DON QUIXOTE

Designed and built by LADDIE MIKULASKO, as told to JACK ROUSSEAU . . . Truely an international project, the design is by a Czechoslovakian now living in Canada, and the Polish aircraft was named after a Spanish nut who rode around the countryside on horseback, knocking out windmills!

• "Don Quixote" is a Polish homebuilt design which I first saw in the Polish publication *Skridlada Polska*. I fell in love with the shape of the plane right then, but couldn't get any more information until about two years later, when a friend from the C.S.S.R. sent me the Polish model magazine Modelarz, in which were published three-view drawings and pictures of the airplane.

I started the plans and drawings that same evening, and had the model finished a month and a half later.

The model looks quite unusual in the air, but the controls are easy and landings are slow and gentle. On the first flight, she took right off, with no trim changes needed at all.

After a long and happy flying season, I sold the model and built a new, slightly improved version. This is the airplane presented in this article.

The model should be built in this order: Fuselage and vertical stab; Engine and Wing Mounting Pylon; Wings, Horizontal Stab, and Movable Surfaces.

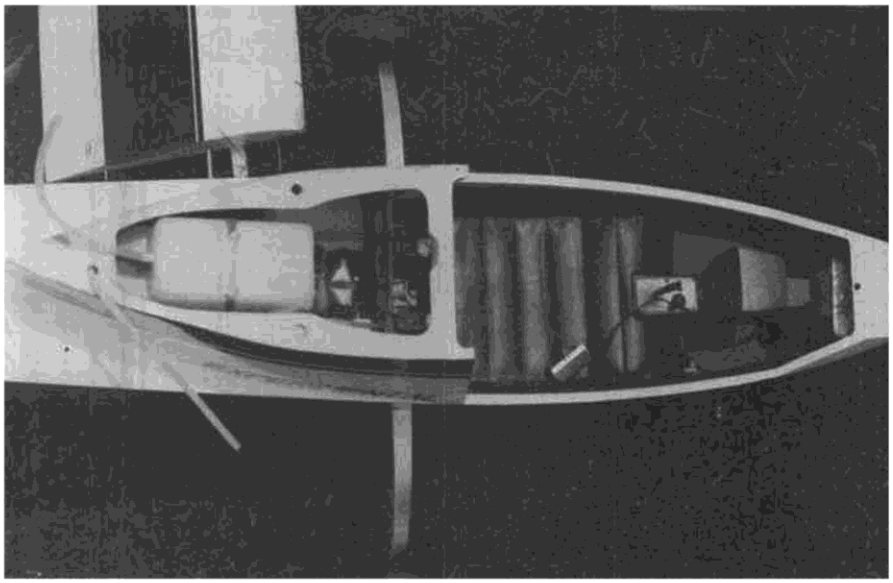
FUSELAGE

The fuselage is all-balsa with plywood bulkheads. First, cut out all the plywood bulkheads, and the balsa sides (59) from 1/8 balsa. Cut out the cockpit area doubler (60) from 1/8 balsa, and (61) from 1/32 ply.

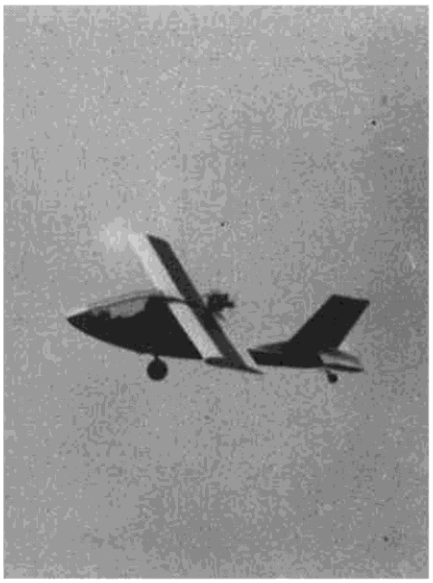
When all these parts are cut, take a piece of 1 inch dowel and roll with light pressure over the balsa sides from nose to bulkhead location "E", to give the balsa a natural curve roughly the shape of the airplane's nose. Do the same thing to the balsa doublers (60). Note: Don't forget, one is left, and one is right side!

Now you have to make the jig for getting the exact curve of the nose of the airplane when laminating the fuselage sides. The jigs can be made from scrap balsa or heavy cardboard, to the sizes shown on the plan.

