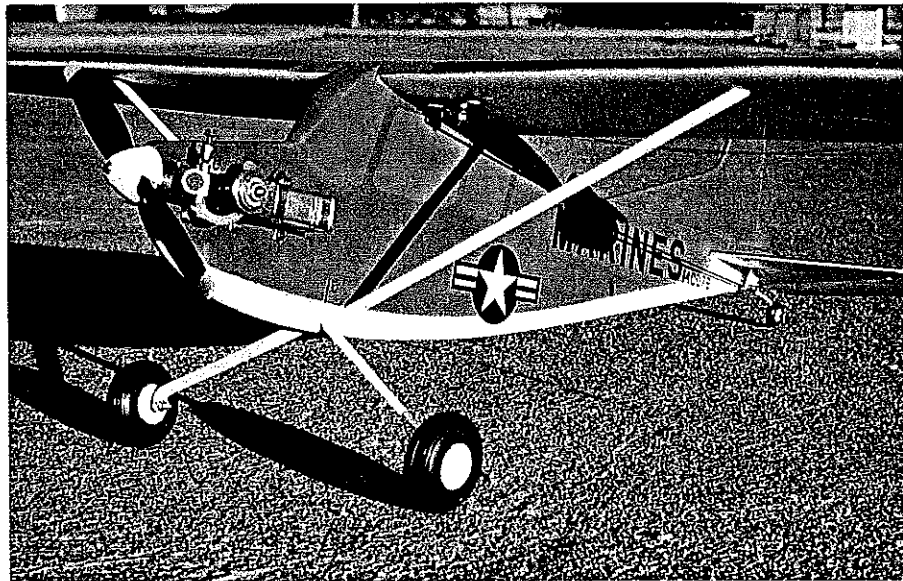


Bird Dog II

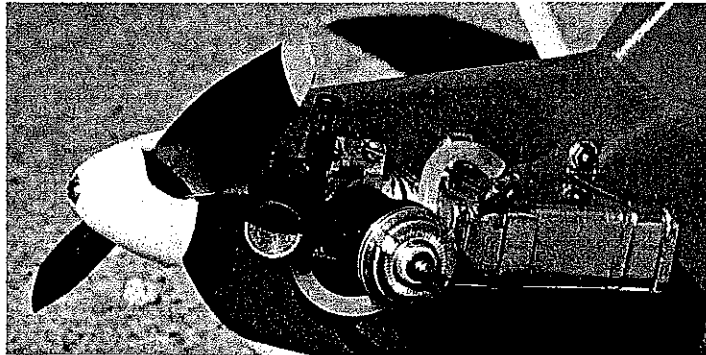
#753

■ **Olin Brown**

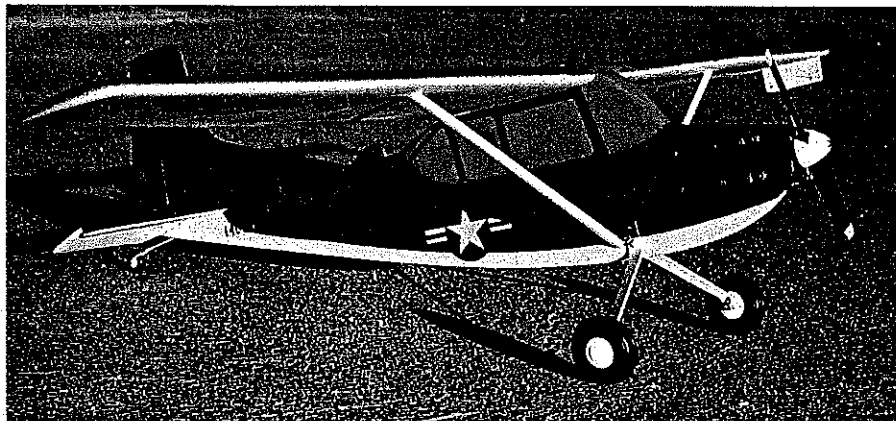
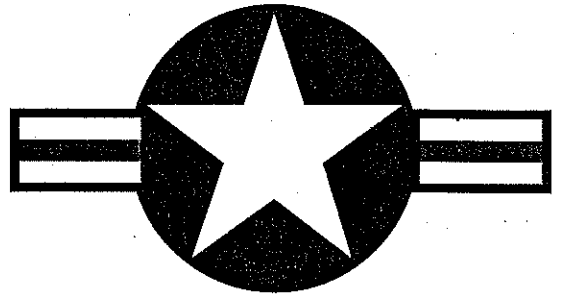
The February 1957 *American Modeler* published a magnificent Walter M. Jefferies Jr. four-view scale rendering of a rare little craft that we've always thought to be a classic: the Cessna OE-2 Bird Dog II. Over the years,



