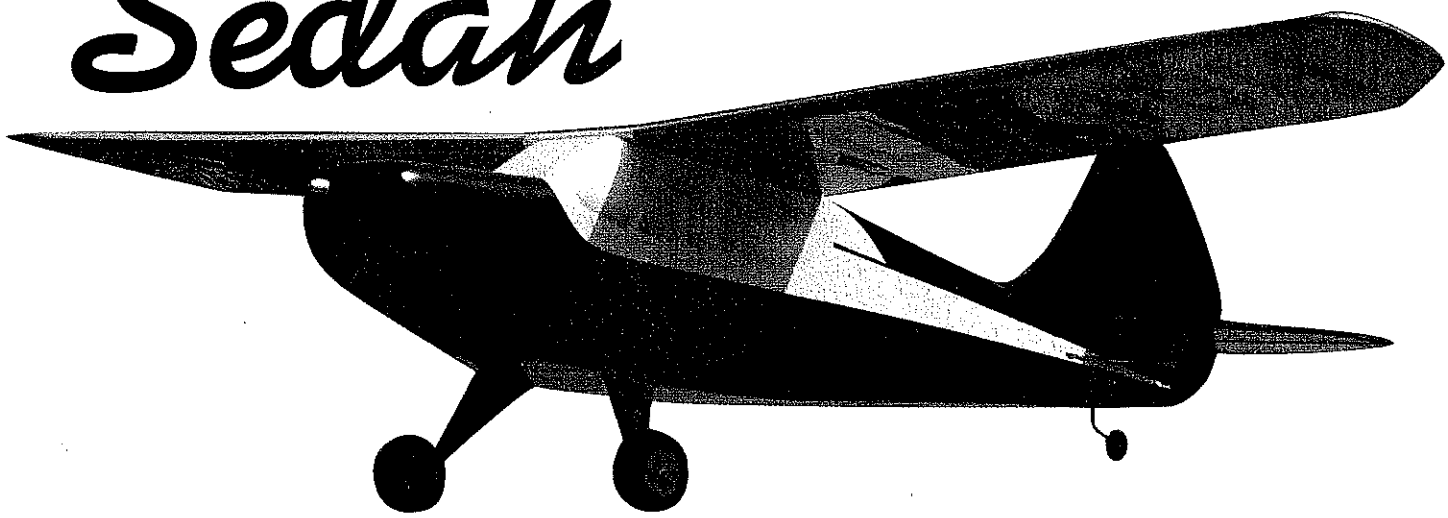
#903

AERONCA Sedan



Electric Scale version of a stylish 1940s lightplane.

■ John H. Linke

When World War II was becoming a memory in 1946, the American light airplane industry expected a boom. With all the pilots returning from their wartime exploits, many "experts" felt that these servicemen would want to continue flying in peacetime, for "the fun of it."

Management at the Aeronautical Corporation of America (Aeronca) wanted to get in on the boom with a family-type airplane. It directed the engineering department to come up with a new four-seat design using as much in-house inventory as possible, to keep

The author proudly displays his replica of the classic Aeronca. This shot gives a good reference for the size of the model.

The Sedan literally jumps into the sky on launch. The Speed 400 electric motors have plenty of performance potential.

production costs down. It would also assure some parts commonality with the other Aeronca models.

The four-seat Aeronca Sedan was the result of this effort. Powered by a 145-horsepower Continental engine, the 37-foot-wingspan aircraft carried its passengers in comfort at 105 mph. Although it wasn't particularly fast—even in its heyday—the Sedan excelled in load-carrying.

The aircraft's reasonable cost and all-metal wing made it a favorite of operators in isolated areas.

Aeronca manufactured 561 Sedans from mid-1948 through March 1951. Two last airplanes were built from spares in October 1951, thus ending Aeronca's aircraft manufacturing business. Aeronca is currently involved in aerospace component manufacturing.

Data from 1980 Federal Aviation Administration (FAA) records indicate that 197 Sedans are still registered, with perhaps another 100 in Canada, which have various utility duties.

The Sedan's standard factory color scheme was limited to three colors throughout the years of production. The 1948 and 1949 models shared the same red and straw (cream) coloring, and the 1948 models had natural aluminum-colored wings.

Aeronca later issued a service bulletin, requiring paint on all models' wings. The 1949 airplanes' wings were painted red, with NC numbers on the top right and bottom left in the straw color. The 1950 Sedans switched to a medium blue over the straw, blue wings, and straw numbers on the wings.

For the purist, the Sedans were numbered consecutively from NC1000H to NC1491H. Many aircraft were exported, so surviving aircraft may have other identification numbers or be painted in other schemes and colors.

