825

A SMALL-FIELD MODEL THAT DOESN'T SACRIFICE PERFORMANCE

■ **Dave Richardson**

THE TWISTER was conceived when a local hotshot pilot mentioned that he occasionally flew in a small field, and he wanted an airplane that would handle the small area without sacrificing performance. We were both elated to find that the Twister outperformed both of our .40-size models in many areas! When you jam the sticks around, the model will perform viciously fast rolls and snaps. However, the airplane's most striking flight characteristic is its uncanny ability to "stick" in any attitude.

Construction is super-fast and simple. After cutting the kit, I had a little more than 20 hours in mine. There is no need to try to build light; the Twister is designed light to maximize performance on a .20- to .25-size engine. The fuselage is bulkhead-free and very spacious; it will easily hold a six-ounce tank (I used a four-ounce tank in the prototype, and it seemed almost lost in the nose).

Both of my prototypes had Fox .25 BB engines. The results were fantastic. However, it became clear that this was almost overkill, as half-throttle resulted in high speed and unlimited vertical performance. Any decent plain-bearing .20 to .25 engine should provide exceptional performance. Good performance could also be achieved with a .15 and low-weight equipment.

If you opt for low-weight equipment, I must recommend a standard-size servo for the ailerons. On a low pass, the prototype suddenly flipped over on its back and drilled itself into the ground. Inspection of the wreckage showed that the small control arm on the wing microservo had snapped. In all fairness to the equipment, I had probably flown one too many times without giving the airplane a thorough checking over, but let's be safe instead of sorry.

Study the plans and read this article thoroughly before you begin. Even with a simple design like this, not having an understanding of the design or a plan of action will surely result in a hair-pulling experience!

For photo purposes, the model was built in its entirety before covering. However, you will find it much easier to cover many of the parts before the model is assembled, so include this thought in your planning.

CONSTRUCTION

I should mention a few things about materials selection. Since this model is really at its outer limits with a strong .25-size engine, using super-lightweight balsa is not necessary or recommended. On the other hand, because of the extreme stresses that this airplane is capable of inflicting on itself, don't use the most rigid material you can find—good medium-weight balsa should be used throughout.

Wing: The foam used for the wing can be fairly lightweight as long as the recommended wing construction is used. My local home supply store stocks 2 x 8-foot sheets of polystyrene foam for about $5 each.

If you use cyanoacrylate (CyA) glue on the wing, make sure it is the foam-safe odorless variety. Most standard CyA glues will melt through foam like a hot knife through butter.

Low-heat covering material (such as TowerKote or EconoKote) must be used on the unsheeted foam wing. I used TowerKote on my first Twister and EconoKote on the second. These choices were based on availability of the materials at the time—the brands are of equal quality.

Fuselage: Begin by cutting out all of the parts. Hold the fuselage sides together and sand them to shape so they match. Glue the 3/16-square balsa pieces and the 1/16-plywood doublers to the fuselage sides.

Using the plans as a guide, glue the firewall to the right fuselage side at 90° using a guide such as a draftsman's triangle (epoxy is not necessary at this point).

Glue the left fuselage side to the firewall at 90°. Glue the 3/16 balsa crossbraces in place. Using epoxy, glue the triangular 3/8 balsa fillets in place at the firewall.

Cut the 3/16-balsa longerons at the tail so that the two sides can be pulled together. Pull the tail together, sandwiching a temporary 1/8 x 1/4 hardwood spacer between them. Carefully check for proper fuselage alignment. Clamp the tail together. Position the horizontal stabilizer and check its alignment; when you are satisfied, glue the horizontal stabilizer in place. Make sure not to get any glue on the temporary spacer. When you remove the spacer you should have a vertical slot for the rudder post.

Glue the rudder post to the vertical stabilizer on a flat surface that's covered with waxed paper. Glue the vertical stabilizer in place, making sure that it's perpendicular to the fuselage.

