

Porterfield CP-65 Collegiate

Don't paint it Cub Yellow, Doc is touchy about such things.
A lesser known bird that flies just great/D.B. Mathews

Have you ever noticed to the general public any model with a high wing, enclosed cabin, and a horizontal engine is automatically a Cub? Taylorcraft, Aeronca or Porterfield, red, blue or green; they are all Cubs. The more knowledgeable layman will even call the model a "Piper Cub" even though the original cub was a Taylorcraft. After many years of attempting to educate the spectators I've finally decided to give up. From now on I'll just smile and agree. When Dad says, "Son that there be a Piper Cub", don't expect me to correct him, for all I care the kid can figure maybe the old guy knows a little something after all. Nope, it's not my job man, no more hassle for me!

Therefore, this is a two inch to the foot model of a Porterfield Collegiate "Cub". It is finished in Cub white, trimmed in Cub red. This Cub uses a preformed plastic cowl from a Sig Liberty Sport, pants and aluminum gear from a Sig Citabria, and features a light-ply box fuselage. For those who know the difference between a Cub and a Collegiate I quickly add that although this model really doesn't look like a Cub, it *does* fly like one. It should, really, since the moments and airfoil are straight from Chuck Hollinger's drawings, first published in Air Trails 1954. The design has become a near classic as it is still kitted to this day by Sig (although structurally modified).

The objective of this project was to de-

velop a model more easily constructed than the Cub, while maintaining the same good stability and forgiving flight behavior. The resultant model is certainly different enough in appearance to avoid the Cub identity crisis and the flight characteristics have proven most highly satisfactory.

I will avoid the temptation to get into a long and detailed history of Ed Porterfield and his aircraft. If you are interested check a copy of American Modeler, August 1968 for an excellent article and drawings authored by Don Pratt. Just in passing I will mention two rather odd coincidences . . . The Collegiate was developed from the Wyndotte Pup built by the Aviation Club of Wyndotte High School (Kansas City, Kansas) in 1933-34. My wife taught school there in 1955-56. Second Odd-ball coincidence . . . I took my very first airplane ride in an Ercoupe piloted by Don Pratt. Now that is wierd.

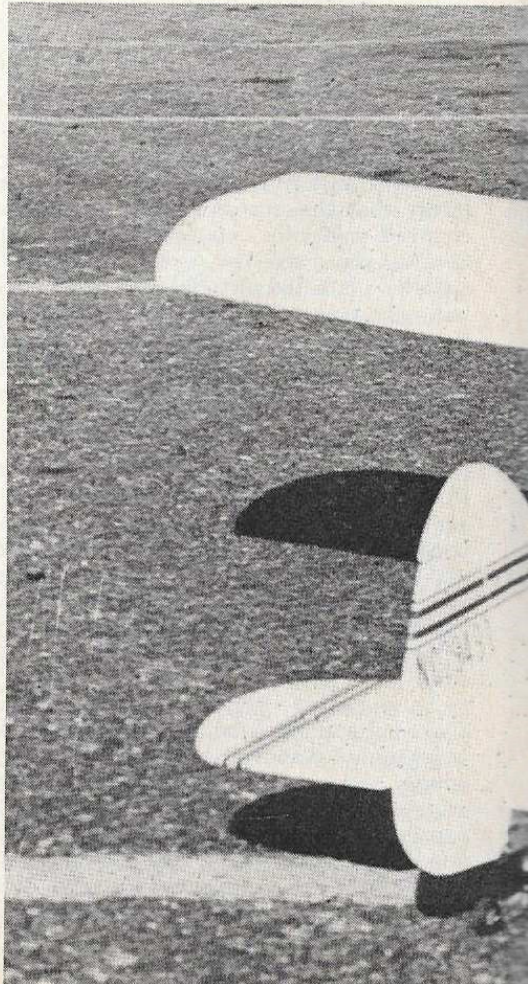
Construction

All references to glue in this article refer to aliphatic resins (Sig-Tite, etc.). The abbreviation C.A. refers to Cyano-acrilate, such as Hot Stuff, Jet, etc. Epoxy refers to the two-to-one types, *not* the five-minute kind. I would not recommend substitution of wood sizes, the structure is light enough and strong enough as drawn.

"Light Ply" is 1/8" poplar plywood available from building suppliers, but also a cata-



PHOTOGRAPHY: D.B. MATHEWS





log item in the Sig line, and many hobby shops carry it. The cowl-pants-landing gear hardware are also standard catalog items your dealer can order for you using the parts numbers on the plans.