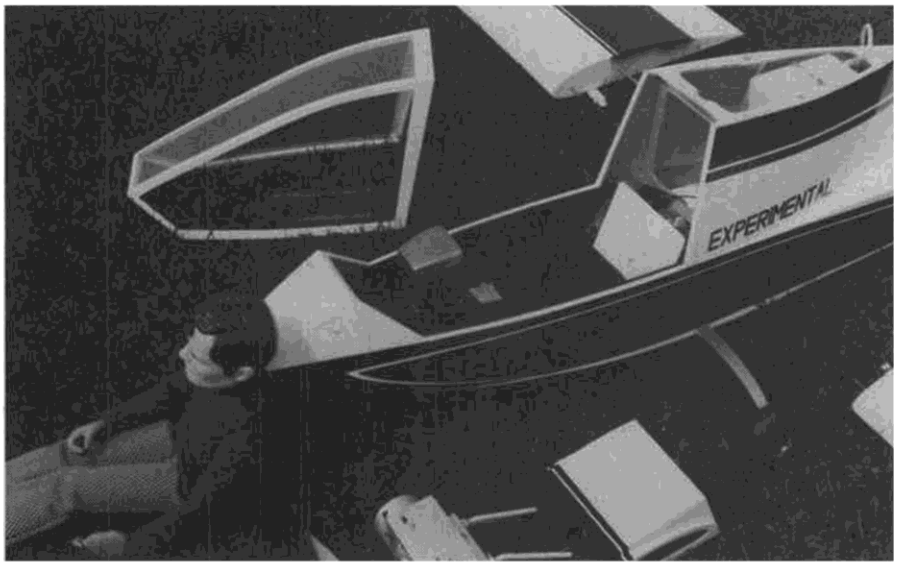
Lay each fuselage side down with the jigs positioned as shown and apply contact cement or polyester resin (I prefer resin) where the doublers will go. Lay the balsa doubler in place, apply the next layer of resin, and lay the plywood doubler over top immediately. Note: This has to be done *fast;* don't use too much hardener or the resin will cure too



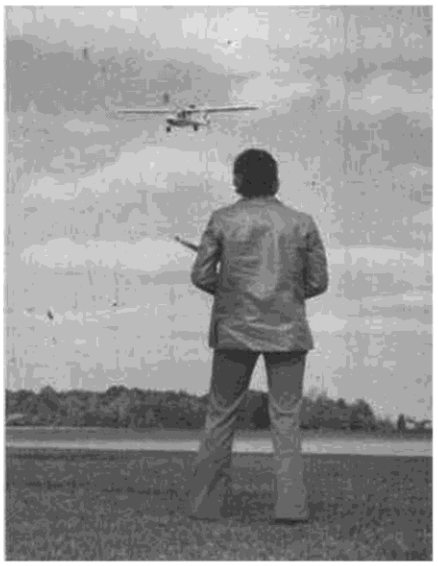
Overhead view of cockpit, showing seat and instrument detailing. Radio is hidden under and behind seat, battery pack is ahead of instrument panel. How 'bout them pleats!



Yes it do fly, and with extreme ease! Author has built two, and neither needed flight trim.



How's that for a nice, flat, do-it-yourself canopy? With all of that "greenhouse", a detailed cockpit is just about a necessity. Single strut landing gear bent from thick aluminum.



A slow and easy pass for the photographer. Slight dihedral eliminates scale 'saggy' look.

quickly for you to get everything lined up.

Pin the assembly down at bulkhead "E" and put a weight on top of it in the cockpit area so that the fuselage side touches each point of the jig. Once one side is complete, you can remove it and do the other.

From now on, the building is easy.

Glue the longerons (68) to the fuselage sides from where the doublers end all the way back to the end of the fuselage side. Glue in the balsa cross-webs as shown.

Now we come to that "easy" part I was telling you about. Because the fuselage is perfectly flat on top, you can build the whole thing upside-down on top of the plan.

Pin the fuselage sides upside-down, standing up on the plan and install half-bulkheads "A-1", "B" and "C".

Install the 1/4 sq. fuselage cross-braces between the fuselage sides as shown, lying on the plan, and glue the narrow half-bulkheads "H", "I" and "K" into position.

