Longster

This big free-flight model is scale in dimensions, construction, and detail features. Even has shock-absorbing landing gear.

by ROBERT HARRAH

This 1933 design has the look of the thirties that is now considered old, but truly "classic." Known as the Henderson Longster, it was powered by the Henderson motorcycle engine. Les Long may have designed a ship similar in all outward appearance to the Aeronca of the same period, but close study shows some outstanding and unique features that should be credited as "originally Les." Every effort was made during the development of this scratch-built scale to maintain much of the inner design features, rather than end up with a scale model by outer measurements only.

A comparison of the vital statistics of a plane of the thirties and the flying machines of the seventies is almost enough to make me want to go back. The data and specifications necessary to build a modern plane would probably outweigh the gross weight of the 575-lb. Longster. The 363-ft. high Saturn moon rocket, laid on its side, would be more than enough to handle the 200-ft. takeoff run required by the Longster. This same rocket will send the astronauts flying to the moon at speeds in excess of 75 mi. per min., while Les listed the high speed of the Longster as 75 mph. To consider the 6,000,000-lb. Saturn as a comparison may seem unfair to some, but it is spectacular–as were the barnstorming pilots, like Les, flying these classics of the thirties. Fifty years ago radio was just being used; now we see astronauts via color television barnstorming the moon.

So, you may ask, why build? To me, it gives those few hours to remember when–and to wonder what the next forty years will bring. Man may be beyond the early dreams to fly like a bird, but I am hopeful that sharing this heritage with our mind and hands now and in the future will never change. So let us get to building a classic of old and have some fun.

All flying wires are functional and require careful pre-flight checking and alignment.

Construction

A flat surface topped with a piece of Celotex (minimum size 24 x 36 1/2"), rubber bands, X-acto saw, sharp blades and pins are my standbys. I like to save my plans, so a bit of waxed paper, MonoKote backing or an old polyethelene bag spread wrinkle-free over the plans preserves them and saves sanding the plans off of the plane. So my family can't claim glue-sniffing, I use white or Titebond-type glues. I found that a fifty percent solution of these water-base glues, diluted with water and then brushed over all surfaces after final sanding, increases the strength considerably with the addition of little weight.

Glue is a subject in itself, and I would like to share some thoughts and findings in this direction for your scrutiny. Engineering, design, and strength require that a glue be

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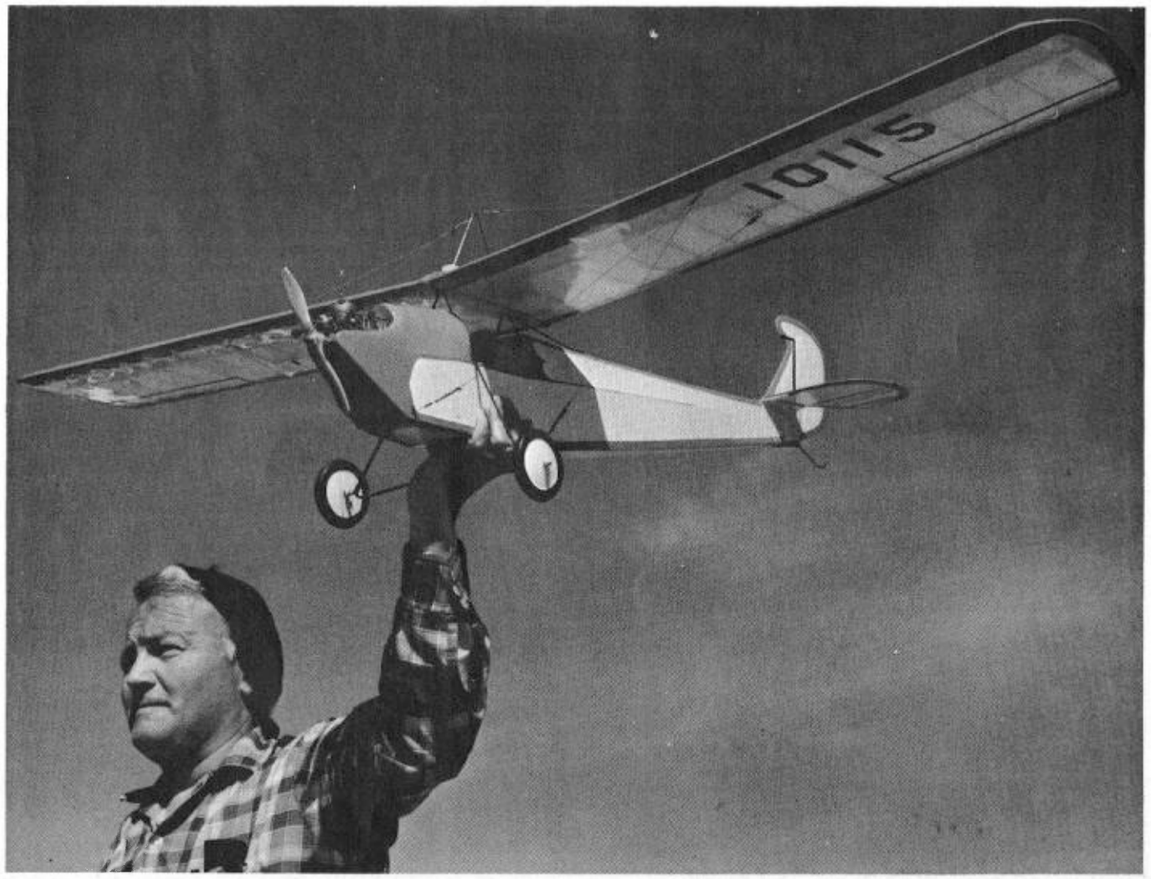

