

SZD-30

Pirat

By Mike Hollison



If you have been wanting to give a scale sailplane a try, but were concerned about lengthy construction and performance, then maybe this is the plane you've been waiting for.

size Pirat lends itself very well to conventional balsa and ply modeling, and results in a light and maneuverable R/C sailplane well within the building skills of the experienced modeler.

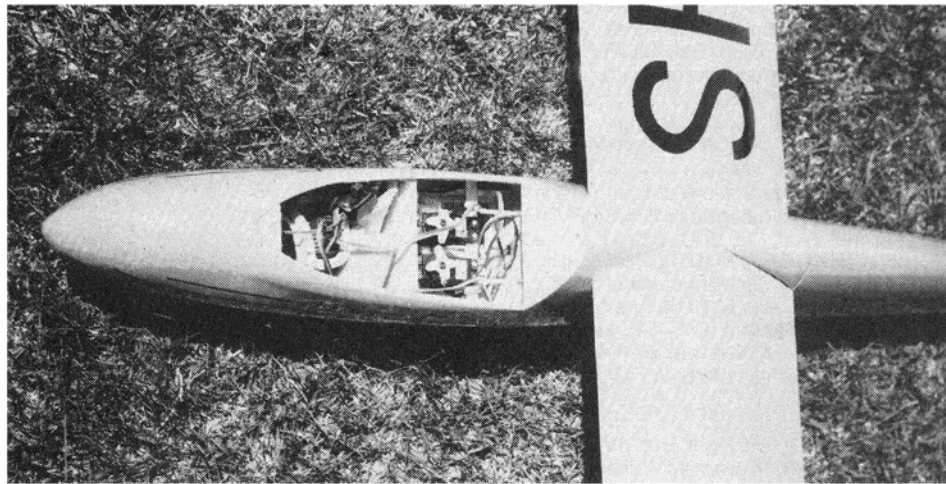
CONSTRUCTION

(1) Start with the fuselage by cutting all the formers to shape, drilling them for pushrods and/or wing mount as indicated, and halving formers F-2 to F-8.

The Instytut Szybownictwa (SZD) was responsible for the design and development of all gliders and sailplanes in Poland between 1947 and 1980. Over 4000 aircraft of more than 100 different types were produced and exported all over the world, a tribute to the excellence of the Polish sailplane industry and its flying machines.

The SZD-30 Pirat first flew in 1966, production started in 1967, and by the end of 1976, over 700 had been built, illustrating both the success and popularity of this design.

The Pirat is a multi-purpose sailplane designed for both training and competition flying, and is capable of basic aerobatics. Being of mainly wood construction, the full



(2) Cut the balsa spine and keel to length, lay them over the side view on the plan and glue F-4 through F-7 in place.

(3) Position former F-3 over the plan and connect to the rest of the fuselage with 1/4" sq. balsa longerons.

(4) Next, add F-2 and join to F-3 with the lower 1/4" sq. longeron.

(5) Glue former F-8 in place, and proceed to sheet the fuselage with 1/16" balsa fore and aft from F-3 to F-8, and from the spine down to the bottom longeron. The bottom of the fuselage between F-4 and F-8 is sheeted after the elevator, rudder, and radio antenna lead-outs have been installed. Remove the fuselage assembly from the board.

(6) Epoxy the remaining halves of formers F-2 through F-7 to the fuselage shell, adding F-3a to F-3, and the 1/4" ply



SZD-30 PIRAT

Designed By:

Mike Hollison

TYPE AIRCRAFT

Stand-Off Scale Sailplane

WINGSPAN

109 Inches

WING CHORD

6-7/16 Inches (Avg.)

TOTAL WING AREA

701 Sq. In. (Approx.)

WING LOCATION

Shoulder

AIRFOIL

Undercambered

WING PLANFORM

Constant Chord Center

Tapered Tip

DIHEDRAL, EACH TIP

1 Inch

OVERALL FUSELAGE LENGTH

49½ Inches

RADIO COMPARTMENT SIZE

(L) 9" x (W) 4" x (H) 2½"

STABILIZER SPAN

24 Inches

STABILIZER CHORD (incl. elev.)