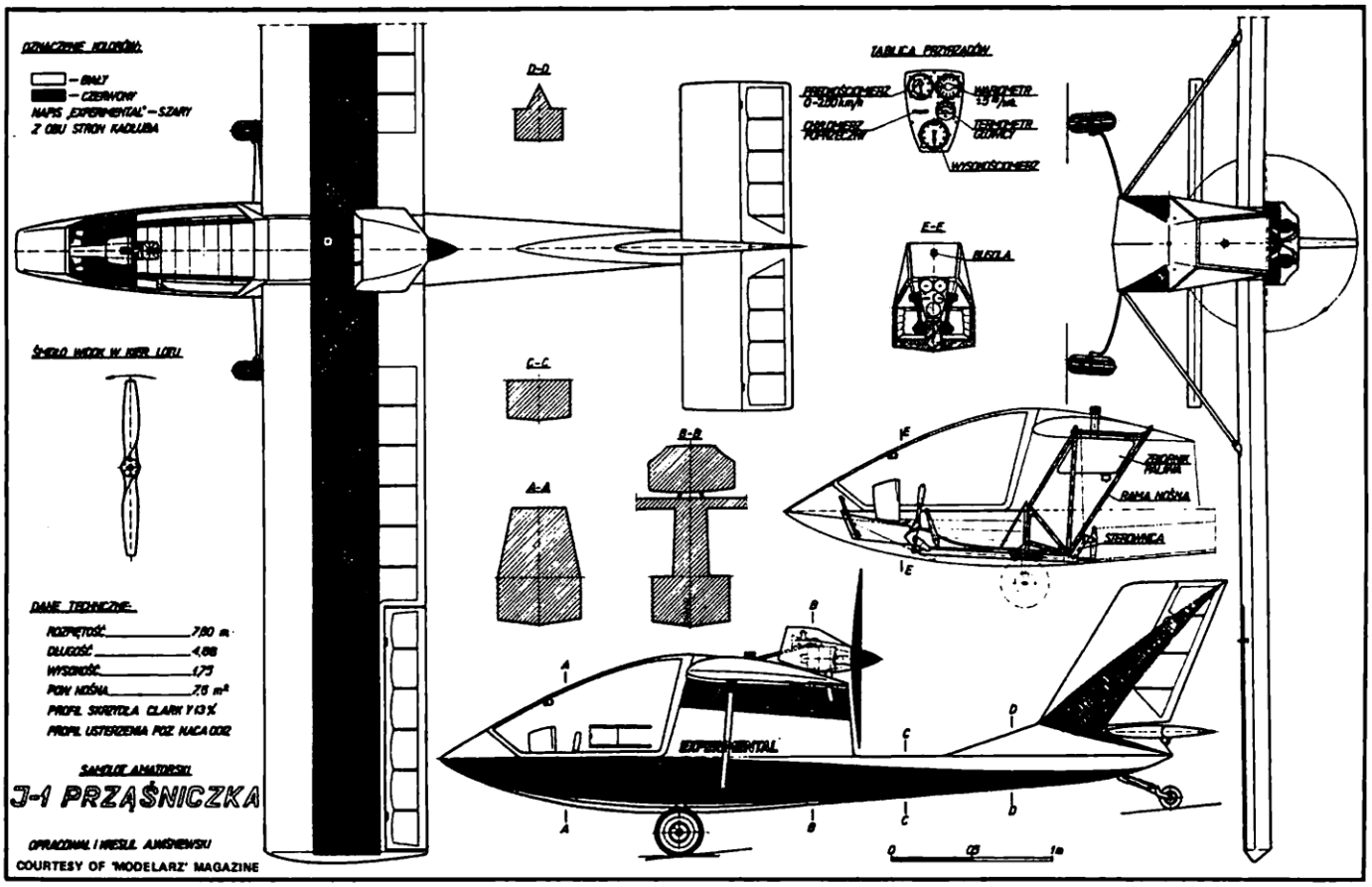
When dry, turn the fuselage right side up and install bulkheads "E", "F" and "G". Then glue the 1/8 plywood mounting base (65) for the engine/wing pylon on top of them. Install spruce triangle stock (64) where the bulkheads butt up against the pylon mounting plate.

Install plywood nose former "A-2" and also nose sides (53) and top (52).

Cut out the fuselage top sheeting from 1/16 balsa and glue it to the top of the fuselage.

Glue the two spruce stiffeners (63) at the rear of the cockpit area and the single trailing-edge stiffener (66) from the pylon mounting plate to the top of the fuselage.

Between bulkheads "F" and "G",



glue the 1/8 balsa fuel tank compartment floor (79).

Cut out and glue on 3/32 balsa side sheeting (67).

Glue in the 1/16 ply cabin floor.

Install the balsa fuselage keel stringer (69).

Glue in the rear fuselage bulkead "J".

The vertical stab should be built at this time so you can glue it to bulkhead "J", with its pine trailing edge stiffener extending down "J" to the center line of the fuselage. Construction of the vertical stab and rudder is similar to the horizontal stab and elevator. The plans should be self-expalanatory.

