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STEREO WORLD

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Giants in the Sky

Giants in the Sky:

Zeppelins

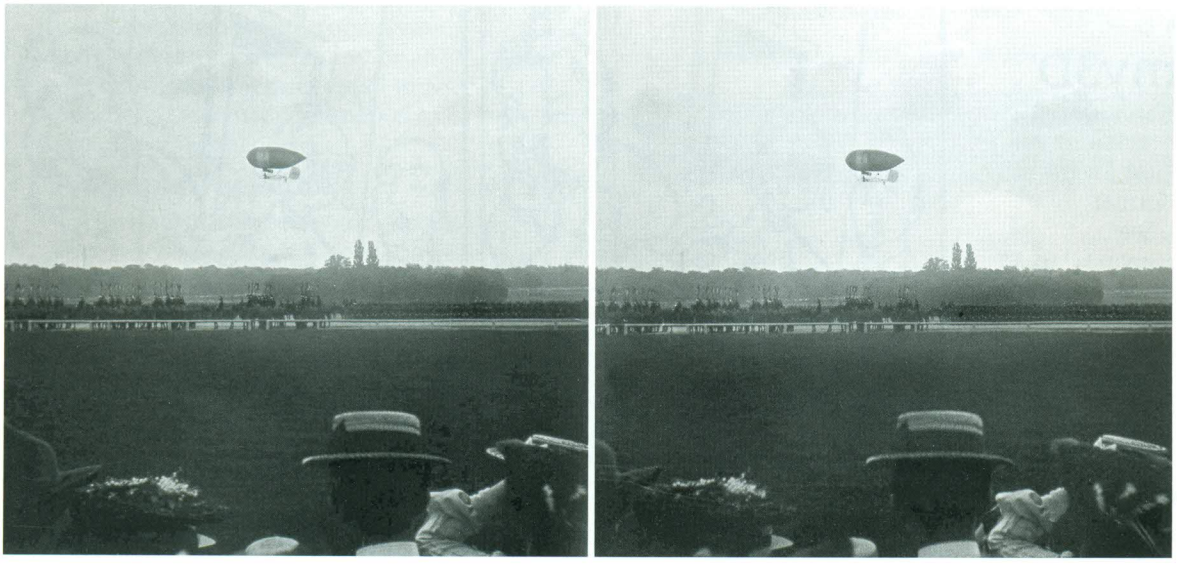
Part 1, 1900-1918

by Ralph Reiley

Zeppelin; a name that still stirs the imagination with visions of airborne luxury hotels, flying aircraft carriers, or monsters of the night dropping bombs. The first zeppelin flew in 1900, and the last two were broken up for scrap in 1940. The time when zeppelins regularly flew the skies was short, the years between 1909 and 1939. In that time period no other type of aircraft could fly farther or carry more passengers than the zeppelin. No aircraft has ever matched them in size or the majestic presence they had in the air. Seeing an airship as large as a battleship passing 500 feet over head was an unforgettable experience. For the

"Düsseldorf un Dirigable." An amateur glass slide taken in Düsseldorf and processed by Verascope Richard. The early zeppelin in this view is flying low over the city, circa 1909 or 1910. Also of interest is the apothecary shop up the street, the Elephanten Apotheke, which began business in 1877, and is still operating at the same address, Bokerstrasse 56, 40213 Düsseldorf, although the building in the photo was destroyed in 1944 during an air raid.

(Stereo and Elephanten Apotheke research courtesy Didier Reboul)



Amateur glass stereo of Santos Dumont in his ninth airship model, circa 1903-1904, flying over Paris. Dumont was an early aviation pioneer with airships and fixed wing aircraft, winner of the Deutsch prize in 1901 with his sixth airship model. After his sixteenth airship, he went on to design, build, and fly some of the first fixed wing aircraft in Europe. (Most of these 45 x 107 mm glass views are reproduced in this larger format.)

(Courtesy of Didier Reboul)

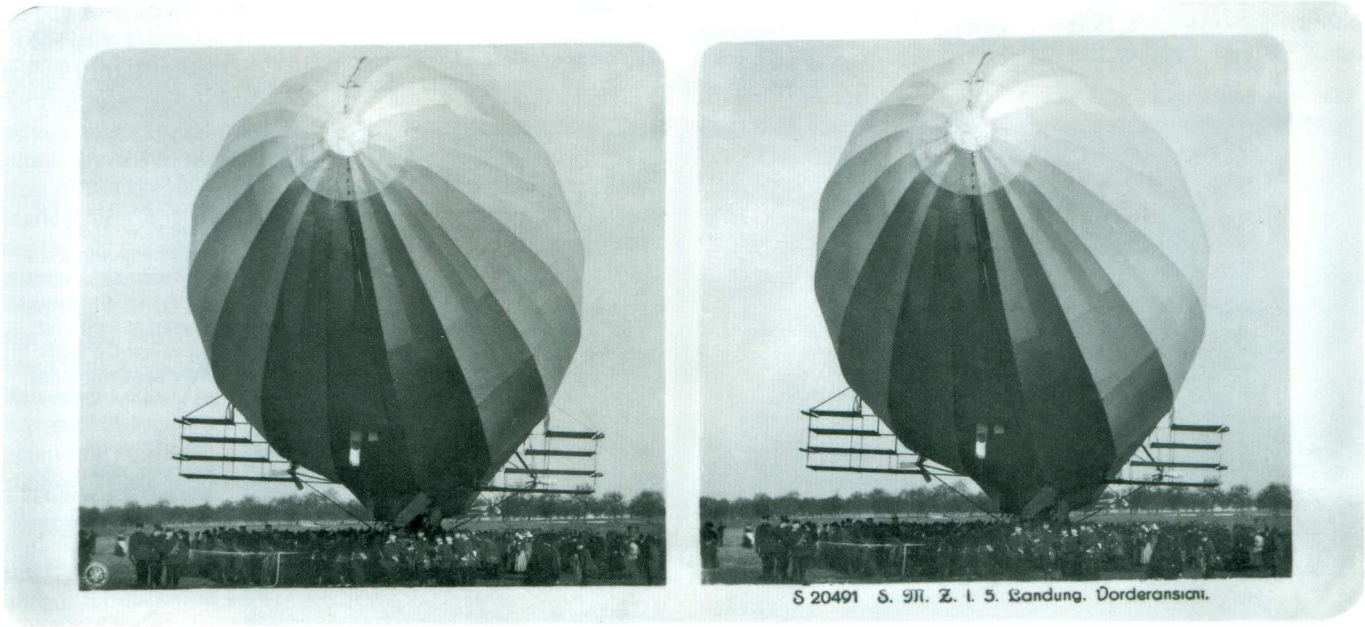
navy, they were ideal for long range scouting missions, searching the ocean for the enemy fleet. They could also be flying luxury hotels, rivaling the ocean liner in comfort, and greatly surpassing them in speed. When everything went well, they were magnificent flying machines. When things went wrong, they fell from the sky in spectacular disasters.

Flying was one of man's longest unfulfilled dreams. In 1783 the Montgolfier Brothers opened one avenue for man to leave the ground and return safely, in a hot air balloon. A free balloon was only a partial solution; it could not be steered, and was carried wherever the wind blew. There were some promising experiments throughout the 19th century, but steering a balloon could not be achieved until a practical engine was found. At the end of the 19th century, this engine made its appearance, and the fulfillment of the old dream of traveling through the air like a ship on the ocean was close to reality. The airship, as well as the automobile and the airplane quickly came into being, each one powered by the newly developed internal combustion engine.