CONSTRUCTION

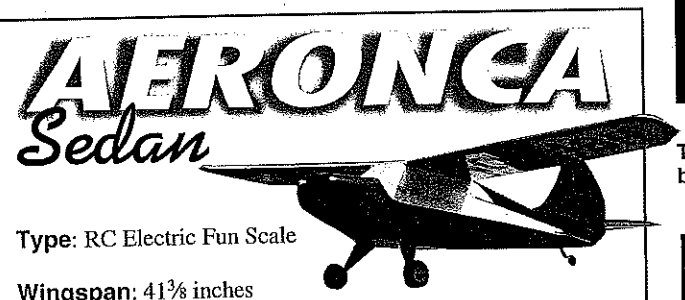
I have been influenced by the efforts of Walt Musciano in the model's layout and general construction features.

A few Sedans have been modeled throughout the years. Berkeley had a kit in the 1950s, and I saw another version advertised in early issues of *Radio Control Modeler.* Walt Musciano had a Control Line model featured in his book *Building and Flying Scale Model Aircraft,* and I think Scientific produced this or a similar version in kit form.

My Electric Sedan is a simple three-channel sport flier that looks like a full-scale airplane in the air. The electronic speed control permits longer flights, by allowing the Speed 400 motor to be "throttled back" for extended cruising.

The model is not a speed demon, nor is it fully aerobatic. It is designed to be easy to fly and to fly in a scalelike fashion, and it has generally good manners.

The wings may be attached with the dowel-and-bolt



Type: RC Electric Fun Scale

Wingspan: 41⅜ inches

Motor: Speed 400

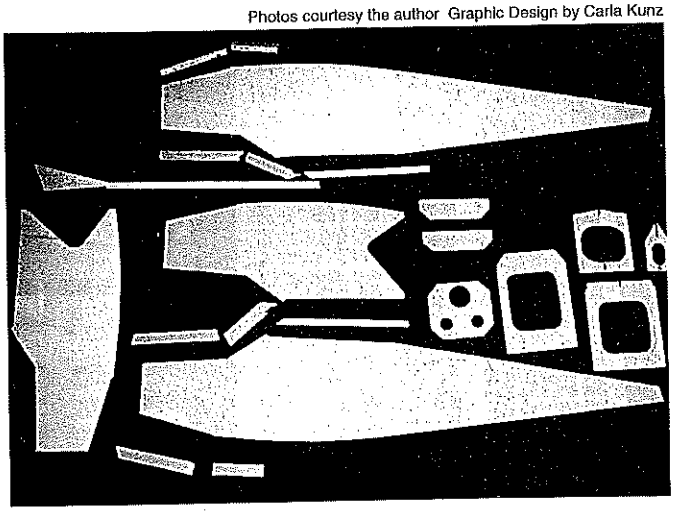
Functions: Speed control, elevator, rudder

Flying Weight: 21 ounces

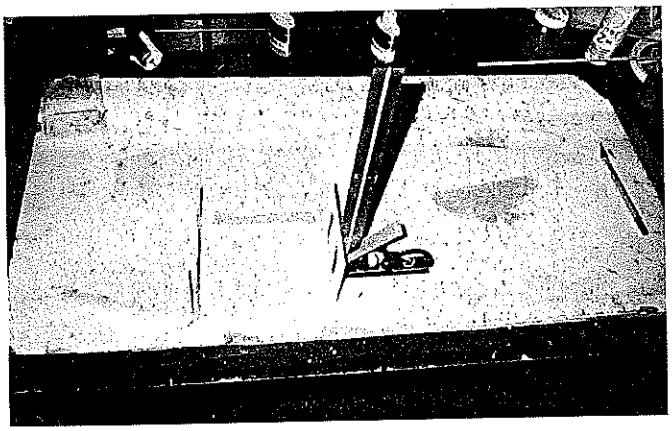
Construction: Balsa and plywood

Covering/finish: Silkspan and dope, MonoKote®

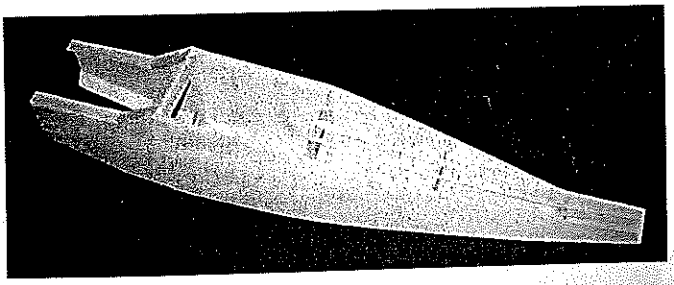
Photos courtesy the author Graphic Design by Carla Kunz



Make a "kit" of parts before beginning construction. The fuselage parts are shown laid out and ready for assembly.

