1938 Porterfield Zephyr

Sometimes a fighter is too much and you need an easy old bird to tool around with. Here's one in keeping with developing skills for .40's to .60's/**Doc Mathews**

The Porterfield Zephyr was designed in 1937 by Noel Hockaday as an improved version of his earlier American Eaglet. Powered by a Continental 40 horse engine, the aircraft proved underpowered and sold poorly. Only 45 were built, even though the selling price was a modest $1355 FOF Kansas City, Kansas.

As an interesting sidelight, these aircraft were constructed in a factory at 25th and McGee, Kansas City, Missouri sharing space with another struggling young company called Hallmark Cards! If a truth can be derived from this it must be that it is more profitable to manufacture greeting cards than aircraft as the Porterfield Co. expired from a lack of interest in 1947. Hallmark on the other hand had sales in excess of 100 million in 1977.

I had purchased a book entitled "History of Aviation in Greater Kansas City" many years ago, mainly since it contained a three-view and a photo of the Zephyr about which I had never heard. During the ensuing years the Zephyr lurked in the far reaches of my memory, cropping up occasionally as a subject worth modeling, but about which too little material was available to do it well.

About two years ago I asked a friend who had purchased the FAA registry computor readouts to check under Porterfield for a registered Zephyr. To my considerable surprise Chuck Lebrecht of Chicago had recently registered Zephyr NC 18743. I of course rushed a letter to Mr. Lebrecht explaining my long interest and asking for his help, to which he most graciously complied.

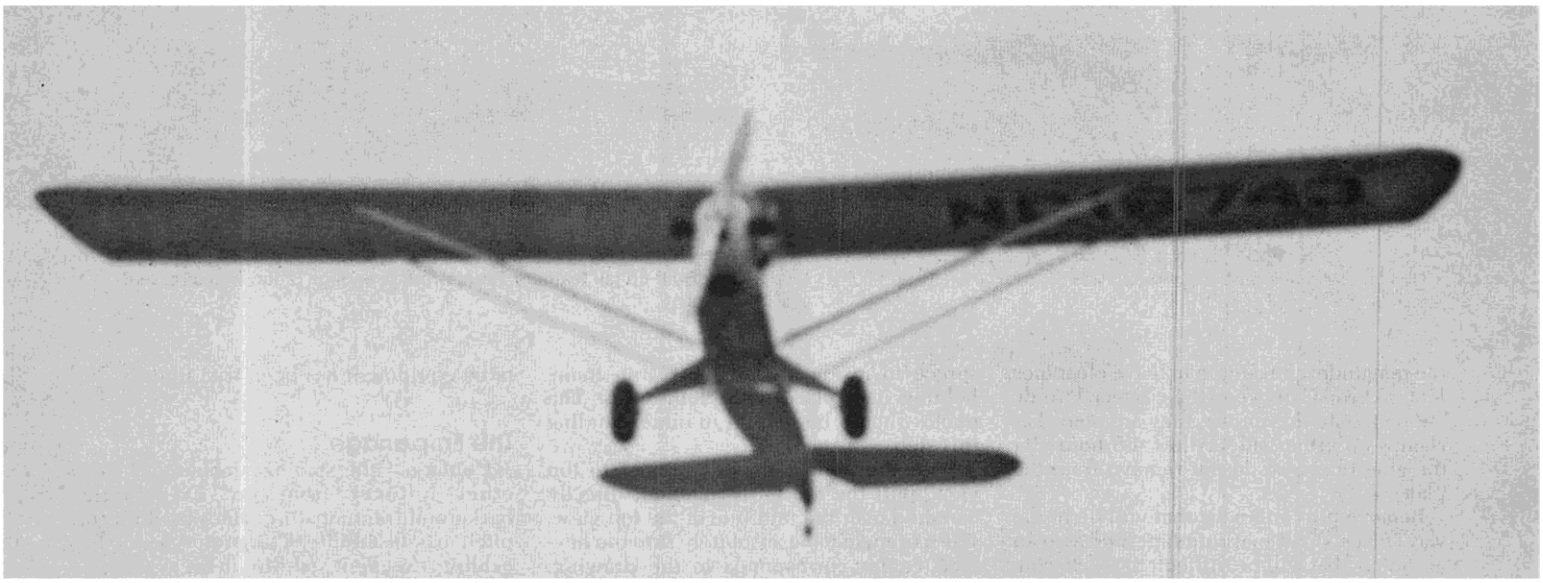
Charles Lebrecht is President of the Porterfield Club of America and has a fund of historical knowledge of the Porterfield Co. that is second to none. I would caution any contest scale builder that I have 12 color photos and an authenticated drawing of the Zephyr that I will provide at cost to avoid bothering Mr. Lebrecht who is a busy man.