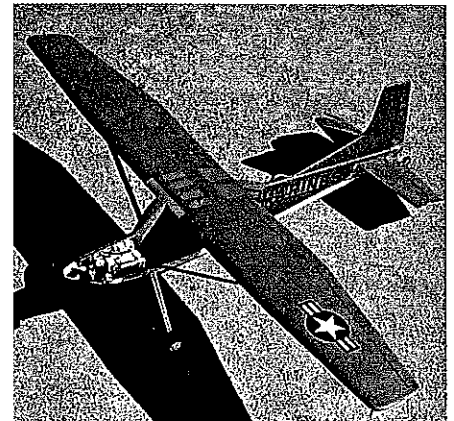
Sheet aluminum landing gear legs add realism, and a simple modification to Sullivan SkyLite wheels gives scale lightplane appearance.



The Cox Tee Dee .051 really hauls the Bird Dog around the circle! Although not designed for aerobatics, the model will loop.



Mounting engine and tank inboard gives scale appearance to judges outside the circle! Authentic color scheme and markings make model a real eye-catcher.



Completed 36-inch-span model has scale outlines and Cessna factory flat olive drab and white color scheme.

our copy of this drawing was shuffled from house to house and drawer to drawer, but it kept popping up to remind us that someday, we ought to model this striking little plane. Well, after thirty-something years of faithful reminding, we finally recovered the little dog-eared Jefferies drawing and decided that *someday* had arrived!

We've always admired the lines of Cessna's 180 and OE-2, with their squared tips and tall, angular vertical stabilizers. We wanted a model that closely resembled the OE-2 but wasn't too tedious or time-consuming to build, so we decided on a profile type in a one-inch-to-the-foot scale.

The outlines of the fuselage, wing and tail surfaces are as close to scale as we could reproduce them. This model has a hollow fuselage to save weight: the fuselage is a 1/4-inch sheet-balsa profile spine covered with markings. The Squadron/Signal Publications book *O-1 Bird Dog in Action*, by Al Adcock, has excellent photos of OE-2s as well as other O-1s, and we recommend it as a source for the history of the Bird Dog family.

CONSTRUCTION

Construction is fairly simple, but we advise you to study the plans and read this article before starting. Pay constant attention to saving weight, particularly in the fuselage and tail. We assure you that anything tail-heavy is a *drag!*

Wing: The wing outline is scale, but the airfoil isn't. The OE-2's NACA 2412 airfoil had an upswept bottom surface, but our model's wing has a flat underside for ease of construction.

Trace the wing's bottom skin outline onto 1/16 sheet balsa and cut it out. Use either a 6 x 36 sheet or two narrower sheets edge-glued together. Pin this bottom wing skin flat onto your building board.

Glue the 3/8 x 1 solid-balsa wing leading edge (LE) down onto the bottom skin with 3/8 of the solid LE protruding beyond the edge of the skin. Pin or weight the solid LE onto the bottom skin for a tight glue joint.

