

AIRCRAFT CIRCULARS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 159

THE DREIECK I TAILLESS AIRPLANE (GERMAN)
A Low-Wing Cantilever Monoplane

Washington
March, 1932

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

AIRCRAFT CIRCULAR NO. 159

THE DREIECK I TAILLESS AIRPLANE (GERMAN)*

A Low-Wing Cantilever Monoplane

By Edwin P. A. Heinze

On the instigation of Dr. Hermann Köhl, the successful German ocean flyer, Mr. Lippisch, the chief engineer of the Rhon-Rossitten Association, and his staff have developed a tailless airplane, which has so far shown excellent flying qualities. It was recently demonstrated at Berlin-Tempelhof airport before a party of prominent people interested in aviation and representatives of the press. (Figs. 1, 2, 3, 4, 5.) Dr. Hermann Köhl, as he said in a speech, sees in the development of this type of airplane the present most promising step towards achieving more economical airplanes, capable of profitable long-distance transport work across oceans and continents. He is personally interested in the early perfection of such airplanes, with which, as we know from other sources, he plans inaugurating a regular transport service between Europe and America.

From the performance of the first trial airplane it would appear that the new type promises well for the future. It was first built as a glider, which was successfully flown at the Rhon, and the experience there gained was such as to encourage altering the design into the present engine-driven airplane. In the glider the body was situated below the wing. It has now been built into the latter, with its top protruding above it, while the lower wing surface is flush. The wing is of the cantilever type, with a pronounced lateral dihedral angle. It has been constructed entirely of wood, with plywood leading edge and fabric covering. For this size of airplane the wing has an unusually deep section, and its plan contours are those of an isosceles triangle, with a very obtuse apex angle forming the front, while the long base line constitutes the trailing edge. The fuselage projects in front and contains two seats arranged one behind the other, the front one being equipped with the usual type of controls.

*From Flight, October 9, 1931.

From the rear seat one has practically no view of the ground, as one is situated in the center of the wing. An old Bristol "Cherub" engine of 30 hp maximum output, presented by Mr. Croneiss, the managing director of the Deutsche Verkehrsflug Company (the second largest German air transport company), is fitted at the rear end of the fuselage, and drives a metal two-blade pusher propeller. The cockpits are covered by hinged hoods with wooden frames and cellophane panes, some of which, at the side, are slidable.

The trailing edge of the wing on each side is formed by two ailerons, the inner set serving as elevators. The rudder fins are located on top of the wing tips, and have no lateral supporting struts, which are entirely avoided in the whole airplane, giving it a very neat appearance and ensuring good aerodynamic qualities. While the fins and the attached rudders have a flat surface facing outward, the inward surface facing toward the fuselage has a pronounced camber. The two rudders work independently, as their manner of operation is different from that of rudders on normal airplanes. The left rudder is solely connected with the left and the other with the right pedal, and when the airplane is required to make, say, a left-hand turn, only the left pedal is moved, while the right remains stationary, and vice versa. By depressing the pedal the corresponding rudder is swung out and the air resistance thus caused retards the motion of the wing tip, while the other wing tip swings round unobstructed, so the airplane makes the required turn. If both rudders were to be depressed together, it would merely reduce the airplane's speed without causing it to turn.

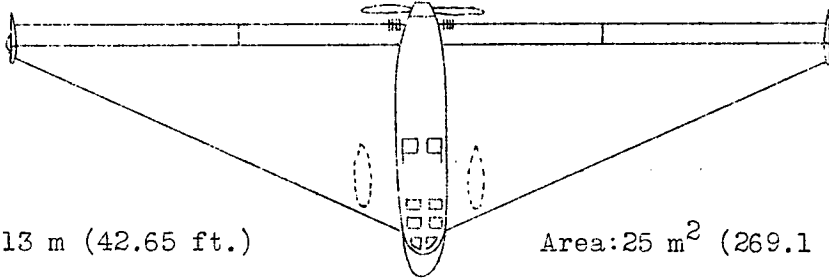
The landing gear consists of three independent wheels with low-pressure tires. The two wheels under the wing, one each side of the fuselage, are enclosed in a streamlined casing secured to the wing, inside of which rubber-cord shock absorbers are located. These are visible through cellophane panes let into the top of the wing for inspection purposes. Similar inspection windows are provided at all points where the control cables run over pulleys. The small front wheel is likewise encased, the casing forming a continuation of a perpendicular fin suspended from the front end of the fuselage. The wheel casing, with the wheel, can be steered by means of a tiller in the cockpit, which, however, is only used for maneuvering on the ground.

CHARACTERISTICS AND PERFORMANCE

Span	13.0 m	42.65 ft.
Wing area	25 m ²	269.1 sq.ft.
Weight empty	320 kg	705.48 lb.
Flying weight	520 "	1146.40 "
Wing loading	20.8 kg/m ²	4.25 lb./sq.ft.
Power loading	17.87 kg/hp	39.4 lb./hp
Maximum speed	155 km/h	96.31 mi./hr.
Cruising speed	140 "	86.99 "
Highest altitude	4700 m	15420 ft.

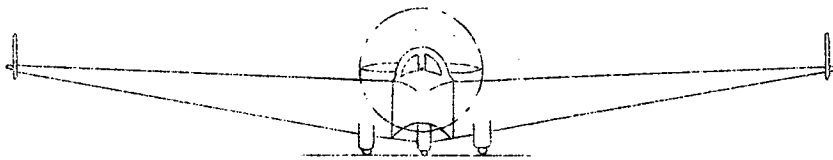
In the hands of the pilot Groenhoff, the airplane showed a surprising degree of maneuverability. Groenhoff said the airplane steers very lightly, and he can do anything with it which he can do with any good normal airplane, including looping. The latter were, however, not shown at the demonstration. The airplane flew very close circles and zoomed up in a manner that would appear to indicate its having plenty of reserve power. It seemed practically nonstallable.

