

Der Jager D-IX

by Laddie Mikulasko



**A WWI-looking home-built,
fresh from the 1970s**



The Der Jager's light wing loading allows it to climb quickly. Sport aerobatics are comfortable.

SEVERAL YEARS AGO, in one of the aircraft magazines I saw pictures of a unique-looking home-built biplane called the "Der Jager D-IX." I was attracted to it because of its shape and color scheme. Marshall Wright designed and built the airplane.

Sometime later, I stumbled across a three-view drawing for the design. I kept it with the intention of building a scale model of the D-IX at some point in the future. In addition to the three-views, I found some photos on the Internet of the original biplane.

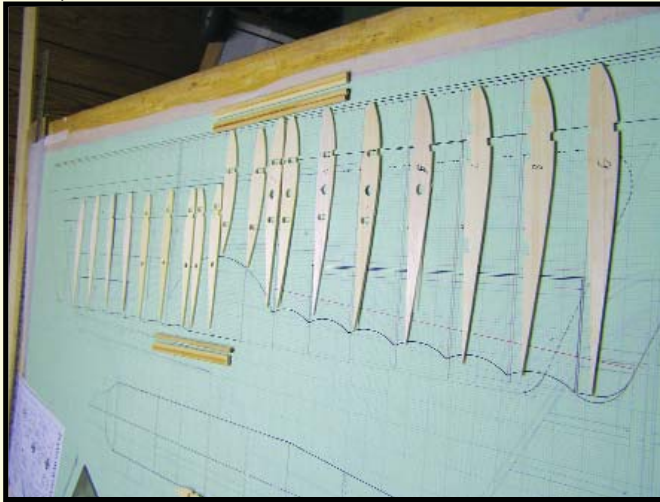
I designed the model for an AXi 2826/10 brushless motor using a Jeti Advance 40 PLUS speed controller and 3S Li-Poly batteries. I made sure that the battery's installation is easy; the top half of the cowl comes off, and the battery is placed on the battery floor.

Four Blue Bird BMS-380 servos are used for control. They are half the size of a standard servo, half the weight, and have the same torque rating: approximately 50 inch-ounces. If you do not want to fly this model as an electric, any .40-.45 glow engine can be used.

I drew the plans and then proceeded to build the Der Jager model. The test flight was a nonevent; the model tracked straight on takeoffs and has excellent flying characteristics. It is fully aerobatic with no bad habits, and the landings are straightforward. Even with the wheel pants, the D-IX doesn't nose over when flown off the grass.



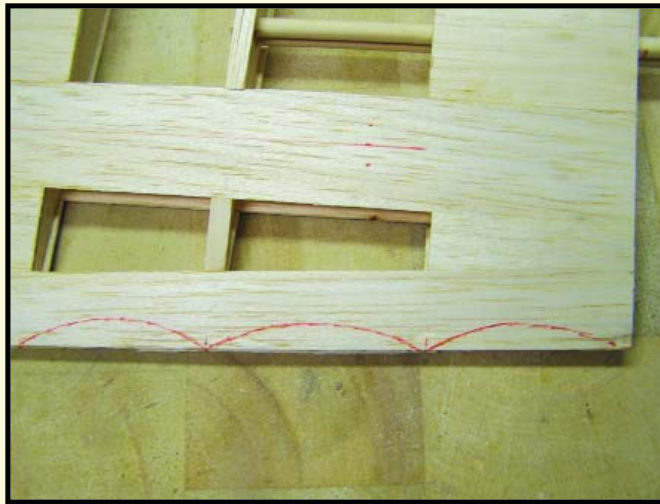
The author designed his airplane to be similar to the full-scale aircraft that was designed by the Stolp-White Aircraft Company in 1969. The model includes almost every charming aspect of the biplane lineage.



The ribs are organized over the top wing plans as they are cut from blank material. Holes in the inner ribs are for the aileron servo wire and dowel supports.



Wing panels join the center-sections with stacked dowel rods at the apex of the rib shape. Center-area ribs are made from light plywood.



