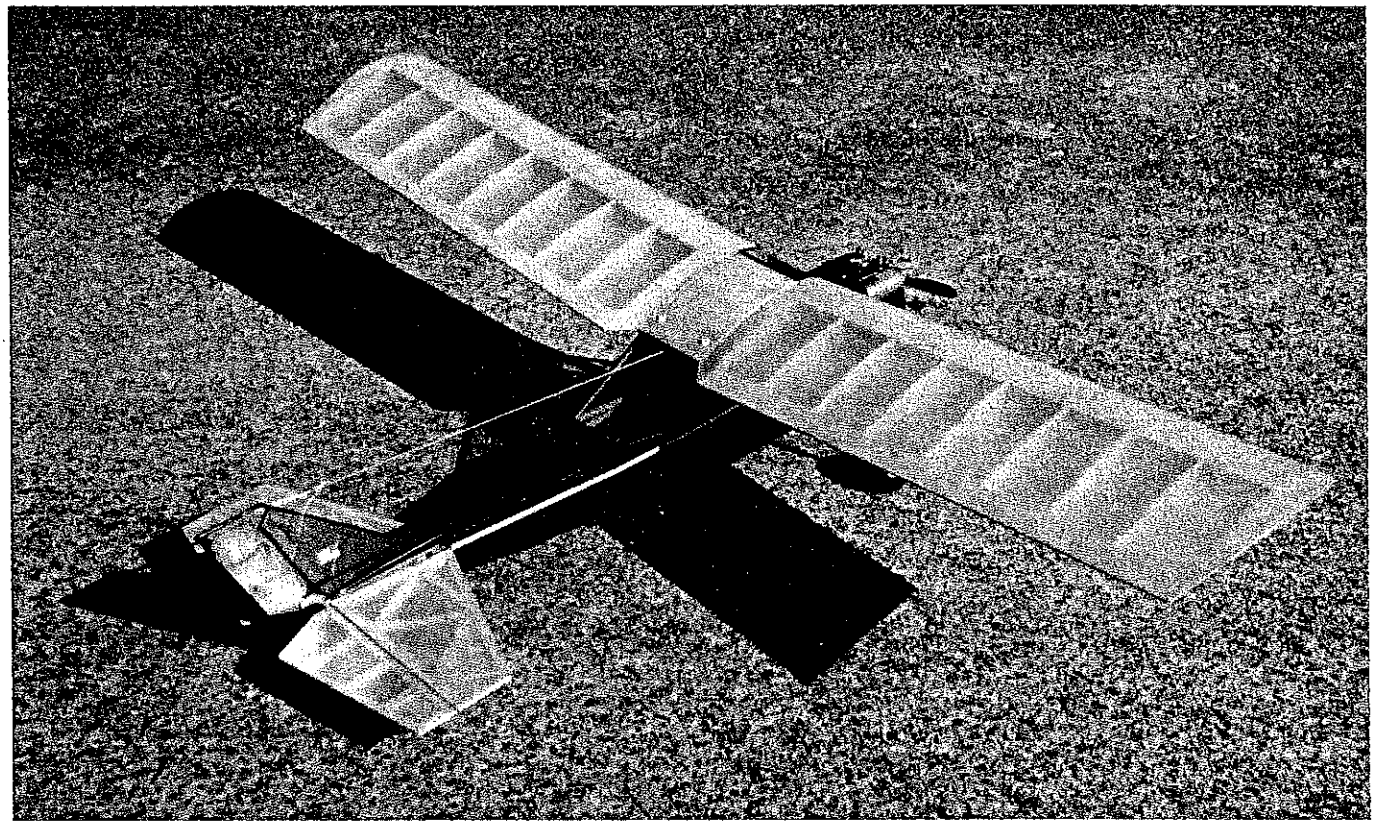
737

George Wilson holds the JN-1 prior to its first flight.

PERIS JN-1

George A. Wilson, Jr.

The JN-1 and its shadow are about to meet after its third test flight.



Waiting for good test flying weather in March on Cape Cod. The transparent windows are easy to install and give a clear view of the interior—servos, tank, and all. The JN-1 is a simple airplane, but it has very pretty lines.

MOST OF US get "turned on" by one or more full-size airplanes—my latest turn-on is the Peris JN-1. My interest was stimulated by R.G. Schmitt's article in the November 1990 *Model Builder* on a small electric RC version of the JN-1.

