



# MINIMOA

*John Read launches the Minimoa with a winch. Model has been entered in three contests and has gained one "First" and two "Seconds"!*

**E**ver give a party and nobody came? That's the way it was in the summer of '78. Our R/C club planned the annual sailplane contest and added a new event --- scale. We invested in five shiny trophies and Xeroxed a bunch of sport-scale scoring forms. Three members volunteered to judge the event. And, of the thirty-plus contestants, none had a scale ship in the trunk! Of course, our immediate reaction was, "Howcum"?

Part of the reason why there were no scale models may be accounted for by the fact that there are only a few scale sailplane kits. Then too, the magazines haven't published many scale gliders --- in the United States, at least. European modeling magazines regularly feature scale R/C sailplanes and many of them fly as well as purpose-designed models. Then there's the problem of **documenting** scale R/C gliders. Many of the best references lie buried in obscure books that specialize in sailplane history. Just finding an acceptable three-view of a particular prototype may prove to be a major research effort.

Our design for the pre-War German sailplane, the Hirth "Minimoa," initially proved to be a difficult model to document.

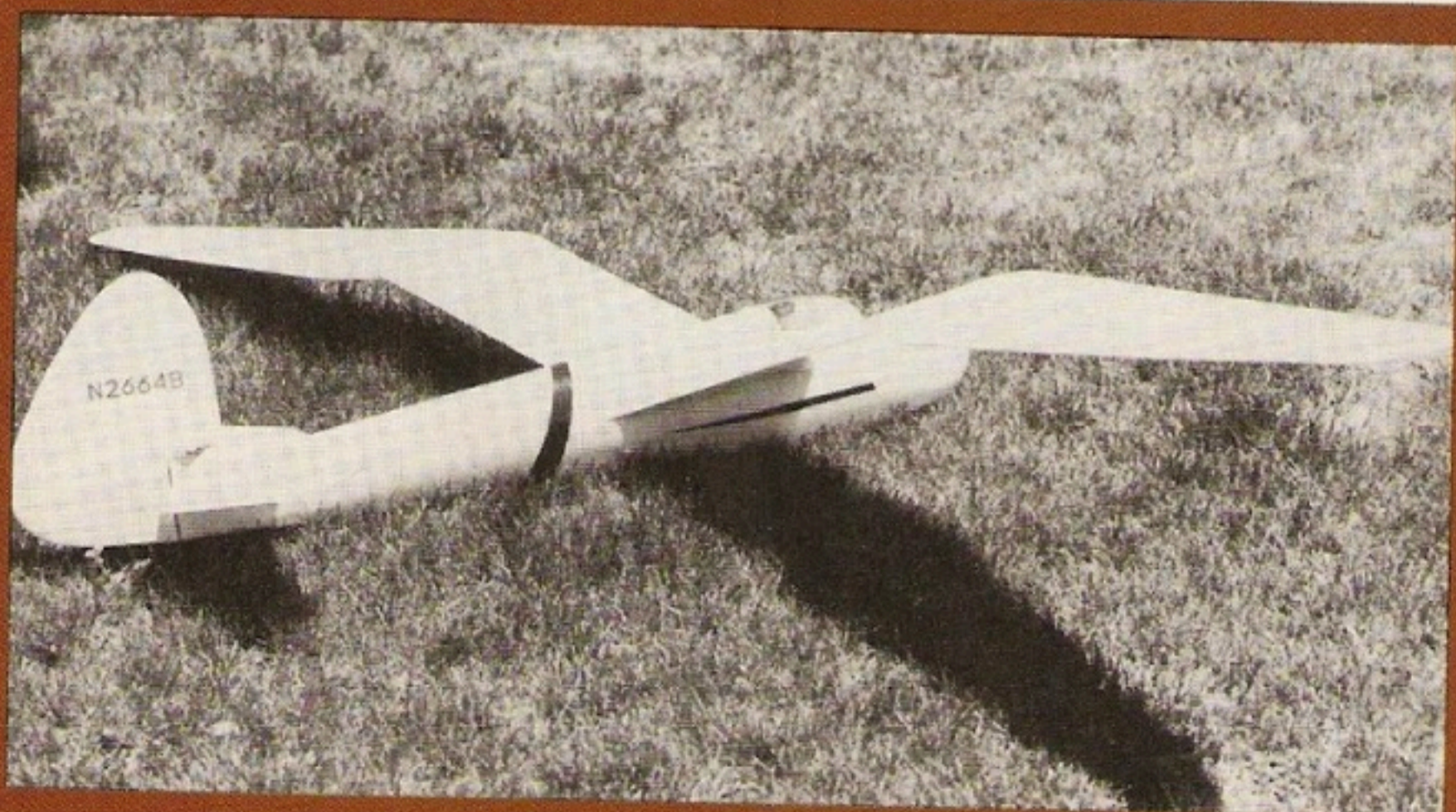
*LEFT: Lori Gutierrez of Colorado Springs showing off John A. de Vries beautiful Minimoa.*



But, since it was a production craft (110 were built!), we were able to locate enough information for a Stand-Off (sport) scale model of the beautiful gull-winged bird. When the model was half-built, however, the heavens opened up! John Read found Jan Scott --- who owns a real Minimoa! And, I discovered Jim Ealy --- who has Minimoa three-views! It would only take a

bit more digging to build our model as AMA Scale, since we used **scale** airfoil sections.

