesting another aircraft!

Press *Continue* to go back to the Aerodrome menu.

View Pilot Record

Pressing *View Pilot Record* will display the current record for your pilot. It will display the name and rank of the pilot, what squadron he is assigned to, which aerodrome he's stationed at and which aircraft he's flying. In addition, it will display his total victories against other aircraft, balloons, Zeppelins, and his total victories (the sum of the aircraft, Balloon, and Zep victories). Also displayed is the career score, which is the accumulation of all mission scores, and all medals that have been received.



Backup Career

If you have a pilot who is doing very well, you may want to backup his status just in case he's shot down. After pressing *Backup Career*, enter the name under which you wish to backup the career. If the career roster is full, you will be prompted to delete another pilot or to cancel. This backup career may be restored from the Continue A Career option in the Career Menu.

NOTE: A pilot's most current career progress is automatically saved upon exiting the Aerodrome menu. Backup Career is used to save a separate version of the current career for later restoring. This is useful for undoing a mistake you've made in a mission. If you die or perform an act that damages your career, you will have the option of *restoring* the backup career and replaying the mission until you are satisfied with the outcome.

Return to Main

Pressing *Return to Main* will save your current pilot status and return you to the Main Menu. You may later restore this career by pressing *Continue A Career* from the Career Menu and selecting the pilot on the Career Roster.

CAREER SEQUENCES

There are numerous sequences that can occur between missions while playing in Career Mode. You may be promoted, alerted to new aircraft, moved to new aerodromes, transferred to another squadron or challenged by a famous ace.

Rank promotions

As your score increases, you will be promoted in rank. You'll start out as a Second Lieutenant (Leutnant if you're German), and may work your way up to Captain (Rittmeister).

British Rank	Equivalent German Rank
Second Lieutenant	Leutnant
First Lieutenant	Oberleutnant
Captain	Rittmeister or Hauptmann.

With the rank of First Lieutenant (Oberleutnant), you will be a flight leader and may lead the missions you go on. With the rank of Captain, you will be given the use of your own personal aircraft.

New aircraft introductions

As new aircraft are introduced, you will be notified. If you have a rank of Captain (Rittmeister), you will be given a chance to exchange your present aircraft for the new aircraft.

Moving to new aerodromes

From time to time, your squadron may be ordered to move to a different part of the Front. You will be informed of your new station and aerodrome.

Squadron transfers

In addition to being able to transfer from the Aerodrome menu, you may receive special invitations to transfer. Some of the invitations will be for a temporary transfer and some will be for an indefinite period. Manfred von Richthofen's career started when he caught the eye of Oswald Boelcke who requested he transfer to Boelcke's elite Jasta 4. If you are transferred for a temporary tour of duty, you'll be transferred to your official squadron when the tour is up.

Challenges by Famous Aces

Occasionally, famous aces would issue challenges to enemy aces. If you're doing exceptionally well you may receive a challenge by a famous ace to meet at a certain place, at a specified time and altitude to dogfight. You may choose to ignore or answer these challenges.

End of Career

Your career will end with either your pilot being killed in action or surviving to the end of the war (Nov. 10, 1918). If your pilot survives to the end of the war, his final standing in history will be displayed.

MISSION RECORD

Perhaps one of the most exciting elements of Red Baron is the Mission Record feature. With the mission recorder, you can record an entire mission, save it to disk and then replay the saved mission. However, the ability to save and replay a mission isn't what makes this feature so unique. Mission Record will also allow you to *change* the saved mission. You can alter the views, watch the action from nearly any angle (including from behind other planes) and *enter* the simulation again from any point in playback. The changes you make can then be saved, played back and modified even further. You essentially become actor, producer and director of your own WWI aerial dogfights. To help spread the news of your talent, you can copy the recorded missions to floppy disk or transfer them by modem to your friends who have Red Baron. They can then load the files and admire your handiwork first hand.

Lights, Camera, Action!

