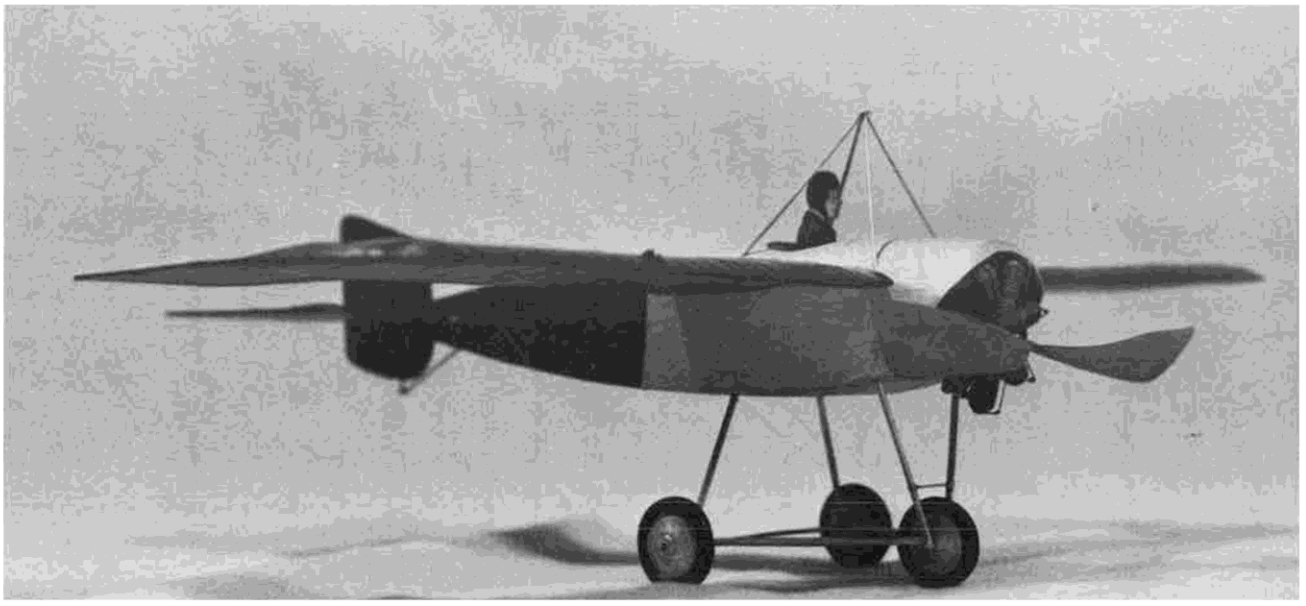


PEANUT SCALE

BEACHEY MONOPLANE

By HOBY CLAY . . . Here is a Peanut plan with a double bonus: a very interesting history of the Beachey Monoplane, and a scale three-view for your documentation (see page 36). Hop to it!

• Lincoln Beachey was a renowned aerobatic pilot in the pre-World War I era. He was a pioneer and innovator and his flamboyance and popularity enabled him to make a real contribution to the early development of the airplane. Reams have been written about him and his exploits. The information that I have available to me is from three articles in the *American Aviation Historical Society Journal:* Summer 1961, by Hud Weeks; and Spring 1964, by Willis Nye, with a drawing of the monoplane. In February 1964, Hud Weeks published a lengthy article in the *American Aircraft Modeler* about this intrepid aviator, together with a number of photos of the planes that he flew.

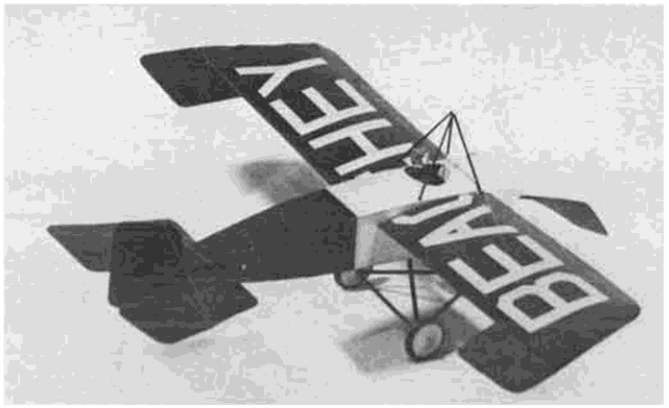
Born in San Francisco in 1887, by the age of 15 he had become proficient in the repair of gasoline engines and was, with his brother Hillary, a professional motorcycle racer. His knowledge of engines led to his association with Captain Thomas Baldwin, an early balloonist and dirigible builder. In 1903, he built his first dirigible, and he and Hillary developed a number of innovations which advanced the state of the art. He participated in airship races and exhibitions through 1910, but had already learned from Glen Curtiss how to fly the Curtiss biplanes.

By early 1911, Beachey was giving airplane flying exhibitions, and on August 20 he gained his reputation as a number one airman by demonstrating a mastery of control and daring against the cream of the world's aviators from France, England, and the United States, flying an early Curtiss pusher. He tested planes for Curtiss and gave exhibitions all over the US. An inveterate showman, people flocked to his airshows wherever he appeared. He didn't invent the loop or other aerobatic maneuvers, but he perfected their execution. He was one of the prime movers in the field of aircraft design development, and always strove to obtain a vehicle capable of more daring and difficult maneuvers to astound his airshow audiences.