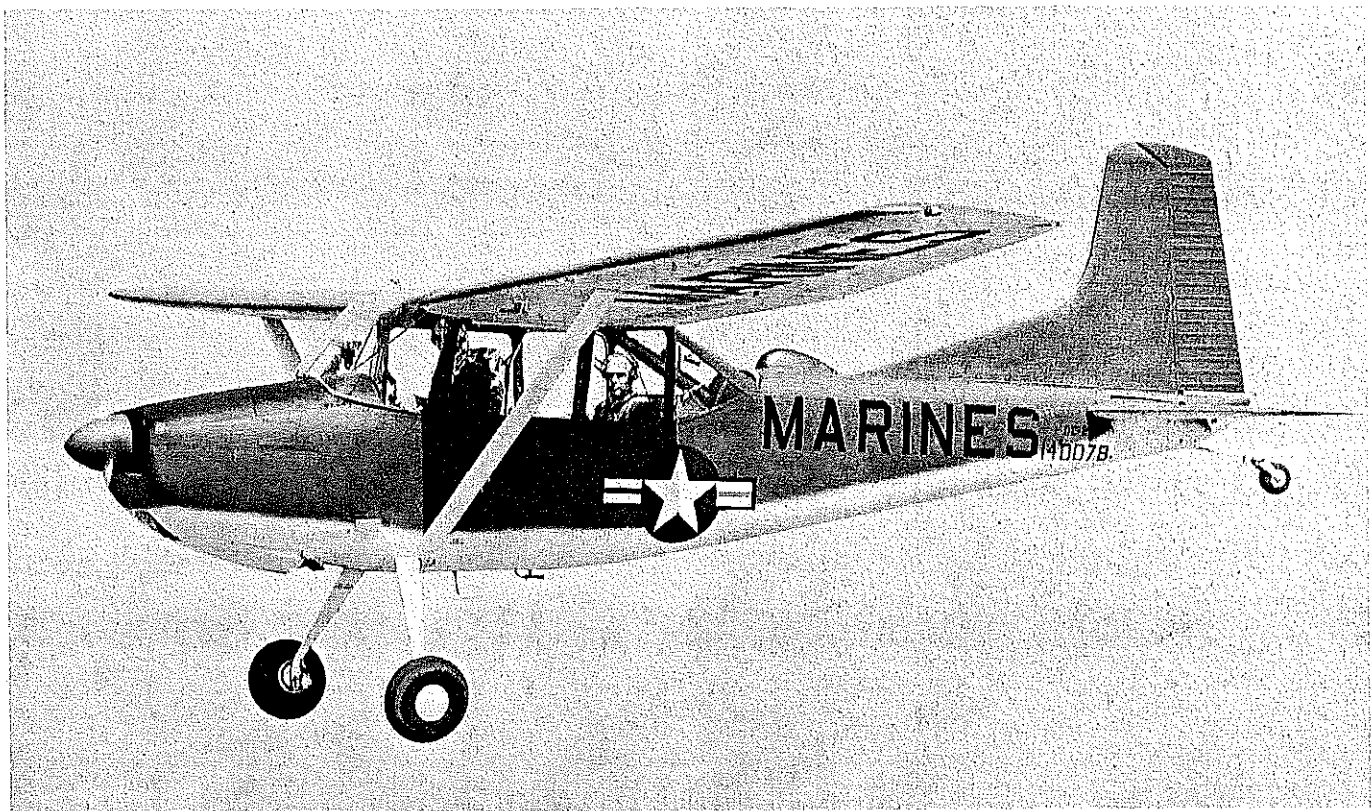
Make a template of the airfoil cross-section at the center section LE and use it to

partially shape the airfoil of the entire wing LE. Shape the LE sweepback of the outer wing panels. Trim the bottom skin/LE to the correct span. Cut the bottom skin/LE unit at the dihedral-break lines with a razor saw to yield the center section and two outer panels.

Cut the wing joiner from 1/8 plywood and glue onto the center section against the rear of the LE. Cut six ribs W-1 from 1/8 sheet balsa. One W-1 is glued onto the bottom skin and against the rear of the wing joiner at each end of the center section. Two W-1s are glued together, then glued to the bottom skin, against the rear of the wing joiner in the middle of the center section.

Cut the bellcrank platform from 1/8 plywood and glue onto the bottom skin. Glue the balsa filler block onto the bellcrank platform and shape to airfoil contour so the top skin will fit flush over it.

The remaining two W-1s are glued onto the bottom skin at the inboard end of each outer wing panel. Notice that a 1/8 gap between the front ends of these W-1 ribs and the solid LE allows space for the plywood



Full-scale Bird Dog number 140078, on a test hop at Cessna's Wichita factory in 1955. Robert Pickett photo.



