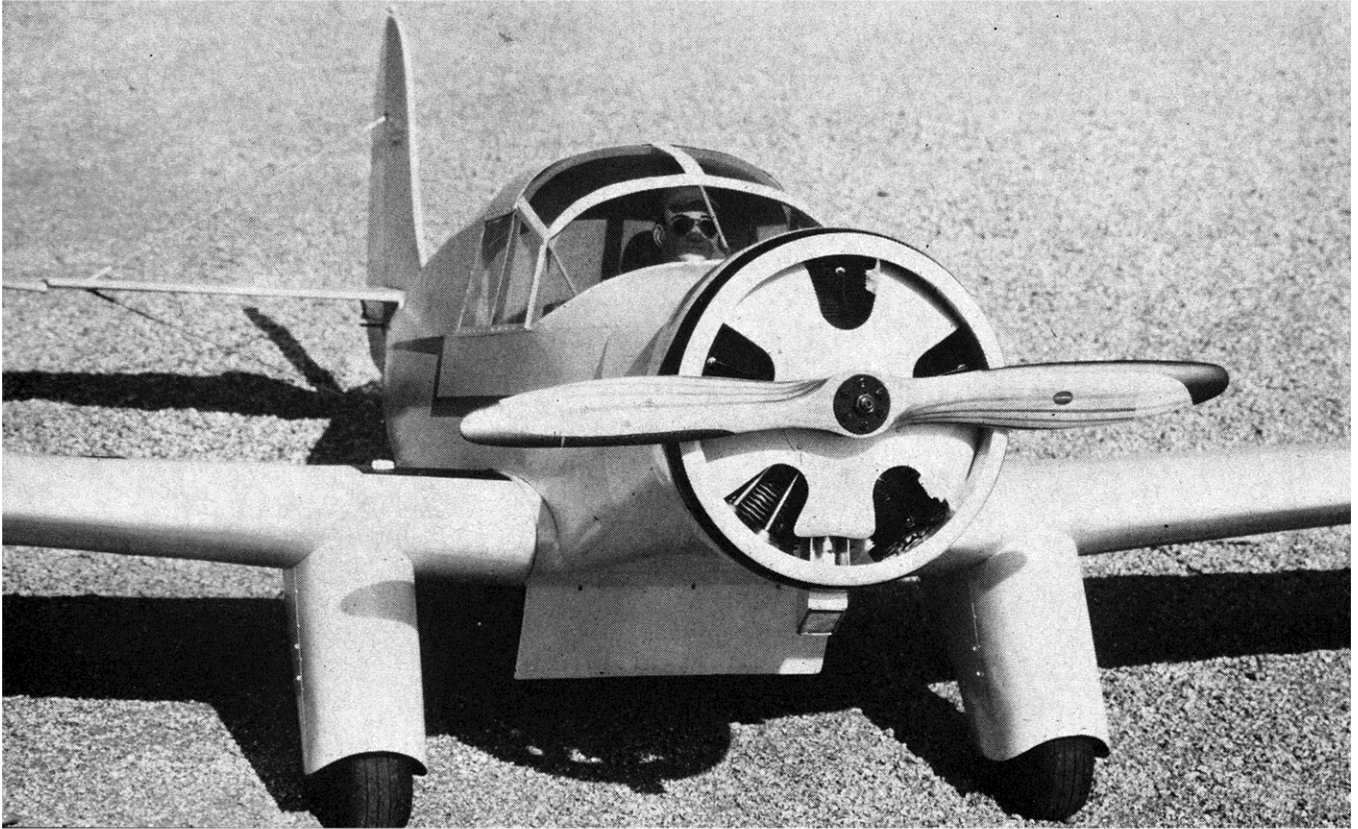


THE AERONCA LC



By John Eaton and Jim MacDonald

Some airplanes are built to be airliners, others start out to be fighters, or bombers, business barges, or trainers. And then there are airplanes that are built for more personal uses, like the Cessna 172. It has always been, and perhaps always will be, that airplanes cannot be commercially successful unless they are practical, serving some economic need of the aeronautical masses. If the airplane is really successful, like the DC-3 or the 172, it will serve multiple purposes. Every once in a while, however, a miscalculation is made, and unsuccessful results. Unsuccess can take many forms, the Hughes flying boat, the Dornier Do-X, the list goes on. The Swift, the Navion. For every airplane that has failed there is a champion to declare that had not foulness of heart in some person intervened the airplane would have

been a huge success, no doubt! Well maybe nobody ever said that about the Wittman-Lewis-Barling XNBL-1, but I believe you get the point. So I'm not going to try to tell you that the Aeronca L never got a chance because of some dastardly conspiracy. I would simply say that such an airplane, untouched and pure with virtue to spare, need only declare C'est moi, I put it to you, gentlemen, that this little morsel was built for Camelot! Of course, if you read the history books you will find some prattle about the two-place market and other such rationalizations that accompany any commercial venture. The stockholders and accountants, you know.