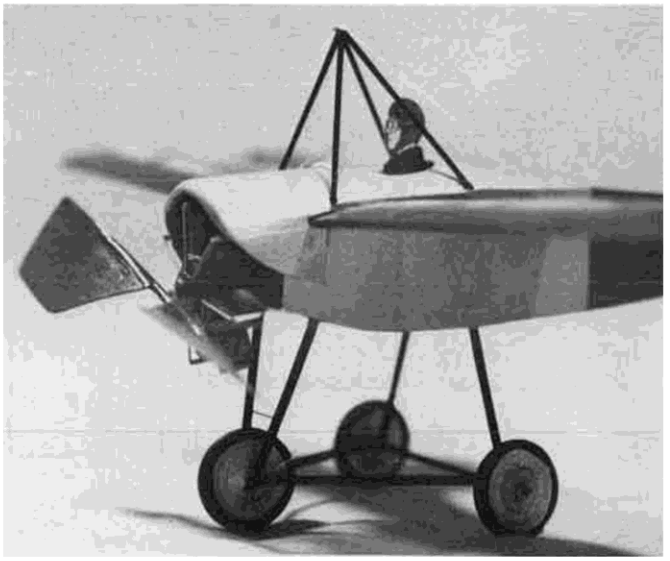
In 1914, he went to France and bought an 80 hp Gnome rotary engine. With this lightweight, aircooled engine in hand, he commissioned designer Warren Eaton to build his most famous mount, the clipped-wing, Curtiss-type pusher biplane known as the *"Little Looper"* or *"Pocket Pusher."*

Embarking at once on an exhibition tour, he looped for Orville Wright at Dayton, and raced Eddie Rickenbacker in an auto at the Iowa State Fair. Over a

Continued from page 53



ABOVE: Lincoln Beachey had his name painted on the upper surface of his wings so that people could read it as he performed the death-defying vertical dive which eventually claimed his life.



RIGHT: Author prefers the "backwards-looking" props as they yield better power characteristics with their variable pitch.

million postcards with a photo of this event were sold, and I have seen a calendar with this scene, or a similar race with Barney Oldfield, which was performed a number of times.

Late in 1914, Beachey commissioned Eaton to build still another small, fast ship, this time a monoplane, for his 1915 exhibition tour. It would use the same Gnome engine. The monoplane, probably finished in January or February, 1915, began undergoing testing. No plans were saved, but Eaton and Beachey's mechanic, Art Mix, were able to recall many of the specifications and dimensions which Hud Weeks gleaned from interviews with them. The monoplane was as fast as it looked. Design speed in level flight was 103 mph compared to 80 in the clean *Little Looper* with the same engine.

Beachey was so busy that he never really had time to check out the new plane. However, the Panama Pacific International Exposition officials pressured him to use it at the San Francisco fair in March. He was able to do some practice flying early in the month, transferring the Gnome from the *Little Looper* to the monoplane and back each time.

On the 13th, it was flown at the fairgrounds three times for short periods, and on Sunday the 14th of March, 1915, he agreed to fly his aerobatic routine in it before a crowd estimated at 50,000. He accomplished a series of loops and climbed to 3,500 feet to perform his famous vertical dive. From the dive, he flipped to inverted and continued down at a 45-degree angle so the crowd could read his name on the wings. He then resumed the vertical dive, probably with the throttle wide open, against the advice of the designer.

During this series of maneuvers, it is estimated he attained an airspeed of 250 mph. He continued the dive to about 500 feet, then apparently panicked a little and snapped the wings while pulling out too fast.

The airplane dumped into the bay. His injuries from the crash landing were relatively minor, but the top cowl crushed back over the cockpit trapping him inside where he drowned.

His incredible performances in such a short time (he died at 28) are a credit to his energy, daring, and probably excellent press agents. Because of his stature in the early aviation historical annals, this short-lived, one-of-a-kind airplane is significant. In addition, its appearance as that of being ready to jump off the ground is unique for an airplane of the period.

Willis Nye's drawing, while beautifully done as his all are, was probably made mostly from photos: it is not completely dimensionally accurate. Some of the dimensions shown were probably filled in after the drawing was finished as they do not scale. In addition, the ailerons and elevators were not drawn identically, while Eaton and Mix both insist they were interchangeable. For these reasons, I determined to draw up as accurate a three-view as I could, and I enlisted the aid of the late Russ Barrera, then an AMA Scale Contest Board member, to perfect the drawing and obtain his authentication.

During early 1976, we corresponded several times, and the drawing you see here is the result. Like Beachey, I really haven't created anything . . . just collected and used the work of others to obtain the result I wanted. And that result was to come up with a model of a plane with which I was particularly enamored, and which could follow AMA scale rules.

Several sizes of this model have been built from this data, the most fun of which has been this Peanut Scale version. Interestingly, this 28-foot span, 18-foot long prototype essentially satisfies both sets of Peanut Scale rules at half-inch scale. The only deviations from true scale in this model are a small amount of dihedral in the wings and the enlarged rubber needed to cure a dutch roll wallow.