In 1962 the OE-2 became the O-1C. This Marine Corps O-1C Bird Dog II has been repainted for Marine Corps field service. Robert Pickett photo via Al Adcock.

wing joiner's outer ends.

The balance of ribs W-2 through W-8 are cut from $\frac{1}{16}$ sheet balsa and glued onto the bottom wing skin, against the rear of the solid LE at positions shown on the plans. Cut two spacers from $\frac{1}{8}$ plywood and glue on edge to the bottom skin of each outer wing panel between ribs W-1 and W-2.

On the center section and the outer panels, use a sanding block to bevel the trailing edges of the bottom wing skins that protrude behind the rear ends of the ribs. Use the tops of the ribs as a guide, and bevel these trailing-edge surfaces so that the top wing skins can be glued flush onto the beveled surfaces.

Apply strips of masking tape to the top edges of the ribs to keep from cutting or flattening them during the beveling. The beveling is a somewhat tedious procedure, but will assure a close fit of the top wing skin.

Cut the top wing skins from $\frac{1}{16}$ balsa and glue them to the center section and outer panels. Pin the top skins to the ribs and allow the sections to dry while weighted or pinned flat to your board.

Cut the solid balsa tips to outline shape. Mortise the left tip block where the plywood leadout guide will fit. Glue the tip blocks in place, carve and sand to final shape. Cut a wing strut hole in the bottom of each outer panel.

Each wingtip has $\frac{1}{2}$ inch dihedral, which is close to scale. Fit the wing panels to the center section to insure that the joiner strip ends fit into the outer panel tenons, and that outer panel/center section joints will be true and flush.

Fill in any cracks at the dihedral and tip-block joints. We use a latex filler, ZAR Wood Patch, because of its soft consistency and easy working when dry. Sand the

Cessna Bird Dog II

Type: CL Sport

Wingspan: 36 inches

Engine size/type: Tee
Dee .051

Flying weight: 13 ounces

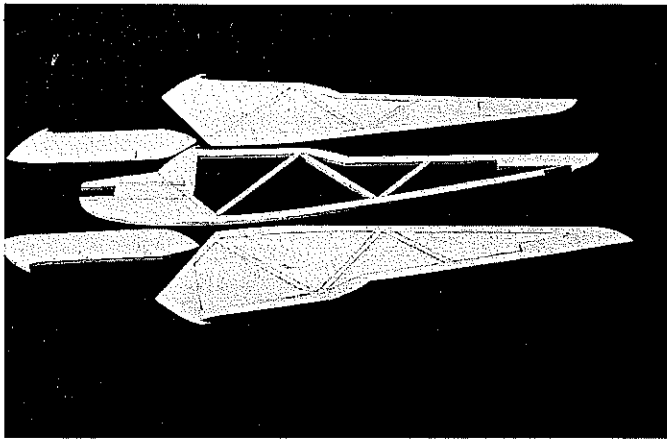
Construction: Built-up

Covering/finish: Silkspan
and dope

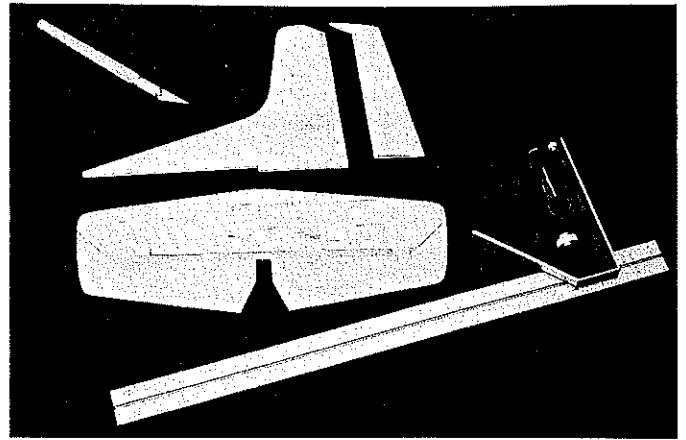
completed wing to final contour and surface finish, then lay it aside in a safe place!

