Sliver

PHOTOGRAPHY: DICK SARPOLUS

This one is not so exotic that you can't build it. This thin-lined bird will soar on the slighest lift/ **Dick Sarpolus**

This sailplane offers good performance, modern styling, and easy construction, based on some well proven design features. I hadn't built a sailplane in quite a while and had some new techniques I wanted to try as well as a desire to go back to a proven wing with a long, long history. The airfoil - and the wing - go way back to Frank Zaic's Thermic 100 of the 1940's. The airfoil is the well known NACA 6409, with or without the flat bottom modification. This basic wing also offers several choices in the airfoils and sizes it can easily be built to.

I first encountered this wing as one of my early sailplane ventures with friend Joe Roslyn; the Thermic 100 wing was combined with a Taurus tail assembly for the Thermus, a successful sailplane in 1969 which is still winning trophies today. Frank Zaic later modified the wing, going to a straight tapered tip panel in place of the original "Wolf" outline. It was sold commercially by Frank and also incorporated into several successful kit sail planes. He later modified the undercambered 6409 airfoil into a flat bottomed section and again offered it commercially in several sizes, from 100" up to 130".

My intent to build this wing with the undercambered airfoil was to have a model which would be well suited to calm air or light breeze conditions. The flat bottomed wing version could be used for windier weather, being faster and better penetrating. The wing's multiple spar and closely spaced rib layout offers easy construction - no planking or capstrips required - and still performs well. The chosen layout uses 34" span constant chord center panels and 21" span tapered tip panels for a 110" span, 906 square inch area. The two main panels construction easily mates with two wire joiners through the fuselage for a clean assembly.

This plane is my first with a vee tail, and selection of this feature led to the slender fuselage design. The vee tail is appealing for several reasons - less construction time, less drag, novel appearance, less vulnerable to crash damage. The control linkage chosen was Du Bro's new setup, with the mixer linkage mounted on one servo and linked to a second servo, directly behind the first one. With the two servos now mounted in line, it was obvious that a very slender fuselage could be built, using a flat pack battery and a flat receiver. The fuselage was laid out to be

Dick, if you don't get the photos right now the dumb sky is going to open up and drop two feet of snow on your head tomorrow. Quite a winter in the east for testing anything. It's a beautiful easy floater.

barely wide enough to accept the DuBro linkage; the servos, battery, and receiver easily fit.

The vee tail surface area is 216 square inches, 24% of the wing area, generously sized for stability. The movable control portions are large to insure adequate control response. Full moving surfaces were not used to simplify the installation. The vee tail assembly is simply mounted to the fuselage with two nylon bolts.

The fuselage itself, now slender due to the inline servo mounting, was further reduced in bulk by going to a pod-and-boom layout. Although a tapered fiberglass or aluminum tubing boom would be ideal, these items are not readily available to a scratch builder. A small rectangular cross-section, with ¼" x ½" spruce top and bottom pieces and ⅛" balsa sides, results in a reasonably light and strong, quickly built boom construction. Perhaps 1/32" plywood could be used as the boom side planking for even more strength.

Our first test flights showed this combination of features had resulted in a really good flying sailplane. It climbs out on the hi-start straight as an arrow and is very stable yet maneuverable. It doesn't feature spoilers, flaps, towhook release, etc., but does offer simple construction and good performance.