Finally, this is not a suitable model for the rank beginner at scratch building from plans. However, anyone who has successfully built and flown a kit trainer such as a Kadet or H-Ray should be able to construct and fly this design.

The Fuselage

Since this portion is rather different and involves a relatively new material let's start here. Place a suitably sized piece of light-ply on the bench with two layers of carbon paper over it. One greasy side goes against the ply, the other against the plan. . . . this will give a reverse image with which to trace the opposite side. Trace over the plan outline using a pencil and a straight edge for all straight lines.

Cut the fuselage sides to the carbon marks. Most of the cutting can be done on a Dremel saw, the remainder will cut out nicely with a model knife. Save all scraps as they will be used later in the construction. Try to keep the pieces as large as possible by judicious planning.

Pin the two sides together and sand edges to match as closely as possible. Separate and add $\frac{1}{8}$ " X $\frac{1}{4}$ " cabin frames, former jigs, and gussets as per the plans. Keep reminding yourself to make a left and a right side. Taper left and right tail post joint and cut and install nose doublers. (Use contact cement, it avoids warping.) Be sure to leave a gap for bulkhead "B".

The formers can be traced onto thin paper or run off on a copier. Cut out to rough outline, spray with 3M Sprayment and stick to the wood. Trim carefully on the saw, drill

the needed holes, then peel the paper off. Simple! Trial fit bulkheads, trimming if necessary for a good snug fit. Position and epoxy to right side held flat on the building surface, then check alignment with triangles and a carpenter's square. Hold to plan with pins. Use clamps (spring clothespins are great) and masking tape to hold everything in place, adjusting until everything is square in all dimensions. Epoxy left side onto A, B and C, then allow the whole deal to set at least eight hours.

With the frame still on its side, block the right side of tail up at tail post so that its mid-line is exactly two inches off of surface. Secure block, apply glue and pull left tail post onto right. Check that curvature of sides is even and symmetrical. It can't be far off, but check. Now add top and bottom cross-grained sheeting, using C.A., then remove from building surface. Add undercarriage mount, hatch and hardware (if you plan on using a removable tank hatch), cowl sheeting, wing hold-down blocks $\frac{1}{4}$ " X $\frac{1}{2}$ " tail fillers etc.

Complete fuselage by sanding and smoothing, then give all exterior surfaces and tank area one coat of finishing resin. Allow to soak into wood, then wipe off excess with a roll of toilet tissue.

Landing Gear

The aluminum Citabria gear provides a sturdy and simple undercarriage with a good tread width. If desired a $\frac{1}{8}$ " dia. music wire gear could be made up, but why bend wire needlessly? The pop riveted ply is novel, but it *does* work, I stripped the gear out of the fuselage bottom by hitting a concrete curb without so much as a crack in the plywood. I just epoxied the $\frac{1}{4}$ " ply back into the fuselage and was back in business.

The tail wheel bracket may be primitive,

but it is most practical. If you'd like to get fancy, a C.B. Associated tail wheel unit would sure look slick.

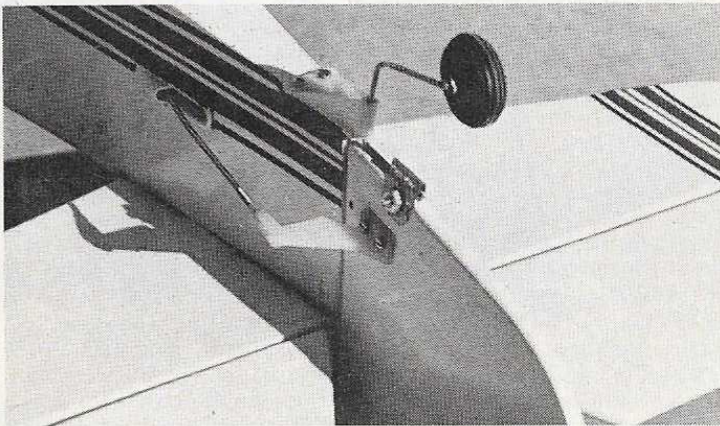
Tail Feathers

Everything is built dead flat on the board over the plans. Note grain directions. I like to build to rough outline, then cut the true shape after removing from the surface. Hinge slots should be cut before sanding in the airfoil. The Collegiate surfaces were made of tubing so a half round border is scale. Cover sections before final hinging, it is much simpler.

