SEMPERFI

A .15-.25 powered semi-tween-the-wars fun type R/C model that even those with aging reflexes can handle.

Between the wars was a romantic period in aviation for modelers and, although I have never been a scale buff, some of that romance has rubbed off. Memories of the thirties, when military aircraft participated in airshows along with the "stunt flyers," are still fresh. Of course, I was Very Young then and most of my information came from the pulp magazines that littered the shelves at the drug store. Semperfi is an attempt to capture some of the yellow-winged military mystique of that time in an easy to build and fun to fly airplane.

Since most airplanes of that period had conventional landing gears, so does Semperfi and it is a compromise between scale looks and practical operation. The result is an airplane that these aging reflexes are able to keep on the runway, even in a crosswind. In fact, after a bunch of flying the only prop damage has been slightly round tips from nose-low landings.

In the air it is a solid airplane and not given to bad habits. It will snap and spin but these are controlled maneuvers and not accidental ones. Although inverted passes and loops are comfortable, outside snaps and spins are not its bag. The roll rate is good and makes even the most uncoordinated of us look good. A rolling break to an overhead 360° approach, like the airshow boys did it, is easy and impresses the Sunday onlookers. Wheel landings are just as easy as stall landings and look great as the tail comes down to three point position.

When building Semperfi, or any airplane, think light. There is no way a brick can perform like an airplane, and this is an airplane not a brick.

CONSTRUCTION

Wing:

Cut the wing ribs from medium 1/16" sheet balsa (all wood is balsa unless otherwise stated); pin them together and gang sand them to the same outline. Select six from the batch and cut the main spar notches 1/8" wider on each side to accept the dihedral braces and trim 1/16" from the top and bottom of them for the center section sheeting. Call these ribs R1. Cut the webs for the main spars and the trailing edge from 1/16" sheet; the grain should run vertically. The trailing edge sheeting is 1/16" sheet and the trailing edge is 1/8" square.

Cover the plan with plastic sheeting or waxpaper to keep the glue from sticking and assemble the wing right over the plan by laying the trailing edge sheeting and the bottom main spar in position on the plan. Glue the trailing edge on the back edge of the trailing edge sheeting. Start the assembly with the second R1 from the center, install it and the webbing next to it (on both spar and trailing edge); install the next rib followed by the webbing, another rib, etc., out to the tip. The webs help with the spacing as well as keeping the ribs perpendicular to the spars. The ribs should be glued in as you go. Glue in the two top spars and the leading edge, then remove the wing half from the plans and glue in the other bottom spar. Do not add the top trailing edge sheeting at this time.

The other wing half is built just as the first by turning the plan over and building it on the back side. The plan can be rubbed with cooking oil or sprayed with spray-wax to make it transparent.

When both halves are complete, bevel the ends of the spars, leading and trailing edges to fit together at the dihedral joint in the center, and join them with the plywood dihedral braces. Cut two R1's apart at the aft side of the main spar notch and install them on either side of the dihedral joint, as shown, to form the servo box. The leading edge of these ribs are cut in front of the spar notch and joined together at the center. The trailing edge sheeting is now added and the center section sheeted with 1/16" sheet. Do not sheet the top of the servo box. The brass tube aileron torque bearings, with their torque rods, are epoxied to the trailing edge on either side of the center section and faired with pieces of 1/4" square soft balsa that

SEMPERFI
Designed By : L.F. (Randy) Randolph

TYPE AIRCRAFT
Sport
WINGSPAN
48½ Inches
WING CHORD
Root 7¾" — Tip 7½"
TOTAL WING AREA
366 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Flat Bottom
WING PLANFORM
Swept T.E. (slight)
DIHEDRAL, EACH TIP
1 Inch
OVERALL FUSELAGE LENGTH
35¼ Inches
RADIO COMPARTMENT AREA
(L) 8¼" x (W) 2½" x (H) 4"
STABILIZER SPAN
18 Inches
STABILIZER CHORD (incl. elev.)
5⅜" Average
STABILIZER AREA
95 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
5 Inches
VERTICAL FIN WIDTH (incl. rud.)
5" Average
REC. ENGINE SIZE
.15-.25 Cu. In.
FUEL TANK SIZE
4 Ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa and Ply
Empennage ..... Balsa and Ply
Wt. Ready-To-Fly ..... 36-40 Oz.
Wing Loading ..... 16 Oz./Sq. Ft.