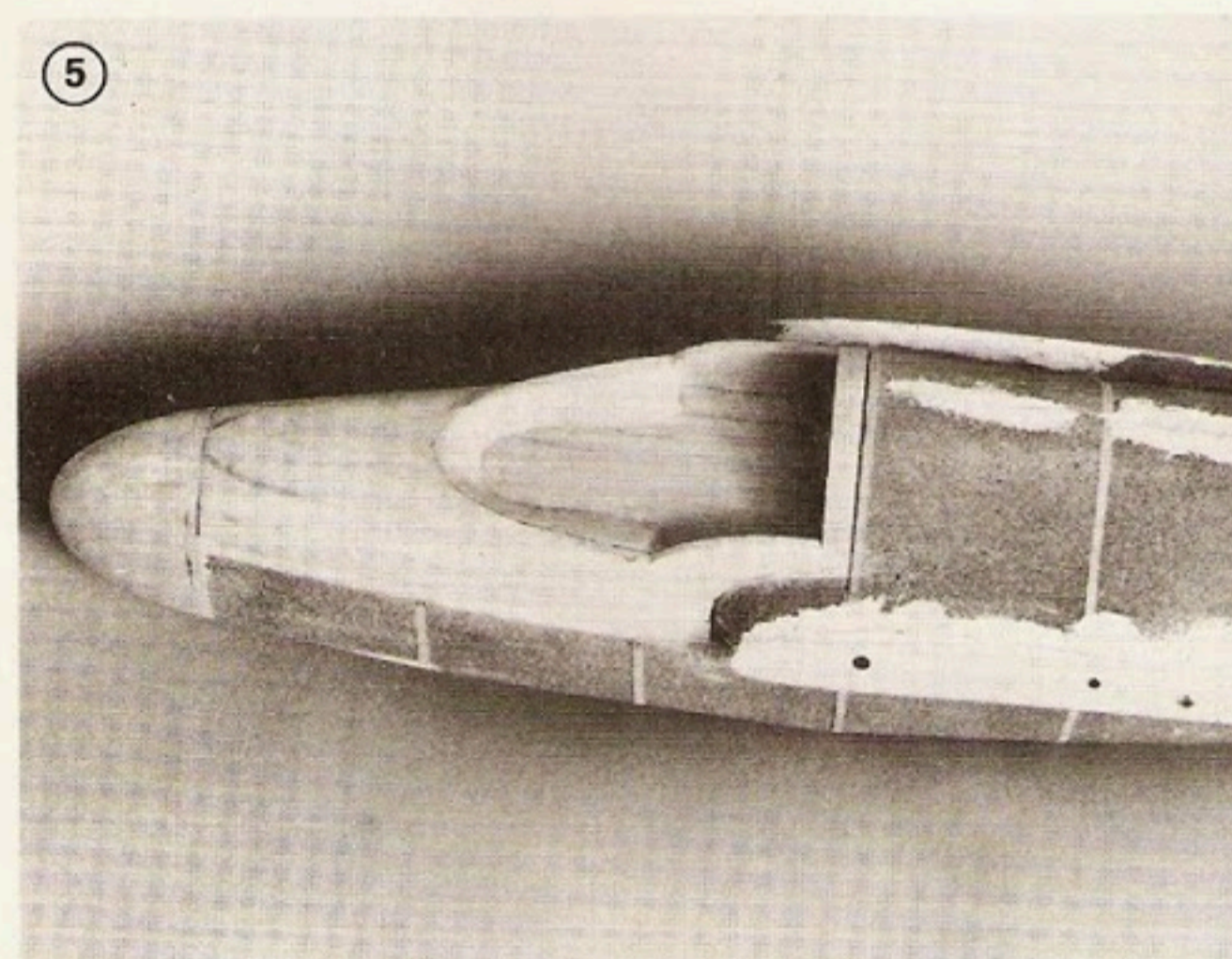
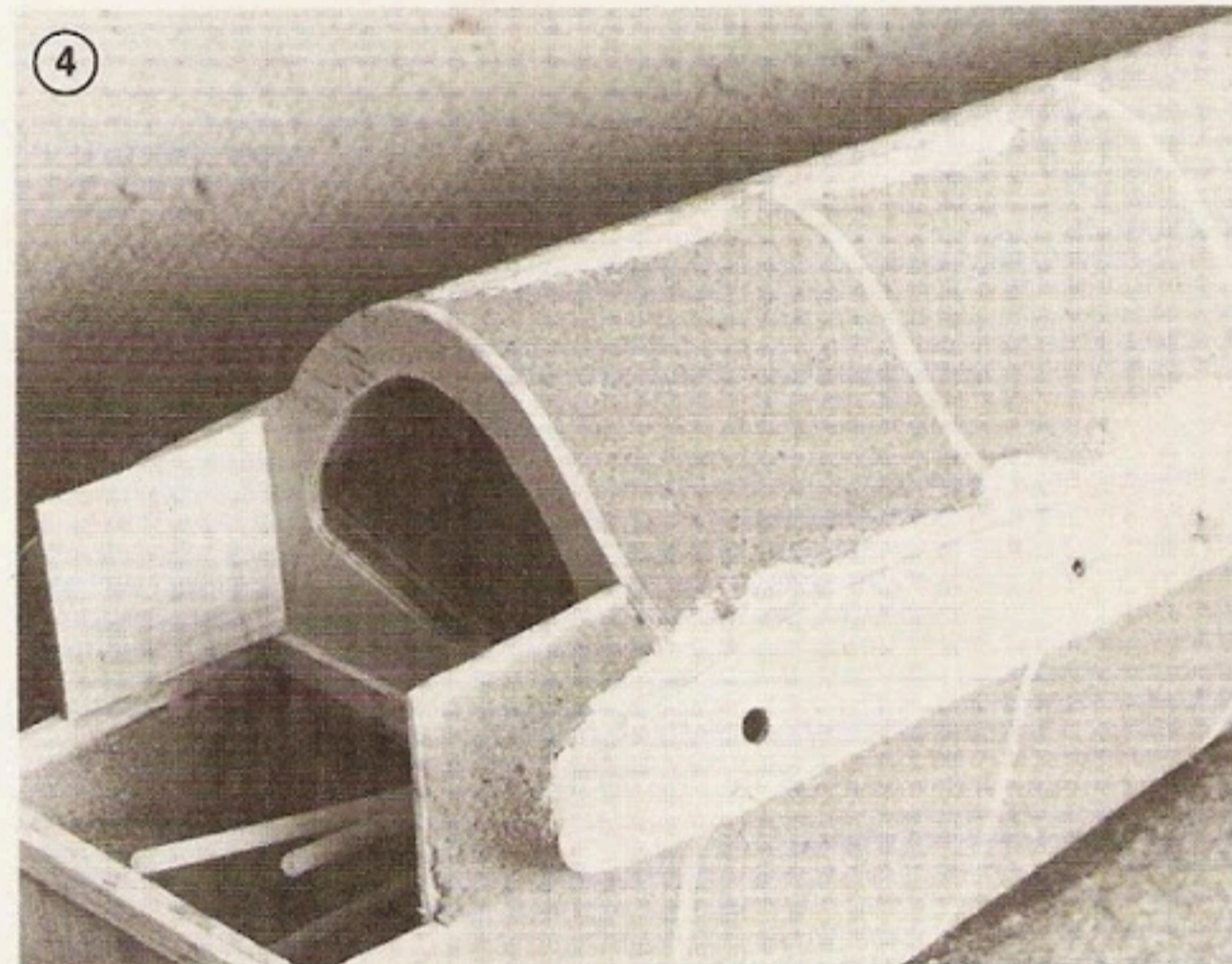
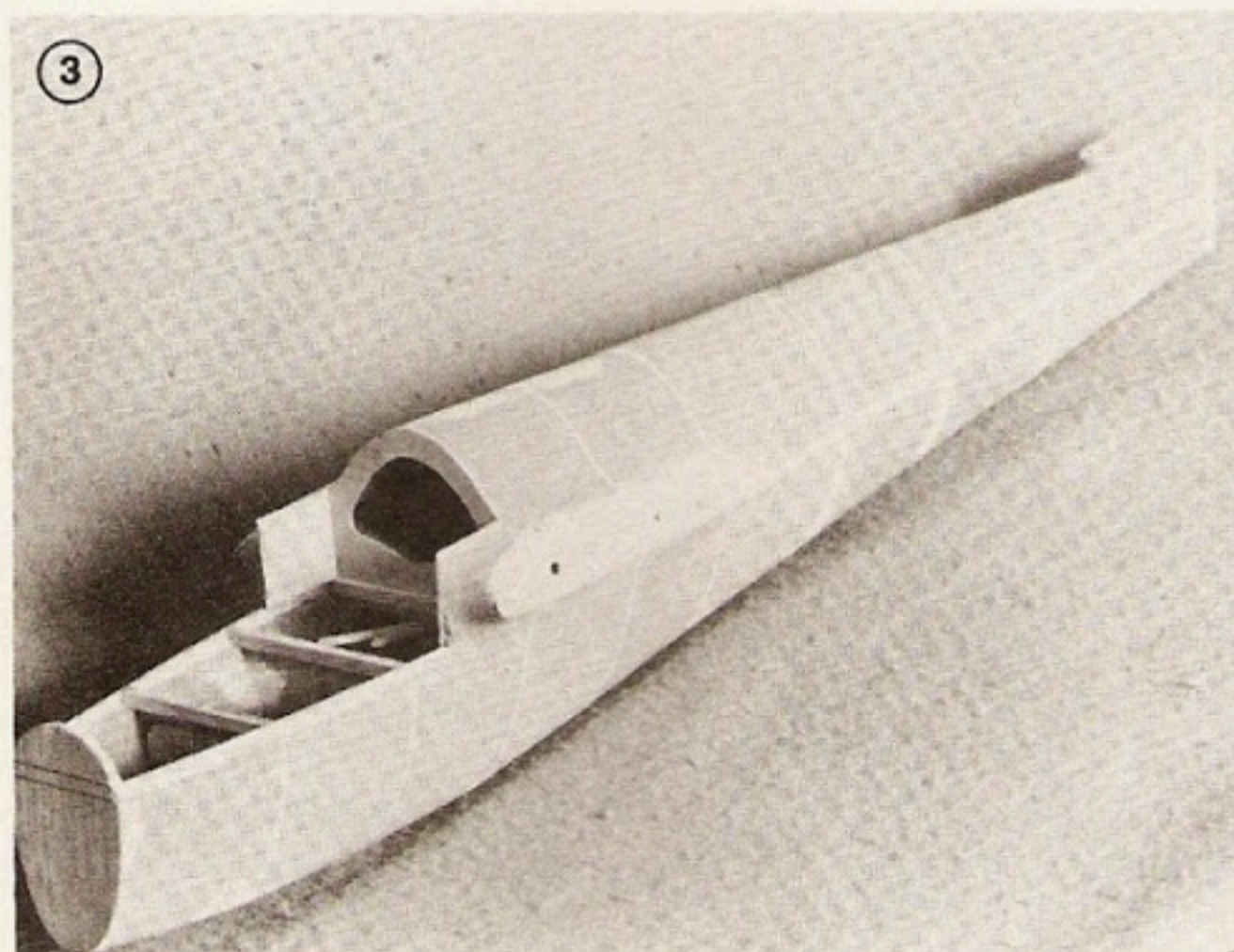
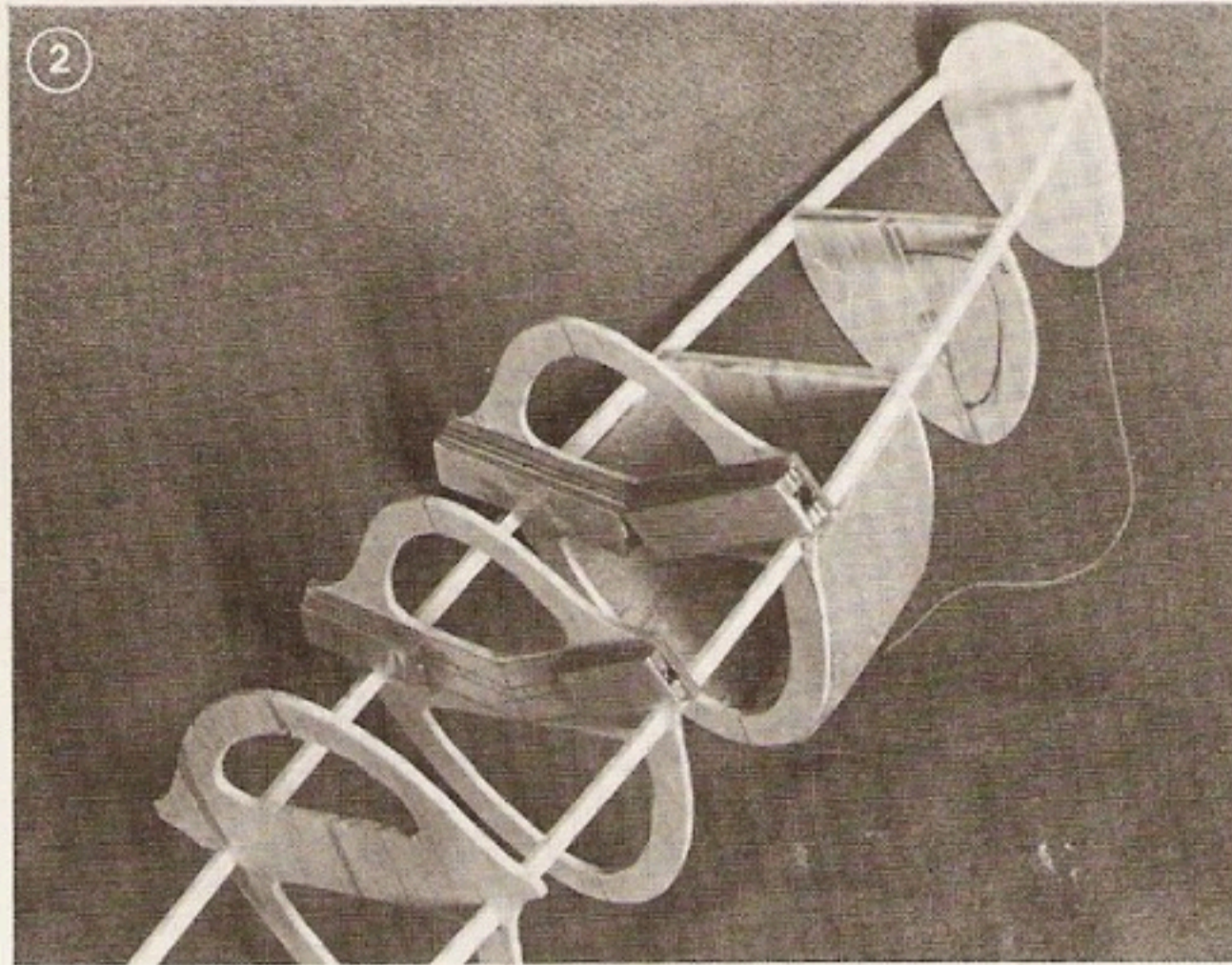
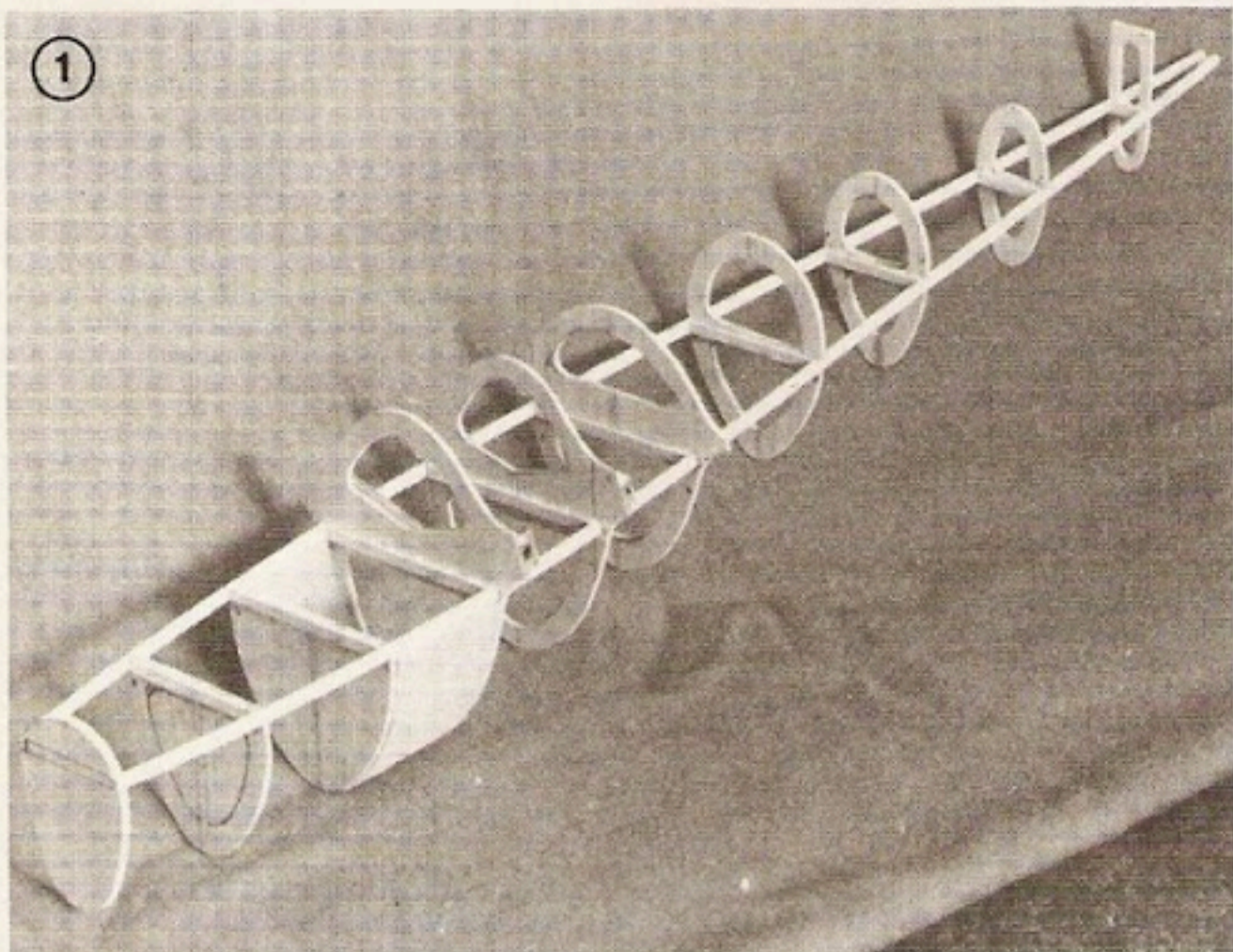
The "real" Minimoa was a 1935/36 product of the Hirth Segelflugzeugwerke. It represents a milestone in sailplane design --- the first one imported into the U.S. was also the first sailplane to truly "thermal" here. The Minimoa set the pattern for many high performance sailplanes that followed. The plywood covered fuselage is of super simple design --- aft of the cockpit there are no compound curves. The vertical surface (fin/rudder) is a one piece, all-moving control and the gulled and swept back wing holds both ailerons and spoilers. As with any scale R/C model, the builder should be cautioned that there were differences between the several examples of the



