

After two somewhat unsuccessful attempts at an .049 powered flying wing design using Ace R/C foam wings, Nos. 3 and 4 were wonderful!

# WEEKEND WONDERS

By BRUCE THARPE . . . If you've ever wanted to mess around with flying wings, but you weren't sure just how involved in a project you wanted to get . . . consider the *Weekend Wonders*. These little gems are easily built in a weekend (thus the name), and because they're built with Ace R/C foam wings, they're quick.

How would one go about describing a *Weekend Wonder*? Well, they are not really flying wings, because the elevator hinge line isn't in the airfoil cross section. They are extremely short coupled airplanes. And most importantly, they are so incredibly simple that you could easily build, finish, and fly either one in a weekend.

The name "*Weekend Wonder*" wasn't my idea. Actually, I had no name at all for the first model (which I built during the course of one weekend, naturally). When my father jokingly referred to it one day as a *Weekend Wonder*, the name just seemed to stick.

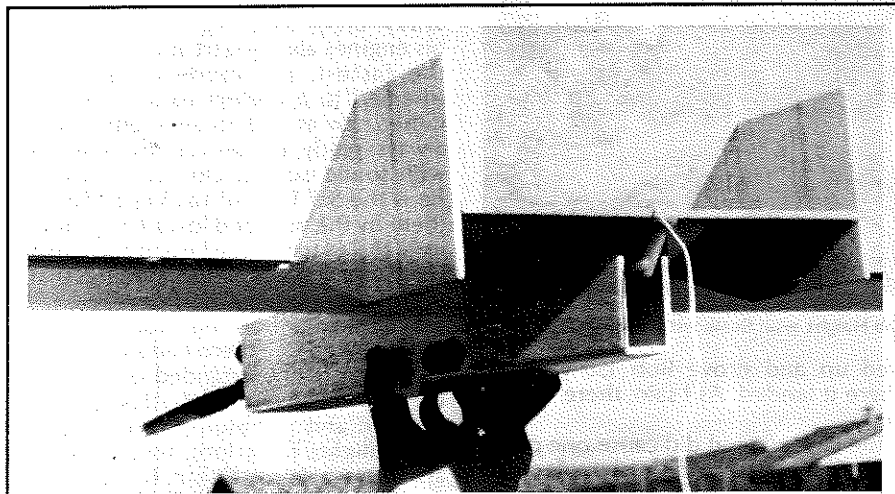
The first *Weekend Wonder* had a swept back wing, single fin and a Cox Golden Bee .049. It flew reasonably well once I added a Medallion .049 and cured its noseheavy condition. On the same day that it crashed (due to a poor hand launch), *Weekend Wonder 2* was test flown. On its first attempt, it went into gyrations and crashed also, obviously the victim of an aft C.G. This was all a bit discouraging, but the models were so easy to build that I just had to continue experimenting. Number 3 was a total success (I finally got that dreaded C.G. in the right place!) as was Number 4. The models presented in this article represent slightly refined versions of the originals.

The design philosophy behind all of the *Wonders* has been to produce simple, inexpensive, fast-building models. *Weekend Wonders* may not be the epitome of simplicity, but they are

awfully close. However, I wanted to have relatively high performance also. These somewhat conflicting requirements took a bit of thought, but resulted in a rather unique series of aircraft. I would like to review some of the thought process behind the models now.

and separate clunk tanks. Bolting a Golden Bee to the firewall is certainly fast and easy, but the performance gain with a Tee Dee is well worth the extra time and cost.

