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fect of the flaps for slow speed spiralling but retains full aileron effectiveness at the stall at large flap angles.

The high wing design, although inherent with the use of struts, reduces wing-fuselage interference effects. Flap and aileron gaps on top and bottom surfaces are closed as much as is practicable and diaphragms are used to seal the remaining slot. The flap and aileron hinges are all submerged in the wing. Likewise the flap actuating mechanisms and the aileron bell cranks do not appear outside of either top or bottom surface.

The wing construction is somewhat unusual; a section through the wing is shown in Figure 2. Except for the ailerons and intermediate flaps the wings are completely plywood covered. Under the plywood, except on the inboard flaps, is a supporting layer of Styrofoam to preserve the airfoil contour. Styrofoam is Dow Chemical Company's plastic foam produced by the expansion of polystyrene. The grade used weighed two lbs. per cubic foot; the weight per wing was about 12 pounds. About eight lbs. extra of phenolic glue was used to bond the plywood to the Styrofoam so this feature cost about 20 pounds per wing. After exposure to a few extended soaking rains followed by several days of damp weather it has been noted that the contours are not as good as when new. However, the warping is far less than would have been the case with no Styrofoam underneath. When new it was estimated that most of the wing surface was within 1/64" of true contour whereas after five months most of it varies 1/32" from true form. Under similar conditions of exposure unsupported plywood would probably have a waviness of 1/16" or more over most of the surface. It is my conclusion that, although I have not yet attained it, a true laminar flow wing can be built with this construction, and if exposure to extreme weather conditions can be avoided the wing will retain its accuracy.

Another novel feature, which lends itself nicely to home construction, is the method of forming the leading edge. No difficult forming of a D tube is necessary. The sharp leading edge permits the use of a trapezoidal nose block to which the plywood is glued without need for pre-forming. After the nailing strips are removed the nose is shaped to contour. Some difficulty is caused by the differences in hardnesses in woods and crossed grains but with reasonable care an accurate leading edge can be obtained. I would like to see someone develop a utility using this construction. A suitable airfoil would be NACA 641-612, the main spar would be located at 35-40 per cent chord, the plywood covering would extend back only to the spar, and a single strut would be used.

The main spars of the Nucleon are solid Sitka spruce and weigh 17 lbs. each. Built-up box spars would have been a few pounds lighter but the weight saving would be a small return for the amount of work required. Material was produced at a local boat yard by carefully checking over its supply of mast and spar stock. The rough machining was done at the yard; the total cost was about $50.

The wing ribs are of two types: the first eleven are built-up from 5/16 x 3/8 spruce stock, and the outer thirteen were sawed out of 5/16 mahogany plywood. The plywood ribs were far easier to make although the material cost is somewhat higher. Also the plywood ribs facilitated the fitting and gluing of the Styrofoam blocks.

The struts are very small and light and cleanly faired into both fuselage and wing. At the fuselage the fitting is conventional except that a telescoping streamline socket is welded to the fuselage frame. At the wing fitting two bolts are used and a streamline fairing is placed over the connection. In this way a coefficient of fixety of 2.0 is obtained so that the strut size works out only 1¼ x 2½ x .039 in size. The saving of weight of the massive root fittings and spar roots required by full cantilever construction is felt to be worth the slight extra drag. Also permitted by strut bracing are push-fit assembly pins which usually go together and come apart faster than the tapered pins required in cantilever construction. Because of

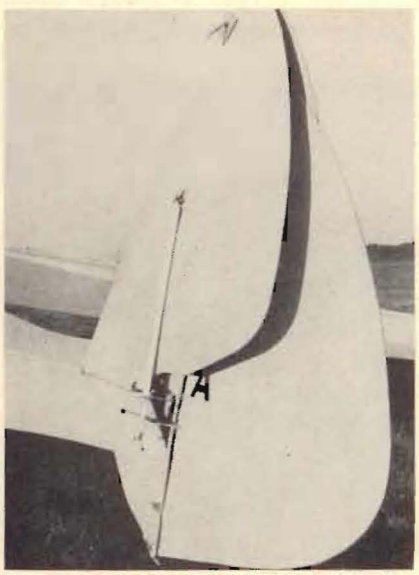

Photo: Art Schultz

The Nucleon tail shown in the folded position.

Photo: Art Schultz

The tail group shown in normal position. Note the elevator horn which locks the elevator when folded.