The lovely L was preceded in life by a clattering bathtub, the Aeronca C-2 and C-3 which in a flight of fancy were officially the Collegian and Master. I don't know why. Ugly

The LC had a unique under-the-center section flap, and a perforated disc over the Warner radial engine for directing the air blast.

as sin, the bathtubs were a success for the Aeronautical Corporation of America. They were powered by the Aeronca E-113 two-cylinder opposed air-cooled engine from which the exhaust sprang like a beard, and in which crankshafts broke like dry branches. This was one of those engines that survived only because there was no replacement, not because of any intrinsic usefulness. Ask any owner.

As if in atonement for its C-3 sins, Aeronca took some of the profits from the sales of its bathtubs and put them into the development of the L. October 1935 was the beginning of the design process for the L, several months after Walter Friedlander bought the company and put his sons Carl and John in Model Design by Bob Henson

Another In Our Series Of Golden Era Model Designs

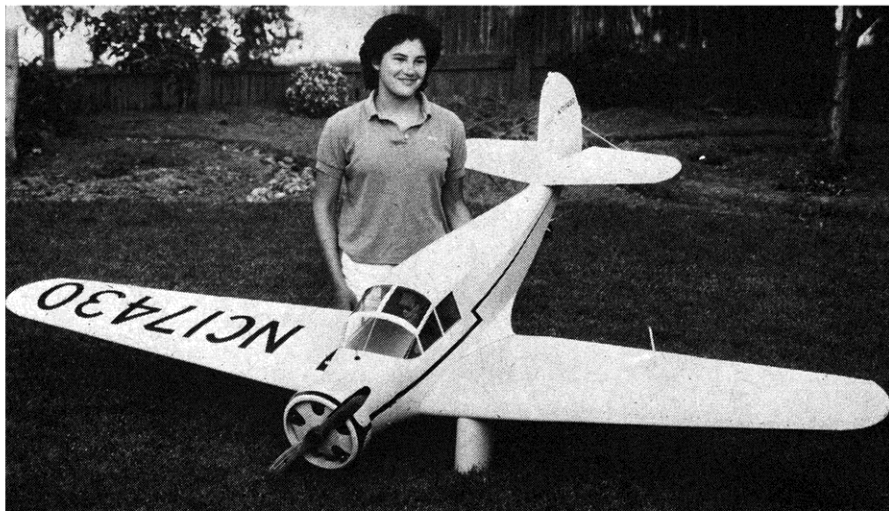
charge. Roger Schlemmer was engineer on the project. The final design was as clean as the wired and king-posted C-3 was dirty, with a Townsend ring over the engine, a long graceful tapered wing and a fuselage with flowing lines. A very up to date NACA 2218 airfoil section tapering to a 2209 at the tip was used, and a simple split flap was under the fuselage to make approaches and landings easier.

Throughout the design the emphasis was on simplicity and lightness. The wing was all wood except for aluminum ailerons and leading edge sheeting, with fabric covering overall. The landing gear used big fat airwheels for those pasture landings and had Aeronca designed oleo struts. Large spat-type fairings covered all but a little of the tire, and were made from flat aluminum sheet. The fuselage structure was made from steel tubing as were the tail surfaces. As you will find inside the fabric of the Citabria, the aft fuselage has only three longerons with formers and stringers filling out the shape. Except for the aluminum cowling and nose section the fuselage was covered with fabric.

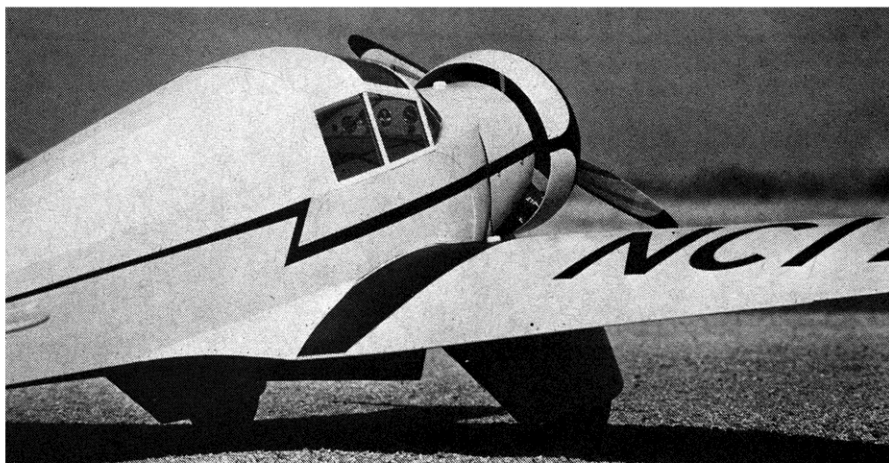
All was not sweetness and light during the design and test phase, however. Over the protests of the engineering department it was decided to use the E-113 engine. (There were plenty of them.) This resulted in a pug-nosed airplane, not very nice looking in the front even with the exhaust covered by cowling, and an airplane with a very high power loading, undoubtedly between 30 and 35 pounds per horsepower even if the E-113 was cooperating to its full 40 horsepower potential. It fell to the luckless Ford Fluck to test fly the thing, and he couldn't have done a better job for the engineering department if they had paid him (?). He was a long way from the airport before he had enough altitude to make a turn back for a landing. Back in the factory it went for the installation of a LeBlond 5-cylinder radial.