To greatly speed up construction time, the Ace constant chord Mini Foam

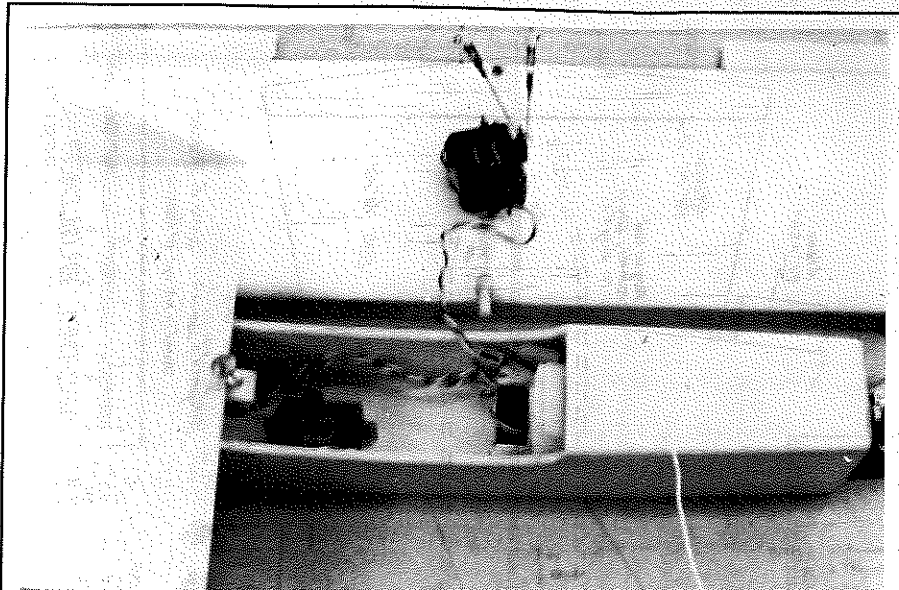


Rear view of the number three *Weekend Wonder* shows the opening for the elevator linkage. Simple, sheet balsa construction is evident. Susan Tharpe holds No. 3 for the camera.

The size of the model was dictated by cost: two-channel, 1/2A models are simply cheaper than larger models. The simple omission of landing gear cuts down building time, cost, drag, weight, and eliminates the need for a paved runway. The shoulder mounted wing makes hand-launching a breeze. The largest compromise made against simplicity was the use of Tee Dee engines

Wing was chosen as the heart of the model. The wing halves are simply epoxied together; no covering is necessary because the foam is fuelproof (saves money and time). The semisymmetrical airfoil is just fine for aerobatics, and results in a gentle glide once the engine dies.

The rest of the model is constructed of 1/8 balsa sheet, and a scrap piece of 1/8



Radio installation details. There is ample room to stack a Futaba four-channel RX and 225 mah battery in the nose of the *Wonders*. Servo tape holds servos in place.

plywood for the firewall. By using stock sizes of balsa, the number of required knife cuts is kept to a minimum, actually reducing building time. For example, the fuselage sides and formers are made from 1/8-inch sheet balsa, two inches wide, simply cut to length. The tail surfaces are made from a three inch wide sheet of 1/8 balsa, and the ailerons are 1/8 x 3/4 strips.

There are several other less noticeable features that add to the overall theme of absolute simplicity. The ailerons are both hinged and covered in one step using a low-heat plastic covering material such as Top Flite's Econokote. The torque rod assemblies are then epoxied to the trailing edge of the wing, and attached to the end of the aileron using strips of scotch tape. I admit that this sounds a bit crude, but this method is fast, easy, cheap, nearly invisible, and well-proven. The aft end of the fuselage is left open for easy linkage to the elevator. And by all means, use Hot Stuff or a similar glue for as much of the construction as possible (but not on the foam!).

#### CONSTRUCTION

Just a few construction tips should be sufficient for building a *Wonder*. The leading edge of the wing should be sanded round, the skin should be sanded lightly to remove manufacturing marks, and the trailing edge should be sanded square until it is about 1/8-inch thick. Epoxy the halves together with no dihedral. No wing bracing or stiffeners have ever been used or needed. A typical wing hold-down arrangement is shown on the plans.