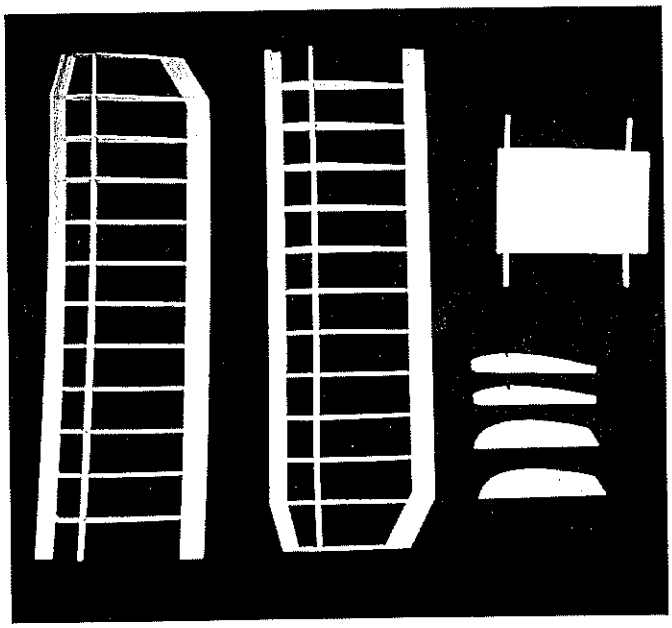


Use a combination square or a right triangle to ensure that the forward fuselage formers are properly aligned.

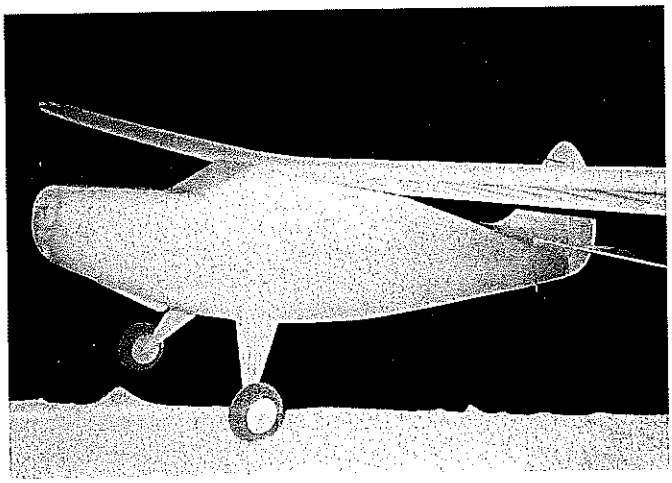


The fuselage near completion, with all the formers installed, the bottom glued in place, and the stringers positioned.

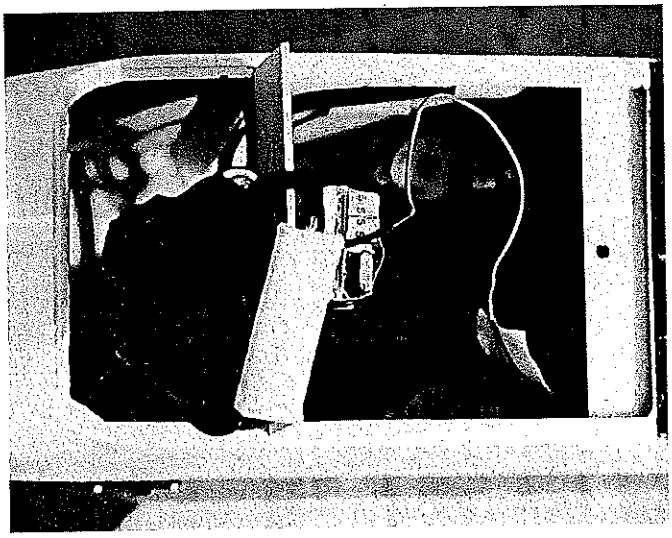
Each of the outer wing panels must be joined to the center-section. Accuracy and alignment are critical in this step!



The model's wing panels, the center-section with dihedral braces, and the innermost wing ribs are ready to be joined.



Give the completed Sedan airframe a careful sanding. The final finish is only as good as the woodwork beneath.



Looking into the cabin area, you can see the battery on the forward side of the slide and the receiver on the rear face.

arrangement shown on the plans or the more-traditional dowel-and-rubber band arrangement.

If you want to try out a good-flying, inexpensive Electric, this is the one for you. It can also be powered by ½A gas engines, for those who don't have the desire to try clean and quiet Electric flying.

