PHOTOS BY AUTHORS

LONGSTER

By LE GRAY and CURTIS CHRISTEN . . . CO_2 R/C Scale? Why not? This little cutie is easy to build and can be flown indoors or out.

• Les Long could be introduced in any number of ways, with any number of glowing descriptions: the Father of Light Aircraft; the founder of aircraft homebuilding. Overstatements? Of course. But, without doubt, Les Long was an innovative pioneer during aviation's adolescence. His work has yet to receive appropriate recognition.

With specific reference to lightplanes, he was a giant. He was also a man of fortunate circumstance. Though the CAA (later FAA) had effectively regulated away most all national potential for homebuilt aircraft, one state offered haven for amateur aeronautical genius. Long was a resident of Oregon, and that state alone allowed freedom to his talents. Les Long flourished. Unfortunately, the rest of the country was denied the promise of his productivity.

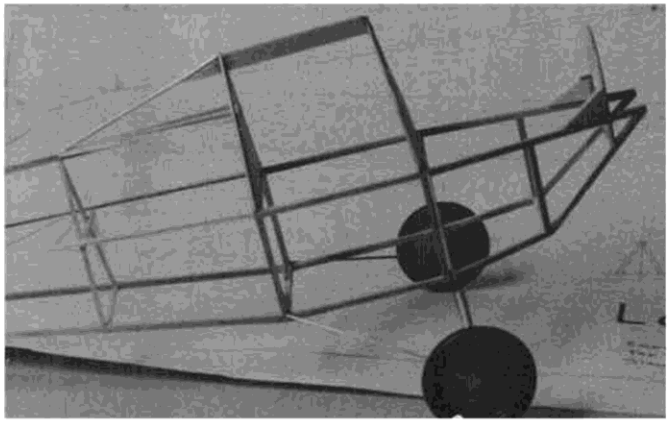
One of Long's most appealing creations was a small, single-place parasol, the Longster . . . often identified as the Henderson-Longster or Longster III. Quite advanced in many of its features, the Longster utilized a steel tube fuselage (though brazed and riveted rather than welded) and was powered by a horizontally-opposed engine.

The common pacing factor in the development and advancement of small aircraft was, as now, lack of suitable powerplants. Many homebuilts of the era staggered into the air with modified automobile or motorcycle engines. These units had unacceptable power-to-weight ratios and only marginal reliability, but they were available and they were relatively inexpensive. Early Long aircraft carried these cast-iron burdens. The subject Longster was first powered by a 20-hp converted four-cylinder Henderson motorcycle engine. Later it was fitted with an opposed twin, designed by Les Long, which incorporated cylinders from a Harley-Davidson engine. The new engine developed some 30 hp and undoubtedly provided a more flyable craft.

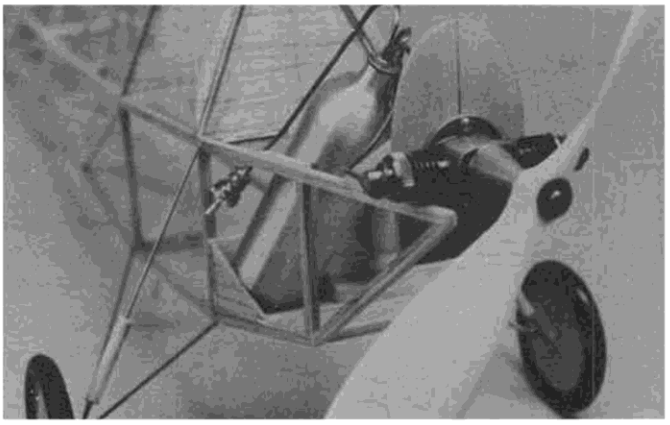
The Longster's performance was adequate even by today's standards and a C-65 or modified VW engine would make it a very competitive machine. It seems incongruous that updated Longsters are not now crowding workshops and dotting sport airstrips across the nation. With its simplicity, the current interest in minimum-machine flying, and the wave of nostalgia washing the land, the Longster surely is a candidate worthy of serious consideration by present day homebuilders. It certainly has personality and a friendly hound-dawg kind of appeal. Construction could hardly be more basic. It is unique, unusual, and a stable platform, and most assuredly would be fun to fly. A real crowd pleaser, so to speak.