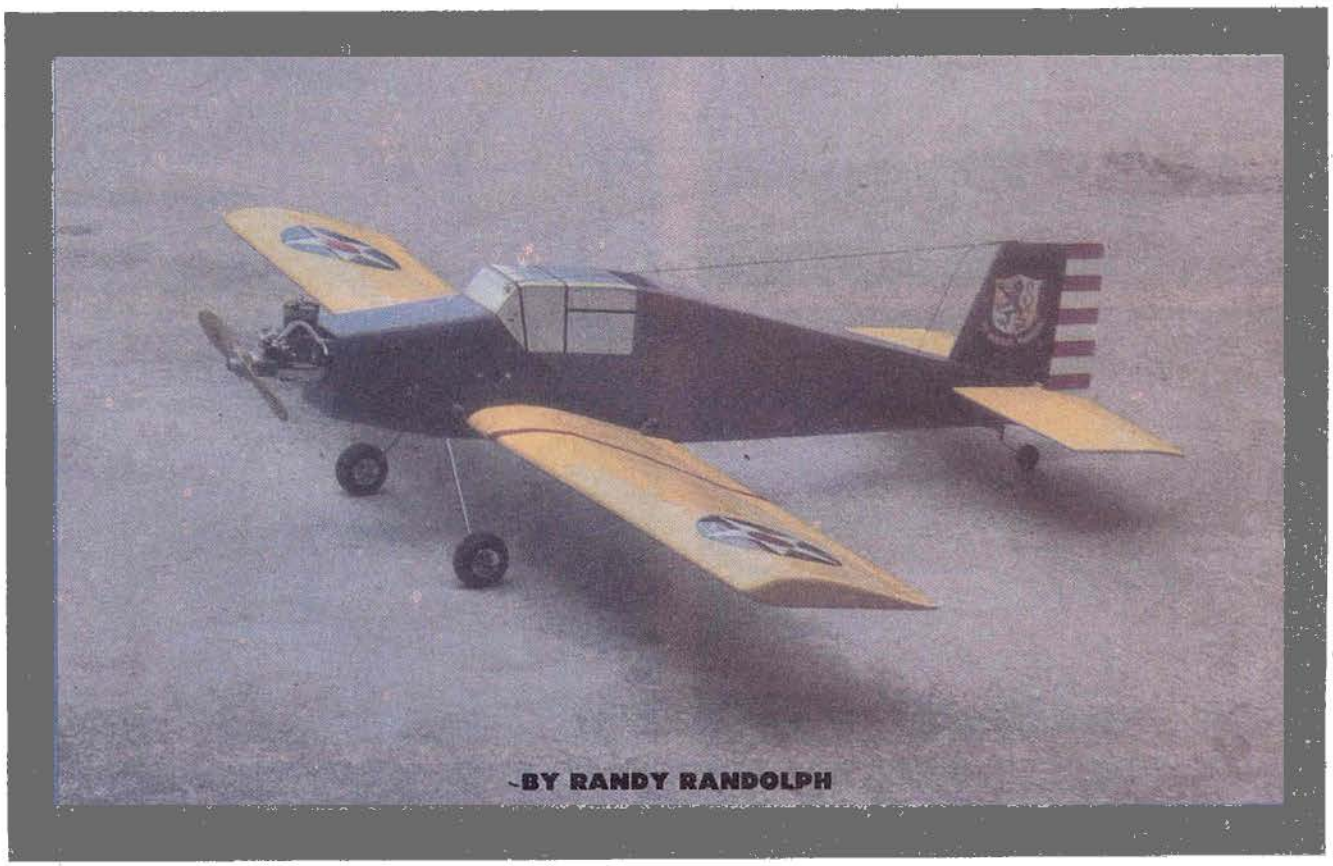
have been hollowed to receive the bearings. The ailerons are 1/4" aileron stock that has been tapered at the tip. Make them full length and cut 2" from the outboard tip of each and glue these pieces to the trailing edge of the wing at each tip. The ailerons themselves will be installed when the airplane is covered. Cut the wing tips from 1/4" soft balsa, glue them to the tip ribs, and sand them to shape. Round the leading edge and sand the whole wing with 150 grit sandpaper.

