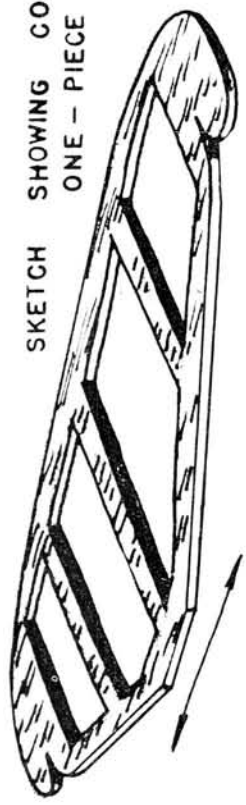


SKETCH SHOWING CONSTRUCTION OF ONE - PIECE STABILIZER

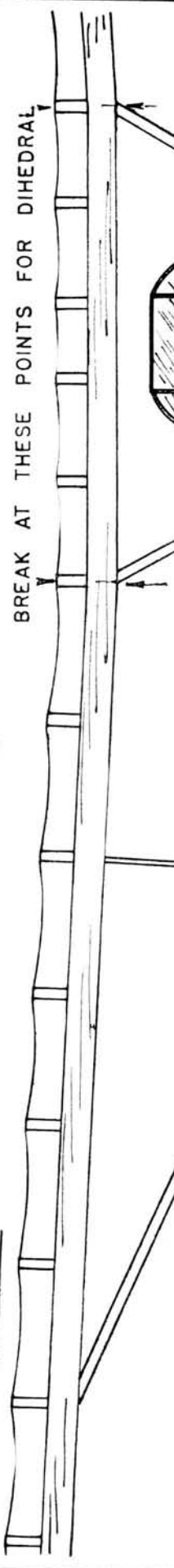


DIRECTION OF GRAIN

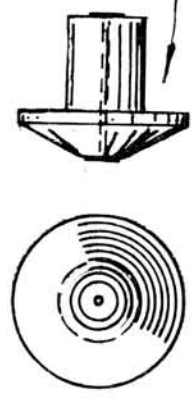
1/2" DIHEDRAL



BREAK AT THESE POINTS FOR DIHEDRAL



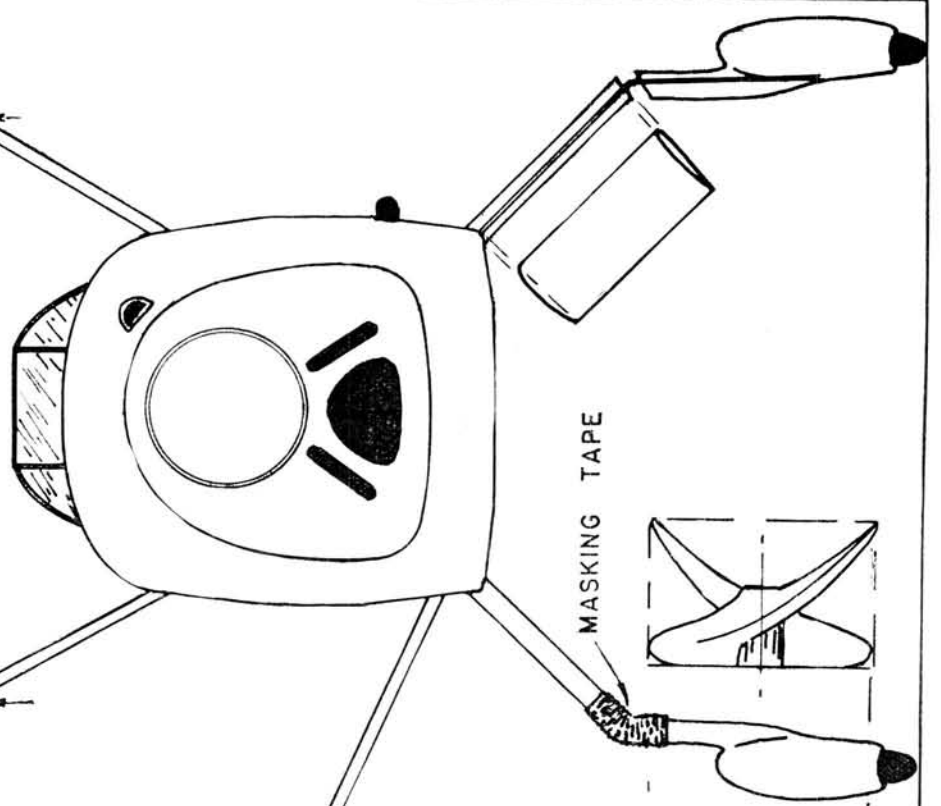
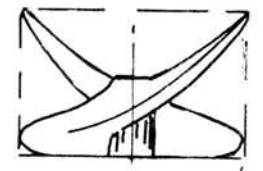
NOSE PLUG (HARD Balsa)