Aeronca sold Model Ls in three versions, all identical aft of the firewall. The LA had a 70 horsepower LeBlond, the LB a 90 horsepower LeBlond, and the LC had a customer furnished 90 horsepower Warner radial, although technically the customer could install any engine he wanted. The LC had a slightly longer nose than the LB which was again longer than the LA.

The model L had nice performance, comparing favorably with any modern airplane of equivalent horsepower. It grossed 1680 pounds with scale r/c modeler



Author's daughter, Beth MacDonald, shows the large size of the Golden Era model.



Rear angle shows the characteristic shape of the Aeronca's tail surfaces.

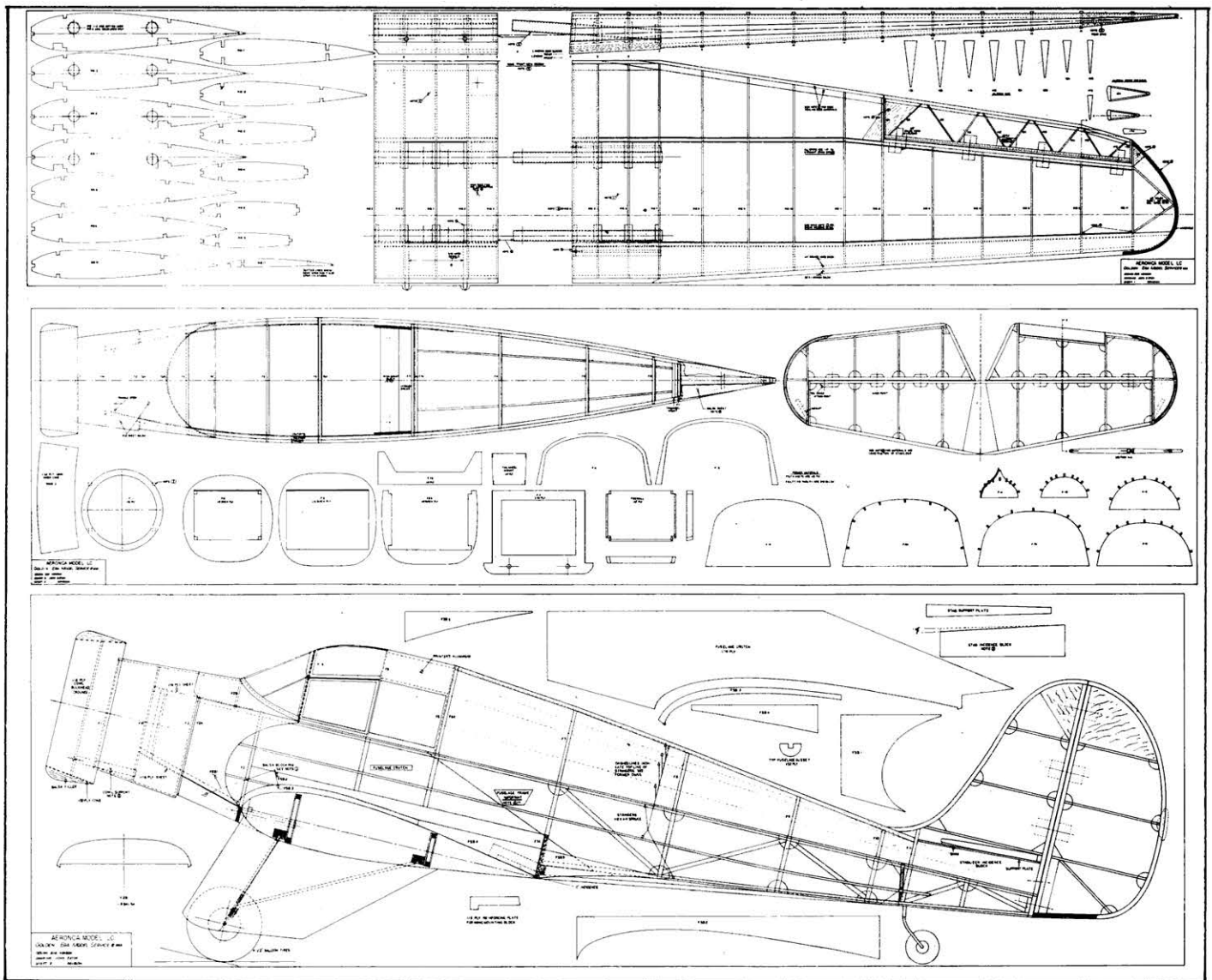


The overall shape of the aircraft is very pleasing, and performance is on a par with some of today's equally-powered aircraft.