My original development thrust on the Zephyr project was an extremely successful Free-Flight Scale for rubber and CO_2 power. This little project was published in the past issue of FLYING MODELS. As a second effort, an R/C sized model was decided upon. Since my radio flying has been primarily directed toward a strong orientation in Old Timers, my flying skills are somewhere well below the average Pattern flyer's. Therefore, any scale type model for my use had to possess gentle handling qualities and excellent stability to compensate for my slower reaction times. This model is an absolute pussycat, with flying characteristics resembling a Sig Kadet.

It is not surprising that this Zephyr should behave like an oversized Kadet as it's wing section and construction should be quite familiar to anyone who has built Sig's best seller. The fuselage construction techniques used in this project also reveal my background as an Old Timer, that is, strong but light, with lots of strip and a minimum of solid sheet. Any builder with some experience in scratch building should not encounter any insurmountable problems and could well learn some new tricks. Actually the model builds easily and quickly.

The model's size was dictated by the dimensions of the Sig Cub cowling and other readily available hardware. Please do not misinterpret the powerplant in my prototype, it is a very ancient and tired Super Tigre .51. I rarely run the throttle over ¾ths and I am certain any good .40 or .45 would be

PHOTOGRAPHY: DOC MATHEWS



adequate. I'm sure someone will install a .60 in their Zephyr and fly around at the same speeds as a P-51, but they'll be missing some great low key fun. Even if they enjoy sweaty palms and armpits while burning holes in the atmosphere, let's ignore them and build yours with more realistic lightplane-like power.

In General

The term "cement" refers to aliphatic resins (Sig-Tite, etc.) only. Epoxy is meant to be 2 to 1 type only, no 5-minute epoxy should be used. The abreviation CA stands for cyano-acrylate (Hot-Stuff, Zap, Jet etc.). All wood sizes and types have been carefully chosen, so please do not substitute. The cowling, aluminum landing gear and other Sig items are all obtainable directly from their catalog or your dealer can order them.

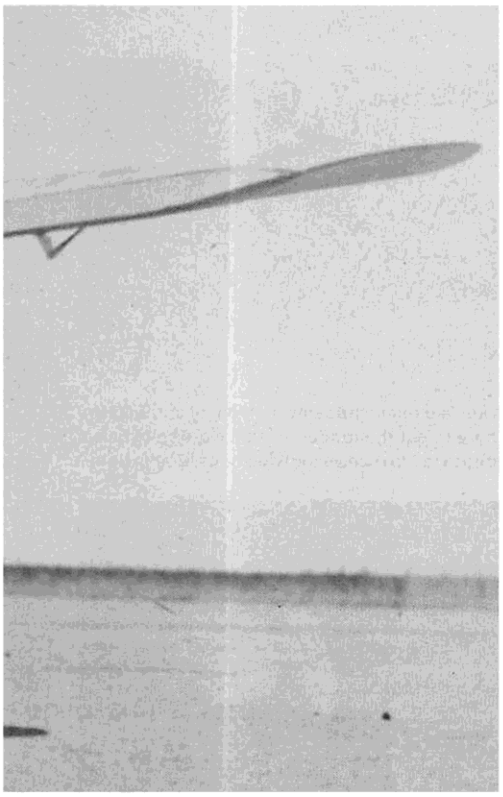
The ¼" panel plywood used in the fuselage siding is scrap from a cabinet makers shop. It is good on both sides (although blemishes could be placed inside), and it is approximately half the weight of 5-ply aircraft birch ply and excellent as far as strength and warp resistance when used properly. Better yet, it's dirt cheap.