My JN-1 is based on Schmitt's drawing, but structurally it is very different. It weighs 2 lb. 14 oz., flies nicely with an O.S. .15 engine, and has a wing loading of 14 ounces per square foot.

The O.S. fits neatly into the engine compartment. An exhaust extension tube is used to keep oil off the fuselage and tail—it works well.

My model required two ounces of lead in the nose to balance at 28% of the wing chord. If the tail is built as light as is practical, this weight may not be necessary.

KITTING

As most scratch builders know, kitting prior to assembly is a must.

A 1/16 Micarta or plywood template makes it easy to cut the ribs. Stack and pin the ribs together, then sand and cut the spar notches with a razor saw.

The leading edge was pre-shaped using a razor plane. Mark the edges of the cut, and plane to these lines.

Cut the wing sheeting to size, and trim it to assure that the inner edges are straight. The outer edges are trimmed after assembly.

Please note the spanwise grain direction when cutting the bottom wing tip pieces.

Cut out the remaining parts—i.e., the servo shelf, hatch cover, tail wheel mount, fuselage formers, etc. The outside of the fuselage formers may be cut with a bench saw. Make the notches with a razor saw and #11 blade. The inside cutouts are made by drilling ½-inch holes in the corners and using a jigsaw to finish cutting the openings.

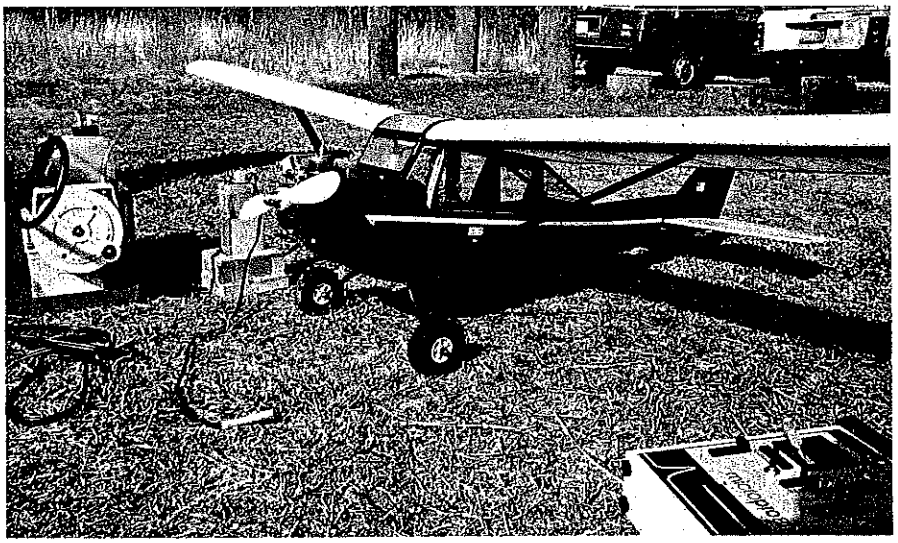
Cut and drill the main gear mounting pieces. Machine tools make the job easier, but hand tools will do the work.

Cut the wing strut mounts from 1/8 Lite Ply, and install 4-40 blind nuts.

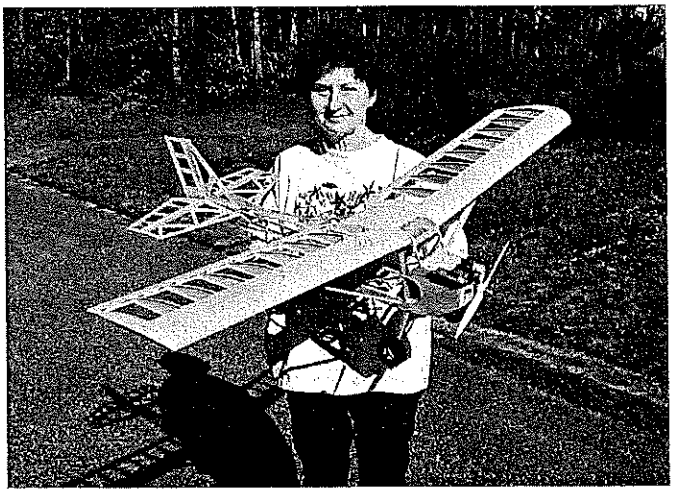
One of the advantages of scratch-building is the ability to select the appropriate hardnesses of sheet and strip wood. Wing spars, fuselage longerons, and the strips below the side windows should be hard balsa. Almost everything else can be medium balsa. To save weight, the tail can be built using relatively soft balsa.