a published useful load of 669 pounds in the LB version. It cruised at 105 mph and climbed 600 feet per minute, and would cruise 500 miles on 28 gallons of fuel (without NBAA reserves). Visibility must have been very good from the glassy cockpit, set well forward on the

wing. You entered the cockpit from the right side where there was a wingwalk and the right half of the canopy hinged forward. Like all real airplanes it was flown with a stick. The forward side windows opened up and out for ventilation. It was a very sporty airplane, usually painted Loening Yellow with a black lightning stripe on the sides.

Sadly, Cincinnati is not Camelot, and in the winter of 1936 the rains



came. Lunken Airport, home of Aeronca, was surrounded by rivers. The rivers rose above the levees and the factory was entirely under water for a time. Aeronca had sold only 54 Model Ls in the first year of production and it was decided to not restart production of the L or C-3 but to concentrate on the K instead. The K led to the Chief, the military L-2, and eventually the best known Aeronca, the 7AC. In the 1950s the Aeronca Corporation sold its aircraft

manufacturing business to concentrate on more profitable defense subcontracting which it had begun in World War Two and still does today. Civilian aerospace work is done, including thrust reversers for business jets. In the hands of later companies the 7AC grew into the Citabria and the Scout and was last built by Bellanca.

Perhaps little charmers like the LC exist only to please romantics like myself when we happen upon

them. My first encounter with an LC was in the mid-'60s. I was driving past Shady Grove airport which at that time was mostly a repository of tired things and weeds. Dave Williams, the mad Canadian, had not yet arrived with his gliders, and the most active airplane was an only marginally respectable Beech 18. I was just driving by, though, when out of the weeds and into my eye sprang a most unusual airplane.

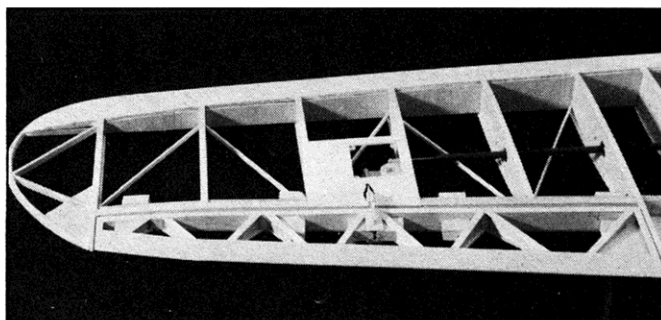
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Full-size plans for the 1/4-scale Aeronca L-C are available from: **GOLDEN ERA MODEL SERVICE**, Rt. 3, Box 158, Woodland, CA 95695, (916) 662-3698. Plans come rolled in mailing tube for \$29.95 plus \$5.00 postage and handling. Plans for the Vickers "JOCKEY" are also available.

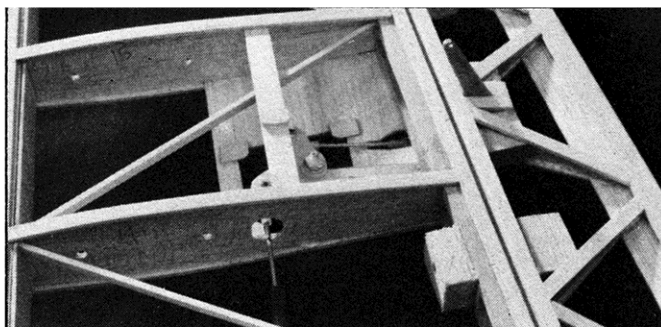


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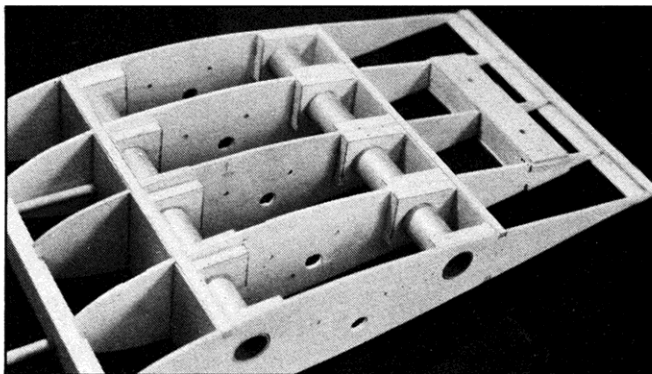
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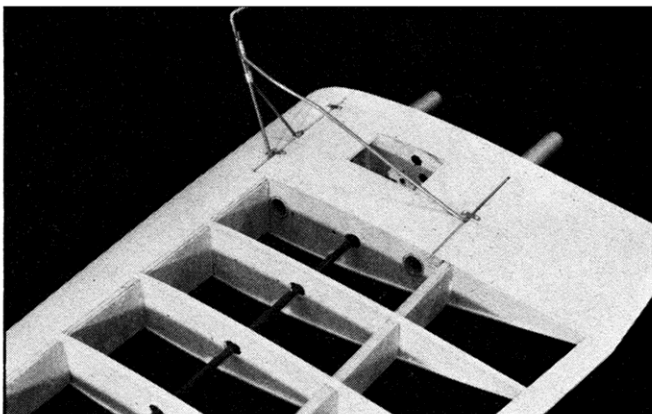
Bottom view of right-hand wing tip.
Note aileron bellcrank access hatch.



