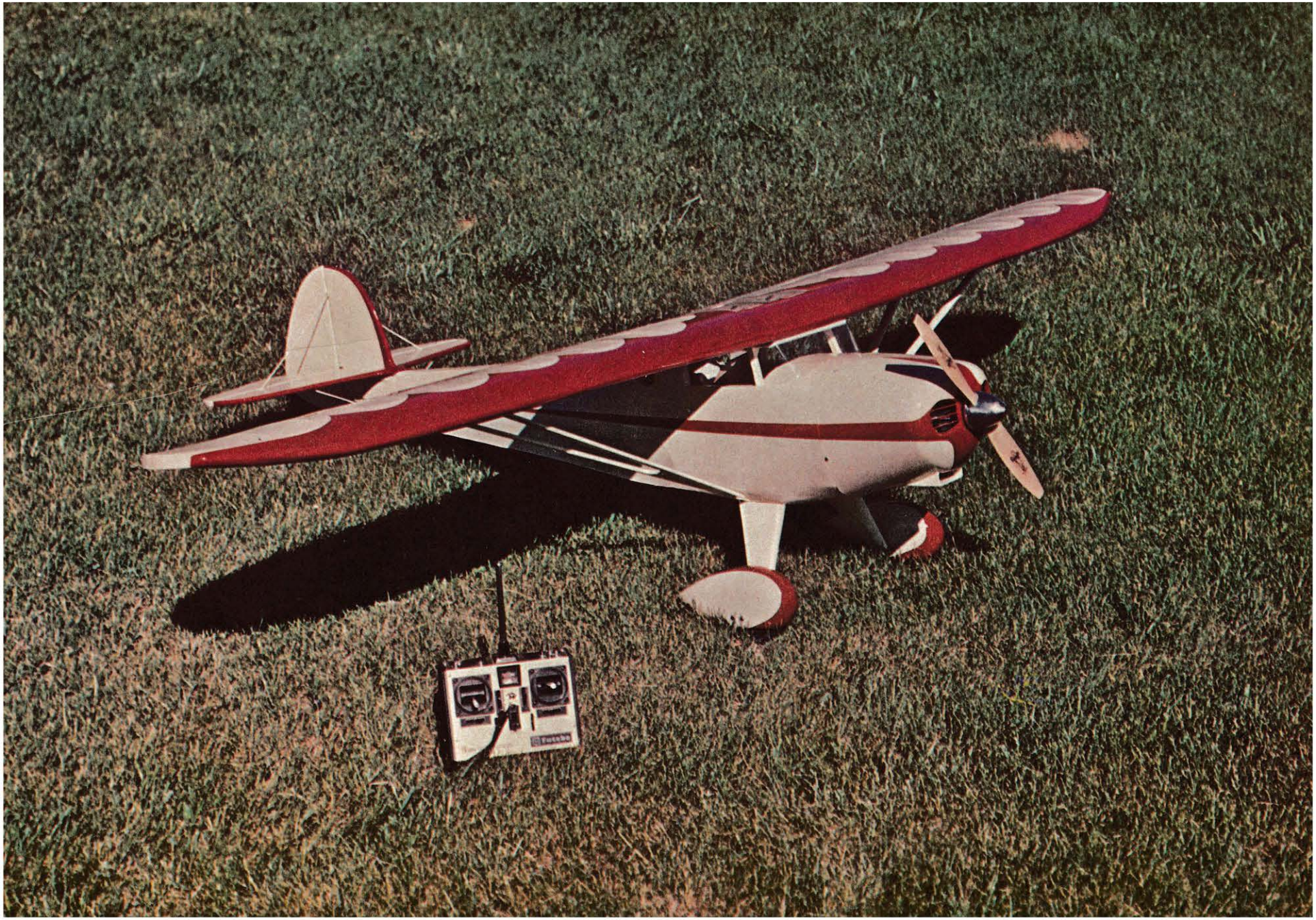

THE LEAST KNOWN MONOCOUPE

In A Vain Attempt To Capture The Aftermarket, Monocoupe Even Tried An Opposed Lycoming Engine. It Was Not A Sales Success, But It Makes A Very Sucessful 1/4 Scale Model

By Thomas Houle

Right off I should emphatically state that anyone who isn't turned on by the graceful curves of a Monocoupe has been doping too many wings in unventilated basements. For that matter, some of you are probably groaning about yet *another* Monocoupe project. True. It is another Monocoupe, Bucky, but it ain't your standard 90A or 110. It's the rarely seen 90AL. When you truck this baby out to your flying field you're definitely going to get some goofy guesses—like an Aeronca with elliptical tips, a taper-wing T-Craft? Yeah, it's a lot of fun to see the local scale "experts" react. (The "L" by the way, stands for Lycoming.)