6 Inches

STABILIZER AREA

144 Sq. In.

STAB AIRFOIL SECTION

Semi-Symmetrical

STABILIZER LOCATION

Top of Vertical Fin

VERTICAL FIN HEIGHT

9 Inches

VERTICAL FIN WIDTH (incl. rud.)

6¾ Inches

ENGINE SIZE

NA

FUEL TANK SIZE

NA

LANDING GEAR

NA

REC. NO. OF CHANNELS

3

CONTROL FUNCTIONS

Rud., Elev., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

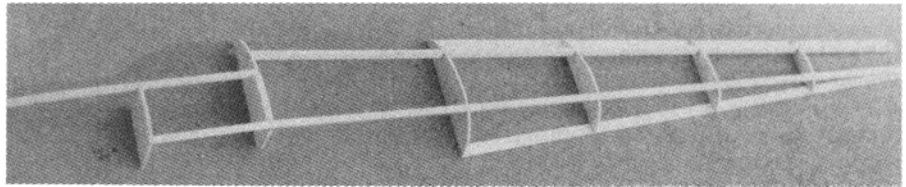
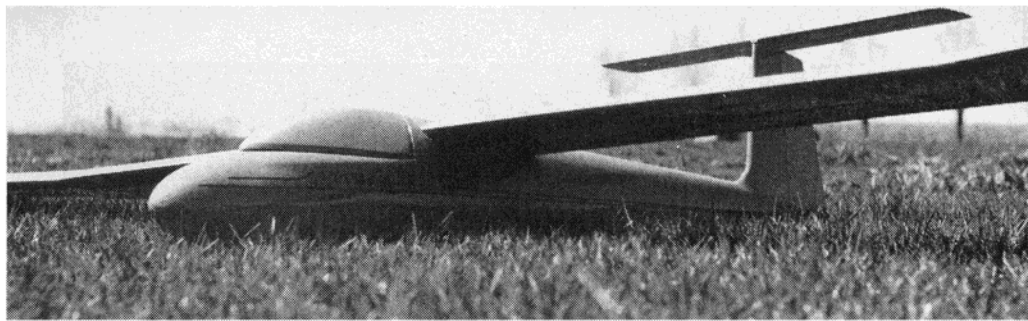
Fuselage Balsa, Ply & Fiberglass

Wing Balsa & Spruce

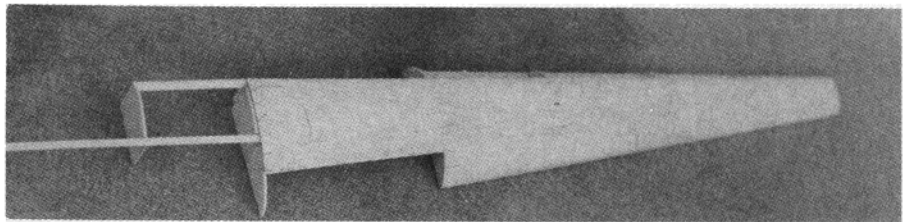
Empennage Balsa

Wt. Ready To Fly 64 Ozs. (4 Lbs.)

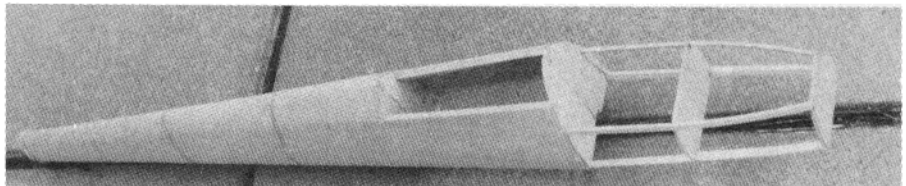
Wing Loading 13.1 Oz./Sq. Ft.



Fuselage assembly begins by gluing formers to spine and keel, then adding longerons.



1/16" balsa skin is glued to basic framework and held in place until glue dries.



