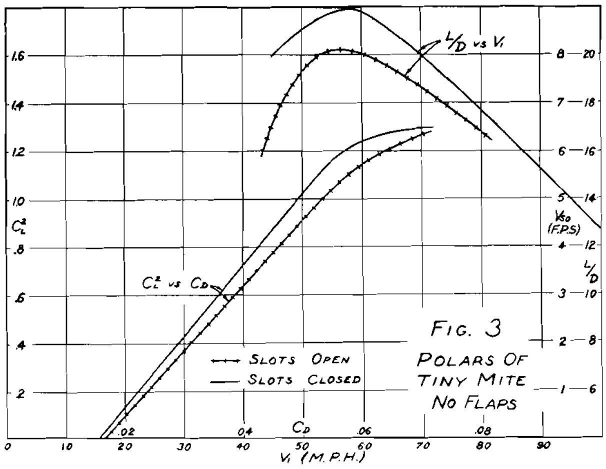
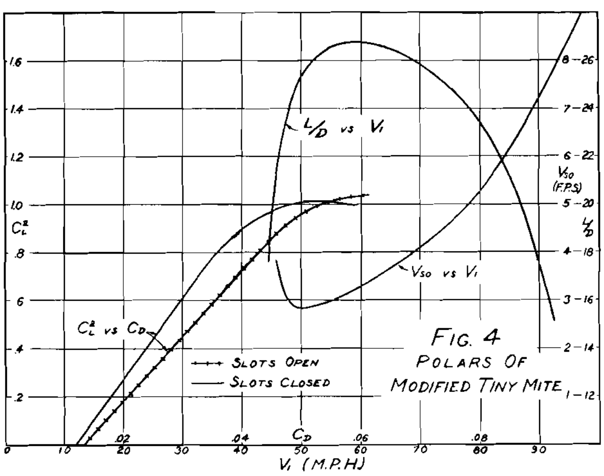


Perhaps retractable Fowler flaps would not suffer these losses.

Since the external airfoil flaps showed little advantage it was decided to make a flight test with the flaps off. On Fig. 3 are shown the results of these measurements with flaps off and with leading edge slots at the wing tips closed and open. A considerable gain in effective aspect ration is obtained by removing the flaps and by closing the slots. This is shown by the increased slope of the linear region in the polar plots. The maximum glide ratio with flaps off and slots closed is found to be 21.9, a not insignificant gain over the original Tiny Mite with flaps and slots.

The Modified Tiny Mite

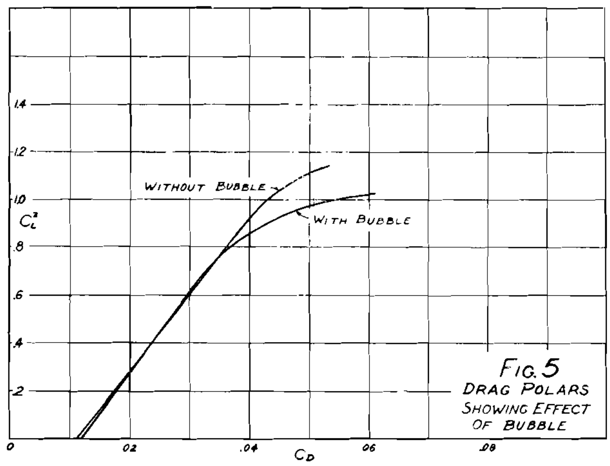
Following the foregoing tests and analysis Ray Parker undertook to modify the Tiny Mite with a view toward reducing the expansion of the airflow in the wing root. At the same time he removed the struts supporting the horizontal tail, shortened the fuselage nose, removed the wheel and installed a skid. When these changes were completed the sailplane was again test flown for performance with the results



shown in Fig. 4 and Fig. 2. With the slots closed the maximum glide ratio is 26.7 and the minimum sink at a wing loading of 5.4 pounds per square foot is 2.8 feet per second. The aerodynamic efficiency factor has been increased to 88% and the minimum drag coefficient reduced to 0.0119. This is the lowest drag coefficient of any sailplane except the Horten IV which is 0.010 and the black buzzard with its phenomenal 0.0058. (Ref. 4)

Seeking to delineate the effect of a streamlined body such as a canopy over a wing, a flight test was planned in which the modified Tiny Mite would be flown without any projection above the wing contour. The pilot took off in a reclined position with a small hinged windscreen before his eyes. On reaching the altitude required for flight test he released and reclined enough so that the hinged windscreen formed a continuous smooth surface. On completing the flight tests the pilot pulled the hinged windscreen into the cockpit, sat upright and landed. The flight test was made entirely on instruments.

The results of this interesting test showed at identical wind loading no essential improvement in maximum glide ratio or minimum sinking speed, but the bubble did have a marked effect on the perform-



ance in circling flight. See Fig. 5 and Fig. 2.

It may be well to summarize the gains made through systematic modification of Tiny Mite. In the following table is shown the various aerodynamic parameters for the various configurations:

Configuration	(L/D) max	Effective Aspect Ratio	CDmin
Original, 0° flap	19.8	8.6	0.0194
Original, no flap	20.4	8.6	0.0162
Original, no flap, no slots	21.9	9.4	0.0158
Modified, no slots	26.7	10.8	0.0120
Modified, no slots, no bubble	26.7	10.8	0.0114

In the light of these results it is not difficult to visualize the effect which a similar aerodynamic treatment would have on other sailplanes suffering similar ills (and there are many the world over.) One might also wonder what could be done if one began with an original design and utilized these principals. It is certainly useless to talk of laminar airfoils if we disturb the laminar boundary layer at the fuselage by an aerodynamic shape which imposes adverse pressure gradients upon the flow in this region.

In examining the final result of the modification of the Tiny Mite the authors feel that the effort expended on this sailplane should lift the small sailplane from the low level into which it has fallen to a position where it actively competes with the larger craft. It must not be inferred from this that the authors feel that an ultimate has been reached. As a matter of

(Continued on Page 10)