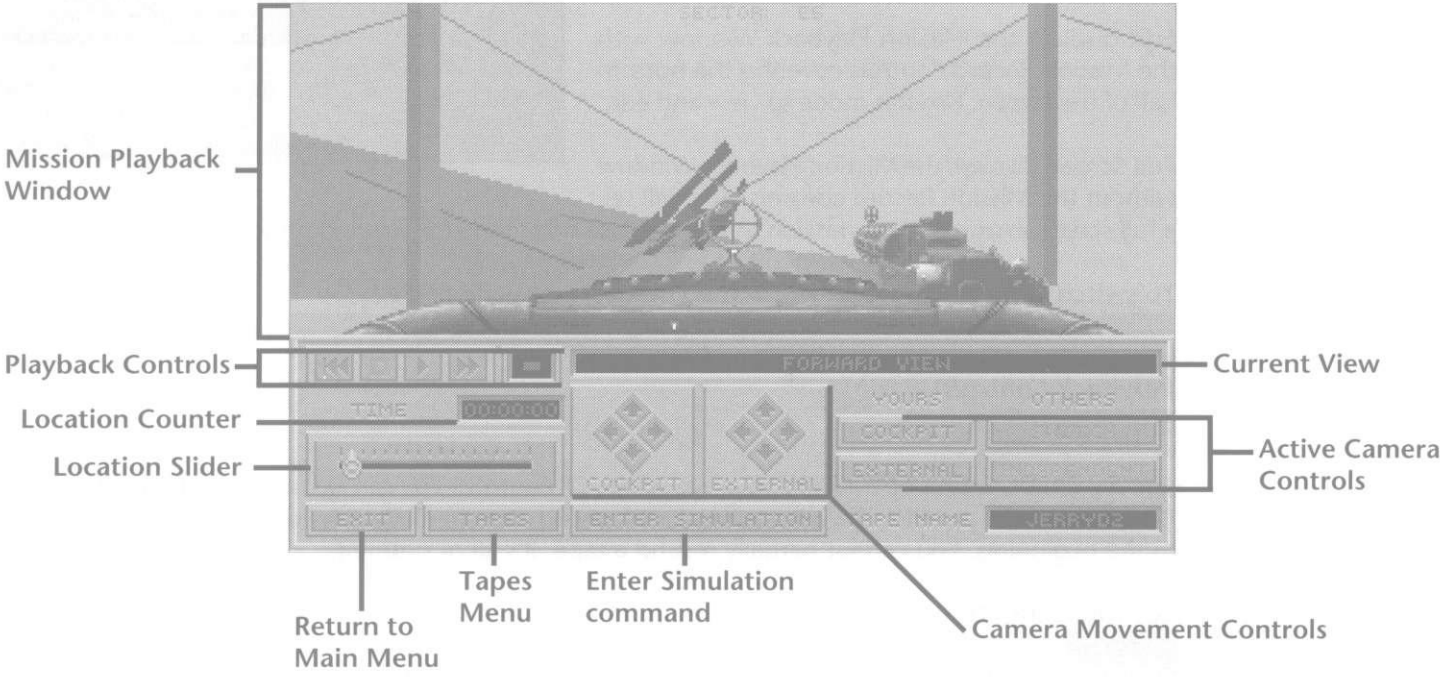
The first step in using the Mission Record feature is to tell the game to record your missions as you play them. Each time you enter the simulation, Red Baron will ask you if you wish to record the mission. Saying yes will automatically start the Mission Record feature. It operates silently and patiently in the background while you storm the skies. When your mission is over, you will be asked to name and save the recorded mission.

-Naming the file and pressing *Save* will automatically save the mission in a sub-directory called **TAPES**.
-Pressing *Cancel* will abort the mission save, erasing the recorded mission and exiting the simulation.

IMPORTANT! the mission name that you choose can be no longer than 8 characters long.
If you type a name longer than 8 characters, the computer will cut off the additional characters, saving only the first 8.