The opposite side's formers, longerons, and skin is then added to the first side, being careful of alignment.

extension plate to F-4. Bolt the Du-Bro wing bracket to F-4.

(7) Glue all longerons in place, epoxy former F-1 in position, and sheet the second half of the fuselage as described above.

(8) Next, glue F-2a to the edges of F-3 between the top and bottom longerons; these will provide a surface on which to glue the forward fuselage sheeting between F-1 and F-3. Cement these 1/16" sheet balsa sides in place, then fiberglass the inside of the fuselage between F-1 and F-4.

(9) Carve the fuselage bottom from soft balsa block, using the template cross-sections shown on the plan, and glue in place between F-1 and F-3. Bolt a cut-down Airtronics tow hook mount to a strip of 1/2" sq. pine, recess this into a second balsa block, and cement this to the bottom of the fuselage between F-3 and F-4.

(10) Now, carve the nose cone from hard balsa and epoxy to F-1, then cement the carved balsa cockpit decking to the top longerons between F-1 and F-3. Add the tapered balsa fuselage block to the front of F-3 (immediately behind the canopy position) and drill a 1/4" diameter hole for the canopy and wing retaining dowels.

(11) Finally, glue the 1/4" balsa wing shoulders to the top longerons between F-3 and F-4, shaping them to fit the underside of the wing.

The basic fuselage structure is now complete, save for the canopy and the bottom fuselage sheeting between F-4 and F-8.

Fin

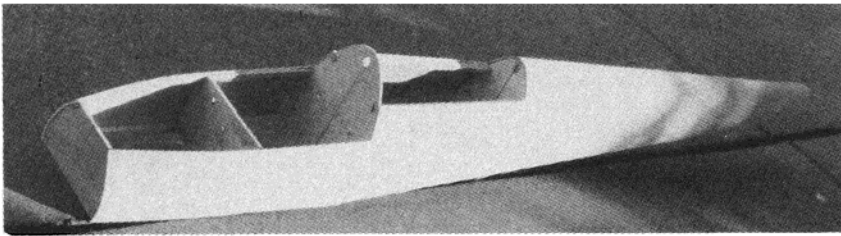
(1) Cut the 1/4" sq. balsa leading edge and the 1/4" balsa tapered fin post to length, epoxy the rudder hinges into the post, and lay both over the plan.

(2) Cut out fin ribs T-1 to T-3, punching out holes for the elevator pushrod as shown, and glue in place. Epoxy the 1/4" ply stabilizer mounting plate in position, and sheet one side of the fin with 1/16" balsa.

(3) Cut the elevator pushrod tube to the correct length, and epoxy one end into the fin as shown. Sheet the remaining side of the fin with 1/16" balsa.

(4) Now, drill a hole for the pushrod tube in the top of the fuselage, slide the tube down the length of the fuselage through F-7 to F-2, and epoxy the fin in place. Fill any gaps between the fin and fuselage with a mixture of epoxy and micro-balloons, then fair in to make a smooth joint to the fuselage.

(5) Finish the fuselage by adding the rudder pushrod, radio antenna tube, and sheeting the bottom of the fuselage from F-4 to F-8 with 1/16" balsa. Carve the canopy from light balsa, epoxy the 1/4" diameter retaining dowel in place, cement one half of



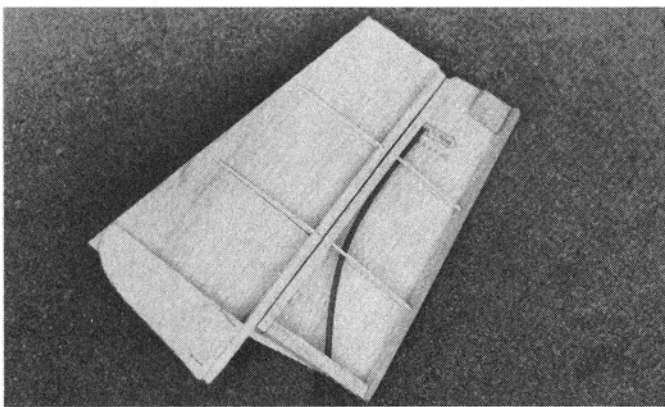
With all the skin in place, fuselage is ready for nose and bottom balsa blocks.

a snap fastener to the front of the canopy and the other half to the fuselage as shown.

