



The Author in the "160"

TAKE ANOTHER LOOK AT THE SMALL SAILPLANE

By IRVING PRUE

HAVING designed and built a very small wing area sailplane I wish to convey the results and my present thoughts on small sailplanes to soaring enthusiasts everywhere. I shall endeavor to bring to light the troubles encountered with the Prue "160" and corrections of those troubles to be incorporated in my next design, the Prue "215."

In comparison to large sailplanes, the midget cannot, by its very nature, have as low a minimum sinking speed. Therefore one flies a midget only because of the advantages it *does have* over the large sailplane. There are a surprising number, as the following summary will indicate.

Strength. A small span results in ruggedness unattainable in large spans. Loads applied nearer to the center of gravity require less weight in structure.

Lower Cost. Less material to buy. Smaller, lighter tow equipment required for single or double tow. Smaller trailer to buy or build. Covered trailer not required; can be stored in the ordinary garage. Not so easily damaged due to its ruggedness. Smaller maintenance and repair costs due to size. Recovering, repainting, etc., held to a minimum.

Handling Ease. Not a problem to lift assemblies. Easier to move about by hand. Will receive more care due to the little effort required. Most damage comes from ground handling. This is brought to a minimum in a small ship. Not affected so badly by high winds, dust whirls.

More Maneuverable. In flight the small ship's greatest advantage is rate of roll. It can be racked into a thermal with less hunting. It is also possible to tighten the turn on *this* side of the 360° instead of the next time around due to superior rolling rate. Rolling inertia loads are smaller.

Easier to Fly. Control loads are practically nonexistent requiring no physical effort. This makes flying less tiring and more enjoyable over a longer length of time. Due to small span, landings can be made more easily on highways when necessary.

Dangerous obstructions are nearer pilot's line of vision.

Home Building. Possible in many more cases. The home garage or utility room is nearly always large enough to allow home building of a midget. Alignment problems are much simpler. Smaller jigs are used. Fewer man hours required due to fewer and smaller parts.

The faults of the Prue 160 as it is now developed are not only peculiar to it but exist in many sailplanes today. They are as follows:

Tip Stall. Tip stalling was the most dangerous characteristic inherent in this ship. This is the bugaboo that causes pilots to "sweat it out" whenever they are flying near any object, ground, or aircraft. It is completely frowned upon by our governing agency, the C.A.A., and must be eliminated before full certification can be granted. The cure on the 160 was the addition of the external airfoil type flap. The reasons the flap cures lateral instability in stall are three fold.

- (a) An increase in effective dihedral.
- (b) Increase in induced angle of attack at the root.
- (c) Slotted flap effect binds airflow to the wing surface, making the stall slower in action.

Uncomfortable Cockpit. This is still uncorrected in the 160 as in a number of other sailplanes. While sitting on the ground in a sailplane cockpit, we experience gravity acceleration of one. While flying we are nearly always maneuvering in some manner. This produces added acceleration and causes as much as one and one half to two G's in thermal flying. Consequently the posterior of a pilot gets loaded equivalent to having someone sitting on his lap. Now with a seat that has a vertical or near vertical back rest, and no support for the thighs and elbows, it means the posterior carries nearly a double load most of the time. This can be eliminated almost completely by reclining the seat back, providing arm rests, and an adjustable seat portion under the knees.