Cover the top with a single piece of 1/8 balsa sheet (running lengthwise). Install the Nyrods and drill the firewall for the engine mount, throttle, fuel supply, and pressure lines. The engine must be mounted with approximately 2° right thrust and 2° downthrust.

Sheet the bottom as shown on the plans. I recommend making a hatch, and installing rudder and elevator servos behind the wing as shown on the plans. This will leave plenty of room to install the equipment as needed to balance the airplane.

The 1/8 plywood sheeting under the nose can be sized by laying the forward end of the fuselage on the plywood and tracing around it. Cut out the traced piece, then glue it under the nose and sand it to fit. Epoxy the landing gear block in place. Drill it for 10-32 blind nuts and epoxy the nuts to the landing gear block.

Sand the fuselage to shape, cover it, and install your wing dowels. (I like to install the dowels after the covering is applied). I fuelproofed the firewall with flat black Pactra Aero Gloss dope—I had run out of epoxy at the time. The standard fuel-proofing method is to use epoxy thinned with alcohol.

Wing: If you don't have foam-cutting equipment, maybe one of the other fliers at your local field does. Perhaps you can give one of them the template and ask them to cut it for you. (You may get your wing cut *and* an enthusiastic lesson in wing cutting!) The small wing is easy to cut; the halves can be done with a wire that is approximately 22 inches long.

Join the wing halves—lay them on a flat surface covered with waxed paper and block up each wingtip 1/8 inch. I recommend blocking at the leading and trailing edge until the thickest part of the wingtip is 1/8 inch from the table. This will minimize the risk of ending up with wing halves with varied incidence. Use 15- or 30-minute epoxy to join

