BF-109E

BY CARL LONGFELLOW

● Have you ever been so moved by something that it gives you "goose bumps"? Like the lines of an outstanding classic car or a good piece of music?

Well, the looks of WW II German Fighter planes do that to me. They all just seem to have the lines that I like. For this reason I have been thinking about RC'ing the ones I like best. And, what else do you start with but the BF-109E? There is one big problem that keeps giving me trouble: I'm not a good enough flier for true scale, but I am far enough along to be tired of trainer types, which I don't think look like airplanes. I keep asking myself "Why can't I come up with a design that looks real, but is still relatively gentle to fly"? I know it's been tried many times before, but I just had to give it a try. It seems that I debated with myself for months about going ahead with the project. During this time I even looked for a kit, but, of course, there isn't much available in Stand-Off Scale for a .40 to .45 engine.

At about this point in time I picked up the current R/C Modeler; low and behold two stand-offs; a 109E and a Tony, both on the same plan by Danny Reiss. This gave me the boost I needed. Although Mr. Reiss' plans were close, they were not just what I wanted. I broke out the drafting table and went to work on some plans of my own. Using the old "rules of thumb": length — 75% of span; nose moment — 20% of length; and tail moment — 40% of length. I kept juggling these figures until I got the "look" I was after. A "reasonable facsimile" of the real thing.

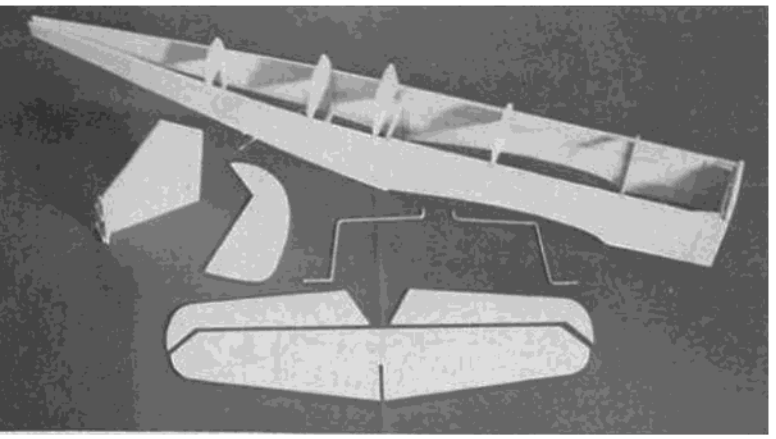
Before I go any farther, I think I should explain something I'm sure you're thinking by now, "What's with this guy, first he says he's not a good flier, now he's designing a scale model!" What goes? Well, I have been designing, building, and flying models, off and on for over thirty years, but I just never got around to R/C until about three years ago. Now I've really got the bug! Okay, back to the 109.

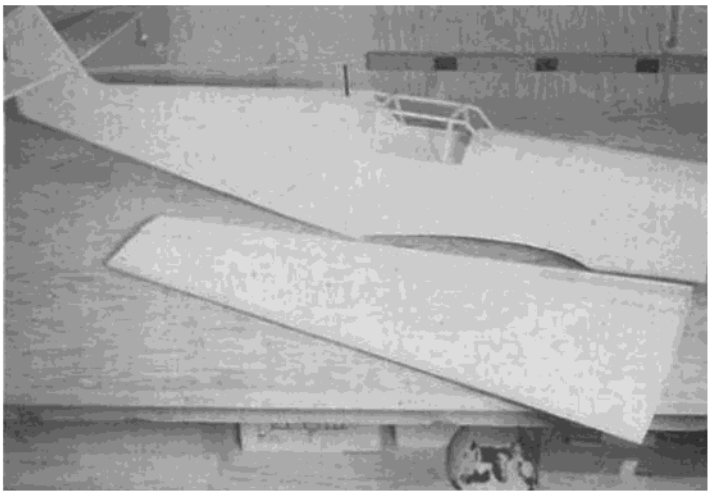
After arriving at the moments I wanted, the rest was easy. Since I hate to build wings, I decided on a foam core. I did stick with the old standard, "balsa and rags (silk)" for the rest of the construction. Since I scratch build most all of my models, I have developed a routine. It starts by transferring all the piece parts to the balsa sheets, and cutting them all out. If you make all the pieces you're going to need for the complete model right away you'll find the rest of the construction goes along just like a kit.

