Experimental Tailless Free Flight by Roy Clough

Ever since the airplane was invented people have been looking at it and telling themselves that its performance could be improved if they could eliminate the weight and drag of the tail.

As a result, quite a number of tailless planes have been built down through the years. Some of them were pretty good. (A tailless plane has to be pretty good to fly at all as we'll explain shortly.) But, none of them managed to crowd out conventional designs.

Why?

The answer is complex and touches upon many factors from simple mechanical leverage to pilot psychology. Strange enough, it is some of the disadvantages of the tailless design that make it a good bet for a flying miniature.

Early flight experiments were made with flat surfaces, that is where we got the term "plane". Some of them flew fairly well, with and without tails. Then it was discovered that curved surfaces, copied from bird wings, produced more lift. This was a major discovery but it introduced a problem: A cambered wing tended to "tuck under" or perform the first half of an outside loop as soon as it picked up a little speed. To prevent this it was necessary to add a boom and stabilizing surface either behind, or ahead, of the wing.

The first planes to fly had this stabilizer in front. Later, mechanical and aerodynamic expediences moved it around to the rear with the rudders and it became known as the "tail".

When designers first tried to do away with the tail they had to substitute some other steadying influence. One of the first tricks they learned was to break the wing in the middle, bend it sharply backward, and twist the tips downward. This eliminated the need for a tail but it was rather begging the question because such planes really had two tails—the swept back tips of the wings located far behind the center of lift. Wings of this type could be quite efficient, but "sweepback" put a terrific leverage on the wing roots. This faced the designer with the choice of building his wings weak—or taking (Continued on page 98)