The air age began in Paris in 1898, when Alberto Santos Dumont began experimenting with a semi rigid airship filled with hydrogen, a propeller, and the 2-cylinder engine from his motorcycle. His sixth model airship, using a 16-hp engine, succeeded in winning the Deutsch prize in 1901, by flying a 6.8-mile course in 30 minutes, including a stylish turn around the Eiffel Tower. Also in 1898, crazy old Graf (Count) Ferdinand von Zeppelin was at work on a different kind of airship in Württemberg. He was an eccentric, an aristocrat, an old cavalryman, and hero of the Franco-Prussian War, where he earned the nickname, the Crazy Count. In 1887, while serving as the Württemberg ambassador to Prussia, he made some critical remarks about the Prussian army. The Kaiser was insulted, complained to the King of Württemberg, and von Zeppelin was recalled in disgrace, and asked to retire. This was devastating to his sense of duty and honor, but left him free to pursue a long held dream, a fleet of airships to defend Germany.

Von Zeppelin had the idea for the airship, but not the ability to do all the work himself. He assembled a team, including Dr. Ludwig Dür as his engineer. Dr. Dür would design every Zeppelin airship from LZ 1 in 1900, to LZ 130 in 1935. Dür rarely traveled in airships, and preferred to travel no further than his bicycle could take him. In July 1900, LZ 1,

"Düsseldorf Haner Zeppelin." This amateur 45 x107 mm glass slide (reproduced here at original size), was taken at the Deutsche Lusftshiffarhrts-Atiengesellschaft, German Airship Travel Corp, (DELAG) airfield in Düsseldorf around 1909 or 1910. Delag began operations in November 1909. By 1910, a route had been established between Frankfurt, Baden-Baden and Düsseldorf. By 1913, DELAG was flying a route between Frankfurt, Düsseldorf, Baden-Oos, Berlin-Johannisthal, Gotha, Hamburg, Dresden and Leipzig. The war in 1914 and its aftermath interrupted regular DELAG operations until 1928 when the Graf Zeppelin began flying. In 1935 DELAG was disbanded and reorganized under the state sponsored Deutsche Zeppelin-Reederei, DZR, German Zeppelin Transport Co. (Courtesy Didier Reboul)



NPG No. 5, "S.M.Z 1, Landung. Vorderansicht." (His Majesty's Zeppelin No. 1, Landing, Front View.) The view is part of a series of stereo views on early zeppelins from 1910 by NPG, the largest German stereo view publisher, showing the forward elevators of Z-1. The early zeppelins had a number of elevator fins at the front and rear of the airship. They were later replaced with two large vertical rudders and two large horizontals elevators at the rear that proved to provide more effective controls, much like the feathers on an arrow. (Courtesy Martin Kohler)

Airship Terminology

Aerostat describes a vehicle that is lighter than air. Aerostats can be steered and propelled through the air with rudders, propellers or other types of thrust mechanism, or by the wind alone.

Balloons use hot air, hydrogen on helium for lift, and are carried by the wind, with no real means of steering, other than finding an altitude with a favorable wind direction.

Blimps or **Non-Rigid Airships** use a pressure level in excess of the surrounding air pressure to retain their shape during flight. There are no separate gas compartments, and they are usually made of rubberized fabric, and they typically have one or two engines.

Semi-Rigid Airships, like blimps, require internal pressure to maintain their shape, but have articulated keel frames running along the bottom of the envelope to distribute suspension loads into the envelope and allow lower envelope pressures.

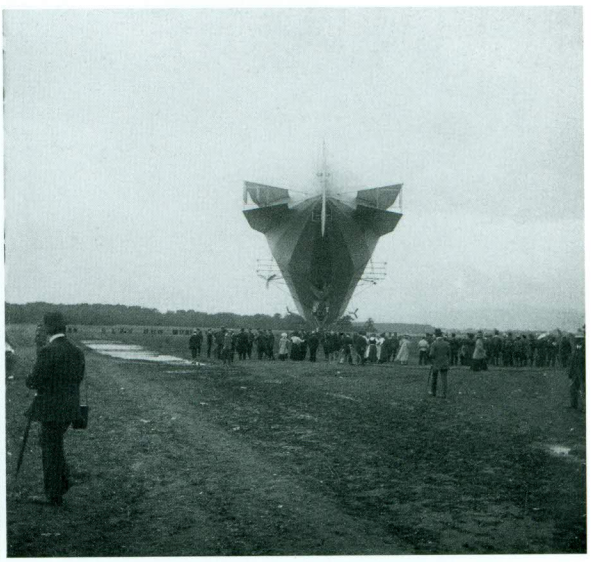
Rigid Airships (Zeppelin is almost synonymous with this type) have rigid frames containing multiple, non-pressurized gas cells or balloons to provide lift. Rigid airships do not depend on internal pressure to maintain their shape and can be made to virtually any size.

Metal Clad Airships were of two kinds: rigid and non-rigid. Each kind used a thin gastight metal envelope, rather than the usual rubber-coated fabric envelope. Only four metal-clad ships are known to have been built, and only two actually flew: an aluminum rigid airship of 1893 collapsed, while the second one flew. The non-rigid ZMC-2 flew from 1929 to 1941; while the 1929 non-rigid "City of Glendale" collapsed on its first flight attempt.

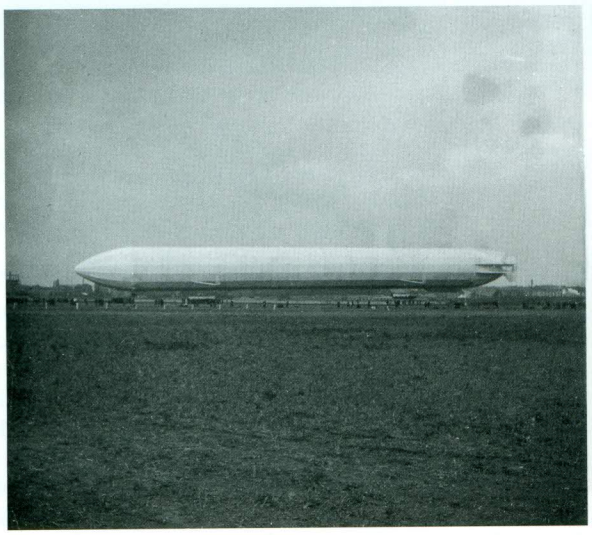
Luftschiff (Airship) Zeppelin 1, made its first flight. It was 425 feet long, 39 feet in diameter, and held 400,000 cubic feet of hydrogen. Nothing like it had ever been seen before. It was powered by two 15-hp Daimler marine engines, each weighing 850 pounds. Each engine drove two propellers mounted on the sides of the airship. The first flight of LZ 1 was hardly amazing or majestic, and lasted only 17 minutes. It was found to be lacking in speed, was difficult to control, and the hull structure started to collapse. After three flights, totaling two hours and one minute, von Zeppelin's airship company was out of money, and the ship was broken up and sold for scrap in early 1901. In 1905, von Zeppelin had raised new funds and began work on LZ 2. At this time von Zeppelin employed Dr. Hugo Eckener as the public relations man. Eckener eventually became head of the Zeppelin works. He also became the foremost advocate for airship travel, and the best airship captain there ever was. Before his association with von Zeppelin, Dr. Eckener was an avid sailboat enthusiast. As a sailor he had learned to read weather signs, and developed a near-supernatural ability to read the weather by watching clouds move, a talent which served him very well in piloting airships.

