

a yaw in the opposite direction. The result is a sluggish skidding turn. This is caused by the down aileron producing more drag than the up aileron. Ailerons in a sailplane can be amazingly effective, but only when used in conjunction with rudder.

Low dihedral also greatly reduces the bad effects of turbulent air. Turbulence can be thought of as a sudden change in the direction of the airstream striking the sailplane. This change in airstream direction has two components: a horizontal component and a vertical component. The change in the vertical component changes the angle of attack of the wing and stab and makes the nose go up or down—an effect easily corrected by elevator control. The change in the horizontal component of the airstream produces a roll in a sailplane with dihedral but only a harmless yaw for Mariha. When landing in gusty air, Mariha will come in straight and level, while other sailplanes are being bounced about.

A three-channel Stand-Off Scale sailplane for thermal or slope soaring.

MARIHA HAS a somewhat unusual origin. A local flier of full-sized sailplanes, Fred Hewitt, designed the full-sized prototype of Mariha as a high performance homebuilt. A model version of Fred's sailplane was built to see if anything could be learned about the design before construction of the full-sized version was complete. Since then, the model Mariha design has evolved into a high-performance RC model sailplane that maintains the appearance of the full-scale Mariha, yet combines the speed and maneuverability of a slope glider with the light wing loading of a flat-land thermal soarer.

The extended speed range is accomplished by almost completely eliminating dihedral. This reduces drag and improves high speed stability. The plane can float along at 15 mph when working light lift. Yet, with eight ounces or more of ballast and downtrim the ship will tear up the field at 40 mph or more.

In order to effectively control a sailplane having so little dihedral, it must be equipped with ailerons. Ailerons coordinated with rudder and full-flying stabilizer give Mariha a degree of control that is second only to all-out aerobatic gliders. This maneuverability is the primary design goal of Mariha. Critics may argue that increased speed and maneuverability must be paid for with increased sink rate. This is true to some extent, yet for a good pilot, the speed will help him find lift sooner, and maneuverability will help him stay in the lift longer.

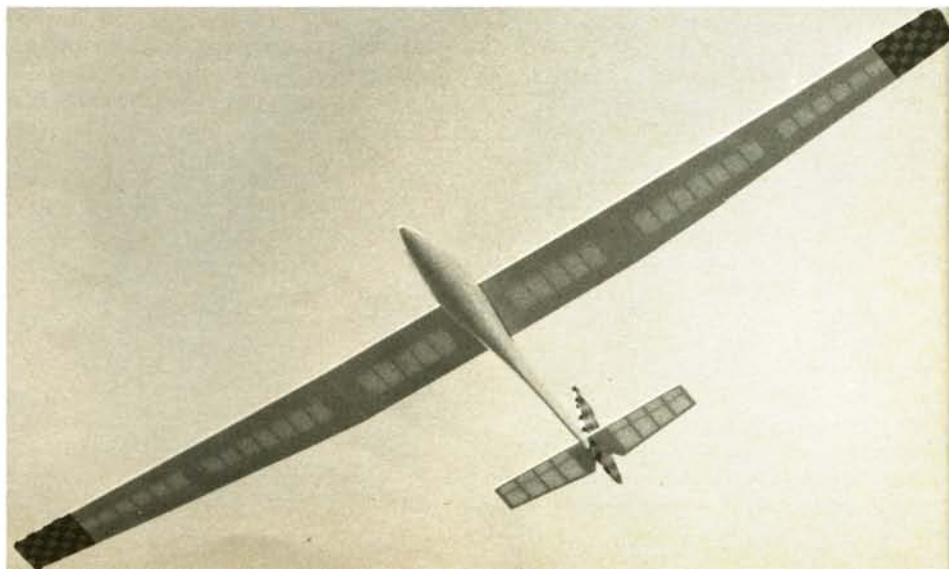
Rudder control alone is not enough to steer a sailplane having little or no dihedral. Rudder alone produces only a mild yaw. Ailerons are needed also. But ailerons alone produce a bank in one direction and

