

Baring the Super-Zeppelin's Secrets

What the French found when they examined the L-49 which fell into their hands after an air raid on England

By Carl Dienstbach

IT was the oddest sort of an accident that preserved the L-49 intact for French inspection. She was one of a fleet of super-Zeppelins which had successfully eluded the airplanes and anti-aircraft guns of Great Britain, only to come to grief on French soil. She lost her way. Her gasoline supply exhausted, she was compelled to descend in the heart of France. True to his duty, her captain attempted to destroy her. He leveled the pistol which was to fire into her great hydrogen-filled envelope a flaming pellet, when he heard a shout:

"Hands up!"

He looked around and found himself gazing into the muzzle of a shotgun in the hands of Jules Boiteux, who had been out hunting. The crew had retired to a safe distance because of the conflagration that would follow the ignition of the gas. There was nothing left for it but to yield. And so a man with a shotgun captured one of Germany's latest super-Zeppelins and placed in the hands of the French Government military information almost priceless.

How Fuel Was Sacrificed to Carry Bombs

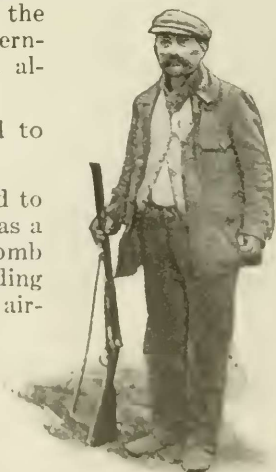
Why was the L-49 forced to land? A super-Zeppelin has a radius of action and a bomb carrying capacity far exceeding that of any other type of aircraft. The experiences of the war have demonstrated that the dropping of a mere bomb or two is a futile proceeding. Literally tons of explosives must rain down from the sky to justify the risks of a



One of the control cars attached to a super-Zeppelin. Its functions are evident

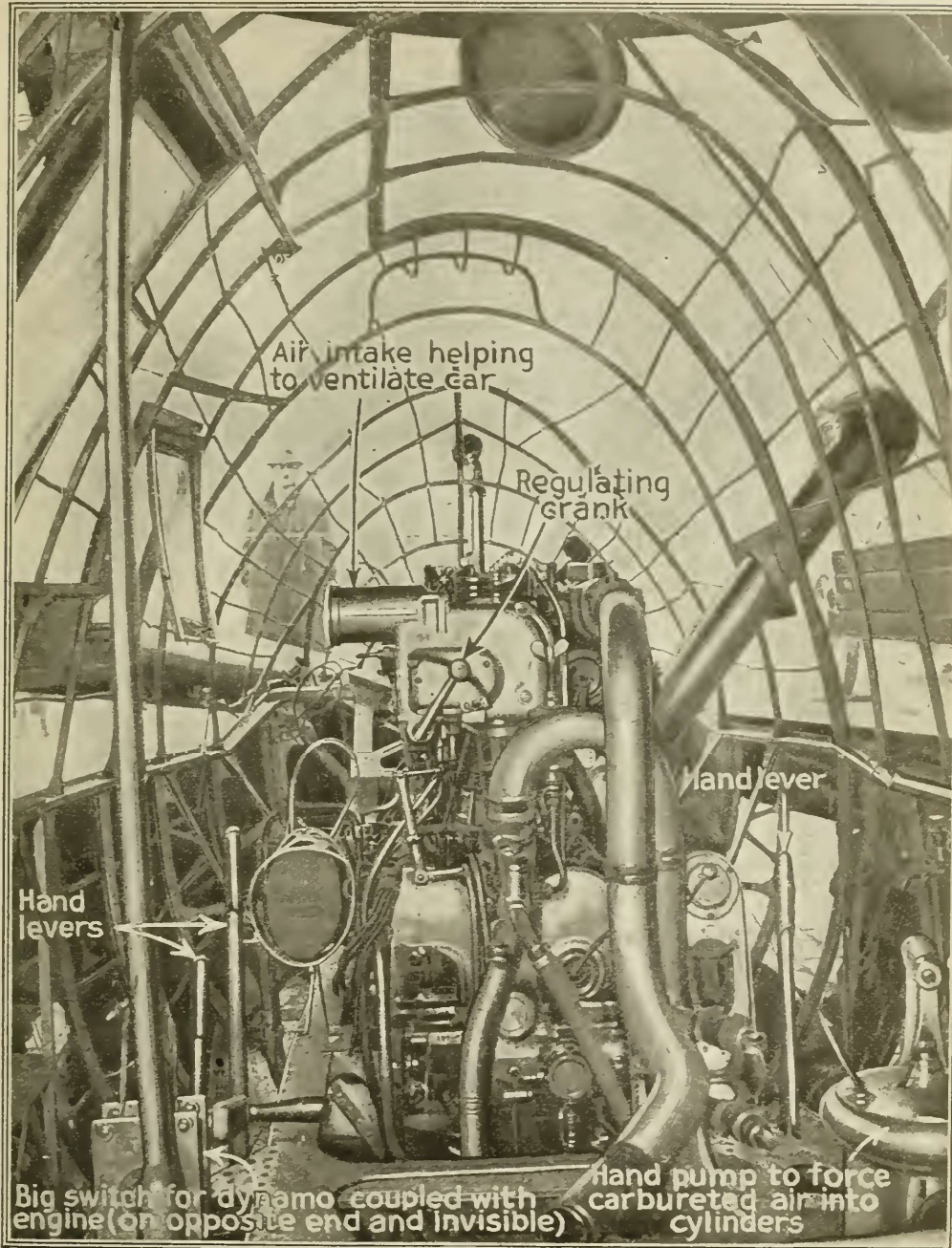
bombing expedition. When airplanes set out to raid German towns they travel in scores—a fashion inaugurated by the French. Only thus is it possible to deliver a telling blow. Because of its enormous carrying capacity, a super-Zeppelin is in many respects a better bombing apparatus than a flock of airplanes. But the L-49 could not carry tons of explosives from Oldenburg to London without sacrificing some of her fuel-carrying capacity. Her fuel load had to be reduced to an unsafe minimum.