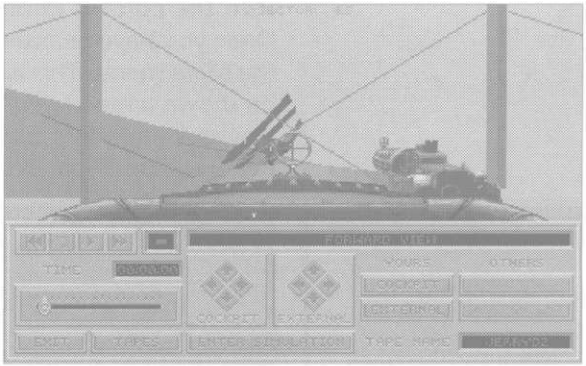
Into the Editing Room

Once you have recorded and saved a mission, select Mission Recorder from the Main menu. This will activate the playback mode of Red Baron. You will be shown a menu of all saved missions. Select the mission tape you wish to playback and press *Load*. The tape will load and the Mission Record control panel will be displayed.



MISSION RECORD

Mission Playback Window



The Mission Playback Window is where playback of your loaded missions is displayed. It will playback the loaded mission exactly as you originally played it. The playback window has two modes of display, **Edit** and **Full Screen**.

Edit displays the Mission Playback Window with the Mission Record controls covering the bottom half of the screen. Use this mode to view and edit.

Full Screen displays the Mission Playback Window without the Mission Record controls. You will see a full screen image of your mission as it plays. Use this mode for viewing only.

To switch between Edit and Full Screen modes, press the ESC key.

Playback Controls

The Playback Controls operate like your everyday VCR controls. You can Fast-forward, Rewind, Stop and Play. It should be noted that while you can Fast-forward incrementally, Rewind will only rewind the tape to the beginning. You cannot partially rewind a tape. It's all or nothing.

Location Counter

Operating just like a VCR counter, the Location Counter keeps a running mark of your playback position.

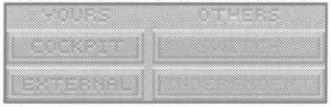
Location Slider

The location Slider operates in two ways.

It will act as a visual marker to display movement through the playing tape.
It will act as a visual Fast-forward slider, allowing you to pick the location you wish to Fast-forward to.

To use the Location Slider to Fast-forward, move the slider bar to the desired distance into the tape. When you release the slider bar, the Mission Recorder will display an on-screen countdown as it Fast-forwards to the specified point. NOTE: the slider cannot be move backward. You must use the Rewind command.

Active Camera Controls



The Active Camera Controls allow you to change the location of the playback camera.

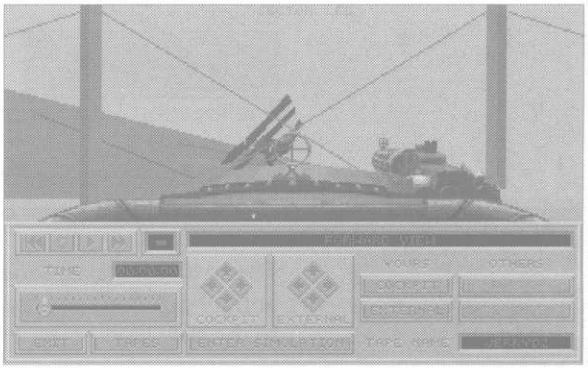
Under the **YOURS** section, you can move the camera between your cockpit and your plane's external view.
Under the **OTHERS** section, you can move the camera between other plane's external views and an independent world camera.

The options of *SWITCH* and *INDEPENDENT* become active when you have switched your camera viewpoint to *EXTERNAL*. Continually pressing SWITCH will cycle you through all the external views of all enemy airplanes in the recorded mission. Pressing INDEPENDENT will place the camera free from all aircraft movement to be completely controlled by the Movement Controls.

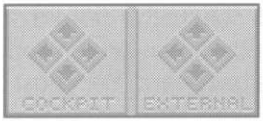
MISSION RECORD

Camera Movement Controls

Once the Active Camera has been chosen, the viewpoint can be fine tuned by using the Camera Movement Controls. The two arrow pads operate slightly differently depending upon where your Active Camera is positioned.