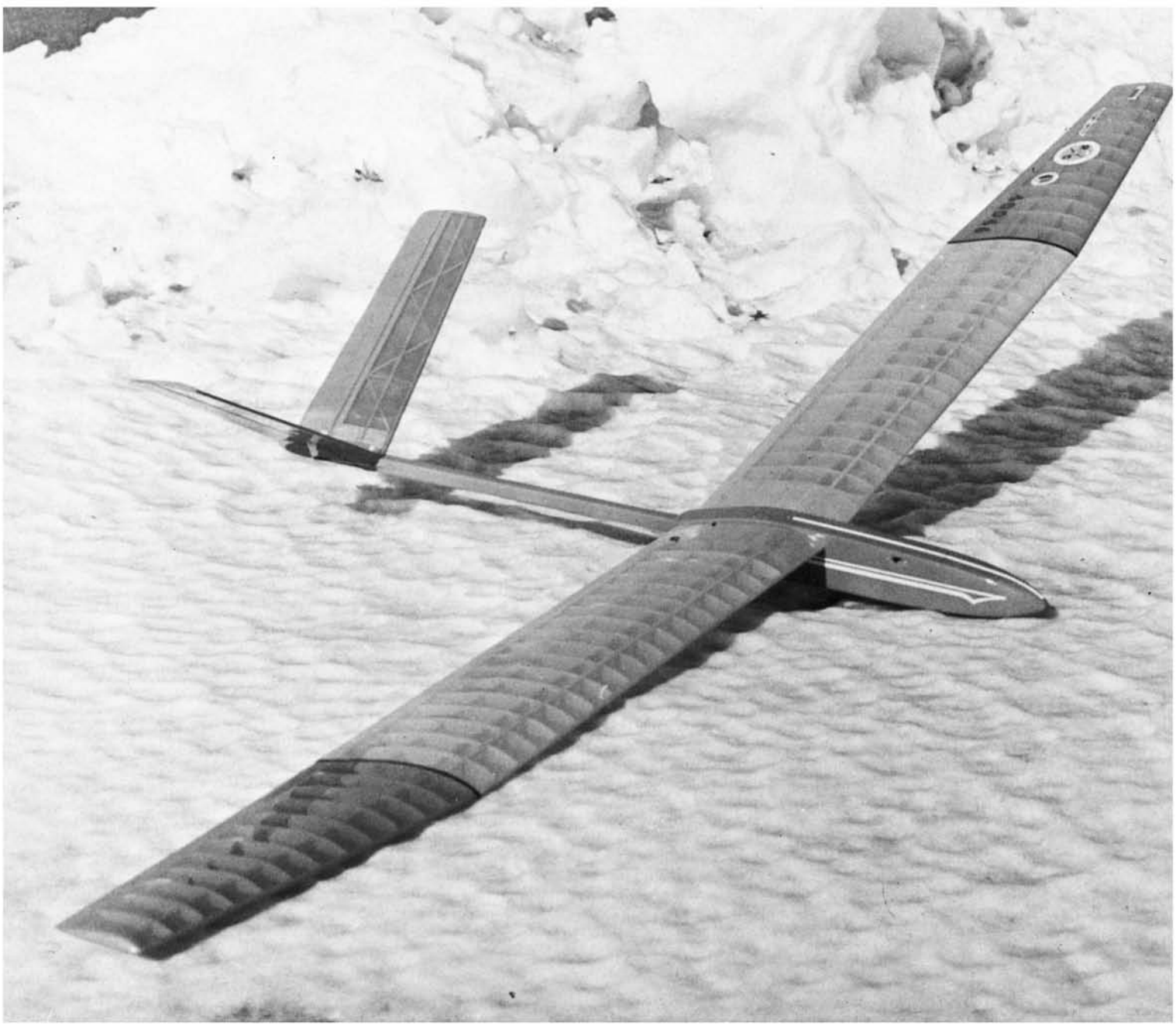
Before getting into the construction, you may be able to save some labor by obtaining a wing kit from Frank Zaic, if he still has them available. I suggest you inquire at P.O. Box 135, Northridge, California, 91328, for his G-99, G-110, or G-130 wing kits.