Fuselage: To save weight, the fuselage is hollow. All wood was as light as we could find, and attention to saving weight really paid off. This is like building a stick-and-tissue fuselage side, only with larger pieces!

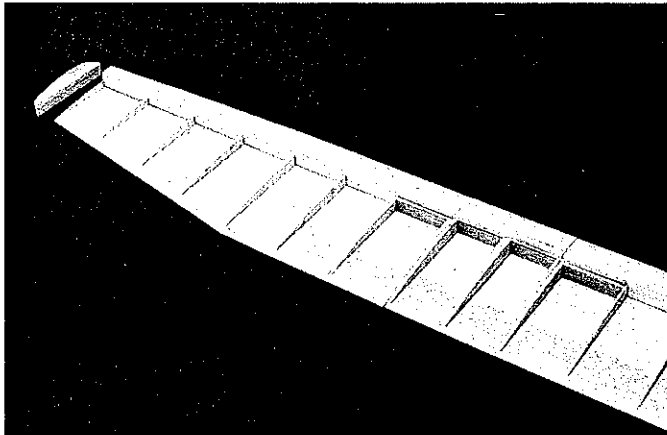
Cut the fuselage outline spine and the square bracing strips from $\frac{1}{4}$ sheet. Be sure to cut out the inset for the tailwheel mounting block. Pin the fuselage spine onto the plan outline and add the $\frac{1}{4}$ -inch-square



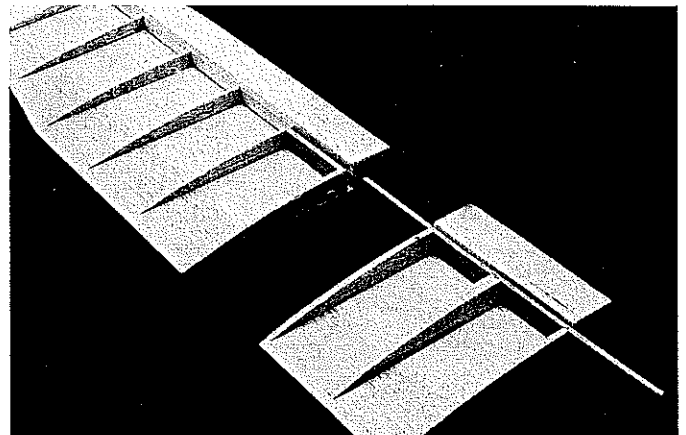
Built-up fuselage saves weight. Spine, cross-braces, and window panels are cut from light 1/4-inch sheet; sides are 1/16.



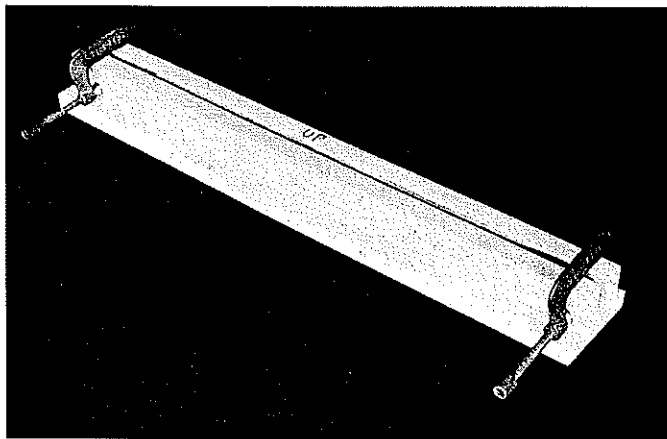
Tail parts are light 1/8 sheet balsa. Elevators are joined by hardwood strip and use silk hinges.



