THE MODERN SAILPLANES

by George B. Moffat, Jr.

While most subsonic powered-aircraft have shown little improvement since World War II, the opposite is true in the realm of motorless flight—sailplanes have markedly developed during the same time. Record flights show performance gains of 50 percent and over, in both speed and distance, with speed over triangle courses approaching 80 mph and the distance, 560 miles. Since these sailplanes represent the ultimate in aerodyanmic efficiency a look at new configurations and developments seems to be in order.

The facts and opinions presented here are garnered from personal flight tests in over 35 modern sailplanes and from observations of others, both here and abroad.

Increase in performance during the last 20 years has been due to three basic improvements, the most important single gain being probably in the construction. Modern high performance sailplanes are built to standards unheard of a few years ago. Wings finished to tolerances of .002 inches, fuselages smoothened to give extensive laminar flow have resulted in L/Ds of over 40 to 1. A second reason stems from the widespread use of laiminar flow wing sections. These have increased the high speed capabilities of the sailplanes especially where the high Reynolds Numbers allow the laiminar sections to come into their own. The third notable change has been in the wing loading. In the early days, sailplane designers strived to achieve low wing loadings on the order of four pounds per square foot with circling speeds around 40 mph and rather low crusing speeds. Today, the latest sailplanes have wing loadings averaging five and a half to six and a half pounds with extremes going as high as eight pounds per square foot. These sailplanes circle at 50 to 60 mph, climb slower but can cruise at over 100 mph between thermals, giving far higher average speeds at the expense of poorer weak weather performance.

The majority of sailplanes discussed in this article, namely the Sisu, the Schreder HPs, the Polish Foka, to name a few, belong in the latter category. They represent the apex in aerodynamic art.

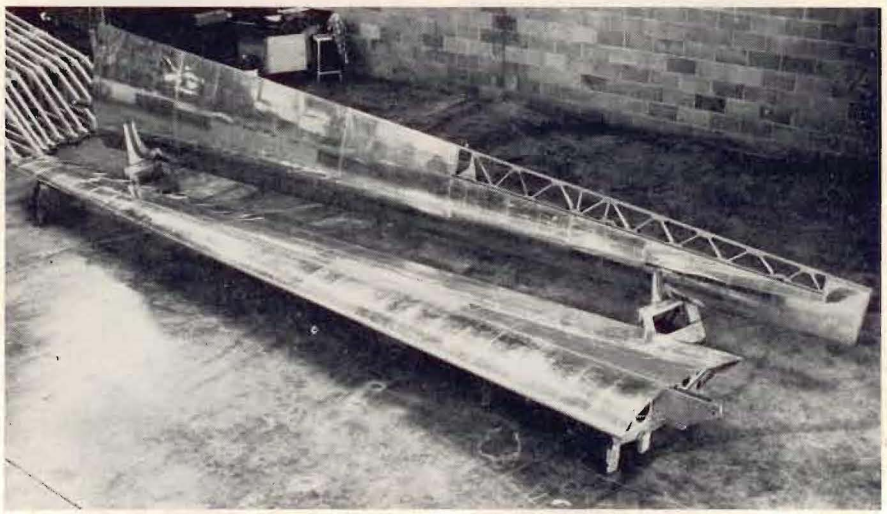
Some basic criteria for comparison of sailplanes must be established. In general, therefore, they will be considered in relation to their desirability for contest work rather than conventional sport flying. In this country relatively few non-contest pilots engage in extensive cross country flying after acquiring their FAI badges. For soaring within a 20 mile radius of the home airport any good sailplane with a 25 to 1 glide ratio that is easy to fly and maintain will do as well as the most exotic one, in fact better. The very high performance ships are costly and require a good deal of attention if they are to retain their high L/Ds.

The modern contest sailplane has been growing heavier and faster in the last few years and the trend will doubtlessly continue as contest committees put more emphasis on speed and distance tasks and less on the old fashioned downwind float beloved by Weihe owners. The faster, heavier modern sailplanes tend to be more difficult to thermal and require much better judgment in the use of up-currents; problems, which a contest pilot accepts as an inevitable part of the game but which may cause a sport pilot to pause.

Before dwelling into detailed description of individual sailplanes, mention should be made of materials used in their construction.

Wood, the traditional material, is still prominent on the scene in Europe. Its excellence is a well proven factor as demonstrated by the numerous contest victories of the Skylarks, Ka-6s and Fokas. It is relatively inexpensive, is easy to repair with ordinary tools and, since most sailplanes are kept out of the weather, rot and deterioration are not a factor. A wooden sailplane will last for 10 years and a number of much older gliders are still around. The major difficulty is that plywood begins to show glue lines with age. After a couple of years, every rib and bulkhead can be spotted by a ridge on the skin, with a consequent drop in performance. The Breguet 901s, built 10 years ago, had originally an L/D of 36 to 1, Today, few will reach 30 to 1.

Metal, mainly aluminum alloy, is the favored material in the United States. It has the unquestionable advantage of being long lasting and enormously strong. I have made several landing in the desert with my HP-8 which would have reduced a Ka-6 t kindling wood. The amazingly quick repairs possible with metal have been demonstrated by Paul Bikle for two years



Wings of the Schweizer 2-32 under construction clearly show the all metal structure favored in the U.S.A. Schweizer sailplanes are renown for their strength and pilot protection.

Opposite: The HP-8 owned by George Moffat, Jr., author of The Modern Sailplanes. Hod Taylor, operations director of Sail Flights, Inc., Wurtsboro, N.Y., is at the controls. Moffat used the HP-8 extensively for comparative testing of a number of sailplanes described in his serialized article. Photo by S. A. Aldott (All rights reserved)