*The Minimoa, photographed the day before its first flight. She averaged four minutes in "dead air," the first time off the high-start. All scale markings are from Jan Scott's full size Minimoa.*

This 105" span scale gull-winged beauty was the inspiration of Col. John A. de Vries to design and John Read to build. The model scored 88.6 static points and a second place trophy in its first contest.

Photos By Merrie Anne Brandin



(1) 1/8" x 1/4" spruce crutch with all ten formers glued to cross-pieces. One section has hollowed foam blocks in place "to try it out." (2) Close-up of basic fuselage structure showing ply "boxes" built around the brass tubing wing rod holders. "Boxes" are epoxied to the rear of formers 4 and 5 before they are attached to the crutch. (3) Minimoa fuselage, with all of the spaces between formers filled with foam. White contour lines are the formers --- just sand the foam down until they show and the fuselage is contoured! (4) Close-up of the 1/16" ply wing root rib. Note the two wing-wire holes and the short length of protruding NyRod which houses the spoiler cables. (5) Speckles on the foam of the uncovered fuselage is filler. Foamed fuselage was covered with fiberglass cloth and polyester resin and then painted.

"real" airplane. In the photographs we've collected, we've found substantially different fin/rudder shapes, clear and segmented canopy construction and Minimoa's with and without a single, centerline landing wheel aft of the forward skid. Our drawings show two rudder shapes and the location of the landing wheel. But, it's a good idea to choose and document a specific airframe before you begin building your model Minimoa!

