4-GONE

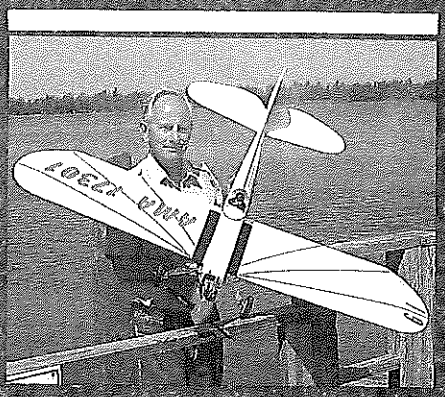
COMBINING the general appearance of a 1930s Kinner or Ryan sport plane with reliable sport aerobatic performance, this good-looking low-wing design should find a welcome niche with the average RC modeler. A generous, 550-sq.-in. wing area gives the 4-Gone dependable low-speed characteristics, and the Saito FA-45 takes it smoothly through such standard sport aerobatics as loops, stall turns, Cuban eights, inverted flight, and spins.

Designed for a .40-.50-size, four-cycle engine and a four-channel radio, this large, 4.6-lb. model is 43¾ in. long and has a 57½-in. wingspan. The moderate, 19.25-oz./sq.-ft. wing loading makes for smooth, forgiving handling. Construction is straightforward, blending balsa, spruce, Lite Ply, and

■ Charles H. Stumpf

Want sport aerobatic performance minus the quirks and hassles? Maybe a touch of nostalgia, too? Fit a .40-.50-size, four-cycle engine and a four-channel radio in this 43¾-in.-long, 57½-in.-span model, and see how smooth and forgiving low-wing flight can be.

4-GONE



Big picture: Ample wing area and a moderate wing loading make for dependable low-speed performance and smooth, gentle handling. Above: The author gives scale to his RC sport design, whose classic lines echo such Golden Age sport planes as the Ryan and Kinner. The AMA numbers are from Vinylwrite Custom Lettering.

aircraft plywood for a structure that's both light and strong.

If you're ready to graduate from high-wing and shoulder-wing sport and trainer models but want to avoid the quirky and difficult-to-fly, this airplane makes an excellent choice.

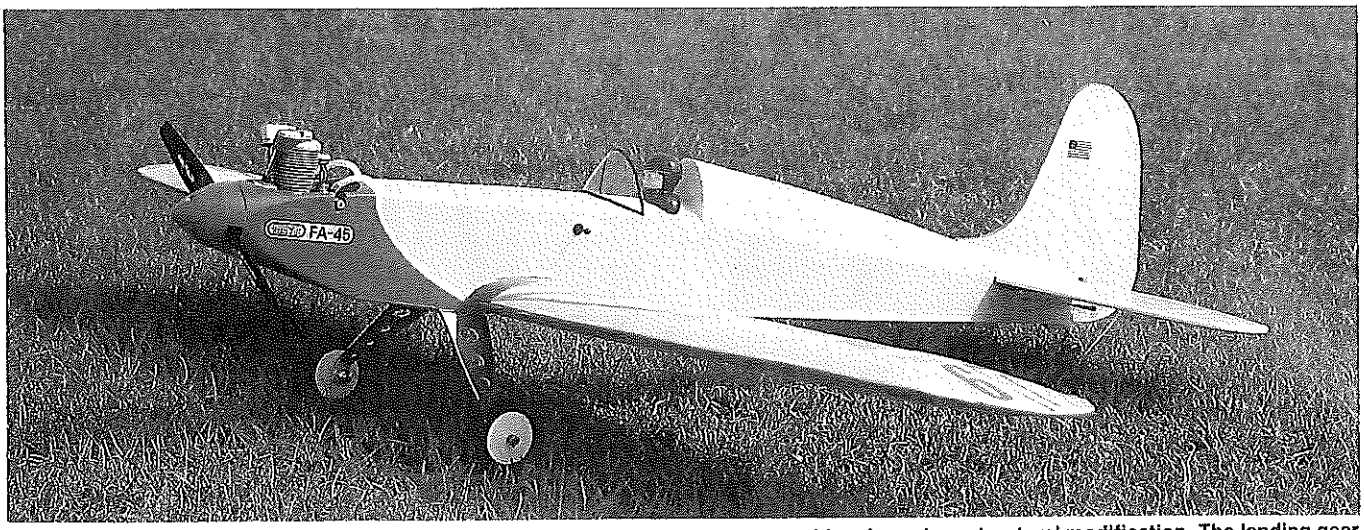
The 4-Gone is loosely based on a smaller model my friend Ron Farkas and I designed and built in 1986 while employed with Grumman Aerospace Corporation in Bethpage, New York. That airplane was designed for a .20-size engine, the maximum permitted at our postage stamp-size flying field next to the corporate headquarters building.