Type: RC Sport

Wingspan: 40 inches

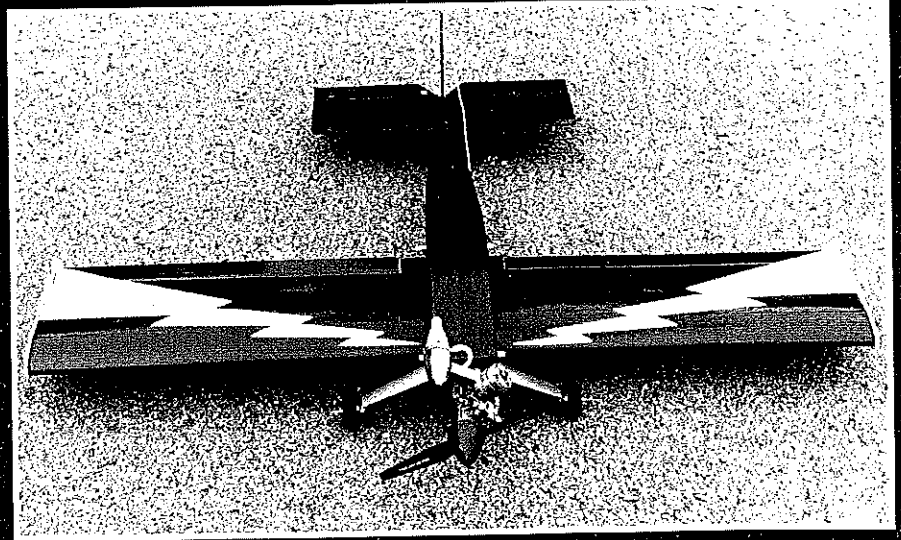
Engine: .20 - .25 glow

Flying Weight: 2 pounds 10 ounces

Functions: Throttle, ailerons, rudder, elevator

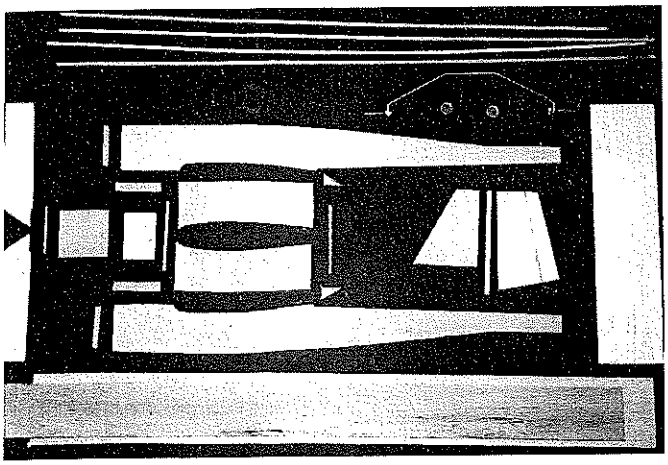
Construction: Foam wing, sheet balsa fuselage and tail surfaces

Covering/finish: TowerKote, EconoKote, or equivalent

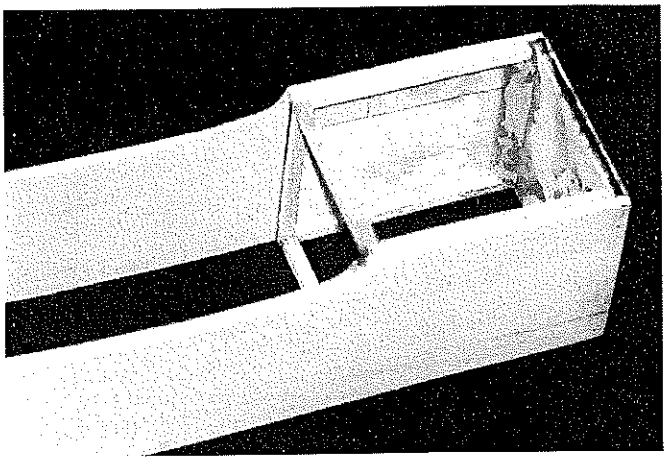


Photos by the author. Graphic Design by Carla Kunz

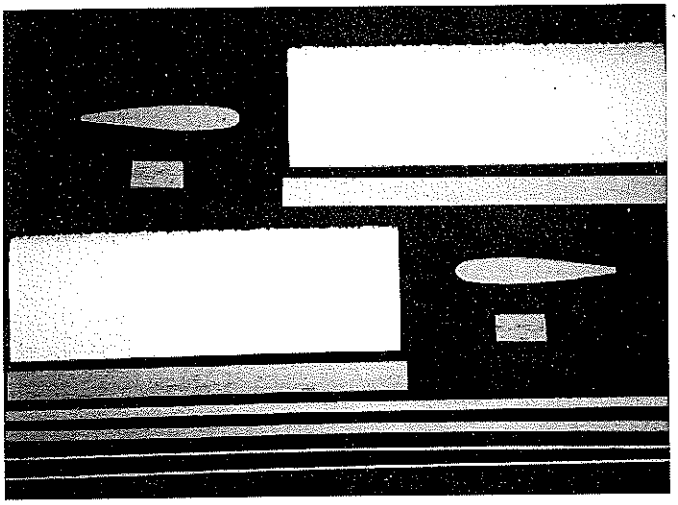
The Twister is designed to maximize performance on a .20- to .25-size engine. A plain-bearing engine should yield exceptional performance.



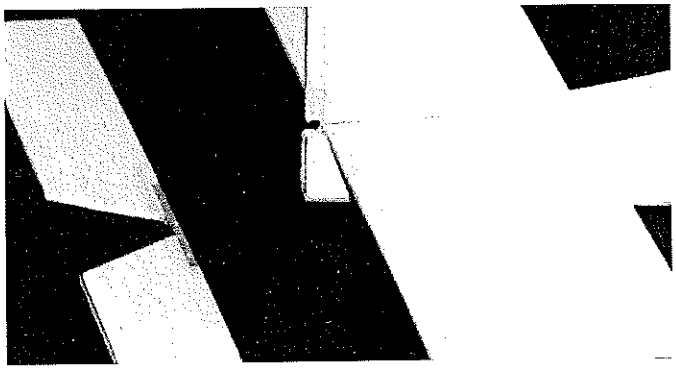
Twister's fuselage components. Construction is super-fast and simple; the fuselage is bulkhead-free and very spacious.