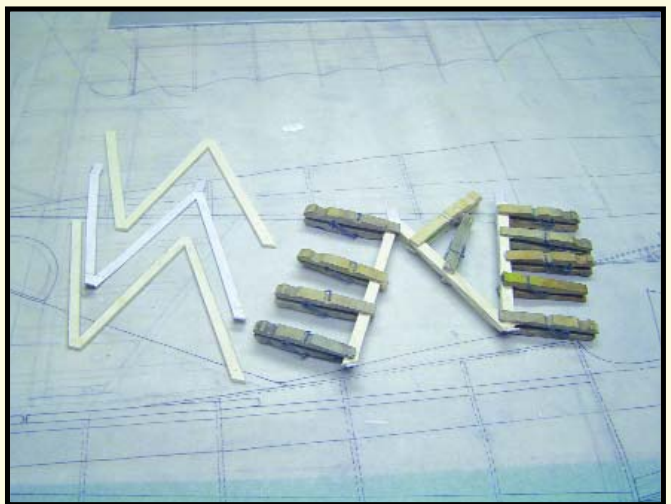
TE scallops add distinctive character to the Der Jager. After drawing the outline, sand away the excess with a rasp or round dowel covered with sandpaper.



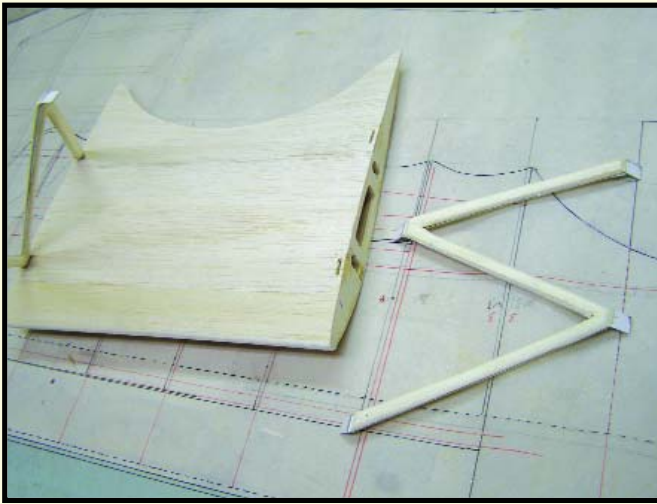
The wide sheeting near the TE is centered over the hinge line. Once the aileron is cut away, cap the open areas with balsa.



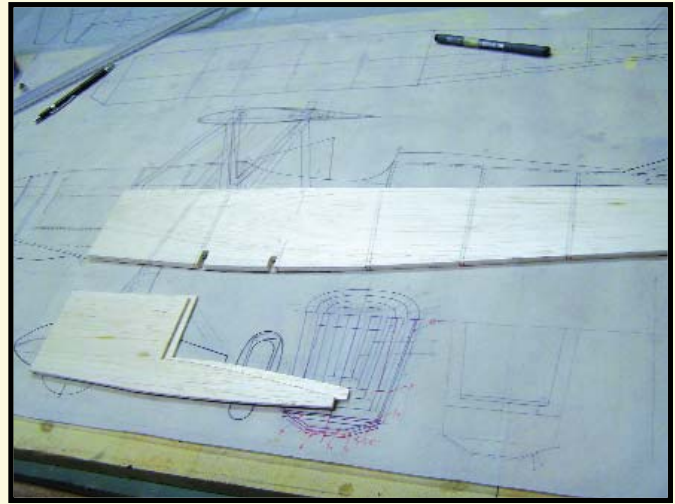
The center-section of the upper wing secures the dowel-rod wing joiners inside plywood ribs. The completed sheeting is sanded flush with the outer panels.



The cabane struts and N struts have an aluminum-sheet core that is laminated with wood on both sides. The material is sanded to a streamlined shape later.