Moving to Florida changed my situation dramatically. After joining the West Pasco Model Pilots Association, I found myself flying off part of a 15,000-acre cattle ranch (one of many such ranches in Florida). With my horizons literally expanded, I set about enlarging, revising, and redesigning Ron's and my modestly scaled airplane to accommodate an engine in the much more accepted .40-.50 size range.

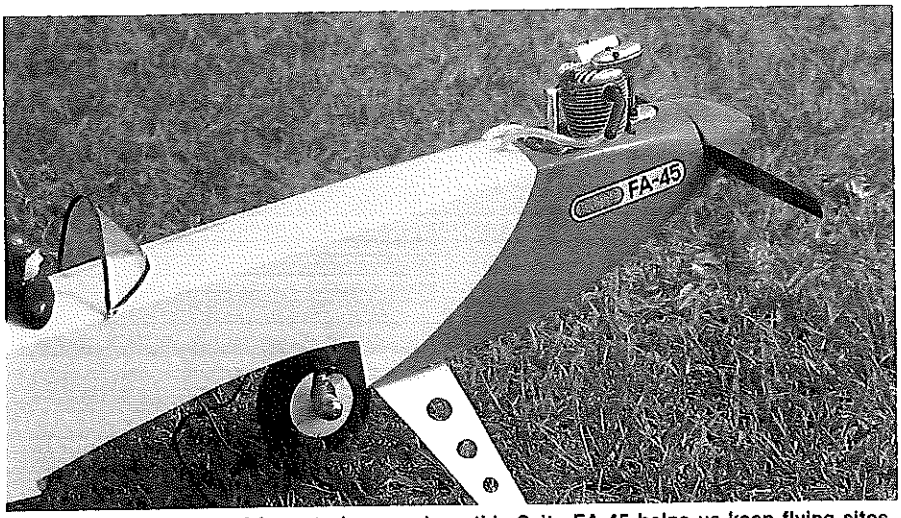
I chose a four-cycle engine because of its low, scalelike noise output. Quiet engines are our best defense against losing flying sites.

Construction

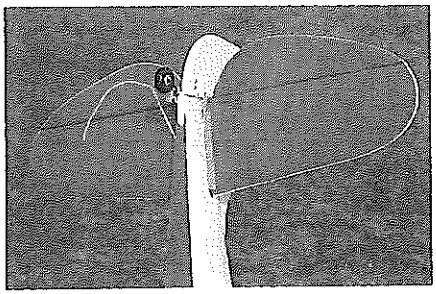
Fuselage. Cut the sides and formers F3A through F7 from



The prototype uses a Saito FA-45 engine. A two-stroker could be fitted in the nose with only a minor structural modification. The landing gear is made from .062-in.-thick tempered aluminum sheet. Wheels are Williams Bros. Smooth Contour in 3¼-in. diameter.



The relative quietness of four-strokers such as this Saito FA-45 helps us keep flying sites. O.S., Enya, and other four-cycle engines can easily be accommodated as well.



Tail wheel and rudder horn detail. The tail wheel bracket is installed on its 3/32 plywood mounting plate using epoxy.