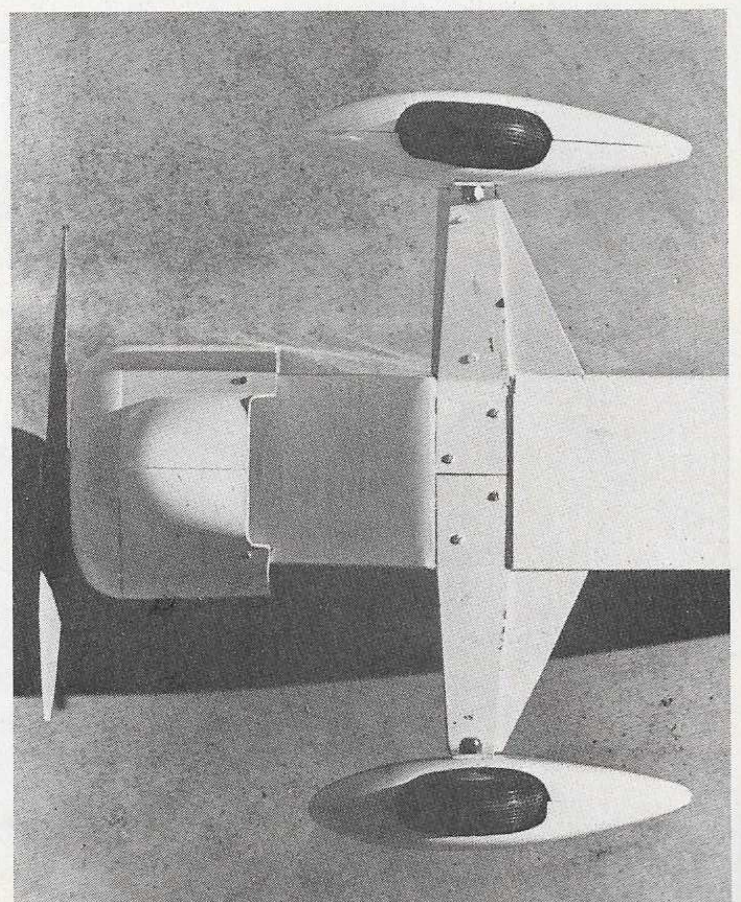
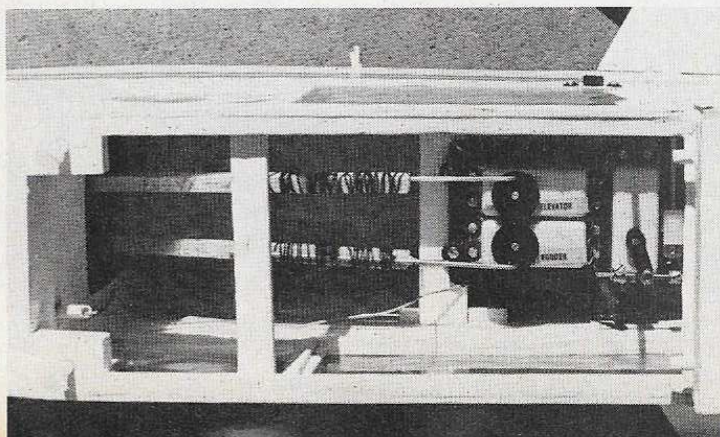
Wings and Ailerons

Use the tracing paper (or copier) Sprayment technique to develop a wing tip pattern, dihedral gussets, and a plywood or metal master rib pattern. All ribs are identical really, with only the trailing edge cut off for W-3 ribs. Therefore, the ribs can be stack sawn to the rough outline, then sanded to match the master rib. *Do not forget the guide hole for the aileron pushrods!* The center-section ribs require a separate pattern and are cut out of $\frac{1}{8}$ " lite ply. Just cut the nose off W-1 ribs for W-C ribs. Use a punch to widen the $\frac{1}{16}$ " pushrod guide holes.

The wings are built flat on the plans, adding $\frac{3}{8}$ " X $\frac{3}{8}$ " leading edges last. Tips run from center of aileron spar to center of leading edge butting into the spars. Fillers are added to blend tips from W-3 into outside edges. Add all $\frac{3}{32}$ " sheet gussets, scrap fillers, horn mounts, strut mounts (pre drilled) and other odds and ends, then remove from plans. Repeat the whole thing from an opposite side, the model will look much nicer with a right and a left wing. Add the $\frac{1}{16}$ " planking, then sand in the dihedral angle using the classic table edge and sanding block technique.



The linkage. It's a wonder we don't call pushrods mechanical tendons. Small tailwheel pivots in bracket, swings with rudder movement for your steering. **Below and right:** Room to spare for your system, the simple and sturdy gear.