Bend the main landing gear wire to the shape shown. The tail gear wire has to have the brass tubing bearing added before the final bend is made. Cut the main gear strut fairings, the tail gear support fittings, and the tail gear steering fitting from shim brass or steel "tin" can stock.

The landing gear parts should be soldered using a high-tin solder currently

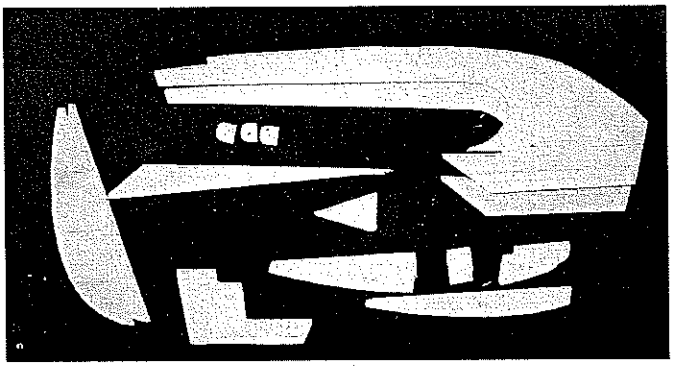


The JN-1 is fueled up and ready to go. Ace R/C pilot Cap'n Eddy just yelled, "Clear!" Grass takeoffs are easy. Wing loading is 14 oz. per square foot.

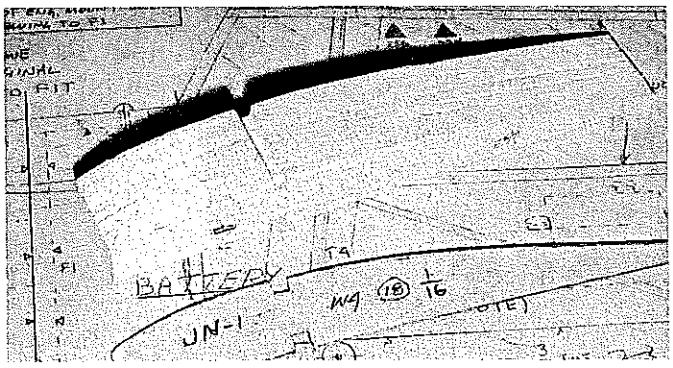


The author's wife, Eleanor, shows the JN-1's uncovered frame. Careful wood selection and construction yielded a model that is light (2 lb. 14 oz.) but strong.

The O.S. .15 engine is perfect for the JN-1. Extension tube keeps exhaust oil off the airplane. Flying prop is a nylon 10 x 3. A small amount of downthrust was added after test flights.



Kitting is important when scratch-building. Here are some of the Peris JN-1 parts at the kit stage. Note the spanwise grain direction of the tip pieces at far left.