For these same reasons, a model Longster is fun, too. Make it a CO_2 powered, R/C indoor model and the project provides an interesting challenge.

Flights to date with the prototype model indicate that the concept is feasible. With currently available CO_2 powerplants, the miniature Longster offers limited duration, and the twin-cylinder Brown motor is definitely recommended. Efficiency of the airframe/powerplant combination is marginal, however, and improvement is needed. And it's a fascinating challenge



Nose structure details. If you've built a couple of stick-and-tissue models before, you won't have any trouble with this one.



Closeup of the motor and tank installation. Model uses a 10cc main tank and 1-3/4cc condenser tank (hidden behind firewall).

. . . if you're into that sort of thing.

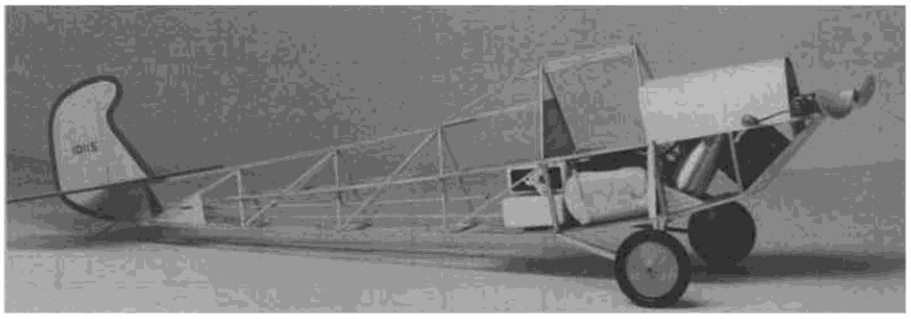
Increased tankage for longer motor runs is certainly needed. However, this becomes a rather sophisticated pressure vessel problem which should not be approached by us amateurs. Gas under the pressures useful for this purpose can be dangerous. Expend your talents in other areas and use only commercially manufactured tanks. These units are a lot more than just soldered, sheet brass containers.

Where most of us can work effectively . . . and safely . . . for improved performance is in propeller/motor efficiency. An experimental program that trades propeller pitch versus motor duration for best climb/distance performance will be very rewarding. A simple sheet aluminum propeller will allow rapid, on-field changes with minimum fuss or expense. Those individuals or groups who accept the challenge and extend the general performance of this or this type model may well enjoy the satisfaction of pioneering a new class of sport/competition . . . indoor R/C scale.

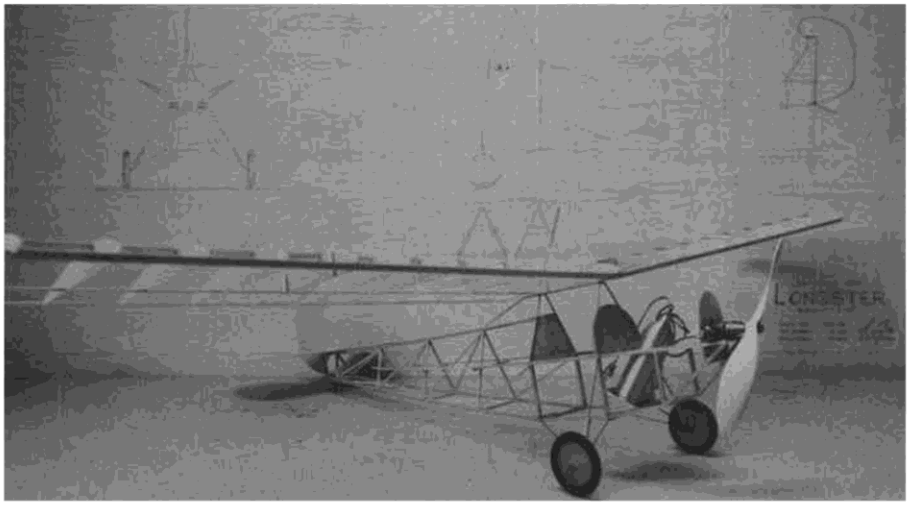
If an indoor flying site is not open for use, a nearby Little League diamond will serve on calm evenings during soccer season. Or a tennis court. And if a little, dinky radio is not readily available, the Longster makes a fine free flight model.