Wing

The wing is made in three sections; a bolted-down center panel and two removable tip panels. Begin the left half of the center panel first.

(1) Cut the 1/4" sq. spruce leading edge, the 1/8" x 1/4" spruce bottom spar and the 1/8" balsa rear spar to the correct lengths,



Vertical fin and rudder, with outer flex tube in place for the stabilizer control. Note: Check plans and text for minor changes in construction not shown in photo.

and lay them over the plan, after first slotting the rear spar for the wing ribs.

(2) Cut all wing ribs as shown, glue W-3 ribs in place, and add the top spar.

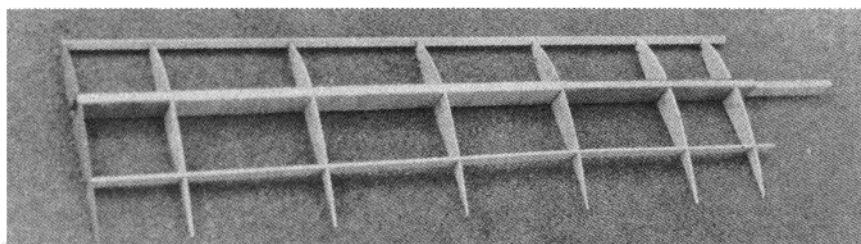
(3) Next, cut the 1/4" ply center section wing joiner to size, and epoxy in place between the top and bottom spars.

(4) Fill in the gaps between the spars and the first two W-3 ribs and rib W-2 (not yet added) with 1/4" balsa sheet.

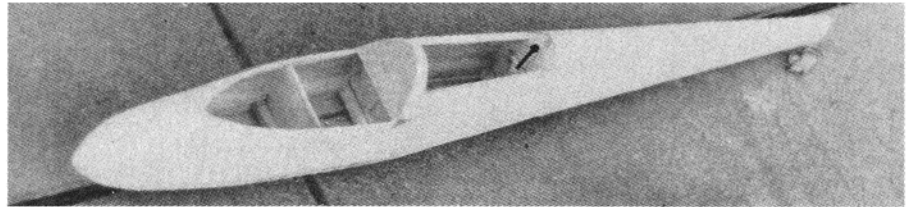
(5) Now, cut the two webbing plates (W-12) from 1/16" ply, and epoxy in position between W-1 and W-3.

(6) Epoxy ribs W-1 and W-2 in place, then add the 1/16" balsa vertical grain webbing between the remaining W-3 ribs.

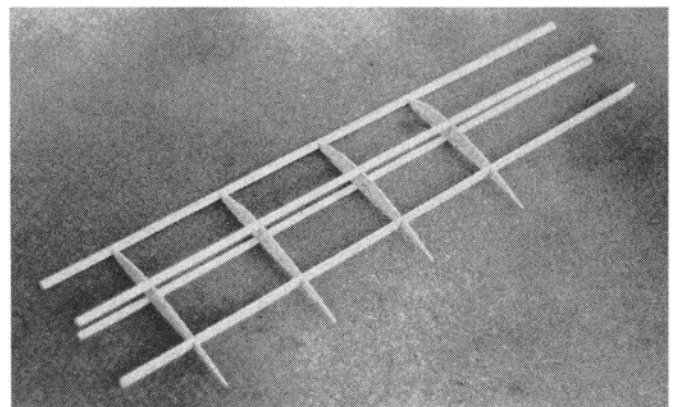
(7) Cut two W-13 pieces from 1/16" ply, and epoxy between W-3 and the end of the



Shear webs and wing joiner boxes all in place, ready to add 1/16" balsa bottom sheeting. Note: Aileron control cable tubing and wing dowel/mounting blocks are installed prior to sheeting.



Completed fuselage, ready for installation of vertical fin assembly.