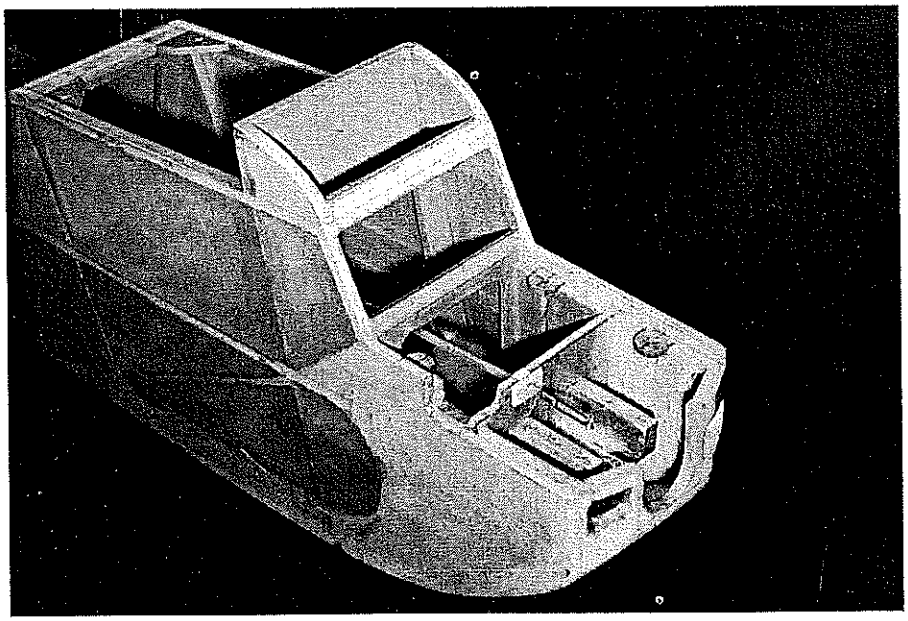


A 1/16 plywood or Micarta template is used to cut the wing ribs. Blank ribs are stacked, pinned together, and sanded to shape. Spar notches are then cut using a razor saw.

used by plumbers, such as Stay-Brite. It's easy to use if you have a large soldering iron; sand the surfaces clean, and use a flux like Nokorode.

The engine mount can be made from birch, maple, or a similar hard wood. A jigsaw and sander are very helpful in cutting and shaping these parts. Predrill 5/64 holes for the #4 wood screws that will be used to attach the mount to the firewall and the engine to the mount.

I used Dave Brown main wheels and a streamlined tail wheel. Their appearance is appropriate for the JN-1's square lines.



Front view of the fuselage after covering and painting the interior. Note that the covering masked the windows to make painting easier. The interior color simulates the zinc chromate used in most full-scale aircraft.

A discussion of adhesives seems to be in order. My models are primarily assembled with aliphatic resin glue such as Sig Bond or Titebond. It dries quickly enough for most purposes and allows time to reposition the pieces if necessary.

Critical joints that must be jigged or hand-held in position may be spot glued with thick CyA and frozen in place with an accelerator. Aliphatic resin glue may then be added as a fillet. Note that aliphatic resin glues are totally fuelproof.

The windows were attached with Wilhold R/C-56 glue—it is transparent when dry. R/C-56 was also used at the joint between the vertical fin and the fuselage.

WING CONSTRUCTION

The wing is built in three parts: the center section and the two outer panels.

In my opinion, it is best to preserve the plan and build the wing over a piece of paper that has one long horizontal line on it and some marks to locate the ribs. In this case, the line should be at the rear of the bottom spar. Of course, the plan or paper should be covered with waxed paper before construction begins.