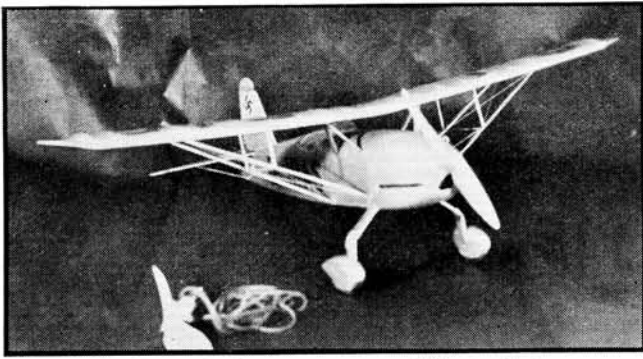


PROPELLER : OUTLINES



MASKING TAPE





The Parasol wing promotes stability in flight.



It is very realistic when properly built and decorated.

# How To Build The Arado Trainer

THE model presented this month is the German Arado 76 acrobatic trainer, the prototype of which is known for its maneuverability and quick recovery from spins and other abnormal attitudes of flight. Powered with the popular Argus As-10-C inverted V-8 motor of 240 H.P., the Arado attains a top speed of 170 miles per hour at normal altitudes, and lands at the comparatively low speed of 63 miles per hour. With an empty weight of 1554 pounds and a useful load of 628 pounds, the gross weight totals up to the figure of 2182 pounds. The climb is 1315 feet per minute, and the service ceiling is 20,998 feet.

The model has been accurately scaled down, both in dimensions and performance, and is very stable when provided with the flying scale stabilizer and prop shown in the plans. Due to the nicely arranged parasol wing, scale dihedral is used without loss of stability. The construction is simple, and the method shown for making the ribs lightens the model for flying, yet permits a fine covering job to be done on the wing. After familiarizing yourself with the plans and details of construction, you may begin building the—

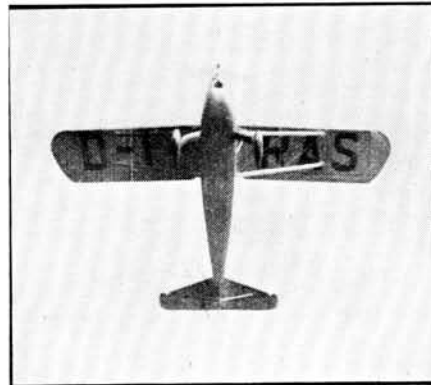
## Fuselage

The front and top of the fuselage are the first parts to be made, and there are two methods of making them. First, the nose block may be hollowed out the same as the top portion, which is called the "turtle-deck."

The second method is to hollow out

**A Realistic Scale Model of a Famous German Acrobatic Trainer—a Very Consistent Flier Because of Its General Design**

By PAUL PLECAN



Passing Over in full flight.

the nose block, assemble the rest of the fuselage framework behind it, and build up the turtle-deck by cementing the proper formers in their places and covering with sheet balsa.