Center section frame is made up using spruce leading edge and front spars, with balsa rear spar.

wing. Epoxy W-4 in place.

(8) Sheet the bottom of the wing panel with 1/16" balsa, then add the scrap balsa blocks for the hardwood alignment dowel and wing mounting bolt at W-4 and W-1 respectively.

(9) Epoxy the aileron steel cable tubing through ribs W-2 to W-4, then sheet the top of the wing with 1/16" balsa.

(10) Repeat steps 1 through 8 (Step 3 involves merely epoxying the wing joiner between the spars) for the right side of the center panel.

(11) Fiberglass the center section top and bottom around W-1 and W-2 with 3" wide fiberglass tape, cutting out the bottom of the sheeting between W-2 and the leading edge for the aileron servo.

(12) Drill the scrap balsa blocks at W-4 and W-1 for the wing dowels and mounting bolt, then bolt the wing onto the fuselage. Using F-3 and F-4 as template guides, carve the L.E. and T.E. fairings from soft balsa and cement in place, drilling the L.E. fairing for the 1/4" diameter hardwood wing retaining dowel, and the T.E. fairing for the wing mounting bolt.

The center panel is now ready for

finishing. Begin the left outer panel as follows:

(1) Cut the 1/4" sq. spruce leading edge, the 1/8" x 1/4" spruce bottom main spar, and the 1/4" balsa rear spar to the correct lengths and lay them over the plan, after first notching the tapered rear spar for the wing ribs. (Be sure to make one right and one left.)

(2) Glue ribs W-5 through W-11 in place, saving the aileron portion of ribs W-7 to W-9 for later. Prop up the T.E. of W-11 with 1/4" scrap to build in the desired washout.