⅛-in. Lite Ply. Use ⅛-in. aircraft plywood for F1 and F3, 3/16 aircraft plywood for F2.

Cut the D-1 doublers from ⅛-in. aircraft plywood. Glue D1 and the 3/16-sq. upper and lower longerons to the fuselage sides, taking care to make both a left side and a right. Drill holes in F2 for the engine mount and throttle pushrod. Install blind nuts for the engine mount.

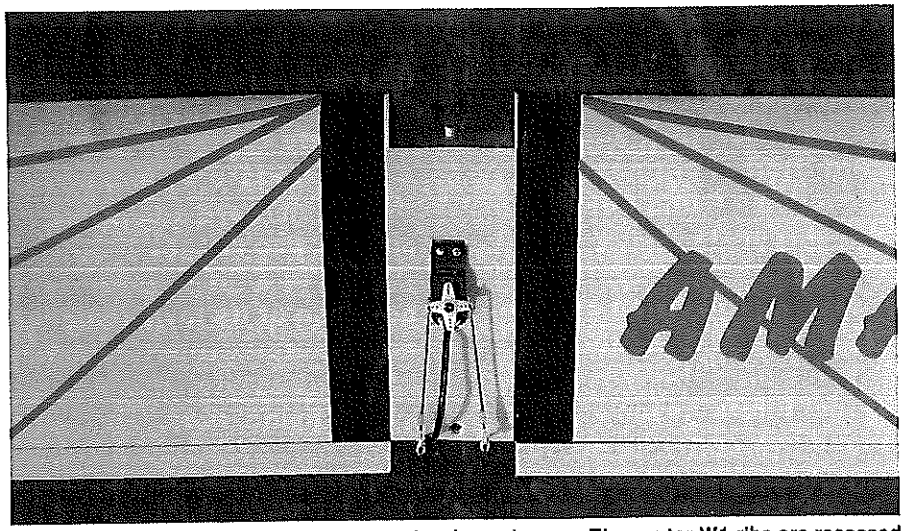
Mark the former locations on both fuselage sides. Align the sides on your building board using a T-square, and glue F2, the three F3A's, and F4 in place. Allow the glue to dry.

Pull the sides together at the tail, check the alignment, and glue. Glue in formers F5 through F7. Slot the 3/32 plywood tail wheel mount plate for the tail wheel bracket, and install it as shown on the plan.

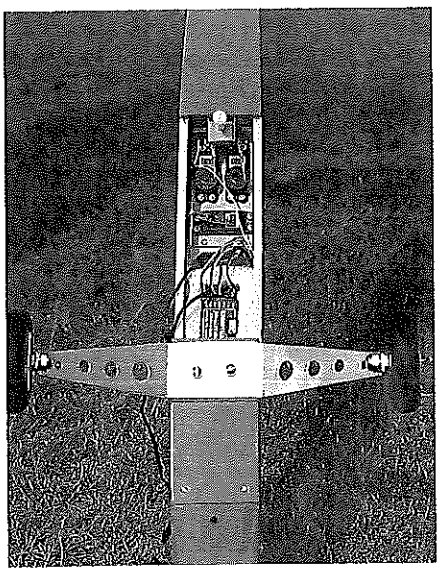
Install the ¼ x ⅞-in. balsa top stringer and the 3/16-sq. side stringers from F4 to F7. Install the ⅛-in.-sq. spruce stringers from F2 to F4. Fill in between the stringers from F2 to the first F3A former with ⅛-in. balsa sheet.

Install the Sullivan Gold-N-Clevis Nyrod tubes for the elevator and rudder pushrods and an additional Nyrod tube for conveying the receiver antenna out the aft fuselage. Cover the fuselage bottom aft of the wing with cross-grained 3/32 sheet balsa.

