# THE CURTISS XP-55 'ASCENDER'

**By TOM NALLEN . . . The frenzied efforts for wartime air supremacy foster some pretty unorthodox aircraft designs. Some make it big (P-38) and some drop into obscurity (XP-55). Only modelers keep them alive.**

• From the time the Wright Brothers started it all by climbing away from the dunes at Kitty Hawk with a stabilizer out front, the canard, or tail-first flying machine, has intrigued aviation fans everywhere. A discussion of canards would be incomplete if it didn't recall the first heavier-than-air flight in France, by the expatriate Brazilian, Santos-Dumont, acknowledged to be the first aeroplane flight in all of Europe. Isn't a tip of the helmet due his box-kite like 14bis, which flew into history in the backward style? Wouldn't it also be an oversight not to mention that in England, heavier-than-air flight began with the colorful Americans, S.F. Cody, who did it first . . . flying tail first . . . at Farnborough?

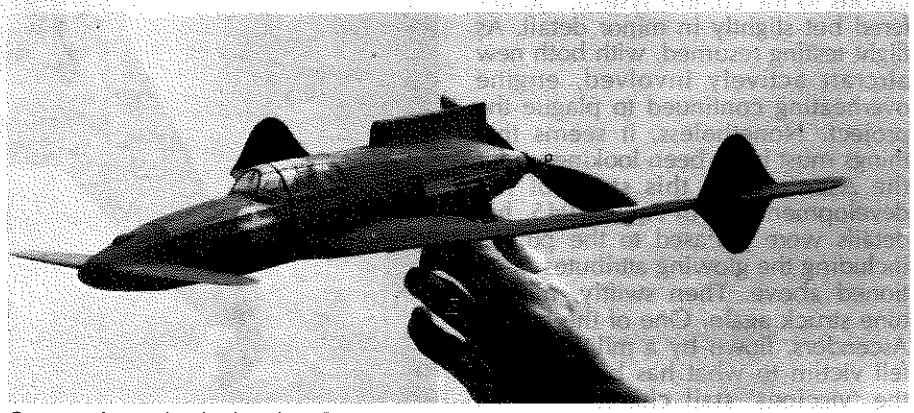
How fitting, in light of these historic milestones, that one of our own, Paul McCready, should employ the venerable canard configuration in achieving one of aviation's most elusive goals with his man-powered Gossamer Condor.

In the infancy of flight, the canard ruled the roost, but with the epochal flight of Louis Bleriot across the English Channel in 1909, the much cleaner (aerodynamically) tractor monoplane dethroned the dirty old bird, and the backward configuration soon faded into obscurity.

In 1930, Mark Granville, of the Gee Bee clan, built a canard as a lark, at Springfield, Massachusetts. Because the ungainly craft appeared to fly back end to, Granville, tongue-in-cheek, aptly christened his new airplane the "Ascender." Years later, when Curtiss announced its new Ascender, the amused Granville took delight in pointing out that Curtiss' spelling was as deficient as had been his own.

As the clouds of war broke over Europe in 1939, the Luftwaffe, playing the decisive role in the blitzkrieg of Poland, vividly demonstrated the devastating effect of massive airpower. It was a new kind of warfare, awesomely staged before a stunned and unprepared world. A sobered America hastily began to mobilize her near-dormant aircraft industry, and manufacturers hurriedly embarked on research and development programs seeking to gain an edge for their country in the race for supremacy in the air. Off the drawing boards came many farsighted concepts, including a bevy of unorthodox designs. The Curtiss XP-55 Ascender was a product of these efforts. She was destined to excite her imaginative creators with tantalizing hints of brilliant performance, then dash their hopes in sudden, crushing disaster. The imposition of wartime secrecy, and the passage of time have clouded her story, but bits and pieces of information gathered during the search for documentation of the model form an interesting, if somewhat sketchy picture.