Fuselage: This is a simple balsa box, with an open, stringered rear section. Plywood is used in areas of stress.

The model is not designed to survive a major ground impact, and increasing wood sizes will only make it too heavy to fly well with electric or gas power.

Wood selection is not particularly critical, but try to keep the same density in the fuselage sides and doublers, to make the bends easier.

The tail surfaces are made from medium-weight 3/32 balsa sheet. They may also be built up for "lightness," but be careful when covering not to introduce warps into the lightweight structure.

The easiest way to build from scratch is to make a "kit" of components. Cut the fuselage sides and doublers from medium-weight 1/16 balsa. Note that the doublers have vertical grain. Edge-glue three-inch-wide sheets together with CyA, to make it easy and quick.

Cut the firewall, landing gear braces, and formers 1 and 2 from 1/8 plywood. *Don't skimp here;* these pieces hold the airplane together! Drill 1/16- or 1/8-inch-diameter pilot holes in former 1, for the wing hold-down dowels.

The remaining formers are cut from scrap 3/32 balsa, or are laminated to 1/8-inch-thick using two pieces of 1/16 balsa.

Cut the "keel" piece—to support the vertical and horizontal stabilizer—from 1/8 medium balsa. Leave it slightly long on the forward end; it can be trimmed later.

The stringers are 3/32 square balsa, and they should be made from hard balsa stock; they take some abuse during the covering process.

Taper the aft end of the keel piece, as indicated, to fit between the fuselage sides when they are joined.

Glue the doublers in place with CyA, Ambroid cement, white glue, or aliphatic resin—whichever is your favored method. If you use anything other than CyA, weight the sides on a flat surface until the glue is dry, to minimize warpage.

Mark the location of all the formers by referencing the top view on the plan.

The down-thrust angle on the firewall is not critical; just make sure it's down-thrust—not upthrust. (The little Speed 400 is "torquey" under a full battery charge, and the down-thrust compensates for that.)

Cut the triangular stock to size, on reference to the actual sides. Cut the wing rest from 1/8 balsa, and cut a slot in the windshield triangular stock, to accept the wing rest.

Glue the triangular stock in place on both fuselage sides, and glue the wing-rest pieces. When dry, epoxy formers 1 and 2 to one side. Assure squareness with the side using a 90° fixture (triangle or square). When that is dry, epoxy the other side to formers 1 and 2. Allow to dry thoroughly.

Glue a 1/8-square spacer piece to the lower front side of former 1; this positions the landing-gear (LG) brace. Cut a groove in each LG brace to fit the gear wire, and epoxy one LG brace in place.

Cut, fit, and glue in the 1/16 bottom sheeting between formers 1 and 2 (cross-grain). When dry, pull the tail together carefully, sandwiching the keel piece in position. Check squareness with a ruler and square at the wing mount.

Use the keel as a "fixture," to help align formers 3 and 4. Mark the location of former 3, make sure the sides are "square," and glue it in place. Continue with former 4. When satisfied, glue the sides to the keel and clamp until dry.