Begin wing construction with the outer panels. If your building board is long

PERIS JN-1

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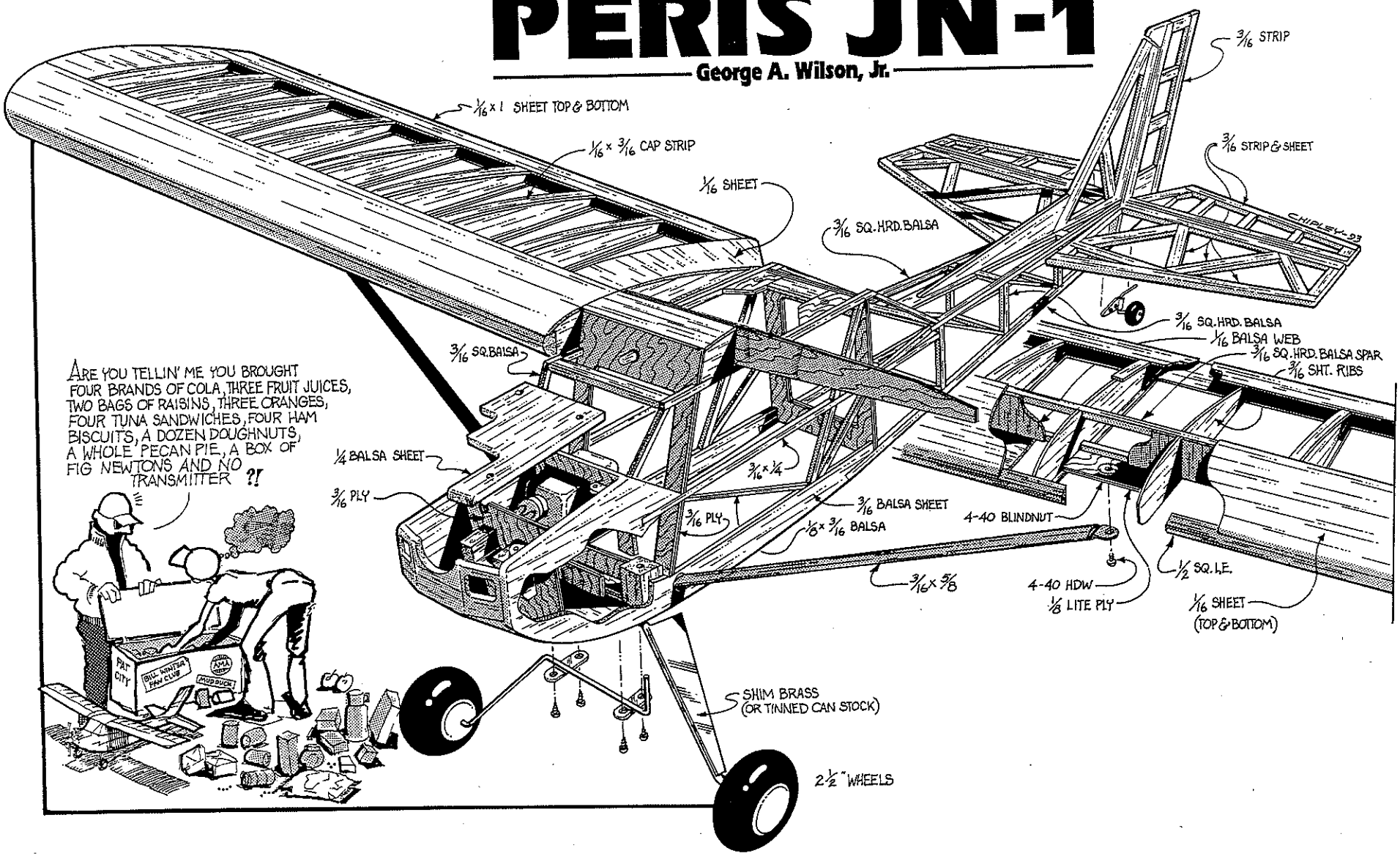
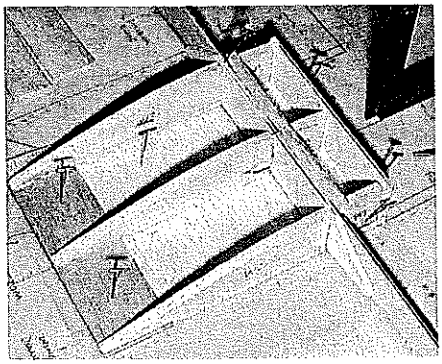




The wing center section during construction. Dihedral brace assembly and forward crosspieces are full wing depth.

enough, build them at the same time: one right and one left.

Cut the lower spar, and pin it in place. Mark the rib locations on the back of the spar. The marks should be about ⅛ inch high to project above the cap strips. Cut and install the bottom cap strips and the front and rear bottom sheeting. Add the strut mount in the front bottom sheeting.

Glue the ribs to the bottom sheeting at the marked locations. Use a square to assure that the ribs are at right angles to the spar. When this assembly is dry, lift the tip trailing edge and slide a piece of ¼-inch stock under the outer ends of the tip to create washout.

Keep the leading edge and center section tight to the building board, and build the rest of the structure to accept the washout. Space three balsa support pieces under the trailing edge, and pin in place. The remainder of the wing construction is done with the trailing edge supports in place.

Add the top spar and pre-shaped leading edge. Ribs W3A and W3B should be angled five degrees for dihedral. Install the webbing, the top sheeting, and the cap strips.

Make a pattern of the wing tip shape, and trim the top sheeting to match it. Using an 80-grit sanding block, sand the bottom of the tips to the proper angle, then install the bottom tip pieces. (Great sanding blocks can be made by white-gluing sandpaper to ¾-inch board scraps.)

Use a plane and an 80-grit sanding block to shape the leading and trailing edges. The trailing edge should be a flat ⅛-inch surface. Trim the center ribs to accept the dihedral brace.

Sand the panels with a 100- or 120-grit sanding block. The framework of the outer panels is now complete.

The center section construction is similar to that of the outer panels. First, glue the main dihedral braces and doublers together. Mark the center on both sides of this assembly. Pin the 3/16 sheet vertical piece to the board. Note that this piece, the front ⅛ Lite Ply piece, and the dihedral brace are full depth for maximum strength.

