



Photo: Galen Asher

Art Schultz not only designs but builds and flies his own sailplanes.

THE

"NUCLEON"

SAILPLANE

By ARTHUR B. SCHULTZ

Every soaring pilot gets a yen now and then to try out some new idea—the Nucleon Sailplane is the most recent result of the author's efforts in this direction. The main features sought in the design are: use of laminar flow airfoils, strut bracing, large full span flaps interlocked with ailerons, and adaptability to home construction. At the end of one and three quarter years of development the results are mixed. The performance, as usual, is not as high as originally anticipated but shows promise of improvement if given the normal number of years for cleanup. The home-construction features worked out very well.

At the start, some very practical considerations entered into the design. To be able to build the wings in my basement I had to get them out of a standard 11" x 31" window, and not to disrupt domestic affairs too much the semi-span was limited to the distance from the laundry tubs to the farthest wall. This was contingent also upon no one building a house on the vacant lot next door, directly in line with my only exit window. To cut the building program to a reasonable period I made use of a hand-me-down utility fuselage that had been lying around our glider hangar for a number of years.

As things worked out the space available permitted a 46' span which I would have used anyway. By using 30 per cent chord flaps for glide path control the wings passed out the window alright. In spite of the neighborhood building up practically solid the vacant lot is still without a house. The fuselage, which was a copy of a BG-6 and Cinema and had a Midwest folding tail, was, after considerable

modification, not far from what I would have designed if starting from scratch. The fuselage work and the covering and doping of fuselage, flaps and ailerons, were done in my one-car garage after warm weather set in.

The aerodynamic design of the wing was to be the most important feature, inspired to a great extent by the excellent results on the RJ-5

order to match its low drag bucket with the root airfoil; main emphasis was to be on minimum drag at cruising speed.

Full-span flaps were desired for reasons other than to get the wings out of the basement window: (1) for glide path control in place of spoilers, (2) for improved spiralling performance by reducing the flying speed, and



Photo: Art Schultz

The Nucleon Sailplane shown with the temporary canopy, which is now replaced by a full-blown one.

and other clean-up work as reported in *Soaring* by Raspel, Johnson, Carmichael and others. A compromise was made at a span of 46 feet, aspect ratio of 16, taper ratio of $2\frac{1}{3}$, and a wing area of 131 sq. ft. A careful study of "Summary of Airfoil Data" NACA ACR No. L5C05 and NACA Technical Report No. 1915 indicated that the 652-415 airfoil would be best at the root, tapering to 641-A212 at the tip. The tip airfoil was set at a -1° angle in

the sink speed, and permitting tighter circling. (3) to permit the wing to be set at 0° incidence and yet to allow the ship to land two-point at CL max of the wing with the flaps all the way down, and (4) to reduce the landing speed. The ailerons are interconnected with the flaps to give them half the droop of the flaps at the 10° , 20° , and 30° flap settings but they return towards neutral at the 40° - 50° positions. This extends the beneficial ef-

(Continued on Page 6)