Fuselage:

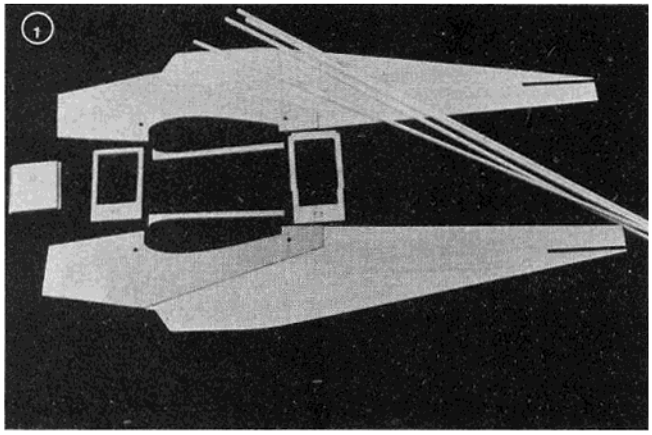
The fuselage sides are cut from two pieces of 3/32" x 6" x 36" medium balsa. These can be purchased or made by edge gluing four sheets of 3" stock to form two pieces 6" wide.

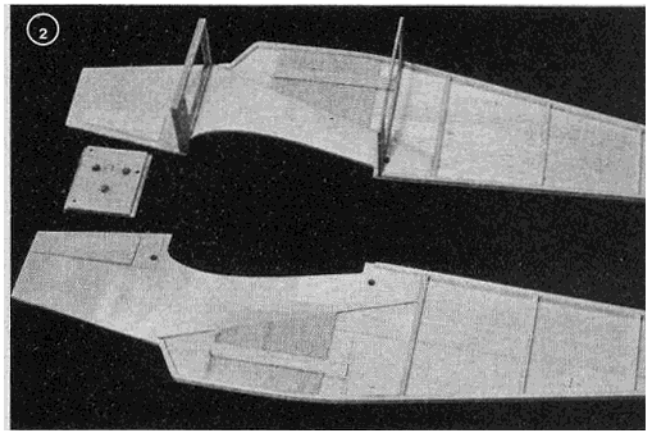
Cut out the two sides, pin them together and sand them to the same outline with a sanding block. Use the finished sanded side as a template to cut the two 1/16" plywood doublers. Epoxy the doublers in place, one left and one right, and again pin the sides together with the doublers on the outside and sand the edges square. While the sides are still pinned together, drill the 1/4" holes for the wing hold-down dowels and make the cut-outs for the stabilizer and wing. Save the bottom of the wing cut-out as it will be glued to the bottom center of the wing to form that fairing. Cut the notch just forward of the wing to receive the landing gear mounting block. Separate the sides and add the 3/16" square balsa uprights and longerons, the 1/16" balsa cabin doublers, and the servo and tank mounting rails.