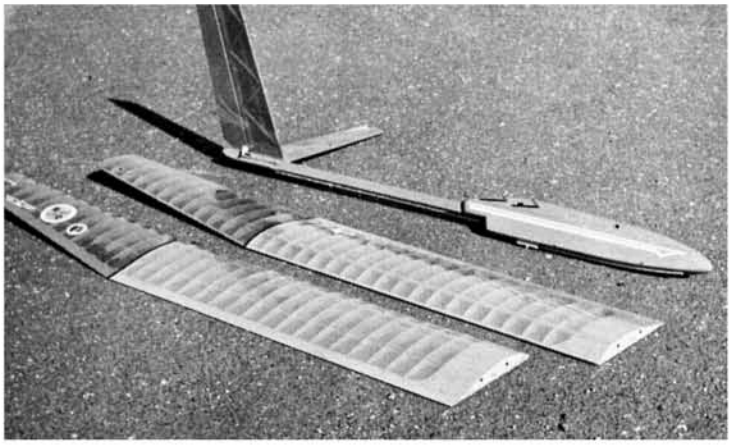
Starting with the wing, there is no denying that there are a lot of ribs to be cut out. Most of these are the same, for the constant chord center panels. A band saw or jig saw will make things easier by stack cutting the ribs, also the six 1/16" plywood center section ribs. Stick with it - it's worth it. With the ribs cut, the panels can be built flat over the plans if you choose the flat bottomed airfoil section. For the undercambered section, the spars must be spaced up off the building board. At the polyhedral break, the extended spars of the tip panel overlap the spars of the center panel for easy reinforcement. Use epoxy here. At the center joint, use 3/16" dia. wire wing joiners to line up the brass tubes before epoxying them to the plywood center ribs.

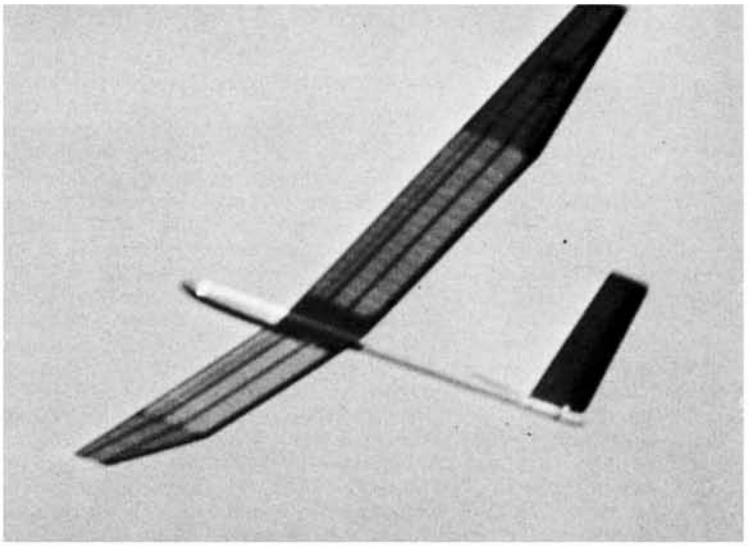
You may wish to add one or two ¼" square spruce spars on the top surface of the wing for extra strength. I did add one such spar on the prototype and have repeatedly looped the model with no problems. The spruce spars are very strong and still flexible; the center wire joiners also flex for more safety.

Going to the tail surfaces, the simple built-up structure with the top spar and tapered control surfaces results in a diamond style lifting airfoil. The center-section is flattened on the bottom for fuselage mounting and reinforced with epoxy and fiberglass cloth. It is removable, mounted with two #10 nylon bolts into the fuselage.