Top view of right wing panel at
aileron mechanism. Note crossmember
between ribs with scrap balsa elevated
to level of fabric covering. This supports
exit hole for dummy aileron control cable.



Wing center section prior to sheeting.
Note blocking around wing tubes and
holes in ribs for servo leads to
outer panels.



Bottom right wing panel before covering.
Note servo compartment, aileron
pushrod, and landing gear detail.

Without wrecking my car I pulled off of Highway 40 and went back for a closer look. At 500 feet I was in love. It was such a pretty airplane, even though the blue and white dope was a little chalky even at that distance. What could it be? Who had built it? The little radial engine was really intoxicating. I could easily forgive the Junkers type canopy, for this airplane had style. As I got closer I could see the airplane was a derelict, unflyable. So sad. I still wanted it. Wood was peeling here and there, I'm sure the tires were flat. I found the data plate, read it through the crazing plexiglass. Aeronca? I didn't believe it. It was like finding a ballerina playing for a football team, it challenged my most basic beliefs. Afraid of wood rot, I left. Soon after, the LC disappeared from Shady Grove and I forgot about it, only to happen upon the same one in 1978 at Whiteman Airport in Los Angeles where it was being completely rebuilt. I feel good about that, knowing my act of simple desertion did not result in the loss of such a worthy artifact. I wonder where the other 53 Model Ls are?

While Cincinnati may not be Camelot, certainly model aviation might be and it seems right to me that the

LC should have an extended life in model form that it might give people pleasure. The prototype has already done so on one memorable occasion, an open house that Jim went to at Beale Air Force Base. After flying the model in a demonstration Jim was standing next to it on the flight line when a gentleman walked up with a happy look on his face and said, "I learned to fly in one of those!" Times like that make all the work of building worthwhile for a scale modeler.

If you haven't already, before building this LC is an excellent time to build that workshop you've always talked about. You'll have a difficult time building this model on the dining room table, even if your wife IS that tolerant. This is a big aircraft, and you will need lots of room to spread out at various stages to set or check the alignment of component parts, especially the wing.

The wing center section and each of the panels are assembled individually on an "Adjusto-Jig" wing jig. Although the full size airplane had no washout we built in three-eighths inch washout between the tip and the inboard end of the aileron, with good results. This is easy to do while preparing the ribs for the wing

jig by stacking the involved ribs in a fanfold pattern before drilling for the alignment wires. While the ribs are stacked be sure to drill holes for the aileron pushrods and in the case of the center section ribs only the holes for the wing attach tubes. Mount the ribs on the jig and install the 1/4 square spar members and the leading and trailing edge pieces. Be sure to glue the butt rib of each outer wing panel at the proper dihedral angle. After the shear webbing and leading edge sheeting have been glued in place, the panel can be removed from the jig. When both panels and the center section have been framed, glue the wing attach tubes in the center section securely in place and find a big, flat, smooth, open area where you can put the entire 9-ft. wing together. Position the attach tubes in each panel and slip the panels into place on the center section. Weigh down the center section piece to avoid shifting and block up each panel to the proper dihedral. After assuring proper alignment of the panels onto the center section, glue the tubes in place. Gently remove the panels from the center section and add the balsa support blocking around each tube. With the tubes

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scale r/c modeler

AERONCA

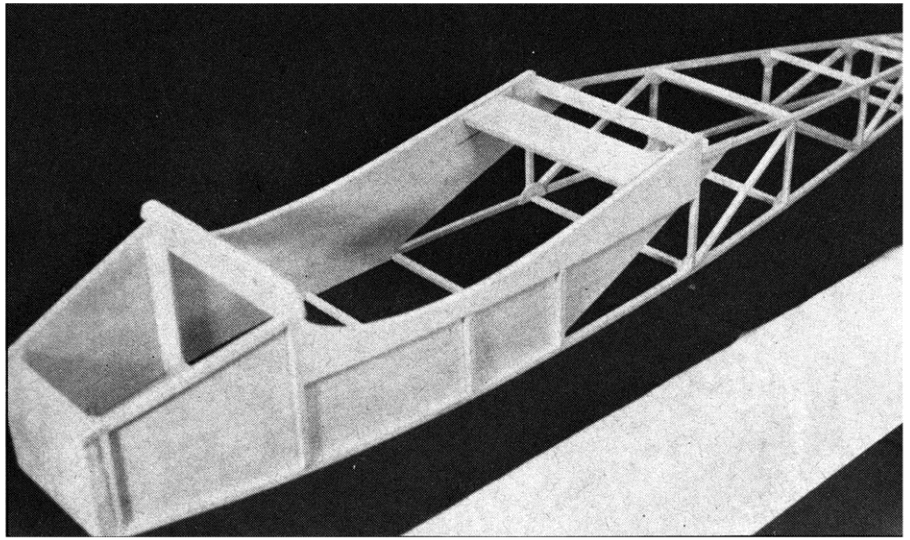
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securely glued and braced, add the balsa sheeting to the center section and to the root of the wing panels. Note there is more sheeting on the upper right wing panel than the left to support the wing walk area.

