UTU—FINNISH FIBERGLASS SAILPLANE

Although the development and production of fiberglass sailplanes is principally associated with Germany and the Germans a certain amount of developmental work has gone on in other countries as well. Among these are Argentina (Super Albatross), Canada (Viking 104), France (Wassmer) and Finland. The Finnish entry is a 15-meter, shoulder-wing glider with at least a superficial resemblance to the Boelkow Phoebus.

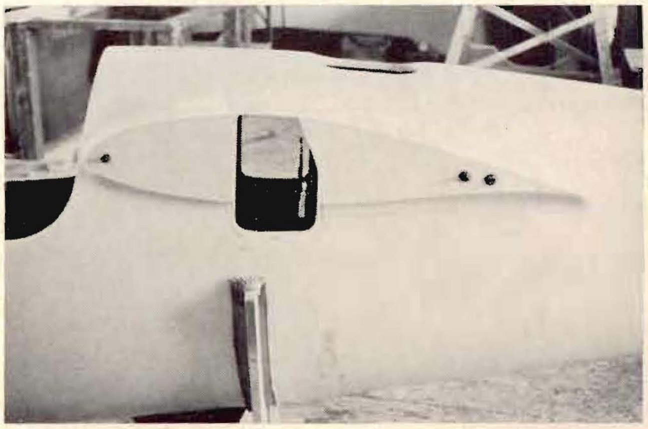
A design study of the Utu, as the ship is called, was the graduate work of Ahto Anttlia while he was a student at the Finnish Institute of Technology. The first of six prototypes was built by Mr. Anttila and three associates during 1961 and 1962. This ship, which never flew, was accidentally broken down during proof loading. Prototype number two was built by the same team (minus one member), licensed as OH-LKX, and flown by the builders during 1964 and 1965. It was sacrificed, via the destruction-testing route, in 1966. Additional prototypes were built trying various techniques and structures. This later work was done at the Helsinki factories of Oy Fibera Ab, the company established to produce the glider.

During the evolution of the Utu the aerodynamic concept and objectives have remained the same, excepting those minor modifications made on the basis of test-flight results and the opinions of test pilots. The structural evolution has been another matter, however. This was due mainly to the radical differences between conventional and fiberglass airframes.

At present, as regards the primary structure, the Utu is fairly well refined, thus complying with the criterion set down by Saint-Exupery that an airplane is not ready when everything that is necessary has been added to it, but only when there is nothing that can be left out.

The wing structure is fiberglass-reinforced-plastic (FRP) sandwich shell with a foam-plastic core. There is a single I-spar and no ribs. The fuselage consists of a load-carrying outer skin, the rear part of which is also of sandwich construction. Fittings for the controls, the seats, and the detachable instrument panel are separately produced and bonded to the structure. A bulkhead just behind the pilot's seat has been retained to deal with the big loads transmitted by the wheel and the wing/fuselage carry-through structure. The structure as a whole, therefore, is relatively simple, open and easy to inspect. The wings are attached with two conical bolts. Some control mechanism parts, traditionally made of metal, have been replaced with fittings of injection-molded nylon.

Several specimens of all main components were used in proof-loading experiments. Several different wings were proof loaded to clear up questions regarding buckling strengths. These wings contained the same amount of fiber in the spars, but the material in the shells was distributed in a variety of ways. Results with these wings ranged from ultimate load factors of +5.7 to +14. The lowest values were obtained with wings in which the majority of the fiber was spread over a rather broad surface. This configuration provides a thick, dimensionally stable, and accurate wing contour. The gathering of loads at the main-spar fittings, however, requires a convergence of the fiber patterns in this area. This, however, leaves the wing shell unstable. Even very small buckling in the wing leading and trailing edges, which may occur in normal use, showed a tendency to widen into the middle of the wing under increased loads. The result was the buckling of the entire upper surface.



The wing-root area of the Utu shows the sort of clean profiles which can be achieved with molded-fiberglass construction.