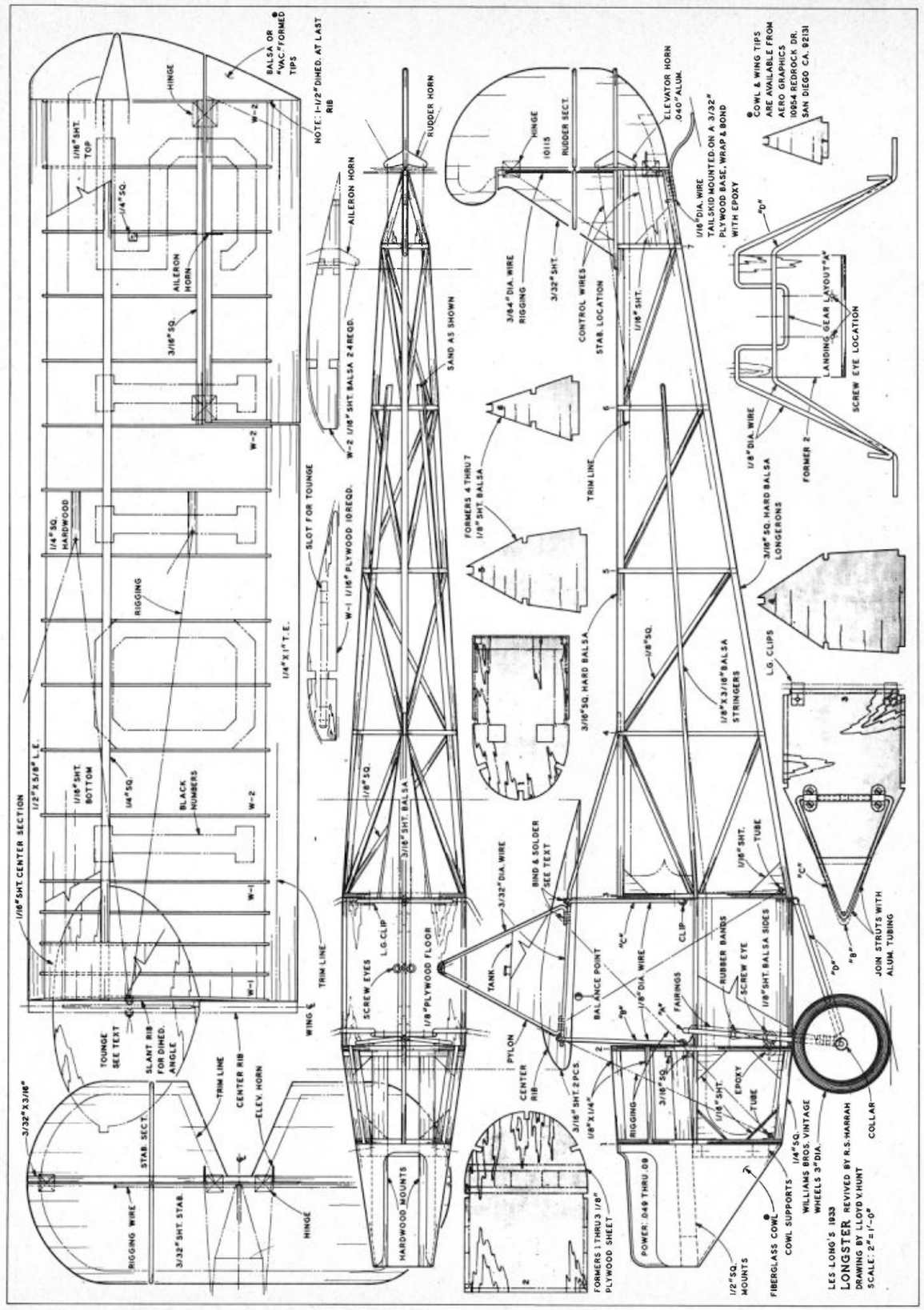

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only slightly stronger than the like materials being bonded. If unlike materials are being bonded, then the adhesive only needs to be slightly stronger than the weaker of the two materials. True? Not necessarily. It is true in itself, but the building of the Longster and other models means we must circumvent some of these truisms if we are to stay light, neat and strong.

For years, modelers have been wrapping steel and wood with thread, and coating it with wood glue that is not designed for gluing metals and it works well. This is because the non-compatible surface has been licked-in rather than glued. (The tail skid and pylon on the Longster.) The strength of each of these glues will do a good construction job, but weight is a big consideration. Epoxy and resin (polyurethane types) adhesives are the same weight when dry as when applied; butyrate or acetate glues become slightly lighter as the solvents disperse. Water-base glues (Elmer's, Titebond, Wilhold, etc.) become very light when the water evaporates, and are also the easiest to clean. There is one more type I have found very helpful, but is not usually handled by the local hobby shop. Referred to as an RTV (room temperature vulcanizing), it is usually a silicone rubber glue that has been premixed in tube form, put out by companies like General Electric and Dow Corning, and usually available from electronic supply companies. RTV has the adhesive qualities of epoxy, but is very elastic–ideal for areas where shock or stress may be a problem.

