TEXT & PHOTOS BY **DENNIS SUMNER**

The author with his just test-flown prototype. The smile tells the whole story. (Photo by Charlie Dochenetz)

Electric Mooney Mite

A unique 1/6-scale classic you can build

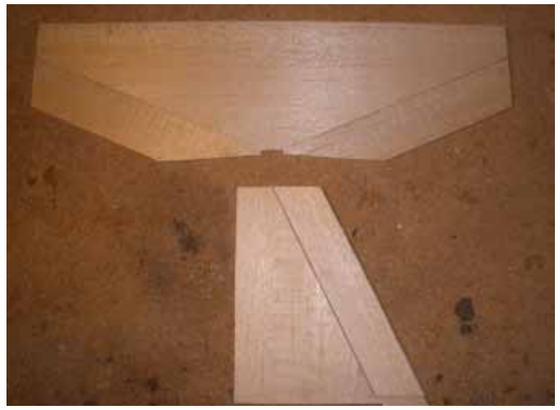
I like unique and lesser-known general aviation airplanes, and so, with a little prodding from fellow electric flier Mike Brinker, I picked the Mooney Mite for my most recent project. The model is all-balsa construction, and it features a fully sheeted wing and 3/16-inch balsa tail surfaces and is equipped with E-flite 15–25 electric retracts. The model features a large top hatch to make battery changes easy, and the build is pretty straightforward. To help speed it up, I asked Top Notch Kits (TNK) to laser-cut my cowl pieces, firewall, formers, and wing ribs. I also used the TNK 1/6-scale A-65 scale engine kit to help dress up the nose of the airplane. If you are interested in building a Mooney Mite of your own, TNK has all my CAD files and can cut a short kit for you as well (topnotchkits.com).

GETTING STARTED

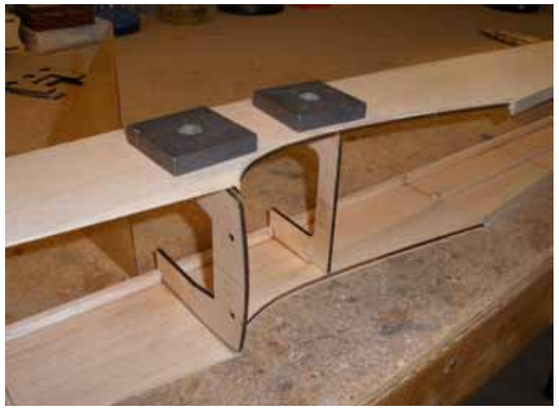
Start by cutting the tail feathers out of 3/16-inch balsa, then cut out the 1/16-inch balsa sides using the plans for a template. Make the forward area between the firewall and former F-1 about 1/8 inch oversize at the bottom to allow extra balsa for the rounded firewall and F-1. Make left and right sides, mark the locations for the firewall and formers, then glue 1/4-inch square balsa longerons to the top of the sides and cut and glue the 3/16-inch square and 3/8-inch triangle pieces. Add 1/16 balsa filler to each side for the tail post, and sand the tail to fit together, using the fuselage top view as a guide.

Glue formers F-1 and F-1a to one side, making sure that they are at 90 degrees to the side, then glue them to the other fuselage side. Add the 1/8-inch balsa wing saddle, then place the fuselage over the top view and add formers F-2, F-3, and F-4. I had to wet the 1/4-inch longerons forward of F-1 to get the sides to pull together while installing the firewall and the nose-gear mount. Sand the bottom sides from the firewall to F-1, then add 3/16-inch square longerons at the bottom from firewall to F-1. The plans show a 75-degree angle alignment tool to set the angle of upper former H-1. Set the angle and then add the 3/16-inch square stringer to the top of the formers. Make up the parts for the spring latch, install it to the hatch area, then add the sheeting to the turtledeck and top forward section of the fuselage using 1/16-inch balsa.

Wait to sheet the bottom of the fuselage aft of former F-2 until you've installed the servos and pushrods. Also wait to install the lower forward balsa block to facilitate drilling the holes for the wing-alignment dowels. Cut and glue the 1/4-inch plywood nose-gear mount in place using 15-minute epoxy.



The tail feathers are made out of solid 3/16-inch balsa sheet. Simple straight lines make them quick to make.



Start building the fuselage by gluing the top longeron in place, followed by these two formers. The weight holds them firmly in place until the glue dries. Make sure that the sides line up with each other.

