

[Construction]

BY DAVID JOHNSON || PHOTOS BY DAVID JOHNSON & GERRY YARRISH



ALBATROS D.III

A giant-scale WW I biplane for scale competition

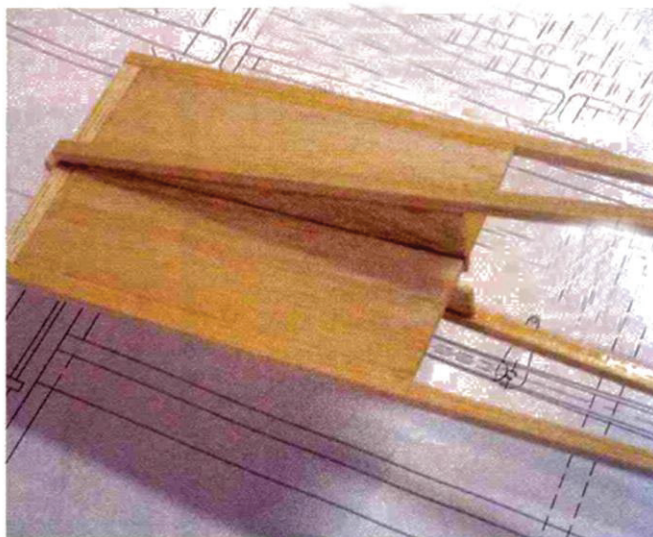
During WW I, Germany built more of the Albatros D series fighters than any other type of warbird. Though overshadowed by the Fokker D.VII and the Dr.I triplane, the Albatros was truly the workhorse of Germany's air service. Many famous aces such as Manfred von Richthofen, Werner Voss and Ernst Udet scored the vast majority of their victories while flying an Albatros. My construction subject is the D.III, which was introduced in 1917. The model is built to $\frac{1}{3}$ scale and is an excellent flyer that's capable of contest-winning scores, both static and in flight.

Specifications

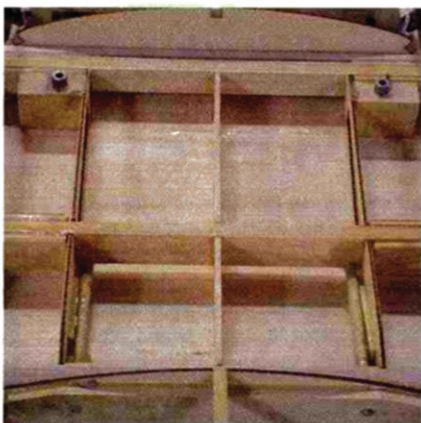
MODEL: $\frac{1}{3}$ -scale Albatros D.III
TYPE: competition scale biplane
WINGSPANS: 118 in. (top), 112 in. (bottom)
LENGTH: 93.5 in.
WEIGHT: 35 lb.
TOTAL WING AREA: 3,316 sq. in.
WING LOADING: 24.28 oz./sq. ft.
ENGINE REQ'D: 3.5 to 4ci 2-stroke gas
ENGINE USED: Zenoah G-62
PROP USED: 28x8
REQUIRED: 4-channel (rudder, ailerons, throttle, elevator)
RADIO USED: Futaba 14MZ



The basic fuselage is built around this box structure. The box and formers are then strung onto a length of copper pipe for alignment, and the stringers are added.



Before the fuselage is sheeted, the aft tail-section structure is assembled and glued to the stringers as shown here.



The lower wing center section has been bolted to the fuselage.

FUSELAGE

The fuselage is the only aspect of the aircraft that presents a particular challenge. Begin by cutting a kit of parts and then construct the sides of the forward "box" section. Epoxy the $\frac{1}{8}$ -inch lite-ply front piece to the $\frac{1}{4}$ -inch main piece, and prop up the front end $1\frac{1}{16}$ inch above the work surface. Install formers F3 through F7, and make certain that F5H and F7H are exactly on the centerline, as these will align the entire structure. Then build the tail assembly out of F11 and two vertical balsa pieces.

Slide formers F8 through F10 and the box structure onto a straight piece of $\frac{3}{4}$ -inch copper pipe (available at any hardware store). Carefully align and position the formers in their correct locations so they are at right angles to the pipe; then install the top, bottom and side balsa stringers (spliced together to the proper lengths) and cut them off $20\frac{7}{8}$ inches behind F10. Install a $\frac{1}{4}$ -inch-square crosspiece between the two side stringers, and then install the aft tail section.