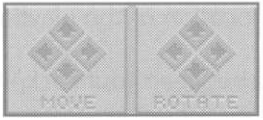


Active Camera Inside Your Cockpit



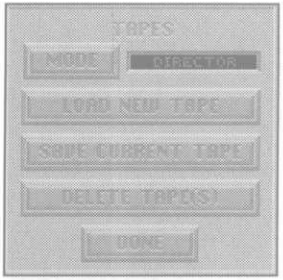
COCKPIT allows you to look out the forward, left, right and back cockpit views.
EXTERNAL allows you to switch to forward, left, right and back outside views of your plane.

Active Camera Outside Your Cockpit



MOVE allows you to zoom the camera in/out. In INDEPENDENT mode, it also shifts the camera left and right.
ROTATE allows you to rotate the camera over, under and around.

Tapes



Pressing the Tapes button will bring up the Tapes control panel.
MODE: Switches between *Director* and *View-Only* modes (see below).
LOAD NEW TAPE: Brings up the tape menu for loading tapes.
SAVE CURRENT TAPE: Brings up the tape menu for saving tapes.
DELETE TAPE(S): Brings up the tape menu, allowing you to delete recorded missions. Selecting a mission and pressing *Delete* will delete the mission from the VCR subdirectory.
DONE: Closes the Tapes control panel.

Mode

The Mission Recorder has two modes of operation, *Director* and *View-Only*.
Director mode enables the "save changes" option of playback. While in *Director* mode, all changes made during playback will be stored in memory. Upon Rewinding, Loading a new tape or Quitting, the Mission Recorder will display a prompt asking if you wish to save the changes made to the original tape.
View-Only mode disables the "save changes" option. Changes made during playback will not be saved.

Enter Simulation

Pressing the *Enter Simulation* button at any point during playback will place you back into the simulation. You can replay the mission, making whatever changes you desire. When the mission is over, you will be presented with the options of seeing a Mission Review based upon the changes made or returning to the Mission Recorder. IMPORTANT: Changes made after entering the simulation will not be saved if you are operating in *View-Only* mode!

Exit

Quits the Mission Recorder, returning you to the Main Menu. If you are operating in *Director* mode and have made changes that haven't been saved, you will be asked to Save or Discard your modifications.

DESIGNER NOTES


Damon Slye

The key to dogfighting in WWI was to get on the tail of the enemy plane and make a successful shot. Shots from other locations were very difficult because they required the pilot to lead the enemy plane too much. Occasionally, a good pilot could make a head-on shot. However, over 90% of all aerial victories were made by a shot from behind the enemy. Therefore, the challenge was to position one's plane behind the enemy plane.

To get on the tail of the enemy, pilots employed a variety of tactics. The easiest method was to sneak-up unobserved on the enemy pilot and shoot him down before he knew he was in danger. However, when both enemy pilots were aware of each other, a dogfight would develop, with each pilot trying to get on the tail of the other. At this point the battle became a test of flying skill and tactics.

This was the essence of what we wanted to capture with Red Baron. The hard part was getting the computer controlled enemy pilots to choose the proper tactics at the right times. A lot of effort went in to having them pick and perform appropriate maneuvers (for example doing a Split-S when an enemy is on your tail). We also modelled different skill levels of pilots. The novice pilots in Red Baron will often 'freeze-up' when an enemy is on their tail and fly straight, as many of the novice pilots in the war did.

The historic aces deserved special attention. We researched each to find out his strengths, weaknesses, and preferred maneuvers in combat. In Red Baron, each of the famous aces is unique from the others. Some have great flying skill but only average marksmanship; some are great marksman and average pilots; and of course some are great at both. Moreover, we modelled the styles of the famous aces. You will never see Manfred von Richthofen do a loop in this product. He believed loops had no place in combat. On the other hand, Werner Voss, who was a very acrobatic pilot, has a wide variety of maneuvers he'll use in combat.

In addition, we strove for as much historical accuracy as possible. For the most part, the locations of the significant historical Squadrons and Jastas are correct. Jagdgeschwader 1 will move around the front as it did. Also, the aces in Red Baron are stationed in their historic squadrons. We have included

many of the insignias and historic colors the aces painted on their aircraft.