HATCH COVER

Make the hatch floor from 1/16-inch balsa with the grain running from side to side, and pin it to the 1/4-inch square fuselage longerons. Then cut and fit the 3/16-inch square balsa stringers and formers H-1A, IP, and H-3. Measure off the plans, add former H-2, and set the angle using the H-2 alignment tool shown on the plans. Now add the top 3/16-inch square balsa stringer to the top of the hatch formers. Make a paper template to work out the shape of the hatch sheeting. Remove the hatch from the fuselage, and pin it flat to your workbench to hold it straight prior to sheeting.

ENGINE COWL

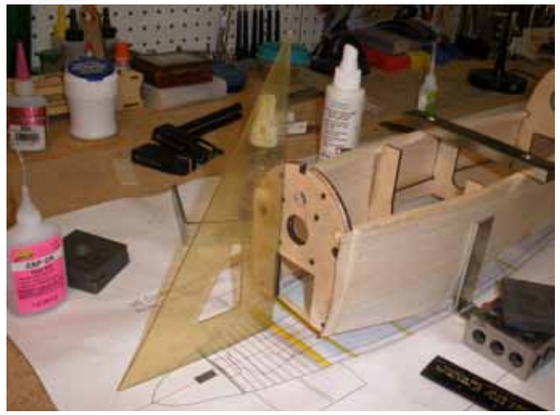
The cowl is shaped from laminated pieces, and the required nine pieces are stacked and assembled onto 1/8-inch music wire that fits into drilled pine blocks. I used Titebond yellow glue so that the seams between the balsa pieces sand easily. The finished cowl is held in place with 1/4-inch rare-earth magnets and aligned with the fuselage with 1/8-inch alignment dowels.

SPECIFICATIONS

Model: Mooney Mite
Type: Electric sport scale
Wingspan: 54 in.
Wing area: 409 sq. in.
Weight: 56 oz.
Wing loading: 19.72 oz./sq. ft.
Power req'd: Scorpion 3014/1040Kv or equivalent
Radio req'd: 5-channel (rudder, elevator, ailerons, throttle, retracts)

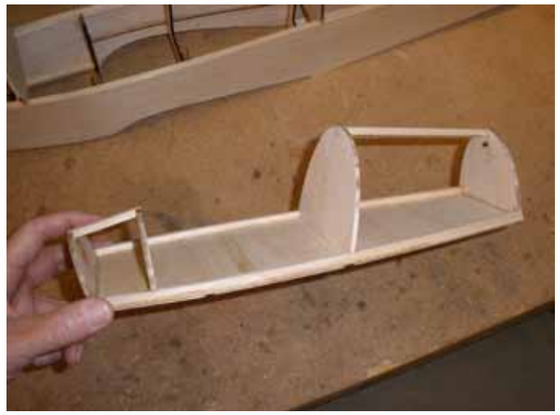
GEAR USED

Radio: Spektrum DX9 w/ AR6210 receiver (spektrumrc.com); JR SM241 servos for ailerons (jramerica.com); Hitec HS65 servos for rudder and elevator (hitecrcd.com)
Motor: Scorpion 3014/1040Kv (innov8tivedesigns.com)
Speed control: Castle ICE 50 ESC (castlecreations.com)
Battery: Glacier 3S 4000mAh LiPo (buddyrc.com)
Propeller: APC 10x7E (apcprop.com)
Retracts: E-flite 15-25 (horizonhobby.com)

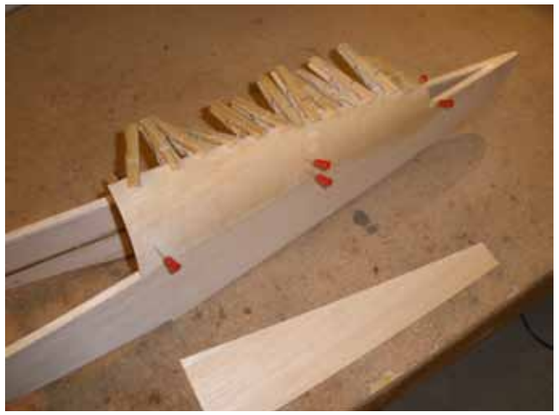


When you install the firewall, make sure that it is square with the workbench. This ensures the proper 0 degrees of motor thrust.

The main fuselage hatch is built on top of the assembled fuselage. There are angle-alignment template tools shown on the plans to properly install the upper formers.



