# the CONTENDER

*by Alan Barrister*

**Take an excursion into adventure with this Class "C," rubber-powered, high-performance, cabin contester**

HIGH-PERFORMANCE rubber models can be easy to build. It is not necessarily true that a streamlined model must be a complex construction job.

The "Contender" serves as an excellent example of clean streamlining, yet it employs the most elementary type of construction, the simple box fuselage, without looking like a "flying cattle car." This is accomplished by taking a symmetrical, square, box-type basic structure, turning it on edge, forming a diamond, and adding a light superstructure of stringers and only two formers to shape the cabin and round out the sides. *Presto!* We have a streamlined fuselage.

Getting a model to turn in high performance is another story in itself. It can be attributed to a combination of things, the prop, the high power (28 strands of 1/8" flat rubber), the moment arms, the wing design, and the angles of attack of the flying surfaces. Considering these factors in the above order, we may observe their various effects on the ship as a whole.

By using a high-pitched prop of large diameter, the full power of the rubber motor is used to its best advantage, giving the model its greatest amount of forward speed under power. If you go for the straight-up climb, under this arrangement of prop and power, you have the greatest possible rate of ascent. However, in such a case, the prop must lift the full weight of the model, a task for which it was not designed. Therefore, it is more advisable to adjust the model to climb at about a forty-five degree angle, where the wing can carry the major portion of the load while the prop devotes itself to increasing the forward speed, thereby increasing the actual lift of the wing to its maximum. This setup will, in the long run, get the model up higher, which, after all, is what we want.

The moment arms, as you will notice, are relatively short. This close-coupling allows for extreme maneuverability, which means tight circles without the risk of spinning, and is extremely desirable for thermal chasing.

In order to take full advantage of the high speed, an air-foil with a relatively high Lift to Drag ratio is used at five degrees angle of attack in the wing. This helps to eliminate the excessive incorporation of downthrust, and thereby increases the overall efficiency of the ship.

The construction was kept to a minimum of weight, with sufficient stressing of the parts that must take shock, to maintain ruggedness and still enable the greatest amount of weight to be incorporated in the form of rubber.

Construction should begin with the building of the basic fuselage structure. Lay out two sides and join them, using the same size cross-braces for the top and bottom as were used on the sides. Add the two bulkheads that form the cabin and complete the cabin superstructure. Cut the two top rear stringers and cement them in place. The remaining stringers are cut from 1/18" by 3/8" soft balsa, and are cemented in place and held with rubber bands while the cement dries. Carve the nose fairing from soft balsa blocks to approximate shape and cement them in place. Finish when dry. Install the landing gear and cement well.

The wing is of conventional construction, therefore not very much need be said about it, other than to