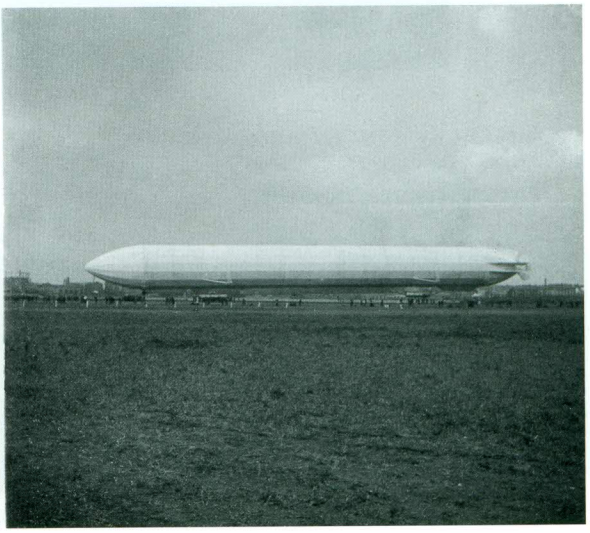
The frame of LZ 2 was stronger than LZ 1, and it had two 85-hp Daimler engines. During the second flight of LZ 2, the motors failed after a 20-mile trip. The ship was moored in a field, waiting for repairs by technicians from Daimler. That night strong winds destroyed the ship at its mooring. Zeppelin then used his own money to build LZ 3 in 1906. He astonished the world with a majestic and problem free eight hour flight in 1907. The German military became interested in the airship and agreed to buy one if it could make a 24-hour journey, cover 435 miles, fly to a predetermined spot and return safely. Since a 24-hour flight was beyond the ability of LZ 3, Zeppelin built a larger ship, LZ 4, with the last of his family fortune. On August 4, 1908, LZ 4 set off on its 24-hour test flight. After 11 hours of smooth flying, an engine failed, and LZ 4 set down for repairs. The engine was repaired and the ship set off again, but early on the morning of August 5, there was another engine failure and the airship landed again. While repairs were underway, a sudden gust of wind tore the ship from its

NPG No. 6, "S.M.Z 1, Landung. Ansicht von der Selte." (His Majesty's Zeppelin No. 1, Landing, front view from the Selte.) This is ZL-1, or Z-1 as it was numbered by the military. The Z-1 was used as a training ship, and was scrapped in 1913. A large crowd has grown around the airship, which set down in a field waiting for mechanics to come and repair the engines. This was a fairly common event in the early airship days, and huge crowds would form to get a close view. These became spontaneous and patriotic celebrations, with the crews treated to food and wine. The Germans were filled with pride as the only nation with flying machines as majestic as the zeppelin, and to see one up close was a major event. *(Enlargement courtesy Martin Kohler)*



An unmarked glass slide of the tail of LZ-3. The early zeppelins, LZ-3 through LZ-6, all had tail structures similar to this. There is a large central rudder and smaller rudders mounted between the double tail fins. There were two engines, one front and one rear, in open gondolas. Each engine powered two propellers, connected to the engines by long drive shafts.
(Courtesy Didier Reboul)





Unmarked glass view of an early zeppelin, possible LZ-3. The early zeppelins had a definite "Pencil" shape to the nose, and very complex tail structures. During the First World War, the zeppelins acquired the cigar-shaped nose and a cruciform tail structure, both pioneered by Shütte-Lanz airships and forced upon von Zeppelin by the military, much against his stubborn resistance to accept any ideas from Sh tte-Lanz.
(Courtesy of Didier Reboul)

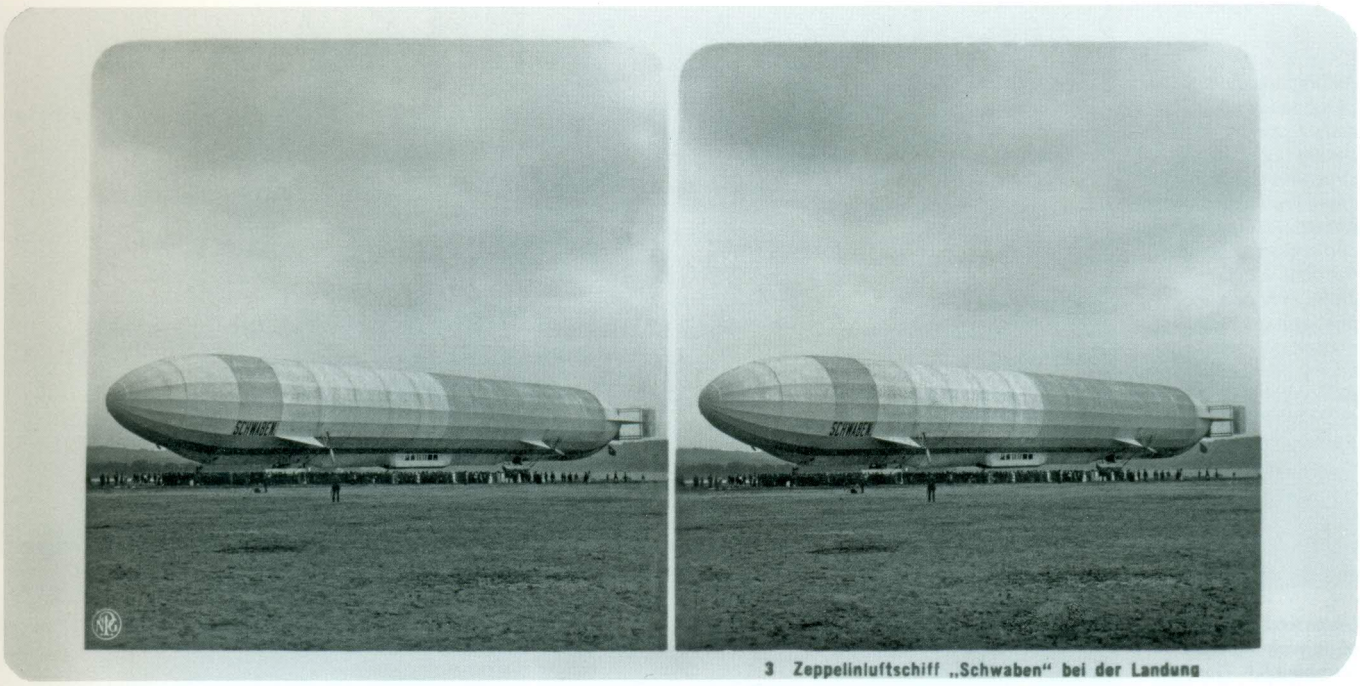
moorings, blew it across a field, where it hit a tree, caught fire, and after a few spectacular moments, it was a smoldering wreck.

Graf von Zeppelin was ruined by the disaster, as he had used the last of his own family fortune to build the airship. In using his own money for the Fatherland, and a very clever advertising campaign by Dr. Eckener, von Zeppelin had earned the admiration of the German people. He soon started receiving money in letters, sent in by people from all over Germany. The smallest donation was 7 Pfennig, sent in by a little girl, and the largest was 100,000 Marks from the Mining Association of Essen. The Kaiser and the King of Württemberg, having forgiven von Zeppelin for his offending remarks, also donated money. Those who could not send money sent wine, sausages, hams and other food items. In all, the voluntary and spontaneous donations amounted to 6,096,555 Marks.

The Zeppelin works were saved, von Zeppelin's honor had been restored, and the name of the inventor and his invention became linked forever. There was a period of Zeppelin mania starting in 1909, and much has been written about the Germans and their zeppelins. Theories have been put forward that the zeppelin indicated a national sense of inferiority, as well as a Freudian sense of inadequacy. Whatever the reason, only the Germans could build zeppelins, they were a technical marvel, and they were magnificent flying machines.