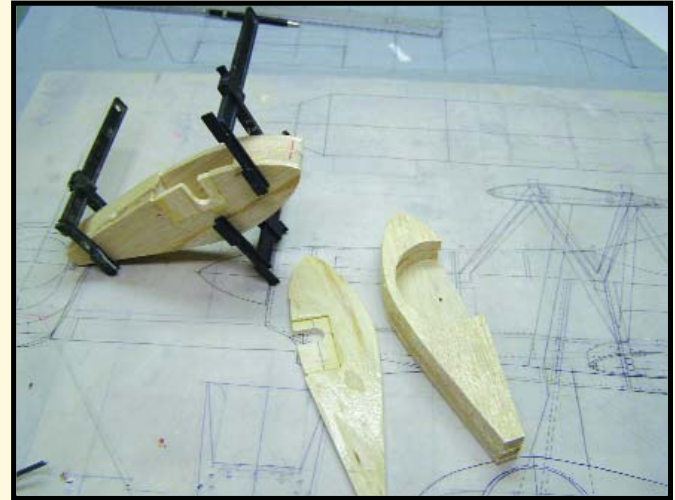
The cabane struts mount inside tabs in the top wing's center-section and are secured with #4 socket-head servo screws.



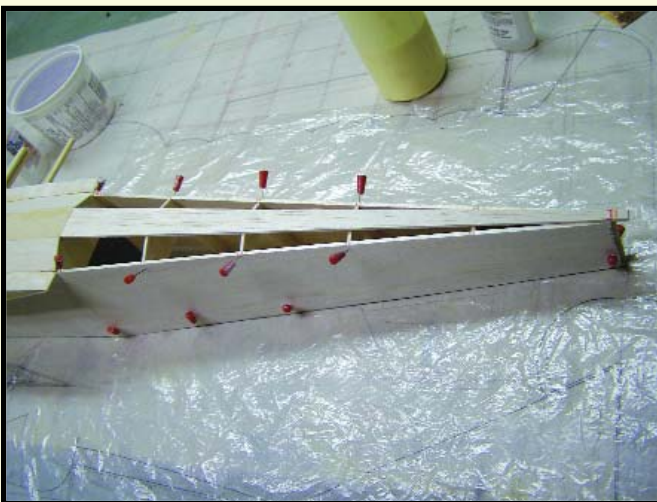
The primary fuselage sides are marked left and right, as are the forward 1/4-inch sheets that will be sanded to shape later.



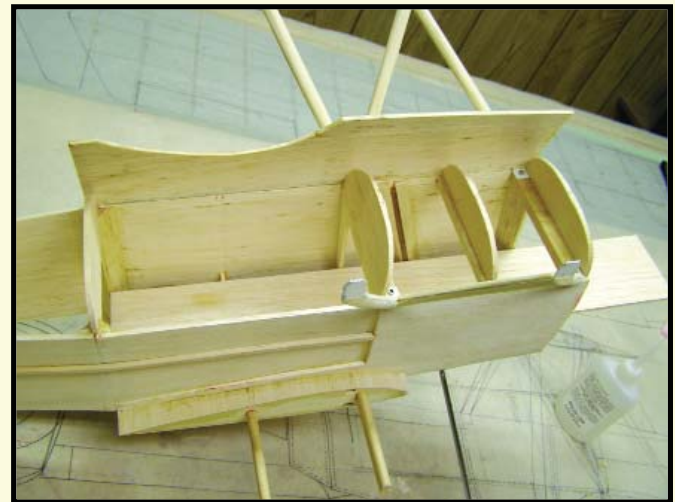
The piano-wire landing gear is stitched to the former with thread, Kevlar, or copper wire. The lower wing's center-section is built into the forward framework.



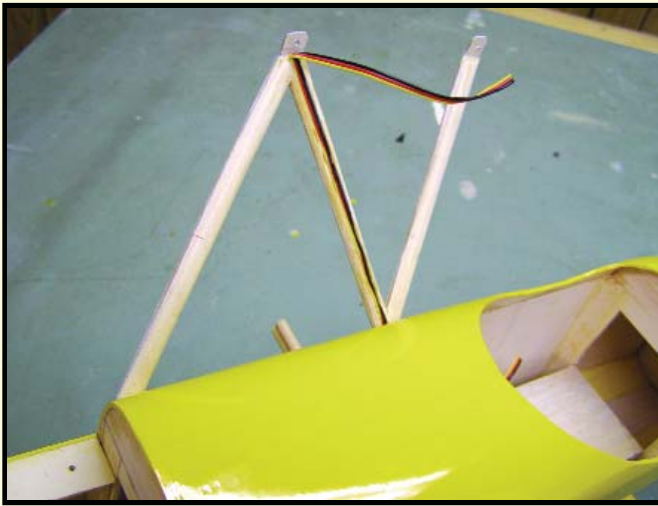
The wooden sections of the wheel pants are laminated with wood glue, which is easy to sand later. Plywood buried inside acts as a mounting point.