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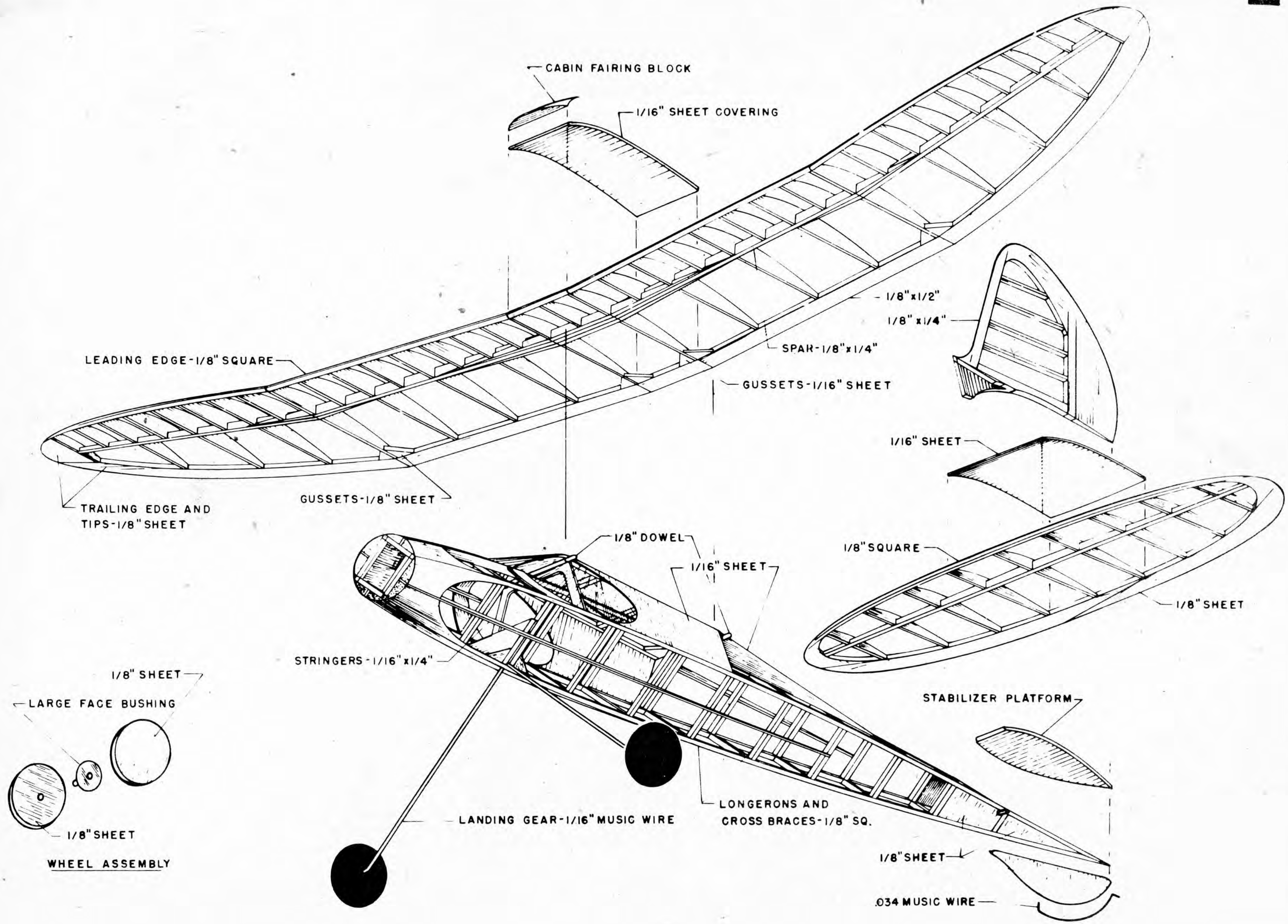
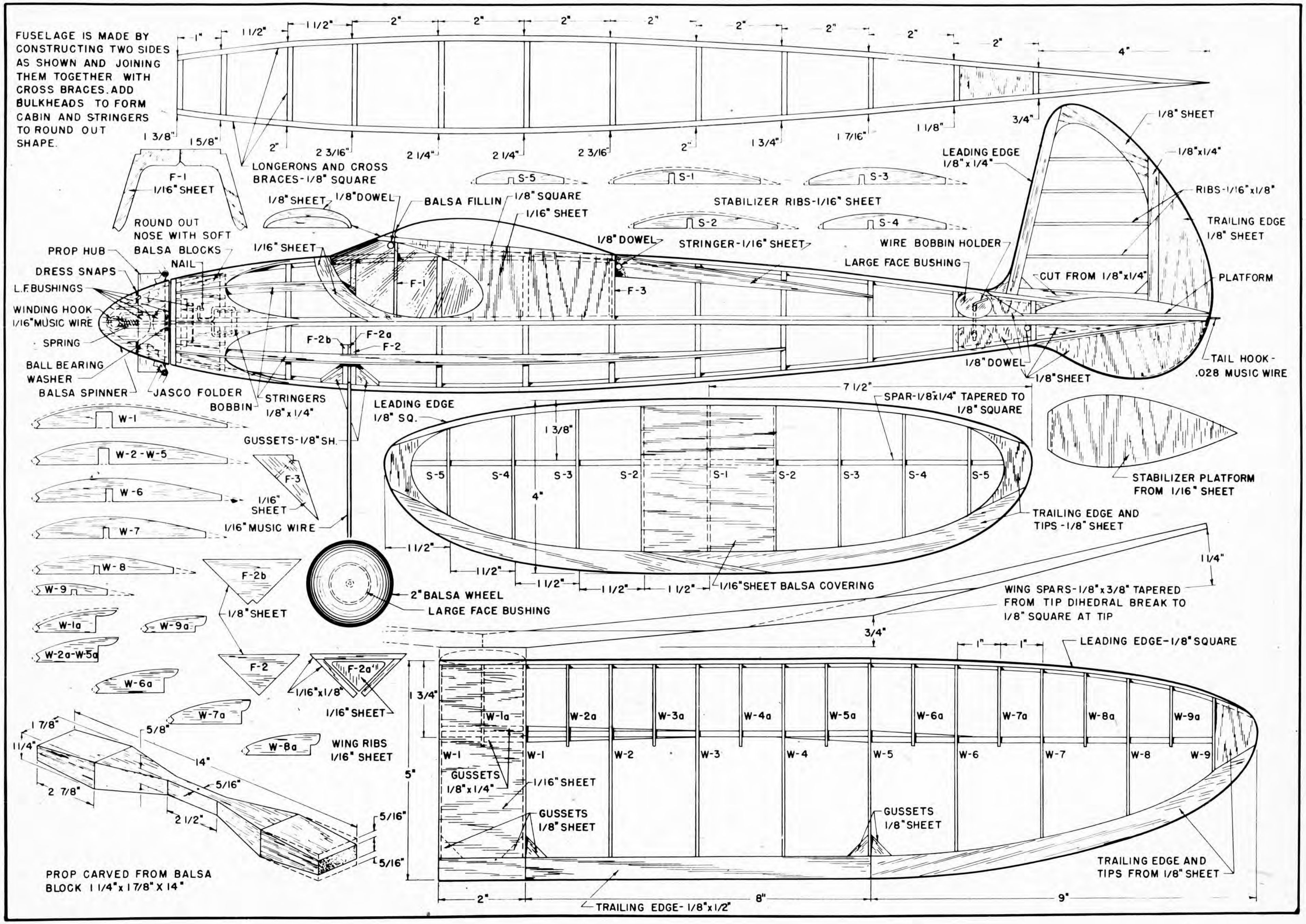