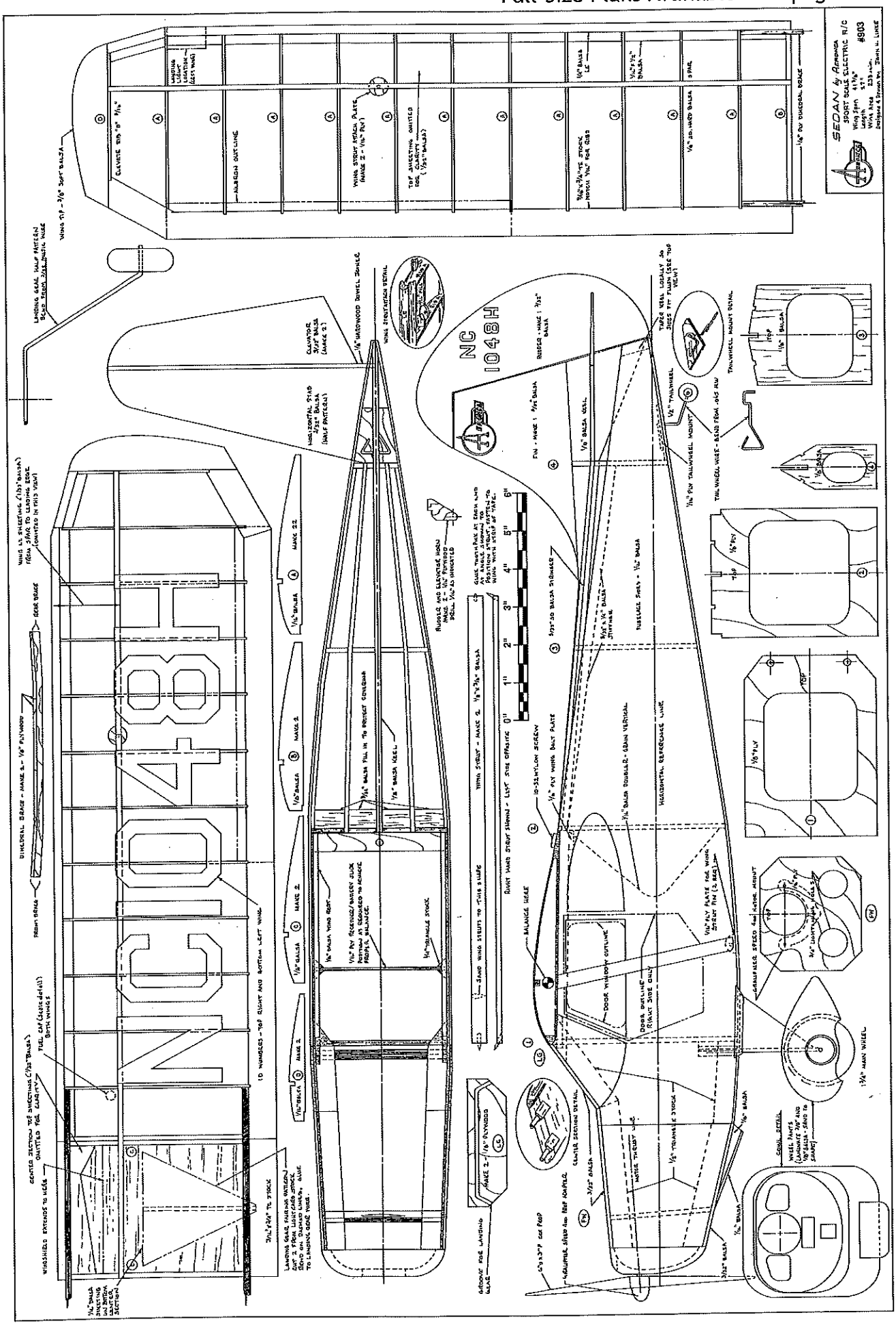
Cut a piece of scrap 1/16 or 1/8 plywood to fit between former 4 and the tail post. Bend the .045-inch-diameter tail wheel wire to shape, and glue it securely to this plywood piece. Glue the tail-wheel mount in place, flush with the fuselage sides.

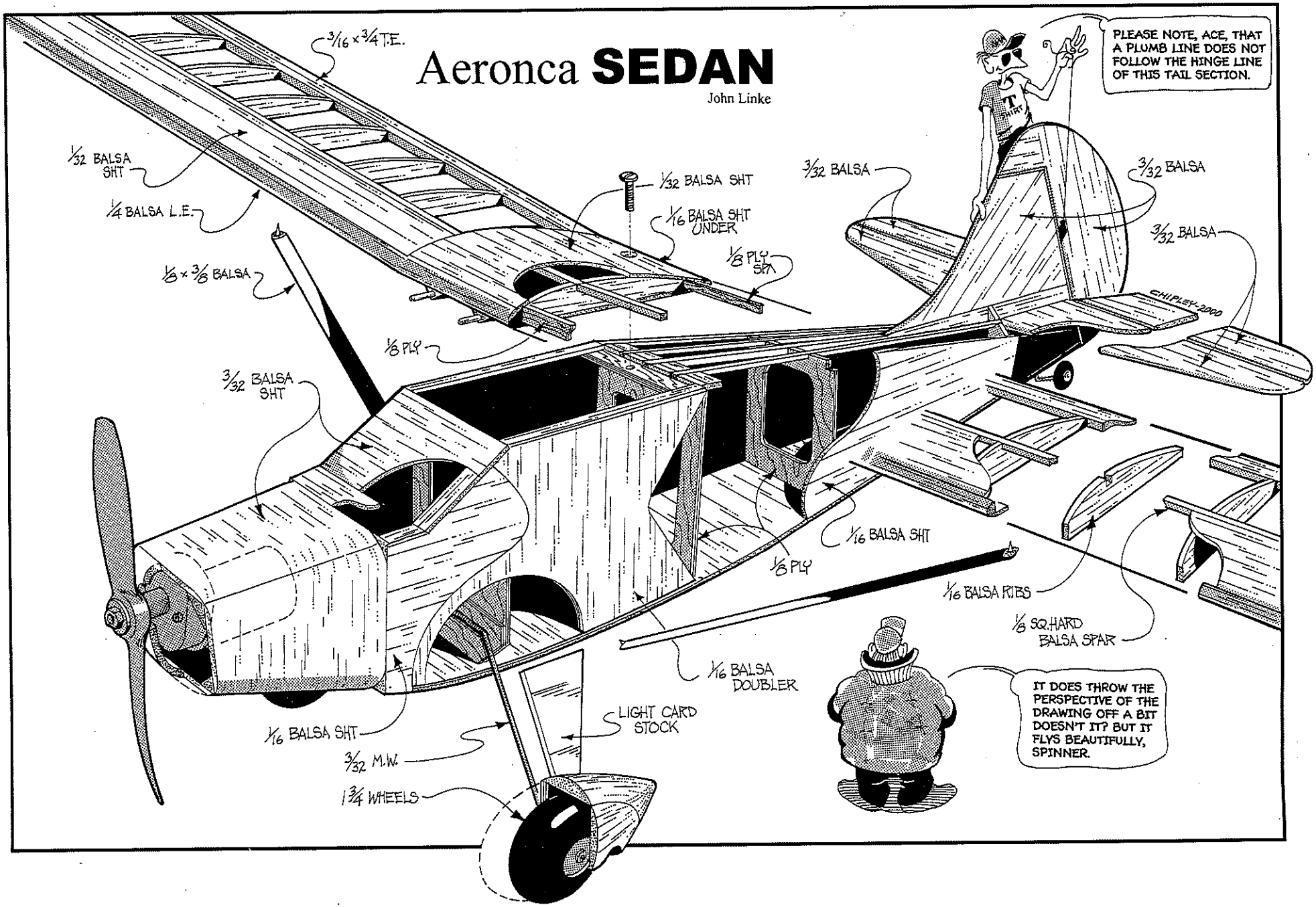
Cut and fit the fuselage bottom pieces cross-grain, and glue them in place. Fit the 3/32 stringers in place, and glue them.