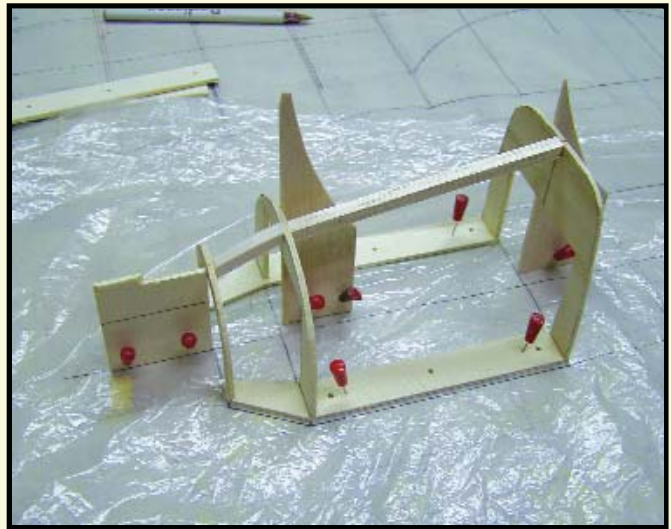
Once the fuselage sides are pulled together, the lower sheeting and longerons can be added. Watch out for twisting and keep the tail post square.



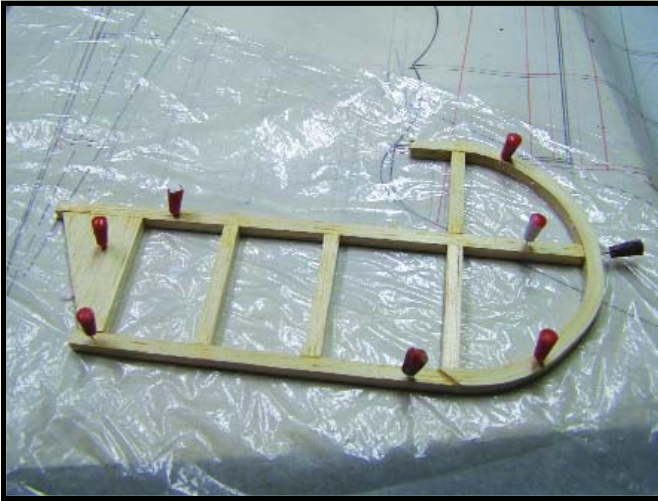
The cabane struts are securely mounted into hardwood areas. Sheeting is wrapped around the forward turtledeck, forming the cockpit area.



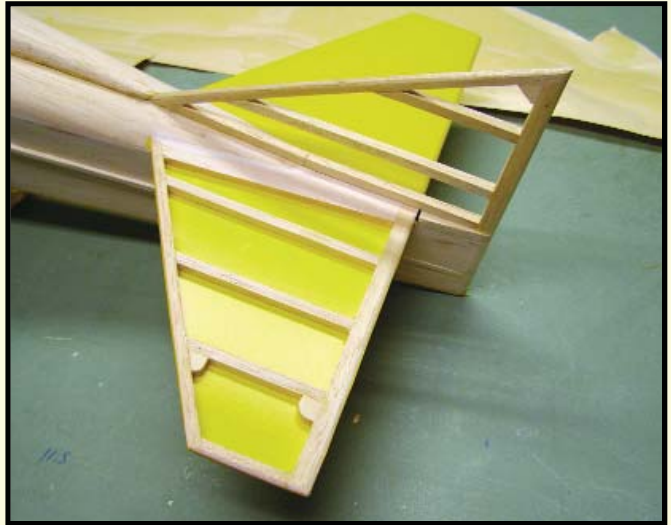
A channel is carved in the right cabane strut to hide the aileron-servo extension wire. Covering material is applied over the wood-skinned aluminum supports later.



