BUILD THE PAUL POBEREZNY-DESIGNED PARASOL

The Pober Pixie was designed by Paul Poberezny in 1974 in response to the EAA's Project Econoplane. The goal was to develop a homebuilt airplane requiring minimal fuel consumption. The Pixie is an offshoot of the Heath Parasol in that it's a single-seat, open-cockpit parasol monoplane. The prototype was flown using a Volkswagen 1,835cc engine, consuming only 3 to 3.5 gallons of fuel per hour. The design also featured full-span ailerons, which provided a good roll rate with minimal adverse yaw.

Later versions of the Pixie were set up with 65 hp Continental and Lycoming engines, as well as other lesser-known powerplants. The full-scale Pixie has a 29-foot, 10-inch wingspan, a gross weight of 900 pounds, a cruise speed of 83 mph, and a climb rate of 500 feet per minute. Construction is a welded, steel-tube fuselage and wood wings with fabric covering.

The Model

The Pixie is a $^1/_6$-scale park flyer with a 60-inch wingspan, electric power, and four-channel R/C. The outlines are true to scale, including the full-span ailerons. Construction is primarily of wood and features removable plug-in wing halves for easy transport. It requires no tools for field assembly. Power is provided by an economical outrunner motor and guided by four submicro servos and a 2S LiPo battery that will provide 15-minute flight times.

Before construction begins, take the time to read and study the plans to become familiar with the construction notes and assembly views. For those who would rather not cut the parts by hand, a wood and plastic parts package is available from Manzano Laser Works that includes the laser-cut, shaped parts and vacuum-formed cowl and wheel pants.

Preliminary Subassemblies

Begin cutting out and labeling all of the parts using the provided patterns. For the next three steps, there are "How-To" articles available in *Model Aviation* magazine to cover these basic construction techniques.

Build up the bowed outlines for the rudder and elevator using the provided patterns and wood sizes shown on the plans (*Model Aviation*, July 2017). The forms are made up from $^3/_{16}$-inch artist's

R PIXIE

The Pixie is finished and ready to go for its maiden flight. In the air, the Pixie is a gentle and docile flier. Control response is gentle and positive throughout the speed range. With the full-span ailerons, it exhibits no adverse yaw, making it easy to fly.

by Pat Tritle | Photos by the author

foam board. The built-up landing gear uses the patterns and wire sizes provided on the plans (*Model Aviation*, June 2018).

Next, build up the vacuum-formed wheel pants (*Model Aviation*, October 2017). And finally, build up the five-piece plastic cowl. If the laser-cut parts are used, join the inner and outer section of the wing and aileron spars using the provided detail drawings for reference. With all of the subassemblies completed, construction will go quickly.

Wing Center Section

Dry-fit CR1 and CR2 in place on CS1 and CS2, and pin them in place over the plans and tack-glue them. Laminate the left- and right-hand FCM and FCMA assemblies and glue in place. Fit and glue the $^3/_{16}$ x $^1/_2$-inch balsa leading edge (LE) in place, followed by both RCMs. Fit and glue the $^9/_{32}$-inch outer-diameter (OD) aluminum receiver tubes in place.

Finally, sand the bevel into the LE and CS1 and glue the $^1/_{32}$-inch balsa sheeting in place. Remove the assembly from the building board, secure each point of contact with thin CA glue, and sand to final shape.

Outer Panels

Pin ASM and A4 in place over the plans. Dry-fit each of the ribs on the front and rear spars, pin them in place over the plans, and tack-glue each point of contact on the assembly. Align and glue wingtips A5 in place, followed by the $^3/_{16}$ x $^1/_2$-inch balsa LE and SM2.

Glue JSMA in place on top of JSMF and JSMR. Glue JSMR in place between ribs R5 and R6. Remove the wing from the building board and glue JSMF and A3 in place. Secure all points of contact with thin CA glue. Fit and glue the $^1/_{16}$-inch OD aluminum tube strut fittings in place at A3 and A4, lash them in place with sewing thread, and harden with thin CA glue.