In early 1909, LZ 5 carried out the 24 hour flight, and the War Ministry bought LZ 3 and LZ 5, re-numbering them Z 1 and Z 2. In November of 1909, von Zeppelin created the Deutsche Luftschiffahrts-Aktiengesellschaft, or DELAG, German Airship Travel Corporation, the worlds first commercial airline. The LZ 6 was the first commercial aircraft and flew from August 25, 1909, to October 1910, when it was lost in a fire. A series of accidents destroyed LZ 7, LZ 8 and LZ 9, with no loss of life, but nearly bankrupted DELAG. In 1911, LZ 10, the *Schwaben*, was completed and began passenger service. It completed 218 flights, and on June 28, 1912, it caught fire and was lost, with no loss of life. By 1912, DELAG had the airships *Victoria Louise*, *Hansa* and *Sachsen* in operation. Stamp collectors requested airmail, and zeppelin mail soon became a significant factor in financing commercial zeppelin flights. Also in 1909, the rival airship firm of Shütte-Lanz was founded. Their airships used laminated plywood girders for the airship frame, where zeppelins used duralumin, an aluminum alloy that was as strong as steel, but much lighter.

DELAG provided safe and reliable passenger, light cargo, and airmail service in Germany on as regular a

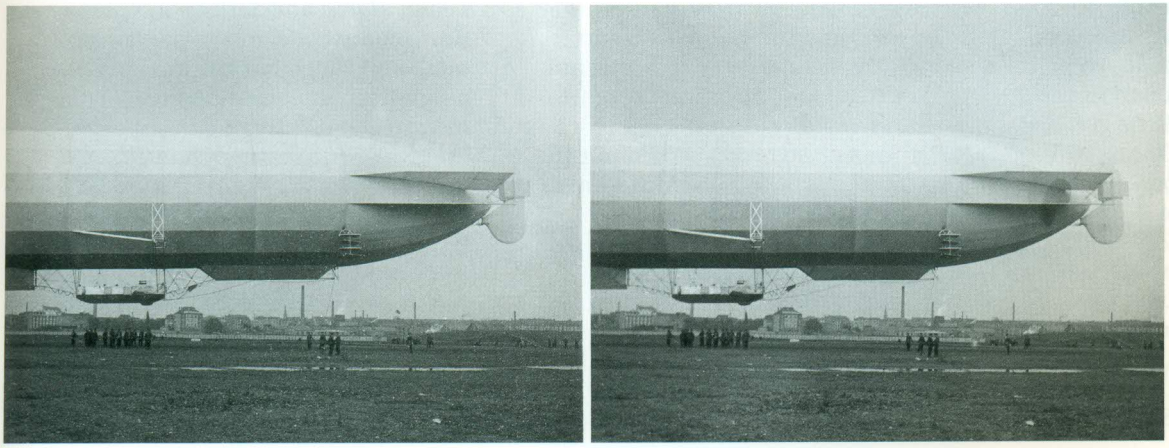


NPG No. 3, "Zeppelinlusftschiff 'Schwaben' bei der Landung." (Zeppelin Airship Schwaben, *after Landing." This is a view of LZ-10,* Schwaben, *a DELAG airship. It was lost to fire on June 28, 1912 on the landing field at Düsseldorf. During its brief career, it carried 4,354 passengers in 224 flights, and flew over 16,900 miles. The clumsy forward elevators have been replaced with elevators at the rear. The passenger cabin was located at the middle of the airship.*

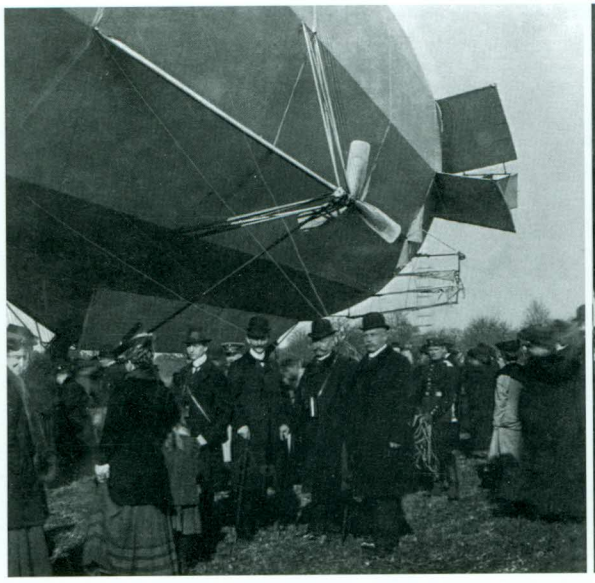
basis as the weather allowed. In the spring and fall there were special two-hour pleasure cruises where food and wine were served and the passengers relaxed in wicker chairs and enjoyed the scenery. During these pleasure cruises, and between regular passenger flights, Army and Navy personnel received training. By July 31, 1914, DELAG airships had safely carried 10,197 passengers on 1,588 trips, covering 107,231 miles. When the war started, all airships, the Zeppelin works, and the Shütte-Lanz works were taken over by the German government.

DELAG had a remarkable safety record, although it had lost airships, no accidents occurred while passengers were aboard. The army and navy airships had a number of accidents prior to the start of the war, which included the deaths of crewmen. Airships were extremely difficult to fly. They were affected by the slightest change in wind direction, temperature, humidity and altitude. To keep the ship in trim, ballast had to be dropped, or gas vented. It was a delicate balance to keep the airship stable in the air, and a vigilant watch was maintained at all times by the flight crew in the control gondola. The other airship crewmen were also vigilant in keeping the engines running smoothly, checking the gas cells for leaks, checking the structural frame for buckling girders, and watching the airship envelope, looking for rips or tears in the fabric covering.

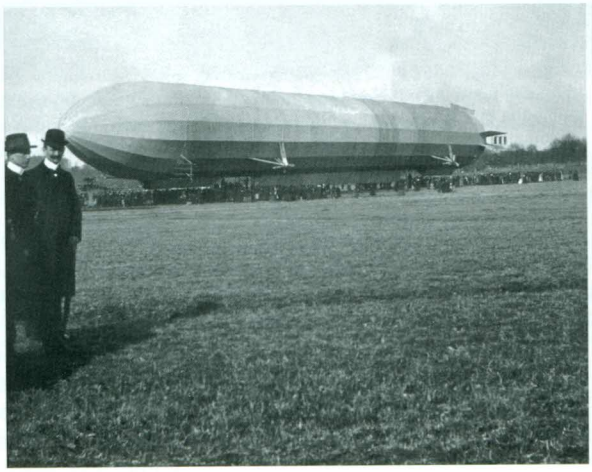
When hydrogen is mixed with air, a very dangerous and explosive mixture is formed, and the smallest spark or heat source could set it ablaze. Engines could overheat, or lightning could strike, and in a moment, the ship could be on fire. During long flights an airship could build up a static electric charge; sometimes the whole ship and crew would be glowing with St. Elmo's fire. To prevent sparks, rubber soled shoes were worn by all crewmen, the engines and exhaust pipes were shielded, and smoking was strictly forbidden. Air currents and cross winds were a danger, and could send the ship into an uncontrolled dive or climb, both potentially disastrous. When unexpected events occurred, the airship captain had only a few moments to give the correct com-