This juggling of loads also has its effect on the maneuvering power of a Zeppelin. It has been pointed out more than once in the pages of the POPULAR SCIENCE MONTHLY that a huge dirigible flies not only as an airship but also as an airplane. In other words, it is buoyed up not only by its gas, but also by the upward pressure of the air against its enormous surface. Indeed, were it not for the pressure of the air against its thousands of square feet of exposed area—a pressure comparable in every respect with that which keeps an airplane aloft—the giant rigid dirigible would be an impos-



He did it with his little shotgun

Zeppelins Are All Ribs and Machinery



French Official Photo

Interior of a Zeppelin Engine Car

Now that the secrets of a Zeppelin's structure are completely bared to the Allies, the question arises whether it is not as difficult to succeed in running one of the machines as to build it. German officers say they would not mind giving the Allies a Zeppelin. They think only Germans could run it. The difficulties of getting the ships in and out of hangars, are very considerable

sibility. It is this air pressure which is relied upon to control the craft when the gas expands at great height and is dissipated, or when it shrinks in volume in a cold layer of the atmosphere, or when tons of weight are added by dew, rain, snow or sleet. Moreover, descending or ascending currents of air force the ship up or down, and these currents must be counteracted by flying the ship airplane-style.

All this means that much is expected of the engines. The ship must be driven through the air at high speed if the most is to be made of the airplane effect. Since so much depends on mere motive power, the L-49 had been reduced to a huge cylinder of gas, a few cars for the crew, an enormous load of bombs, and the most powerful engines that air can support.