Bevel the top of the main spar and LE as shown on the rib detail drawings and glue the $^1/_{32}$-inch balsa sheeting in place. Sand the wing to final shape, fit and glue the $^1/_4$-inch OD brass joiner tubes in place, then repeat the process to build the other wing half.

Ailerons

Sand the bevel into AS using the rib detail drawings for reference. Pin the $^3/_{32}$ x $^1/_4$-inch balsa trailing edge (TE)

in place over the plans. Align and glue ribs AR1 in place on AS then pin them in place over the plans. Fit and glue the AR1 ribs in place, followed by A6, A7, and A8. Remove the aileron from the board, secure all points of contact with thin CA glue, sand to final shape, and dry-fit the hinges at the locations shown.

Vertical Stabilizer

Pin D1 in place over the plans, followed by the 1/8-inch square balsa hinge spars. Pin the bowed outline in place, and then add D2 and all of the horizontal and diagonal ribs using 1/16 x 1/8-inch balsa. Remove from the board and sand to shape then dry-fit all of the hinges in place.

Bend the tail wheel strut to shape and glue in place. Using a #50 drill bit, drill a hole for the toothpick control horn.

Horizontal Stabilizer

Pin the 1/8-inch square balsa hinge spars and doubler in place over the plans. Pin C1, C2, and C3 in place over the plans, followed by the bowed outline. Fit and glue all of the 1/8-inch square and 1/16 x 1/8-inch balsa vertical and diagonal ribs in place. Remove the stabilizer from the board, sand to shape, and then dry-fit all of the hinges in place.

Fuselage

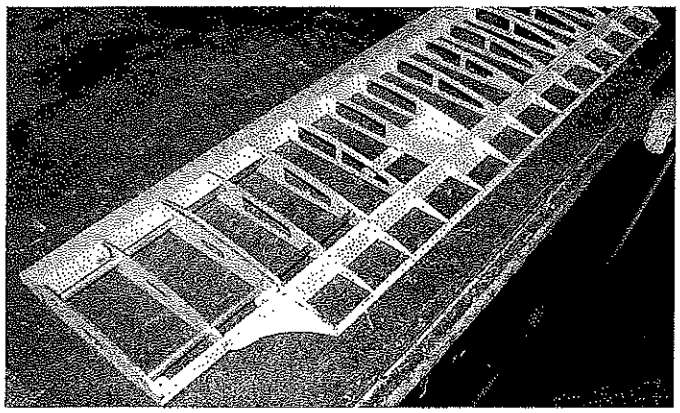
Build the side frames directly over the plans. With the exception of PRG, the frames are identical, although they *are* dedicated left- and right-hand sides. To join the side frames, join former 1R and 1L.

Note the orientation of the motor mount slots and mark the front side. Turn it over and glue CMF and CMFa to the backside then glue CMR and CMRa in place on formers T1 and T2. Make up the 1/8 x 1/4-inch balsa landing gear mount beams and pin them in place over the plans, slot side down. Align and glue the side frames in place on the landing gear beams, followed by formers T1 and T2. Be sure that the cabane mounts are properly oriented.

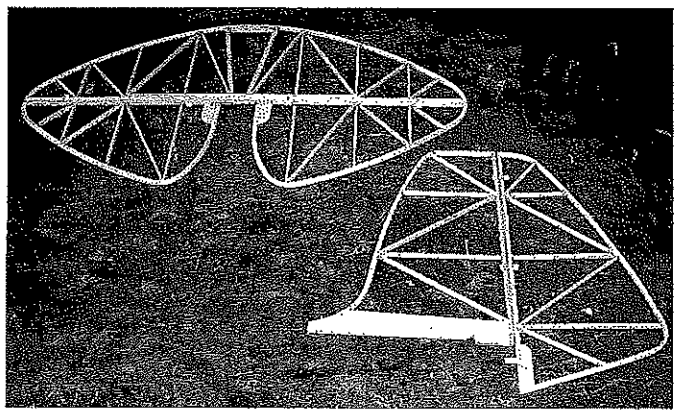
Sand the bevel into the tail post, pull it together, and glue. Fit all of the top formers in place and glue. Remove the frame from the building board and glue former 1 and all of the bottom formers in place. Fit the landing gear in place on the mount beams, lash it in place with sewing thread, and secure it with thin CA glue.