Trial fit the engine. Center mount the F1 spinner ring on the engine shaft, and glue it in place. Remove the engine, and add



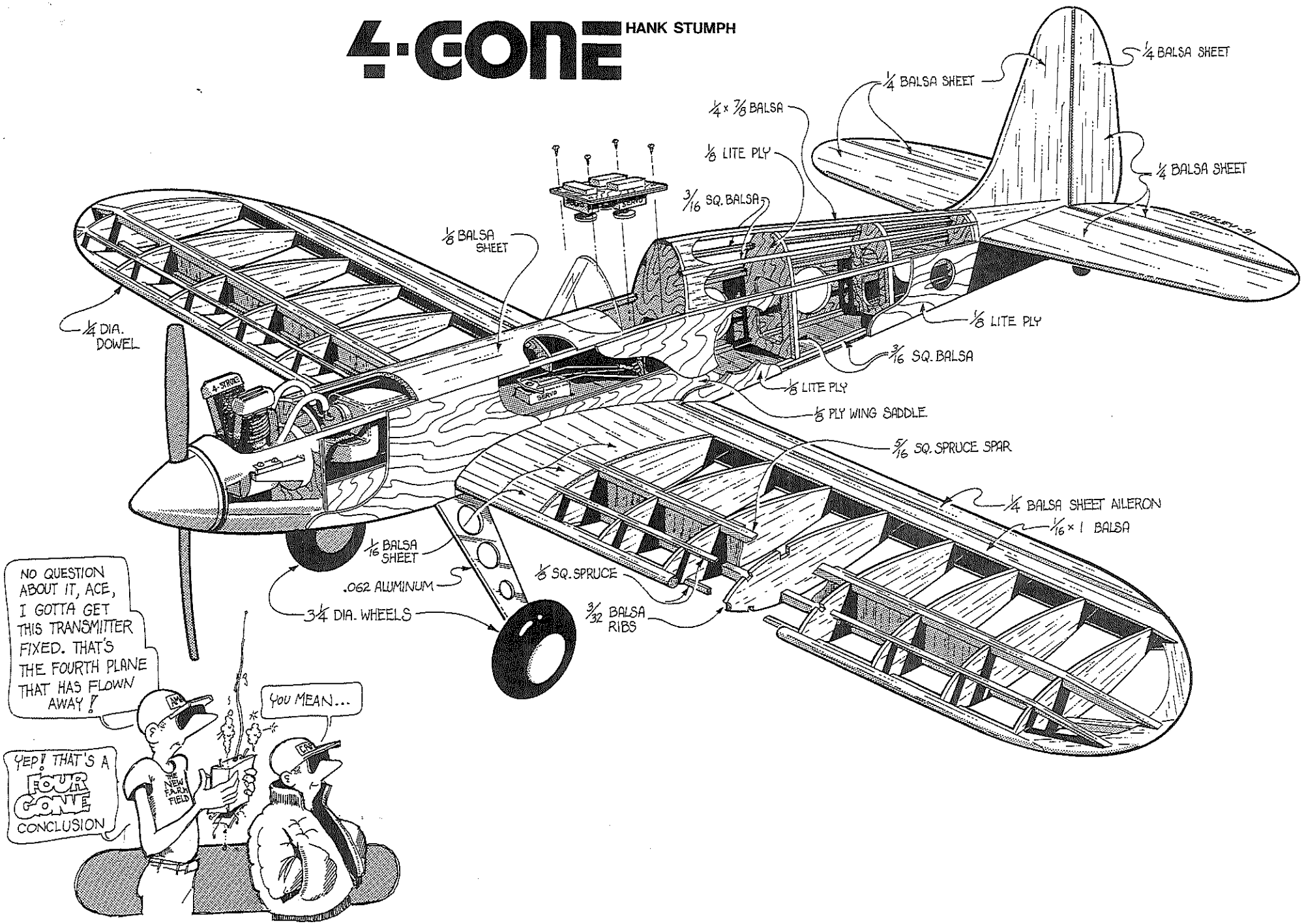
Close-up of the aileron control horns, pushrods, and servo. The center W1 ribs are recessed for the aileron servo, and the opening is boxed in.