Wireless Signals from Germany Guide the Zeppelins

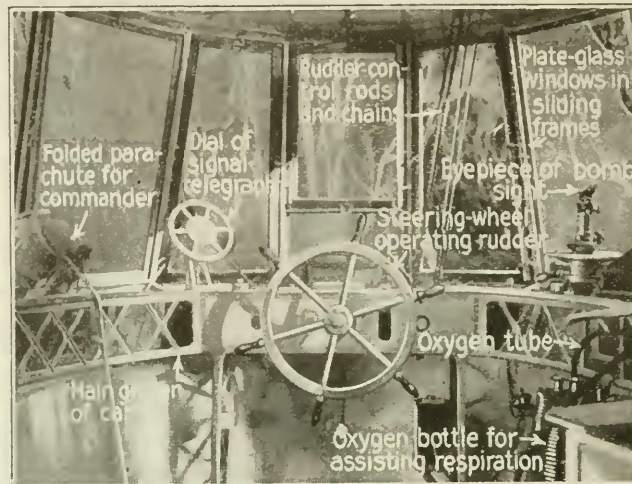
The passenger-carrying Zeppelins that plied over the Rhine before the war, had luxurious cabins. Fully three times as bulky as these ante-bellum vessels, the L-49 was nevertheless as bare of comforts as a racing automobile. She had been stripped of everything not absolutely necessary. For instance, she had only two machine guns; hence she was practically defenseless.

To the necessity of greatly reducing the amount of fuel so that an enormous quantity of bombs might be dropped on England, may be attributed the capture of the L-49 on French soil. Just how she lost her way, it is needless to explain here; the subject is discussed in the April

issue of the POPULAR SCIENCE MONTHLY. It may be stated in passing, however, that Zeppelins are guided by wireless signals sent from German stations.

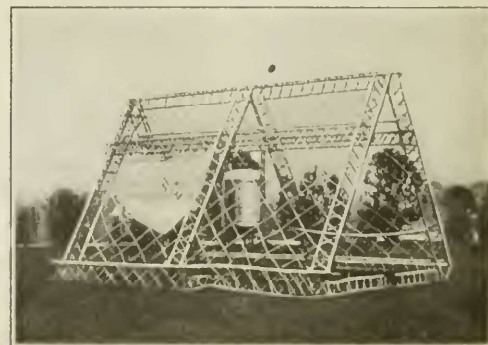
The capture of the L-49 may be attributed either to those unexplained vagaries of wireless with which every amateur operator is familiar, or to ingenious radio deception on the part of the English or French. Of a fog-bound

raiding squadron of a dozen or more ships, two returned safely on their regular course; six lost their way, drifted temporarily over France, luckily for them unobserved, and succeeded in stemming a frigid, violent northeasterly gale that had sprung up enough to regain German territory. The rest succumbed to attack and came to the end of their supplies in a gale which they had had to buffet with a limited amount of fuel. Rising to an altitude of 16,000 feet to escape shells and pursuing airplanes, they encountered an upper wind so violent that they drifted



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Interior of the commander's cabin, L-49. This was the directing head, and navigating center of the big craft



© Kadel & Herbert

This is the triangular keel (part of it at least) from the ridge of which fuel tanks are hung like clothes from a wardrobe pole

farther and farther into France in spite of all their fuel-wasting efforts. One vessel had been ignited in the air by an anti-aircraft battery into the range of which it had blundered. One senselessly kept on fleeing until it was literally swallowed up by the Mediterranean. Two wisely landed and surrendered. One of them was the L-49 which was so oddly prevented from hiding its secret by self-destruction; the other was reduced to a mere mass of wreckage by its commander. A fifth, of uncertain identity, is supposed to have gained Switzerland (possibly Friedrichshafen) in a damaged condition.

An Immense, Naked Hull of Perfect Form

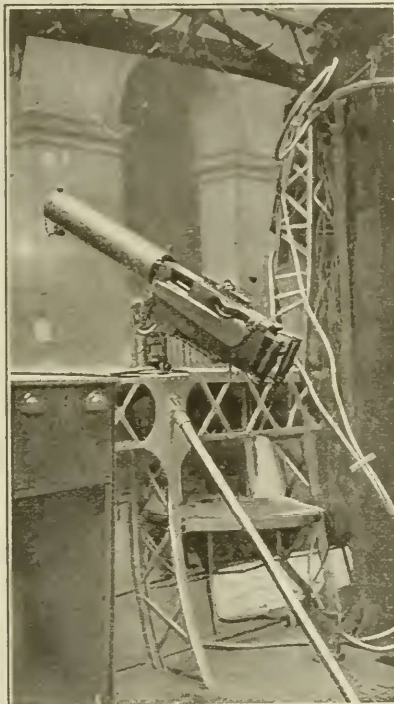
The marvelous progress in design revealed by the L-49 is apparent to anyone who is at all familiar with the evolution of the Zeppelin. Her perfection lay in her simplicity. Speed is the life and soul of a Zeppelin—a speed that is never less than sixty miles an hour and may be as much as one hun-

dred. Speed saves the Zeppelin from destruction in a gale. And speed has been obtained by trebling the size and by applying the lessons learned in developing

the one-hundred-and-thirty-mile-an-hour fighting airplane.

