

%CHORD	UP'R	C'R	L'W	C'R
0.00	3.70			3.70
1.25	6.15			2.10
2.50	7.25			1.45
5.00	8.70			0.75
7.50	9.75			0.35
10.00	10.60			0.15
15.00	11.90			0.00
20.00	12.65			0.10
30.00	13.40			0.70
40.00	13.10			1.45
50.00	12.25			2.10
60.00	10.70			2.40
70.00	8.65			2.35
80.00	6.10			2.00
90.00	3.20			1.25
95.00	1.64			0.70
100.00	0.00			0.00

WING CONSTRUCTION PLATE 1

SCALE - WING: 1" = 1" SEE NOTES

DRAWN BY



# Building the DOLPHIN

How You Can Build an Efficient Contest Gas Model That Flew Out of Sight in Nine Minutes  
—Part No. 1

By **THRACY PETRIDES** and **FELIX GILBERT**

Thracy Petrides with his Dolphin, one of the most efficient contest planes ever built

Scene: Wayne County Airport, Detroit  
Time: July 9, 1937, about 10 A.M.

**S**UDDENLY a huge blue and orange winged teardrop roars off the snowy white runway into the azure, glistening in the sun and nosing upward on its maiden flight. Up, up, up it goes till after nine minutes it is only a speck in the sky.

This is what took place on the morning of the Texaco Event. The model had been adjusted the night before by its builder, Petrides, and when given its first trial flight, it disappeared into the blue. This spoke well for the design and the construction of the ship, but it was disappointing to know that the plane could not be entered in the event because of an abrupt leave of absence.

Three days after the contest, when the model had been given up for lost, an airplane pilot phoned the hotel in accordance with a notice in the paper, and stated that he had sighted the model from his airplane. The Dolphin had landed in a soft wheat field, and was exactly 24 miles from the point of launching, however, two automobile trips had to be made before the model was located. The car followed under the plane to the approximate spot, while the big ship circled around the vicinity in which the little one had landed. The total gas bill involved in retrieving the plane amounted to \$9. If that aviator hadn't sighted the gas job, the latter may never have been retrieved. You know how some of those farmers are.

A streamliner model of this type, due to its high lift and high efficiency is easily adaptable to weight lifting and radio control work. The monocoque fuselage provides a high strength safety factor enabling the model to carry a great deal of weight with the assurance that it remain intact. Of course for this type of work it is essential to maintain the correct center of gravity placement and this must be taken into consideration when making any adaptation. If the builder does happen to be interested in using the model for the above

purpose, he is referred to the article on the "Payload Gas Model" in the August, 1938, issue of MODEL AIRPLANE NEWS. The original model had a projected wing area of nine square feet with a weight of 5.3 pounds. This made the wing loading 9.3

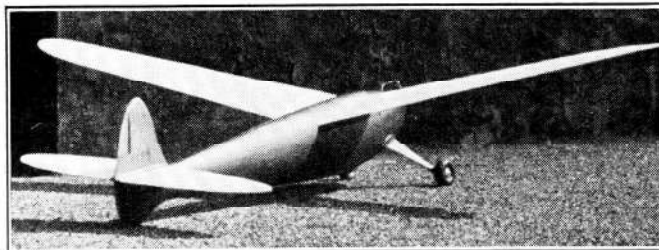
heavier a model, the more gas allotted to it; this gave them all an equal chance. Of course, this system is not now in effect. All motors run for twenty seconds, large or small. We thus see that a model just meeting the weight rule with a maximum of power will stand the best chance. By following the instructions given here, the "Dolphin" may be made to meet the adequate requirements.

Thus on completion of the model the builder will find that he has a gas job outstanding in performance, appearance and we might add—dimensions.

## Construction

In this first installment the building of the wing and tail surfaces will be fully described. Always keep in mind that the accuracy of the structure and its alignment determine the success of the performance of the ship.