The radio installation with the hatch removed. The receiver is nestled in foam, the servos fitted in a plywood tray. Note the landing gear and the nylon wing hold-down screw in its threaded wood block.

4-GONE

HANK STUMPH



the lower cowl block and the ½-in. balsa triangle stock. When the glue has set, carve and sand the cowl to match the spinner ring.

Any of the .40-.50 four-cycle engines currently available from Saito, Enya, or O.S. will perform well in this model. The Saito FA-45 gives the prototype ample power for sport flying. Like all four-cycle engines, it offers good fuel economy. The prototype flies for about 15 minutes using the Du-Bro S6 (6-oz. capacity) fuel tank shown on the plan.

In lieu of a four-cycle engine, you could use a two-stroker of the same displacement. To do so, simply move former F2 forward about ¾ in. to an inch; the exact distance will depend on the engine and mount combination used. The propeller location remains unchanged. Since two-cycle engines tend to weigh significantly less than four-cycle ones, you may need to ballast the cowl to duplicate the center-of-gravity shown on the plan.

Moving F2 forward will also permit the use of an 8-oz. fuel tank to compensate for the higher fuel consumption of two-cycle engines.

Wing. Cut all the wing ribs from 3/32 balsa sheet. Since the W1 and W2 ribs are identical except that the W1s are relieved 1/16 in. for the center section sheeting, I found it worthwhile to make a rib template from 1/8-in. sheet plywood. The two W3 ribs abutting the tips are shaped differently and must be cut separately.

Cut the T1 and T2 tip pieces from ¼-in. balsa sheet, and glue them together. Cut the dihedral braces W4, W5, and W6 from aircraft grade plywood.

Pin the 1/16 x 1-in. hard balsa sheet in position, and cut out a recess for the full-depth W6 dihedral brace. Hold the 5/16-sq. spruce lower main spar in place with crisscrossed pins. Glue in all but the center W1 and W2 ribs. Rock the assembly back until the ribs rest on the trailing edge sheet, then glue them down.

Glue in the ¼-in.-dia. birch dowel leading edge (LE) and the 5/16-sq. spruce upper main spar. The dowel ensures an accurately located, uniformly shaped leading edge radius, which is essential for a fully functional airfoil section.

Saw partway through the main spars so that you'll be able to bend them to the tip contour. Sand the forward edge of T1 to match the leading edge dowel, and glue the tip in place. Install W3 and the upper 1/8-in.-sq. turbulator spar. Bend the main spars and the turbulator spar to the shape of the tip, then glue the spars in place. Also glue the saw cuts in the tip area of the main spars.

Glue blocks on the lower trailing edge sheet at the three aileron hinge locations. Sand the blocks to the rib contour. Glue on the upper 1/16 balsa TE sheet, and add the 3/16 x 3/8-in. balsa TE cap to the upper and lower sheets. Glue in the full-depth W5 dihedral brace and the 1/16 balsa sheet vertical-grain shear webs.

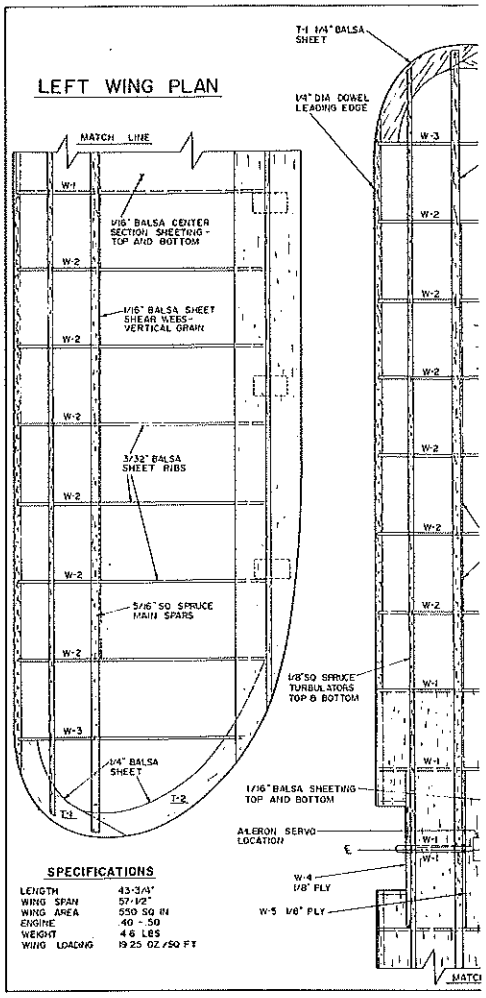
Remove the wing panel from the building board, and install the lower 1/8-in.-sq. spruce turbulator spar and the lower center section sheet.