Now all of the 1/16 x 1/8-inch and 1/16 x 3/16-inch balsa top, bottom, and side stringers can be added. Make up the tail fairing block jig from scrap 1/8-inch balsa and tack-glue it to the fuselage. Tack-glue the blocks into the jig and sand to shape.

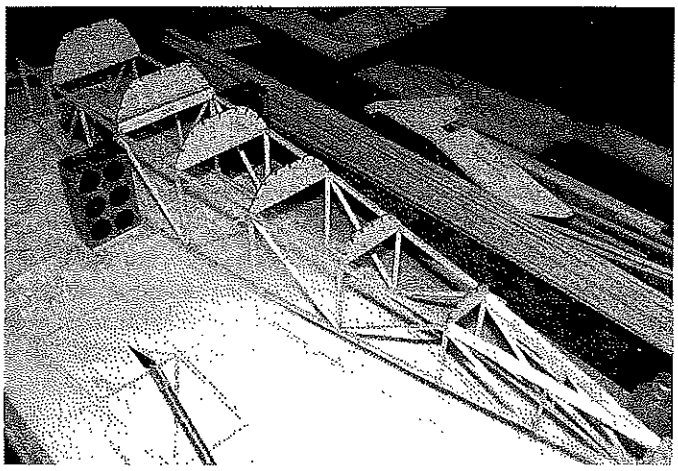
Remove the jig and the blocks and set aside until final assembly. Finally, align and glue the 1/16-inch OD strut retention tubes onto the fuselage, lash them in place with sewing thread, and harden them with thin CA glue.



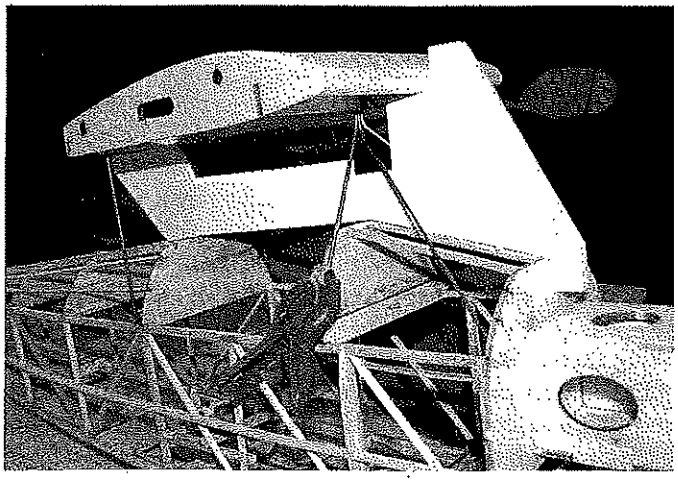
The outer wing panels plug into the center section for fast assembly and disassembly, offering easy transport with no tools required.



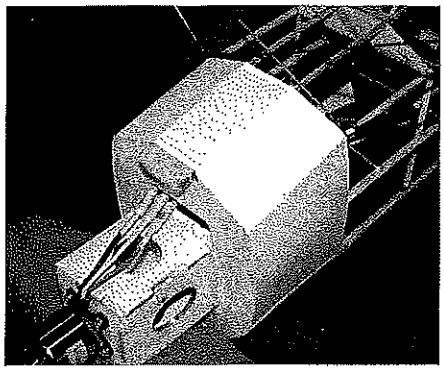
The vertical and horizontal tail assemblies incorporate bowed outlines for a strong, yet lightweight, structure.



The fuselage frame is built directly over the plans beginning with the landing gear mount beams and top formers. Squaring blocks are used to ensure that the assembly builds straight and true.



The wing center section is aligned using the wing alignment jig to set up the jury strut arrangement. Clamps are used to hold the middle struts in place while shaping the front struts.



