BY **MARK RITTINGER**

At the flying field with the new LM-1. On the wing, the LM-1 is an honest but demanding flier. Not for beginners.

Lowers-Minges LM-1

An unusual prototype Reno Racer

It's doubtful that more than a handful of people have ever heard of the Lowers-Minges LM-1. I discovered a three-view in a 1974 *Flying* magazine article about the up-and-coming Reno Unlimited class racing technologies. Though never built, it was to have been powered by a 500hp Ranger Inverted V 770 V12, yet it only had a 16.5-foot wingspan. No mention was made of methods or materials, but I suspect that it might have been planned to be of wood construction, like the Osprey GP-5. Small, undoubtedly fast, and no doubt a handful to fly, I thought it would make a great challenge as a model. Was I ever right on that one!

I had an E-flite Power 25 brushless motor sitting in a box and an E-flite 60 Pro speed control, as well, so I designed the LM-1 around this power setup. I originally built the model with a scale wing planform, but it proved to be very roll axis sensitive, so I ended up adding a few inches to each tip. Although this helped in roll damping and wing loading, I also added some vertical to the fin and a lower skeg to aid in stability. This was necessary most likely due to the significant side area ahead of the center of lift and neutral point. I also built a simple takeoff dolly as hand-launches didn't have enough speed for the controls to become effective.

With all the bugs worked out, the LM-1 is now a great little ship but certainly *not* for the faint of heart or an inexperienced pilot—most likely just as the full-scale aircraft would have been! Because this is not a beginner's bird to build or fly, I'll just touch upon some of the more tricky and problematic portions of the build.

WING

The plans show the original wing as well as the stretched version. Unless you are used to flying F-104s, I suggest building the extended wing. Although some photos might show handholds, I have found that the model is extremely difficult to hand-launch, and the handholds were left off the plans in favor of a takeoff dolly.

Cut your foam cores using the templates provided on the plan. Be sure to cut them out with 1/8 inch of washout. Cut the aileron servo pockets and troughs for the wires. Add the servo-hatch mounting pads, then sheet the wings with 1/16-inch-thick balsa. Join in the center with the proper amount of dihedral, then wrap with fiberglass cloth and epoxy resin.

Cut the ailerons from the wing, and remove the appropriate wood for the facings. Bevel the aileron leading edges, then glue on the wingtips. If you aren't thinking about a super scale model, adding some wingtip plates might help performance a bit. I used a simple rounded cross-section. Build up your servo hatches from 1/16-inch-thick plywood.

TAIL AND FUSELAGE

The tail surfaces are all made out of simple 3/16-inch-thick balsa sheet. Pay attention to the grain directions, and use flat, warp-free wood for these parts. The elevator halves are joined with bent music wire.

A bit trickier than the rest of the bird, the fuselage is very fat up front, and it has a weird inverted-V shape that progresses to a tombstone-shaped aft. I've made some changes to the model design since the prototype was built, so follow the plans. Use two pieces of laminated, cross-grained 1/16-inch-thick balsa for formers F1, F3, and F5. I used 1/8-inch-thick balsa for the remainder, with the exception of F2, which is made out of 1/8-inch-thick plywood.

Build the framework upside-down on the board with the longerons pinned over the plans. Install formers F1, F2, F3, and F5, then add the side stringers and corner stringers along with the vertical pieces at F4. Install the wing-saddle doublers, then add the front gussets, paying attention to the grain direction. While still on the building board, sheet the fuselage sides with 1/8-inch-thick balsa, then sheet the rear lower fuselage with 1/16-inch-thick cross-grained balsa. Once the sheeting is added, the fuselage gets quite a bit stronger. Install the lower front and nose blocks. Add the top nose block, and note the size of the hole in the front for motor clearance.

It took a few tries, but I eventually was able to hand-launch the LM-1 with success. The dolly, however, is much preferred.