David Andersen Photos by George Otis

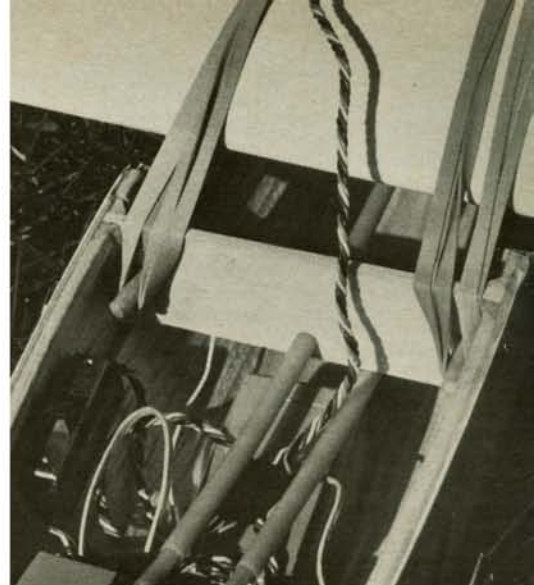
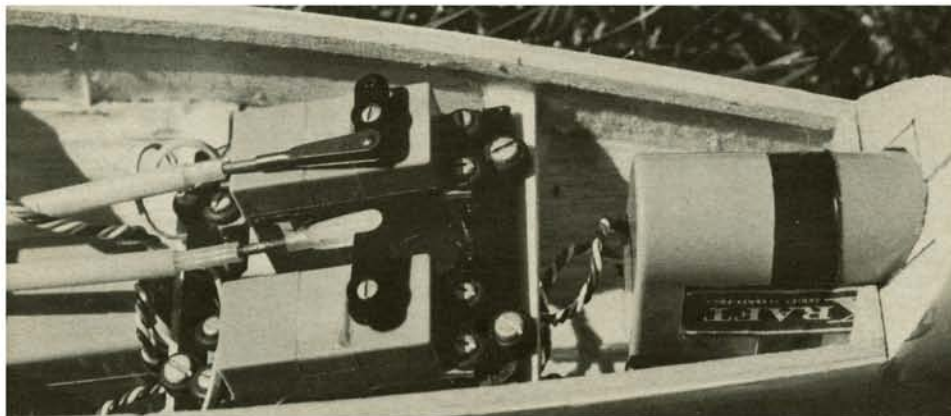


Although Mariha was designed primarily for slope soaring in the Midwest, it turned out to be a competitive thermal hunter as well. That is because slopes in the Midwest are rather small and shallow-faced. Slope soaring in the Midwest generally consists of skimming close above the crest of the hill until a safe altitude is reached and then striking out in search of thermals. Thus the sailplane requirements for slope soaring or hi-start flying in the Midwest don't differ by very much.

Top: Built for testing purposes prior to construction of full-scale homebuilt, Mariha has a naturally graceful configuration. Left: The author gets Mariha away on winch tow. Below: A beautiful flier, Mariha has an ability to perform tight loops, inverted flight, split-S and axial rolls, but has scale-like attributes.



Mariha 1



Left: How's this for accessibility? Rudder and ailerons are coupled—stab full-flying. Top: Rubberbands for wing-mounting are internal and minimize damage. Below: Bands loop over fore and aft dowels. Spoilers are not required.

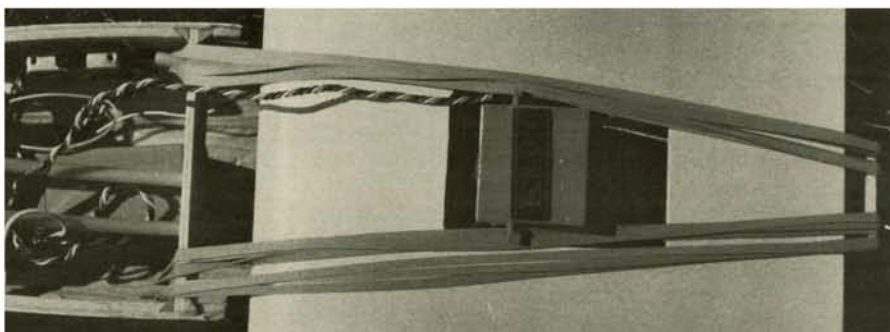
During the Twin City Radio Controllers fall glider contest, Mariha's pilot was lured into a 14-minute thermal flight by a pair of red-tailed hawks to score the longest flight of the contest. Unfortunately, the task was the five-minute precision event, so that flight received zero points. Nevertheless, Mariha went on to win third place in spite of the pilot's impetuous behavior.

