The STANLEY SAILPLANE

by Robert Stanley

The sailplane in which I made my initial three contest flights at Elmira this summer represents the culmination of an ambition of some years standing. It had long been my desire to design and build a high performance sailplane embodying those features and design practices current among present transport and military aircraft, disregarding present sailplane design standards if necessary to fulfill these requirements.

The prime characteristics desired are good gliding angles with a wide speed range, permitting efficient cross-country flight at the high altitudes prevalent in the West. As a result, the principal design criterion was to achieve a refined, streamline form, even at the expense of weight, if necessary. Span loading must be low for high altitude performance, and for high rates of climb in small intensity thermals, as well as to permit small turning radii. An aspect ratio of eighteen with a wing of elliptical plan form was selected as best fulfilling these requirements.

WINGS:

In planform, the wing is semi-elliptical, with a straight leading edge, curved trailing edge. The center of pressure is normal to the fuselage. The airfoil tapers in thickness as well as in planform from an N.A.C.A. 23018 section at the root to an N.A.C.A. 23012 at the tip, and is of varying incidence to compensate for non-uniformity of downwash and to provide good lateral control in the range of maximum lift coefficient. The structure is of spruce and mahogany plywood. A single box beam located slightly aft of the center of pressure takes all bending loads; a torsionally rigid plywood leading edge cover, glued to the spar, furnishes requisite drag and torsional strength. The wing attaches by means of three steel fittings, two at the spar, and one at the nose, special emphasis being placed on their design to assure rapid assembly. Inasmuch as the spar is built out to the surface of the wing, the ribs are necessarily built in two segments, and attached by gusset plates and by the nose cover to the main beam. The after portion of the wing is fabric covered. A drag flap on the lower surface, and hinged to the main wing beam for convenience, was chosen rather than a spoiler for glide path control.

FUSELAGE:

The fuselage is all-metal, of monococque construction, employing Alclad skin over flanged frames and bulb-angle stringers. The wing attachment is achieved by means of welded steel tubes at approximately the height of the pilot's shoulders. A single retractible airwheel is used for take-off, and landing in smooth fields, the metal keel used only on rough ground, or where fields are so small as to require considerable braking action. A self-releasing towing hook, releasing when the downward component of load exceeds 800 lbs., is secured to the forward keel structure. Especial care was taken to reinforce the forward part of the fuselage to care for hazards of crash and nose-over. Compound curvature occurs in the forward half of the fuselage, a modified elliptical cone forming the rear half. The stub wing is carefully filleted to the wing by means of formed Alclad fairing. The cockpit enclosure is formed of transparent material, stretched hot over a carefully molded wooden form. The rear portion folds back inside the fuselage, so that the plane can be opened in flight and flown either as an open or closed cockpit. Entry is accomplished by folding the rear portion, and removal of the windshield. The bottom is deeply vee-ed and has exceptionally heavy members along the keel to care for localized stresses resulting from landing on rocks, &c. A removable tail-cone permits of easy inspection of the empennage structure and control system. Aft of the pilot is being built a large baggage compartment to carry a sleeping bag and necessary gear to spend the night if forced down far from civilization. Provision is made to carry in this compartment a small outboard motor (as described in the February issue of SOARING), to permit return by motor after a flight, rather than awaiting the tow car. Brazier head rivets are used throughout, insufficient equipment being available to attempt flush riveting. Tailskid is molded rubber, and conforms

The Stanley Sailplane at Elmira

The author with rear half of metal fuselage