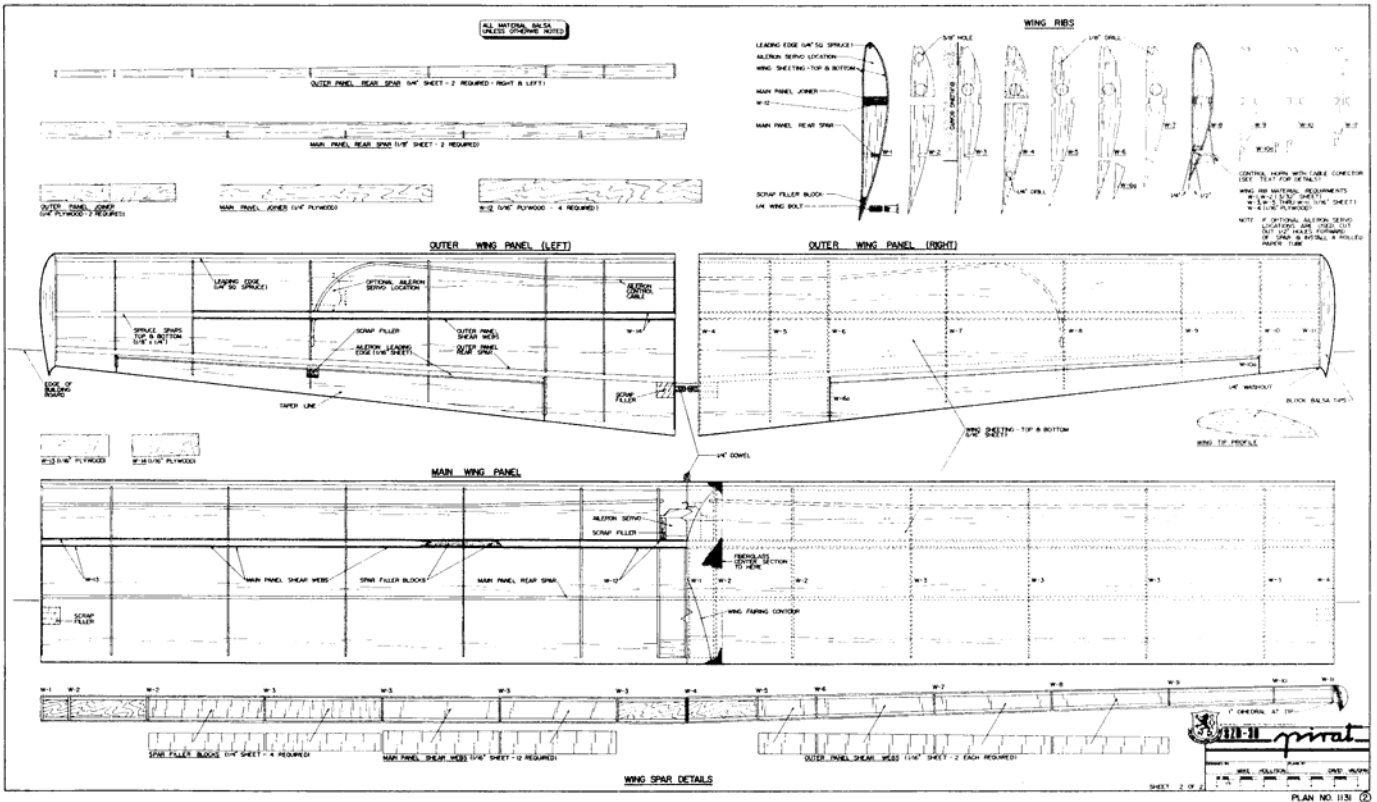
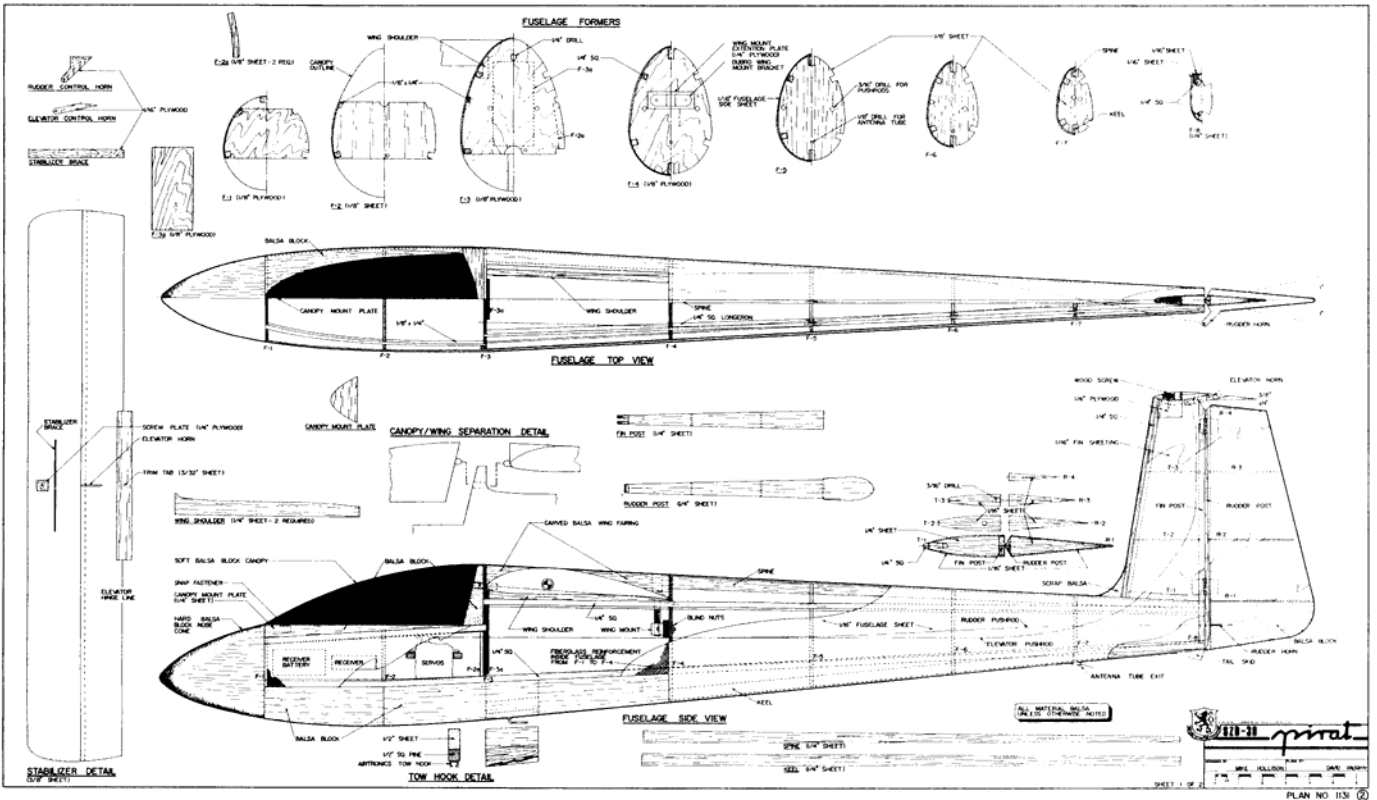
(3) Cut two webbing panels (W-14) from 1/16" ply and epoxy between W-5 and the end of the panel. Epoxy W-4 in place.