Install the front 1/16 hard balsa bottom sheeting, ribs W1, the ⅛ front piece, and the dihedral brace assembly. Install the rear bottom sheeting, which is 1/16 hard balsa except at the rear, which is ⅛ plywood.

Add ribs W2 and the wing hold-down blocks. Install the top sheeting. Note that the hole for the wing retainer dowel is to be drilled later—with the wing fitted to the fuselage. Trim the wing hold-down blocks to be even with the wing top.

Sand the center section to match the outer panels in preparation for covering. Carefully fit the panels to the center section, and trim as necessary.

Pin the center section to the building board. Slide the outer panels into place, and support them with flat pieces of 2 x 2 x 10-inch pine (or similar wood) placed the same distance from center on each side. Block up the trailing edges of the outer panels as necessary to accommodate the washout. Use the dihedral brace to establish the dihedral angle, but make sure the angle is the same on each side.

Remove the outer panels, and apply glue to the surfaces to be joined. Reassemble the panels, recheck the angles and alignment, then go away and let everything dry. Additional glue may be added later to strengthen the joints.

The original wing was covered with white translucent Micafilm.

TAIL CONSTRUCTION

The horizontal and vertical tail surfaces are constructed from 3/16 balsa. Again, my preference is to build over lines drawn on a blank sheet of paper. The rear spars of the fixed section should be relatively hard balsa. The remaining parts can be medium-soft. The diagonal bracing—used here and in many of my other designs—provides warp resistance.

Block-sand the surfaces to assure flatness. The rudder and elevator should be tapered toward their trailing edges. The trailing edges of the fixed and movable surfaces are flat. The front of the rudder and elevator are V-shaped to allow them to move freely. The other edges should be half round.

Sig Easy Hinges were fitted before covering. I like to hand-rout a rectangular opening for the control horns and imbed them in five-minute epoxy—I've never had one fail.

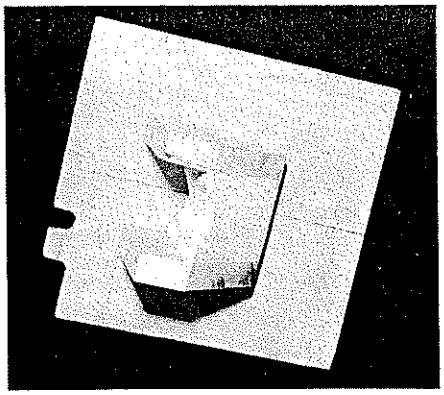
My model has white translucent Micafilm covering on the horizontal tail; the vertical tail was covered with silkspan.

FUSELAGE CONSTRUCTION

The fuselage sides require special attention during construction. Note that the spruce pieces under the wing and the hard balsa strips under the side windows are ¼ x 3/16. These help to strengthen the fuselage side-to-side. The remaining fuselage frame material is 3/16 strip or sheet. The top and bottom longerons behind the cabin area should be hard balsa.

Build the right side over the plan, then build the left side over the plan, but *omit* the ¼ x 3/16 pieces and the diagonal support pieces.

Remove the left side from the plan. Place waxed paper over the outside (the flat side) of the fuselage's right side, and pin the sides together, aligning them carefully. Now add the ¼ x 3/16 pieces to the left side, and add the missing diagonal braces.



The engine mount and firewall assembly is hardwood and 3/16 plywood. The mount is screwed and glued to the firewall.

Pin the right side to the board, and glue formers F2, F4, and F5 to it. Be sure that the formers are in the proper locations and are at right angles to the building board. Fit the formers by trimming their notches as necessary.

If the motor mount was not assembled during kitting, assemble it now and mount it on F1. Don't forget the 5/64 predrill for the #4 screws. Pin the side assembly top-down to the building board—let F4 project over the edge of the board.

Attach the left side, making sure it is properly positioned with respect to the right side. Align the nose with a square, and pull the tail together for a trial fit. This is a good time to add the ¼-inch doublers and the main gear mounts.

Glue the tail end together—be sure it is centered. To do this, mark a centerline on a blank piece of paper. Draw a centerline across the tops and bottoms of F4 and F5. Pin the bottom of the fuselage to the board, and block up the front and back to keep things steady. A square should be used to transfer the centerline up to the tail post. When the sides are properly aligned, CyA glue can be used to freeze them in place.