Mount the Graupner Speed 400 motor mount to the firewall. Cut a 1⅛-

Continued on page 38

Full-Size Plans Available—see page 173




Aeronca SEDAN
John Linke
3/16 x 3/4 T.E.
1/32 BALSA SHT
1/4 BALSA L.E.
1/8 x 3/8 BALSA
1/8 PLY
3/32 BALSA SHT
1/32 BALSA SHT
1/16 BALSA SHT UNDER
1/8 PLY SPAR
3/32 BALSA
3/32 BALSA
3/32 BALSA
CHIPLEY-2000
PLEASE NOTE, ACE, THAT A PLUMB LINE DOES NOT FOLLOW THE HINGE LINE OF THIS TAIL SECTION.
1/16 BALSA SHT
1/8 PLY
1/16 BALSA RIBS
1/8 SQ. HARD BALSA SPAR
1/16 BALSA DOUBLER
LIGHT CARD STOCK
1/16 BALSA SHT
3/32 M.W.
1 3/4 WHEELS
IT DOES THROW THE PERSPECTIVE OF THE DRAWING OFF A BIT DOESN'T IT? BUT IT FLYS BEAUTIFULLY, SPINNER.

Aeronca Sedan

Continued from page 34

inch-diameter hole into the firewall, so the motor can be inserted from the rear. Enlarge as necessary, to ensure easy passage.

Epoxy the firewall in place, pulling the nose section together with rubber bands. Check firewall alignment before the epoxy sets. No up-thrust or left-thrust allowed!

Cut through the fuselage sides for the landing gear wire, sandwich the wire between LG pieces, glue (epoxy is recommended), and clamp.

When that is dry, cover the bottom of the fuselage from landing gear to cowl markings on the plan with 1/16 balsa; cover the forward part with 3/32 balsa (cross-grain). Set aside to dry.

Cut the tail surfaces from medium 3/32 balsa. Sand smooth and round the edges of the fin, rudder, horizontal stabilizer, and the trailing edge of the elevators.

Use a 1/8-inch-diameter hardwood dowel to join elevator halves. *Do not* hinge the rudder to the vertical fin at this time. Hinge the elevator to the horizontal stabilizer with over/under cloth hinges or a MonoKote® hinge.

Position the horizontal stabilizer assembly in the keel slot. Check alignment with the wing rest. Ensure that the stabilizer is parallel to the wing, 90° to the fuselage in the horizontal and vertical plane before gluing in place.

This alignment is critical for a successful first flight! Glue the stabilizer assembly in place when you are satisfied with the placement.

Carefully cut scrap 1/16 x 1/4 balsa to fit between former 4 and the tail post, above and below the stabilizer. This will strengthen the joint, and give the covering material something to grab onto when you are covering around the tail.

Install the motor. The electronic speed control should be placed in the area behind the firewall. Tape wires on the fuselage side, to keep them out of the way.