In an airplane, it will be remembered, wires and struts are eliminated wherever possible; they offer too much resistance to the wind. The aviator is seated in a beautifully modeled boat-like body which parts the air with little disturbance, thanks to its streamline form. The rudders are as simple as possible. All the lessons which the war has taught the airplane designer have borne fruit in the L-49. There is the same inclosing of mechanical and structural parts, the same streamlining everywhere, the same simplification of rudders, the same reduction of surface and friction,

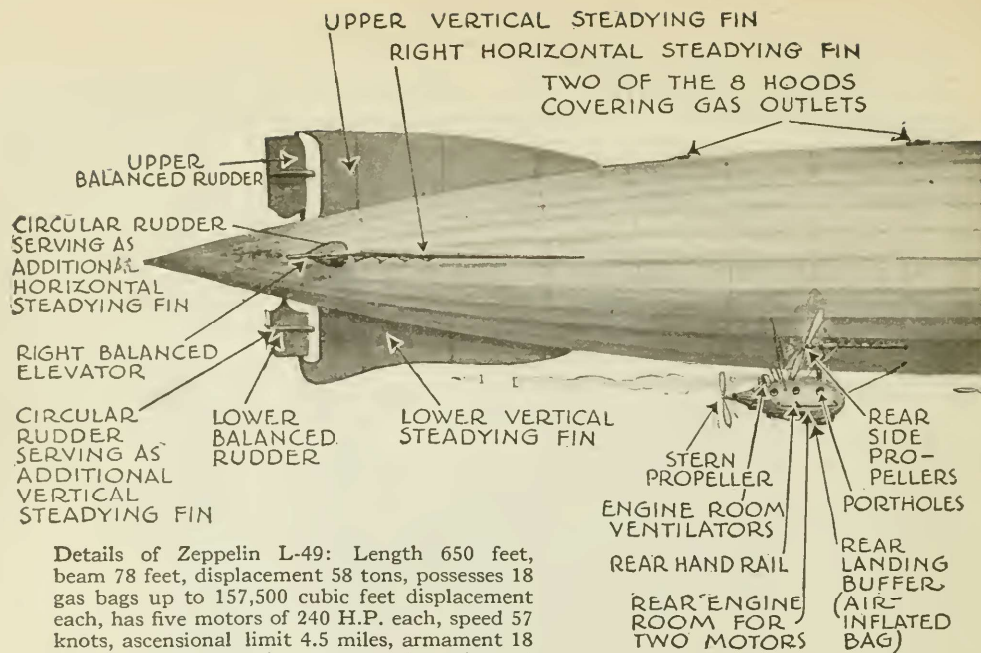
the same disregard of mere bulk, provided it is correctly designed. As the drawing shows, the L-49 is but a naked, immense fish-shaped envelope of perfect stream-line form, with single monoplane fins and rudders, and with absolutely no appendages save four cars, each entirely enclosed and each torpedo-shaped. Only a rigid hull permits such ultra-refinement of form. Here we have another parallel with the development of the airplane. As the number and rigidity of the ribs in an airplane was increased, so all types of dirigibles have ceded their place to the Zeppelin despite opposition—all for perfectly good and practical reasons. The smooth, clean sweep of the craft was broken on the



French Official photo
Machine-gun of the commander's cabin of the super-Zeppelin L-49



A pile of Zeppelin fuel tanks. The airships must carry much fuel because of long trips and exigencies met with



sides and at the rear car only by the mountings and shafts of two propellers—a strictly necessary evil because two of the propellers must run when the cars rest on the ground and because the others behind the cars cannot revolve.