(4) Next, add the 1/16" vertical grain balsa webbing between ribs W-5 through W-9.

(5) Sheet the bottom of the wing panel with 1/16" balsa, snake the aileron control tubing through the ribs as shown so that it emerges through the top of the wing at W-8. Add the scrap balsa blocks to the inside of W-4 for the wing locating dowel. Epoxy the tubing firmly to W-8.

(6) Now, sheet the top of the wing with 1/16" balsa and glue on the carved Hoerner tip.

(7) The aileron is constructed by laying



down the bottom 1/16" balsa sheeting over the plan, and cutting the tapered leading edge from 1/16" balsa, then cementing it to the sheet, angled back to allow free upward movement of the aileron.

(8) Glue ribs W-6a through W-1a in

place, add the piece of scrap balsa at W-8 for the control horn mount, and sheet the top of the aileron with 1/16" balsa.

(9) Repeat steps 1 through 8 for the right wing panel.

(10) Now, cut two wing joiners from

1/4" ply and two wing alignment pins from 1/4" dia. x 1 1/8" long spruce dowels. Temporarily assemble the wing, ensuring that the joiners and dowels fit tightly, and that there is approximately 1" dihedral under each tip.

(11) Attach the control horns to the top of each aileron as shown. The steel flexible control cable should be fixed permanently to the aileron servo, and slid through the tubing of each outer panel when the wing is assembled, then secured to the aileron control horn by means of a Du-Bro cable connector. Set up the servo throws for aileron differential (more up than down).

The wing is now ready for finishing; afterwards the ailerons should be hinged at the bottom with iron-on covering or tape.

Rudder

(1) Lay the 1/16" sheet balsa side over the plan, cut the tapered rudder post from 1/4" balsa, and slot for the hinges.

(2) Cut out ribs R-1 to R-4 and glue in position.

(3) Cement the remaining 1/16" balsa side to the structure and sand smooth. Add the balsa block to the bottom of the rudder and attach the 1/16" plywood rudder horn. Add the rudder to the fin after finishing and connect to the rudder control pushrod.

Stabilizer

(1) Cut the stabilizer from a sheet of lightweight 3/8" x 4" x 24" balsa and carve to the airfoil shape indicated on the plan.

(2) Separate the elevator portion from the stabilizer and bevel the leading edge of the elevator to allow for down movement. Glue the trim tab to the trailing edge as shown.

(3) Slot the stabilizer and epoxy a 1/16" ply brace across the center section. Next, add the 1/4" ply mounting plate to the stabilizer and drill for the hold-down wood screw. Slot the rear of the stabilizer for the elevator horn.