Install the remaining stringers, with the

Designed by Dave Johnson, the $\frac{1}{3}$ -scale Albatros D.III is a great flying WW I biplane that isn't at all difficult to build. It is scale in outline, and the fuselage is fully sheeted. The model can be built fully detailed for serious scale competition, or you can build it for sport flying, as it has excellent flight characteristics.

last four ending directly on top of the two middle ones at the tail. Double the middle, side, top and bottom stringers with additional $\frac{1}{4}$ -inch-square balsa from F10 to the crosspiece. Find the stabilizer-spar locations, and drill $\frac{1}{4}$ -inch holes for them. Now install the mounting blocks for the cabane struts and front landing-gear struts. Fabricate the rear landing-gear attachments out of $\frac{1}{8} \times \frac{1}{2}$ -inch aluminum, and tap them for a 4-40 bolt. Install them on the outside of the box structure with the bolt heads on the inside for now. Remember to use thread-locker, as you don't want these to come loose. Sheet the

wing saddle now, and note that the sides come straight down to the seat and will be faired in by the fillets when the fuselage is finished. One last time, make sure that all the formers are square, and it will be time to start sheeting.

I used $\frac{1}{8} \times 6 \times 48$ -inch balsa sheets from Trillium Balsa for this task. Begin by sheeting from F10 forward, and go as far as you can from the middle stringer upward (be careful not to twist the structure). Trim this panel along the top stringer. If you plan to stain the fuselage, you must avoid getting glue on the outer surfaces. Now sheet from the bottom of the middle stringer downward, and work forward from F10. Complete the sheeting on the top from F10 forward to the former in front of the cockpit. If you dampen the outside of the balsa with a little water, it will help it go around the corners without cracking.

Go back and sheet the sides and tops from F10 back. Keep in mind that this area changes



Here, the fuselage has been partially sheeted and slid off of the alignment pipe.

from a smooth radius to a right angle. Install the rudder tiller as shown on the plans, and install the pull-pull guide tubes from F10 back. Now add a Nyrod tube from the rudder tiller to an area under the wing saddle. Remove the tube, and finish sheeting the bottom of the fuselage. Then bend and install your cabane struts and landing gear. The 1/3-scale wheels are from Balsa USA. We'll return to the fuselage and cowl later.



Here, the wings are being attached and aligned with the fuselage.



This is the rudder tiller arm. It is built into the fuselage before it is completely sheeted.



The tail surfaces are attached permanently to the fuselage. The outline is laminated with several strips of balsa.

TAIL SURFACES

Laminate the outlines using eight layers of 1/16-inch balsa. I hammered nails into a sheet of plywood every 1/4 inch around the inside outline and made the laminations using carpenter's glue. Sheet the vertical top and subfins as shown on the plans, and make sure



PHOTO BY TOM POLAPINK

Lethal Wooden Wonder

Let's try to put the Albatros-Flugzeugwerke series of WW I fighters into perspective. The Wrights flew in 1903, but they didn't reveal many of their secrets to the world until 1905. And it was closer to 1908 or 1910 when Glenn Curtiss jumped into the game with ailerons, elevators and all that other "real" airplane stuff.

Now flash ahead to 1916: the Albatros D.III was introduced to combat carrying a pair of Spandau machine guns and capable of flying at more than 105mph. Only about 10 years separated "airplane, the entertaining but useless kite" from "airplane, the highly efficient killing machine." The technological progress during that period was absolutely amazing.

A frenzy of airplane design and construction was then under way in Europe. Tony Fokker is credited with conceptualizing the steel-tube truss fuselage. Junkers came up with the clunky corrugated-aluminum designs that set the stage for stressed-skin aluminum structures. Albatros, along with Pfalz and a few others, steered away from the "sticks and wire" wooden fuselage trusses of the Sopwiths and Nieuports and instead developed its own versions of stressed-skin, semi-monocoque construction. Although the wings of an Albatros are traditional biplane fare—wooden ribs stacked on wooden spars, with the entire mess braced by miles of wire—the fuselage is really intriguing because it owes more to boat building than to aeronautical engineering.

The Albatros's fuselage was a thin skin of what we call plywood today, although the word hadn't yet been invented. Unlike Pfalz and Roland, which used male molds, Albatros formed its skins in female molds, probably by laying relatively narrow strips of steamed veneer into the mold, with each successive layer running at an angle to the one before. Three layers were formed, and when the glue had dried, a rigid, compound curved skin—not unlike that of a boat—was the result.

The four skins (top, bottom, right and left) carried most of the fuselage loads and were attached to the frames with screws, nails and glue. The edges of each skin overlapped in a smooth, wide scarf joint. The end product was an extremely rigid, light structure that was as streamlined as an airplane could be at that time—although it must have been tough to repair.

With the D.III, Albatros broke from its earlier designs by replacing the full-size bottom wing with a much narrower one, thereby creating what was almost a sesqui-plane. This allowed the use of a single V-strut at the tip, rather than the drag-producing N-struts of earlier designs.