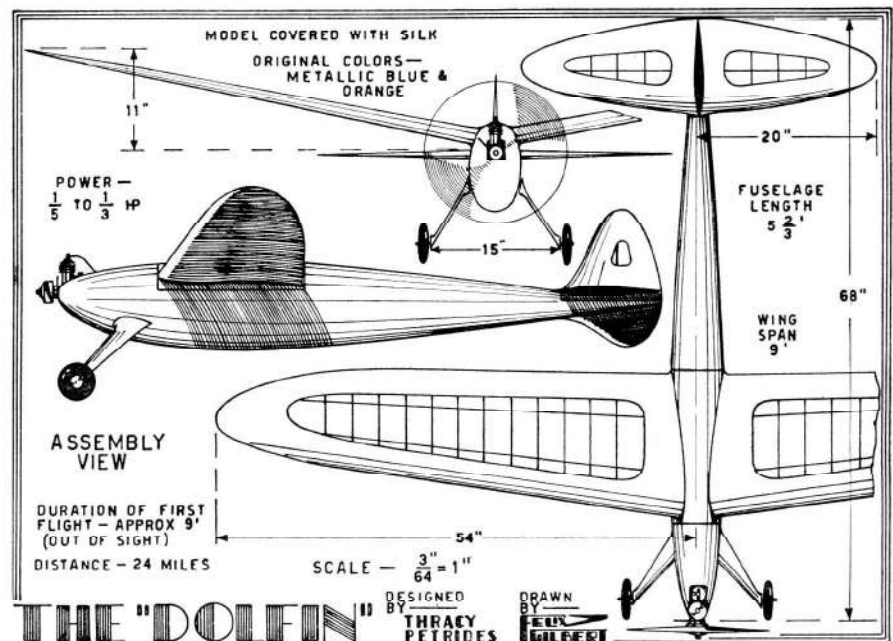
A full size drawing of the wing half is required. This is easily accomplished by  
(Continued on page 56)



A rear view shows careful streamlining

ounces per square foot.

Although a Brown Jr. motor was used in the plane with a great deal of success, it is advisable to use a 1/3 horse-power motor in the model. The reason for this is that in previous Nationals, the models were "gassed" according to their weight. The



THE "DOLPHIN" DESIGNED BY THRACY PETRIDES DRAWN BY FELIX GILBERT

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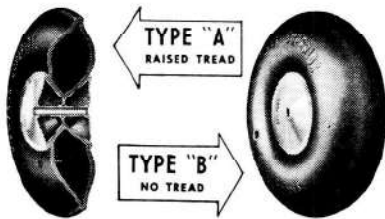
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See Page 39**MARPELL**  
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should fly your model again and again in order to make sure that you have established the desired adjustment.

Sometimes model builders mistake the result of improper launching for improper adjustment. Correct care should be taken when launching your plane to start it on its way with the proper flying speed (not too great and along a horizontal flight path; never tilting the nose of a model upward or launching it in a climbing position).

On some occasions when test flights for longitudinal adjustments are undertaken, the lack of correct lateral balance, or adjustment, may cause the model to side-slip, dive or execute various other gyrations that make the observation for longitudinal balance impossible. In such cases the model should be checked immediately for lateral balance and corrections made which will eliminate this trouble. One of the best ways to test for lateral balance is to glide the ship power off. If faults in lateral balance do not present themselves under such conditions put only a few winds in the motor and test the ship in a short flight. Of course, if you are adjusting a gas model this will be impossible; then it will be necessary to set the timer for a short flight.

If your plane falls off to the side when it is in level flight it is usually an indication that there is too little dihedral angle or too large a fin. If the plane is in a climb and it persists in turning to the left or right, it is not always an indication of lack of lateral balance, but rather of a stalling tendency. Under such conditions the plane is actually stalling and "falling off." Such a condition is corrected by moving the wing toward the

rear of the plane slightly.