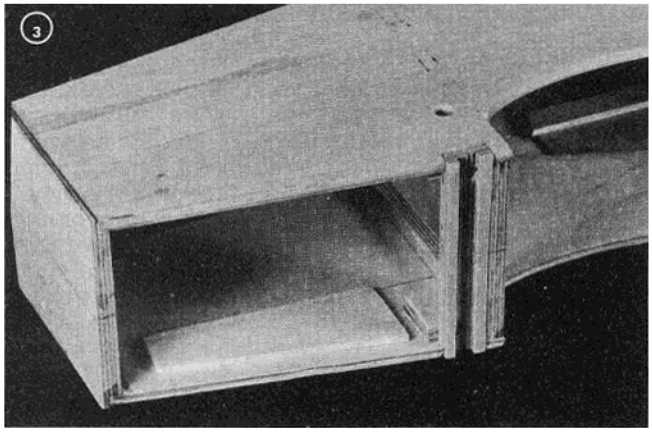
The firewall and first bulkhead are cut from 1/4" plywood and the aft bulkhead is 1/8" plywood. Drill the firewall for the throttle line, fuel lines and engine mounting bolts. Install T-nuts for the engine mount and epoxy them in place. Glue the two bulkheads in place on one of the fuselage sides; make sure they are square and glue the other side directly over the first. Use a square and make sure that both sides are exactly in line. Glue the sides together at the tail and install the firewall and check that the fuselage is true with no bends or twists. Glue the landing gear mounting block in place and add the two pieces of 1/4" plywood above it on each side. These pieces are glued to the fuselage sides as well as to the 1/4" plywood bulkhead.