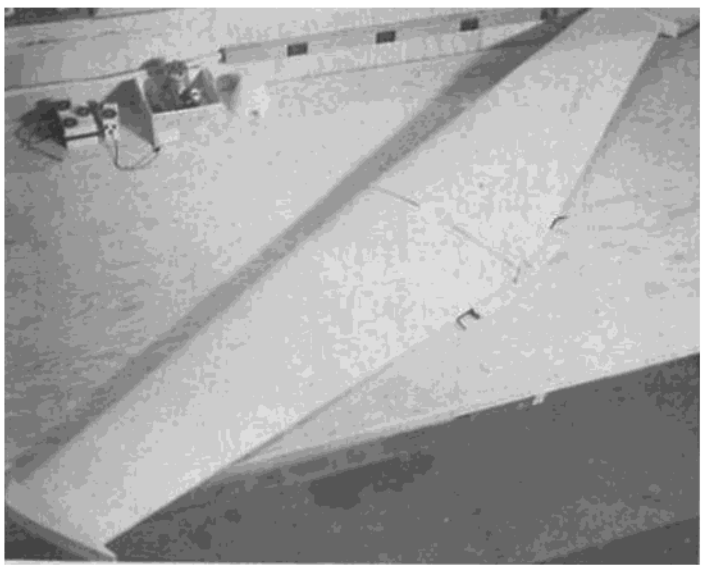
CONSTRUCTION

Starting with the fuselage, install the doublers as shown. Making sure both sides are lined up, clamp the aft ends together, but do not glue. Install the firewall F-1 and bulkhead F-4. I use 5 minute epoxy here. After these are set, install all bulkheads except F-8. Making sure they are centered, add the fin alignment blocks to the aft side of F-8. Now, position on the front of the fin and install both in the fuselage. As you will notice, this is a self aligning assembly, so a little care at this point will save lots of headaches later. The planking on the bottom front should be done first. This area, being for the fuel tank, should be sealed well. I used fiberglass cloth and polyester resin. Now the rest of the fuselage construction can be done in any order. The inside of the top front can be sealed through the wing opening. In fact, I coated the entire inside back to bulkhead F-4. Now install the horizontal stab, and don't forget the triangular pieces on the bottom sides. Rough sand the whole thing to shape. Make up the canopy framework and install as per plans. Now this area should be finish painted and a pilot installed if you desire. I was not able to buy a WW II German pilot, so I "faked" one out of an American jet

LEFT: Donna Baremore, wife of Albuquerque R/C Club President, poses for Max Mills' Ektachrome of author's BF-109E. BELOW: First prototype of several BF-109's built by Carl Longfellow.







TOP ROW, LEFT: BF-109E basic structure.

ABOVE: Canopy framing, antenna feed-through, and one foam wing panel.

LEFT: Covered foam wing with linkage installed and rough-sawn wing tips in place.

BELOW, LEFT: Shaped foam pattern for cowling.

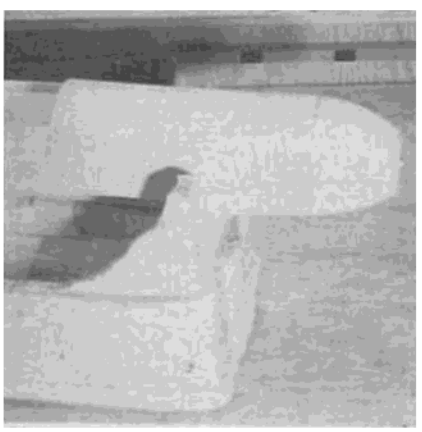
BELOW, CENTER: Molding plaster poured over pattern.

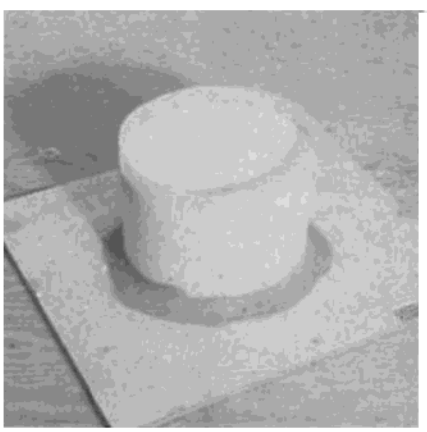
BELOW, RIGHT: Spinner set up to be cut off.

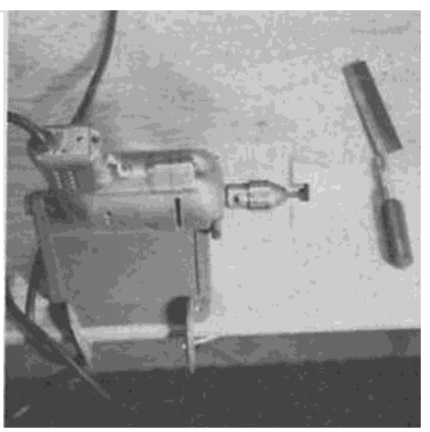
BOTTOM, LEFT: Sanding cut-off ABS plastic spinner to contour.