In some instances, we had a choice to make between realism and playability. Wherever possible, we left this choice to the player by making it a preference on the Realism Panel.

There were some areas in which we chose to stray from history. The most significant of these is the number of aircraft we allow in a dogfight. Toward the end of the war, the dogfights included as many as eighty aircraft at a time. Of course, given the speeds of today's computers, we can't model this. However, we did include flights of up to four aircraft which the player can command. Perhaps in ten years, Red Baron 4.0 will include dogfights with eighty planes instead of eight.

In addition, the front in Red Baron does not move. For most of WWI it was static. It was not until very late in the war that it changed. We decided that moving the front didn't add anything to the experience of being a WWI pilot. The action was in the air.

Finally, we allow the player to paint his aircraft as a British pilot. While it was the custom of the German pilots to do so, the R.F.C would never allow their pilots to indulge in such a flamboyant act. We allow it because it's fun.

Researching Red Baron was much more work than we had anticipated. While information on WWII is abundant, information on WWI is more difficult to come by. We had to locate knowledgeable individuals to fill in the blanks that were unavailable through traditional means of research.

First, I would like to thank Ed Usinowicz, a pilot for Old Rhinebeck aerodrome. It is impossible to get any figures on the maneuverability of the WWI aircraft through normal research. Ed was kind enough to take his Albatros D.V up for us and time some important maneuvers for us. Without his help we would have been guessing about how long it took the planes to roll and turn.

DESIGNER NOTES

I would also like to thank Patrick Henry, a modern-day Fokker Triplane pilot. He graciously allowed us to photograph his red Triplane from the cockpit. This enabled us to get the cockpit perspectives correct.

I am also grateful to Neal O'Connor for his excellent work on the Medals and Awards section. He also supplied us with the names of many other WWI aviation historians.

Peter Grosz, who is one of the World's leading experts on German WWI aircraft, supplied us with the technical data and information on the German fighters.

I would also like to thank the people at Sierra. With their assistance, we were able to add the people we needed to do justice to this topic. As you can see from the list of credits, Red Baron had a large team indeed.

Finally, I would personally like to thank the people on the Red Baron team. They are certainly the most talented group of people I have worked with. The design goals for Red Baron were very ambitious. The team rose to the challenge, and came through with flying colors.

Damon Slye

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Paths of Glory, directed by Stanley Kubrick. Harris Kubrick Pictures, 1957. Black and White. Stars Kirk Douglas. (An excellent, powerful movie. Studies the politics of command in the French Army.)

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GLOSSARY

Ace An aviator with at least 5 victories.

Aerodrome An airfield, generally makeshift or temporary.

Ailerons The movable surfaces on an aircraft's wings that control its roll.

Alley-man Derived from the French word for German, this was a British and American term for a German.

Allies The French, British, American, Russian and Italian coalition which was allied against the Central Powers.

Archie Pilot's slang for anti-aircraft fire.

As des As French term for the top ace. It literally means ace of aces.

Bloody April A name given to April of 1917 when the German Albatros D.III inflicted huge casualties on the Allied aircraft.

Blue Max Common English term for Germany's highest military honor, the Pour Le Merite award.

Bosche French slang for a German.

Bounce A slang term meaning to surprise an enemy aircraft.

Brisfit Nickname of the Bristol Fighter.

Central Powers The German and Austro-Hungarian Alliance which was allied against the Allies.

Crate Slang for aircraft.

Deflection angle The angle a target is in relation to the aircraft shooting at it.

Deflector gear Invented by Roland Garros as a means to allow a machine gun to fire through the arc of a propeller. Deflector gear was nothing more than a steel wedge mounted on the propeller blades to deflect any bullets that would have otherwise torn the blades off.

Dirigible A gas-filled airship with an internal framework or skeleton.

Dogfight Multiple aircraft involved in a melee. Sometimes more than 50 were involved in such battles.

Doppledecker German for biplane.

Dreidecker German for triplane, as in "Fokker Dreidecker I" or "Fokker Dr.I" for short.

Eagle of the Lille Nickname of Max Immelmann.

Eindecker German for monoplane. It is used to describe the Fokker E series.