I'm not going to give you another history of the Monocoupe firm's struggle for fame except to say that the 90AL was the last model built. It ceased production in 1949 or 1950, depending on the particular history you read. (The Franklin powered 90AF came out about 1940.) Peter Westburg has an excellent set of drawings available for the 90A. His short history, drawings and photos appeared in the June, 1978 *Model Builder*. He makes no direct reference to the 90AL except that it ceased production in 1950. Bjorn Karlstrom did a three-view of the 90AL which was published in the March 1953 *Model Airplane News* and Tom Stark ran an excellent construction article for a rubber powered model in the July, 1974 *Model Airplane News*. This model had exact scale outlines (except for stab.), accurate colors and markings and a scale airframe. Finally, no Monocoupe scale research project would be complete without mentioning John Underwood's *Of Monocoupes and Men* which contains the complete story

The lush green grass of Wisconsin makes a nice contrast with the cream and red colors of the models.

The author, Thomas Houle, is shown holding the 90 AL to show the design on the top side of the wing.

of both Monocoupes and the Folkert's racers.

Since the 90AF and 90AL differ from the 90A only from the firewall forward, I used Westburg's drawings and Tom Stark's plans for color references and scale airframe. The color markings on my plans are taken from the Stark article and depict "Snappy," a 90AL owned by Jim Harvey (former?) president of the Monocoupe Club. The structure is exact scale for the most part and came out pretty close. The airfoil is not scale; I chose the popular NACA 4412 over the scale Clark-Y as a good overall section, but in retrospect, I think I'd use the Clark-Y foil today. You can take your choice —I doubt if it will make much difference in performance either way. Both are flat bottom, high lift sections. Pertinent specs are wing area 1,355 square inches, span 96 inches and flying weight 20 pounds. The wing is built in three pieces; the outer panels plus a removable center section. This makes it real easy to get into the exceptionally roomy cabin. Wing loading worked out to 34 oz./foot. A Super Tigre 2000 motor was used in the prototype. The beautiful glass cowl was supplied by FIBERGLASS MASTER in Virginia per my drawings and is available at a very reasonable price from them. I can personally recommend this firm—the exterior finish of mine was glass-smooth. Wheel fairings with the same kind of finish were also used from them. And they are completely assembled. Order a FIBERGLASS MASTER catalog, you'll be glad you did.

Construction of the Tom Thumb Sky Tracings Monocoupe is definitely not difficult. In fact, the prototype was built by a builder who has only done a few kits. It's your basic big "stick model" and if you follow the plans, you'll come out with a beautifully flying model. Please do not "beef up" the plans. It is most assuredly strong enough and adding more wood will only raise the wing loading.

Let's take a quick look at construction. The tail feathers are balsa sheet with balsa and spruce framed outlines to simulate steel tube construction. This worked out quite well; you could also add rib stitching and pinked rig tapes. We didn't in the interest of getting it done and flown. Plywood plates are let into the stabilizer for the attachment of brace fittings. The vertical stabilizer and rudder are built in the same way.

I originally designed the wings in one piece but so many people told me I was nuts, including the guy who built the prototype, that I relented and converted it to three pieces. I prefer one piece because of the weight saving but what are ya gonna do with an eight-foot plank in your two-door micro-mobile? The wing construction is strong, strong, strong. At the heart of each wing are the two $\frac{1}{4}$x$\frac{3}{4}$-inch spruce spars to which the lift struts are attached. One-quarter square spruce spars are used on top—one in each wing. We used 3/16 foamboard ribs in the prototype because they're cheap and someone gave me a sheet of the stuff out of which I got all the ribs and then some. They are capped with 1/16x3/8 capstrips. If you gotta have balsa ribs, use 3/32 sheet. If you use foamboard, don't use ACC glues. Use Titebond or Sigbond as the ACC glues will attack the foam.

We sheeted the top and bottom leading and trailing edges of the wings with 1/16 sheet to simulate the veneer of the prototype. Ailerons and flaps were built up in the usual manner using 1/16 sheet. The leading edge requires a bit of laminating to get that beautiful curve, the tips are cut from sheet balsa. Ribs, of course, are scale spaced. All veneered surfaces are covered with 1/16 balsa sheet.

The Great Planes $\frac{5}{8}$-inch hardwood lift struts provide plenty of support. I understand that Hobby Lobby now has hardwood struts too —I haven't tried them yet. The plans show both left and right wing panels along with the center section and full-size rib patterns. It's a good idea to cut all the wing parts out before starting construction. A smooth door makes a nice building surface.

A Byron Originals aluminum wing attach system was used to attach the wing panels to the center section. Since it's used on all of the Byron designs we thought it would be plenty strong for the 90AL. Believe me, it is. The plans show the complete installation—nothing difficult except to make sure that the plates which attach to the wing spars are positioned with one degree of dihedral.

The fuselage primary structure is $\frac{1}{4}$ square spruce and replicates the actual airframe. You'll have to hot-soak the longerons in an ammonia and water solution to get the longerons to curve properly. I recommend that you make up some $\frac{1}{4}$ plywood bending outlines around which you can securely wrap the longerons for a few days to make sure they stay put. Alternately, you could laminate two layers of $\frac{1}{8}$x$\frac{1}{4}$ spruce for each longeron; they'll still need to be soaked, but bending will be a lot easier. Three-eighths square balsa longerons could also be used if you wish.