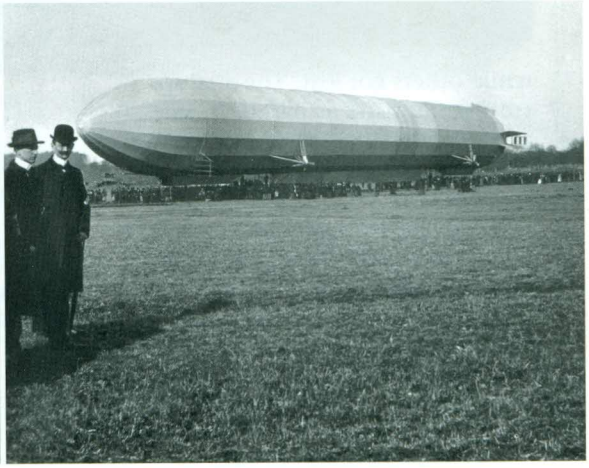


Unmarked glass view of the rear of LZ-3, showing the details of how the rear-engine gondola was attached the airship frame, how the propeller assembly was braced to the airship frame, and the complex rudder/ elevator structures at the tail end. The men in the gondola and under the airship give a good indication as to the vast size of the zeppelin. (Courtesy Didier Reboul)



Enlarged detail of an NPG view of LZ-3 showing details of the rear portion of the airship. Note the long drive shaft that connected the propeller to the engine in the open gondola, and the bracing of the propeller assembly to the airframe. Also note the angled stabilizing fins at the rear with rudder panels between them, and the four level elevator fins at the bottom of the tail of the zeppelin. (Courtesy Martin Kohler)





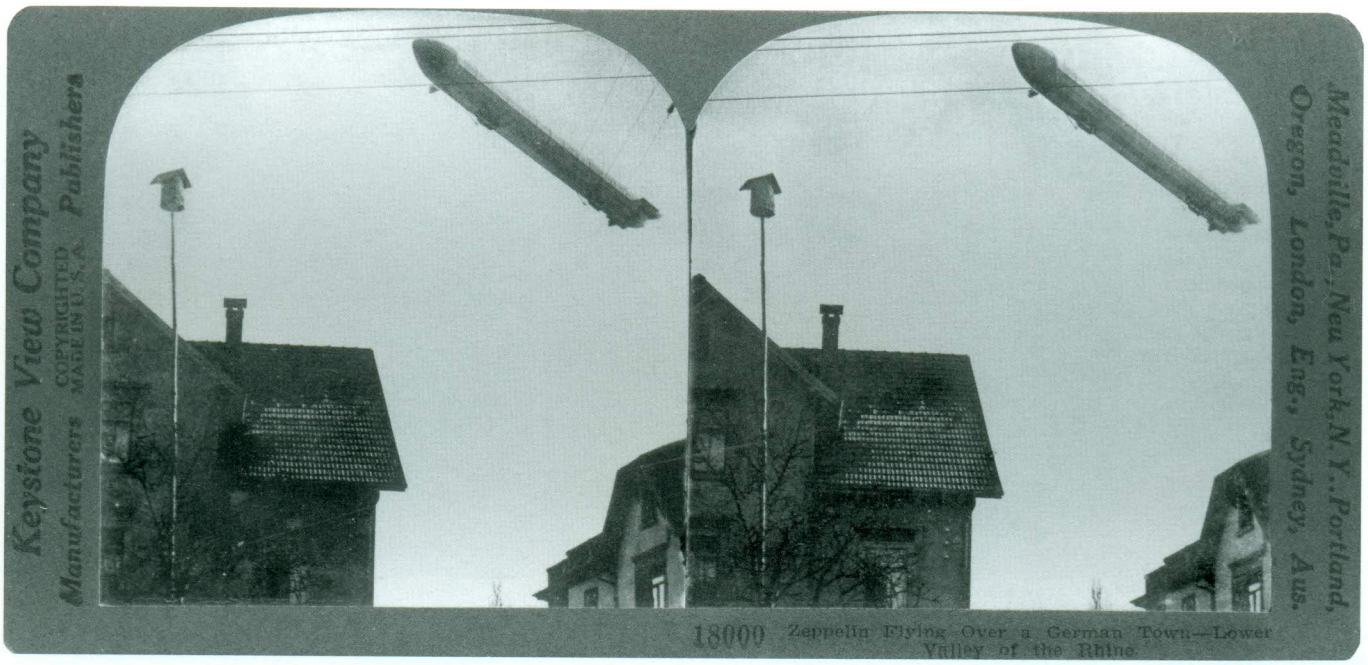
Enlarged detail of an NPG view of LZ-3. The front and rear propellers are clearly visible, as are the front elevators. These were dropped from LZ-7, as it was determined the elevators were more effective at the rear of the airship. Later on a cruciform tail structure was adopted, with the vertical fins acting as the rudder, and the horizontal fins acting as the elevators, offering more effective control for the airship. (Courtesy Martin Kohler)

mands to get the ship back in trim. Airships were especially vulnerable to cross winds at landings, when most of the water ballast had been dropped, and the gas cells vented for landing. Entering or exiting the huge zeppelin sheds was a dangerous time for an airship, where a gentle 10-mph crosswind could push the ship into the sides of the shed, and damage the ship. More than one airship was wrecked coming out of or going into the shed when winds drove it into the side of the building, some on their very first flight. The best airship pilots developed a sixth sense of reading wind and weather conditions. They always remained calm, and had the ability to make the correct speed, rudder and elevator adjustments.

With the coming of the war in 1914, the Zeppelin and Shütte-Lanz airships were put to work on scouting and bombing missions. The Zeppelin and Shütte-Lanz works were shifted into an intensive wartime research and construction program. The Europeans envisioned a short and decisive war, but events took a different turn. As the war drew on, orders came in for airships that could patrol the North Sea, the Baltic Sea, and bomb London. The pre-war airships were used on the Western and Eastern Fronts, and did not have the range to threaten London, although they did bomb Antwerp, Warsaw and Paris. By the end of 1914, a number of them had been shot down by artillery and machine gun fire, some in flames, showing that they were extremely vulnerable to enemy fire.

The German naval airship service was commanded by Fregattenkapitan Peter Strasser, a very charismatic officer, who was utterly convinced the zeppelins could bomb England out of the war. He greatly overestimated the abilities of the airships, but he never lost his fanatical belief in them. He was killed on August 5, 1918, aboard LZ-112. The zeppelin had dropped its bomb load and was headed back to base. It was attacked and set on fire by a DH-4 aircraft over the North Sea, with no survivors. The death of Strasser put an end to the naval airship division's bombing campaign.

Before the war there was much speculation on how effective the zeppelins would be as bombers, the damage they could cause, and terror they could generate. In 1914, they had great promise, and building zeppelins became a priority. The airships were built larger, and with more engines so that they could fly higher, farther, faster, and carry more bombs. They were able to fly at a speed of 60 mph, and carry up to three tons of bombs. Some raids had as many as 16 airships involved. In theory they should have been able to deliver a massive bomb load on the target. In reality, zeppelin attacks were poorly coordinated. The zeppelin formations broke up, some would turn back with mechanical problems,