To assess the potential of a markedly different, tail-first, swept-wing configuration, the XP-55 was



**Some purists maintain that the XP-55 wasn't a true canard, but rather, a flying wing with a forward control surface. Picky, picky, picky . . .**

developed at the St. Louis plant of the Curtiss-Wright Airplane Division. On July 13, 1943, the radical fighter hopeful made her maiden flight, pushed into the air by a liquid-cooled Allison V-12 engine of 1275 hp. Top speed was reportedly equal to comparably powered conventional fighters, placing the remarkable machine in the close-to-400 mph category.

The prototype demonstrated superb high speed handling qualities and first-rate maneuverability, along with a virtue described as, "outstanding longitudinal control". Among the many unique features of the design was a jettisonable propeller, provided to enable the pilot to abandon his aircraft in an emergency without having to contend with a prop whirling behind him, and the exceptional field of vision from the high, forward cockpit was unparalleled in contemporary fighting aircraft.

Unfortunately, with all the good, came some bad. An extraordinarily long takeoff run was required by the new plane, a serious deficiency in a fighter, and engine cooling was a problem at all speeds and altitudes.

In November of 1943, disaster struck the fledging project, when, ostensibly while undergoing stall tests, the prototype crashed and was destroyed. Undeterred, Curtiss rolled out two more of the type in early 1944. This pair incorporated modifications to the control system and differed but slightly in minor detail. As flight testing resumed, with both new aircraft actively involved, engine overheating continued to plague the project. Nonetheless, it seems that things must have been looking up for the Ascender at this stage of her development, for in April, 1945, her details were released to the public, including the glowing attributes mentioned above. Then swiftly, misfortune struck again. One of the pair of Ascenders, flown by a military pilot, fell victim to what has been termed the 'viscious' stall characteristic of the design. In a file on the XP-55 at the National Air and Space Museum Library, photographs dated May 29, 1945, depict the scattered remains of this, the second ill-fated Ascender, and bear silent testimony to the flaw that presumably ended her development. The unusual and unlucky craft met her fate at the south end of Wright Field, perhaps not far from where many of us took part in the 1976 Nationals.

In spite of her short and tragic tenure in the air, the XP-55 earned her niche in aviation history, and for unique approach to purpose and distinction of line, the Ascender takes a back seat to few. As a flying model she offers an absorbing challenge, and an adventurous change of pace.

The model was built expressly for competition under Flying Aces Club scale rules, where bonus points are awarded to more inherently difficult-to-fly types. Under these rules, the Ascender earns a whopping bonus score of 45 points which are added to flight and scale fidelity scores. Bonus points are earned this way . . . 15 for a low wing, 10 for being a pusher, and 20 for featuring an unorthodox configuration. The rules allow the landing gear to be represented in the retracted position. Flying under these refreshingly innovative rules, the Ascender can never be ruled out of contention, and has won an F.A.C. scale meet against quality competition.

As might be expected, the model XP-55 didn't fly right off the board. First glide tests indicated too little forward flying surface area, so a new, slightly larger stabilizer was built. With the glide satisfactory, it was off to the tall grass for first powered flights. Originally, the stab was built up and was slid through a tapered slot in the forward fuselage to allow for shimming as an aid to optimizing glide trim. The built-up stab quickly proved impractical, as it was damaged to some degree on nearly every landing, good ones included. Even the usually forgiving tall grass was too tough!

An all 1/16 sheet stab was next slid through the slot. This brainstorm not only saw the stab continue to be broken up, but also resulted in damage to the forward fuselage. Frustration built up over a number of testing sessions, and even though the airplane showed promise in flight, the continual need for repair put a damper on our enthusiasm for the design. A suggestion from one of my sons, that perhaps a tongue arrangement with knock-off surfaces would be the answer, was followed, and turned out to be even more successful than anticipated. In addition to completely eliminating the stabilizer damage problem, the 1/32 plywood tongue made the forward fuselage extremely robust and at the same time provided slight nose ballast. After this modification, the Ascender became the exciting, colorful . . . and durable performer originally envisioned.