The motor mount is assembled and glued in place. The motor is mounted on the firewall and run up to ensure the proper direction of rotation. The wires are labeled to ensure correct orientation should the motor need to be separated from the ESC.

Mounting the Servos and Motor

Center the servo arms and mount the aileron servos on ASM with silicone caulk. When it is dry, run in the extension leads. Build up the servo mounts in the fuselage using 1/8-inch square and 1/8 x 1/4-inch firm balsa. Mount the rudder servo on the center and the aileron servo on the right side.

Space the beams to fit the servos used. Run in the elevator pushrod tube and secure at PRG and at the front and two places in between the front and PRG with a PRSO. Trim the excess off of the PRSOs after they've been glued in place. Run in the rudder pull-pull cables, tie them off at the rudder control horn, and mark the exact location where they exit the fuselage on the plans.

Fit the servo Y lead into the center section. You'll need to remove the plug from the wires on the receiver end to fit the wires through the hole in RCM. The connector will go back on after the wires are run into the fuselage during final assembly.

Build up the motor mount assembly and glue in place on former 1. Mount the motor and ESC and test for proper direction of rotation.

Setting Up the Cabane Struts

Using the provided patterns, bend cabane struts B and C to shape. For now, make only the bottom bend on cabane strut A. Fit struts B and C into their respective locations and using the wing-alignment jig, fit the center section onto the struts.

Measure from CMF to the top of strut B and transfer that dimension to strut A. Remove the C section and fit strut A into CMF. Using strut B for reference, make the top bends in strut A so that the vertical posts are parallel with strut B. Take your time and get the alignment right now; it will pay off later when you build up the lift struts.

Again using the alignment jig, place the C section back on the struts and glue struts A and B in place in their respective mounts. Remove the C section and solder the top of struts A and B. Next, make up the boot cowl sections and cockpit fairing from file folder material using the provided patterns.

Fit and glue the cockpit fairing in place first, followed by the boot cowling, starting at the bottom and working upward. Some trimming might be needed around the cabane struts, so work carefully to get good clean protrusions through the cowling.

Mounting the Cowling and Wheel Pants

Make up the cowl mount blocks from 3/16 x 1/2-inch basswood, sand the bevels onto the back edge and glue in place on center. Mount the cowling using the leftover aileron servo screws.

Make up the four wheel pant retainers from 1/16-inch wheel collars and brass strap using the detailed drawing provided. Align and screw the retainers in place and make up the bushings and spacers as needed to fit the wheels to the pants and axles. Test-fit the pants on the landing gear to make any necessary adjustments for a proper alignment.

Covering the Pixie

With the major framing done, sand the assembly to eliminate any stubborn bumps then cover your model, except for the top of the center section with any of the lightweight films that are available. Add the trim and paint the struts, cowling, and wheel pants to match.

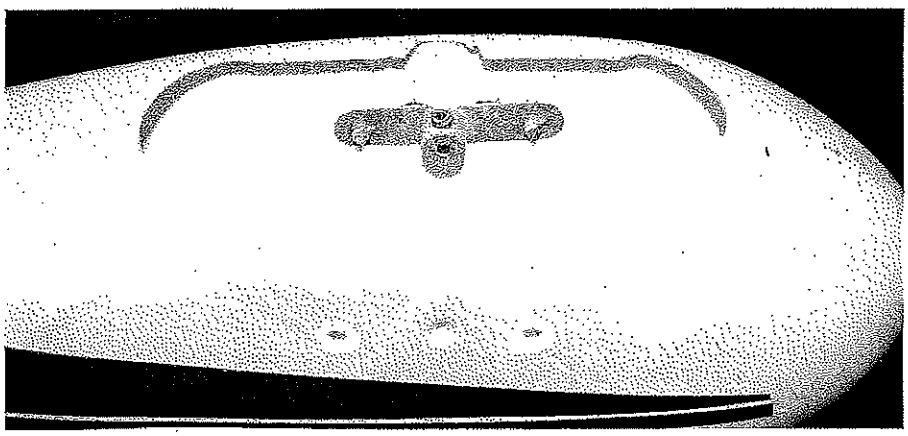
Final Assembly

Begin by gluing all of the hinges in place. Next, cut the front end off of the wing alignment jig at the reference line shown. Fit the C section in place on top of the jig. Using small levels across the top longerons in the cockpit and the top of the C section, glue it in place with 15-minute epoxy at all three points.