Here, the hatch-cover framework has been removed from the fuselage. It is then pinned to the workbench to keep it straight while applying the balsa sheeting.



Here, the turtledeck section of the fuselage is being sheeted one half at a time.

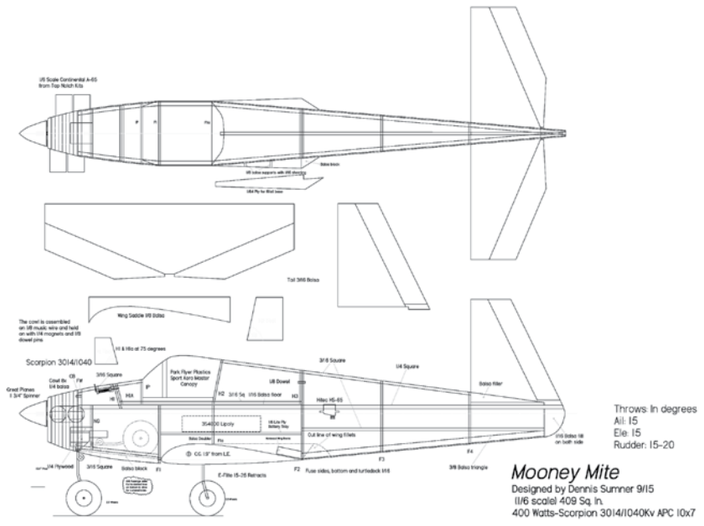
WING CONSTRUCTION

Use your favorite method to glue the sheeting together and prepare four sets of wing skins. Pin the 3/16-inch balsa spar to the bottom sheeting, then add the ribs and the rear 3/16-inch spar between ribs R-1 and R-5. The plans show an R-1 angle tool to easily set the center-rib angles for the 10-degree wing-dihedral angle. Add plywood LG-1 and LG-2 landing-gear mount pieces between the plywood R-3 and R-4 ribs. Use a piece of scrap aileron stock to shim the sheeting up at the leading edge.

To build in the wingtip washout, shim up the trailing edge of ribs R-9 to R-12 with a piece of tapered 1/8-inch balsa sheeting. Glue the top 3/16-inch spar in place, then cut and glue the 1/8-inch balsa strip to the back of the ribs and the 1/16-inch balsa subleading edge strip to the front of the ribs. Sand the leading-edge and trailing-edge balsa strips to match the contour of the ribs.

Using the plans as a guide, make a template to position and cut out the aileron-servo-mount locations, then glue the plywood mounts in place. Rough-cut the openings where the retract units will mount, then cut and glue the hardwood retract mount rails. Now is a good time to add a pull string for the aileron servos (I use dental floss). Add 1/16-inch balsa shear webbing from ribs R-2 to R-12 and the 1/16-inch plywood shear web between ribs R-1 and R-2. Also add the plywood wing-dowel reinforcement behind the leading edge from ribs R-1 to R-2. Now add the top-wing sheeting, then, to set the washout, use a scrap piece of 1/16-inch balsa under the bottom spar and a scrap piece of aileron stock under the leading edge while keeping the tapered 1/8-inch balsa strip under the trailing edge between ribs R-9 to R-12.

With the wings sheeted, add the solid balsa trailing edge and leading edge. Shape and sand the leading edges to shape, then glue the wing halves together with 30-minute epoxy. Trim the trailing edge of the wing to fit between formers F-1 and F-2. Now is a good time to sand the fuselage/wing saddle for a good fit and check to make sure that the wing incidence is at 0 degrees. When satisfied with a good fit and incidence angle, drill the holes for the 3/16-inch-diameter hardwood wing-alignment dowels. Add hardwood blocks in the fuselage for your nylon wing-attachment bolts. I used 1/2-inch hardwood dowels installed



Mooney Mite | XQ617A

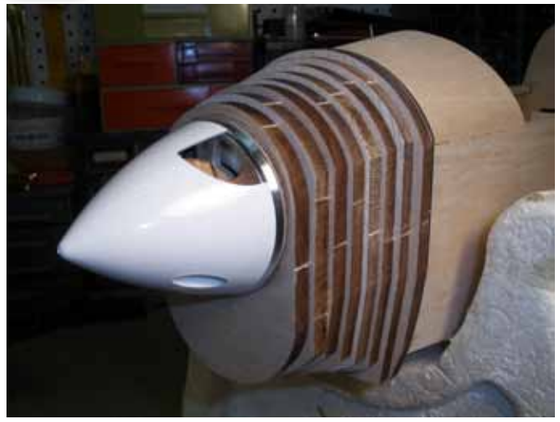
Designed by Dennis Sumner, this 1/6-scale sport flier has all the scale looks and great-flying performance of its full-size counterpart. Using traditional wood construction, the model has a fully sheeted wing and retractable trike landing gear. Laser-cut parts are available from Top Notch Kits and are called out on the plans.