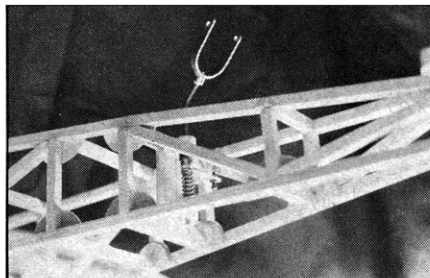
Lay up the fuselage sides using $\frac{1}{4}$ sq. spruce and make the $\frac{1}{16}$ th ply crutch panels. Note in the top view that there is a pronounced curvature in the nose section of the fuselage sides (to provide strain-relief at the bulkhead joints) during the assembly of the spruce side-frames and the ply crutch. This is accomplished by constructing a simple assembly bed that conforms to the fuselage curvature at the outside of the longerons. The pieces are epoxied together, laid in the curved bed, and clamped firmly in place until the epoxy cures. You have an opportunity here to make two rights or two lefts. Don't. After assembling both fuselage sides, cut out the $\frac{1}{16}$ th ply fuel tank compartment top and glue the firewall and former F3 to it. Epoxy and clamp the fuselage sides to the firewall and F3 and after complete curing lay the fuselage upside-down on the plans. Pin the sides to assure proper curvature from the firewall to the tailpost and install all of the cross bracing and internal formers. Reinforce all joints with ply gussets as shown on the plans. Install the plywood wing mounting plate so the wing center section can be mounted and checked for the proper 0 degrees incidence.

Install formers F1 to F2B and all the balsa blocking and sheeting needed to complete the forward section of the fuselage back to F-7A. After installing the rudder and elevator control linkage and the tail wheel assembly, add the upper fuselage formers, all stringers, and the vertical fin. Note that the stabilizer support block in the tail should be cut to provide the negative incidence detailed in the construction notes.

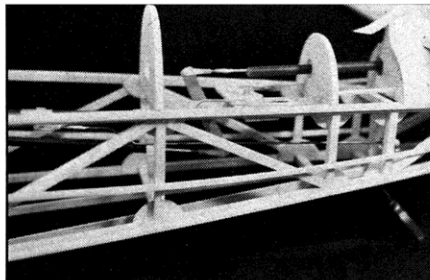
The ring cowl is made by first cutting two plywood circles corresponding in size to the inside diameters of the cowl. The centers of the circles are drilled for a dowel and braced so they are completely parallel to each other and separated by the width of the cowl. A cone section of $\frac{1}{32}$ ply is constructed from three of the templates on the plan and is temporarily spot glued to the formers and overlaid with three laminations of $\frac{3}{16}$ th balsa (oriented with



Fuselage framework.



Aft section of fuselage with shock-mounted, steerable tailwheel.

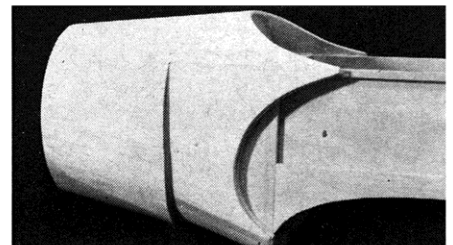


Tail assembly showing transfer arm mechanism used to drive elevator. Note bellcrank mechanism with pushrod to rudder servo and cables to rudder. Note also link arm connecting rudder pushrod to tail wheel steering arm.

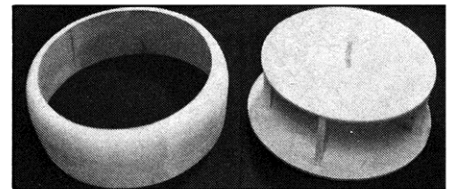
the grain running chordwise). The dowel onto which the cowl formers are glued can then be chucked into a drill and spun, allowing the cowl to be sanded to shape.

The wheel pants are an obvious feature on this aircraft, and on Jim's model were constructed of fiberglass using a plaster mold. They are attached to the wing using rubber bands, an effective method that also leaves them free to give without damaging the wing structure if you occasionally make a less-than-perfect landing. If you wish to make them out of plywood or plastic sheet you can use the templates on the plan.