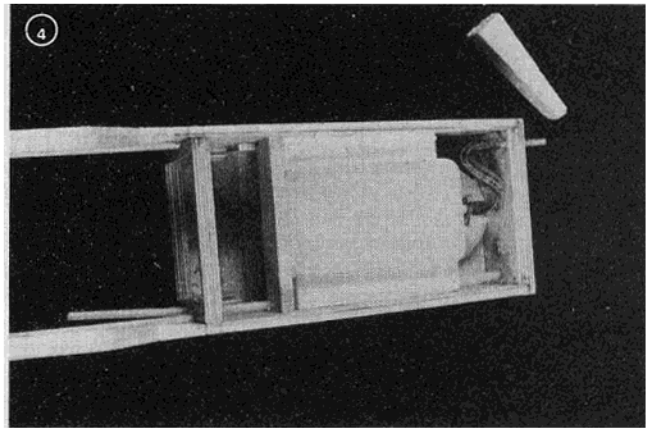


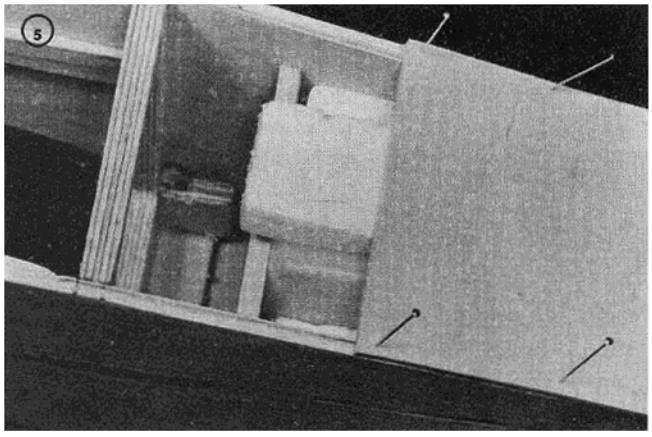
-BY RANDY RANDOLPH

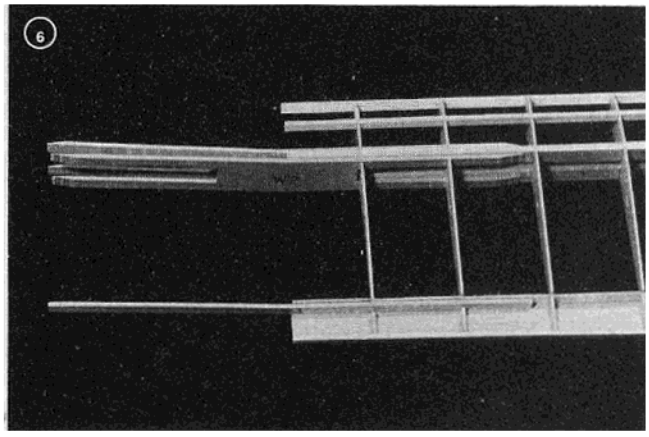


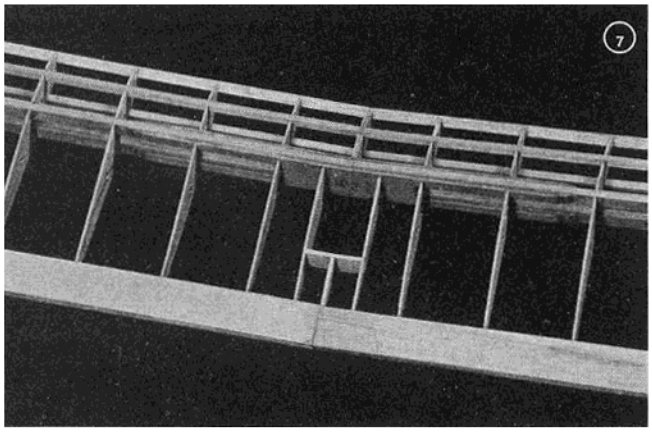


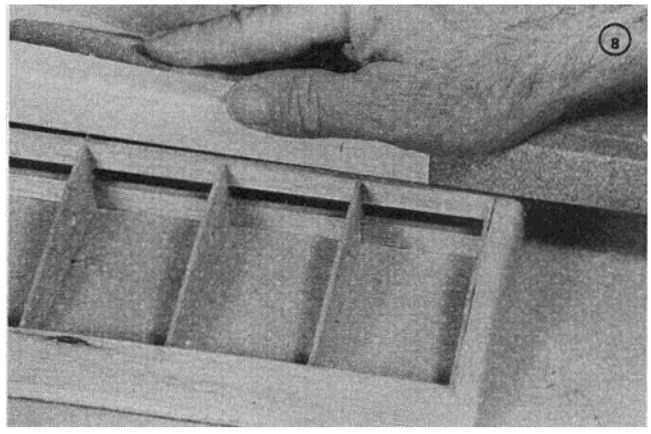




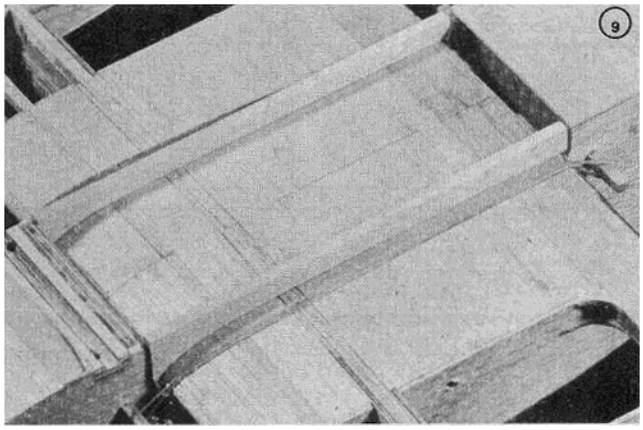


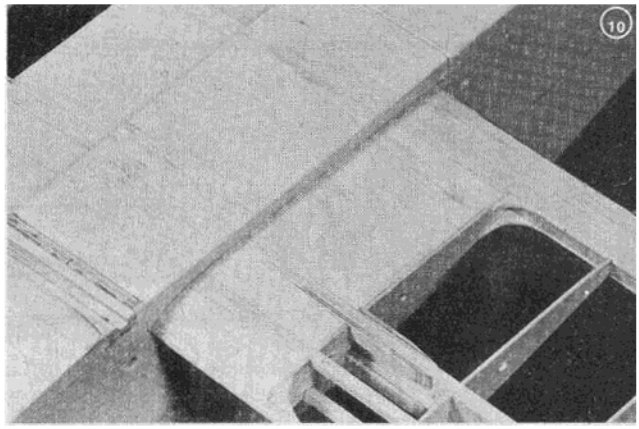


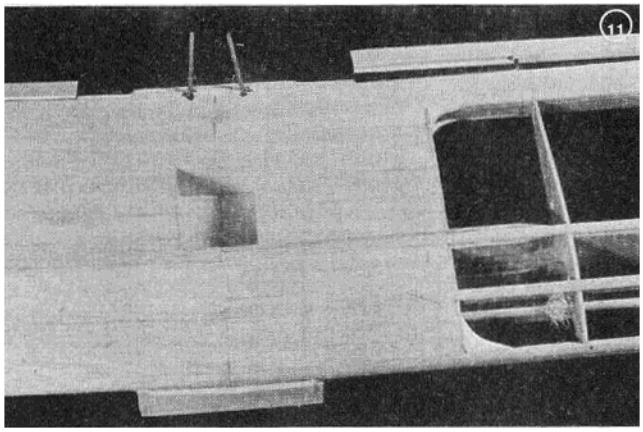


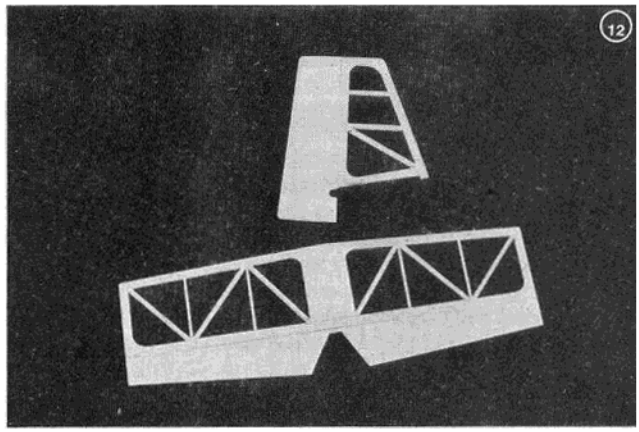


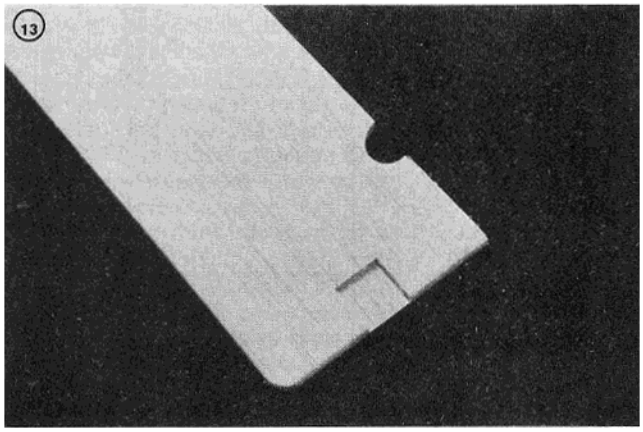
(1) The fuselage "kit" ready for assembly. (2) Fuselage sides with cabin doublers, tank and servo rails added. Cabin bulkheads are first glued to one side in preparation for assembly. (3) Firewall installation. The sides are notched to receive the landing gear mount, torque anchors are added above the mount and the mount and anchors drilled to receive the landing gear. (4) Fuel tank is installed with foam wedges after throttle line is epoxied through firewall and into cabin. (5) Foam wedge above tank completes installation and final sheeting can be done. (6) The two ribs on both side of the center section are notched at the main spars to allow installation of the dihedral braces. (7) The completed center section ready for sheeting, trailing edge top sheet has now been installed. (8) Wrap bond paper around part of sanding block to form tips, the paper keeps the sandpaper from changing the airflow at the tip.