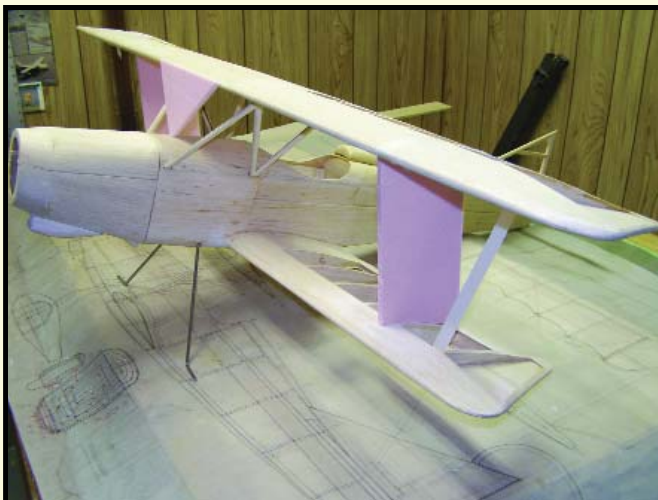
Cowling halves are framed separately. The lower half (shown) is permanently attached to the fuselage and houses the motor.



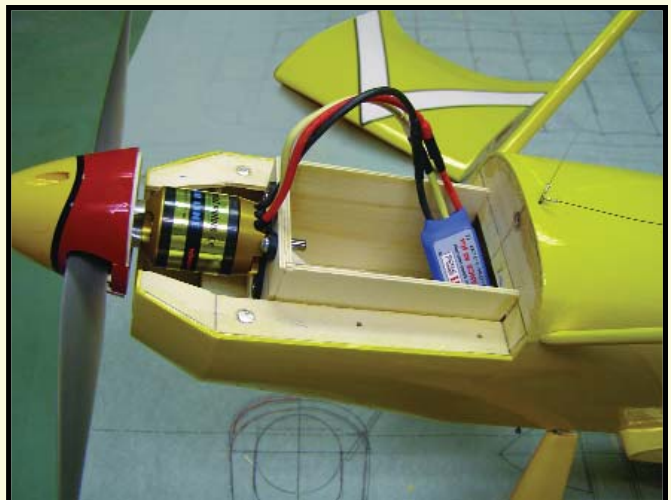
Each control surface of the tail must have cardboard templates made to form the laminations of the curved outer-framework material.



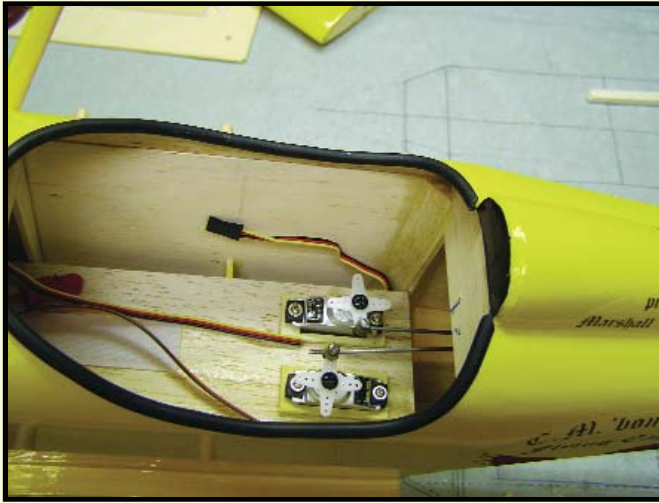
The stabilizer and fin are framed to simulate steel-tube framework, so they are rounded on all outside edges.



Temporary foam fixtures are placed to align and set the struts' final locations. Double-stick tape and pins hold the fixtures in place.