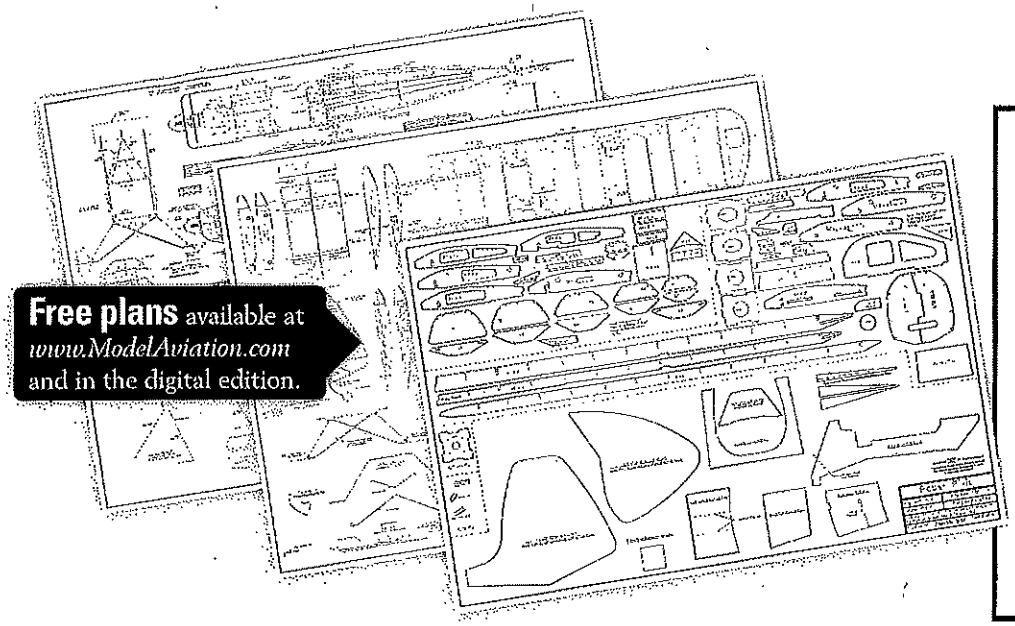
When fully cured, remove the jig and cover the top of the C section. Using the wings for reference, align and glue the vertical and horizontal stabilizers in place. Cut a small hole in the cockpit fairing at the rear cabane, run the aileron lead through the hole, and reinstall the plug.

Run in the .025-inch steel wire elevator pushrod and secure it to the servo arm with a Z-bend. Make another Z-bend on the hinge line and, with the elevator properly aligned, glue the control horn in place. Make the slots for the pull-pull cables to exit the fuselage and run in the cables. Align and glue the cables in place on the toothpick control horn.

Fit the .032-inch steel wire aileron pushrods into the servo arm with a Z-bend. Make another Z-bend at the hinge line, align the ailerons, and glue the control horns in place. Connect the



The wheel pant retainers are screwed in place using sheet-metal screws. The screws are clipped to prevent them from rubbing on the wheels.



Free plans available at *www.ModelAviation.com* and in the digital edition.

SPECIFICATIONS	
Wingspan:	60 inches
Wing area:	533 square inches
Length:	35.5 inches
Flying weight:	23 ounces
Wing loading:	6.2 ounces per square foot
Power system:	Suppo 2217/9 outrunner motor; 18-amp ESC; APC 11 x 5.5E propeller; Venom 2,000 mAh 2S LiPo battery
Radio gear:	Suppo SP-60 and SP-90 servos; two 6-inch servo extensions; 11-inch servo Y harness; four-channel receiver

receiver and set up the controls at the values shown on the plans.