Build the opposite panel. (Make sure you end up with both a right side and a left.) Join the panels at the intersection of the trailing edge and the main spar dihedral braces. Install the center W1 ribs; recess them for the aileron servo. Box in the servo opening, and sheet the top center section aft of the turbulator spars. Sand the forward side of the turbulator spars flat, and glue in the W4 forward dihedral brace.

Cut the ailerons from ¼-in. sheet balsa, and sand them to shape. Install the aileron torque rods on the TE cap. Glue the 5/16 x 3/8-in. spruce filler piece on the center trailing edge.

Trial fit the wing to the fuselage. Install the two leading edge false ribs and the LE sheeting forward of the turbulator spars.

Fit F3 flush against the W4 forward dihedral brace, and glue it in place. Drill

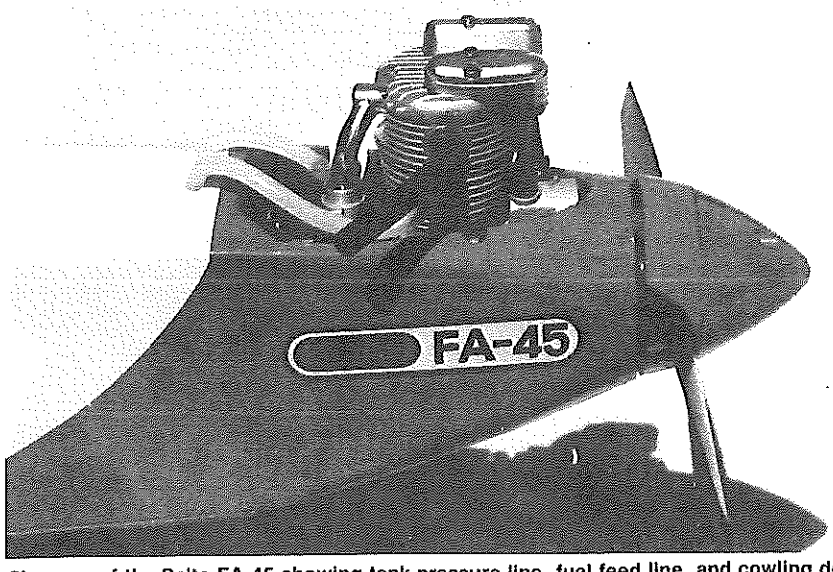


through F3 and W4 for the ¼-in.-dia. wing locating dowel. Remove the wing, and continue the hole through W4 and the W5 center dihedral brace. Install the ¼-in.-dia. wing locating dowel.