CABIN FAIRING BLOCK
1/16" SHEET COVERING
LEADING EDGE-1/8" SQUARE
- 1/8"x1/2"
1/8" x1/4"
SPAR-1/8"x1/4"
GUSSETS-1/16" SHEET
TRAILING EDGE AND
TIPS-1/8" SHEET
GUSSETS-1/8" SHEET
1/16" SHEET
1/8" DOWEL
1/16" SHEET
1/8" SQUARE
1/8" SHEET
STRINGERS-1/16"x1/4"
1/8" SHEET
LARGE FACE BUSHING
STABILIZER PLATFORM
1/8" SHEET
LANDING GEAR-1/16" MUSIC WIRE
LONGERONS AND
CROSS BRACES-1/8" SQ.
1/8" SHEET
WHEEL ASSEMBLY
.034 MUSIC WIRE


FUSELAGE IS MADE BY CONSTRUCTING TWO SIDES AS SHOWN AND JOINING THEM TOGETHER WITH CROSS BRACES. ADD BULKHEADS TO FORM CABIN AND STRINGERS TO ROUND OUT SHAPE.
1"
1 1/2"
1 1/2"
2"
2"
2"
2"
2"
2"
2"
2"
4"
1 3/8"
1 5/8"
2"
2 3/16"
2 1/4"
2 1/4"
2 3/16"
2"
1 3/4"
1 7/16"
1 1/8"
3/4"
LONGERONS AND CROSS BRACES-1/8" SQUARE
F-1
1/16" SHEET
S-5
S-1
S-3
S-2
S-4
STABILIZER RIBS-1/16" SHEET
1/8" SHEET
1/8" DOWEL
BALSA FILLIN
1/8" SQUARE
1/16" SHEET
ROUND OUT NOSE WITH SOFT BALSA BLOCKS
PROP HUB
NAIL
DRESS SNAPS
L.F. BUSHINGS
WINDING HOOK 1/16" MUSIC WIRE
SPRING
BALL BEARING WASHER
BALSA SPINNER
JASCO FOLDER
BOBBIN
STRINGERS 1/8" x 1/4"
1/16" SHEET
1/8" DOWEL
STRINGER-1/16" SHEET
F-1
F-3
F-2b
F-2a
F-2
WIRE BOBBIN HOLDER
LARGE FACE BUSHING
CUT FROM 1/8" x 1/4"
PLATFORM
1/8" DOWEL
1/8" SHEET
TAIL HOOK-.028 MUSIC WIRE
LEADING EDGE 1/8" x 1/4"
1/8" SHEET
1/8" x 1/4"
RIBS-1/16" x 1/8"
TRAILING EDGE 1/8" SHEET
LEADING EDGE 1/8" SQ.
GUSSETS-1/8" SH.
7 1/2"
SPAR-1/8" x 1/4" TAPERED TO 1/8" SQUARE
1 3/8"
4"
S-5
S-4
S-3
S-2
S-1
S-2
S-3
S-4
S-5
STABILIZER PLATFORM FROM 1/16" SHEET
TRAILING EDGE AND TIPS-1/8" SHEET
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1/16" SHEET BALSA COVERING
W-1
W-2-W-5
W-6
W-7
W-8
W-9
W-1a
W-9a
W-2a-W-5a
W-6a
W-7a
W-8a
F-3
1/16" SHEET
1/16" MUSIC WIRE
F-2b
1/8" SHEET
F-2
F-2a
1/16" x 1/8"
1/16" SHEET
2" BALSA WHEEL
LARGE FACE BUSHING
WING RIBS 1/16" SHEET
1 1/4"
WING SPARS-1/8" x 3/8" TAPERED FROM TIP DIHEDRAL BREAK TO 1/8" SQUARE AT TIP
3/4"
1"
1"
LEADING EDGE-1/8" SQUARE
1 3/4"
W-1a
W-2a
W-3a
W-4a
W-5a
W-6a
W-7a
W-8a
W-9a
W-1
W-1
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
5"
GUSSETS 1/8" x 1/4"
1/16" SHEET
GUSSETS 1/8" SHEET
GUSSETS 1/8" SHEET
TRAILING EDGE AND TIPS FROM 1/8" SHEET
2"
8"
9"
TRAILING EDGE-1/8" x 1/2"
1 7/8"
1 1/4"
5/8"
14"
2 7/8"
5/16"
2 1/2"
5/16"
5/16"
PROP CARVED FROM BALSA BLOCK 1 1/4" x 1 7/8" X 14"

and survey than anything else. While possessing certain drawbacks, this approach develops the imagination.

There is a good deal of similarity between the American and Soviet modelers, however, which distinguishes them from such modelers as the Germans and Japanese, whose model work, before and during the war, was devoted to purely military ends. American and Soviet modelers go in for flying models as a healthy diversion, as a sport, and as a preparation for participation in civil aviation, largely. It is to be hoped that they will soon meet in large numbers, either in the Soviet Union or in our own United States to exchange greetings, friendships, viewpoints and pointers.