Some concern was felt about the vulnerability of the wing-mounted rudders, but they have posed no problem at all over the course of many flights. The rudders are non-adjustable. What amount to elevons are outboard of the rudders, and they are adjustable. They were intended to provide tip wash-out if needed, but have not been necessary for that purpose. Test flying should begin with the elevons in neutral and adjustments worked in gradually as the model is brought into flight trim. The effect of the elevons will be found to be moderate.

Begin construction with the fuselage. Put down the keel pieces and glue on the half-formers. When dry, pick up the keels and add the other former halves. Starting at mid-fuselage, add the side stringers, working first toward the nose, and then toward the tail . . . whoops . . . rear. As stringers are added side-to-side, alternately, keep an eye on fuselage alignment. Note from the plan that the stringers on the upper rear air scoop are 1/32 x 1/16 square. Leave off the two uppermost forward fuselage stringers until the instrument panel former is mounted. When all other stringers are on, glue the sanded plywood tongue into place at the angle shown on the plan.

Fill between the adjacent stringers and the tongue with soft 1/16 sheet balsa. Fill the other fuselage areas indicated at this time too, except that area at the wing's leading edge.

Make the support for the motor peg of fairly hard 1/16 sheet balsa. The upper half of the forward cockpit former is made by wrapping a wet 1/32 x 1/16 basswood strip around a suitable form. Make the ends of this bow a little longer than actually required, and trim to size when cementing into place.

Carefully cut out that portion of former No. 4 indicated and install the instrument panel former, trimming as needed. The dashed portion of the keel running through the canopy area is cut out. Add the two upper forward fuselage stringers at this time. Make two 1/32 sheet balsa wing saddles, from the side view of the plan, and cement them in place. The fuselage should now be sanded and brought to readiness for covering.

The wing is built in five sections. The center section and main panels are constructed together, and after the dihedral is blocked in, are joined, with careful attention being paid to the important center section gussets. The leading edge of the center section is not shaped, but presents a square edge to the facing piece of 1/8 sheet balsa attached there. Construct the tips next, noting that the trailing edge, where the sheet elevons abut, is a piece of 1/16 sheet balsa tapered toward the tip. Add the elevons after covering the tips. Soft copper wire will make satisfactory hinges.

The rudders are simple. Cut them from warp-resistant sheet, with the

grain running vertically. The rudders should be sanded but not doped until after they are mounted to the wings.

Trim and sand the wing panels, carrying the leading edge shape to the apex of the center section triangle. Cover the wing with Japanese tissue. White was used on the model shown here.

Attach the rudders to the main panels and when dry, cement the wingtips to the rudders, using care in alignment. Use a sealer on the rudders. Talcum powder in lightly thinned nitrate dope is suitable. Sand the rudders lightly between several coats of sealer.

The forward flying surface, or stab, is made of 3 laminations of medium weight, straight grained 1/32 sheet balsa. The middle lamination should be made first, fitting a blank against the fuselage, under the tongue, and sanding the edge until a flush fit is obtained. Trace around the tongue onto the blank and cut out. Cement on the upper and lower laminations.

Sand the stab halves to a smooth, symmetrical section. Their plug-on fit should be snug, and may be tightened up by rubbing cement onto the upper and lower surfaces of the tongue. Since the stab isn't covered, it should be sealed and sanded prior to painting.

The covered wing may now be fitted to the uncovered fuselage. Some cutting and trimming will be necessary, particularly where the leading edge of the wing center section must be brought flush with the fuselage bottom. When you're satisfied with the fit, set aside the wing, and sheet that area of the fuselage around the wing's leading edge. Refit the wing, sanding and trimming the newly sheeted portion of the fuselage as necessary. Putting aside the wing, cover the fuselage.

Join the wing and fuselage, carefully checking alignment. Add the 1/16 sheet sub-fin and carve, hollow, and mount the lower scoops. Seal and prepare them for painting, as they are not tissue covered.