A rather obvious modification is the installation of a Cox .010 engine. This calls for a bit of beefing around the nose and sort of shoots the indoor philosophy right in the old empennage, so to speak . . . but fun is the name of the game. And fun it will provide . . . R/C or no. So go forth, do with, and be joyous. Or whatever.

Anyone who grew up with Megow, Comet, Scientific or other stick-and-tissue models will have no difficulty with the Longster. Nor will a cultist of the Peanut Scale mania. Even so, a few building hints . . . especially the recommended sequence of construction . . . are in order. Pay attention.



Fuselage ready for covering. Nose section covered with card stock prior to adding tissue. If you want a longer motor run and can stand the noise, a Cox .010 would be just right.



Completed basic structure is quite light, closely follows the construction of the full-size Longster. The flying wires are functional, so don't leave 'em off.

CONSTRUCTION

1) Build forward fuselage (3/32 sq. balsa) complete with firewall and cabane bulkheads but without 1/64 plywood floor. Position completed forward fuselage subassembly over top view with rear cabane bulkhead located precisely on drawing and with subassembly square and centered. Elevate front end of subassembly so that bottom of forward cabane bulkhead is EXACTLY 3/8 of an inch above building surface, using fuselage subassembly alignment template either side. (See reference dimension on side view plan.) Check squareness and centering of subassembly with plans and block and pin securely in place.

2) Build 1/16 sq. balsa "A" frame bulkheads for fuselage tailcone directly over plans. These units consists of side pieces and a center cross brace stringer support piece. Build carefully and cut lengths accurately.

3) Fuselage tailcone is built over projected true length (broken lines) of top view plan. Position bottom 3/32 sq. balsa tailcone longerons over drawing, glued to the bottom of rear cabane bulkhead. Add 1/16 sq. balsa cross braces between longerons. Add 1/16 balsa aft end. Add pre-bent 1/64 plywood floor. Add 1/16 balsa gussets.

Position and attach tailcone "A" frames to bottom longerons, using bulkhead erection template to establish proper slant angle. Add 3/32 sq. balsa tailcone top longeron, gluing to top of "A" frames and rear cabane bulkhead. Add 1/16 balsa gusset. Add 1/16 sq. balsa diagonal braces, sides and bottom. Add 1/16 sq. balsa side stringer on each side

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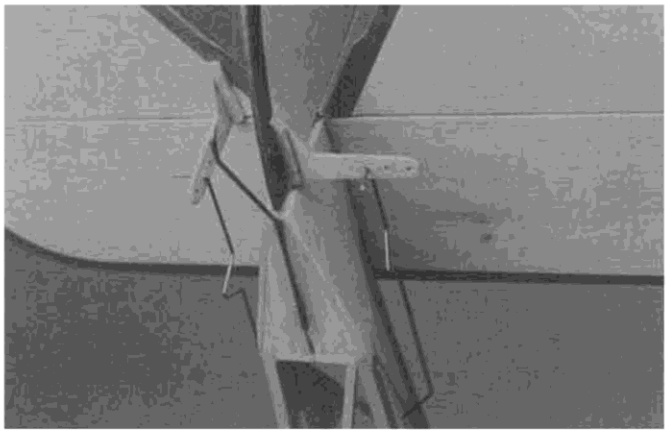
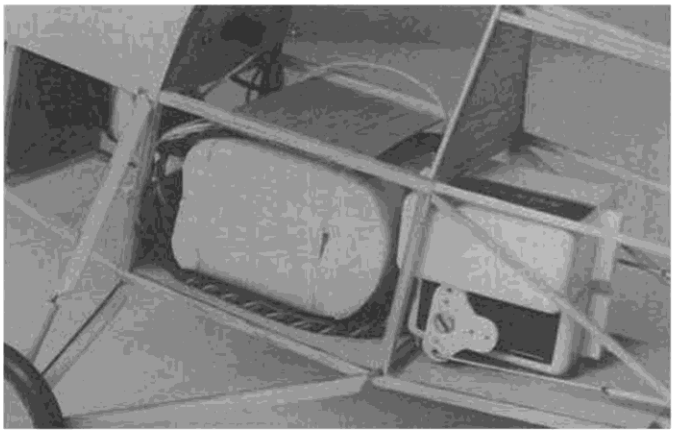


Control linkage hook-up detail. V-bends in pushrods wires are for adjusting the pushrod length.