The Mariha design has evolved over the last four years during which two models and four wings preceded the final design. Hundreds of flights in all weather and terrain conditions have been flown. Yet, because of its responsiveness, it is not recommended for the beginner to glider flying. Some experience with high performance sailplanes is recommended before attempting to fly Mariha.

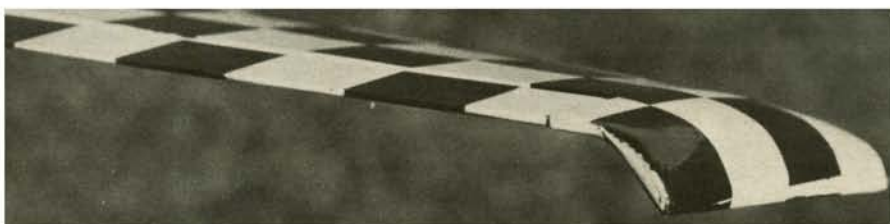
Construction

Wing: The wing is the most important part of any sailplane and should be constructed with as much precision as possible. Mariha has a one-piece wing that spans 105 in. This wingspan was arrived at by determining the biggest possible span that would fit inside a '62 Ford Falcon. Measure your car before deciding to build! Wing construction is rather conventional. Be careful to select wood of equal density for both sides of the wing. It is important to have as little gap in the aileron hinge as possible. Any air gap will add drag and reduce effectiveness. Make the leading edge of the aileron "V"-shaped and its corresponding fixed surface flat. The hinge pin should be centered at the apex of the "V" and inset on both sides of the hinge. Cover the mating surfaces of the aileron with Solarfilm before gluing the hinge in place. Cover the rest of the wing later.

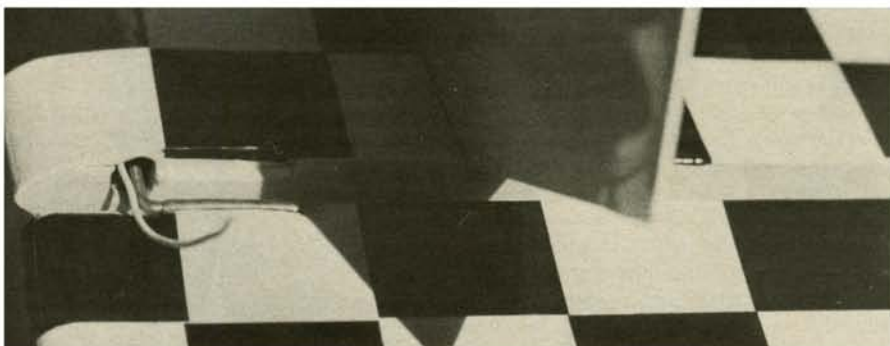
The wing panels can be built either flat on a board over the plans with wood scrap shims to hold the ribs at equal incidence angles, or the wing may be built on a wing-



Above: Hoerner-type wing tips add to efficiency by reducing tip vortices. Overall design and control set-up allows less dihedral.



Below: A unique feature detail is hinging of the rudder on one side with pushrod (shown) on the other. Note antenna protruding at bottom.



rod jig. To achieve the correct dihedral angle, pin the center section down flat and prop up the outer wing panels one inch at rib W12 while the glue dries at the dihedral joints. Use a Goldberg aileron connector

and affix the servo in place with double-faced foam tape. Add a little washout after covering by heating and twisting the wingtips. This tends to soften the stall.

(more)

