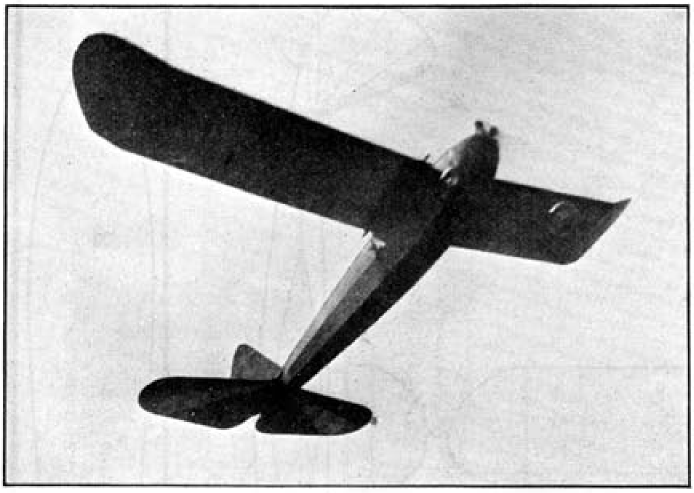


"She picked up speed, lifted off and started to climb."

How to Build A Payload Gas Model

Complete Plans and Instructions to Build a Ship That Will Lift Three Pounds of Useful Load

By THRACY PETRIDES

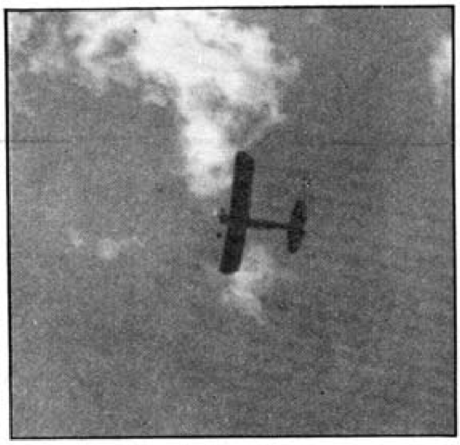
Drawings by Malcolm Abzug

THE weight-lifting event at the recent Kresge contest was coming along just as anticipated—on all sides the heavily laden gas jobs were ploughing up large sections of the New Jersey landscape. That was the reason why we watched, without too much joy, the line in front of us dwindle. The PB-2 had already been weighed, and had received its payload of a pound and a half of lead. Soon our turn had come. The motor was "perking" merrily when we started her on her way. She picked up speed, (that pound and a half of lead)—lifted off and started to climb! At a little after three minutes the motor cut, but we were already straining our eyes to locate the PB-2 against the late afternoon sky. And soaring conditions were good! At fifteen minutes she rolled to a stop, miles away from the field, completing the longest official payload flight on record. In view of the excellent weight-lifting characteristics of the PB-2, this ship would seem to be the logical choice for a comparatively small, radio-controlled gas job. The PB-2 is able to lift two or three pounds of dead weight with 1/5 HP., which should be enough for a light receiving set. If, however, your set weighs more than three pounds, these plans will serve as a valuable guide towards the construction of a ten or twelve foot "transport." A successful weight-lifting gas model, whether the "payload" be lead, a radio-receiving set, or just a smooth skin finish and streamlined parts, must possess the following attributes:

1. The most obvious requirement is, of course, a high lift airfoil such as the Eiffel 431 (used on this model). A high lift airfoil is used for several purposes. First, a heavy model must travel very fast to obtain sufficient lift, and a high lift section slows the model to a safe speed. Second, this type of airfoil is necessary to supply lift to overcome the extra weight. Third, this type of section is usually thick enough to provide for deep, husky spars.

2. A good payload model must be perfectly stressed to absorb the magnified strains set up by the extra weight. For each ounce of unnecessary weight, eliminated by painstaking stress analysis, you are able to carry an ounce more of weight than the next fellow; or your model will be that much lighter, with corresponding better performance. The necessity for careful designing might be given as reason enough for the inauguration of payload contests. Each step towards the final elimination of lucky flights is in the right direction.

3. The third attribute of a good weight-lifting model is the correct placement of the payload, if the weight is in reasonably concentrated form. The common error in this direction is to place the weight too low, the model builder hoping for greater stability because of the low C.G. A very low C.G. will have just the opposite effect, causing the model to take an excessive time in recovering from disturbances. The best procedure to follow is to determine the exact C.G. of the model. At this point the weight should be placed. An exception to this method occurs when the C.G. comes out in a bad position—too high or too low. (See the "Aerodynamic Design of the Model Airplane.") The thing to do in that case is to use the weight to bring the C.G. to the proper position, actually stabilizing the model, and perhaps improving its performance!



