

ALONG THE FAR-FLUNG AIRWAYS

THICK-WING
GIVES LIFT

Flying Wing Principle
May Be Next Step
In Plane Design

By FREDERICK GRAHAM

THE mad scramble of the major nations of the world to gain air superiority is by no means confined to the many factories that produce airplanes. That is only one phase of the struggle. Another phase no less important and dramatic takes place in the laboratories where engineers and designers work against time and each other to produce a more efficient plane. Little information of an exact nature leaks out of those laboratories, but that does not mean little is being accomplished.

In Germany, Russia, England and the United States aeronautical engineers are working with problems that the general public will know about only when a solution has been reached. A new type of plane suddenly makes its public appearance just as if it had been developed and built overnight. But it is the safest sort of bet that men were working on that very plane months and months, even years, before it was shown.

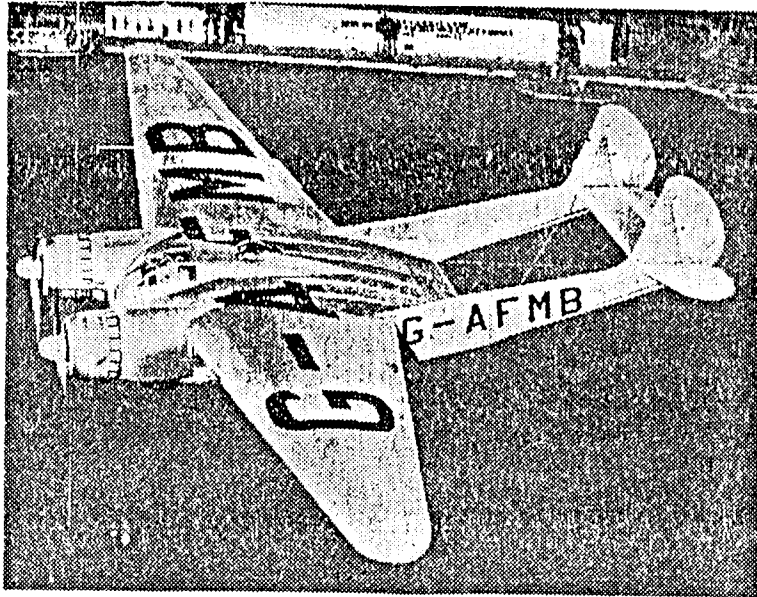
Flying Wing Not New

An example of this is the flying wing craft recently announced by Northrop Aircraft, Inc. The War Department, which is deeply interested in the Northrop flying wing, has stated that this unconventional plane "embodies the principle which is generally recognized as being the ultimate possible refinement based on the present concept of heavier-than-air craft."

The fact is, John Northrop had been engrossed with the idea of a flying wing for almost two decades, and back in 1929 he supervised the designing and building of a so-called flying wing, on which the tail surfaces were carried on outriggers. About ten years later he started work on a plane that was absolutely tailless.

Even before that the flying wing idea stimulated the imagination of aeronautical engineers. Back in 1918 Vincent J. Burnelli, a young aircraft designer, was looking forward to the end of the World War and the possibility of a great commercial air transport industry. Big planes capable of carrying loads large enough to make operations profitable would be needed, he reasoned, and as he turned to the drawing board he found that the flying wing principle offered a possible solution.

Roughly, Mr. Burnelli figured that by making the fuselage, which carried the pilots, passengers and



British Combi

This Burnelli all-wing or lifting fuselage type airplane was built and used commercially in Great Britain before the war.

other cargo, a part of the airfoil so it would lift a part of the load he could increase the efficiency of the plane. The fuselage of the conventional plane, he well knew, did not provide any lift in flight.

Fuselage Adds Lift

The fuselage Mr. Burnelli designed was not round or boxy. It was, rather, shaped much the same as a huge wing section. In 1920 he built a fuselage that resembled nothing so much as a section of a wing on a big modern plane. This fuselage was carried by two wings. Seven years later he had carried the design to a point where it was possible to build a high-wing monoplane for the unorthodox fuselage. The next step was the fuselage built into the wing with outriggers to carry the tail surfaces.

The long, cylindrical fuselage of the conventional airplane provides no lift, but Mr. Burnelli's flying wing is said to carry about 80 per cent of the weight at cruising speed and 32 per cent when landing. The fuselage looks as if it is a part of the airfoil and acts aerodynamically as such.

In shape the Burnelli fuselage is nearly square, giving more space for passengers or cargo. The engines are close together and ahead

of the pilots and passengers. This makes the center of the plane much stronger than in conventional designs, it is held, and is a safety factor in the event of crash landings.

Aeronautical engineers who have studied the Burnelli flying wing and experienced pilots who have flown it agree that it is an extremely efficient plane. The Smithsonian Institution has credited Mr. Burnelli with pioneer rights in the "thick-wing art" and in the reduction of theory to practice.

Aeronautical engineers also agree that the "flying-wing principle" is the ideal for heavier-than-air flight. And perhaps the day is not far distant when flying-wing types will dominate the entire field of military, commercial and private flying. For some years early railway coaches resembled stage-coaches which they replaced and the first automobile looked a great deal like the horse-drawn buggy. And the airplane fuselage, which still basically resembles the early structures designed to keep the pilot out of the wind stream, may some day be a part of the wing that provides lift and not a cigar or pencil shaped body that goes along just for the ride.