A lightweight, super-small radio is a must for this model. Prototype uses a Cannon rig, 100 ma. battery mounted in the nose.

of tailcone, gluing to rear of cabane bulkhead. Let the whole mess dry completely before removing from building surface.

4) Install 1/16 balsa triangular fairings either side of top tailcone longeron, immediately aft of rear cabane bulkhead. Add 1/16 dia. aluminum tube cabane anti-drag brace and 3/32 balsa gusset between aft end of cabane spreader and anti-drag brace.

5) Fabricate landing gear components and attach to fuselage.

6) Fabricate and fit 3/32 balsa center rib over cabane struts, cabane spreader and cabane anti-drag brace. DO NOT glue in position.

7) Fabricate wing panels, left and right, including tips and root ribs directly over plan. Tilt 1/16 balsa root ribs outboard using root rib dihedral template to establish proper angle. Assemble left and right wing panels to 3/32 balsa center rib fabricated in Step 6, with each tip rib elevated 1-3/8 inch above building surface. Sand, cover, and trim. Use tissue and apply two coats of 75% Sig Lite Coat dope or equivalent.

8) Fabricate tail surfaces from light 1/16 balsa. Round edges slightly and cover with tissue. Coat with the one light application of 75% Sig Lite Coat or equivalent. Cut hinges from very thin plastic sheet such as used for notebook filler sheet protective covers. Abrade plastic with fine sandpaper, cut hinges to size, insert in pre-cut slots in surfaces, and secure with Zap or Hot Stuff.

9) Fit motor and tanks. Prototype uses 10cc main and 1-3/4cc condenser tank.

10) Remove 100 ma battery from case and wrap battery with 1/4-inch Sig foam tape or equivalent. Mount battery in fuselage nose as far forward as possible.

11) Mount receiver in 1/4-inch Sig foam tape just aft of forward cabane bulkhead. Stack servos on side and mount immediately aft of receiver. Temporarily attach hinged rudder and stabilizer assemblies to fuselage. Fabricate pushrods, length as required, from 1/16-inch dia. aluminum tube and soft wire to fit tube I.D. Epoxy tube and wire components. Install pushrods in fuselage. Add 1/16 sq. balsa cross pieces to "A" frames as necessary to limit pushrod flex. Add 1/32 balsa in aft fuselage for pushrod exit support. Make final check of all control installation and operation.

12) Add card stock to fuselage nose sides, top and bottom forward of front cabane bulkhead. Cover with tissue and add trim. Use three coats of 75% Sig Lite Coat or equivalent.

13) Locate wing assembly on cabane mount and note that small notches will be required in bottom of 1/16 balsa root ribs to clear 1/16 dia. aluminum tube struts, forward and aft. Notch as required so that 3/32 balsa center rib seats to cabane spreader. Glue wing assembly to cabane and rudder and stabilizer assemblies to fuselage. Check squareness and centering with fuselage and between surfaces. Add landing wire pylon and gas tank detail to wing center section.

14) Add wing and tail flying and landing wires (use medium weight thread), sewing *through* surfaces. When positioned, hit point of penetration with a drop of Zap or Hot Stuff and the entry and exit point with a drop of acetate-base model airplane glue such as Ambroid or Testors. These wires are functional, do not omit. Take care that brace wires do not distort but rather secure proper surface alignment.

15) Check CG position. Ballast as required to locate per plans. The prototype weighed 6-3/4 oz.

17) DO NOT test glide. Make first launch an extended glide using approximately half power, outside, over tall grass (if available). Increase power on subsequent launches. •