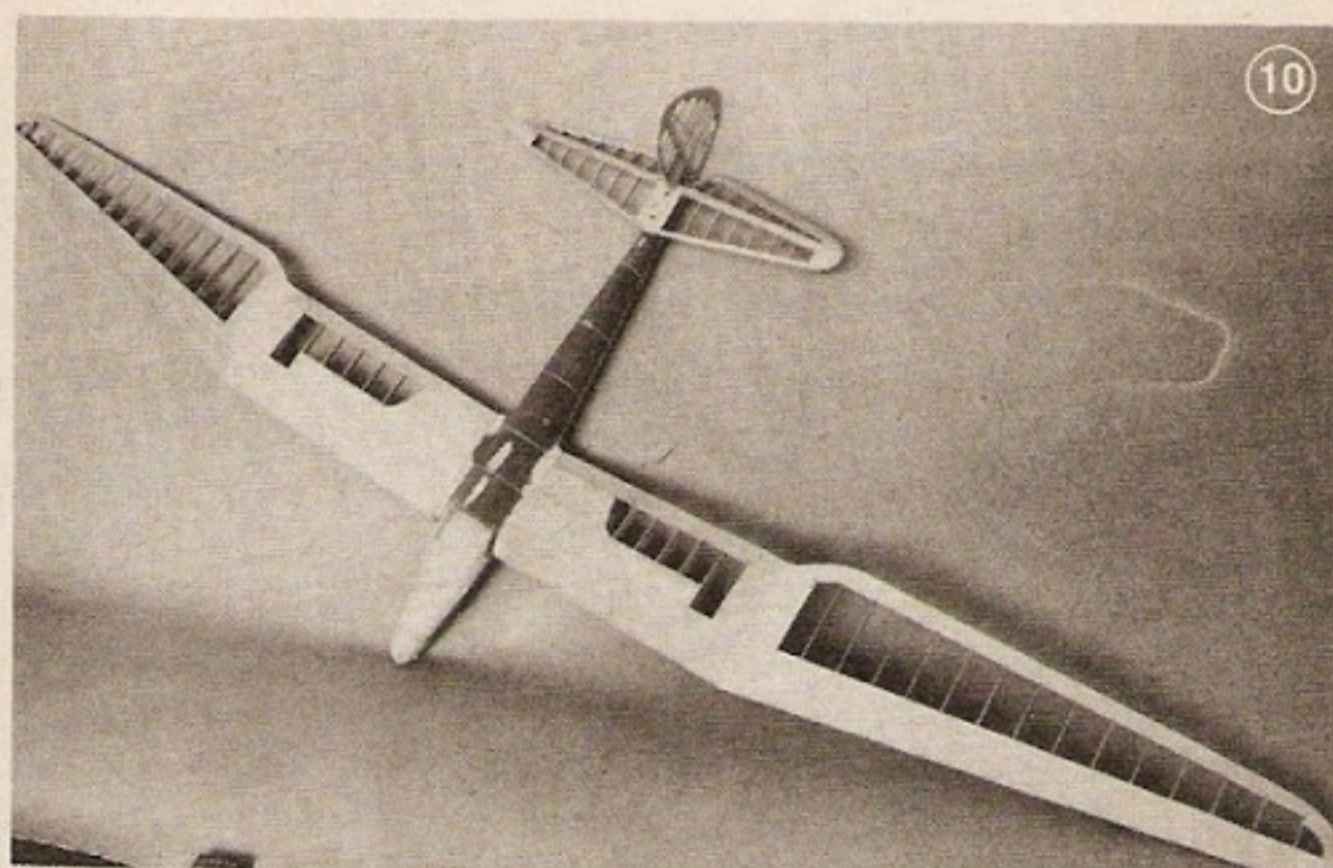
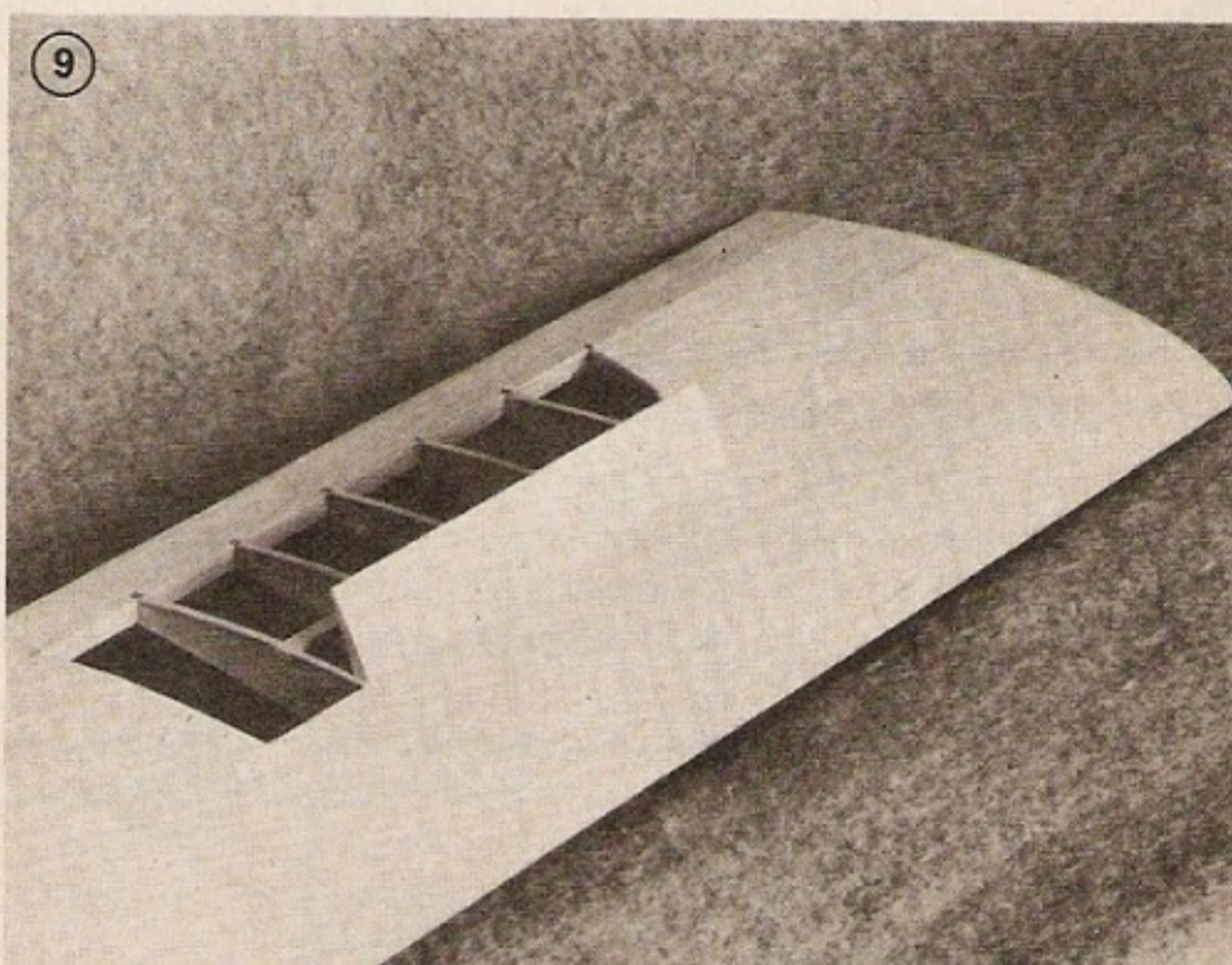
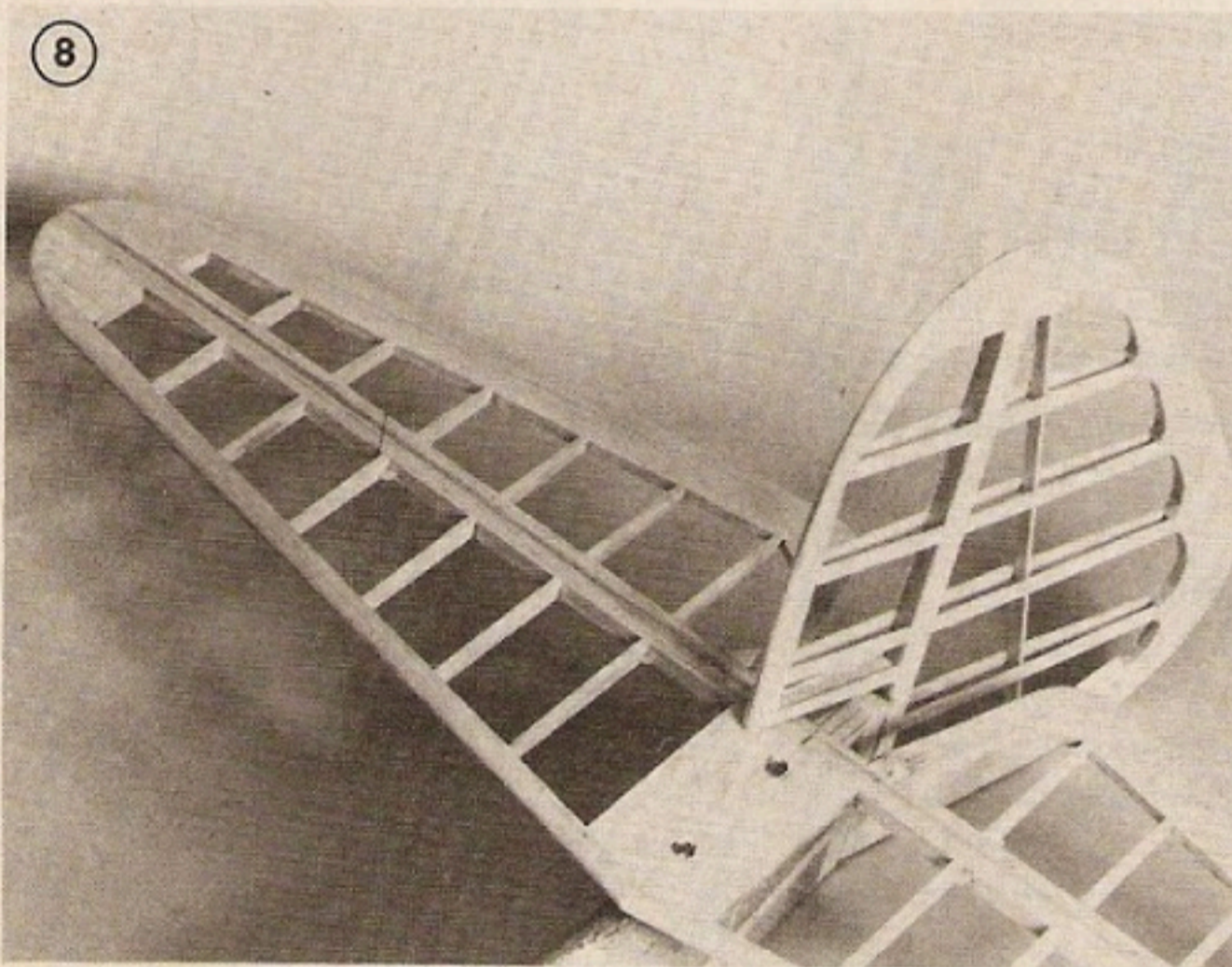
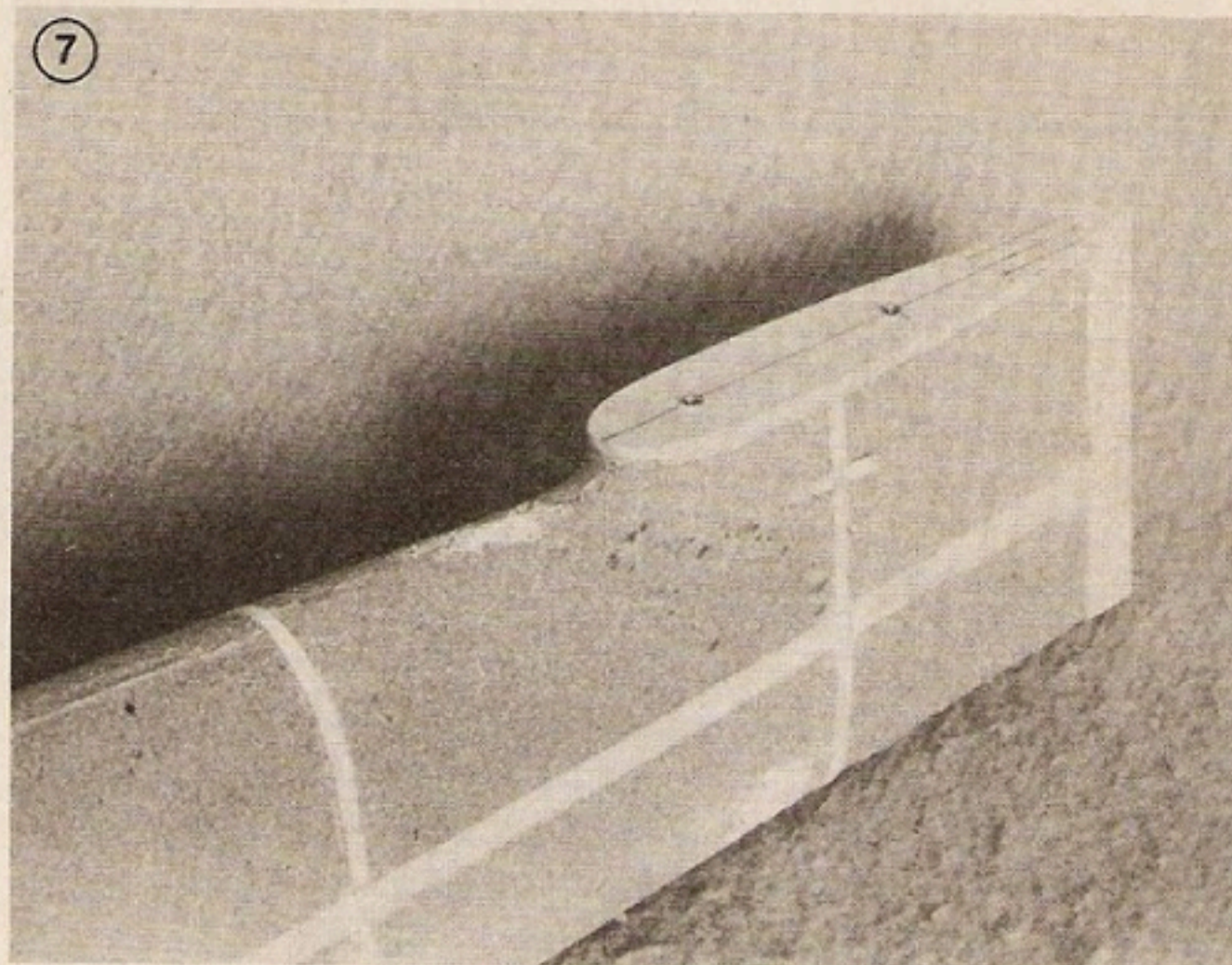
