It is properly designed for stability and high performance

This business of "packing" power in ships has long been carried to extremes. Engines of a quarter - or even a third - horsepower have been built into tiny ships, giving them a startling climb, but seldom if ever does the glide match that stupendous rise under power.

We have always figured that, given enough power to obtain a good climb, a big ship had considerable advantage in the glide.

We recall seeing a pilot and a mechanic (from an adjacent airport) standing near the starting line when we started the motor of the Powerhouse in a recent meet. The pilot turned to the mechanic and said, in a "know-it-all" manner: "There's a big job . . . sloppy climb, no power."

He almost ate his words when the ship was launched. In twenty seconds the Powerhouse had gained tremendous altitude. When the motor cut out, a strong wind carried the ship off the field and despite an excellent flight we had no joy in our hearts for the plane was lost. We hired a Cub to look for the job from the air, but to no avail. Our only consolation was that, at last, we had developed a fast climbing large gas job, and as such we now present - The Powerhouse.

In the first appearance of the Powerhouse, at Creedmore, L.I. on February 12th at a contest sponsored by the Metropolitan Model Airplane Council, the ship did 6:04 out-of-sight, and took first prize in the Class C group. Later it took first place in the Haaren High School Model Airplane Contest, doing 2:35 for the best flight of the day, despite a 30 m.p.h. wind. Equipped with floats the ship took first honors in the first annual Eastern States Gas Model Seaplane Contest on August 20 at Lake Hopatcong, N.J., averaging 1:07, establishing a new world's record for gas model seaplanes. In addition the ship has taken a number of other prizes in eastern contests. Four foot, five-foot and six-foot versions of the ship, powered with Class B and smaller Class C motors (Browns, Dennymites, etc.), have also made fine showings and won several prizes.

In the first place a big ship is more stable, responds to adjustments more easily, and is less inclined to be critical and cranky. A big ship has but one disadvantage . . . it's a trifle hard to transport. Otherwise, give us a big ship that can really take advantage of a thermal and make the most of any altitude it may get.

The Powerhouse represents a development in design, and as is the case with most models, it took almost a year before the design was finally perfected. In contest work we had always noted the failure of planes with large wing spans to obtain a sufficient altitude. Of course, once they did get "up there" they performed beautifully, but the difficulty lay in the climb. The first ships we built did not come up to our
expectations so we traced the trouble to several small elements. One of the large jobs was too heavy, although it performed beautifully AFTER it got sufficient altitude. But 20 seconds was far too little time in which to get the job up, so we abandoned that design.

The second ship had a diamond fuselage and the cabin resembled that of a blimp. The performance was as bad as that of the first job, so we firmly crushed the ship under foot. The third ship had the familiar boxy type fuselage and was an excellent performer except for one small item - the motor could not be opened wide because the ship had looping tendencies. We later found that the tail moment arm was too small. We took several high prizes with the ship in that condition, but we knew we could improve the design and built our next ship accordingly.

The principal changes were to lengthen the fuselage and increase the wing chord by an inch. That was the answer. In her first contest the ship performed sensationally.

Through several seasons of contest work we have developed such units as the nose construction, motor mountings, battery box construction, etc. and these are included in the design.

Construction

In building the Powerhouse the fuselage is the first step. Select a hard grade of 5/16" square balsa. Behind the cabin a softer grade of balsa may be used, for strength will not be needed to such an extent at that particular part. The motor mount bearers are 5/16" by 7/8" hard gum or bass wood, preferably the former. Get the red gumwood if possible; it's better.

Sides of the fuselage at the nose are cut from 5/16" sheet as indicated on the drawings. This is important as it adds to the rigidity of the nose. After the sides are built they are joined as indicated on the top view of the plan. Check the fuselage for alignment at this point. Next the firewall of 1/4" sheet balsa is added as indicated. Following the installation of the firewall, the nose block is added and securely cemented in place. After thoroughly dry, the nose block may be carved to shape.

Inasmuch as the nose construction of the ship is the recipient of most of the shocks of flying, it is important that cementing at that part of the fuselage be very thorough. At least three or four coats of cement should be given at each joint, allowing at least fifteen minutes of drying between each coat.

Following the installation of the nose block, the formers are added to the fuselage. While they are drying, two pieces of 1/16" by 3" by 7" balsa are cemented together to form the nose cowling over the formers. After the cement has dried thoroughly sand the fuselage and the nose block smooth. Give the nose block several coats of cement to assure a smooth finish. This is important as balsa alone is a notorious absorber of gas and oil. Should you skip this step, your nose block and construction will soon become saturated with gas and oil and cement will eventually loosen, necessitating a complete job of rebuilding.

The next step before covering is the wiring of the Powerhouse. Mount the coil where shown on the plan and construct the battery box as indicated. It is most advisable to use a good quality wire (preferably spaghetti covered) which will not be affected by gas and oil or be subject to breakage under vibration. Always use stranded wire for all connections and be sure that all solder joints are secure and electrically perfect.