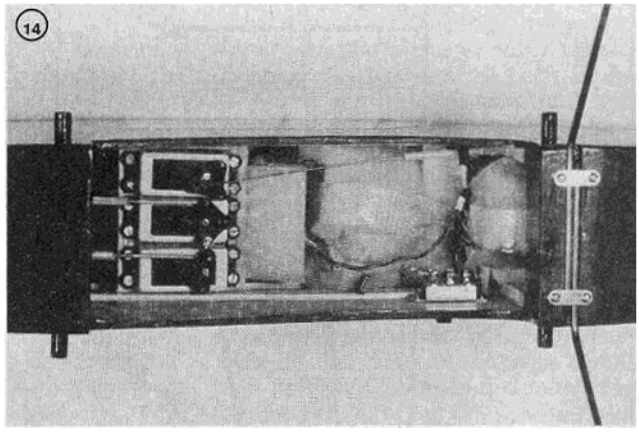


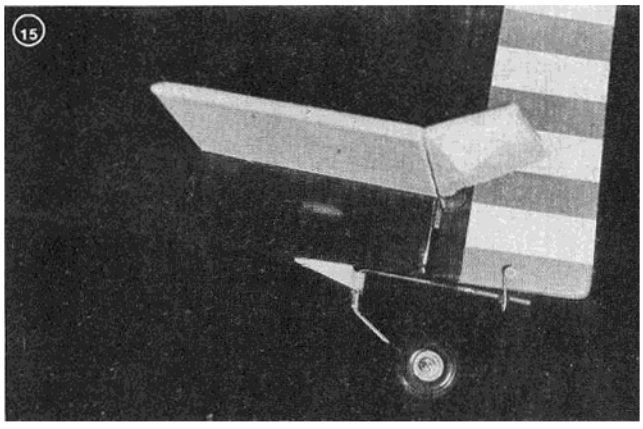


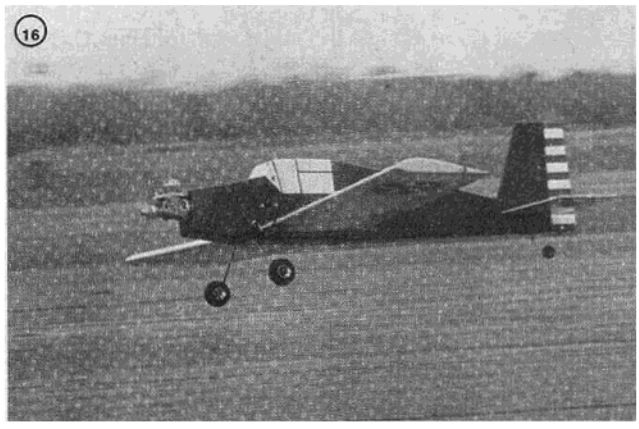












(9) Temporarily hold wing in position on fuselage to build bottom fairing on wing. Fairing is formed from the bottom sections of the sides which were cut out to make the wing saddle. (10) Complete wing to fuselage fairing. Aileron hardware can now be installed. (11) Aileron hardware installed and ailerons notched and drilled to receive aileron torque rods. Do not install ailerons until they are covered. (12) Elevator, stab and rudder, fin ready for cover. (13) Detail of bottom of rudder, notched to receive plywood insert for tail wheel tiller anchor. (14) Radio installation, battery and receiver forward, servos aft. (15) Tail wheel installation. (16) SEMPERFI.

Locate the approximate position of the elevator, rudder, and throttle servos, and install the NyRod guides for them. Install the balsa bulkhead and floor that forms the tank compartment and mount the tank with foam wedges on both sides to hold it in place. Epoxy two pieces of 1/8" brass tube through the firewall for the fuel and overflow lines and connect them to the tank with fuel line tubing. Sheet the fuselage top and bottom at the firewall, and the bottom at the tail, with 1/16" plywood as shown, and finish the sheeting with 1/16" balsa.