Once you have the vertical stab completed and installed as described, glue on the triangular leading edge (80) of the fin, and install balsa former "Q".

At this stage, you must fashion and install the control rod and horn for the rudder, which is made from 1/16 piano wire with a metal control horn (76) silver-soldered to its bottom.

Slide a piece of Nyrod inner tubing (85) over the wire and bend the top of the wire to the shape shown on the plan. Fasten the tailwheel-steering cables to the bottom horn and install the assembly, glueing the nyrod to the pine stiffener extension (83).

Now install the Nyrods for the rudder and elevator.

For the rudder klevis, I prefer the new Du-Bro threaded ball-links, as the swivel action absorbs any binding side-to-side motions.

The Nyrods should be secured between bulkheads "G" and "J" so that they can't twist or vibrate in flight.

Install the 3/32 sheeting (70) between the vertical stab and the fuselage.

At the rear of the fuselage, glue the 1/4 inch balsa strips (71) on both sides and the plywood end bulkhead "L".

Bend the tail-skid (72) from 3/32 steel, 3/8 inch wide . . . preferably spring-steel.

Silver-solder tube (74) to it and install the 1/32 steel stiffener (73).

The tailwheel fork is 1/32 steel drilled in the center for a 6-32 screw and silver-soldered. The screw goes through the tubing and horn (75) is silver-soldered on top of it. The fork and horn must move together freely for good steering.

The tailwheel assembly is fastened to bulkhead "K" with two 4-40 bolts. The two control cables from horn (76) protrude through bulkhead "K".

Now, the bottom of the fuselage can be completely sheeted with 3/32 balsa from nose to tail.

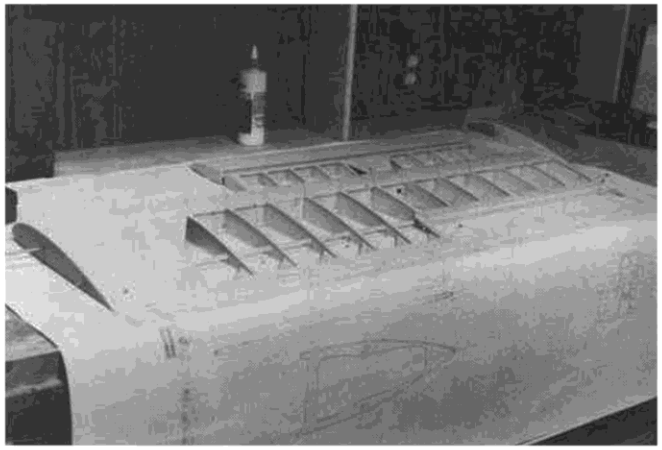
Install 1/4 bulkhead "E-1" in the fuselage and glue hardwood block (78) for the landing gear as shown.

Install plywood stiffener (77) as shown.

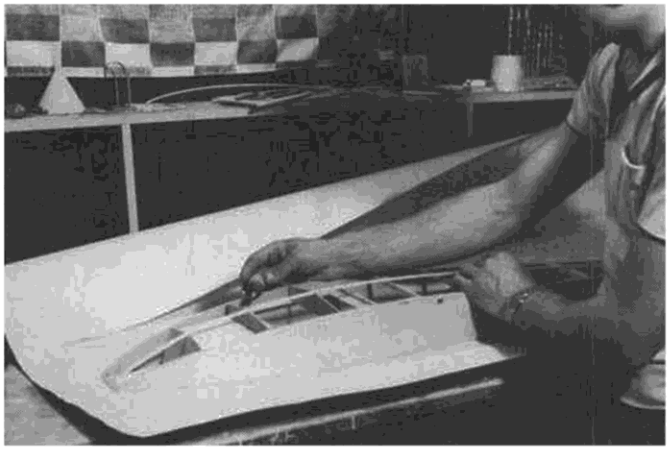
Glue the horizontal stab *(Whoops! Gotta build it first! See further on. wcn)* to the fuselage and drill a 1/16 hole through stiffener (29) in the hori-

The author and his second "Don Quixote". Slight modifications from the first one are included in the plans. Pusher configuration requires reversing engine operation or L.H. props. See text.