In some instances, model builders have proceeded to follow a system of adjustment with extreme care without being able to eliminate eccentricities in the flight of their model. Many times they check in vain for the correction of the cause of their difficulties. In such instances, it is not always a case of improper procedure in adjusting the plane, but rather some inherent fault in design which no adjustment will ever correct. Therefore if the model builder has done everything possible to adjust his ship without success, he should scan his design most carefully.

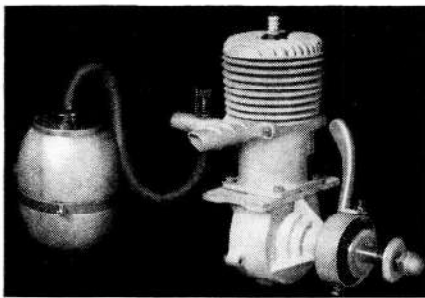
In some cases spiral dives, in the case of heavy models for instance, are caused by a condition in which the center of lateral projected area is too high relative to the center of gravity. The model builder, therefore, will see that it is wise to check his design carefully and be absolutely sure that his plane has been laid out according to the proper lines and arrangement of flight forces. This has been discussed in previous articles, otherwise many hours can be wasted in attempting to adjust a plane which never will fly properly regardless of how the surfaces and angles are manipulated.

The discussion of the problem of control in our next issue will pertain to making adjustments which will induce various types of flights. Also a few hints will be given which will show you how to do your own "trouble-shooting."

**Building the Dolphin***(Continued from page 23)*

following the dimensions on Plate 1. Note the slight sweep-back in the wing. It is suggested that a horizontal reference line be drawn through the leading edge of the wing at the root. Everything else may be drawn in relation to that line. The various chord lengths are obtained from this layout. In plotting the ribs it is recommended that the builder follow the method outlined on page 36 of the September issue of MODEL AIRPLANE NEWS. This article completely describes the method of plotting the individual rib or a set of ribs in a taper wing with facility. The wing is now built according to the favorite method of the individual modeler, or as follows if the builder has no definite method:

Tack down the wing-half drawing on a board large enough to accommodate it. Pin some 3/8" square hard leading edge stock in place over the drawing. It should be laid on one edge so that the sides are diagonal to the board, then by sliding along pins elevated sufficiently to allow enough clearance for the under camber of the ribs. Do not sand this piece down as yet. The shaping of the leading edge is done after the cap-stripping is in place. Now some 1/4" x 1" stock is sanded so as to taper properly in thickness toward the tip end. This is the trailing edge and is pinned on the board with the sharp edge touching the board while the forward edge is elevated slightly. In pinning the leading and trailing edges to the board, refer to the graph of the Göttingen section on Plate 1. The zero line corresponds to the surface of the board and the leading and



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trailing edges have the same relation to the board as they have to the zero (chord) line. It is assumed that all the ribs have been cut out by now. They are of 1/16" plus medium hard sheet balsa. Each rib is cemented in its proper place, (all except the four center ribs which are put in later). Allow this "skeleton" frame to dry thoroughly, then remove it, set aside, reverse the wing half plan sheet and trace the outline from the other side. This may be accomplished easily if the paper is translucent, or it may be done by means of pin holes pricked through the paper at important points. Then connect this on the blank side, thus producing a perfect replica. A second wing half is now made. Thus the left and right wing halves are produced.

Another method of making the wing halves requires no pinning down on a board but does call for a great deal of accuracy. It is as follows: Make the main spar of 1/8" hard sheet balsa. Mark off the positions for the various ribs on the spar. Make a cardboard triangular template containing the angle that the ribs make with the spar. Then starting with the larger ribs, glue each rib to the spar at the right station using the template to determine the correct angle the plane of the rib makes with the plane of the spar. Use a pin through the rib and spar near the joint to preserve this angle till the joint is dry. When finished this should appear like some variation of a fishbone skeleton. Both halves are made. When completed the leading and trailing edges are glued in place. The leading edge is put on first. This will line up the trailing edges of the ribs.