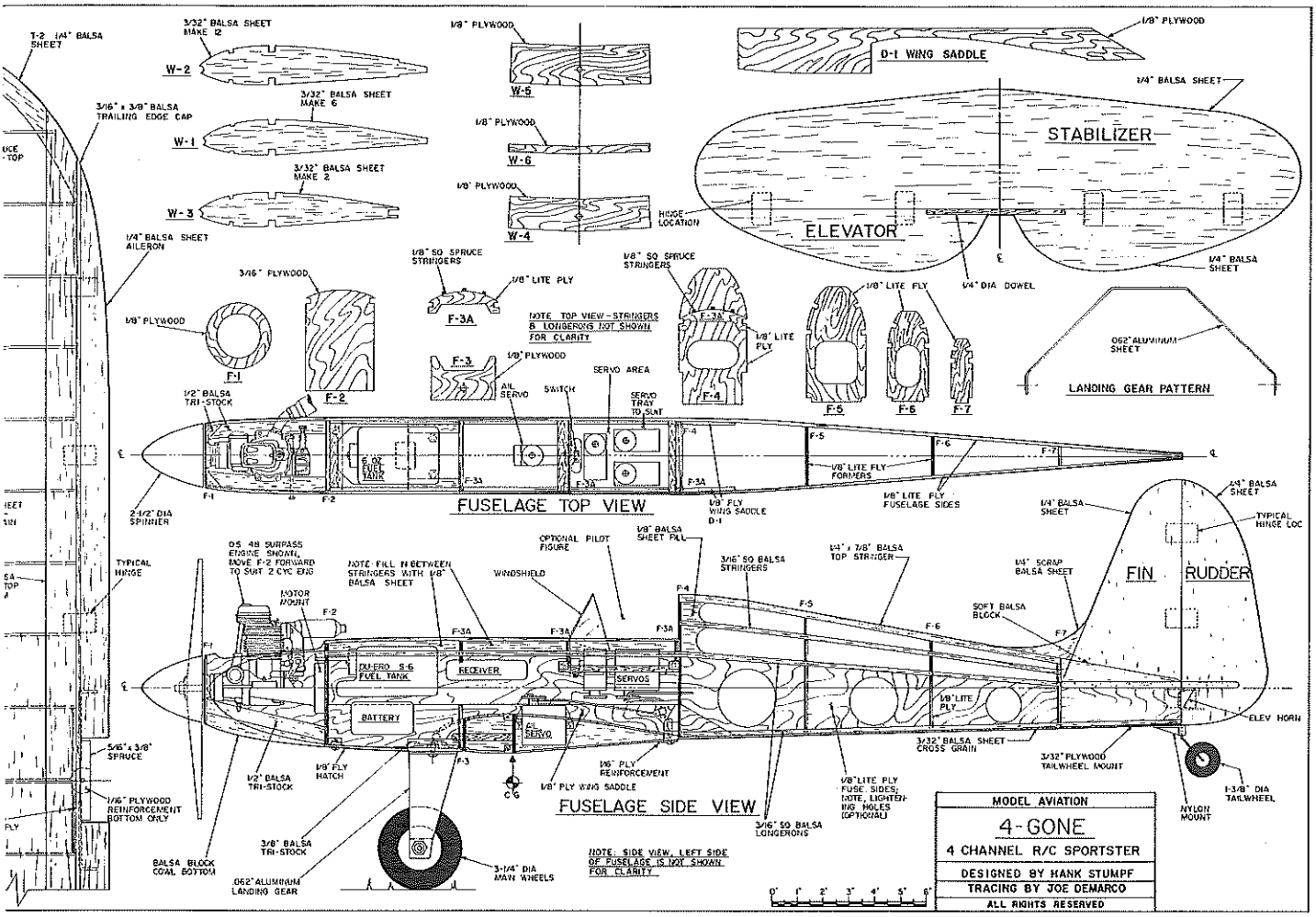
Install the 1/8-in. aircraft grade plywood landing gear mounting plate on the fuselage, aligning it with the aft side of F3. Using epoxy for extra strength, back up the mounting plate with 3/8-in. balsa triangle stock as shown on the plan. Install a threaded block on F4 using epoxy and 1/8-in. aircraft plywood gussets.

Reattach the wing to the fuselage. Align the wing center section with the center of the threaded block, and mark the center section at that point. Remove the wing, and drill through the center section mark for the wing hold-down screw. Epoxy a 1-in.-dia., 1/16 plywood washer over the hole as reinforcement at the lower surface of the wing. This will prevent the wing hold-down screw from pulling out through the wing.