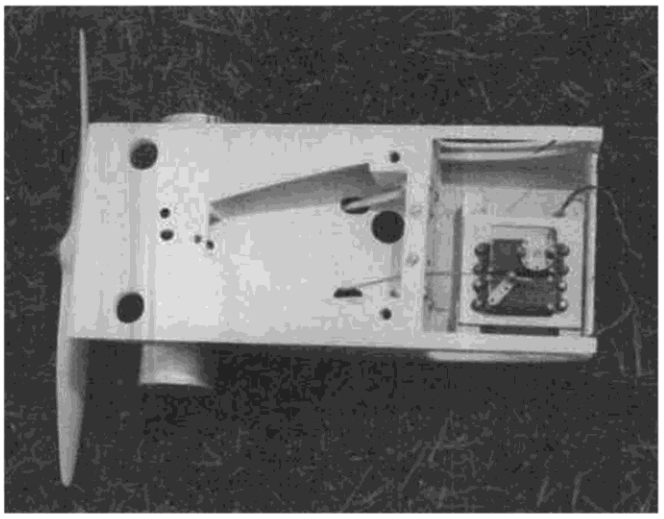
Gosh, that was a hard landing! A lesson learned from R/C sailplanes . . . Two half wing panels are easier to pack than one whole one! Center section also removes for access to fuselage.



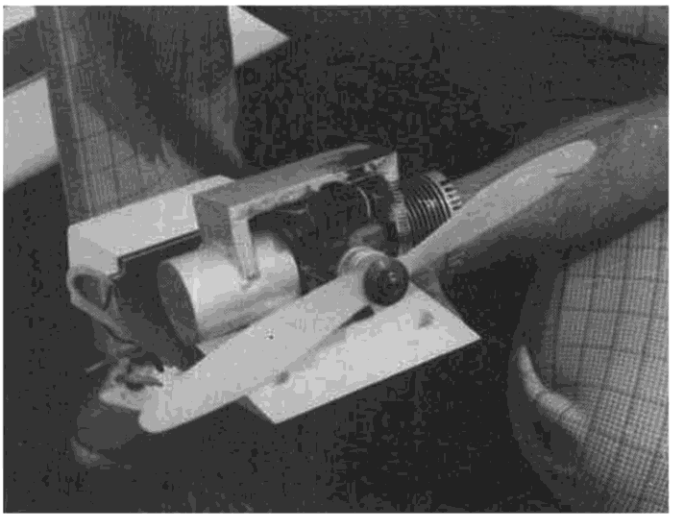
Right wing panel during construction. Flat bottomed airfoil simplifies building. Gee, what a neat workbench!



Fuselage is also easy to build on the board because the top is flat. Sides are prebent when doublers are glued on.



Underside of centersection pod, showing aileron and throttle servos. Fuel must be pressurized, or pumped. Dummy cylinder is muffler.



Top side of centersection pod, showing dummy engine cylinder which acts as muffler. Silver soldered from 1/64 sheet steel.

zontal stab and the 1/4 inch balsa (71) at the fuselage rear. Glue a dowel in this hole to pin the stab in position permanently.

The cockpit frame is made from four layers of 1/16 balsa laminated together. For a pattern, use pins or cut the shape out of cardboard. Use Titebond or similar glue for this job.

When the glue is dry, lay the plywood end plates "A-3" and "D-1" into position in the fuselage and glue the laminated frame members (57) and (58) to them to rough out the canopy shape.

When dry, sand everything to the proper angle and about 1/16 smaller than the finished outline. The inside of the frame can now be filled, primed, and painted white.

Now take clear plastic or acetate sheet for the windows and cut it out about 1/8 inch larger than the frame. Sand around the outside edges of the plastic about 1/4 inch in on both sides with fine sandpaper for a good gluing surface, and glue it to the frame with slow-curing epoxy. Use masking tape to hold the plastic to the frame while drying.

The outside framing is then made from thin white plastic or ABS sheet, lightly sanded on the inner side and glued over the clear plastic with epoxy.

The sliding window is on the left side. It should be made before you glue the left side window material to the frame.

The inside of the cockpit is done after the model is finished and painted.

The instrument panel column and seat are made from 1/16 balsa with the upholstery as follows:

Cut the sides from thin cardboard.

Glue 1/8 inch foam to the cardboard.

Cover it with leatherette, folding the sides around the cardboard and gluing them to the bottom side.

Draw lines with a soft pencil where the leatherette is to be sewn.

Sew the stitch lines right through the cardboard.

Do the same for the seat cushion.

LANDING GEAR

The landing gear is made from 3/16 or 5/32 dural.

First, drill all the holes, and then bend it to the shape shown on the plan. You shouldn't have to heat the aluminum to bend it.