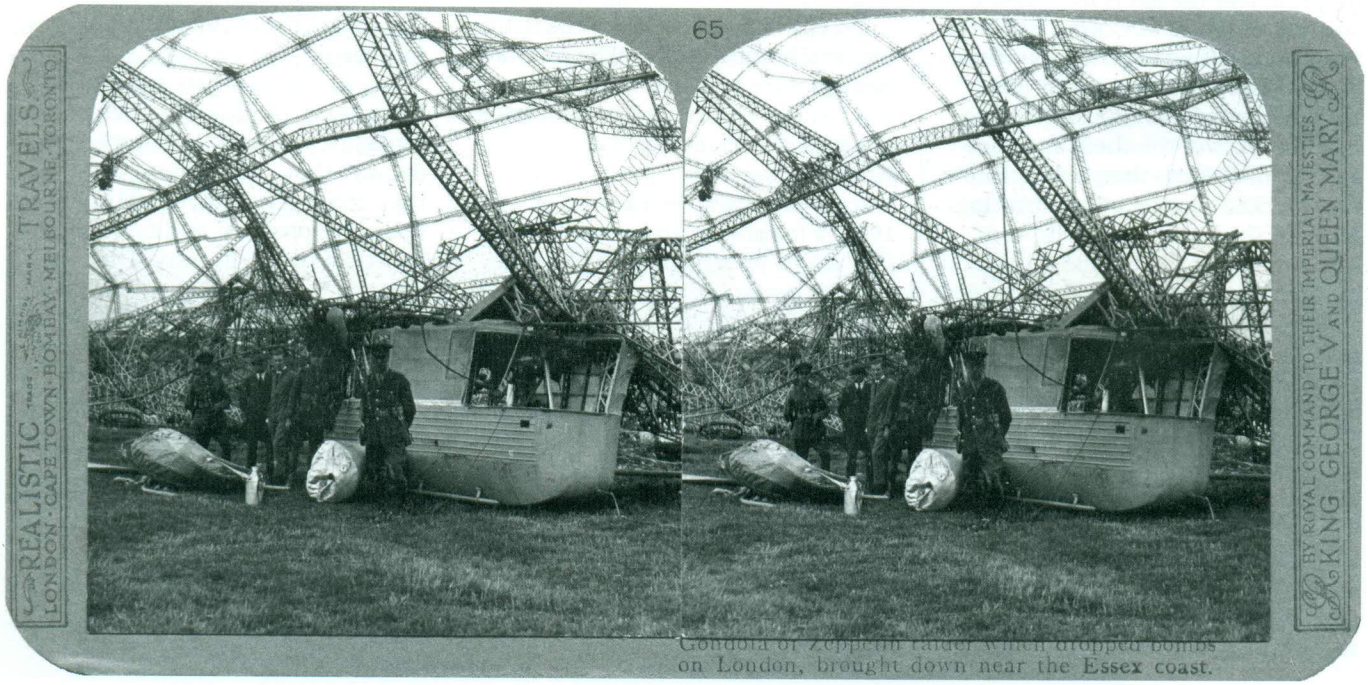


Keystone No. 18000, "Zeppelin Flying over a German Town - Lower Valley of the Rhine." This well known Keystone view was part of every single Keystone war view set from 1916 to 1932. The image was acquired from NPG in early 1916, before the United States entered the war. It shows LZ-3 in flight in 1910. LZ-3 flew from October 9, 1906 to 1913 when it was decommissioned. (Courtesy Mike Griffith)

while others got lost. The airships reached England at different times, at different altitudes, and over different cities and towns. Navigation at night was by dead reckoning, and the airships were rarely over the cities they thought they were bombing. The process for dropping bombs at night was as inaccurate as the navigation, and many bombs fell on open fields or in the ocean. At one point the British thought the Germans were trying to starve them by bombing farmland and destroying fields full of crops.

The first raid on England was on January 19, 1915. The weather was calm, there were no clouds, and England had no air defense. The airships went about their business in a seemingly leisurely manner. Although the bombing was spread over a large area, damage was done, and people were killed. The terror the zeppelins created was enormous, much greater than any physical damage they caused. As the raids continued, the air defense of England grew stronger, and the

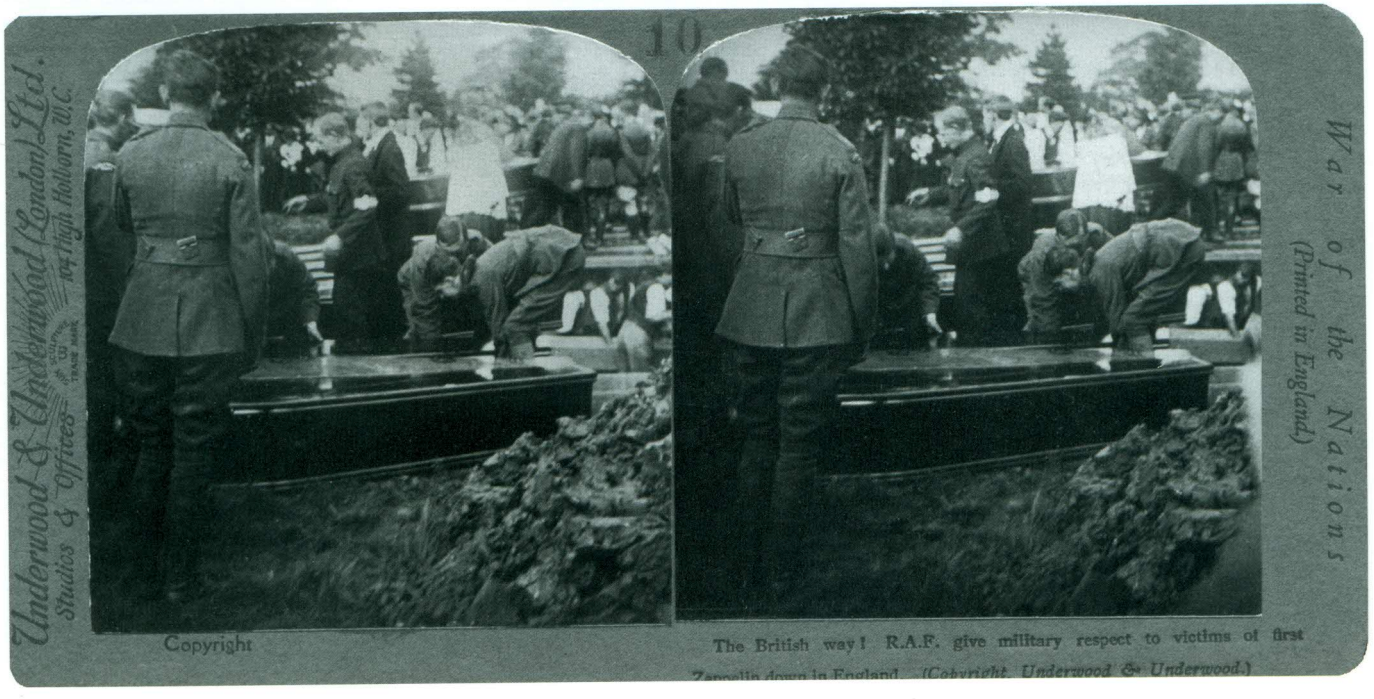
Realistic Travels No. 65, "Godola of zeppelin raider which dropped bombs on London, brought down near the Essex coast." The remains of LZ-76, which came down with every gas cell punctured on September 24, 1916. This was the first operational flight for the LZ-76. The crew attempted to burn the ship, but were unsuccessful in fully destroying the wrecked zeppelin. Also on board was a German Naval code book, giving British intelligence a copy of the current German naval codes. As the airship was nearly intact when it crash landed, it was studied intensely, and was the basis for the design of R-33 and R-34 airships. (Courtesy Robert Boyd)