Small fittings hold plane together. Turnbuckles found at model ship suppliers.

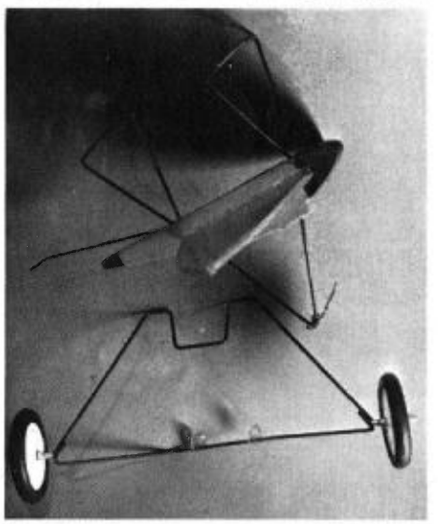
Actual construction, wood-sizing and engine desired, will all be dependent upon the scale you choose. The model shown is two in. per ft. scale. This size was picked so the plane could be flown free flight, plus single-channel radio or multi-channel proportional. Three-quarter-in. scale will make a good peanut scale and three-in. scale would fly like a sailplane–it had better have a good DT on it. Les has designed this plane so well; it is forgiving and hard to make it not fly well.

In constructing the fuselage, cut formers Nos. 1 thru 8–1,2,3 and 8 are 1/8 ply; 4,5,6 and 7 are 1/8 hard balsa. The part forming the bottom of the fuselage between 2 and 3 is 1/8 ply and should be cut at this time. The cockpit section was built first (2, 3 and bottom plus side panels). The two lower back longerons are cut and marked for placement of 4, 5, 6 and 7. These are glued in at the proper angle. When set, add top longeron from 4 past 8. Let dry and attach to cockpit section (bottom of 3) and glue in top longerons between 3 and 4. Alignment may be maintained by weighting down the cockpit to the plans and blocking rear to proper height. (Diagonal bracing should be added at this time.)