Which ever way the halves were built these steps follow: Put in the spars (method 1) or the remaining rear spar (method 2). The straight taper of the spars makes them easy to lay out. At the bottom center of Plate 1 a pattern is shown for some 1/32" sheet plywood root-reinforcing pieces. Two sets of two each are made. Two will fit over the main spar and the other two over the rear spar. They are glued in place and bound tightly with ribbon 1/2" wide cut from silk (gas model type) and coated with a cement skin. A piece of 1/8" steel wire 6" long is bent into a shallow "V," as shown on the right middle of the "Wing" plate. This is set into a groove cut for it on the inside leading edge. Coat this well with cement. During the joining of the wing halves and the reinforcing of the root it is important to check the dihedral which should be 11" in each tip. Apply cement skins over all the joints at the root and then insert the remaining four center ribs. The wing tip edging is cut from 1/4" sheet balsa and may be scaled up from the drawings by laying off the dimensions six times with dividers.

The wing is cap-stripped with 1/16" by 3" medium sheet balsa. This method is very simple, and is worked from the leading edge back. It is shown diagrammatically in the lower right corner of Plate 1. The cap-strip pieces running lengthwise over the top portions of the ribs are 1/16" x 5/16". They are glued down after the main cap-strips are in place. Now the wing is trimmed down at the leading and trailing edges to conform to the airfoil shape. It is then sanded very smooth.

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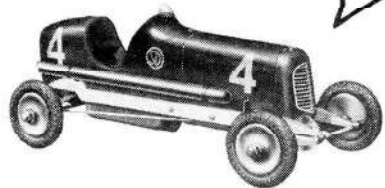
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### Elevator and Rudder

The tail surfaces should be built on full size drawings that can be easily made by scaling up the views on Plate 2 four times the size shown or by following the dimensions. As reference lines, use the centerlines of the main spars (elevator and rudder). On these reference lines lay off the distances between the ribs and through these points draw perpendiculars on either side. Along these perpendiculars lay off the true distance from the reference lines to the edges of the surfaces. Connecting these points will give the correct outlines. The inner edge of the leading and trailing edges and tips may be obtained in the same way. If dividers are used, measure the distance wanted on Plate 2 and lay it off four times from the reference line. This will make it full scale.

From these full size plans transfer the leading and trailing edge and tip shapes onto 1/8" medium sheet balsa. This may be done with carbon paper or by means of a pin, pricking holes through the outline

at intervals into the wood. Then remove the paper and connect the points with a French curve and retracing the outline. Now cut out the leading edge pieces and pin them over the plans on a board, just like in the wing construction. The trailing edge pieces are cut into a "V" shape and pinned down. Glue all the pieces that make up the outline as they are pinned onto the board. The main spar is then cut out and mounted. The ribs are easily made by scaling up the graphs to four times the size shown. The same method is used here as that employed in obtaining the tail outlines. When all the ribs are cut (each rib is in two pieces), they are glued in place. When dry the tail is cap-stripped like the wing. It is advisable to join the rudder and elevator before cap-stripping them. Make this joint very strong. The various minor details such as filletting and making the rudder tab are clearly shown on Plate 2 and require no further explanation here.

Next month the remainder of the construction of the "Dolphin" shall be published. Until then—Happy Landings.

### Air Ways

(Continued from page 26)

PLANE NEWS some time ago. The model is equipped with everything included on the real plane; such as, joysticks, machine gun trips, rudder bar, spark and throttle levers, fire extinguisher, etc.

One of the most important things which Guernsey has found out while working on this model is the correct manner of taking pictures. The essence of his success lies in this statement: "I always made the mistake of taking pictures in strong sunlight and the heavy shadows were sometimes confusing." The picture of this model was made on a cloudy day. Guernsey has found the secret of success: On sunshiny days there is too much contrast between highlights and shadows—the highlights usually are so bright and the shadows so dark that the details are entirely blotted out.

We hope that photographers who wish to submit pictures to "Air Ways" take particular notice of these comments. A