SPECIFICATIONS
Model: Lowers-Minges LM-1
Type: Prototype Reno Racer
Wingspan: 33 in. (37 in. extended)
Length: 40 in.
Wing area: 321.27 sq. in. (@ 37 in.)
Weight: 54 oz.
Wing loading: 24.2 oz./sq. ft.
Power: E-flite Power 25 Brushless motor w/ 60-amp speed control (e-fliterc.com) and 4S 2600mAh Giant Power 65C LiPo (giantpower.com)
Radio req'd: 4-channel

Cut the firewall out of 3/16-inch-thick aircraft plywood, drill and cut the shaft hole, then add the blind nuts from the front. The motor has the shaft reversed and is installed from the rear. This puts half of the mass behind the firewall and half in front. The 1/4-inch-thick plywood spacer behind the firewall works with a Great Planes spinner. Carve and sand the nose to shape. Be sure that the firewall has two degrees right thrust and zero degrees down, then epoxy it into place. Use some

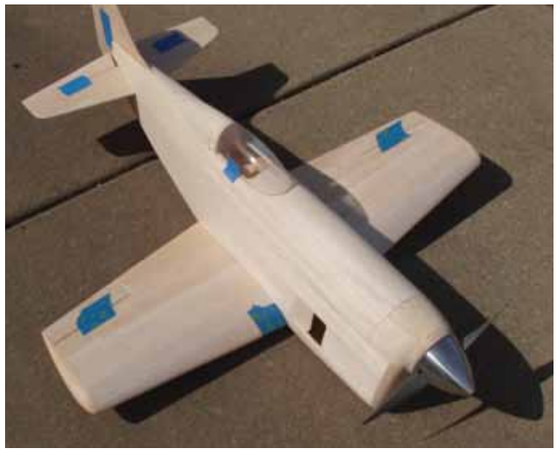
The fuselage is built upside-down over the plans. Start by pinning the longerons in place, and add the formers.

Sheeting the aft turtle deck gives the fuselage some shape.

Here, you see the nose blocks shaped to blend into the spinner.

The wings are made out of foam cores cut with a hot wire. The tip and root templates are shown on the plans. Be sure to add the required wingtip washout.

Here, the LM-1 takes shape on the living-room floor.



The final assembly, with the wings sheeted with balsa, shows how short those wings really are.

epoxy and microballoons to fair in the firewall as needed. The scale air vents on the sides should be made functional to get the airflow and heat out. I closed off half of the front opening as it took in so much air that the main hatch kept coming off.

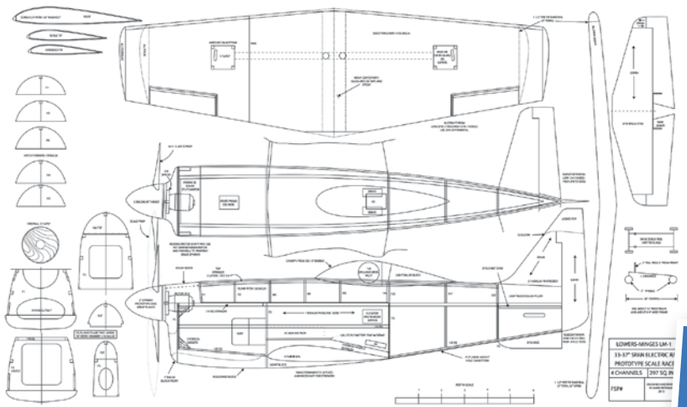
Glue in formers F3T, F4T, and F5T and the top stringer, then sheet the top deck. Build up the hatch with a 1/16-inch-thick balsa floor and add H formers, add the top stringer, then sheet the assembly. The small rear deck is made out of a very light hollowed-out block balsa. The canopy is made with the front portion of a Sig Mfg. 12-inch World War II bubble canopy (sigmfg.com), and the pilot is a 1/6-scale pilot bust from Williams Brothers (williamsbrothersmodelproducts.com).