Wingspan: 54 in.; power: Scorpion 3014; radio: 5-channel: LD: 2; 2 sheets; $23.95

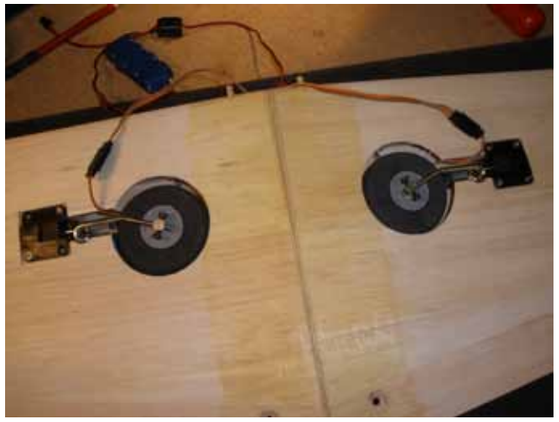
To order the full-size plan, visit AirAgeStore.com.

The Full-Size Mite

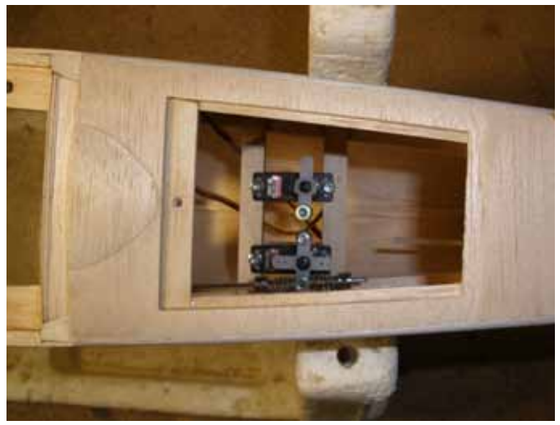
The Mooney Mite was designed by Al Mooney, and it first flew in 1947. The first few Mites were powered by 25hp modified Crosley Auto engines, then switched to Lycoming O-145 65hp engines and finally the Continental A-65 65hp engine. The Mooney Mite is 18 feet long and has a wingspan of 26 feet 10 inches and has an empty weight of 520 pounds. Its maximum speed is listed at 138mph, and it has a cruise speed of 125mph—not too shabby on only 65hp! The aircraft carried 11 gallons of fuel and had a maximum range of about 425 miles. The Mite pictured here—N4187—was built in 1957 and is registered as SN #352. It was refurbished in 2002-03 and sports the color scheme I chose for my model.



Eight layers of balsa sheeting are cut to shape and then stacked together with the use of an alignment block, then glued together. The cowl formers are then set in position over the motor. The spinner is attached to help define the shape of the cowl.



Here, the main retractable landing gear have been installed. Notice that the strut wires have been bent to the scale shape of the gear and fit precisely in the wheel-well openings.



To get to the servos, there is a large hatch opening aft of the wing saddle.

The finished fairing really cleans up the model's appearance.

in the wing for reinforcement for the 10-32 countersunk nylon bolts. Reinforce the wing top and bottom center section with three layers of 3/4-ounce fiberglass cloth, starting with a 2-inch-wide strip, then adding a 3-inch-wide strip, followed by a final 4-inch-wide strip of glass cloth. I use Pacer Z-Poxy to apply the fiberglass cloth strips.

Make templates for the retracts and wheel-well openings, then cut them out and trim to fit. You will need to bend the struts on the mains as shown on the plans. Take the struts out of the retract units to bend them to the correct angle using a bench vise. Now mark and cut out the ailerons.