Build up the lift struts from $^1/_8$ x $^1/_4$-inch balsa sanded to an airfoil shape. The retention clips are made from .032-inch steel wire and the struts are hand-fitted on the model. Make up the jury struts from .046-inch steel wire and lash them to the lift struts with sewing thread and secure with thin CA glue.

Set up the tail brace wires in a continuous loop and tie off at the tail wheel strut. Align the tail section and secure with a drop of thin CA glue. From here you can add all of the detail you like, including the windshield, strut fairings, exhaust stacks, or other fine details.

Finally, set up the center of gravity (CG) as shown. Locate a battery to best accommodate the CG. Make up the battery hatch and mount the battery using Velcro. I placed small magnets at the front and rear of the hatch on center to help keep it in place in flight.

With that, the Pixie is finished and ready to go.

Flying the Pixie

The Pixie is a far more docile flier than I expected, although control is crisp and responsive. When flown with the dual rates on, control is more than adequate. The rudder, on the other hand, is less effective than one might think for its seemingly massive size, which makes ground handling easy. In the air, the full-span ailerons exhibit no adverse yaw, so no rudder input is needed to coordinate the turns.

When set up with the elevator dual rate on, the Pixie won't stall. At full rate, it breaks right down the center and immediately begins to fly again when the elevator is released. Overall, the Pixie is an honest and predictable flier with no vices.

Landings are easy, but it does require a fair amount of power to keep the sink rate in check. At approach speed, the elevator remains lively, so a soft touch is in order to keep the attitude right so that power can be used to control the rate of descent.

Just before touchdown, a touch of up-elevator prepares the model for a nice, gentle, three-point touchdown.

For touch-and-gos, wheel landings are the best choice. Fly it all the way to the ground then add a bit of power and some up-elevator and you're off and running again.

Overall, the Pixie is fun to build and a great flier. The only area that requires extra care is in setting up the cabane struts to ensure proper wing alignment. Otherwise, it's just a good old-fashioned old-school-style build.

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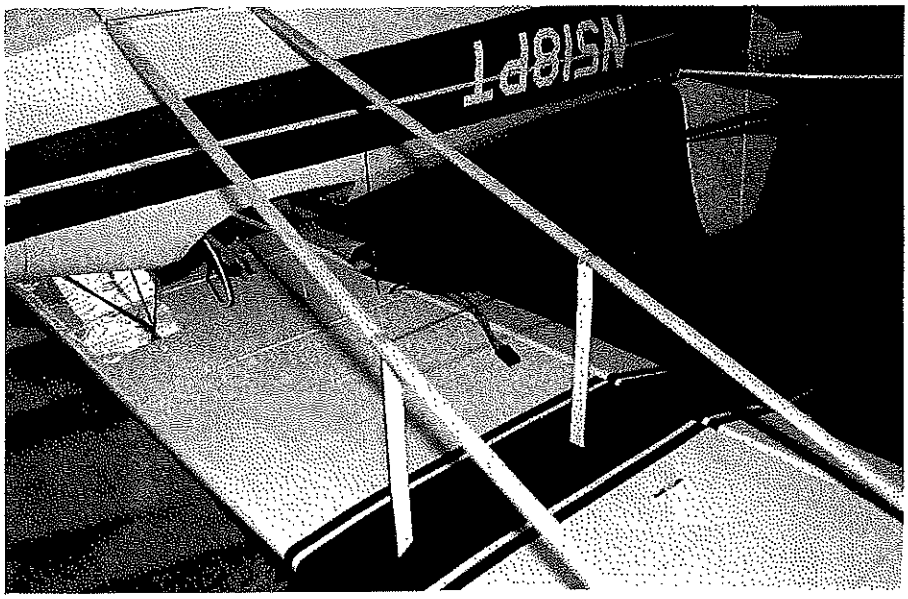

The built-up lift and jury struts are hand-fitted directly on the model. The jury struts are lashed in place with sewing thread and secured with thin CA glue.

SOURCES:

Manzano Laser Works
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