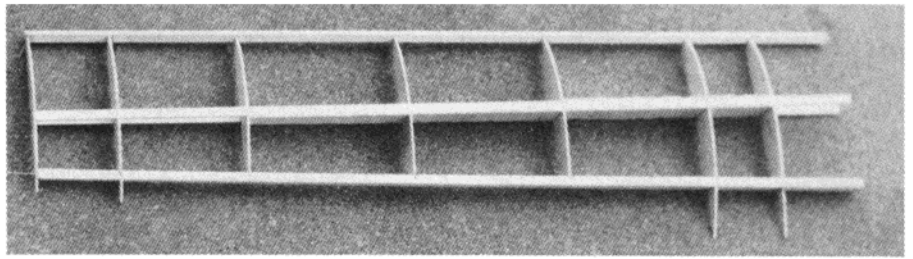
(4) Cover or paint the elevator and stabilizer, then hinge the elevator to the top of the stabilizer with iron-on covering or tape.

(5) Attach the elevator horn to the beveled edge of the elevator. Next, slide the elevator pushrod through the fuselage tubing and up into the rudder, twist a clevis onto the end, and clip this onto the elevator horn. Epoxy the stabilizer to the top of the fin, making sure that the elevator horn and clevis don't bind.

(6) Epoxy 1/4" triangular balsa stock to the underside of the stabilizer on each side of the fin for additional support. Finally, install a small wood screw through the elevator and fin mounting blocks.

Finishing

All that remains now is to paint or cover your completed Pirat in your favorite color;



Tip panel framed up, ready for bottom sheeting.

I chose orange with the Polish registration letters SP plus a four-digit number in black, top and bottom of the wing center panel, and the word "Pirat" immediately beneath the cockpit.

Radio

The model uses three servos; rudder and elevator servos in the nose between F-2 and F-3, and the aileron servo in the wing center section between the leading edge and the main wing spar. Batteries and receiver are in the nose between F-1 and F-2.

Add a tail skid, and balance the model as per plan. Control travel of the ailerons, rudder, and stabilizer are as follows: 1/2" up and 1/4" down for the ailerons, 3/8" up and 1/4" down for the stabilizer, and about 1" either way for the rudder, all measurements being taken at the trailing edges of the control surfaces. Your Pirat is now ready for the field.

Flying

Assembling the aircraft merely involves sliding the aileron control cables through the pushrod tubing in the outer wing panels when joining them to the center section, then bolting the wing to the fuselage after connecting up the aileron servo to the receiver. Secure the control cables to the ailerons by means of the Du-Bro cable connectors, making sure that each aileron is set at neutral. Switch on the radio and your model is ready for flying.

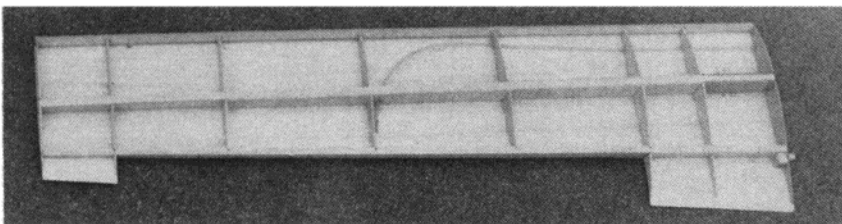
The Pirat is light enough to hand-launch, and after you have a nice flat glide, crank in a little elevator down trim. This will ensure the model doesn't stall on the winch. (T-tail sailplanes have a tendency to drop their "rear ends" on launching, and this action, coupled with the Pirat's narrow wingtips will almost guarantee a tip-stall.)

Let your Pirat rise-off ground at full winch power, then when the model is about ten feet off the ground and rising smoothly, ease up on the foot-pedal, apply a little up-elevator, and pump the sailplane up to

release height as you would a sport model.

Allow the Pirat to fly itself off the line, trim for a medium forward speed, and start hunting for thermals. The Pirat is a light model and will indicate the presence of a thermal by either rising, or turning out of the lift; simply apply the appropriate rudder/aileron movement and the model will turn on its wingtip. Keep it in the thermal and you'll soon be a dot in the sky!

In the absence of any thermal lift, try flying the Pirat from a good slope — mine flew for over an hour on its first flight. Either way you go, the Pirat is a pleasure to fly and always looks good in the air. □



Aileron control cable tubing is glued in place, and the tip panel is ready for the top sheeting.