The Fuselage

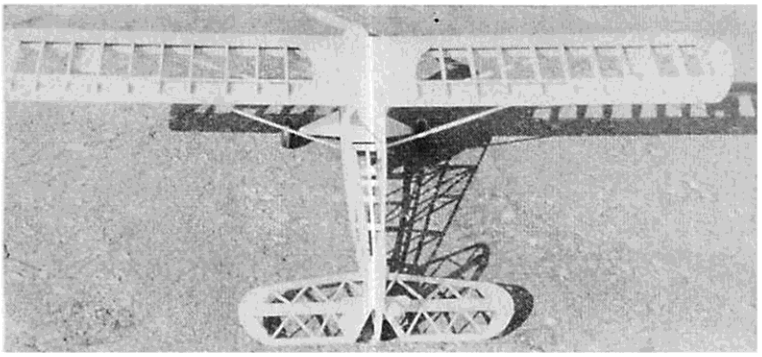
Since box frame type fuselage construction tends to frighten a few modelers, I'll show you a method that gives a true box every time. For any of you who have built one of my published Old Timers, the next several paragraphs will cover what you already know to be a pretty darn good technique.

Cut two identical fuselage sides from ¼" plywood (not aircraft ply, just plain old three ply, ¼" mahogany panel ply). Place carbon paper between the plans and the plywood and trace. Nail through 1/16" dia. holes a second piece to the first and develop a left and right side. Use carbon paper to develop the ply bulkheads (of 5-ply aircraft plywood). Cut and drill all holes now! Use a mounted engine to determine the firewall hole positions.

Place one plywood side (recheck that all notches and holes are in line) onto Saran Wrap covered plan side view. Cut and fit spruce frame pieces and join. Use epoxy for all ply to spruce joints and aliphatic resin for



An ancient Super Tigre .51 still puts out more than enough horsepower. Uses a ¾" K&B extension shaft. Cowling is from a Sig J-3 Cub. Tailwheel steering with horns is simple. **At top:** In flight, dead stick.



A few longerons, uprights, diagonals does it. Your radio will fit in easily. **At left:** Built up tail feathers. Framework is enough, light, well stressed.

the remainder. Be certain to leave clearance for bulkhead C between the gussets. Pins do not penetrate the spruce, they are placed as clamps on either side. Allow 4-8 hours for the glue to set, so do not remove from the plan.

Remove pins and nails that will be in the way. Place small masking tape pieces over any joints that will be difficult to reach, construct an identical second side over the first. Wait 24 hours, then remove frame from working surface. Pop the two sides apart using a table knife, then sand and smooth glue dabs etc. Add triangular stock to the front and make a left and a right.

Trial fit bulkheads A, B and C. Adjust by sanding to obtain a tight but non-binding fit. Invert and pin the wing rails onto the top view, then epoxy A, B and C, holding in place with masking tape, clothespins etc. Try for perpendicular and horizontal squareness using triangles and a carpenter's square. Do not feel rushed, the epoxy gives plenty of working time to carefully develop a square box.

It is now time to add part CT and the top cross-members. Bend 3/32" dia. music wire or welding rod cabin reinforcing wire over plan and trial fit it. Groove ¼" x ¼" spruce for a loose fit around wire using a 3/32" dia. carbide bit in a Dremel Moto-tool. Cut the ¼" x ¼" pieces to length, then epoxy wire and spruce to inside of the front cabin frame holding it in place with clothespins. The photos should be helpful in understanding this step.

With the wing rails still pinned to top view, pull the tail posts together, directly centered over the mid line of the top view. Use a triangle to be absolutely sure the beveled center corresponds to the drawing. Epoxy the tail post using clothespins for clamps. Cut two of each ¼" x ½" balsa cross-brace and glue onto top and bottom of the frame. Be careful not to pull tail post off center during this step.