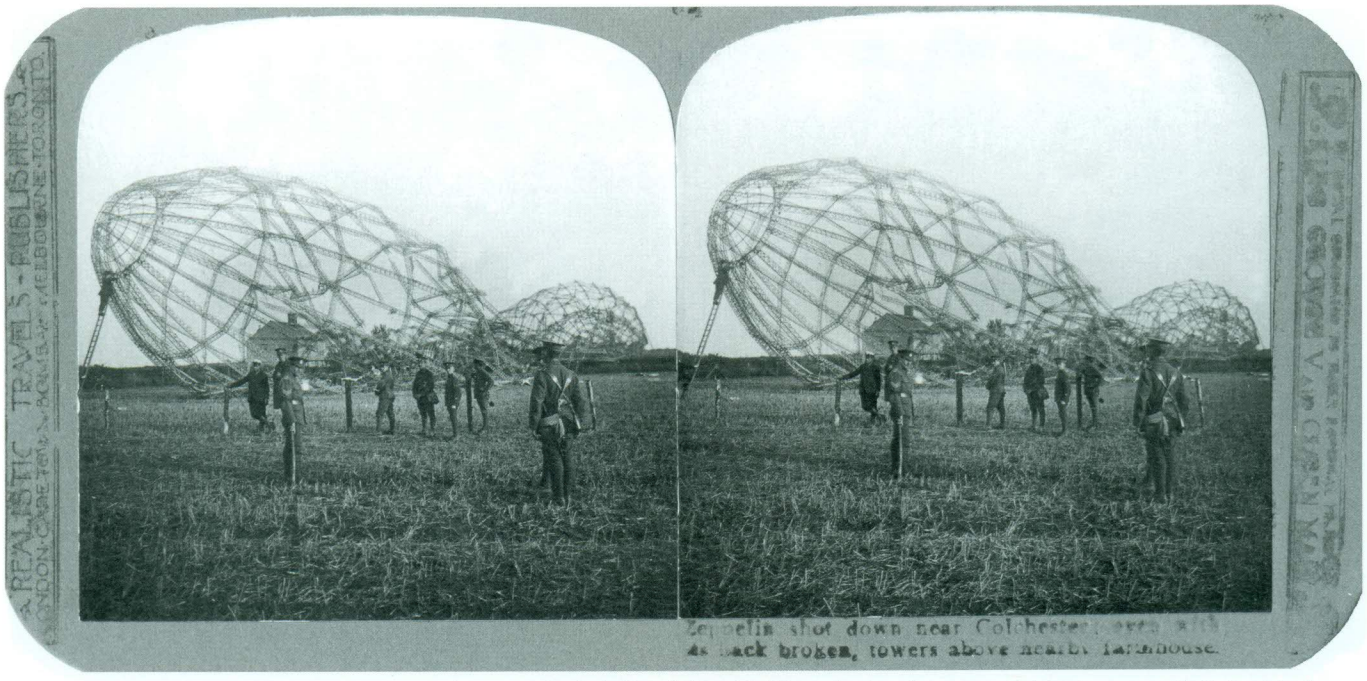


Realistic Travels No. 66, "Impression made in the ground by Commander falling from burning Zeppelin at Billericay." This was taken October 3, 1916, at the wreck of LZ-72. It was shot down by Second Lt. W.J. Tempest of the Royal Flying Corps flying a BE-2c, just north of London on October 2, 1916. The impression is that of Kapitan Leutnant Henrich Mathy, one of the best airship captains of the German Naval Air service. He was still breathing when he was found but died before medical help arrived. Mathy had an uncanny ability to navigate at night, bombing the center of London in 1915. That single bombing run accounted for one sixth of all deaths and damage caused by the entire zeppelin bombing campaign. His death marked a turning point in the zeppelin campaign, and fixed wing aircraft began taking over the strategic bombing of England. (Courtesy of Robert Boyd)

bombing runs stopped being leisurely affairs, and became a deadly race for the zeppelins to find targets, drop their bombs, and get away before they were caught by searchlights and fired on by anti-aircraft guns or intercepted by aircraft. Some airships went down in flames in a spectacular display. They lit up the night sky to daylight levels for the few seconds it took the hydrogen to burn. This was a truly dreadful sight for the other zeppelin crews, who could see a burning ship up to 100 miles away. Other airships would go down slowly with punctured gas cells. Every unnecessary object would be thrown

Underwood & Underwood No. 10 from the War of the Nations series, "The British way!" The R.A.F. give military respect to victims of the first Zeppelin shot down in England. The War of Nations series was published shortly after the end of the War, and only available in England. This is the burial of Kapitan Leutnant Henrich Mathy and his crew of LZ-72, which was not the first zeppelin shot down over England. Mathy was as well known in England as he was in Germany, as an ace airship captain, whose bombing missions were usually very destructive. Few other airship commanders were as capable, and his death was a severe blow to the German Naval Airship Service.



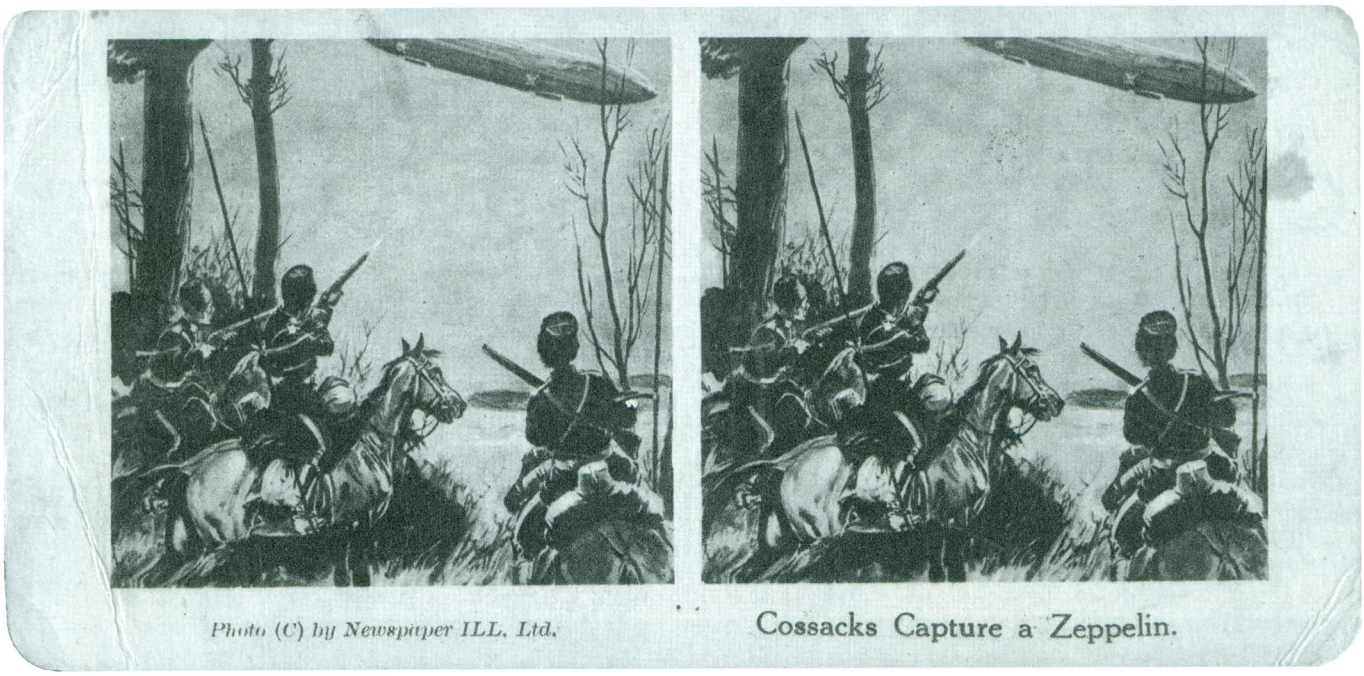


Realistic Travels No. 64, "Zeppelin shot down near Colchester, even with its back broken, towers above nearby Farmhouse." A wider view of the wreck of LZ-76 that came down nearly intact with punctured gas cells. There was so little hydrogen left in the lifting cells, the ship did not burn completely when the crew set it on fire. The crew attempted to reach the coast and steal a boat to return to Germany, but the local police and home guard soon had them under arrest. Realistic sold a basic set of 100 war views. As time went on, they added views to their sets in boxes of 100. Eventually it was a massive set of 600 views. Photos were duplicated, as well as captions. (Courtesy Mike Griffith.)

overboard to lighten the ship, but many still crashed before reaching base. Some of them crashed in the North Sea, some in England, France and Denmark.