Brush a couple of coats of thin nitrate dope onto the entire airplane. Apply the wing fillets, made from the pattern on the plan, attaching first at the rear and drawing over the leading edge/fuselage junction. White glue works well for this purpose.

Color is applied by spraying the model with very thin, clear nitrate dope, tinted with Floquil, a model railroad paint. Apply the color so the dope is almost dry on contact, to minimize weight build-up. Upper surfaces are Olive Drab and below the color line, all surfaces are Pale Gray. Control surface and panel outlines may be black tissue strips applied with Scotch Spra-mount adhesive, or they may be inked.

The windscreen is formed over a balsa block, carved to shape, keeping in mind that the form should be made slightly longer and deeper than actually required so that the windscreen may be trimmed to fit properly.

Make a bond paper pattern for the canopy, cut out the window areas and paint the pattern olive drab. Cement the pattern to a piece of celluloid. The two cockpit components may be mounted to the fuselag with a fast-curing epoxy, using masking tape to hold them in place until the epoxy has set. Windscreen frames are simulated with bond paper and are painted with a small brush. A small brush may also be used to paint the airscoop inlets and the yellow numerals on the forward fuselage sides.

Insignia is done with blue and white tissue and is mounted with spray adhesive. The panel to which the exhaust stacks are attached is a rectangular piece of bond paper painted silver and affixed to the fuselage side where shown on the plan. The exhaust stacks are made of scrap balsa, painted black, and glued to the panel.

Initial glide tests are best performed without prop and rubber, but with the model balanced (with clay) where indicated on the plan. The plane is held by the fuselage just forward of the wing, and should be launched slightly nose down, with reasonably good speed. Experiment with adding small bits of clay fore or aft until you've achieved the best glide possible. All this testing, of course, should take place over tall grass.

When the glide is satisfactory, install the prop and rubber, and wind in 200 or 300 turns. Pin the prop and check the balance point. Add or remove clay until the model balances at the point where the glide was best. Later, the clay may be replaced with bits of lead hidden within the fuselage.

About 3 or 4 degrees of down thrust should be built into the nose (tail) block, and the original flies with a little left thrust, too. That is, the plane of the propeller is offset toward the left when the model is viewed from above and behind.

Now let's try a powered flight. With low winds in, about as specified above, pitch the Ascender straight out, smartly. Increase the number of turns gradually with successive flights, making small incremental thrust line changes as needed. With full winds, my Ascender likes to be launched slightly upwards in a shallow left-hand bank. Properly trimmed, a fairly hard launch, in combination with the initial power burst of the rubber motor, will carry the model to altitude in a spectacular, sweeping climb. The cruise portion of the flight often finds the model circling randomly in either direction, and in best trim, the wide circling glide is gently undulating, paced by rhythmic changes in the speed of the free-wheeling prop as the Ascender swings in to land.

The free-wheeling propeller adds greatly to glide duration, and an adequate device is simply a piece of brass tubing, with a ramp-type notch cut into one end (ala plastic props), epoxied into the spinner. The notch engages the prop shaft when the motor is wound.

Best timed flight so far has been 42 seconds, with several untimed sorties estimated at around 50 seconds. A soarer she's not, but at her ready-to-fly weight of 1.1 oz. the XP-55, under cruise, is capable of riding passing thermals to higher altitudes. Four strands of 3/32 FAI rubber about 22 inches long are used for power, and they turn a carved balsa, 7-1/2 inch diameter left-hand (pusher) propeller.

If you build an Ascender of your own, you'll probably run into the same little kid I did, the one who's sure to ask, "Mister, how come your airplane flies backward?"

References:

50 Fighters 1938-1945, Aircam No. 51. Has 3-views and a color side profile of the prototype. Markings are also depicted.

Factory 3-views and a number of photographs are available from the National Air and Space Museum Library, as are 3-views by Mr. Len Wieczorek, FAC, which originally appeared in M.A.N. for July, 1945.

"Airpower", January 1973. ●

**It does fly! In the air, about 80 to 90 feet over Chicopee, Mass. . . . Where?**