This becomes one of the fun challenges of this type of design–each joint requires two cuts for proper fit. If they all fit firmly, you will have a very strong structure. No. 8 may be added at this time. Cut holes in former No. 1 for engine mounts to correspond with yours and continue to build up nose section in conventional manner. Should radial mount be desired, a former may be added between the nose and No. 1 to correspond with your mount. Landing gear and pylon are wire-formed and brazed. (Originally Les? He brazed and plate-pinned all his joints, claiming the flex gave additional strength.) I have used brazing on many planes without failure. In fact, that is all I have left of most of them. If unable to braze, then wire wrap and solder in usual manner. On light loads pure silver solder will work.

The wheels are three in. Williams; the original used wire spoke wheels with canvas covers. The shock absorbing landing gear is very simple, the tension being controlled by the number of rubber bands looped over the nut and bolt placed at the bottom of No. 2. The nylon hinge mounts are standard 1/8 in.–found at most marine or electronic supply outfits. The little extra time it takes for this gear is well spent, as DT's and hard landings can break this type of wing mounting easier than standard types. The side longerons which hold the covering away from the fuselage may be added, giving the Longster a clean look.

The stab and rudder are cut from 3/32-in. straight grain balsa. The wing is designed around the Clark Y rib, as used by Les on the original, and can be made of one section adding the pylon at the center. I designed it with the removable sections for ease of transportation, a stronger and more adjustable mounting, the ease in the adjustment of the rigging and a safeguard that would make it more simple to correct any mistakes I might make. (I wasn't sure how to design a strong enough pylon on the original.) Knowing what I do now about the flying of this ship, I would make the free-flight versions one unit and the radio types removable. I prefer the notched balsa leading and trailing edges for strength–they seem to warp less than other methods. Should you make the two section wing, the first five ribs are cut from 1/16th ply and the rest are medium-to-hard straight grain balsa. I used spruce spars, although balsa may be used on the smaller scale. Spruce was also used between the ribs where the screweyes are mounted for the rigging. The tongue portion of the pylon that fits into the wing is a laminate of 1/16th ply on both sides of 1/8th hard balsa sheet. Sheeting between the first two ribs will strengthen and stop the first bending in when covered. Some say the wind passing wing makes the model fly, but I am sure it must be the sandpaper. The more I sand the better they fly–and look. I never could understand why some modelers would spend hours and hours building and only a few minutes sanding.



The fittings mount cabane and landing gear assemblies. Removeable for service or repair.

Covering this plane is somewhat dependent upon what you intend to do with this model. The RC version was covered with MonoKote. The factory instructions are good but, as mentioned earlier, I coat all surfaces with a 50/50 solution of Titebond and resand with 220 paper. This not only strengthens the structures, seals off and fills the grain, but gives a stronger bond between the MonoKote and the wood. This wing is strong enough if covered in the recommended manner; however, I have found that MonoKote sealed down to each rib adds tremendous strength. The only caution is that your iron be Teflon coated and just the right temperature. Sometimes this coating wears off; you may recoat your own iron. I also Teflon coated some small blades for corners that were heated from the surface of the iron. The product I use is No. 6075 Dry Fluorocarbon, temperatures up to 550 degrees F, made by Crown Industrial Products Co., Hebron, Ill. 60034. The FF version was covered with lightweight silk, applied dry, sprayed with water, sprayed with spray starch and sealed off with three diluted coats of dope, trimmed and added detail.

The rigging and bracing of the plane are important steps in the construction of this type of model. Strength, looks, scale points and trim are all dependent upon how good you do the rigging. The fittings shown in the pictures are all that are needed. The cable is 20 lb. test vinyl-coated steel and corresponding sleeves that can be found at most fishing tackle supply stores. The keepers are standard Goldberg fittings. Rubber bands are inserted through the aluminum tubing at the base of formers 1 and 3 to hold rigging to the fuselage and screw eyes are used on the wing. To check, you should be able to pick up the plane by the wing tips and have very little flex. Turnbuckles make it easy to adjust in the field, but not necessary. So they won't vibrate apart, tie a small string through the adjusting sleeve and one of the eyes.

A rubber band in the fuselage provides the shock absorption. Should be fairly stiff.

Flying

Make sure the center of gravity is correct, add weight as needed. Incidence may be changed by relocating the pylon keepers. Try to test glide in area with high grass, making sure the nose is slightly down when you release. I always feel safer, on the first test glide, if I run alongside and let it fly out of my hand. ROG is recommended for the first flights. Engine speed should be just enough to get it off–this way it will look very realistic. This has been a fun eye-catching plane that is quite easy to build, fly, and maintain.