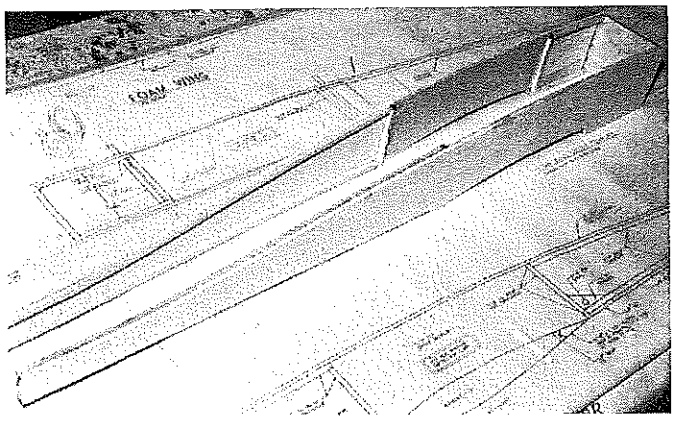
After joining the fuselage sides at the firewall, use epoxy to install the firewall fillets and the 3/16-square crossbraces.



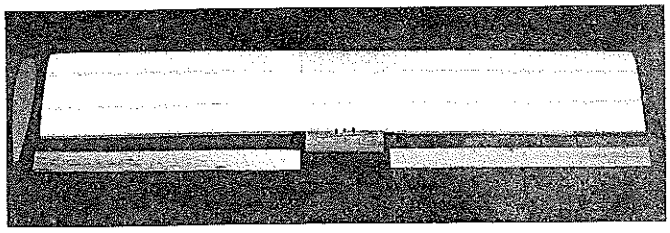
Twister's wing components. The wing is easy to cut; the halves can be done with a 22-inch wire. Build with foam-safe cyanoacrylate.



Notch the hardwood rudder post for the elevator dowel. All of the tail surfaces are 1/8 sheet—use a good medium-weight balsa.



Join the fuselage sides at the firewall using the plans as a guide. A draftsman's triangle will help with alignment.



The completed wing. Join the wing halves with 15- or 30-minute epoxy, then cut 1/8 slots in the top for the two 1/8 spars.

the panels so you'll have time to make adjustments if necessary.

Pre-bend the spars. Lay them on a flat surface and place weights on one half. Block the other half up with a scrap of wood so that the bend roughly matches the dihedral. Wet the center (where the bend is) and leave it overnight. Failure to do this will likely result in a warped wing.

Cut 1/8-inch-wide slots in the top of the wing and glue the bent spars in place. Glue the trailing-edge pieces in place, and sand them flush with the wings. Add the hardwood blocks and linkages.

Run strapping tape over the spars from the top center, around the bottom of the wing, and back to the center. Wrap a wide piece of fiberglass cloth around the center section and epoxy it in place.

When you finish covering the model you can proceed to hinging and equipment installation.

Flying: Hold just a little "up" in the controls to keep the tail pinned down, and give it the juice. When the model gains enough speed (it shouldn't take long!) let the tail come up off the ground. Feed in a little up elevator to bring the model off the ground whenever you're ready. Fly a few laps around the pea patch to get accustomed to the model's flight characteristics before you cut loose. When you do, be ready for very fast rolls (can you count 'em?), fantastic vertical performance, a knife edge that requires little or no rudder input, and dead-straight tracking.

Since the model has a fairly large firewall for its size, drag seems high enough to permit very manageable landings. No "it won't come down" syndrome. Dead-stick landings are no sweat as long as you don't let the model slow down too much.

Although the model will get up and move fairly well at full throttle, the *real* fun arrives when you slow down. Try some slow vertical rolls at half throttle, then throttle back a little and let the model wallow around while you experiment with the stick input—it's great fun. Enjoy! ✈

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Full-Size Plans Available—see page 192