Tail surfaces. Cut all components from ¼-in. medium-hard balsa sheet. Join the elevator halves with a piece of ¼-in.-dia. birch doweling. Slot all surfaces for the hinges, and epoxy them in place. Retain the hinges by inserting a toothpick or small dowel through each component and its hinge. Retain the aileron hinges the same way.



Close-up of the Saito FA-45 showing tank pressure line, fuel feed line, and cowling details.



Landing gear. Form the landing gear strut from .062-in.-thick tempered aluminum sheet. Use a ¼-in.-radius block on all bends to prevent cracking. If you lack the material or facilities for making the strut, use a Hallco premade strut assembly.

Drill two 5/32-dia. holes through the strut and fuselage, and mount the gear with No. 8 screws and nuts. Williams Bros. 3¼-in.-dia. Smooth Contour wheels and Banner 5/32-dia. axle shafts complete the landing gear.

Bend the tail wheel strut from 3/32-dia. music wire. Insert the strut in the tail wheel bracket, and epoxy the bracket on the 3/32 plywood fuselage mounting plate. Install the 1⅜-in.-dia. tail wheel on the strut.

Glue the fin and stabilizer to the fuselage, aligning them carefully with the wing. Cut out the left and right tail fairing blocks, and sand them to match F7. When you're satisfied with the fit, glue the blocks in place.

Finishing. Fuel proof the inside of the cowl and firewall with a coating of polyester resin or epoxy. Sand the model smooth, and hand-vacuum the sanding dust. MonoKote will adhere better to a dust-free structure, especially on the tail, fuselage sides, and other solid wood surfaces.

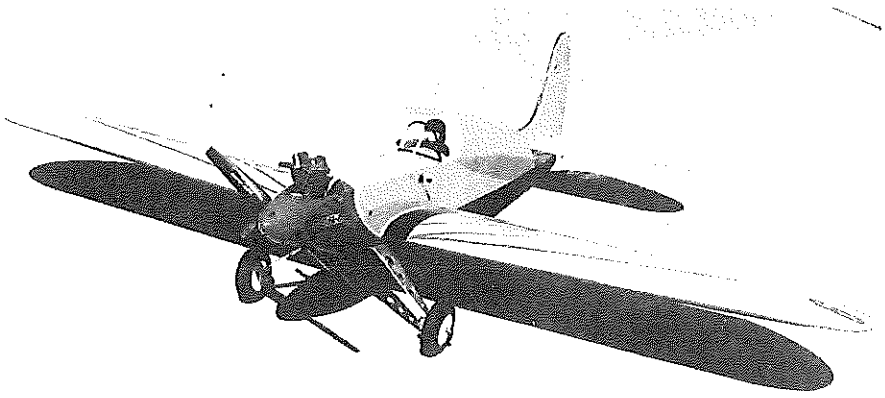
I covered the entire model with Super MonoKote—yellow on the upper surfaces and fuselage sides, red on the lower surfaces. Red trim stripes and AMA numbers from Vinylwrite Custom Lettering complete the job.

Radio installation. Install the servos, receiver, and battery pack in the locations shown. The 4-Gone can accommodate any modern radio system using standard-size servos; an Airtronics SR system was installed in the prototype.

Flying. Start up the engine, and check the radio installation for range and correct operation. Set the initial control surface throws as follows: ailerons, ± ¼ in.; elevator, ± ½ in.; rudder, ± ¾ in. Throws are measured at the widest chord. Check that the model balances within ¼ in. of the location shown on the plan.

The 4-Gone is smooth, predictable, and relatively docile in the air. On its first flight the prototype needed only a minor trim adjustment in roll. Once you get the feel of the plane, try some maneuvers; you may want to adjust the control surface throws to suit your flying preferences.

This quiet, aerobatic sport plane will bring you hours of satisfying flying. Write and tell me about *your* experiences with the 4-Gone. □



The pilot's in the cockpit, the 4-Gone poised for the blue.