In the old Zeppelins there was a triangular keel under the hull. The L-49 has that keel too; but it has been inverted like a glove so that now it protrudes into the interior with the apex of the triangle uppermost. It stiffens the envelope—its function from the very beginning; but two-thirds of its air friction is eliminated by this ingenious tucking away of its larger sides. Why were not the cars and engines moved into the envelope as well? There was no necessity for that. Modern science teaches that a streamlined bulk affords no more wind resistance than slender irregular appendages. The cars were given the

shapes of torpedoes. Hence they offered no serious impediment to speed and dispensed with the weight of special apparatus for insulation and ventilation that would be needed for engine rooms inside the gas-inflated hull.

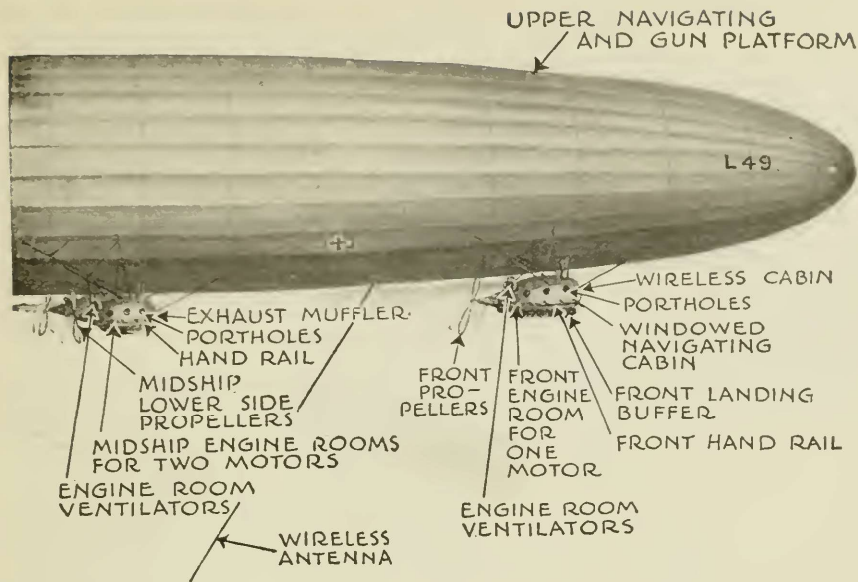
Small as the cars are, the space allotted for the crew is not "as restricted as in a submarine," as the French put it. There is an abundance of room in a wide passageway within the immense hull. But there is not as much comfort as may be supposed. These ample cabins serve merely as a shelter from the icy gale that beats against the outside of the ship. They are about as comfortable as the clouds of heaven are for the angels pictured in

children's books. Being pitched about at sea is nothing compared with a refractory Zeppelin airship.

A Zeppelin is at once the flimsiest and the staunchest of artificial structures. When the old Zeppelin was



Wreckage of a Zeppelin. A labyrinth of aluminum frames, engines, and elaborate control mechanism



trebled in size the weight could not be disproportionately increased.

“A Gigantic Piece of Lacework,”
said the French

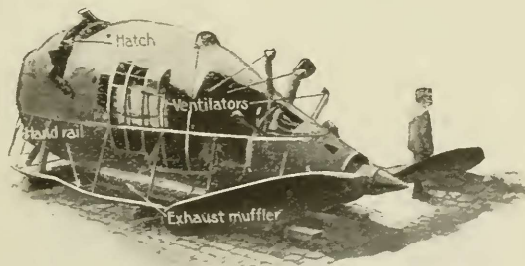
The framework of the huge hull in which the gas bags are confined has been multiplied in parts and reduced in material to a veritable cloud of riveted lattice-work made of channeled strips of the thinnest aluminum sheeting. Indeed, the frame of the L-49 has been described by the French as a “gigantic piece of lacework.”