BUILDING A BEACHEY

The structure shown is relatively simple and light. Mine weighs just under 12 grams. The only drawback to this design for modeling purposes is the short nose, which requires some nose weight for balance as a rubber-powered model. This is not an uncommon problem with antique designs.

Frame the fuselage, building the leading edge and spar pockets accurately, and attach the wire landing gear strut stubs and cowl formers. Obtain a bottle 1-1/2 inches in diameter (a can will work if you cut off the end flange). To form the engine cowl, moisten a piece of 1/64 balsa sheet two inches wide by 2-3/4 inches long and strap it on the form with 1/2-inch projecting over the end. Glue in three strips of 1/32 sheet, cut across the grain and progressively narrower, on the inside front edge of the sheet which is overhanging the bottle. When dry, the thickened, laminated edge can be shaped with the tip of an emery board to create the rolled front edge of the aluminum prototype's cowl. Mount the cowl and trim to shape, but don't fasten the rear of the engine enclosure to the fuselage sides until they are tissued.

Wing ribs are shown to scale shape and spacing. Use of sheet ribs makes it easiest to obtain the correct undercamber. Stack and pin them together, sand to uniform section, and cut the spar notches in the entire stack with a piece of hacksaw blade. Make the laminated tips, bending the cardboard form slightly after the strips are taped in place to approximate the wing undercamber. Build the entire wing in one piece, carrying the edge strips and all spars across the centersection for handling strength until assembly. Attach the ailerons with fine steel wire before covering. The rudder, elevators and ailerons are flat, but the stabilizer has airfoiled ribs. Put in all the gussets and small blocks for running the rigging before covering.

Cover with fine tissue or condenser paper and color with Floquil applied with an airbrush for best results. The entire airplane is black, except for the wheel discs and the fuselage forward of the rear end of the turtledeck which are aluminum. You will need to mask off the fuselage at this line each time you spray color.

If you don't have silver tissue, make some on a small frame for the wing letters. A light coat of clear dope on the back side of the tissue while it is still on the frame will help stick the letters when softened slightly and carefully with acetone.

Turn the crankcase on a Moto-Tool or electric drill from a balsa block into which has been inserted and cemented a 1/8-inch birch dowel spindle, drilling the shaft hole 1/32 while it is still in the chuck. Cut it off with a razor saw and trim off the seven flats. Cylinders can be made from thread-wrapped balsa dowel, but are more realistically simulated using lengths of the flexible sections of plastic drinking straws with the ends capped with balsa. Assemble and paint the engine flat metallic gray. Pushrods are fabricated from .015 wire. Build the nose thrust block and attach the engine, slipping the assembly into position before gluing the rear of the cowl to the fuselage sides. Cut away the cowl and tissue at the wing-mount pockets and attach the wing to the fuselage after trimming away the unnecessary centersection spars and trailing edge. Put in about 1/8-inch, nonscale dihedral.

Turn and paint the three wheels, making sure they're identical. If you use styrofoam, prime them with four or five coats of diluted white glue to keep the paint solvents from dissolving the foam. Attach all the landing gear struts and the pylon, painting them black. Make the little pylon cap, working in the holes for rigging before trimming and filing to shape, and attach with a small dab of epoxy. The little tension cable actuated drag brake sprocket can be made from a narrow strip of the same material with end holes worked in to slip the axle through. Fabricate the brake shoe from balsa and paint the same color as the dummy engine. Imbed the .015 wire axle in the cross-strut fairing and drill the front struts for the axle, reinforcing with a little smear of epoxy. Slip on the wheels and form small eyes at the axle ends to attach the rigging.

Use two pound test nylon monofilament fishing line for the rigging. If you think it out, the landing gear struts can be rigged with two pieces, and each side of the wings with one. The control wires can be omitted for simplicity, but the wing rigging is functional and should be installed.

Mount the tail feathers and install the safety skid. Skid struts are slivers of bamboo painted black, one to each bottom longeron. The short vertical piece is 1/32 round balsa. Rig the tail and slide in all the control horns. Alternate entrance and exit of the elevator control wires through the two fuselage entrance points and to the top and bottom of the elevator horns to allow up and down movement. If you mull that over, you'll see when I mean. The flippers specified

by Beachey for low, slow maneuvers before his audiences are monstrous, so flight adjustments must be made carefully, identically and minutely. But you'll no doubt need to make them to get the bird to fly most efficiently.

Glue on the windscreen and mount a half-inch scale pilot if you agree with the **Model Builder** staff and me that the model won't fly without one.

The prop shown has been discussed on these pages in the past. I think it will give better flights than any commercially available one due to its larger blade area and its ability to change the pitch. Try one, you'll like the results.

Slip in a length of two-strand 3/32 or 1/8-inch Pirelli for power and balance where shown, or no further aft than the tip of the pylon. Test fly with low winds, adjusting the surfaces to get the pattern right. This is not a one-minute-plus flyer, but 30 seconds can easily be beaten with a little patience and practice. •