

# FINDRAGGER

By BRUCE THARPE . . . A small/medium sport R/C model for learning to fly (with an .049), or tearing up the sky (with a .10). The inverted fin? Just think of the fun you can have explaining it to the spectators!

• “Let me guess. You were either half asleep or drunk when you glued the fin on, right?” This is a pretty typical comment when fellow R/Cers eyeball the Findragger for the first time. If I were smart, I would just kind of grin and play along, but usually I tell them that I actually did it that way *on purpose*. Why? My answer to that is the ageless reason: just to be different. It could definitely be argued that an inverted rudder holds certain aerodynamic advantages, but on a sport ship like the Findragger, they’re relatively unimportant.

One very obvious disadvantage is the fin’s vulnerability to damage. The rugged design in the tail area has proven more than sufficient in squelching that concern. In fact, the entire structure is pretty beefy, resulting in one tough little bird. The overriding factor during design, however, was ease of construction . . . that is where the flat-bottomed wing, sheet tail surfaces, and box fuselage come into play.

The Findragger is an extremely versatile aircraft. It was originally designed around a Cox Medallion .049 R/C (with throttle). It flies around very nicely on this power. With the .049 and small control surface deflections, the Findragger is an extremely easy aircraft to fly. I recommend this setup for training (with an instructor). More advanced fliers will definitely want to go with an .09 or .10 for much higher performance. Crank up the control deflections, shift the balance point back, and you’ll have a truly spectacular hot-dogger. It will do loops like a control liner, spin faster than you can count the turns, hug the field contours at quarter throttle, and settle in for beautiful, soft three-pointers every time.

I generally fly aileron-equipped models, but rudder control can be a lot of fun . . . and quite a challenge to fly well. Flying with rudder is quite a bit different from aileron flying; while certain maneuvers cannot be done (axial rolls, for example), the Findragger will do other stunts (as yet unnamed) that will amaze you. So give it a try . . .

rudder/elevator/throttle is a lot of fun. And fun is the whole idea behind the Findragger and our hobby, right?

## CONSTRUCTION

One point that I would like to get across in this article is that modification is strongly encouraged. I certainly don’t expect this design to appeal to everybody, so change *should* be made to suit your tastes. This is a creative person’s hobby, so be creative. Maybe a curved belly would look better, or maybe the stab could be tapered. You could add a nosewheel, or replace the vortex wingtips with tip plates. You could even turn the fin upright, but that would break my heart!

As with any scratch-built project, wood selection is paramount. Use contest quality wood, if possible, to keep the weight down. Epoxy use should be limited to the engine and landing gear mount areas and the wing joint. Hot Stuff and Titebond are fine for the rest of the structure.

As you begin to cut balsa, you will notice that many parts have been designed to fit standard sizes of wood. The fuselage sides will just fit on four-inch-wide sheets. When you cut the 3-1/2-inch-wide balsa portion of the stab, the remaining half-inch strip can be used for the wing saddle. Using standard sizes of balsa results in fewer knife operations, less building time, and a simplified structure.

## WING

The wing is built in two pieces. Cut out twenty ribs (all identical) using your favorite method. I prefer to make a plywood or stiff cardboard template; cut the ribs using the template, and then sand the stack of ribs together. Lay down the bottom leading and trailing edge sheeting over your Saran-Wrap protected plans. Glue the lower spar to the leading edge sheeting (even with the back edge), followed by 10 ribs. Align the root rib using the dihedral template. Add the spruce leading edge stiffener, the balsa leading edge, the upper spar, the upper leading and trailing edge and center sheeting, and the upper capstrips. When thoroughly dry, the wing half is

unpinned from the board and the lower center sheeting and capstrips are added. Sand the leading edges to shape and epoxy the wing halves together (butt joint) with one panel pinned to the board, and the other panel raised two inches at the tip. The original Findragger did not have or need a dihedral brace, but one can be installed if desired.

The vortex wingtips are surprisingly easy to make if very soft balsa blocks are used. Glue the block to the tip so that it hangs below the trailing edge about one inch, and is even with the leading edge. Carve and sand the block to match the airfoil upper surface. The under-surface is roughed out with a circular gouge and sanded smooth with a rounded sanding block. Blend the upper surface to the outer edge of the bottom surface and you have a beautiful wingtip.

## FUSELAGE AND TAIL

Glue the wing supports and nose doublers to the fuselage sides. Make sure you have a right and a left side. (What would a construction article be without that classic line!) Attach the F3 former pieces to the fin. Glue the fuselage sides, F1, and F2 together over the plans, upside down. When dry, put the fin in place and pull the fuselage ends together around the fin assembly. Epoxy the firewall at the front and you’re ready to finish the body construction by adding the landing gear and mount, the stab, the top and bottom sheeting (crossgrained), and the triangle pieces behind the firewall and landing gear mount.