This frame serves exactly the same purpose as the pole in your wardrobe, from which you suspend coats on hangers. As a whole, the frame could resist the fiercest gale, and yet it could not support a single man’s weight on one of its component parts! If ever there was a scientifically designed structure, it is this framework of the L-49. It is applied science with a

vengeance! From a long row of correctly placed hooks, hang all the aluminum fuel tanks, the water ballast tanks and lastly, all the bombs—just as the clothes in your closet are suspended from the pole on their hangers. The fuel tanks are dropped through trap doors on guides like ballast. The bombs fall similarly; but they are electrically released, since the one-hundredth part of a second is vital in hitting a target and human agency is too slow.

The Gloomy Boardwalk

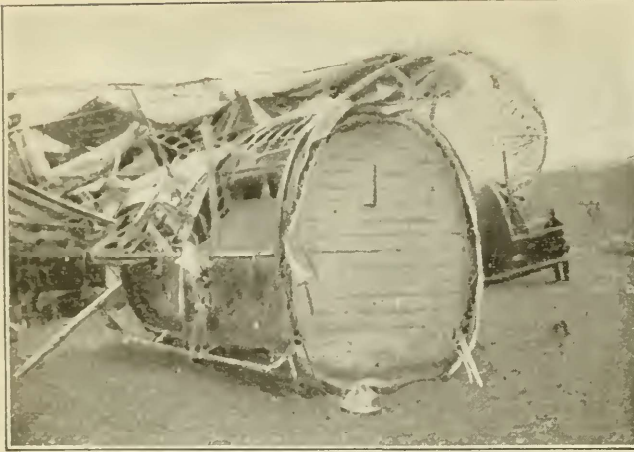
Within the framework is a long passageway for the crew—a mere boardwalk, nine inches wide, composed of wooden slats



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Rear view of car containing the Zeppelin engines and related mechanism. Note streamline form of the body

separated one from the other by several inches. Along this passageway hangs a series of hammocks or cots. The crew almost “sleeps on a clothes line.” Real comfort was merely a subject for pleasant dreams, for life in that passageway must have resembled that of a tight-



The padded wall which sealed off the noise of the engine room from the wireless cabin—another refinement

rope walker who dines and sleeps in pretended comfort on his lofty perch. Airships can roll and pitch like any steamer on the bounding deep, and so a hand-railing in the shape of a wire cable is provided on one side of this board-walk. If a man stumbles he is caught by a wide netting of rope cord, "the thickness of a pencil" as the French said—a netting placed, not to save his neck, but to stiffen the cloth covering of the hull against the gale. It is doubtful if that thin netting would save him from the abyss below. I traveled in the passenger Zeppelin "Viktoria Luise" before the war. I understand now why I was warned that "passengers are not permitted outside the cabin," by an officer who saw me peeping through the door that led into the passageway. At night a man is guided along this perilous board-walk not by electric lights (they would betray the presence of the ship to an anti-aircraft battery below), but by ghostly patches of luminous paint. Even in daytime the place must be weird and gloomy, because the ship's whole belly is painted coal black to make it invis-

ble at night. The upper surface of the hull is painted white and gray to blend with the clouds as seen from an airplane.

Other details of the L-49, the dimensions, the power, the number of engines and propellers and their arrangement only corroborate what has been quite correctly described in previous articles on Zeppelins, published in the POPULAR SCIENCE MONTHLY. The only important progress made consists in torpedo-shaping and stream-lining all the cars.

Although life on a super-Zeppelin is not exactly luxurious, some comforts at least are provided. The protection against the biting wind is perfect. The powerful dynamos which supply the radio apparatus also furnish current for electric heating.

The material of the gas bags is cotton-lined goldbeaters' skin. To me the chief advantage of such a fabric lies in the fact that it remains gas-tight in the flabby, even crumpled condition that the gas bags so often must assume when they return to a low altitude after they have been inordinately expanded by a flight at 10,000 feet and more.

This, then, is briefly the kind of machine a Zeppelin is. Germany's well-guarded secret is in the hands of the Allies at last, and they will no doubt make good use of it. They already have a good number of air-craft of their own, but pointers are always welcome, even from the enemy. If there is anything new or advantageous about this enemy machine the Allied engineers may be depended upon to utilize it to its full value, for Germany has not a monopoly of all the brains and ingenuity.



The super-Zeppelin's wireless; the very brains of the aerial monster. Note its size