Drill the two 1/8" holes in the landing gear mount as shown on the plans. The holes go into the plywood pads above the mount on each side of the fuselage and receive the torque anchors of each landing gear leg. Sand the entire fuselage with 100 grit sandpaper to round the edges. Mount the wing in its saddle and hold it in position with rubber bands around the fuselage and then build the bottom fairing. The front and back of this fairing are scrap 1/8" balsa and the sides are the pieces saved from the fuselage. Sheet the bottom with 1/'6" balsa and sand to match the fuselage.

Tail:

The stabilizer and vertical fin are built over the plan from 3/8" x 3/16" and 3/16" square balsa. Pin the trailing edge in place and add the 1/32" x 3/16" plywood doubler before the 3/16" center sheet and 3/16" square ribs. The fin is built in the same way but without the plywood doubler. Cut the elevator from soft 3/16" sheet and install the 3/16" dowel through before making the rudder cut-out at the trailing edge. This is done to assure alignment of both sides of the elevator. The rudder is also cut from 3/16" soft balsa. Inlay 1/32" plywood on both sides, as shown, for the tail wheel steering bracket. Sand the completed surfaces and the airplane is ready to cover.

Finishing:

The original is covered with MonoKote --- yellow for the wing and stab, and blue for the fuselage and fin. The trim and insignia are cut from red, white and blue MonoKote. Cover the wing and ailerons separately and epoxy the aileron torque rods to the pre-drilled and notched ailerons when they are hinged to the trailing edge of the wing. The elevator and rudder should be covered before they are hinged to their mating surfaces.

Bend the landing gear from 1/8" music wire to the shape shown on the plan. Solder a washer in the bend at the axle to keep the wheel running true, and install the wheels with collars or soldered washers. The gear is mounted on the bottom of the fuselage in the grooved landing gear mounting block by sliding the torque anchors into the previously drilled holes. They are held in place with landing gear mounting brackets and small wood screws. Epoxy the wing hold-down dowels in place and paint them with epoxy to protect them from the exhaust. The tail wheel mount is cut away at the top rear to clear a bend in the 1/16" music wire strut which forms the tiller. The strut is bent to shape and the tail wheel is installed before the mount is epoxied to the plywood mounting plate. The tiller is run through a U-shaped bracket in which a rubber grommet has been installed, and the bracket is bolted to the plywood pads at the bottom of the rudder. This type of mounting gives some reduction in the steering rate and aids in ground stability.

Before installing the motor mount, it is a good idea to give the firewall a coat of epoxy paint to match the fuselage; it looks good and protects the plywood from oil and dirt. Overlap the MonoKote slightly at the firewall to seal the sides.

The throttle line to the engine is iron florist's wire and there is a V-shaped link bent in it just forward of the firewall at full low throttle to act as an adjustment and a strain relief. It is connected to the throttle servo with a Z bend. The ailerons, elevator, and rudder, are connected with standard hardware and/or NyRod and clevises.

Balance the airplane at the Center of Gravity shown. This is accomplished by moving the servos fore and aft until the desired CG is attained. The batteries should be in front of the 1/4" ply bulkhead (F2). The antenna is run out through a small piece of plastic tubing epoxied to the top of the cabin and is connected to the top of the fin with a pin and small rubber band.

Flying:

Semperfi handles well on the ground and, when the throttle is advanced, the tail will come up all by itself; when it does, it is ready to rotate. The original model needed right trim on the initial flight due to a warped wing but, after a session with the heat gun, all trim was returned to neutral. The airplane has no bad habits and has quite a wide performance envelope --- and it sure looks good against a blue sky and white clouds. Build one, you'll like it! □

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