Remove fuselage from the top view after allowing for overnight glue cure. Complete by adding threaded blocks, bottom infill, hatch detail, tank compartment, cowl block, etc. Cut the rudder/elevator slot as per photo. Wrap the nose area with glass cloth and polyester, then trial fit main gear, tailwheel bracket, engine mounts and engine.

I used cyano-acrylate to join the A.B.S. cowl with strips of material provided to reinforce the joint. Cut the clearance holes a little at a time until the cowl slides over engine. The area behind the cylinder may require removal to clear, depending on engine used. File and sand the corners at the firewall to allow the cowling to fit nicely.

Do not attempt to cover the fuselage until wing and emphanage are completed and radio equipment has been trial fitted.

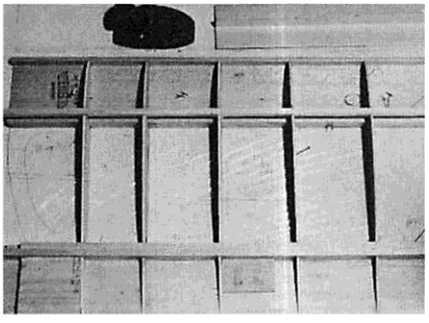
The Empanage

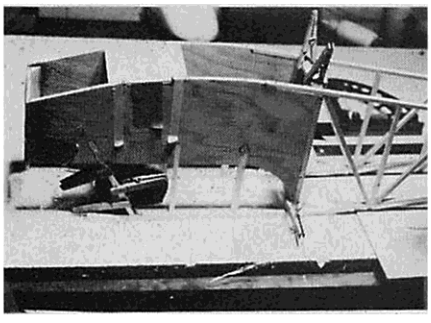
I enlarged the stabilizer about 20% (another leftover from my Free-Flight background) anticipating some possibility of pitch axis instability. The prototype model exhibits excellent stability in all axis, leading me to conclude that a scale size horizontal tail would be acceptable. Therefore, the drawing shows the scale stabilizer dashed inside the prototype outline for those wishing to construct one.

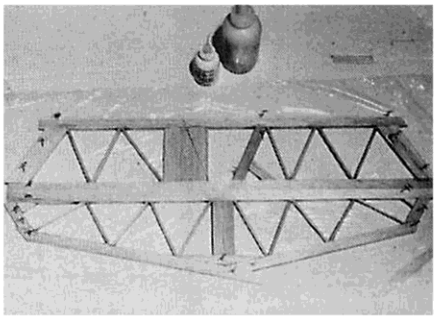
The construction of both vertical and horizontal tails is so simple I will not bother the builder with step by step detail. The only unusual step involves cutting the outlines after basic construction. If the ¼" sheet is positioned to meet the inside lines while covering the outside perimeter, one need only trace the outline using carbon paper, then saw the perimeter to the line. This method is much simpler and more accurate than attempting to match pre-cut pieces.

I prefer to add the joiner wire and hinge slots before cutting and sanding. The full sized Zephyr had tube frame tail surfaces, therefore a half-round edge is scale. No airfoil is needed.

The rudder base slips into a slot in the center of the stabilizer. Make certain the