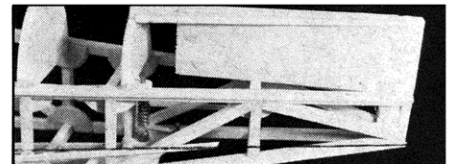
Jim's prototype finished out at $15\frac{1}{4}$ lbs. flying weight, which gave



Forward section of fuselage with all sheeting and blocking in place.

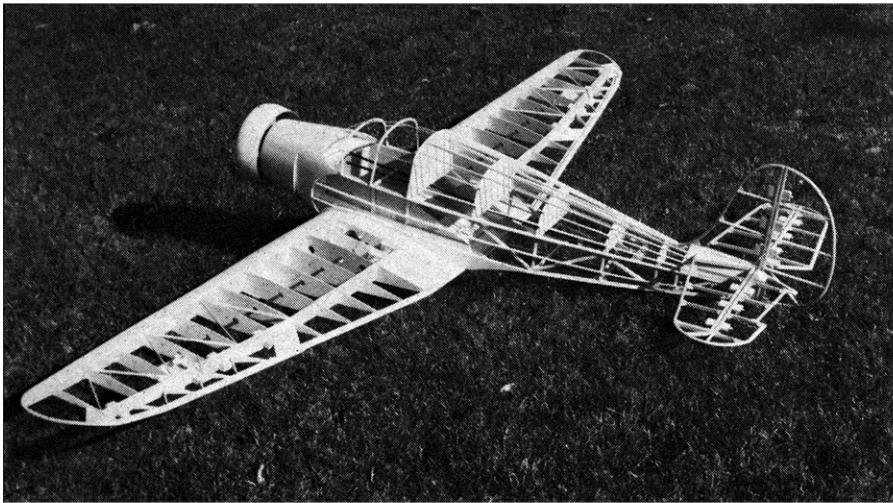


The ring cowl after forming and initial shaping on the plywood former (shown on the right).



Stabilizer support plate between rear former and tailpost. Set incidence relative to top longerons.

a 28 oz./sq. ft. wing-loading. Three ounces of lead were epoxied into the nose to place the CG at the quarter chord point. Two years earlier, Bob Henson (the third man in Golden Era Model Service) and Jim MacDonald had collaborated in the building of a $\frac{1}{6}$ th scale model of the LC (from plans published in *Model Builder*) for a team-scale project and it proved to be a real handful to fly. It was very prone to tip stall, had to be flown much too fast (especially on landings) for scale appearance, and had to be nursed gently through turns to avoid high-speed stalls. The necessarily high flight speeds of the smaller model made it impossible to use the



Completed framework just before covering.

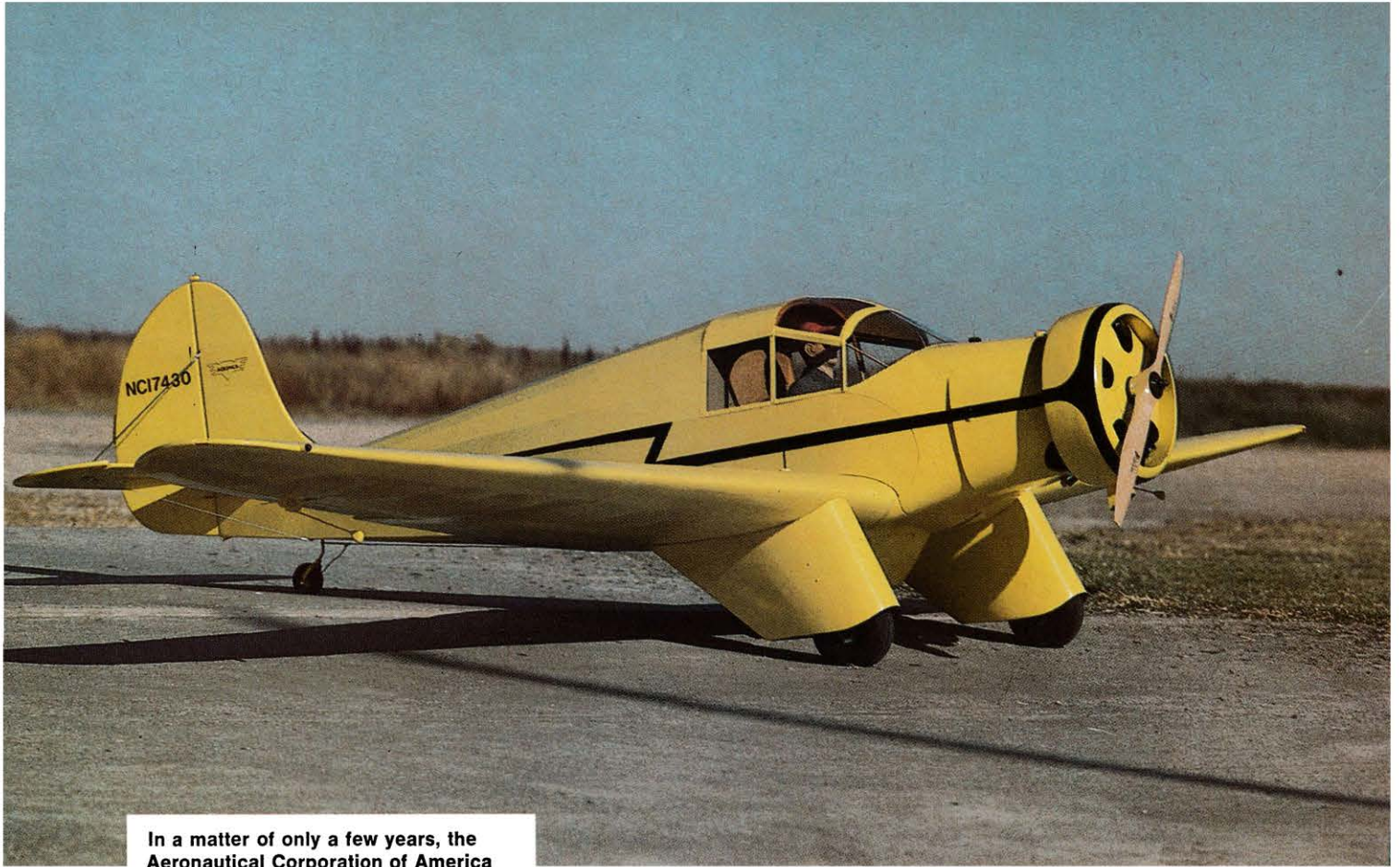
speed brake because it would balloon wildly when the brake was extended. That model also had a 28-oz. wing-loading, creating some apprehension during this project though we bravely rationalized that the higher Reynolds number of the quarter scale model would come to our rescue. But, just to help old Reynolds out, Bob's design includes some washout in the wing tips and a 10 percent enlargement over scale of the horizontal tail surfaces.

