



Here's a snappy little semi-scale that you can take back and forth to the field without dismantling. A real crowd pleaser.

LITTLE

# TOOT

By Denny Elder

● A few years ago, while attending a contest in Dallas, Texas, I first saw the fiberglass Little Toot. The fiberglass job had foam wings and the works, all ready for Formula II. The only one that flew was entered in scale, due to lack of entries in this event. With a screaming K & B .40 there wasn't much of a show. Had the city of Dallas been a bit easier on my pocket, I would have probably brought one home.

As the summer months grew to an end, the winter air inspired the birth of my version of the Little Toot. The 600 inches of wing area were kept in the design in order to create a biplane for the mid-sized engine and the miniature radios. There are a few around here who think only in terms of 7 foot Travelairs. (So what's so bad about that? - WCN).

The plane in the photos is the second of two. The first was a bit shorter and sat higher off the landing gear. The second plane was lengthened from the trailing edge of the bottom wing and the landing gear was shortened. Both of the changes were brought about to aid in ground handling.

Before we begin chopping wood and smelling glue, I would like to make a couple of comments. First, if you're seriously thinking about building this little biplane you've got to be crazy about wings. All biplanes have two wings. (Very profound there, Denny! - WCN). Second, though this is relatively a simple plane to build and fly, I'd recommend some flying experience. Not "ace of the base", but just an Ugly Stick or two. Ready? Let's go!

## WINGS

Both wings use the same rib pattern. The rib outline is traced on a 2 x 4 inch block and cut with a band saw. The idea was given to me by the creator of Big John. (I'm on my second B.J. II). After the outline is cut, notch the rib block for the spars. Sand the block lightly and then using some type of a guide, begin slicing the ribs off about 3/32 inch thick. The waste from the block looks to be rather great, but compare the cost of the block to the sheet stuff.

The four wing panels are built separately. Begin by cutting ribs B and C for the top wing to accept the plywood wing brace. Cut the four lower trailing edge sheets to size and taper the upper back edge with a sanding block as shown on the plans.

Pin the trailing edge sheets over the plans along with the 1/2 inch wing jig strip. Glue and pin the lower rear spar to the sheet trailing edge. Now glue the ribs and other spars in place, trying to keep things straight and on the board as long as possible.

With the four panels completed as far as possible, join the two top panels with the correct sweep and at 0 degrees dihedral. Now cut the 1/8 inch plywood cabane platform and glue with epoxy between the two center ribs, making sure the platform is level according to the center line. After the epoxy is dry, glue the plywood wing brace in place, along with the hardwood blocks for the wing hold-down screws. The top of the top wing's center section gets 3/32 inch sheet instead of 1/16 inch, but wait until the wing hold-down blocks are tapped.

With everything looking great, go ahead and add the wing tips. I used the laminated tips as shown for strength and looks. I am sure the flying of the thing would not be affected if another type tip were used, such as sheet.

The bottom wing panels are joined by sanding the center ribs to produce a half-inch dihedral under each tip rib. Now, the two lower panels are joined but not sheeted over the center section. No plywood spar is used . . . remember the Kaos.

This is the time to cut, drill, and glue what is needed to provide ailerons. Barn-door or strip ailerons will work great, as will bellcranks or torque rods. Suit yourself. By the way, the first Toot had four ailerons. The thing was very quick . . . too quick. Now that you have just mastered the engineering of the ailerons, finish the rest of the wing in the same manner as the top wing. Don't forget to fiberglass the center section after sheeting.

## FUSELAGE

The fuselage is a bit simpler than it looks. Basically, the top of the thing is constructed in the same manner as the Stafford Mustang. Begin by building the fuselage sides. This is done by cutting half way through the sides with a hack saw blade, at Former center lines 2 and 3. Pin the flat section of the sides between Formers 2 and 3 to a flat surface. Now, with a small amount of water, soak the cuts to soften the wood. After several minutes, or a slow beer, (depends on how fast you drink beer), block the front and back sections up to match the plans. Fill the cuts with epoxy glue and add Formers 2 to one side and 3 to the other side. Be sure to use the center section of the side to square these Formers. Let these assemblies dry overnight.

Now, after removing the sides from the board, add the longerons and the plywood and balsa doublers. Taper the longerons and balsa doublers at the tail to let the sides meet. Join the two sides at Formers 2 and 3. The two sides should come together at the tail and fit the firewall. Glue the firewall and Formers 4 and 5 in place.

The basic fuselage is now complete. The top of the fuselage is built by cutting the 1/4 inch sheets to fit from Former 3 to 5. Glue the two side pieces in place and when dry, sand the top flat and add the top piece. From Former 5

to the tail, is a soft block. The sheeting from Former 3 to 1 is done in six pieces. The side pieces are cut out of 1/2 inch sheet and the top is out of 3/8 inch sheet. Glue these pieces in place in the same manner as the tail. Sand the top to shape, mark the cockpit and cut out. Do not sheet any of the bottom until the plywood cabane blocks are epoxied in place.