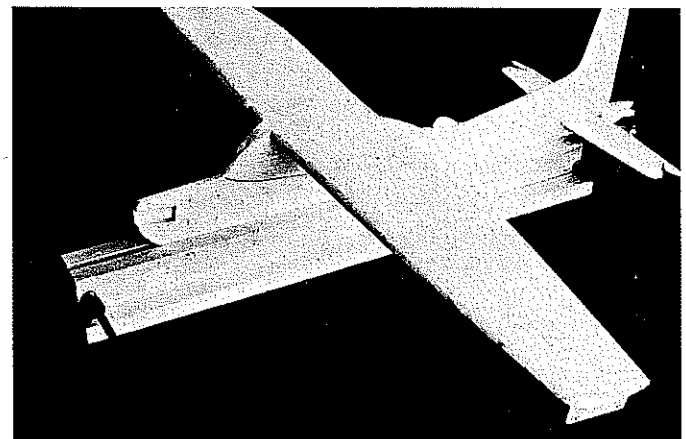
Wing is built-up, with solid LE and 1/16 sheet ribs, top and bottom skins. Tips are solid blocks sanded to shape.



Wing center section with 1/8 plywood joiner spar. Joiner spar ends fit into mortises in outer panels for dihedral.



Inexpensive vise fixture holds fuselage while wing is attached (see text). Make sure boards are straight and flat!



Fuselage clamped in fixture to hold it vertical during attachment of completed wing. Use slow-curing epoxy to attach wing.

bracing strips.

Cut two engine mounts from 1/4-inch-square hardwood, two nose doublers from 1/16 plywood, and glue in place. Cut two fuselage sides from 1/16 balsa and glue onto the fuselage spine. Pay particular attention to making a tight butt joint where the rear of the plywood nose doublers meets the front of the sheet balsa fuselage sides. When you glue the nose doublers and fuselage sides onto the fuselage spine, lay the spine flat on your board and weight the

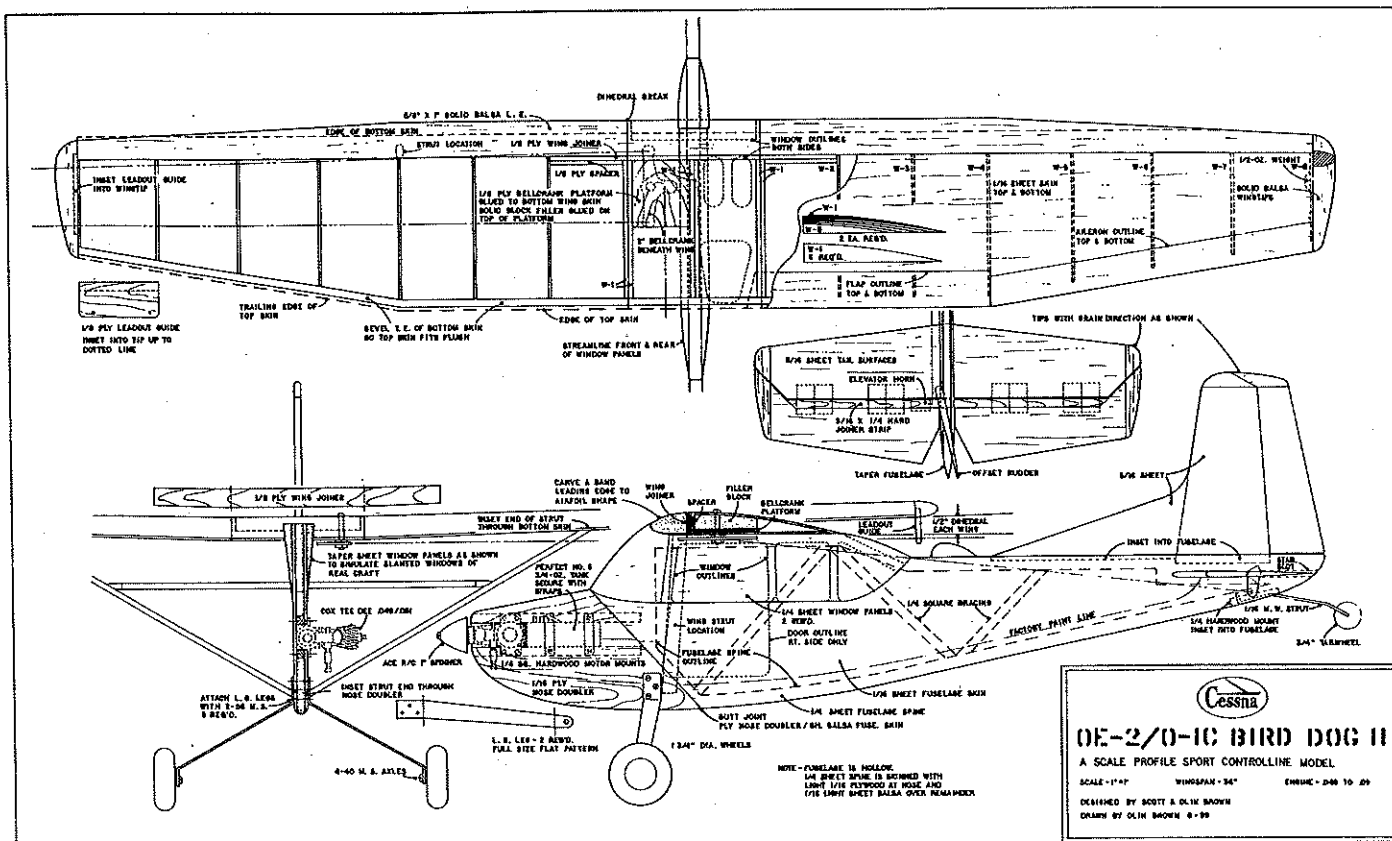
sheets in place while the glue dries so that the fuselage won't warp or twist.