Cover the rest of the nose area and the windshield area, except at the top of the windshield; leave a space here for drilling the dowel holes when you fit the wing into position.

With a spoke shave, knife, and sandpaper, shape the nose to resemble the drawing on the plan. The 1/2-inch triangle

stock can take a lot of cutting, so keep at it to get nice, big, smooth curves to the cowl and the windshield.

Besides, your model doesn't need to carry all that extra balsa around! Cut the nose block to shape. It may be made from one piece or from several laminated pieces. Keep it soft and light. Hollow as indicated, and cut the 1⅛-inch-diameter hole for the motor.

Fit the nose block in place, cutting and adjusting as necessary to fit around the motor and the mount. When you are satisfied, tack-glue the nose block in place and blend it into the rest of the nose contour.

The scale air intakes for the cylinders and the carburetor may be cut into the nose block or painted on. If you cut them, strengthen the edges afterward with a bead of CyA.

Epoxy in the ⅛ plywood wing-bolt mount. Fit scrap pieces of 3/32 or 1/16 balsa between the stringers behind former 2; this will help prevent you from punching a hole in the covering with the screwdriver, as I did.

Servos will be mounted at the rear of the cabin, just ahead of former 2.

Cut pushrods for the tail surfaces. I used 3/16 balsa with wire ends; clevis in the rear and "Z" bends at the servo.

Cut a scrap 3/32 x ¼ piece of balsa, to fit between formers 2 and 3 and 3 and 4 on the upper fuselage sides. Glue this scrap in

place. It will minimize distortion of the sides when you are shrinking the covering.

Wing construction is straightforward.

The center-section is sheeted with 1/16 balsa on the bottom and 1/32 balsa on the top. If you plan on using rubber bands to secure the wing, use 1/16 balsa on the top also.

Cut all the ribs, trailing edge (TE) pieces, 1/8-inch square spar, and the 1/4-inch square leading edge (LE).

Lay the 1/16- x 1/2-inch lower LE on the plan. Glue the 1/4-inch LE to this piece. Pin the TE to the plan. Raise the tips, as indicated.

Fit the ribs, and glue them in place. Leave rib B off until the outer panels are joined to the center-section. Glue the spar in place. Allow assembly to dry thoroughly before removing it from the plan.

Build the other wing panel as the preceding one was done. To build the center-section, cut the 1/8 plywood dihedral supports. Edge-glue 1/16 balsa to make up the lower sheeting. Pin the TE to the plan. Edge-glue the lower sheeting to the TE. Glue the LE to the lower sheeting.

Glue (epoxy preferred) the 1/8 plywood dihedral joiners to the LE and the TE. Make sure each end of the joiner is equidistant from the building board.

Shape the LE of each wing panel and the center-section with spoke shave, and sandpaper. Fit the 1/32 sheeting to the center-section. Mate the outer panels to the center-section one at a time. Fit, cut, sand, and jiggle to fit, if necessary.

Support the tip one inch above the board at the last A rib, and glue the dihedral braces to the outer panel. Fit and glue rib B. Repeat this process with the other panel when the first is dry.

Fit and glue the LE sheeting to each wing panel. The tips may be cut from 3/8 soft balsa or laminated. Glue in place.

Trim excess from the tips with a knife, and sand the entire wing assembly. Go easy sanding the 1/32 sheeting.

Fit the wing to the fuselage, ensuring that it is parallel with the horizontal stabilizer. Temporarily secure the wing with tape or rubber bands. Drill a 3/16-inch-diameter hole through the pilot holes in former 1. This will leave a mark on the bottom of the wing.

Remove the wing, and cut two pieces of 3/4-inch-long scrap triangular stock. Sand or cut a 3/16-inch groove in the triangular stock, to accept the dowel. Spot-glue the dowels to the wing, and reposition the wing in place.

If the fit is satisfactory, remove the wing and reglue the dowels in place. Glue triangular stock over the dowels for reinforcement.

Fit the wing to the fuselage, and make sure all is in alignment. Drill a 1/8-inch-diameter hole through the center-section TE and into the plywood bolt mount.

Remove the wing, and make the hole in the plywood bolt mount with a 10-32 tap. Drill the hole in the TE to 3/16-inch, and strengthen it with CyA or plywood scrap.

Fit the wing, screw the bolt in place, and ensure alignment. When satisfied, fit and glue the final piece to the windshield. Sand to contour with the center-section LE. Remove the wing and finish shaping the windshield.

Sand the whole fuselage with 280-grit (or finer) paper, smoothing and slightly rounding the bottom.

Final Assembly and Finish: Glue on the vertical fin; use epoxy or CyA, since there is such a small gluing area.