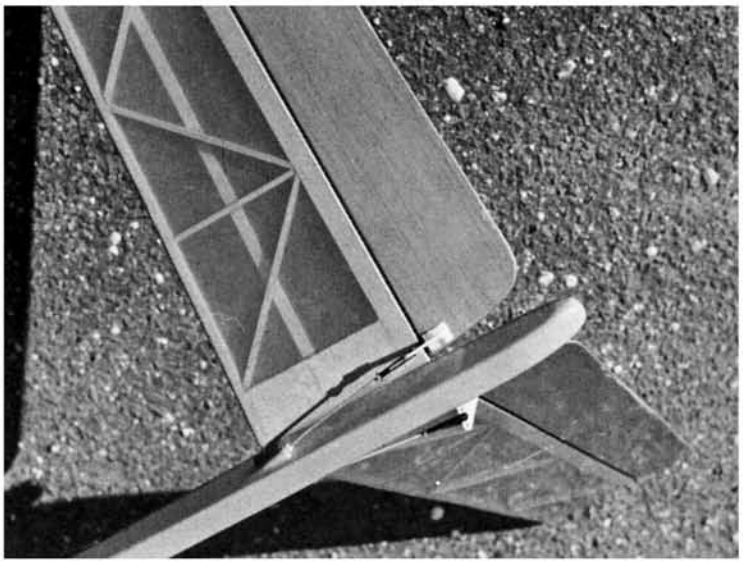
The main fuselage section is made from ⅛" balsa side pieces with 1/16" plywood doublers; this fairly heavy construction is designed to take considerable abuse. Brass tubes are epoxied in place to accept the wing joining wires; the wing panels are held in place with a heavy rubber band between screw eyes in the panels. The tail boom is built up of ⅛" balsa side planking over the ¼" x ½" spruce top and bottom pieces. The nylon tube linkage runs back through the boom, exiting on each side to the control



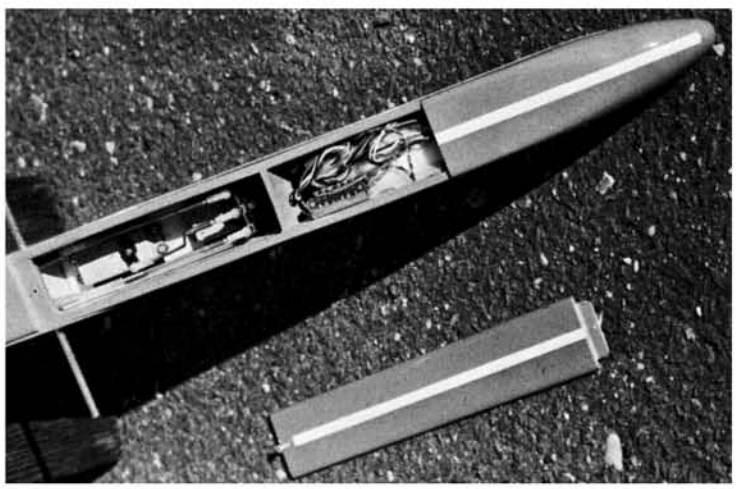




Translucent gleam of the ironed-on film gives you an idea of the structure. A thin fuselage, equipment in tandem arrangement. Light, thermals in winter air. **At right:** Temperature 22 degrees, thermals all over. It flies superbly.



The "V" tail, easily built, nice in that it is graceful, high above ground on the landing roll. Popular on full scale soarers for this reason. Linkage can be seen on photo to **right**. Two horns are required. **Bottom right** photo captures the winch mechanism, foot tredle etc. Or use a hi-start line deal. **Beneath:** The nose, no room lost for a thin cross-section. It balances well.