If the fuselage were bent into position at the aft opening, the sides would bulge out between the formers. Instead, the fuselage sides are actually cracked into position behind the rear former by scoring the inside of the balsa and gently pushing the aft portion into place. I find it easier to install the fuel tank during

assembly; just leave the fuel lines dangling through the firewall. Hardwood or wire skids should be installed if you plan to be landing on paved surfaces.

#### FINISHING TOUCHES

Finishing your *Wonder* will probably take as much time as building it. Mine were all finished with four or five coats of clear dope with light sanding. You may find it easier to Econokote the entire model (at least this would give it some color). I generally don't spend any time decorating, but for this article I decided to go all out and put those numbers on the wing!

The radio installation shown in the photos is quick and dirty, but so is the entire model for that matter. I know that a lot of people frown on the use of servo tape, but I have had nothing but success with it. Be sure to apply a light film of epoxy to the area where the foam tape will be applied and you will have no problem getting it to stick firmly. A miniature radio will definitely ease installation and reduce weight, but is not absolutely necessary. You may want to plan ahead for larger systems by widening or deepening the fuselage. Stick a hot engine on the nose and check the balance point. This is a critical step... get that balance point (CG) within 1/8 inch of that shown on the plans.

#### FLYING

An easy to build airplane is great, but the bottom line for any aircraft is flight performance. The *Weekend Wonders* won't let you down in this category. They are fast and aerobic... any looping and rolling maneuver is easily accomplished, including inverted flight and outside loops. The vertical performance on an .049 is simply outstanding. They do two rolls straight up with no problem.

Your *Wonder* will eat up a surprisingly large chunk of the sky, so find a nice, grassy field with plenty of space. Get the

engine screaming, take a few steps, and toss the model with the nose up about 30 degrees. It should climb out and gain speed at this attitude (no wallowing around like some 1/2As). You will find that your *Wonder* flies solidly without any quirks or surprises. The one ounce tank will empty after three to four minutes, so be sure to leave some altitude towards the end of the run. When it does quit, glide it down to a gentle landing into the wind. If you have lots of altitude, you can perform several stunts during the glide.

#### FINAL THOUGHTS

Like I said before, the heart of these models is the Ace Mini Foam Wing. The models presented here are but two of a countless number of combinations of fuselages, fins, and wings. I strongly encourage you to change or modify the shapes in order to suit your tastes. Go ahead and experiment with different ideas on wing layout, wing tips, fin outlines, etc. Using the guidelines presented below, you could easily design your own *Wonder* and give it your personal touch.

Some of my ideas include trying sweepback again with two fins on the wingtips, using just one half of the wing with large tips covered with Econokote (like an old C/L), or using the Ace tapered wing instead of the constant chord. How about a biplane, tandem wing, or canard? The possibilities are endless, you just have to use your imagination.

If you do plan to design your own personal *Wonder*, you may find the following guidelines to be of help.

- 1) Keep the center of gravity 1-1/4 to 1-1/2 inches behind the leading edge at the mean aerodynamic chord of the wing (half-span on a constant chord).
- 2) Set the wing and stab at zero degrees of incidence.
- 3) Use about five degrees of down-thrust.
- 4) Keep it light and simple.

I wish you luck with your *Weekend Wonders* (and all of your planes, for that matter). I would love to see any photos or hear any stories, comments, or suggestions. Get the plans from **Model Builder**, set aside a weekend, and have at it!

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#### LIST OF MATERIALS

- 1 - 1/8 x 2 x 36 Balsa: fuselage sides, formers.
- 2 - 1/8 x 3 x 36 Balsa: tail surfaces, fuselage sheeting.
- 1 - 1/8 x 3/4 x 36 Balsa: ailerons.
- 1 - 1/8 Plywood scrap: firewall
- 1 - 1/16 Music wire: torque rods, pushrods.
- 1 - 3/32 Brass tubing: torque rod bushings.
- 1 - 1/2A Motor mount.
- 1 - One-ounce fuel tank.