Alternately, the fuselage may be covered and a small portion of the covering cut away on the keel so the vertical fin may be glued in place. This method is preferable, since the

full-scale Sedan had a smooth fillet line of fabric on the tail section.

Hinge the rudder in place with over/under hinges or MonoKote®. Cover the open area with silkspan, silk, your favorite iron-on film, or 1/32 balsa. I covered the original model there with silkspan, then I doped all covering and exposed wood with nitrate. I applied two coats of dope, and I sanded with 320-grit between coats on the wood.

I followed that with one coat of sanding sealer and sanded with 320-grit, I applied two to three coats of butyrate, sanded with 400-grit, then added color.

After masking, I sprayed on a silver base, cream, then red. I covered the wings with aluminum MonoKote®, and the numbers are MonoKote® Trim Sheets.

Install servos at the rear of the wing bay. Install prefitted pushrods, and check for free operation.

The receiver may be fitted to the rear of the 1/16 plywood slide that also carries the flight batteries. Leave enough wire on the receiver to allow the slide to be removed for flight-battery replacement.

With the width and depth of the fuselage space available, the receiver may also be taped to the sidewall or the floor with double-stick tape.

The slide to carry the power pack is convenient and easy to use. The slide's "springiness" will absorb much of the impact in the event of a nose-first landing, so the battery pack will not try to wipe out everything forward of it.

I used this method for more than 50 flights on my Electric Cub, and I am very satisfied with it.

If the battery pack must be installed in the fuselage on the floor, reinforce the floor locally with 1/32 plywood and Velcro™ the battery to the reinforcement. Lay a piece of foam rubber between the battery and former 1, so something other than the airframe absorbs impact.

All that's left now is finish-up work. Gear fairings may be glued to the wire. Rough up the wire with sandpaper and keep the upper portion of the fairings clear of the fuselage, so they may flex on landing.

A bead of silicone may be dropped into the fairing-fuselage junction, to simulate the fairing on the real Sedan.

Wheel pants were available on the Sedans, and you can make them by laminating 3/8 soft balsa to thickness and carving it to shape. Secure the wheel pants to the gear fairing with epoxy, or solder a mount plate to the gear leg and screw the wheel pants to the plate with cut-down #2 sheet-metal screws.

Balance the model as indicated on the plans. Use the flight pack to achieve final balance, if necessary. The prototype model balanced satisfactorily with the flight pack, receiver, speed control, and servos in the positions described.

All-up weight should be less than 24 ounces for best performance. The original

weighed 21 ounces, ready to fly (with a six-cell power pack). The model flies "on the wing"—not on the motor power—and any increase above the recommended weight only adds to wing loading.

Any powered aircraft's climb performance is the result of the amount of power in excess of what is required for level flight. The higher the wing loading, the more power is required for level flight.

Even though we have built an essentially all-sheet model, we can still build it light enough for good performance if we pay attention to detail.

Many Electric models don't fly well because modelers build in more "strength" than is necessary for flight loads. Our power models are subject to engine vibration, and have historically been designed to tolerate crashes.

Electric models have to carry expected flight loads, and have reasonable survivability in an unsmooth landing. The relatively heavy battery pack that Electric models carry around can easily wipe out the whole interior if it breaks loose in a hard landing.

Flying: Enough editorial! Let's fly this thing.

Battery packs are many and varied. I use Radio Shack 850/1,000 mAh AA Ni-Cds. They are more than satisfactory for fun-flying, and they are readily available. Charge 'em up, fasten them to the slide tray, and install the wing.

There is no need to carry an airborne pack with a Battery Eliminator Circuit (BEC) receiver, and this further reduces the weight the wing must carry.

Check controls before each flight!

This airplane launches easily by hand. Don't throw it; ease it into the air with a smooth follow-through. Allow the model to accelerate to climbing speed before trying any turns.

The model is responsive and stable. Loops are possible, but they require some speed before entry, as with the full-scale Sedan. It's the same with rudder rolls—accelerate, nose up, full rudder. As the model goes inverted, feed in down-elevator to keep the nose from falling through, then release it as the model passes the ¾ position of the roll.

Enter left and right spins from a stall, power *on* or power *off*. As soon as the model stalls, throttle to idle, pull full aft stick, and apply full rudder. Hold this until you are ready to recover. Neutralize the sticks (just let go!), and the model will recover all by itself.

Ease the throttle back to determine the best speed at which to fly. Shut the motor off if thermals are present, and you will be pleasantly surprised with the Sedan's capabilities.

The idea of this is to have a nice, easy, relaxed flier that looks right in the air and is easy on the pocketbook. I think we made it, don't you? MA

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