Elevators The movable surfaces on an aircraft's tail assembly that control pitch.

Escadrille French term for squadron. Usually composed of 12 planes.

Fee Nickname for the F.E.2b. A British two-seat pusher biplane first used as a fighter, then later as night bomber.

Flak Antiaircraft fire.

Flamed A verb used to describe a downed plane.

Flying Circus Nickname applied to Richthofen's Jagdgeschwader because the unit lived out of tents, moved around a lot, and painted their planes in extravagant colors.

Fokker Scourge Took place between 1915-16 when the Fokker Eindeckers cleared the skies of Allied aircraft. Ended by summer of 1916.

Frog, Froggies British term for their French allies.

Geschwader Short for Jagdgeschwader.

Grid British expression for an aircraft.

Hate, Morning and Evening British expression for German artillery bombardments and anti-aircraft fire.

Hun Slang for a German.

Hunland German-held territory.

Jagdgeschwader It literally means "hunting wing." It is a large German unit of about 50 scouts composed of 3 to 4 Jagdstaffeln.

Jagdstaffel Literally "hunting group," it is the German equivalent of the British Squadron. Each Jagdstaffel was equipped with a maximum of 12 scouts.

Jasta Short for Jagdstaffel.

J.G. Short for Jagdgeschwader.

Kill A downed aircraft credited to a pilot.

Lead Placing a machine gun's crosshairs in front of a target in order to compensate for the speed of the target and the angle it is at in relation to the gun.

Luftstreitkrafte Official German name for the German Imperial Air Service.

No-Man's Land The space between the German and Allied front line trenches. It was pocked and scarred and destroyed by the fighting.

Observer The gunner in all two-seaters.

Piste French for landing field, used by American pilots.

Pitch The up or down rotation of an aircraft controlled by the elevators.

Quirk Nickname of the B.E.2c British observation aircraft.

GLOSSARY

R.A.F. Abbreviation for the British Royal Air Force. Founded on April 1, 1918 from the combined R.F.C. and R.N.A.S.

Reconnaissance Scouting the enemy's strength, location and if possible, his intentions.

Red Baron Nickname of Manfred von Richthofen.

Red Devil/ Le Diable Rouge Allied nickname for Manfred von Richthofen.

Roll The rotation of an aircraft about the axis running from nose to tail. It is controlled by the ailerons.

R.F.C. Abbreviation for the British Royal Flying Corps. It later became the Royal Air Force.

R.N.A.S. Abbreviation for the British Royal Navy Air Service. It was incorporated into the R.A.F. on April 1, 1918.

Rudder The fin on the tail of an aircraft that controls its yaw.

Sardine Can Nickname of the Fokker Eindecker.

Schlastastaffel German ground attack squadron. It literally means "battle group."

Scout Usually a single-seat aircraft. Designed specifically to fight other aircraft. Called fighters or interceptors today.

Sortie A mission flown by an airplane.

Spad Acronym for the French Societe Pour l'Aviation et ses Derives. A French aviation company responsible for building the Spad VII and XIII among other aircraft.

Spinning Incinerator Slang for the Airco D.H. 2. Named this since its engines were so unreliable as well as the plane's habit of falling into spins suddenly.

Squadron Standard British and American tactical aircraft unit. Composed of between 12 and 18 planes.

Staffel Short for Jagdstaffel.

Strafe To shoot at ground targets with airborne machine guns.

Stick The control column in an aircraft's cockpit used to operate the ailerons and elevators.

Stunt Merchant 60 Squadron's nickname for Billy Bishop.

Synchroniser gear A timing device which allowed the machine gun to fire between moving propeller blades without ever hitting them. Invented by Anthony Fokker, it revolutionized aerial warfare.

Tripehound Nickname for the Sopwith Triplane.

Triple Entente The French, British and Russian pre-war Alliance.

Two-Seater Generic term applied to aircraft with a crew of two, which were generally observation aircraft.

Victory The shooting down of an enemy aircraft.

Yaw The rotation of the aircraft in the horizontal plane. It is controlled by the rudder.


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