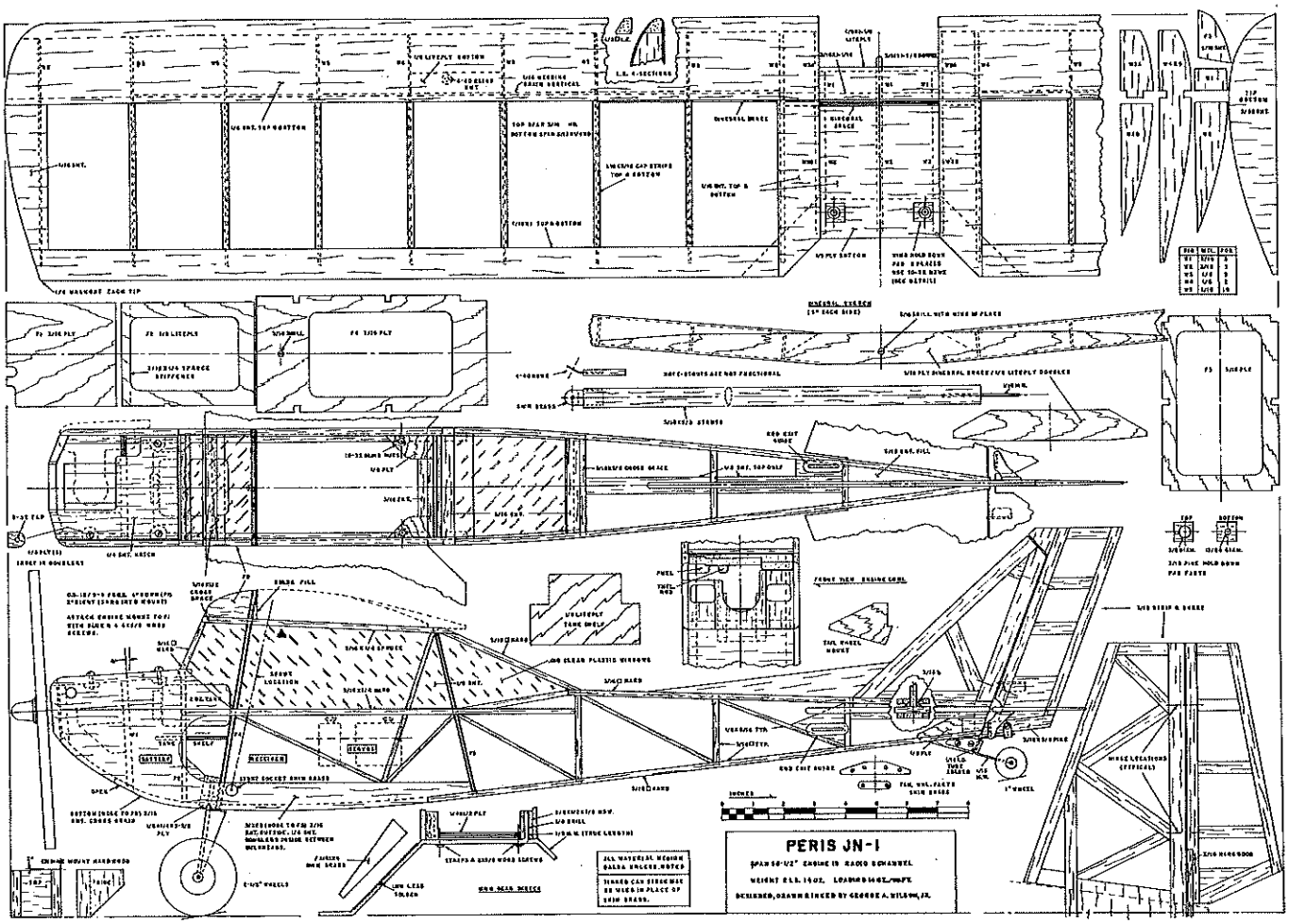
Add the cross braces, F3s, the cross-grained bottom sheeting, the wing hold-down pieces, and the tail mount. Cut and fit the cowl pieces and the engine compartment hatch. Make and set in the hatch hold-downs. Drill #36 holes in the hold-downs with the hatch in place. Tap the hold-downs 6-32, and saturate the threads with thin CyA glue. Enlarge the hatch holes with a #27 drill.

