BUILDING THE AIRMATE HP-7

by RICHARD E. SCHREDER

At the conclusion of the 1956 Nationals in Texas, I considered myself very fortunate to be in third place, especially since I had been introduced to soaring only the year before.

On the plus side was the fact that I had been very lucky and had completed all of the tasks except one which nobody else made either. On the negative side, the 1-23D just couldn't stay with the Jennie Mae and the RJ-5 on the speed runs.

After returning to Toledo, a lot of sketches, comparison of performance curves, study of airfoils, discussion, dreaming, etc., brought the obvious conclusion—a ship must be built.

Wood construction was ruled out from the very beginning because of its very poor crash resistance. The ship must be all metal.

Picking an airfoil is a ticklish proposition. After making a selection, you often wish that another had been chosen; especially after talking to someone who has a pet curve of his own. No one section ever has all of the desired characteristics. It, like any airplane or sailplane is just a compromise. I finally chose the 64_3-618 for the following reasons:

1. Low drag
2. Good stall characteristics
3. Wide low drag bucket in speed range used by sailplanes
5. Good thickness ratio for adequate spar depth
6. Good skin curvature for avoiding wrinkles.

Once the airfoil was chosen, the size of the wing was fixed in this manner: Chord was determined by 48" width of standard aluminum sheet which will wrap around the wing from the rear spar to the leading edge and back again to the rear spar. This gives no chordwise skin laps and results in a 30" chord. Even though this is a narrow chord, the 18% thickness ratio permits a main spar depth of 5.40" which is the same as a 1-23D.

Span of 48 ft. was fixed by the length of four 12-foot sheets. This arrangement requires only 1 skin splice in a 3-piece wing. That splice at the center of the 24-foot rectangular center section, is covered by the fuselage. The outer panel length is 12 ft. with a 2 to 1 taper ratio.

The above dimensions produce a wing area of 105 square feet. By assuming a structural weight about the same as the 1-23D, a gross weight of 750 lbs. was to be expected.

By referring to the drag curves of the 64_3-618 airfoil, some quick computations gave the following information:

Minimum low drag speed, no flap	(C_L=1.0)	45.5 mph
Stalling speed, 45° flap	(C_L=2.16)	36.0 mph
Max. drag speed, no flap	(C_L= .35)	90.0 mph
Max. low drag speed, 5° (up) flap	(C_L=.1)	167.0 mph

These speeds looked good. After a couple of months of sketching fuselage lines, airfoils, etc. the decision was made to build a sailplane to be finished in time for the 1957 Nationals. Members of the Toledo Glider Club showed a keen interest in the project and all who could, agreed to lend a helping hand. *On January 6th, of this year, all-out construction was started.* Since that date, we have averaged 20 man hours per day, 7 days per week except for Saturdays and Sundays when good soaring conditions existed. On such days we dropped everything and went flying.

Outer panels are attached with ½" taper pins supported by a tube assembly attached to the rear spar drag bolt. Panels are mounted by fitting in place, inserting 5/16" dia. bolt in the rear spar and tightening. No gaps exist between panels as skin butts together when panels are assembled. Removal of panels is accomplished by unscrewing drag bolt one inch, tapping it back in with a mallet and then unscrewing bolt. Two men can completely assemble the ship from the trailer in 10 minutes.

Photo by Larry Couture Studio

In the unbelievably short time of less than four months Dick Schreder, with the help of many of his friends designed and built this beautiful high performance sailplane. Although it was only started on January 6 of this year it will have flown in a contest before the end of May.

Primary consideration of the HP design was high strength, simplicity of manufacture, maximum pilot comfort and best possible exterior smoothness. Construction is all-metal, design load factor is 12 G-s and all outside rivets are flush. No control rods are exposed to the slip-stream. A unique shock absorbing tail wheel is incorporated.

A 5°-up flap setting is featured for minimum sink at high speed cruising. .032" thick 24ST wing skin is used to minimize wrinkling. The completed wing can be lifted by the tips without