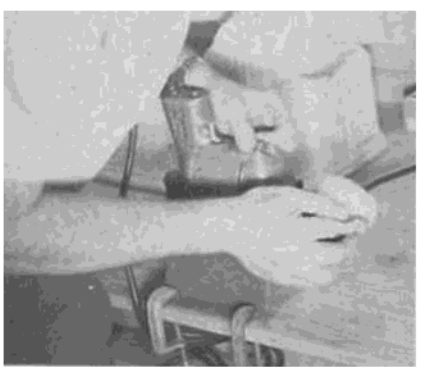
BOTTOM, CENTER: Finished cowl ready for installation.

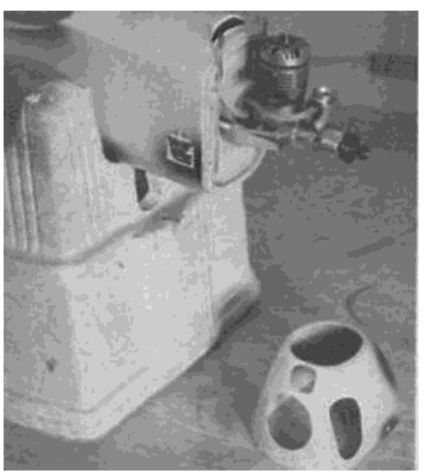
BOTTOM, RIGHT: Cowling and spinner in place.

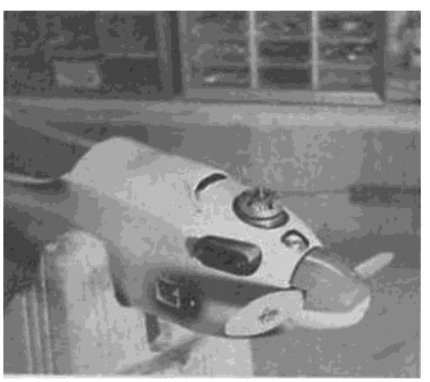












pilot (maybe some of you suppliers should think about that). Now cut out and install the canopy. The canopy may be made in one piece or in three pieces, whichever you prefer. I put mine on in 3 pieces, using 5 minute epoxy. Now mask off the entire cockpit area. Brush a coat of clear dope over the complete fuselage and tail section, sanding lightly when dry. Cover with wet silk and clear dope. Now brush a couple of coats of talc and clear dope, sanding after each coat. Do not sand into the silk! When good and smooth, spray on a coat of automotive primer. Now sand with #400 or #600 wet or dry paper, using it wet. Now you are ready for your finish. I used a "Profile" book to select my color scheme.

The cowling is next. First a pattern must be made. The easiest is to use soft balsa, but any wood or even foam will do. Cut a 2¾" diameter disc from 1/8" plywood and put a 1/4" diameter hole through the center. Put a 1/4" threaded rod through the firewall, the pattern block, and the 1/8" plywood disc. Tighten the block and disc against the firewall. Now start shaping the block to the final contour. Your pattern must be finished to a smooth and slick outer surface. I used acrylic laquer, rubbed out with Dupont #7 rubbing compound. Apply paste wax and polish to a high gloss. Now attach the pattern, large end down, to a piece of plywood or masonite, with wood screws. Cut the top and bottom out of a large plastic Clorox bottle, set it down over the pattern and seal it to the board with clay. Spray the inside of the plastic bottle and the pattern with mold release. Mix up a batch of molding plaster and pour it into the plastic bottle until it covers the pattern by at least 1/2". After this has set, at least overnight, remove the clay from around the plastic bottle and carefully pull on the board and pattern until it comes out of the plaster. Now you should have a nice smooth female mold. Let it dry well — even baking in the oven for awhile works fine. Wax the inside with a good paste wax, polish, and spray with mold release.

You are now ready to lay-up the cowling. For cloth, I use old fiberglass drape material. It has a good tight weave, and is light in weight. Start by cutting some strips about 2" wide by 4" to 5" long. Mix up your resin; I use polyester, but there are others that will work just as well. Brush on a coat of resin, lay in the strips lengthwise, brushing resin through each strip. Do this until the whole mold is covered. Don't worry about the overlaps, they will not show, and will improve the rigidity of the cowl. Don't try to bend the strips around to the face of the mold, just let them stick up out of the mold. Be sure the cloth is filled well. After the resin has set-up, pull on the strips sticking out until the cowl pops out of the mold. Trim off the excess and wash well with detergent. Wet sand with #400 paper and spray with automotive primer. Wet sand again with #400 or #600 and it's ready for the final finish.

Now to the wings. I used a NACA 2415 airfoil, constant root to tip. "Hotwire" the cores from 2" thick foam. Rout out for the spars, landing gear blocks, and wing hold-down blocks. Install these, plus the trailing edge hinge strip, using Titebond. After everything is thoroughly dry, sand the hinge strip to a taper matching the airfoil profile. For the wing covering I use "tag board." It can be purchased at most art supply or stationery stores for about 25¢ a sheet. First lightly sand the wing cores and brush clean. Now brush on a coat of water base contact cement on both the wing core and the tag board. Let both dry completely. Now you are ready to cover.