Although greatly overshadowed by later, more glamorous aircraft such as the Fokker D.VII and the SE5a, the lowly D.III was actually one of the earliest and greatest ace-makers. For instance, nearly two-thirds of Richthofen's 80 kills (21 in April 1917 alone) were in an Albatros D.III, and it was a red-painted Albatros that gave him the "Red Baron" identity—not a Fokker Triplane. In fact, the colorful paint jobs of the Albatroses in his Jagdgeschwader are where the term "flying circus" supposedly originated.

The craftsmanship of the Albatros was akin to that of fine furniture, but even the finest furniture won't survive outdoors. Only two original examples remain: one in Australia, the other in the Smithsonian. They will, however, live forever in the minds of modelers.

—Budd Davison

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The dummy Mercedes engine covers the Zenoh G-62 nicely. The engine cowl has yet to be fitted into place.

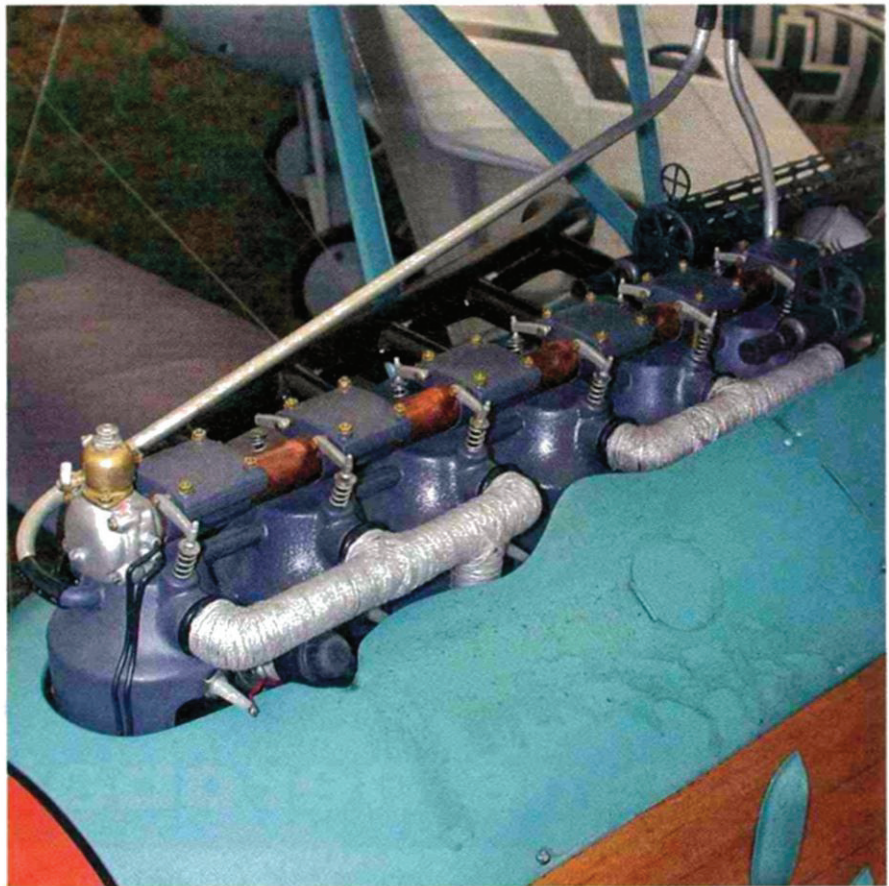
that they are square to the bottom wing saddle. Install the 1/4-inch brass tube through the fuselage, and trial-fit your horizontal stabilizer halves at this time. If they are not 90 degrees to the vertical stabilizer, adjust the tube holes until they are. They should be a close fit to the fuselage side, but if they aren't, build them up and sand them. When you're satisfied with the fit, set them aside until later.

WINGS

The wings are constructed conventionally; only the spars require special attention. They are built out of 1/4-inch-square basswood as one-piece boxes with 3/32-inch balsa sides. Cut the sides and then lay the 1/4-inch basswood strips (spliced with a scarf joint) along the top and bottom edges to form an open box. Beginning at the center, put a vertical 1/4-inch-square basswood piece every 12 inches. Sheet the open face, and you'll be done.

Place the ribs, and then add the leading edge. Add the leading-edge sheeting as shown on the plans. I found it easiest to build the ailerons in place and then cut them out. I laminated the top wing center-section cutout in place and then sanded it to shape. Add the capstrips, and you will essentially be finished.

Bolt your lower wing into place, and prop the fuselage up until the wing is at 0 degree incidence. Set the top wing on your cabane struts, and make sure that it matches. Carefully align the wings so they are parallel, and mark the locations for the top wing-attachment bolts. Add blind nuts and install the aileron servos. To control the ailerons, I ran spoiler-type linkages between the double ribs at the strut locations. A better solution for a sport aircraft would be to install the



The completed dummy engine and engine cowl look very scale. Functional vents aid engine cooling.