## FINISHING TOUCHES

I will leave finishing up to your personal preference. You may spend as much (or as little) time and money on this step as you like. I used Monokote (transparent yellow) on the wing and Aero Gloss dope on the body (black cabin, red trim).

Mount the engine firmly and install the throttle cable or linkage. Assemble and install the fuel tank, wrapped in foam rubber, and hook up the fuel lines as necessary, being sure to avoid kinks. I recommend a two-ounce fuel tank with



Originally called the "Unique Plain", for the same obvious reason, "Findrager" is certainly cause for the old double-take. You could explain that you started a roll and changed your mind halfway through . . .

an .049 and a four-ounce tank for larger engines.

Use your radio equipment to control the balance point and install as per manufacturer's instructions. A miniature radio system is desirable, but not necessary. I used wire-and-dowel push-rods to actuate the control surfaces. Nyrods may be used, but plan their installation during construction. The wing may be held on using 3/16 dowels and rubber bands (better for beginners) or by using a bolt-on system. Stick some wheels on and let's go flying!

#### FLYING

Check that balance point one last time. For the first flight, it should balance on the spar. Control surface deflections of  $\pm 1/2$  inch for the rudder and  $\pm 3/8$  inch for the elevator are good to start with. As you become familiar with the flight performance, deflections can be increased and the balance can be moved aft (small changes only!) until the desired level of maneuverability is reached.

Pilots with some flying experience should have no problems on the first flight. The prototype made its first flight from a hand launch . . . you may want to do the same. Then came the real test: ground handling. I can honestly say that this is the easiest handling taildragger I have ever flown. Ground loops are actually difficult to do, and 'up' elevator is not needed at the start of the ground run (to prevent nose-overs). I really can't

say enough for this aspect of the handling characteristics.

In flight, the Findrager excels. Wind penetration is exceptional for a flat-bottomed airfoil. Once you get used to its somewhat odd profile, you're ready to start wringing it out. Loops, barrel rolls, and spins are done with ease. It can be held inverted, but I have not yet been able to do an outside loop.

The Findrager is a difficult airplane to stall, so don't be shy when pulling on the stick to slow her up for landing. Final approach won't be as rock steady as with an aileron ship because the yawing (due to rudder) is more pronounced during slow flight, causing the plane to oscillate slightly after each input. You will quickly get used to this and pretty soon all of your landings will be perfect.

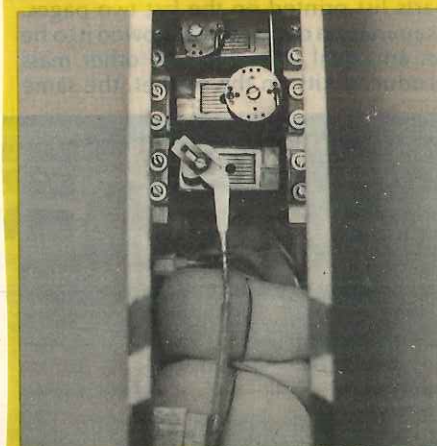
Anyone interested in the Findrager is certainly welcome to call or write me with any questions, comments, or suggestions. I would love to see any snapshots of completed models and hear any experiences, so stop dragging your fin and get a hold of MB's plans! Bruce A. Tharpe, 2380 Cabrillo Dr., Hayward, CA 94545; (415) 782-9172.

#### LIST OF MATERIALS

- (4) 1/8x4x36 Balsa - Fuse sides, sheeting, fin, stab, formers.
- (4) 1/16x1x36 Balsa - Wing trailing edge.
- (2) 1/16x2x36 Balsa - Upper leading edge sheeting.
- (3) 1/16x3x36 Balsa - Lower L.E. and

center sheeting, ribs.

- (4) 1/16x1/4x36 Balsa - Capstrips.
- (2) 1/2x1/2x36 Balsa - Leading edge.
- (1) 1x3x12 Balsa - Wingtips (very soft).
- (1) 1/2 Triangle Balsa - Bracing.
- (4) 3/16 sq. x 36 Spruce - Spars.
- (3) 1/8x1/2x36 Balsa - Stiffeners.
- (1) 1/32 Plywood Sheet - Nose doublers.
- (1) 1/8 Plywood Sheet - Firewall, landing gear mount, F1.
- (1) 1/16 Music Wire - Tailwheel, push-rods.
- (1) 3/32 Music Wire - Main landing gear.



Novak Bantam Midget servos are exact fit across fuselage. Novak receiver, 225 MAH battery up front. Bruce uses Futaba TX.



For relaxed flight training, a Cox Medallion .049, on a C.B. Enterprises mount is a fine combination.



For more lively action and razzle-dazzle aerobatics, an O.S. .10 R/C on a Kraft mount is just right.