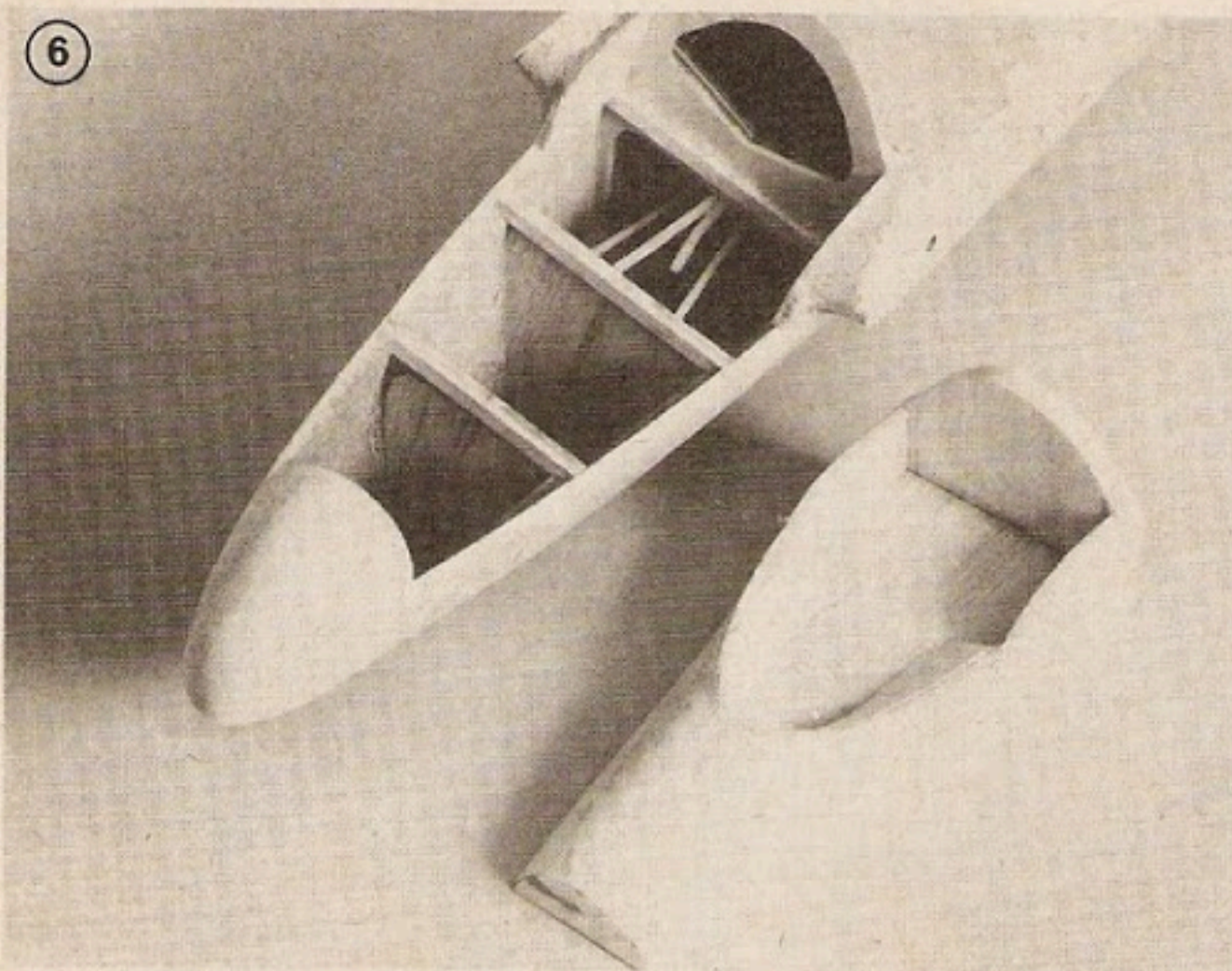
Our model is built to a scale of 1.88 inches to the foot. The scale was chosen to