Making sure you have enough to cover both ends, line up the bottom trailing edge and touch it down to the tag board and, with one continuous motion, roll the wing core onto the tag board across the bottom of the core, around the leading edge and across the top, to the trailing edge. Through the whole operation apply pressure to get good contact all over. Now trim off the excess with a new razor blade. Add the wing tip blocks, sand them to shape being careful not to "rough up" the surface of the tag board. Fill the crack with "Dap" vinyl spackling compound and sand smooth. Join the two wings together per plans. Add a strip of glass cloth at the center, both top and bottom. Add your favorite strip aileron hardware. Make up and install the ailerons per plans. Fill the exposed balsa with a mixture of dope and talc and sand smooth. Spray on a very light coat of clear dope. Be sure not to soak through the tag board; if you do, your wing will melt inside. After this dries, do it again. Now sand very lightly and spray on a coat of primer, then wet sand with #600 paper.

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With the wing at this stage, let's go back to the fuselage and add the wing fillets. Take two pieces of Saran Wrap, 3" wide, and tape them across the wing chord so that, when the wing is installed in the saddle, there is about 2" sticking out each side of the fuselage. Screw the wing in place. Using masking tape, outline the edge of the fillet that will fall on the wing. Make the triangular pieces that go behind the wing per plans, and epoxy them in place. Mix up a putty of polyester resin and "micro balloons." Apply to the fuselage and wing until you get the desired shape. When the putty gets to a jelly state, peel off the masking tape, leaving the fillet outline. When completely set, remove the wing and finish sand the fillets. Re-prime and wet sand this area.

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BF-109E
Designed By: Carl Longfellow

TYPE AIRCRAFT
Sport or Stand-Off Scale
WINGSPAN
54 Inches
WING CHORD
11⅝" Center — 6" At Tip
TOTAL WING AREA
482 Square Inches
WING LOCATION
Low Wing
AIRFOIL
NACA 2415
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
3 Degrees
O.A. FUSELAGE LENGTH
43 Inches
RADIO COMPARTMENT AREA
(L) 11½" X (W) 3½" X (H) 3"
STABILIZER SPAN
19¾ Inches
STABILIZER CHORD (incl. elev.)
4¾ Inches (Average)
STABILIZER AREA
93¾ Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Lower Portion Of Vertical Fin
VERTICAL FIN HEIGHT
5 Inches
VERTICAL FIN WIDTH (incl. rudder)
6 Inches (Average)
REC. ENGINE SIZE
.40-.50 Cubic Inch
FUEL TANK SIZE
6-8 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rudder, Elevator, Ailerons, Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Foam Core, hardwood spar, & cardboard sheeting
Empennage ..... Balsa
Weight Ready-To-Fly ..... 80 Ounces
Wing Loading ..... 24 Oz./Sq. Ft.

Now for the spinner. I used a standard 2¾" "Tatone" one with those "unsightly screws." Mount the spinner on a piece of 1/4" diameter threaded rod about 3" long. Chuck the whole assembly in a drill press or a securely anchored hand drill. With the assembly turning, use a razor saw to cut off the front part to about a 1¾" diameter. Cut a disc of this diameter from some scrap ABS plastic and bond it to the front end of the spinner with 5 minute epoxy. (Roughen up both the spinner and the ABS to assure a good bond.) After the epoxy sets well, spin the assembly again and, using a small file,

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or sandpaper, shape the newly bonded disc to the contour of the spinner. Finish sand the whole thing, and paint it with dope. This seems to hold up very well, even to the abuse of a starter.

Now I believe we're down to the final finish. I mixed 50% acrylic lacquer (color) and 50% clear butyrate dope. This method gives an unlimited number of colors to choose from. Thin for spraying with butyrate thinner, and have at it. After the colors are down and dry, shoot the whole bird with two coats of clear dope, and that's it. If you desire a "flat" finish, do not apply the two coats of clear dope. Instead, spray with one coat of "Flecto-varathane" liquid plastic, #91 satin finish.

FLYING

Flying this bird is very easy. While taxiing, hold a little up elevator. For take-off, hold a light pressure on right rudder, and advance the throttle slowly. Don't slam it forward. In about 20 feet her tail will come off, and if she veers a little to the right, don't jerk left, but just release the right rudder pressure. Work the rudder and throttle gently, and this "tail dragger" will handle very nicely. Add a little up elevator, and you're airborne. From this point on, I'm sure almost everybody out there in R/C land flies as good or better than I can, so have at it. Assuming you have balanced the plane per the plans, you will find it has a very shallow glide angle. You might find yourself wishing you had an extra channel to deploy an anchor!

Good luck and lots of good flying. ▢