WING CENTER SECTION AND ENGINE MOUNT

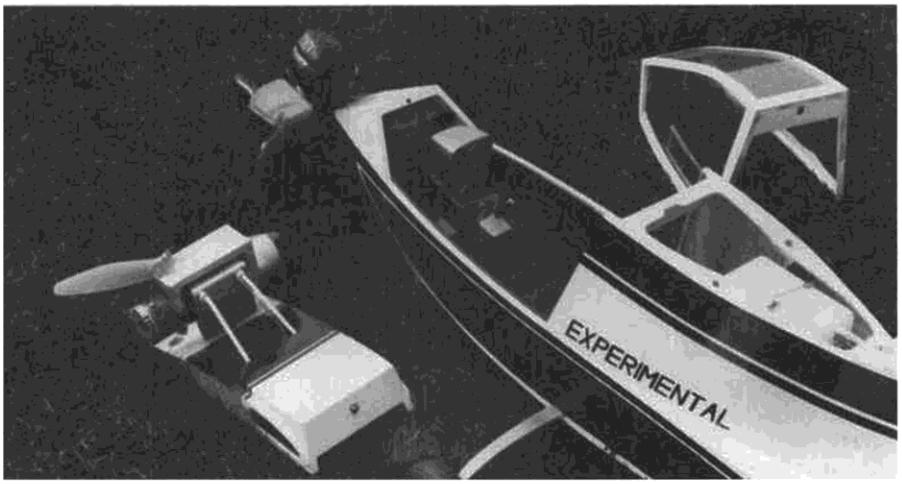
Cut out the two plywood pieces for the main spar center brace (39) with all holes and center lines as shown on the plan.

When done, take one side and epoxy the 3/16 brass tube right on the centerline of the brace.

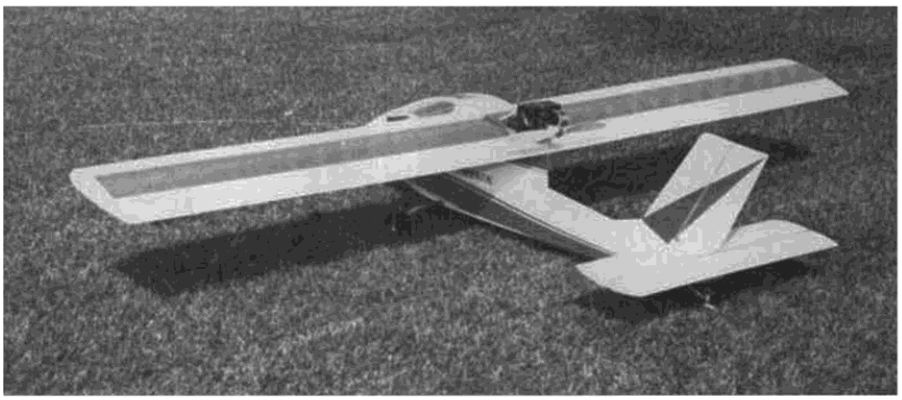
Glue in the 1/4 x 1/8 and 1/4 sq. spruce filler pieces and glue on the other side of the brace. Make sure everything lines up, and then fill the rest of the spaces between the balsa and sand smooth.

Cut out two airfoils "C-1" and drill holes 3/16 and 1/8 for the wire joiners.

Cut out the center section bottom



Another view of cockpit area. Everything is quite accessible. Two piece landing gear is installed after fuselage has been finished and painted. Engine braces provide precision thrust adjustments.



Optical illusion makes wings look 'saggy', but hold photo up and sight along trailing edge. See? Built-up steerable tail wheel provides excellent ground handling. Nose-overs are impossible!

sheeting (43) from 1/32 ply and mark all lines and holes which will center the engine mount and wing bolts later on. Push pins through the hole positions because later on you will have to drill the holes from the opposite side.

Glue the main spar brace to this bottom sheeting, together with the 1/8 plywood plate (47) farther back, and ribs "C-1" at both ends, then glue on the hardwood blocks (44) and (45) and the balsa trailing edge (48).

At the front, glue on the plywood former "D-2". Use the fuselage to get the proper angle.

Glue the top sheeting (42) over the ribs with the center-section cut out as shown on the plan.

On top of this, glue the top sheeting (40) and sides (41) and (41A).

Now drill the hardwood blocks (44) and tap with a 1/4 inch tap.

Drill two holes in block (45) for 8-32 bolts, so that the heads are flush with the bottom of the center section bottom sheeting.

For spacer (46), you need 1/2 inch steel or brass rod, cut to the proper length, drilled through the center, and threaded with an 8-32 tap.

Then drill the 1/2 inch holes about half-way through blocks (45) from the top, pour a little bit of epoxy into the holes, and screw the 8-32 bolts into the spacers (46) to pull them tight and solid into the holes in the blocks. Tighten them down only as far as shown on the plan for aligning the engine thrust line.