FINAL ASSEMBLY

Check the incidence of the stab against the wing and the firewall. Again, the motor, wing, and stabilizer all should be set at 0 degrees. Sand and hinge the tail feathers, and glue the stab and fin in place. Install the rudder and elevator servos, using the 1/4-inch balsa as supports for the servo mounts. I used Du-Bro 0.032-inch micro pushrods for the rudder and elevators' pushrods and a Sonic-Tronics no. 115 Super Clevis on the 4-40 elevator control arms. Once the pushrods are installed, you can sheet the bottom of the fuselage with 1/16-inch balsa. Cut an opening and make a removable hatch for servo access, which also includes an opening for motor-cooling exhaust.

Cut a balsa block to shape for the forward fuselage bottom, and glue it in place. Then use the nose gear (retracted with wheel mounted) to mark an opening for the nose-gear strut and wheel. Do a final shaping of the cowl, bottom nose block, and the bottom sheeting behind the wing using 320- and 400-grit sandpaper.

CONTINENTAL A-65 ENGINE DETAILS

To install the Top Notch Kit's A-65 motor kit, I trimmed it to fit using the top view of the plans as a guide. I used a band saw to cut close, then used my Dremel sander to match the dimensions on the plans. I then installed a 1/2-inch piece of 1/8-inch dowel to the end of the cylinders so that I could glue them into the sides of the cowl.

Wing strake: Attach the wing to the fuselage, and glue the inboard strake rib to the fuselage. Then measure and install the second strake rib and the 1/4-inch square leading edge. Add the top and bottom sheeting, then shape and sand. You could also make these out of solid balsa blocks.

Wing fillet: Cut the two wing-fillet bases out

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MAKE TEMPLATES FOR THE RETRACTS AND WHEEL-WELL OPENINGS, THEN CUT THEM OUT AND TRIM TO FIT. YOU WILL NEED TO BEND THE STRUTS ON THE MAINS AS SHOWN ON THE PLANS.

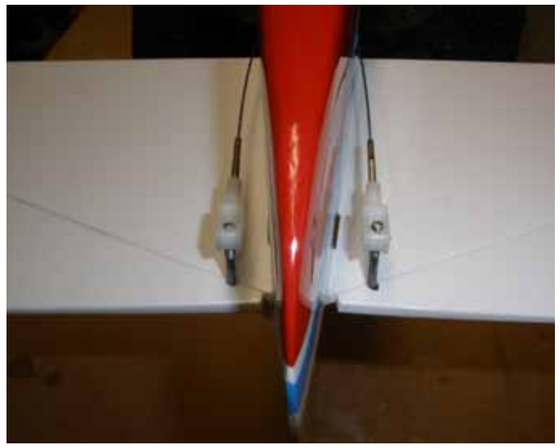
of 1/64-inch plywood, and trim them to fit. Use wax paper between the wing and saddle to prevent you from gluing the wing on. Then, with the wing installed, tack-glue them to the fuselage behind the wing and glue the wing-saddle area from inside. I cut and installed two pieces of balsa to support the top fillet sheeting. The fillets are actually pretty simple and are made out of flat sheets glued at an angle back to the back of the wing. Balsa blocks finish the fillets from the wing trailing edge back. (See side view on plans.) Now finish-sand the model, and cover it with your favorite iron-on material. Install your pilot bust, and add any details you like in the cockpit. Then cut and fit the canopy in place. I used the one for the Sport Aero Master from Park Flyer Plastics.

IN THE AIR

Balance the model with the gear up! The first flight of any new model always makes me nervous, but the Mooney Mite was a pussycat. It needed a couple of clicks of left aileron and a few clicks of down-elevator. I took it up high and did the dive test to check the center of gravity (CG), and it seemed to be neutral with the CG location I show on the plans. Again, going up high, I did some slow flights to check the stall-and-recovery characteristics of the plane—again, nice and mild.

Here are the control throws: elevator—15 degrees, rudder—15 to 20 degrees, and ailerons—15 degrees.

I am very pleased that it is pretty docile on the stall and recovery, and the built-in washout works nicely. Set up for landing, and carry some power down close to the flare. On subsequent flights, I opened up the flight envelope to loops, Immelmann turns, rolls, etc. With the Scorpion motor installed, it delivers 33.5 amps using 391 watts, for 111.7 watts per pound. It looks and flies great. I hope that, if you decide to build one, you'll love it too! If you have any questions or comments, you can contact me at densmodels@gmail.com.



The finished control-linkage assembly is clean and simple.

The molded canopy is available commercially and called out on the plans. You can add as much or as little cockpit detail as you like.