The holes in the front of the wing for the 3/16 dowel and the wing hold-down screws are drilled with the wing in place on the fuselage to assure good alignment. Make sure the wing is at a right angle to the fuselage.

Tap the wing hold-downs 10-32, and saturate the threads with thin CyA glue. If you prefer, 10-32 blind nuts may also be used with the hold-down bolts. The wing hold-down dowel may now be made and installed.

Block-sand the sides, top, and bottom of the fuselage, and the model is ready to be covered.

Full Size Plans Available-See Page 184



My model's fuselage is covered with nylon, but Sig's Koverall would have worked as well and is more readily available.

The fuselage and vertical tail were finished with several coats of thinned nitrate dope, one coat of green butyrate dope, and three coats of thinned clear butyrate. All dope was brushed on. The color coat needed a little touch-up, but only *I* know where those spots were!

Remember that butyrate dope should cure for two to three weeks before it is exposed to raw fuel. If the dope is not thoroughly cured, it may blush white.

Thinned epoxy was used to coat the engine compartment and other interior areas that may be exposed to fuel or exhaust.

This is a good time to install the radio and plumbing. To avoid having to add nose weight for proper balance, keep everything as far forward as practical.

The inside of the original model was given one coat of zinc-chromate-colored butyrate dope. I had to mix white, yellow, and green to come up with something close to zinc chromate. This realism-adding trick was borrowed from Lou Andrews, who has used it for many years.

The fuselage was completely covered and doped, except for the area under the wing. After the last coat of clear dope, the window areas and the openings for the tail assemblies were carefully cut out. This beats having to carefully dope around the open areas.

Peris JN-1

Wingspan: 56½ inches

Engine: O.S. .15

Number of channels: Three

Weight: 2 lb. 14 oz.

Construction: Built-up

Covering/finish: Micafilm on wing and horizontal tail, silkspan on vertical tail, nylon on fuselage. Butyrate and nitrate dope finish.

The windows are installed after the radio and the control linkages have been checked. Use R/C-56 to attach the windows. The R/C-56 takes a while to cure under the plastic, but eventually it will become transparent.

ASSEMBLING THE TAIL

The tail is assembled after covering and finishing its parts. Where the surfaces join, omit or remove the covering and finish.

Install the control horns, the 3/16 triangular pieces at the bottom of the vertical fin, and the elevator and rudder hinges.

Check to see that all the parts fit, that the vertical fin is at right angles to the horizontal fin, and that the whole assembly will be in good alignment with the fuselage. Trim-sand as necessary.

Use a square to align the fins, make sure that the vertical fin is centered on the horizontal fin, and glue the fins together. The fin assembly is then glued to the fuselage. Run a bead of R/C-56 around the joint between the vertical fin and the fuselage. The area above the horizontal fin and below the top longerons is left uncovered, as I am sure was the case on the full-scale JN-1.

FLYING

Adjust the rudder for as much throw as possible between the elevator sections. If your radio has dual rates, about half that amount of throw can be used for relaxed, trainer-type flying. The elevator should be set for about 3/8 inch up and down.

This section could be summarized by saying that the JN-1 flew great just as shown on the plans. The only trim necessary was a small amount of downthrust—the plans show this change. The O.S. .15 is just right for power. The flying propeller is a nylon 10 x 3. Grass takeoffs are easy, even with the forward gear location.

My test pilot, Hans Sagemuehl, wanted me to take over just after takeoff; however, I feel more comfortable taking notes and asking questions during test flights. The only criticism Hans had concerned the transition

between power-on and glide conditions. The previously mentioned downthrust solved this problem.

So build and enjoy. The Peris JN-1 is very cute. To date I have not been able to contact Messrs. Peris or Schmitt. Does the full-scale JN-1 fly without ailerons? Judging from the model, it could very well do that!

I would like thank the late George O'Brien and my test pilot, Hans Sagemuehl, for their valuable help. ✈

In the April issue of *Model Aviation*, we erroneously reported on page 35 ("The Scale Masters: 1992") that Clark Hopkins's Extra 300 used B&B smoke fuel. In fact, the fuel was provided by Frank Reyes of C&F through Hobby Nut hobby shop. Reyes and C&F were also the sponsors, through Hobby Nut, for Clark Hopkins. We regret the error.