Bend the engine mount braces (49) from welding rod and silver-solder them to the anchor plate (52), which has already been drilled before soldering.

The engine mounts are simple and strong.

Take aluminum sheet and mark, cut out, and drill as shown on the plan.

Bend it to shape in a vise.

Cut two blocks (51) from 1/2 or 3/8 inch nylon. The thickness depends on the width of the engine you are using.

Drill holes for the engine.

Assemble everything onto the engine to make sure you have the proper angles. The thrust angle can be changed at any time by screwing the nuts in or out on the ends of the welding rods (49). It is preferable to use self-locking aircraft-type nuts.

Mount the throttle servo and then drill a hole through the main spar center brace so that a Nyrod sleeve can be pushed through it and passed through one of the holes in the top sheeting for the engine mount braces.

Drill the engine mount at the proper location for this rod to pass through, depending on the engine used.

Drill two holes in the wing center section sheeting under the engine mounts for bringing out the fuel line and tank vent.

ENGINE COWL

If you want, you can make a cowl from fiberglass, as I did on my first Don Quixote. However, on the second one, I made a dummy cylinder head as the muffler, silver-soldered together from 1/64 steel or tinplate. It works quite well, and looks more realistic.

WING

First, cut templates "W-2" from 1/8 plywood with the cut-lines for dividing the ailerons marked on them.

Put the templates together and drill the three holes for the guide wires.

Sandwich 13 pieces of 3/32 balsa between the templates, with guiding holes through them and sand them to the shape of the templates while clamped solidly in a vise.

Drill the hole for the aileron pushrod wire.

Now do the same for the other wing.

When both sets of ribs are done, cut the templates at the line marked for the aileron division and sandwich 12 of the finished ribs between these new templates. Cut off the ends of the ribs and save them for use for building the ailerons.

Cut new "W-2"s and "W-5"s from 1/8 ply and drill the holes in "W-2" for the 3/16 and 1/8 wires.

Cut "W-1" from 1/16 ply with the same holes as "W-2".

Now, cut out a 1/2 inch wide strip of 1/16 balsa and pin it down over the plan on your bench with the edge of the strip flush with the back edge of the bottom main spar (5).

Pin the bottom spar on top of it and pin the trailing edge (23) made from 1/16 spruce in position.

Pin down strip (15) at the aileron hinge line.

Glue all ribs except "W-1" and "W-2" over top of these strips and install the top main spar (4) over them.

Thread the back spar through the ribs.

Where the ailerons have been cut out, pin the spar to the back of the ribs to keep it running true and straight all the way to the tip.

Now glue on the leading edge spar (3) and top trailing edge strip (23).

Between the ribs, fill in the space between the spars with 3/32 balsa sheet webbing (18) with the grain vertical. Where the wing struts will join the wing, glue in 1/4 inch plywood (12) with holes pre-drilled for the wing strut attaching plates (13).

Glue 1/8 balsa strips (21) and (22) on the top and bottom of the rear spar at the aileron cutout, and glue in spruce or balsa top strip (14).

Cut out the 1/8 inch plywood sides for enclosing the piano-wire wing joiners within the wing spars. Cut 4 of each (9) and (10).

Now take the finished wing center section and lay it down in line with the wing root. Put the piano wire joiners in place, spread glue on "W-1" and "W-2" and slide them down the wires into position.

Slide the wing onto the wires and line everything up, prop the wing tip up 1/4 inch for dihedral.

Glue in one side each of (9) and (10) to the spars and enclose the wire with 1/4 inch spruce on the angle it passes through the spar to keep it at the proper dihedral angle. Then glue on the other side of the enclosure using lots of epoxy.

The rear 1/8 inch piano wire (2) is stitched directly to the rear spar and saturated with epoxy.

Glue in the 1-1/2 inch wide 1/8 ply bellcrank mounting plate and pass the pushrod wire from the servo to the bellcrank, and the linkage wire from the bellcrank to the aileron horn.

Install the mounting lugs (13) for the wing struts, made from 1/16 brass or steel.

Glue in triangluar corner braces (11) and (12) as shown on plan.

The top and bottom of the leading edge is sheeted with 1/16 balsa to the back of the main spar, and the root of the wing is sheeted in completely as shown on the plan.

Glue cap strips on all the ribs.

Cut the wing tips (25) from 1/4 inch balsa.

The ailerons are built up using the backs cut from the wing ribs. Don't forget the 1/4 inch plywood mounting plate for the control horn.