During the war 196 tons of bombs were dropped on England by the airships, in 51 raids, leaving 557 people dead and 1,358 injured, about equal to the number of airship crewmen that were lost. One sixth of all damage was caused by one airship, on one raid in 1915. It bombed the center of London, causing massive damage. That raid showed the potential the zeppelin had for delivering devastating destruction, if a dense urban area was bombed. Diverting men and equipment from France for home defense in England was a goal of the airship campaign, and it was very successful in that regard, but at a great cost in zeppelins lost to enemy fire. The concept of bombing cities far removed from the battlefield was new, and filled people with terror and hatred for the Germans, especially the zeppelins and their crews. The hatred was so great, that

Realistic Travels No. 571, "Aluminum rudder of Zeppelin brought down in England." Another view of the wreckage of LZ-76. The caption indicates that this is the rudder of the airship, but it could also be an elevator fin. This view is from the last group of 100 added to the Realistic Travel set of 600 views. (Courtesy Bob Boyd.)



Newspaper ILL, Ltd, "Cossacks Capture a Zeppelin." A stereo painting, sold during World War One through newspapers. The event in this painting occurred during the Battle of Tannenburg, which was fought from August 23 through August 31, 1914. It was a crushing defeat for the Russians, although a zeppelin was shot down behind Russian lines and the crew was captured by a troop of Cossacks. There were a series of cheaply produced "stereo" views sold through newspapers during the war. Some were paintings, others were photogravure or lithographs. The paintings were never true stereoviews. The photos sometimes were, if they had been acquired through Underwood & Underwood, but usually they were flat.

when one British trawler came upon a downed zeppelin in the North Sea, the trawler captain reported its location to the Royal Navy, and then left the surviving zeppelin crewmen to their fates in the water.

To counter the stiffening defenses around England, the zeppelins flew higher, over 15,000 feet, they flew only on moonless nights, and were painted black. Zeppelin crews began to black out and die from lack of oxygen at the high altitudes. After some testing, tanks of liquid oxygen were carried on the high altitude raids. The high altitude flights also encountered intense cold and unexpected wind currents, bringing new dangers to the airships. Ice formed on every surface of the airship, sometimes overloading them and causing them to crash. Ice formed on the propeller blades and ice shards were thrown off in large pieces, some puncturing gas cells. No heaters were allowed on zeppelins, so the crew had to bundle up in coats stuffed with newspaper. The oil lines froze and burst, radiators froze solid, and engines seized up, while the crew often got frostbite, and had difficulty performing simple tasks from the effects of the high altitude and intense cold. Soon the British had aircraft that could reach 15,000 feet, and the zeppelins had to go higher. The last wartime zeppelins were the super height climbers, able to fly over 20,000 feet. The high altitude did keep them safe from enemy anti-aircraft fire and fighter planes, but navigation was even more difficult, and bombing became mostly guess work, and even more inaccurate. The structural frames of these airships were lightened so that they could carry more bombs and fly higher, but it made them dangerously fragile, and only able to fly in the best weather conditions.

There were 125 airships built during the war, and 79 of them were lost. Bad weather destroyed seven airships on the ground, 38 were lost to accidents, and 39 were lost to enemy action. As a strategic bomber, the zeppelins proved to be inadequate for the task, although they were effective terror weapons. As a long-range naval patrol craft, they were ideal, and could be built and operated for a fraction of the cost of a navy cruiser. In the lead up to the naval battle at Jutland in 1916, the German High Seas Fleet was performing a sweep of the North Sea, hoping to catch a few ships of the Royal Navy. The British had broken the German Naval code in 1914, and monitored all German wireless communications. They always knew when and where the German High Seas Fleet was going to sail, and in what numbers. They had sent the entire Royal Navy out, hoping to catch the German fleet, bring it to a decisive battle and sink it. A zeppelin spotted the British Navy heading toward the German fleet, and was able to send a warning by wireless. The timely message from the zeppelin is credited with saving the German High Seas Fleet from the trap being set for it by the much larger British Royal Navy.

There were experiments with endurance flights lasting up to five days of continuous patrolling over the Baltic. These were very successful, the only complaint from the crew was the monotony of pea soup served at each meal. The soup was heated up on a metal plate welded to the top of one of the inboard engines. The success of the five day patrols lead to a plan to supply the garrison of German East Africa by zeppelin. German East Africa, now called Tanzania, was the last remnant of the German colonial empire that had not fallen into Allied hands. They were waging a hit and run guerilla campaign. The 10,000-man Schutztruppe had nearly 100,000 Allied troops combing the bush trying to bring them to a decisive battle.

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Giants in the Sky: Zeppelins

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The African garrison had been cut off from all supplies and reinforcements since August 1914. As a morale booster for the home front, a mission to supply East Africa by zeppelin was planned. This was an ambitious plan, as no aircraft had ever flown such a distance before. This was intended to be a one-way trip, with no return for the airship crew. As it was a very speculative one-way trip, the best airship captain and crew were not chosen for the Africa mission. A number of delays and problems prevented the flight from happening on schedule.

The LZ-104, the largest zeppelin ever built to date, finally set off for Africa from Jamboli, Bulgaria. While the flight was being planned and the delays mounted, the German Schutztruppe was pushed out of German territory, and was no longer able to reach the rendezvous point with the zeppelin. They moved into Portuguese East Africa, where they attacked a Portuguese arsenal, and captured enough medical supplies, food, rifles, ammunition, boots, and uniforms to last them for several more years of guerilla warfare. When news reached Germany that supplies were no longer needed, LZ-104 was only a few hundred miles away. The zeppelin was contacted by wireless, and ordered back to Bulgaria. While the Africa flight was a fiasco, it flew the equivalent distance from Berlin to Chicago, a fact not lost on the German high command. Plans were made for a super long-range zeppelin, LZ-114, which was to bomb New York City, but the war ended before the airship was completed.

Graf von Zeppelin died in 1917, having seen his invention show promise of being a wonder weapon capable of taking the war to the heart of Germany's enemies, and then fail to deliver the decisive blow as envisioned. After the death of von Zeppelin, Dr. Eckener became head of the Zeppelin works. He did his patriotic duty and worked closely with the Naval Airship Division, often piloting zeppelins on scouting missions. His vision for the airship was as strong as von Zeppelin's, but it was not for war. He envisioned a worldwide network of passenger airships, rivaling the great ocean liners, delivering passengers in style, luxury and safety from one continent to another at a speed no ocean liner could match. He would spend the rest of his life pursuing this goal.

While the military use of the zeppelin had mixed results, the Zeppelin works greatly accelerated its knowledge of how to build and fly airships due to the extreme conditions the war forced upon them. In 1918, the Germans were the masters of building and flying airships, and the victorious Allies intended to put that to an end. As 1918 drew to a close, the future of the Zeppelin works looked very bleak. The Allies were intent on disarming Germany, and dismantling all of Germany's military industry, including the Zeppelin works. At the end of World War One, lighter than air travel was still considered an important avenue in conquering the sky. The British were finishing up two airships of their own, both copied from a downed zeppelin.

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The Americans were also hard at work building an airship base in Lakehurst, New Jersey, and had plans to build airships, also copied from a downed zeppelin. Italy and the new Russian government were at work developing airships as well. The post-war future of airships looked strong, but not in Germany.

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