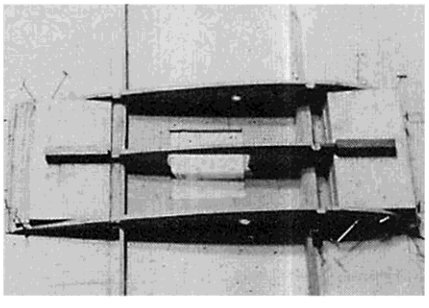


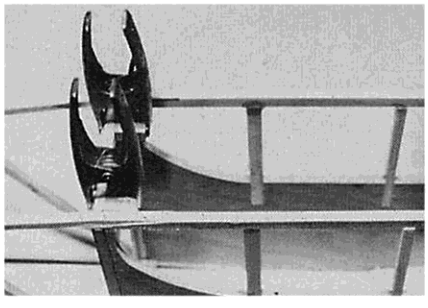


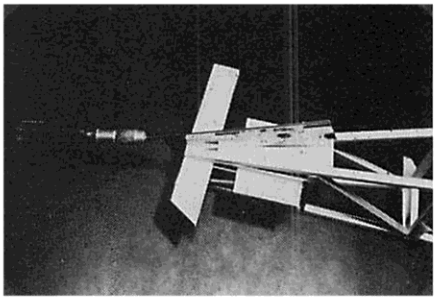


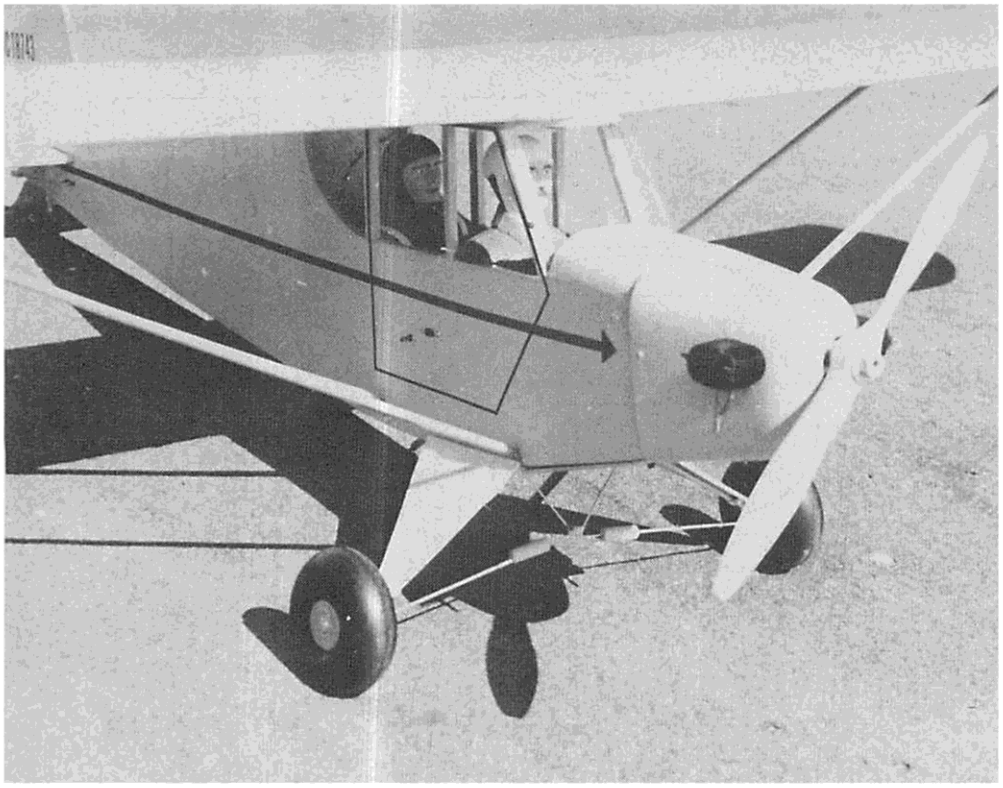
The wing structure. Sanding board tapers leading edge to the proper incline. **Center shot:** Wire and box being epoxied to the cabin frame. Use clothespins. **Beneath:** Center-section shows plywood ribs, dihedral gussets,

Your stabilizer and elevators are laid out in the same moment of enthusiasm. **Below:** A razor saw is used here to cut the rudder fin slot. Note shim balsa. **Center:** Basswood blocks are epoxied to receive the wing bolts. Clamp tight.









It's from the age of the Cub, incorporates the same simplicity. **Beneath:** You can't say that this one is tough to build. You'll need a better excuse than that for delaying the construction. A mild performer.

base is built to the bottom line on the drawings. The tailwheel tiller fits into a scrap of inner Nyrod which has been epoxied into an appropriate hole in the rudder.

Cut the fuselage top filler to accept the rudder as per the photo. Trial fit and adjust the slot to give a level and square relationship prior to covering. Remove and cover the tail surfaces for final assembly steps.