American flying modelers will be interested to learn that in the Soviet Union great attention is being paid to jet and rocket developments in the model field. Of course, as is well known, the first writings on the flying rocket were done in Russian by the great scientist P. Tsiolkovsky during the nineteenth century. Largely because of the spectacular nature of the V1 and V2 reaction-propelled missiles, the Germans have been credited with doing most of the work on jets and rockets. However, sober investigation shows that the Russians were really the pioneers in the field, having first developed rockets (the famous Katiusha gun, for instance) for warfare.

## BRAINSTORMS

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is no set formula to apply, no more than there is a set formula to determine the overall design of any model other than good common sense. As with ignition-type engine craft, these things will become instinctive and the designer will have a pretty good idea of how to vary the nose moment and arrange the structure of the ship to balance properly.

Another predominant type of design that was submitted to the boys in the back room are the jobs with high pylons that place the leading edge of the wing almost on top of the propeller. There is nothing wrong with using pylons, but remember, in any model, the C.G. should be in front of the Center of Lift of the wing. This is almost impossible when the wing is so far forward. Therefore, these models usually balance tail-heavy which causes them to mush in the glide, which means that the wing is practically stalling throughout the flight. A condition of this sort can do wonders towards cutting down the efficiency of a model. It will act as good "dethermalizer" and get the model out of the air in a hurry, but that is about all. A good method of correction is to move the wing back and get the model to balance properly. This will necessitate enlarging the rudder slightly in most cases—because of the shorter moment arm.

The Brainstorms' "Brain Trust" feels that it would be a good idea to pass on a little sound advice about the amount of dihedral to put in a wing. Ever so many of the designs that they look over seem to have excessive dihedral. In most cases, this causes a counter-torque spinning tendency. By increasing the rudder area this can be corrected. However, it would be wiser to build the wings with less dihedral in the first place, for most of it is not necessary and only reduces the efficiency of the lifting surface.

## ANGLE OF ATTACK

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mounted at low angles of attack, many model builders place the stabilizers at negative angles. In these cases, as with the case of downthrust, a downward rotational tendency is indicated, and here again the aerodynamic load is increased; also coincident with this type of set-up, the propeller continuously flies in a stalled position. On low-powered craft, this produces mushing tendencies, while on high-powered ships it produces looping tendencies.

It may be stated with reasonable surety, that the free-flight modeler need not look to "souping up" his engine for increased performance from his models, for, without a doubt more can be gained by reducing the aerodynamic loads and drag on models, and at the same time producing inherent stability by eliminating the set-up where one evil force is used to combat another evil force. For, though fire may be fought with fire, aerodynamic stability can only be combatted with increased knowledge, careful analysis, and thorough understanding.

## THE CONTENDER

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advise the builder to assemble the whole spar before starting the rest of the wing.

The remaining structure is adequately explained and illustrated in the drawings, so that it is only necessary to instruct the modeler to allow all parts sufficient time to dry. This will help immeasurably to keep warps at a minimum.

No trouble should be found in fly-

## WHAT'S HOT IN OUR NEXT ISSUE:

Bernie Schoenfeld's "Lilliput" takes the cake in this issue. Next month he rings the bell again with a Class "C" high-speed controliner, "THE RING-LEADER," which incorporates some new and startling ideas. Following this, in the same issue, is a tasty dish for beginners, called "SAILOR BOY." This zippy glider can be built in ten minutes for the cost of a pre-war ice cream cone. Partisans of rubber-powered models will dote on "KINGPIN," a streamlined Wakefielder. And that isn't all! Paul Plecan, who did that swell World War One FOKKER "TRIPE" solid in this issue does it even better with a first world war British S.E.5, one of the "greats" among this series we're presenting in the solid model class.