After completing the model, Jim made the initial test flights at the Merwin Ranch dichondra farm near Sacramento. This site has literally hundreds of acres of open, pool-table-smooth dichondra turf, and is well-known to giant-scalers in California. There was some initial fussing to get the near-inverted OS 1.20 to idle reliably, followed by some low and high speed taxi tests to get a feel for the ground handling characteristics. On the first flight, Jim learned that the 3 degrees negative incidence on the stabilizer, one less than scale incidence, was a little too much. It took full down trim plus down stick pressure to hold the plane level. Though badly out of elevator trim, the model handled well even at low speed and had a gentle straight-ahead stall. After getting an idea of what to expect at low speed, Jim brought it around for a landing, all the while holding about 25 percent down elevator. That was the first time he ever flared for landing by releasing the elevator stick to neutral! After adjusting the elevator trim to about 5 degrees down, two rather uneventful flights were logged. On the fourth flight, extensive low speed and stall tests were made, both with and without the speed brake extended. With the brake down, the model needs about three

"clicks" of down trim to hold it level. Its speed is visibly slowed and it has a nice descent angle on final approach to landing with good control authority for the final flare and touchdown.

About one week after Jim completed the model, with 10 test flights logged, we all shoved off to Riverside, California, for the 3rd Annual (1984) 4 Stroke Contest sponsored by the Riverside R/C Club and Hobby Shack. Considering how little time he had flown it, Jim was satisfied with a 5th place finish in what has grown to be a very excellent and competitive contest. Two weeks later, Jim entered the LC in what was apparently the final Giant Scale contest at Morgan Hill, California, and finished a close second behind Chuck Fuller's magnificent Waco Taperwing. These are the only contests it has been entered in, as 1985 was spent campaigning the Vickers Jockey. Jim has logged most of his flight time with the model at various fun-flies and air shows (he flies with the Capital City Barnstormers, AMA show team #114). The model is smooth and graceful, even elegant, in the air. With the 1.20 swinging an 18x6 prop, it's not a zippy aerobatic model. Like the full scales of its time, you have to trade altitude for speed to do aerobatics. The scale-like sound of the 1.20 and the model's graceful movements while it scribes loops, barrel rolls and stall turns in the sky really do justice to the "Golden Era" of aviation, and invariably attract a lot of attention from "old-timers" among the spectators. As testimony to the easy, smooth flying characteristics of Bob Henson's design, I should point out that at the time the photographs for this article were taken, Jim had completed his second season and logged over 150 flights with the model. Hell, it's so easy he even lets me fly it!

□



In a matter of only a few years, the Aeronautical Corporation of America (Aeronca) produced one of the ugliest sport planes flying, and one of the most beautiful . . . this Aeronca LC. A sleek low wing, devoid of any bracing with graceful gear and wheel fairings.