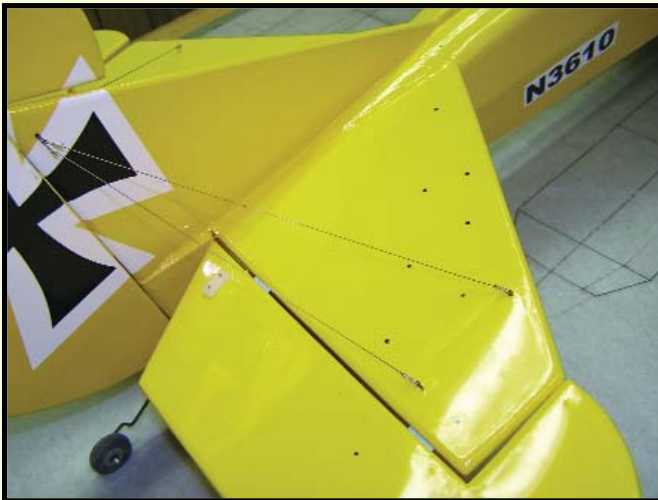
An AXi Gold 2826/10 motor and Jeti 40 Advance ESC are powered with a 3300 mAh 3S Li-Poly battery from FlightPower.



Access to rudder and elevator servos is through the cockpit opening, which is later covered with a pilot figure.



Pushrods from upper to lower aileron are linked to aluminum angle brackets located in hard points near the LE of the control surface.



Simulated bullet-hole decorations, as on the full-scale aircraft. Support wires add support but are mostly for appearance.



The simulated engine is made from scrap balsa that is covered and painted to match the IO-235 four-cylinder engine used in the full-scale aircraft.



Type: RC Sport Scale

Skill level: Intermediate builder, intermediate pilot

Wingspan: Top, 50 inches; bottom, 42 inches

Wing area: Approximately 750 square inches

Length: 42 inches

Weight: 4 pounds (depending on battery)

Power: 300- to 500-watt system, 40- to 54-amp ESC, 3S 3300 mAh Li-Poly battery

Construction: Balsa, light plywood, hardwood-dowel wing joiners

Covering/finish: UltraCote heat-shrink film

Radio: Four miniservos (40 inch-ounces output), receiver, custom servo extensions

Other: 2 1/4-inch spinner, 3-inch wheels, APC 10 x 8E propeller, 1 1/4-inch tail wheel, 5/32-inch music-wire landing gear, 1/32-inch aluminum-sheet strut material

Der Jager D-IX



The four wing panels plug into the structure and are secured with an aluminum main strut that attaches from the lower fuselage to the top outer panel.



I tried to make building this airplane as simple as possible. The outer wing panels are removable; however, if transporting a 50-inch-wingspan model is not a problem, you have the option of building the wings in one piece and permanently attaching them to the fuselage.

The two aileron servos are mounted inside the top wing. The connecting rods join the top aileron to the bottom aileron. The elevator and rudder servos are located inside the cockpit.

To build this model, you will need light balsa, light plywood, $\frac{5}{32}$ -inch-diameter music wire, and $\frac{1}{32}$ -inch-thick aluminum sheeting.



The AXi power system is equivalent to a .32 cu. in. glow engine that offers better-than-scale performance. The Der Jager flies predictably and has a distinctive appearance.

CONSTRUCTION

Wing: The individual wing panels plug into the fuselage using $\frac{1}{4}$ -inch-diameter dowel as joiners. The dowels are not strong enough by themselves to hold the wing panels; the main strut (75) will hold everything in place once the panels are plugged in. It's unnecessary, but you can replace the hardwood dowels with carbon-fiber tubes.

To get started, transfer the ribs' outlines and mark the location of the holes on the plywood and the balsa. Cut out the ribs and drill all the holes.

Cut $\frac{1}{4}$ -inch hardwood dowels (69) (70) and (47) (48) to the proper lengths. Adhere two (69) dowels to create a double-width joiner for the top wing, and then glue two dowels (47) together for the bottom wing joiner.

Build the top wing first. It includes three sections: two outside panels and the center panel.

Begin constructing the outside panels. Pin the bottom main spar (49) to the board directly over the plans. Pin the $\frac{1}{4}$ square balsa to the building board, to be used as a shim under the ribs at the TE. Position and glue all ribs to this spar. Glue the top main spar (50) to the ribs.

Cut out the TE sheets (55) and (56) that include the scallops. Slide the TE sheet (56) between the shim and the ribs. Adhere the ribs to the TE sheet. Glue the sub-LE (53) to the ribs. Sand the sub-LE so that it follows the contour of the ribs.