In addition to all this, you'll find the regular, exciting slew of model departments, including a new one titled "THE LAB," which will analyze kits and accessories put out by leading model manufacturers, thus assuring the buyer of a square deal. Last, but far from least, you can expect a carload of chuckles from "WISECRACK-UPS" and PHINEAS PINKHAM, for, in our July issue, Phineas is funnier than ever, bogged in a hilarious problem that only the mighty Pinkham could mush up before he solves it. See you next month, amigos! —THE EDITOR.

ing the model, for it lends itself to all types of adjustments. However, for best results, the ship should be made to circle to the right under power, and to the left in the glide.

## INDOOR CHAMPION

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THE STABILIZER — The stabilizer consists of two spars and two tips. The two spars are 1/20" round, tapered to 1/32" round at the ends and 7" long. The two tips are made from 1/32" square strips. The method of construction is the same as used in making the wing.

THE RUDDER — This is a single outline of 1/32" square strip, bent around a form with the ribs glued in after it is dry.

THE TAIL BOOM — This is made from a blank, 5/8" wide at one end tapered to 1/4" wide at the other end, using 1/64" thick sheet stock that has been sanded smoothly and evenly to approximately 1/10" thick. This blank is then saturated with water and bent to form a tube around a 1/16" diameter rod; while being bent it should be wrapped with ½" wide gauze to hold it in place. After seeing that the seam is straight it can be placed in an oven and baked for five minutes or until dry. Unwind the gauze and slip the tube off the rod. Then make a light glue joint along the seam.

COVERING — Make several large sheets of microfilm and set aside until they are dry. The microfilm should have green and red colors which denote a medium weight film that is neither too weak nor too heavy for this type of model. To cover the wing with microfilm first wet the top of the wing frame and the top of the ribs with saliva. Place it on the plan and line it up, then select a hoop of microfilm large enough to cover the wing in one piece, and holding the hoop so that the microfilm sags slightly in the center, lower it on to the wing frame. Then place small weights on the microfilm around the outline of the wing. To make sure that the film is sticking to the wing frame, you can pat gently over the wing frame with the forefinger, but be careful that you do not rip the film. Let it dry at least twenty-four hours. Then, with either a hot needle or a small pencil-point soldering iron, trim away the microfilm from the outline of the wing.

Cover the stabilizer and the rudder in the same manner.

To cover the fuselage, you should rest a hoop of microfilm by its frame on two blocks, and, holding the center together until the microfilm sags in a curve deep enough to match the curvature of the fuselage, wet the frame of the fuselage on one side and lower this down on the microfilm. After it is dry you can trim away the microfilm and cover the other three sides in the same manner.

ASSEMBLY — Glue the two clip brackets, the bracing clip bracket, and the landing gear sleeve to the fuselage as shown on the plan. To put the dihedral in the wing you should slit the wing spars chord-wise at the dihedral breaks, and, propping up the wing tips on blocks to the correct height, glue the dihedral breaks and allow to dry. Make two wing clips from aluminum as shown, and glue to the wing stilts. Then glue the assembled wing clips to the wing spars as shown. Assemble the landing gear as shown on the plan and insert in the landing gear sleeve. Then clip the wing on the fuselage. Using four strips of any size, glue these very lightly from the wing dihedral breaks to the fuselage in the form of struts to facilitate bracing the wing. Make the two bracing clips as shown on the plan, and clip these on the bracing clip bracket, having one extending on one side and the other in the opposite direction. Then using either tungsten wire or nylon thread for bracing purposes, tack one end of it with glue to the front spar at the dihedral break. Pass the bracing through the bracing clip and glue the other end of the bracing to the rear spar on the same side of the wing at the dihedral break. Repeat the process with the other side of the wing. After making sure the wing is properly lined up when viewed from the front, you can glue the bracing to the aluminum clips and cut off the four struts. The top bracing is only used when you have a very light wing to prevent the wing from washing out under full power.

The next step is to glue the stabilizer and rudder to the tail boom. Then insert the rear plug in the rear of the fuselage, and, raising the rear