The wing struts are made from K&S 1/2 inch Streamlined Tubing. Cut the tubing to the proper length, then cut 1/4 inch wide strips from brass or steel and bend and solder it around the tubing to form eyes for bolting them to the wing and fuselage lugs.

Fill the space between the strips with hardwood as shown on the plan and glue them into the strut tubing with epoxy.

When set, drill two holes sideways through the plugs and tubing and pin them with wire or thin aluminum tubing epoxied in place to prevent the plugs from pulling out of the ends of the strut tubes.

HORIZONTAL STAB

Cut out templates "S-1" and "E-1". Stack and sand the ribs.

Pin down the trailing edge of the stab (30) and the leading edge spar (27). Make sure that the center lines of both are on the same level.

Glue all ribs (S-1) between them.

In the center, glue in the 1/4 inch balsa stiffening member (29).

Sand everything down to the correct shape and glue on the 1/16 balsa sheeting extending past the trailing edge by 1/8 inch.

Glue on the 1/8 balsa leading edge cap and wing tips (37).

Start the elevator by pinning 1/16 balsa strips (32) over the plan at the leading edge and (36) at the trailing edge.

Glue the ribs (E-1) on top of the strips, and add the leading edge (31). Glue on the other (32) and (36) strips at the L.E. and T.E.

In the center, glue in the 1/4 inch plywood control horn mounting plate.

Sheet the center section as shown on the plan and capstrip each rib.

Glue on the balsa tips (38).

Sand down the leading edge to a round contour.

FINISHING

Everyone has his favorite method for finishing an airplane. Here's how I did mine.

Cover the flying surfaces with Coverite.

Give them two or three coats of clear dope, sanding lightly between coats, until the surfaces are smooth.

Paint the fuselage with two coats of clear epoxy or dope.

Fill any holes and dents with your favorite filler.

Sand between coats and VACUUM after each sanding. It works much better than any tack cloth I've ever tried.

When smooth, give it one coat of primer (I used K&B) and sand with wet sandpaper until there is very little primer left. Vacuum again when dry.

Apply two light coats of the white base color to the whole airplane . . . I used K&B epoxy. Wet-sand and vacuum between coats.

For the red trim and black lettering, start by spraying the whole airplane with a great new product . . . Flite Glass Models' LIQUID MASKING FILM. When the film is dry, cut out the templates for the design on the side of the fuselage from thin cardboard.

Go over the lines with a sharp knife, cutting through the Liquid Masking. Note: LIGHT PRESSURE!

When all the lines are cut, peel off the sections which will be painted black and do them first; then do the same to spray the red parts. Give two coats of red (lightly) and peel off the rest of the masking film while the red is still tacky.

Do the same for the white canopy frame.

Hinge the control surfaces . . . Goldberg's Hinge Slot Knife does a beautiful job here. Because the airplane flies so slowly, pinning the hinges isn't really necessary; just epoxy them directly into the slots.

Install the radio.

The receiver is held by rubber bands around block (78) between bulkheads "E" and "F".

The battery must go all the way to the front, in front of half-bulkhead "A-1". Some ballast will probably be required.

The C.G. should be as shown on the plan.

If the engine can be run backwards, you are all set to go. I am using a Veco .61, reversed by simply rotating the front rotor housing 90 degrees to the left (exhaust side).

If your engine is non-reversible, Punctilio (English) has just come to your rescue with an 11/7-1/2 pusher prop. Hopefully, it is available in your area. If not, check the mail-order houses.

The fuel tank should be pressurized. An engine with the new Perry pump would be ideal, due to the low tank position.

However, I can get my non-pump engine to run beautifully every time. Because the model is not designed to fly upside-down, the needle-valve can be set to draw properly in the upright position only.

FLYING

Both of my Don Quixotes flew hands-off the first time out. If you have set yours up exactly as shown on the plan, you shouldn't be in for any drastic surprises, either. In level flight, the elevator should only be a couple of degrees up. If it takes any more than that, you need to remove some lead from the nose. If the trim changes with different throttle settings, the thrust line is fully adjustable to compensate for it.

On grass surfaces, you may have to hold the elevator full-up for a few yards to keep from nosing over. Don't forget to let off again when she lifts off. You'll be comforted to know that this airplane will not snap over if you do happen to "mush off", but let's not press our luck just the same.

Landings are just as easy. Just cut the throttle and let her settle back to earth, easing the stick back a trifle just as the wheels touch.

All in all, she's an easy, relaxing airplane to fly, and I hope you have as much enjoyment from your "Don Quixote" as I'm having from mine. Happy flying. ●