Competition with the Albatros

Dave Johnson has been building and flying scale WW I models for 30 years, and he has published several designs in *Model Airplane News*. Dave is now a senior manager at Hobbico, and he flies at several scale events every year. So far, the Albatros D.III has earned Dave a first place at the Mint Julep scale meet, and it has finished as high as fifth at Top Gun and second at the AMA Nationals.



The ailerons use strap hinges, and the large slot in the wing is for the scale-like aileron control-horn linkage.



Completed tail surfaces are very scale-like and use pull-pull elevator cables.

servos with the arms exposed and use a standard 4-40 pushrod linkage. If you use the spoiler-type approach, use servos with metal gears! For covering, I used Sig Koverall and finished the wings with Sig Dope. Now, let's go back to the cowl.

COWL AND FUSELAGE

First, install your engine in the cowl. I used a Zenoh G-62, and I built a box with 1/4-inch



Detailed inside and out, the Albatros has a complete cockpit interior and a pilot figure.

plywood to position the engine correctly. Then I bolted on the spinner and spinner backplate (from Arizona Model Aircrafters) with former F1 glued behind it and with a 1/16-inch spacer separating it from the backplate. Build up the forward part of the cowl with 1/8-inch balsa, and sand it to blend into the fuselage. I used Bondo automotive filler to fill low spots, and then I glassed it with 0.5-ounce fiberglass cloth. I formed the top panels and side vents out of aluminum roof flashing. To improve engine cooling, I opened the vents to make them functional.

Apply the fuselage stain, and allow it to dry for at least a week before you seal the wood. Install your fuel tank and servos,

then finish painting and add any scale details you like.

FLYING

This is the fun part! Make sure that the CG is as shown on the plans, and go fly.

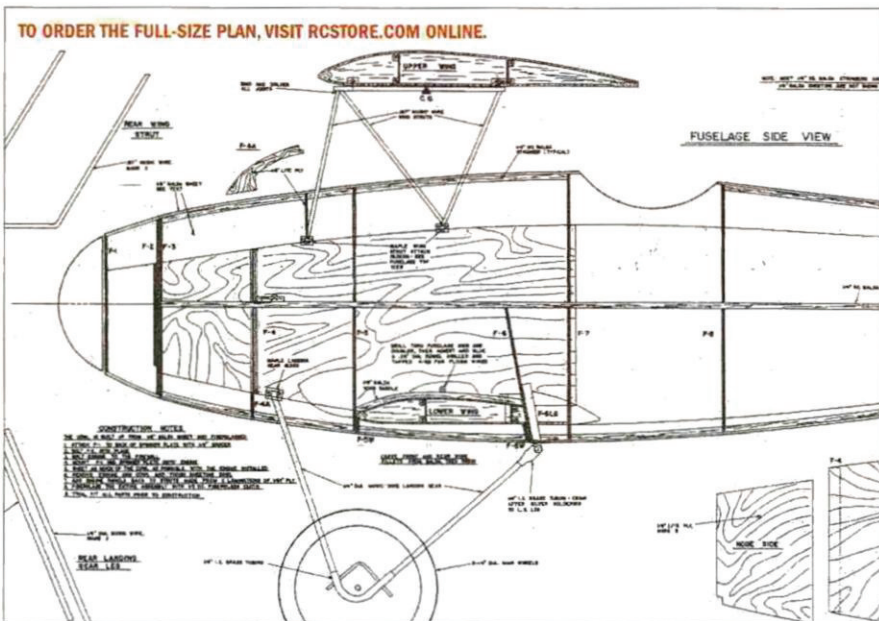
Set up your controls as follows:

- **Ailerons:** 2 inches up, 1 1/2 inches down
- **Elevator:** 3 inches up, 1 1/2 inches down
- **Rudder:** as much as you can get without binding (up to 45 degrees left and right).

Begin your takeoff roll by gently applying the throttle. With its scale tailskid, the plane tracks pretty well on both grass and pavement; just stay on the rudder. When the tail comes up, the plane is ready to break ground on its own and requires about 3/4 throttle on a calm day. The plane is very stable and relatively easy to fly. It will do most standard maneuvers such as loops, stall turns, etc. Couple rudder with aileron to make smooth turns.

On landing, simply throttle back, add a little forward stick, and the plane will settle nicely into the landing pattern. As you get a couple of feet from the ground, slowly keep feeding in up-elevator, and the Albatros will settle into a nice, 3-point landing. Again, stay on the rudder until the model comes to a stop.

For scale competition or for some serious sport flying fun, I think you will like the way the D.III performs. It is fairly easy to build and flies beautifully. Have fun! ⚡



See the Source Guide on page 167 for manufacturers' contact information.