(Taken from Revista Aeronautica with modifications)



Span: 13 m (42.65 ft.)

Area: 25 m² (269.1 sq.ft.)



Bristol
"Cherub" III
30 hp
engine

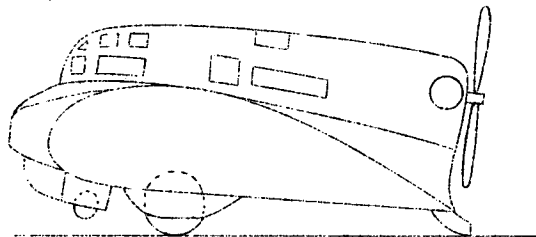


Fig.1 General arrangement drawings of the Dreieck I tailless airplane.

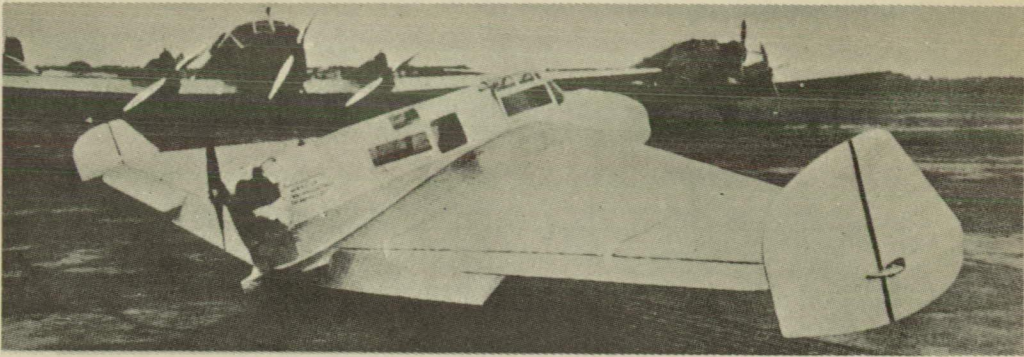
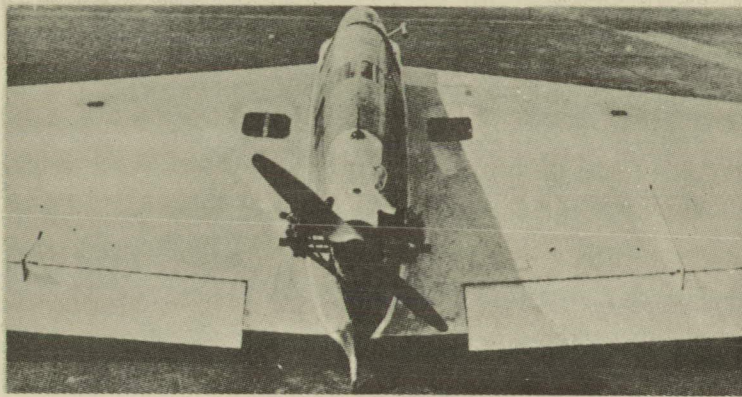


Fig. 2 Three-quarter view of the Dreieck I airplane showing ailerons and wing-tip rudders.



Figs. 2, 3, 4 From "Aircraft Engineering"

Fig. 3 The Bristol Cherub engine and pusher propeller.

Fig. 4 Front view showing the swivelling steering wheel.

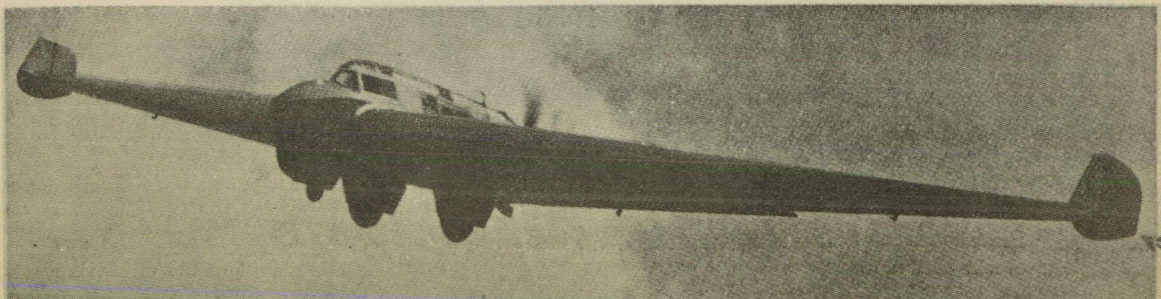
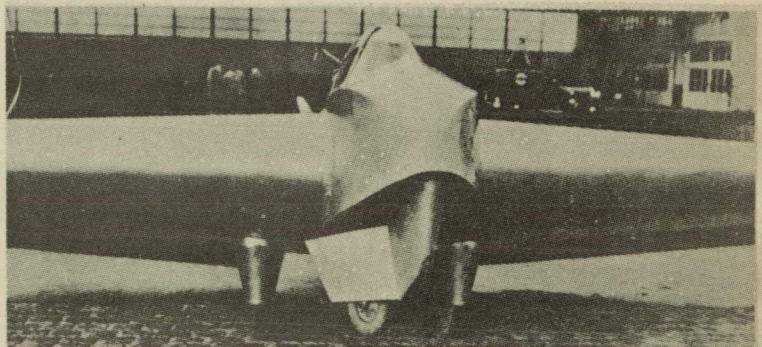


Fig. 5 The port rudder is seen swung outward to make the airplane steer to the left. From "Flight."