Glue the wingtip sheet (66) to rib W10. Adhere the top TE sheet (55) to the ribs. Glue the top LE sheet (51) to the ribs and to the sub-LE. Glue on 1-inch-wide aileron-hinge balsa strip (58) to ribs W5 to W10. Adhere the top capstrips to the ribs. Slide in and glue joiner dowels (69) and (70) to ribs W4 and W5.

Do not go any further with this wing half. Construct the other half of the top wing to the same stage.

Build the wing center-section. Pin the bottom main spar to the building board. Glue ribs W1, W2, and W3 to the spar. Adhere the top main spar to the ribs.

Take hold of the two outside wing panels and slide the joiners all the way into ribs W2 and W3. Glue the sub-LE to ribs W1, W2, and W3. Adhere the top LE sheet (51) to these ribs. Glue on the rest of the top sheeting (62).

Flip the wing over. In the center-section, install the Y harness for the ailerons. Glue the bottom sheeting (61) to ribs W1, W2, and W3. Glue the plywood strips (67) to ribs W8 and W9; you must use the five-ply plywood. The plywood strips will be holding the brackets for N struts and the main struts (75).

Glue on the bottom LE sheeting (52). Adhere the aileron strip (58) to ribs W5 to W10. Glue on the sheeting (63) over ribs W4 and W5 and the sheeting (59) and (60) over ribs W7 and W9. Glue on the capstrips. Attach the LE spar (54).

Separate the ailerons from the wing panels. Glue the hinge spar (57) to the wing and the aileron LE to the aileron. Sand the wing. Glue in the plywood mounting frame for the aileron servo.

In the bottom of the center-section, cut the slots for the cabane struts to go into and one larger hole for the extension cable.

Build the bottom wing in a similar fashion. The difference is having the joiners (47) and (48) glued to the two identical root ribs W11, which will become part of the fuselage; the outside wing panels will slide onto them.

Once the wing panels are built, line up the halves of the bottom wing and place $\frac{1}{2}$ -inch shims under the wingtips to get the proper dihedral. Glue the left joiners to the right joiners.

Tail Surfaces: Before building the elevators and the rudder, cut the templates from

corrugated cardboard. Slice four $\frac{1}{4}$ -inch-wide strips from the $\frac{1}{16}$ balsa sheet. Smear glue onto the strips and form them around the templates. Use pins to hold the strips against the templates until the glue dries.

When the glue is dry, adhere the rest of the frame and the $\frac{1}{4}$ -inch sheets. Build the stabilizer and the fin, and then sand all the surfaces.

Bend a $\frac{1}{16}$ -inch-diameter piano wire to form the tail-wheel strut. Insert the end of the strut into the balsa sheet in the rudder, and then glue in the wire with thin cyanoacrylate. Wrap the whole sheet with fiberglass. You can use thin cyanoacrylate to saturate the cloth.

Cabane and Wing N Struts: Cut four identical cabane struts (72) and four N struts (74) from $\frac{1}{8}$ light plywood. Cut two cabane struts (71) and two N struts (73) from $\frac{1}{32}$ aluminum sheet. Drill the $\frac{1}{16}$ -inch-diameter holes in N struts, as shown on the drawing.

Sand the surface of the aluminum with sandpaper. Using cyanoacrylate or GOOP-type adhesive, adhere the plywood pieces to both sides of the aluminum struts. Sand the edges of the plywood to streamline their shape. Cut a slot in one of the front cabane struts, and insert and glue in the aileron-servo extension cable.

Wrap all the struts with fiberglass and saturate them with thin cyanoacrylate. Sand lightly and bend the exposed aluminum ends of the struts as shown on the drawing.

Fuselage: Cut out as many parts as possible. The fuselage is built upside-down in three sections: the cowl, the center-section, and the tail section.

Cut and bend $\frac{5}{32}$ -inch-diameter piano wire to form the main landing-gear legs. Attach them to former F5 with thread (canvas thread, Kevlar, or copper wire).

Glue the hardwood block (17) to former F4B, and adhere hardwood blocks (18) to formers F3D and F6B. Pin formers F3D, F5, F6B, and F8B to the building board. Pin and glue the fuselage sides (1) to these formers. Insert and glue in the battery floor (13). Insert and glue in formers F4B and F7.