Passing over on the way up

4. The model should have plenty of power for decent flights. A Brown Jr. was used with success on the eight foot PB-2, but a larger motor is necessary for a ten or twelve foot model, carrying a fair amount of weight.

There will be many gas job radio-controlled and weight-lifting events this summer, and a well constructed and intelligently handled gas job can "clean up" some of the biggest prizes ever offered.

Fuselage

The fuselage is built in the conventional manner, two sides connected with compression members and cross-braces. After the bare fuselage frame is completed, the motor mount is built in. The two bulkheads are built up of various sized pieces of 1/4" flat balsa, the pieces adjacent to the actual motor runners, of course, of the hardest stock;

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The finished plane is graceful, light and exceedingly stable.

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the rest of medium balsa.

Cut these strips and sheets accurately, and fit them into their positions piece by piece, until you have a solid unit. The rounded cowl is made by cementing two side plates of 1/32" plywood to the outer flat sides of the motor runners, fitting flush against the first bulkhead. Into the angle formed by the side plates and the bulkhead (as illustrated) lightly cement the 1" x 6" x 6" 1/2 fairing blocks. When thoroughly dry, trim these to shape. After this is done, remove them, hollow them out, and re-cement permanently. The landing gear struts are bent to shape, and bound to 1/2" x 1/4" balsa strips; which are in turn strongly bound and cemented to the fuselage framework. An axle of 1/8" music wire will do much to strengthen the landing gear. The joining of the three struts near the wheel (which is, by the way, a 4-1/2 inch air wheel) is bound with soft wire, and either soldered, welded, or brazed. Wooden wheels may be substituted for the more expensive kind, provided their bushings are long and solid. After the internal bracing, the gusset plates and wiring circuit is attended to. The fuselage may be covered with heavy bamboo paper. Do not forget to provide for easy and quick access to the interior of the fuselage, particularly the battery box.

Wing

The wing is of simple construction and very little comment is needed. Just remember that, as in all other parts of the job, do not sacrifice strength for a few ounces of weight. The two main spars are made of very hard balsa; the rest of the balsa in the wing being medium hard. It should be hardly necessary to remind you that even a slight warp in the wing will cause a lot of trouble; so bear that in mind while covering the wing and tightening the paper. Brace all spars generously, where they are cracked for dihedral, with sheet balsa.

Tail

The stabilizer is built around a 1/8" x 1" spar that tapers to 1/8" x 1/4" at the tips. Since this is a full-depth spar, for strength, the 1/8" sheet balsa ribs are made in two pieces. The simplest way to take care of the airfoil taper in the tail is to accurately lay out the center rib and then cement in rectangles for the other ribs, trimming them to shape when the cement has dried. The method of mounting the stabilizer is shown in the perspective. The rudder mounting is basically the same, the front of the tail spar fitting flush against the rear of the tail block. The tail block is a piece of balsa measuring 2-1/4" x 1" x 8-1/2", and is grooved on its bottom to snugly receive a 1/4" square runner. Before attaching the stabilizer to the tail block, cement two tail hooks to the tail block one inch from either end. With the aid of these hooks, the tail assembly is firmly strapped to the fuselage with rubber. As in the wing, guard very carefully against warps.

The Prop

Use care in carving your prop (better make it props) for nothing can ruin the flying of a good gas job as an inefficient propeller. The prop shape in the plans is for use on the Brown Jr.; but make your prop to suit your motor. It should be heavy, well finished, and perfectly balanced for good results.

The "Details"

The parts of the gas job that we call the "details," are of so much importance that they should really be listed first. Perhaps the most heart-breaking incident that we have ever seen in our gas job experience was the vertical dive of a slick, nine foot Monocoque, from about 500 feet. The pile of splinters, (not to mention the scrap iron that was once a motor) was the result of a careless tail mounting that shifted. The comparatively minor things on a gas job that we would call the "details" are:

1. The wiring circuit. . . .
2. The wing mounting. . . .
3. The tail mounting. . . .
4. The prop. . . .

If you are not prepared to spend a good deal of serious, painstaking work on these "little things," no matter how perfect the rest of your work is, stay home for gas job contests and do a little knitting; it's much more restful.