SAILPLANE MACH 1

By ROBERT J. MCQUILKIN

After being thoroughly bitten by the sailplane bug due to the magnificent efforts of Pat Mulloy, Laurel, Mississippi, the author exhausted all resources to obtain a sailplane but without success. The building-at-home idea appeared to be the only solution to the problem. Consideration was given to several of the sailplane plans that were available, but this was dropped when Fred Obar and Al Backstrum of the Mississippi State College came up with an offer to design a sailplane for the author. Fred Obar's subsequent call into the military service resulted in the shelving of the project for an indefinite period. After this setback the writer decided to design and build a sailplane himself and this resulted in a design of considerably higher performance than had first been intended. So, Sailplane Mach I evolved from just another all purpose sailplane project into an an attempt at an all laminar sailplane.

The preliminary design of Mach I was started early in 1953. Actual construction was started in November 1953, and after a somewhat slow start due to the difficulty in obtaining materials, the project is now well under way.

The author wishes to take this means of expressing his sincere appreciation to Pat Mulloy, Fred Obar, Al Backstrum, and others of Mississippi State College for their help, encouragement, and inspiration, and especially to Bruce Carmichael of Mississippi State College who did considerable research on the Mach I wing.

Sailplane Mach I was designed as a Class I High Performance Sailplane of all metal construction. The pod and boom fuselage employs a 165 gallon steel drop tank as the pod, and a boom of conventional stringer and bulk-head construction. The landing skid of wood and steel construction is shock-mounted and retracts flush with the fuselage. A two-wheel droppable dolly is planned for takeoff operations.

The three-piece wing plan form, consisting of a twenty foot center section and two outboard panels of sixteen feet each, was selected for several of its advantages. Some of the more important ones are, reduced wing fitting weight, simplified wing attachment, and a more desirable wing plan form. Provision will be made for folding the outboard panels, giving a twenty-foot package for trailering purposes. The main wing beam is of built-up aluminum construction and is placed at approximately 50% chord. This simplifies aileron and dive flap attachments which are connected directly to the main beam. An attempt will be made to develop a small trailing edge flap. This would make possible better high speed performance through use of a lower cambered airfoil section.

The empennage is somewhat novel in that the NACA all-movable horizontal tail is placed on top of the rudder. This was done for aerodynamic advantages and also to obtain a more favorable angle of attack for the take-off and landing conditions. The empennage surfaces are metal

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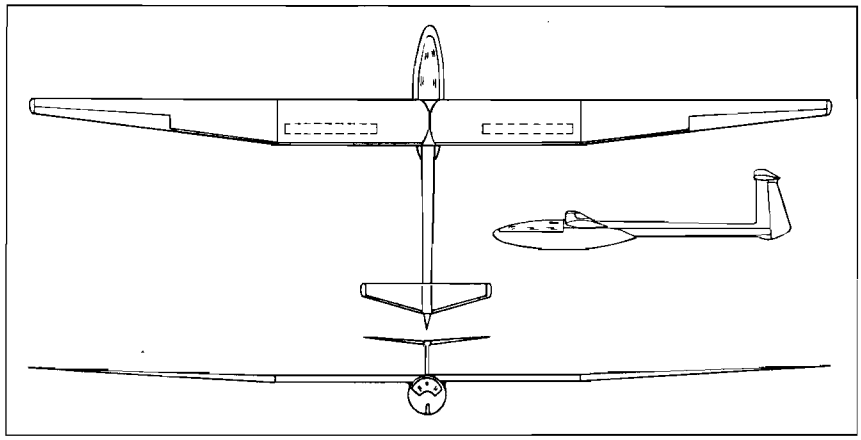

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was on the ground. Ironically, Richter witnessed this escapade and participated in the subsequent critique. It appeared that this spin characteristic would be obtained with a rearward CG position and would not be obtained when flying solo, so we put on the umbrella and found that the old excessive back pressure "accidental" spin could be obtained flying solo and with the CG at the maximum forward position, and that entry into the spin is abrupt and really vicious. A surprising variation was obtained by executing a full snap roll on top of a loop, which is essentially a horizontal spin entered from the inverted position by means of excessive back pressure.

Still curious? Let me be the first to introduce you to Russian Roulette in a sailplane. First verify that the parachute is up to date and then proceed to load the gun by setting up a steep turn in your LK with 50 to 55 mph indicated, and then proceed to allow the ball to ride low. Cock the gun by adding a slight amount of bottom rudder plus a little top aileron, and the LK will really begin to shudder. Pull the trigger by applying a little more back pressure and you'll be off to the races. Try this combination at 600 feet and it is guaranteed to be deadly. With about 3000 feet of smooth air beneath, you will spin as you have never spun before.

You may counter that one normally would not fly in such a fashion, but a rattled pilot in a jam close to the ground in a steep turn, using excessive rudder to take out apparent drift, might. It is certain that a mistake of this type in not habit forming. Dead pilots merely make ugly statistics.

Remember Mr. Horne's classic statement — "Flying is inherently safe, but like the sea is terribly unforgiving of ignorance, incompetence, carelessness or neglect." We cannot rely on the answer that true coordinated flight (ball in the middle — no slip, no skid) can eliminate the accidental spin if one will merely remember to ease off the back pressure when buffeting occurs. The complete panel of flight instruments on the front panel of 913 didn't help Richter one bit, for the simple reason that he was too busy to even look at their carefully measured warnings after he pulled the trigger.

The flight characteristics of the Tri-Pacer may be another contributing factor, due to the fact that interconnected rudder and aileron results in "built-in" coordination.