Cut out two side window panels from soft 1/4-inch sheet and glue onto opposite sides of the fuselage as shown on plans. Carve and sand these panels to beveled shape as shown in the fuselage front view. These window panels also provide a 7/8-wide saddle at the top of the fuselage for the wing mount.

Sand this wing mounting area to match the wing airfoil contour to provide a tight

fit. We wrapped fine sandpaper around the wing center section and used it as a giant sanding block for final sanding!

Cut the slot in the rear of the fuselage for the horizontal stabilizer. Cut the fuselage wing strut mounting recesses through the plywood nose doubler. Locate and drill holes for machine screws to mount the engine, fuel tank and landing gear legs. Do any final filling and sanding, then lay the finished fuselage aside in a safe place with the wing!



Empennage: Cut the tail surfaces and ADF loop dome from soft $\frac{3}{16}$ sheet. Cut the elevator joiner strip from hardwood and glue the elevators to it. Hinge the elevator to the horizontal stabilizer with whatever type hinges you prefer, then sand both to airfoil contour. Glue the fin to the vertical stabilizer; when dry, use as a pattern to cut a mounting slot into the top of the fuselage.

Sand the rudder to airfoil cross-section but don't glue the rudder in place until the vertical stabilizer is installed in the fuselage. *Note:* the counterbalances on the elevators and rudder of the real Cessnas have sharp points—for fidelity to scale, be careful to keep these points sharp during shaping and handling. We coated them with glue for strength.

Covering: Cover all parts with lightweight silkspan before assembling the plane. Follow with three coats of sanding sealer, sanded with 600-grit paper after each coat. This will give a smooth, lightweight surface for the color coats, and will also strengthen the model.

Assembly: Sand any dope or sanding sealer from any wood surfaces to be glued so the glue will bond to bare wood. Drill several small shallow holes for glue relief into the bottom of the center of the wing and wing

saddle. This will provide a solid glue joint for wing attachment.

Use slow-curing epoxy to attach the wing and stabilizer to allow ample time to align them before the glue sets. We made a simple vise fixture from pine 1 x 2 and 1 x 4 stock to hold the fuselage vertical while we glued the wing in place. Use a square or drafting triangle to be sure that the wing is set at right angles to the fuselage.

After the wing/fuselage joint has set, glue the horizontal stabilizer into its fuselage slot. Align the horizontal stabilizer so that it's parallel to the wing when viewed from front and rear. Align the hinge line at right angles to the fuselage, as you did the wing.

Glue the vertical stabilizer/fin into the slot in the top of the fuselage. Be sure that it's perpendicular to the horizontal stabilizer. Glue the ADF loop dome onto the fuselage.

Cut and shape the two wing struts from hardwood (or use streamlined aluminum tubing) and epoxy in the previously-cut mounting holes. After necessary crack-filling and final sanding, you're ready to paint!