Pin formers F9B, F10B, F11, and F12 to the building board. Adhere the rear fuselage sides (2) to these formers and to the fuselage side (1). Glue $\frac{3}{8}$ -inch triangle stock between the fuselage side (2) and former F8B.

On the outside of the fuselage, glue the balsa doublers (3) between formers F3D and F6B.

Between F6B and F8B, adhere the doublers (4) to the fuselage sides.

Glue the bottom wing to the fuselage. Slide the joiners (47) and (48) into the slots in the fuselage sides (1). Check the alignment and adhere the joiners to formers F6B and F7. Glue the balsa strip (12) to the bottom of all the formers. Complete the sheeting of the bottom between formers F3B and F8B.

Turn the fuselage right-side up. Glue the firewall (20) and firewall support sides (19) to the battery floor (13) and to former F3D.

The cowl is built in top and bottom halves. Cut four identical plywood pieces (21). Drill a $\frac{1}{4}$ -inch hole for the magnets and a $\frac{1}{16}$ -inch hole for the guide pins.

Pin two of the four plywood pieces (21) to the building board. Pin and glue formers F1B, F2B, and F3B to them. Insert and glue $\frac{1}{4}$ square balsa into these formers. Adhere the sheeting (9) and (10).

Remove the bottom of the cowl from the building board and glue the scoop (24) to it. The bottom of the cowl can be glued to former F3D. Build the removable top of the cowl the same way, but don't adhere it to anything. Glue the magnets and guide pins into the plywood pieces (21).

Mount the cabane to the hardwood blocks (18) using self-tapping screws. Insert the cabane's top tabs into the slots in the bottom of the top wing's center-section. Line up the holes on cabane struts with the holes in W3 ribs. Attach the cabane to the W3 ribs with self-tapping screws. At the same time, feed the plug from the aileron extension into the cavity between ribs W2 and W3.

Plug in all the wing panels and check the alignment. If any adjustments are required, now is the time to do it. Install the wing N struts. Use self-tapping screws to hold them to the wings.

It's time to install the most important strut (75). Cut the $\frac{1}{2}$ -inch K&S streamlined aluminum tube to the proper length. Flatten the ends. Drill a $\frac{3}{32}$ -inch hole at each end, and bend the ends so that the flat end is flush with the plywood (67) behind the main spar of the top wing. The same goes for the other end, but it has to follow the contour of the hardwood block (17) in the fuselage. Drill the hole in the hardwood block and the plywood for self-tapping screws.

Remove the wings from the fuselage, including the center-section. In the top wing, install the servo extension for the aileron servo.

Glue the stabilizer to the fuselage. Adhere

all top fuselage formers. Glue the top sheeting (5) to the front fuselage formers and the sheeting (6) to the back formers. Cut out the cockpit opening. Glue on the headrest (25). Adhere the longeron (14) to the side of the fuselage. Glue the fin to the fuselage.

Make the wheel pants and the streamline covers for the main gear legs from the balsa materials cited on the plans.

Finishing: Use your own method to apply the finish; I used UltraCote. After completing the covering, I installed the hinges and the servos. I mounted a threaded connecting rod between the top and bottom aileron with a clevis at each end. The small "L"-shaped aluminum bracket is attached to the plywood plate on each aileron with self-tapping screws.

The dummy engine is made from scrap balsa pieces and then glued to the top half of the cowl.

After installing the radio and motor, remove the top half of the cowl and slide the motor battery onto the battery floor. Check the CG. Move the battery as needed to get the D-IX to balance on the CG spot. Mark the battery location. I used hook-and-loop fastener to hold it in place.

Install the servos and check the control surfaces' operation. The elevator should travel $\frac{3}{4}$ inch up and down. The rudder $\frac{1}{4}$ inches left and right at the widest point. The top ailerons should travel $\frac{1}{2}$ inch up and down at the widest point.

You're finished with the construction. Have fun flying this unique-looking scale model. **MA**
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Sources:

AXi 2826/10 motor, Jeti 40 Advance ESC:
MS Composit
(317) 578-1955
www.mscompositusa.com

UltraCote covering:
Hangar 9
(800) 338-4639
www.hangar-9.com

3200 mAh EVO LITE V2 3S battery:
FlightPower
(919) 741-6310
www.flightpowerusa.com

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