Wing Assembly

The following steps are described for those who have not built a Kadet. Trace the master rib pattern onto typing paper, scissor to rough outline, then spray with contact adhesive. Stick it to ⅛" ply and cut to outline. Cut the rib blanks from 3/32" C-grain and pin through ply master pattern creating a stack. Slice out the ribs on a jigsaw (start top and bottom cuts from same end to compensate for any tilt in saw table), sand to final contour and remove pins. All ribs with the exception of those of ply can be cut from one pattern. Be sure pushrod holes are drilled 3/32" dia., then enlarged.

True the edges of all sheeting stock using a metal straight edge. Position drawing so that trailing edge is at the edge of building surface. This will simplify beveling the bottom sheet a little later on. Pin the leading and trailing edges into position.

Pin capstrips in place over plan, gluing joint at front and rear sheet. Note there are no capstrips at center-section where 3/32" sheet will be used for planking later on.

Cut all spars to exact length shown, and glue spars to sheeting using ribs to position. Glue ribs to sheeting and capstrips. Tilt center rib using gauge, then glue leading edge to rib fronts and sheeting. Trim leading edge to match curvature of rib top, A razor plane and sanding block are helpful here.

Add top, front and rear spars. Also front top sheeting (dampen outside for easier bending). Bevel the rear bottom sheet to match rib top contour. Pin and glue top planking strip to bevel and rib then add top capstrips. Next cut and install light ply tips and filler pieces. Insert ply aileron horn base, gussets, fillers etc.

Allow glue to set, then trim ribs and bottom sheet parallel to spars. Fill gaps at wing ribs with scrap balsa from the front. Remove ¼" from front of aileron ribs and install ¼" sheet aileron front spar slot for hinges and temporarily install the wing. Contour the wing tips with sanding block and sand the leading edge radius.

Construct the opposite panel in like manner. Just make certain you are creating a left and right wing. The model will be much more attractive if you do.

Center-Section

This assembly is built completely independent of the wing panels, then joined. Cut lite ply ribs (don't forget to drill pushrod holes) and 3/32" ply floor. Carbon paper outline from drawing onto ply floor. Pin floor flat, epoxy spars, ply gussets and ribs in place. Add filler blocks and top spars. Carve blocks to conform to rib contour and leading edge shape. Leave flat where center-section contacts C.T. 3/32" ply runs forward to this edge. Drill through wing T.E. into maple blocks for the nylon bolts.

Notch the wing panel ribs to match plywood gussets, sand double ribs flat or with a slight angle using a table edge and a sanding block. Epoxy all joints, then slide panel onto center-section. Unless your working surface is unusually long it will be necessary to join one panel at a time. I used ½" dihedral at the outer rib to prevent a drooped looking wing, but the wings may be flat if you prefer. Complete wing by planking center-section and panels. Wrap with glass and epoxy (or polyester resin).

Covering and Finish

The prototype is covered in polyester (acetate) sheathing using classic silking techniques, controlling shrinkage with plastercized clear nitrate dope. Obviously heat shrink plastic could be most successfully used. I find the bolt-through-solder-eyelet attachment to be adequate, however, *any* fastening method preferred by the builder should be satisfactory. The struts are sanded to an airfoil shape, given two coats of finishing resin and sprayed with Perfect paint.

Radio installation is at the builder's option, obviously the cabin is comodious enough to allow for simple access and hookups. The tank hatch will hold an 8 oz. tank, but a 6 oz. is easier to install and maintain.

Flying Notes

What's to tell? The Zephyr is a pussycat for a tail-dragger, just be gentle with the throttle until she accelerates enough for the rudder to get a bite. Lift-off and climb-out are throttle functions. The model is light and has superior lift, making the elevator nearly superfluous. Turns are gentle, with little opposite aileron needed for recovery. This Zephyr just about flies without help, so don't horse it around! The model flies, you control.

Landings are so gentle that I have twice finaled and flaired out before noticing that the motor had died. Just set up about five feet high and retard the throttle, she'll get down from that point.

Well, if you've gotten this far you must agree that Noel Hockaday might have missed the mark somehow with a full sized Zephyr, but he surely came up with the ideal high-winged, two place cabin prototype for a model airplane. Build your's well, fly her lovingly and she'll serve you for years. ⊂