It might be advisable to stress, at this point, that one of the most important phases in the construction of the Powerhouse (or any other ship) is the wiring. If the wiring is imperfect you are certain to have trouble no matter how well-built the ship may be in other respects.

The detailed plans will give you all the measurements for the construction of the landing gear which is formed of spring steel wire of 1/8" diameter. The spreader bar is added after the landing gear is installed on the fuselage.

The construction of the rudder, shown in the article, is entirely self-explanatory and should be comparatively easy.

Covering the windows with celluloid is the final step in the construction of the fuselage prior to covering.

The covering is done in the conventional manner. After the paper is applied, spray the ship with water and let dry. Between each coat of clear dope, sand all surfaces with 10/0 sandpaper. Use at least three coats of dope before applying color dope to the finished fuselage.
PART 2

A High Powered Contest Model That Climbs Straight UP - Equipped With Pontoons If Won the First Official Seaplane Contest

By SAL TAIBI

LET US emphasize that the wing of the Powerhouse is designed not so much for sheer beauty as for ruggedness and high performance. The aspect ratio of six has been found admirably suited to all flying conditions and the entire wing is rugged to an extreme.

We can't define the wing section. It has not had the benefit of wind tunnel tests by experts; however we've found in actual practice it gives us the results we want . . . a fast climb and a slow, steady glide.

The rib sections are indicated on the drawings. Cut them from soft 1/8" sheet balsa, and after cutting them be sure and sand them. This is best done by pinning all the ribs together and sanding them even with a sand-block.

The wing spars, leading and trailing edges, should be of a hard grade balsa. In order to avoid warping of the wings, be sure the balsa used is straight in grain. Pin the quarter-square balsa spar to your work-table and cement each rib in position according to the plan. Next cement the top spar in position. The leading and trailing edges are then placed according to the plans. Allow all joints to dry at least an hour before removing from the board.

The spars are cracked slightly, as indicated, to form the tip and the wing tip outline is then added to the structure. Form the other half of the wing in the same manner. After sanding and cementing all joints thoroughly, the wing is ready to be joined at the center section.

If you will study the construction details on the plans, you will observe that the center section is simple, yet very strong. Pieces of 1/8" hard sheet balsa are cemented in each side of the front and rear spars. Pins are used to hold the construction while the cement is drying.

Note that there are eight inches of dihedral in each wing tip. Check your construction very carefully to insure that the two sides of the wing do not vary, as this is detrimental to good flying.

The bottom of the center section should be cut flat. The ribs are then added to this section which is then sheet covered with 1/16" sheet balsa, top and bottom.

The Stabilizer

The stabilizer is elliptical in outline and may be easily constructed by referring to the plans. The method of tracing the outline is as follows:

Obtain a piece of cardboard, approximately 15 by 17 inches. Measure out the space needed to form half of the stabilizer. Box this space into two inch squares, then trace the stabilizer outline. Cut the outlined form from the cardboard and you will have a pattern for half of the stabilizer. On a piece of paper 15 by 33 inches, trace both halves and you will have the entire outline. Draw in the spar and ribs and follow the method of construction as shown on the plans.
Wings and stabilizer are covered in the conventional manner. Silk or two layers of strong tissue may be used. Several coats of dope over the tissue make it very strong.

**Adjusting And Flying**

Incidences in this ship are "built in." Very little, if any, incidence will be needed in either the wing or the stab.

The ship should be hand-glided to assure a steady, smooth glide before any power flying is done.

On the first flight the motor should be just "ticking over." In other words, run the motor as slowly as possible. Hand-launch the ship, letting the motor run about 20 seconds.

If the ship shows no spiral tendencies, due to warps, etc., more power may be used until finally you are using the maximum power available. It is advisable to decrease the motor run as you add power for the ship has decided "out-of-sight" tendencies.

Slight thrust adjustments, right or left, and rudder adjustments are all that are needed to give the ship proper turn under power and glide.

**Notes**

Propeller - With a Forster motor best results have been obtained with an 18" propeller of approximately 12 - 14 pitch. If you make your own prop and follow the diagram you will have such a propeller and will find that the performances is much better than that which may be obtained from a majority of custom-made props on the market.

If you wish to check your finished ship with the original model, here are the weights. Original job, Forster motor, medium batteries, 4-1/2 pounds. Same job, plus floats, 5-1/4 pounds.
Cut all ribs from 1/8 sheet balsa.

Main rib ~ Make 25

Tip rib ~ Make 2

Propeller Pattern

PLATE ~ 5
PLATE ~ 2

Cowl ~ Make two from 1/8 sheet

Front former

Tailskid is carved from pine 1/4 thick

Rear former ~ both formers are 3/8 thick

Windshield Pattern