give a reasonably sized and easily transported airframe. The span worked out to 105" and the 750 square inch area is about "right" for a three channel sailplane (rudder, elevators and spoilers). On the practical side, we decided not to use ailerons because they take up most of the severely tapered outboard wing panels on the real ship. The structure needed to support the ailerons would have added a lot of unnecessary weight --- and, we weren't sure that model ailerons would have been effective.

## CONSTRUCTION

### Fuselage:

The model Minimoa is built on a full length fuselage crutch. Built of 1/8" x 1/4" spruce, the crutch sets the fuselage alignment and locates all of the fuselage formers. They're simply glued behind the crutch cross-pieces. It's a good idea to pre-build the wing-wire holders and epoxy them to the rear of formers #4 and #5 before the formers are attached to the crutch. Wire alignment is eased --- and the 10½° dihedral angle can be measured,



(6) Nose and radio hatch. There isn't a lot of room for the radio installation but medium-sized rigs fit without too much difficulty. (7) Close-up of the 1/8" ply stabilizer mount. 6-32 blind nuts are installed on the bottom of stab mount then epoxied to former #10 and the 1/2" sq. balsa tail post. The NyRod just ahead of former #10 carries the fin/rudder pushrod. (8) Minimoa tail feathers. Stab is bolted into place and the fin/rudder permanently hinged to the rear of the fuselage with two large Kletts. Optional rudder construction and two scale rudder shapes are shown on the drawings. Stab and elevators are built "1/4" thick" and then sanded to a streamlined cross-section. 1/8" ply stab center section is hidden below the 1/4" balsa. (9) Inner wing panel with the scale-sized spoiler extended. Spoiler is made from a section of trailing edge stock and hinged to the spar with a strip of MonoKote. When the entire wing is MonoKoted, spoiler "gets" a double hinge. Note the 1/8" x 1/4" spoiler "rest," and the cap stripping of the top of the inner panel ribs. (10) The completed Minimoa airframe, ready for finishing. At this point, with all of the pushrods in place, but without the radio, the model weighed only 18 ounces! The fuselage foam "drank up" a LOT of resin. That, plus 4 oz. of balancing weight, resulted in a finished, ready to fly weight, of 54 ounces!

exactly.

We decided to try a polyurethane foam fuselage, so we filled the open spaces between the formers with foam blocks, that were pre-hollowed. The foam sanded easily --- each former acted as a built-in template. With the 1/16" plywood root ribs epoxied to the appropriate formers and the 1/8" ply stabilizer platform (with its 6-32 stab retaining blind nuts installed) glued to the rear of the fuselage, forming the wing fillets and stab fairing was simplified. The foam required some homemade, curved sanding

blocks to "flow" the fillets into the fuselage but the only tricky part of the process involved forming the front of the wing fillet. Since we wanted the entire cockpit area to form the radio hatch, we backed the fillet with 1/8" sheet balsa "plates" at its forward edge. Check the photos for this bit of construction.

The nose block and the cockpit hatch area were formed from laminated 3/8" sheet balsa and the fuselage skid was cut from spruce (1/8" ply is okay, too). The rather fragile foam must be protected so we

decided to cover it with 3/4 oz. fiberglass cloth and polyester resin. Big surprise! Before we fiberglassed the fuselage, the entire airframe (less radio) weighed only 18 ounces. Although we used the old toilet paper roll trick to absorb excess resin, we found that the foam "drank-up" six ounces! That's weight we don't want --- and can't use! It isn't as bad as it sounds, however. The finished model, ready to fly, only weighs 54 ounces --- and that extra resin gave us a sm-o-o-o-th fuselage finish.

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## MINIMOA

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the bird. Establish a turn with the control stick and then feather-in a **slight bit of opposite rudder** and hold it until you want to roll out. The model will go around like it's on rails! There's enough rudder action to handle high-start launches and the Minimoa goes straight up on a winch. If there's **any** thermal action around, the model will act like an elevator.

Our completed model was photographed on Friday, test flown on Saturday and entered in the Rocky Mountain Soaring Society's scale contest on Sunday. it averaged over four minutes in dead air on Saturday and out durationed the other eight scale entries (all kits!) on Sunday. It was first in static judging and gained the second place trophy. John was still "sorting out" the Minimoa's landing characteristics. We think we have a winner!