The center-section is constructed by first developing a carbon paper tracing onto the $\frac{1}{16}$ " ply bottom, then building onto it. Spars and wing dihedral gussets are epoxied onto the ply, while the ribs are glued. Assemble each wing panel to center-section by sliding it onto gussets while the tip is blocked up $1\frac{1}{2}$ inches. Epoxy gussets onto spars and wing rib slots. Hold gussets to spars with clothespins while epoxy cures. The ailerons are cut away from wings, then slotted for hinges. Trim front spar to taper shown on plans. Try to hinge as tightly as free movement will allow as a small gap is much more efficient aerodynamically.

Wing Hold-Downs

Position wing onto fuselage top, check carefully for alignment, then mark trailing edge with a pencil from inside through hole in threaded block. Remove wing and drill trailing edge for $\frac{1}{4}$ " nylon bolt passage. Return wing to fuselage and bolt to place. Clamp against former B and drill through them for $\frac{3}{16}$ " dia. dowels. Try to keep holes parallel to each other by using a short scrap of dowel in first hole as a drilling guide for the second. The narrow gap at the wing rail can be easily filled with Epoxylite using Saran Wrap to protect B.

Fill cabin top with scrap block balsa and epoxy around projecting dowels, then remove wing leaving dowels in cabin top. Build center-section up to fit aileron servo, install hardware (I used a Goldberg aileron coupler unit). Check freedom adjusting for absolutely no bind anywhere. Use horn holes that will provide $\frac{3}{16}$ " of deflection up and down. Cover center-section top with $\frac{1}{16}$ " sheet.

Wing Struts and Connectors

Fabricate the wing struts from appropriate

sized spruce, using drawings for approximate length. Epoxy pushrod wires with wing and fuselage assembled; final adjustment can be obtained with clevis. Carve and sand struts to an airfoiled shape, and give each a coat of finishing resin.

The Finish

The model in the photos was finished using R.S. Perfect urethane paint over polyester sheathing on the open areas and finishing resin on the wooden areas. The sheathing is available in fabric shops and sewing centers. It's silk like in appearance; that is, it has a definite grain. Do not mistake a woven material also referred to as polyester sheathing; the proper material has a definite grain direction when held up to the light and is applied very much like silk. I apply the sheathing wet, over a previously clear doped frame, using the exact techniques we've all used for years. The sheathing will shrink some as the water dries, but the true tightening is controlled with dope. I use enough clear butyrate dope to get the desired tightness, then finish out with Sig Lite Cote. Too much dope can actually cause the fabric to split, so go slow with the clear. The main attraction of the sheathing is its low cost and strength, along with quick filling tendencies. I buy mine for 75¢ a yard and usually need only four coats of dope. I find no major fault with the polyester sheathing, other than a tendency to over-tighten when too much butyrate is used.

The photo model has one coat of clear, with the same basic types of undercoatings as the epoxies. They can be used over butyrate dope if at least forty-eight hours of degassing is allowed. Following the directions on the product will produce a nice shiny finish with a minimal amount of effort. They have excellent fuel spill resistance and the

colors resist fading quite well. I recommend the polyester-polyurethane finishing technique.

The prototype was finished out using red and black vinyl trim tapes. The wing and tail numbers are stock Sig decals which stick to the Perfect paint surfaces quite well. The windshield and windows are the very last thing placed on the model. Cut to outline, trim for a good fit, and C.A. onto the wood. Some strain relief of the windshield can be obtained with a hair dryer. I used vinyl trim tape along the joints to hide them.

Flying Notes

With a .35, my model requires short grass or a paved surface as the acceleration is slow. Generous amounts of rudder are needed until some speed is built up. As the tail begins to rise a gentle tap of up will break the model off the ground. Climb out is gentle and slow, *do not horse this one around*, its flight envelope is realistic and stately. If you tend towards "ham handedness" consider using a strong .40. Obtain some altitude, then try out the aileron and elevator response. Turns are mild with good lateral stability and the model will return to a level heading with little need for opposite aileron.

Landings can be stretched somewhat as the model tends to float and a burst of power will add a surprising amount of distance. Flair out at ground level for a feathery landing.

Well, there you have the information to enable you to build your own Porterfield Collegiate "Cub". If you feel compelled to attempt to educate the lay public about the obvious (to you) differences in light planes, go right ahead! I figure the difference between the products of Kansas City and Locke Haven must be an illusion anyway. ●

