



FLYING-WING DEVELOPMENT

An enlargement from a ciné-film showing the Northrop MX-324 rocket-propelled aircraft on its first flight. In this pioneer aircraft the pilot lay prone.

Research Aircraft, Fighters, "Buzzbombs" and Bombers by Northrop : An Early Rocket-propelled Aircraft

By JOHN W. R. TAYLOR

DURING his recent visit to the United States, as already remarked in *Flight*, Mr. John Cunningham told engineers at the Northrop aircraft factory that, although Britain leads the world in the development of jet-propulsion, America is setting the pace in the design of flying-wing aircraft. As it seems probable that reaction-propulsion will be used to full advantage only in flying-wing layouts, this is quite a challenge to British designers. Whether or not it is true is a matter for conjecture, especially now that the A.W.52 has put in an appearance; but, American designers are in fact ahead of us there is little doubt that Northrop have put them there. They built their first flying-wing some eighteen years ago, and the experience gained since then in the development of some thirteen different prototypes has enabled them to produce the huge new YB-49 jet-propelled flying-wing bomber, details of which were given in *Flight* of March 20th.

The little machine built by Northrop in 1929 was not a true flying-wing as insufficient aerodynamic data was available then to enable its designers to make it stable without a tail; so it had an orthodox tail unit carried on two very stalky booms. But it was a start, and many of the features it introduced are retained on the YB-49. Although it flew quite well, Northrop built no more flying-wings for ten years; but in those ten years other designers, such as Britain's G. T. R. Hill, the German Lippisch, and the Russian

Kalinin had begun to solve some more of the problems of tailless flight.

Northrop claim that their N-1M of 1940 was the world's first successful all-wing aircraft. It was a small machine, just big enough to house a pilot and two engines in its centre-section. The wing leading edges were sharply swept-back and the tips cranked down at 35° to give improved stability. Over 200 successful flights were made with the N-1M, and these gave the first really reliable performance data on modern flying-wing types. The little machine proved so stable and easy to handle that the cranked-down wing-tips were dispensed with after a time, so that it was controlled solely by its combined ailerons and elevators, which were named "elevons."

A Prototype Preserved

Northrop seem to be about the only people so far to have had much success with these simplified controls, for even the latest flying-wing aircraft built by other companies retain also some form of vertical control surface. At any rate the U.S.A.A.F. consider the N-1M such a great contribution to aviation development that they are going to house the prototype in their new museum. Following the success of the N-1M, the U.S.A.A.F. awarded Northrop a contract for four slightly larger aircraft of the same type, powered with two 325 h.p. engines; these were desig-

THIS year's Wilbur Wright Memorial Lecture is to be given on May 29th by Mr. J. K. Northrop, who has chosen as his subject "The Development of All-wing Aircraft."

It is hoped that this article will serve as a useful background to the more detailed account which Mr. Northrop may be expected to give in his lecture.