After the four longerons are molded, construction becomes pretty standard—like building a 25¢ Comet kit 30 years ago! It's best to erect the fuselage sides upside down with plenty of blocking to ensure that the sides are parallel and vertical. We built the front end first and worked back to the tail post using plenty of rubber bands and temporary crossmembers to get that distinctive S-curve from the cabin top to the tail post. This curve is subtle so don't overdo it. I've seen some Monocoupes where the S-curves were way out of scale. The plan view is exact scale so follow it, not your eyeball.

With the primary structure complete we added the firewall, landing gear mounting plate and the side and bottom formers. The fuselage stringers were also attached at this point. There is a lot of scalloped sheeting to do from the firewall back over the cabin sides which simulates the wood veneer skin of the original. Take your time and it will look great. We decided to omit operating doors since the wing center section is removable and there's no problem with cabin access. The interior of the cabin was sheeted with vertical grain balsa.

The landing gear struts are bent up from standard music wire pieces and U-bolted to a $\frac{1}{4}$ plywood mounting plate. We silver-soldered all wire

The author kneeling with his 1/4 scale Monocoupe . . . the last of a great series of aircraft.

This rear angle shows the graceful tapering fuselage which was a trademark of the Monocoupe series.

wrapped joints prior to installation. From here on we went through the myriad of details associated with radio, fuel and flight control systems. Servos for the flaps and ailerons were mounted one per control surface (shown on the plans). Cable and strut details are also shown. One-eighth plywood partitions were built into the prototype under the instrument panel to hold the receiver, battery and fuel tank. There is certainly enough room to get the job done easily. Incidentally, the plans include a bill of materials which will get you through covering without having to make 26 trips to the hobby shop.

Our 90A was covered with Sig Koverall, a polyester heat-shrinkable lightweight material that went on easily using Aero Gloss dope. It's doped on like silk and then shrunk tight with a heat gun. All that was required was to trim the ragged edges after the dope cured. The neat thing, of course, is its fabric weave.

We were going to spray Hobby-

Poxy over the dope but ended up brushing it instead because of ventilation problems. The scale color scheme on the plans is overall white with yellow scalloped leading edges, striping and license numbers. The yellow/white lines are accented with 1/8-inch dark green trim strips. We took a different route with an overall cream finish and maroon scallop trim. The original factory colors were overall Loening yellow (goldish yellow) with Fokker red trim stripes and leading edges. There was no scalloping. A few years ago I shot some color prints of a 90AL with this paint scheme at Oshkosh. Unfortunately, it hasn't been back since or I would have included some slides for this article. So much for our review of construction. But before I get into the flying characteristics I'd like to thank Chuck Curran, the builder, for persevering through a multitude of drawing errors and changes, not to mention several suggestions he made to ease construction, plus the actual building, covering and painting. I think the quality of his work is evident in the pictures.

We test flew the prototype on the Fourth of July—hopefully there would be no fireworks! Dave Ratatori, the club test pilot, was elected to do the first flight. Taxi trials went okay after clearing up some minor problems with the wheel pants catching in the grass. Satisfied with the performance on the ground, he taxied out for the first takeoff. The Super Tigre seemed to be running okay so power was applied and off she went. The tail came up and with a touch of up elevator, the big Monocoupe lifted off and began a scale-like climbout. Several circuits were made around the field when Dave decided that with the gusty winds he'd better bring it in. (Once when flying into the wind, the Monocoupe came close to hovering.) The winds aloft were definitely greater than they were on the ground. To complicate matters, the engine slowed! Dave got it on the ground but not without some damage. The mutual conclusion of the pilot, builder, designer and observers is that it is definitely a stable, flyable airplane even in gusty winds. But at 20 lbs. and eight-foot wingspan, the Super Tigre S2000 just did not have the required reserve to pull it through the gusts. The too lean engine setting didn't help either. More flying in calmer conditions proved out the flying characteristics.

I have set minimum power required at a 2.0 inch Quadra or Super Tigre S2500. Optionally, if you can keep the weight to 15-16 lbs. then a 1.2 inch two-stroke should fly her just fine. About the only way I can see this happening is to use hard balsa in place of the spruce longerons and wing spars. Judging by the minimal damage to ours, this might be a good alternative, although we did not try it.

Built either way, the 90AL makes a fine sport scale project. We have not tried any aerobatics yet but I am confident that with sufficient power it will do loops, rolls, hammerheads and spins. The barn door flaps will enable slowed approaches.

Plans are available from Tom Thumb Sky Tracings, P.O. Box 84, Mequon, WI 53092 for $25.00 plus $2.00 postage and handling. They are shipped rolled in a carton and include all the information to easily build the model. All rib and former patterns and views, including both wings are shown full-size on 42 sq. ft. of drawings. Plans include all scale markings for "Snappy."

Good building and good flying! While you're building your first one, we'll be repowering ours. Send checks or money orders to: Tom Thumb Sky Tracings, P.O. Box 84, Mequon, WI 53092. □