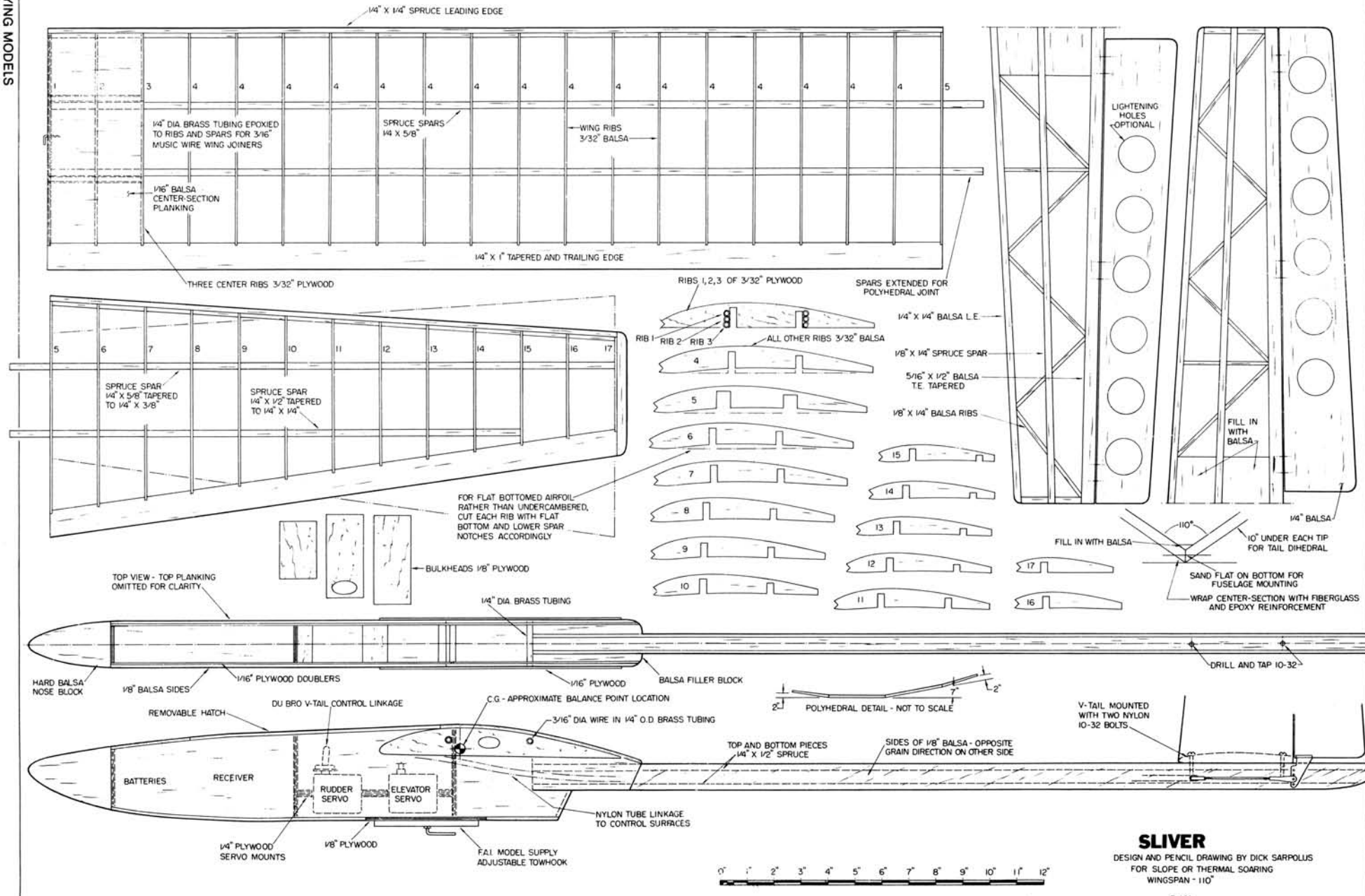
surfaces. Although other linkages could be used, the DuBro setup appears compact and easily workable. A nylon tube could be built into the boom to accept the radio receiver's antenna. The towhook is mounted on a ⅛" plywood bottom section epoxied in place. The nose block should be shaped from hard balsa or even pine.

For finishing, the fuselage should be painted with any usual technique. Wings and tail surfaces, as usual on any sailplane, should be covered with any of the plastic film materials.

My test flying consisted of checking the balance point, which took a few ounces of lead in the nose to locate as shown on the plans, two hand launched test glides, and a shot up on the hi-start. For first launches, the towhook was placed forward for safety, then moved back for the best climb angle. The fifth flight, on a 20 degree cold, clear day off a weak hi-start, resulted in a five minute plus flight! We were pleased.

What's in a name? I usually come up with something catchy like "The new glider with the vee tail", and this time am indebted to FM's editor, Don McGovern, for suggesting the "Sliver", a name whith I like and feel suits this design.

Happy soaring!



SLIVER

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