The front end cowl and cheeks are built on, rather than around. Now is the time to decide what power plant to pull off the shelf. Mount the engine in a suitable radial mount, being sure to match the distance on the plans from the firewall to the thrust washer, and locate the mount on the firewall. While the engine and mount are still on the firewall, cut the cowl to fit and just clear the carb. I will get to the cowl and cheeks in a minute. If you are satisfied with the way the cowl fits, remove the engine and mount.

The cowling and cheeks are made from fiberglass, using the balloon method. Williams Brothers (short) cheek cowl will work but they will let the engine head hang in the breeze. Should you let the idea of fiberglassing stop you cold, don't. I still have my plugs, and for the cost of materials and a letter, I will be more than glad to furnish you with the three parts. (See end of article).

I would advise anyone who hasn't tried the balloon method to go ahead and give it a whirl. You might even want to create your own front end.

The cowling is epoxied to the firewall. When dry, sand and trim the cheeks to shape and glue with epoxy to the cowl and fuselage. Remember, the right side of the cowl should already be cut out before the cheek is glued in place. With all three parts in place, fill the joints and finish the front end as if you were ready to paint. Don't forget to cut plenty of air holes. Mark the desired outline of the removable part of the cowl assembly. Remove the back from a razor saw and begin cutting the cowl, giving yourself plenty of room. After the cowl is removed, clean up the inside with a rotary file and epoxy the necessary mounting blocks in place. There you are, a perfect fit and plenty of room for engines and fingers.

Here comes the fun part; installing the cabane. First of all, the cabane itself is cut out of 1/16 inch aluminum and

bent to shape. Alignment begins by squaring the lower wing and joining to the fuselage. The tail assembly, which is built in the conventional manner, is now glued in place for use as a visual reference. Nothing is more discouraging than to see a biplane (or any plane, for that matter), come down the runway looking as though it is headed towards "Jones". (Who he?)

Cut four slots in the top of the fuselage to accept the cabane struts. Providing the cabane platform in the top wing is at 0 degrees incidence, clamp the fuselage in a vice, or something, to hold the center line perfectly level. With the glue holes drilled in the cabane struts, apply epoxy to the struts and the slots in the cabane blocks, and slide into place. Make sure that the cabane is level both ways. Fill the rest of the cabane blocks with epoxy and let dry overnight, use masking tape to plug the bottom of the cabane blocks.

After the cabane is dry, set the top wing in place and line up, using the tail assembly and the lower wing as guides. Mark the holes on the wing cabane platform and tap for 1/4 x 20 screws. Screw the top wing to the cabane and check the distance between the upper and lower wing tips on both sides. They had better be close . . . Now you can sheet the top wing with 3/32 inch balsa.

Using the template pattern shown, make the interplane struts. If you are satisfied with the location of both wings and tail assembly, finish the fuselage by sheeting the bottom and adding the landing gear block, tail wheel assembly, etc.

#### PREFINISH

This is the time during the construction of a model that I consider most important. It is the time to check everything for fit: The interplane strut tabs are clamped in place. The engine, prop, and spinner are installed along with the radio equipment. Also, install the tail wheel assembly, landing gear and push rods or Nyrods. Everything except the interplane strut tabs is screwed or glued in place. The hinge slots should not be cut if you plan to wet sand during final finishing. Holes and water don't mix.

Well, there it is, except for the uncovered wings and a bit of fuel proofing, it should be just about ready to take out.

#### FINISHING

On the original, the wings were cov-

ered with Top Cote. If you do it this way, cover only the top of the bottom wing and the bottom of the top wing now. With suitable holes drilled in the strut tabs, begin smearing the epoxy and glue the tabs to the plywood ribs. When the glue is dry, cover the rest of the wings.

This particular plane was a test hop for Francis' new surfacing resin. Caution, if you used Hobby epoxy Formula II for the cowl etc., don't get any of the resin on it. Formula II is one of the epoxies the resin will not dry on. The resin was applied to all wood areas as per instructions, with much success.

Hobby epoxy works extremely well on Top Cote. After lightly sanding the wing with 400 paper, spray on a medium coat and let dry for a couple of days. Be sure the wings are clean and free of any fingerprints or oil. After you have achieved a suitable fill on the fuselage and wings, choose a color and get with it. I used my old standby, Hobby epoxy, for the complete airplane.

#### FLYING

First of all, poke a screwdriver through the wing, or something that will take the newness off. Those first hops of a new bird are a bit spooky for me, and this was no exception. It did not fly "off the board", so they say. The fact that I changed radios and did not check the centering on the elevator servo just about cost me an airplane. Back on the ground and everything centered and going the right way, I tried it again . . . . . GREAT! There was no tendency to ground loop during take-off, touch-and-go's or landings. The rolls were a bit slow, but with the extremely effective rudder, everything came around. The thing loops straight and true, and spins are easily entered, and it's "hands off" for recovery. Are you ready to set her down? Make a couple of slow fly-bys to get used to the way it slows down. Three wheel landings were made by chopping off the throttle about fifteen feet off the deck and letting it settle before flaring out. How sweet it is . . . . .

I hope you are as sold on the idea of a half-pint biplane as I am. By the way, for those cheeks and cowl, (chicken!), drop me a line (the cost will be \$3.00 for all three pieces):

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