Painting and Marking: The wing and tail undersurfaces, the bottom of the fuselage, the wing struts, and landing gear legs were

sprayed with two coats of AeroGloss flat white. The white areas were then masked and the top surfaces and fuselage sides were sprayed with two coats of olive drab dope (it's heavy, so go easy).

Window-panel masks were cut from frisket paper (a low-tack transparent masking paper available from artist and drafting supply stores and some hobby shops). Window panels were sprayed light blue. Aileron and flap hinge lines and the door outline are India ink.

The national insignia are $\frac{1}{2}$ -inch (fuselage) and two-inch (wing) pressure-sensitive decals from Sig Manufacturing Co., and are very close to scale size. MARINES on the fuselage sides are one-inch military block letters from Northeast Screen Graphics. MARINES on the underside of the left wing is $\frac{1}{2}$ -inch military block letters, hand-cut from pressure-sensitive film; we couldn't find any store-bought letters this size. The aircraft serial numbers on the fuselage rear were $\frac{3}{16}$ numeral decals from a plastic model kit. After markings were applied, we sprayed two light coats of clear dope over the entire model to seal and fuelproof the markings.

Hardware: We used an Ace R/C one-inch

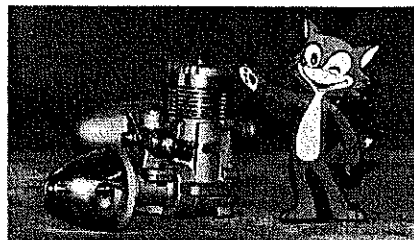
Continued on page 48

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Cessna/Brown

Continued from page 45

plastic spinner for a realistic effect. The military specified flat black propellers with the outermost four inches orange-yellow, so we painted up a black plastic prop for show.

The wheels are 1 3/4-inch Sullivan SkyLites that we modified to simulate scale wheels. First, countersink the outboard axle hub to accept a one-inch 4-40 flathead machine screw axle. Cut discs of thin sheet plastic or card for inboard hub covers; drill or punch out the hole for the axle and glue in place.

Install the axles in the wheels, screw head to the outside, and mount the wheels onto the landing gear legs with a flat washer and jam nut between the wheel and the leg and a locknut on the inside of the leg.

For the outboard hubcaps, we used convex white plastic buttons from a sewing shop. After a little sanding, they fit snugly into the wheel hub and were glued in place for safety. The Sullivan wheel hubs are molded in gray plastic, so we painted them white for scale appearance.

Our modification produced wheels which closely resemble real lightplane wheels and add yet another touch of realism to the "Dog." Install the landing gear legs with machine screws, which should complete the assembly of the model.

Flying: As with *any* flying craft, model or full-size, run a preflight check to insure that all nuts, bolts, screws, pushrods, fuel lines, propeller screws, flying lines, etc. are secure. Be sure that the center of gravity is within at least 1 1/2 inches of the wing leading edge. The model has a long tail moment, and the little Tee Dee .051 doesn't

weigh much, so be sure that it isn't tailheavy!

We flew the model with 1/2A fuel, a Cox grey plastic 6 x 4 propeller, and 35-foot Sullivan lines, and were somewhat surprised at how fast the Cox Tee Dee hauled the "Dog" around the circle—plenty of power there! Longer lines should pose no problem, even with a slight wind.

The model will fly itself off the deck and is very stable. The only flight situation to watch is its tendency to float on landing approach—that yard-wide wing just wants to keep flying!

This model was a thoroughly enjoyable and satisfying project! Remember to always fly safely! →

Letters

Continued from page 40

writing to Jeff to help him out? Such ambition and interest in our younger members should not go to waste!

More Helicopters?

I need to write this concerning my feelings about an issue.

I've been flying helicopters for over 10 years, and decided to get insurance with you because it includes the *Model Aviation* magazine. To my disbelief, the magazine is geared towards the airplanes only.

Myself and 32 other members feel this is just a little too bias[ed] and will be switching to another organization until such time [as] this stops.

You gear up and go after the helicopter enthusiast, so how about something in return in your magazine? Why, you do not

Continued on page 70




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