There should be a large air-exit opening in the lower rear fuselage. Fit the rear filler blocks in place, and sand to shape. Test-fit the model together, and while using the longerons as the datum line, make sure that the motor and stabilizer both sit at zero degrees and that the wing has one degree of positive incidence. Install the filler piece under the wing's leading edge as well as the small V-shaped filler on the fuselage bottom right behind the wing's trailing edge.

FINISH AND FINAL ASSEMBLY

My model is covered with metal flake red Solarfilm on the wing and stab, and white MonoKote on the fuselage and as trim. It has some weird shapes in the nose plus quite a few curves, and I found success with Ohio Superstar's Cover Tugger (ohio-superstar.com). It is worth every penny when it comes to applying film covering. Install your radio gear, keeping the speed control well forward in the fresh incoming airflow. I use a 4S 2600mAh Giant Power 65C LiPo pack, which sits forward toward former F2.

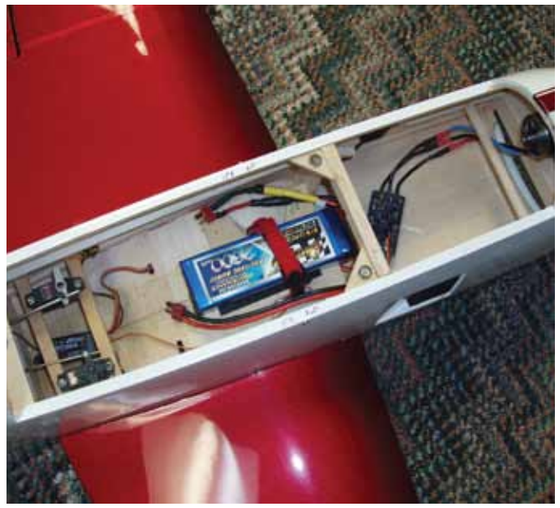
Be sure to properly secure the battery to the tray. Initial control throws are listed on the plan. Trust me, I found out the hard way what works well. The center of gravity is between 17 and 20 percent. Yes, this seems odd, but highly loaded race ships tend to like a forward center of gravity. The LM-1 is very pitch sensitive at 25 percent.



Lowers-Minges LM-1 | **XO116A**

Designed by Mark Rittinger, the Lowers-Minges LM-1 racer is of traditional balsa and lite-ply construction and features a foam-core wing. It is easy to build but demanding to fly, and is not intended for novice builders or pilots. It's designed around the E-flite Power 25 brushless motor and power system. **Wingspan: 37 in.; Length: 40 in.; Power: 25-size brushless motor; LD: 2; 1 sheet; $16.95**

To order the full-size plan, visit AirAgeStore.com.



There's plenty of room in that chubby fuselage for all the radio gear and the battery pack.

Here is the takeoff dolly. Hand-launching has proven difficult.

FLIGHT PERFORMANCE

I test-flew the model with my friend Keith Shaw on the sticks at the Midwest R/C Society field. A first flight is always a cautious exercise, and with a model with these proportions...well, it's even more concerning! Keith did an excellent job flying it and getting the model trimmed out and back down in one piece. Some discussion with Keith about the physics involved resulted in some changes being made and incorporated into the final version of the plans.

I built up a small 24-inch-long, four-wheel takeoff dolly from a few old landing-gear parts. The model sits at a five-degree angle, and for takeoff, it is simply a matter of pointing it into the wind and applying power. The model is great flier, but it requires your complete attention during flight. The LM-1 is actually well behaved on landing, as long as some speed is kept in. It has a high sink rate with reduced power. Keep the speed up and the power on until just before touchdown.

CONCLUSION

I am very pleased with how my LM-1 racer turned out. It earned the coveted "Best MonoKote Finish" award at the Toledo Show. If you are looking for a unique and challenging model, consider the LM-1. If you have any questions, feel free to contact me at mrittinger70@hotmail.com.