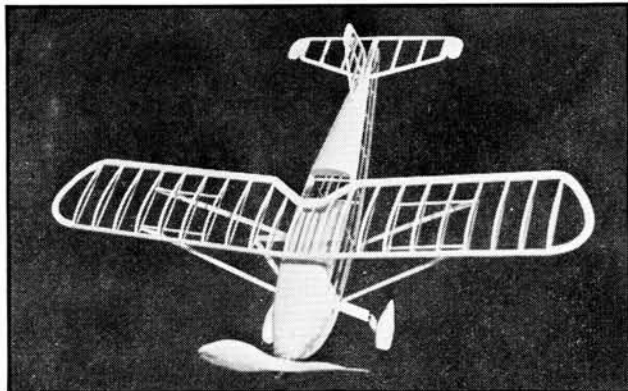
The first mentioned method, that of hollowing out all the parts, is simpler, and beginners should use it. After the balsa blocks of the required size have been procured, the side view of the fuselage front should be traced upon them by piercing the lines on the plan with pins, or traced on with the use of carbon

paper. After carving to the shape shown in the side view, the blocks should be trimmed down to the cross-section shown in the front view. The nose block may be hollowed out with a knife or a gouge, care being

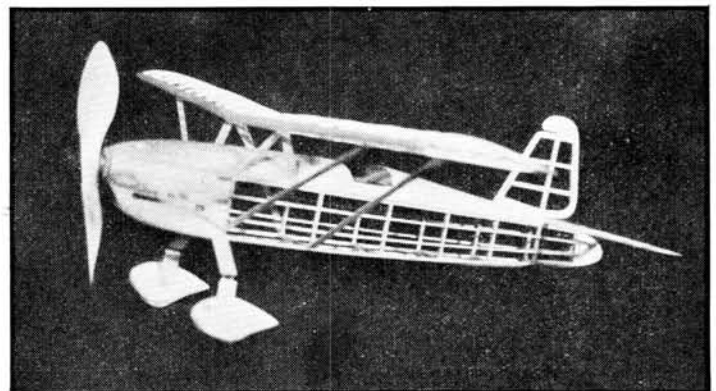
taken that the proper thickness is obtained. The best way of approximating the thickness of the wood is to put it next to a powerful light, the thinnest parts being visible by the greater amount of light they admit through the wood. The turtle-deck is carved and hollowed in the same manner as the nose block, and after the two are finished they should be cemented together. The two fuselage sides should be made now and the cross braces cemented in. It will be found that the fuselage will have a smaller tendency to warp if the two bottom longerons are moistened before forming, so that when they are dry they will retain their bent shape without putting a strain on the other parts of the fuselage. Since the nose block has already been finished, the rear built-up portion can be cemented to it and set aside to dry.

If the modeler wants to make the built-up type of turtle-deck, it may be constructed now on top of the rear of the fuselage instead of cementing the hollowed out type on. While the fuselage frame is drying, the landing gear struts may be formed, and the wheel pants made. The wheel pants need no explanation, as they are of the type with a hollowed out core and sheet balsa sides

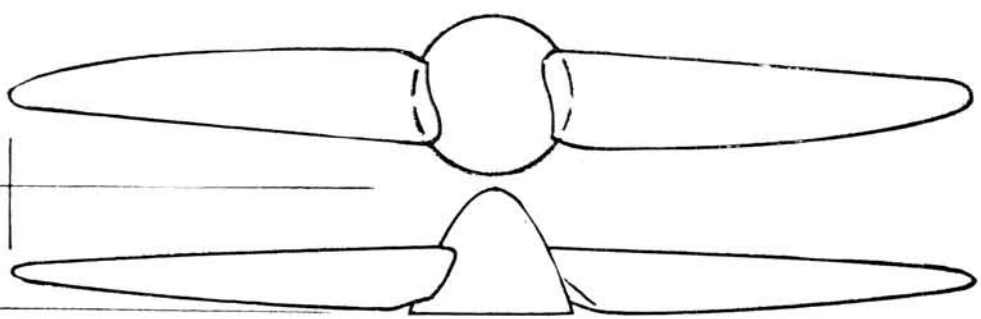
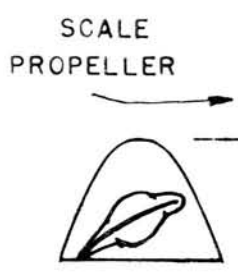
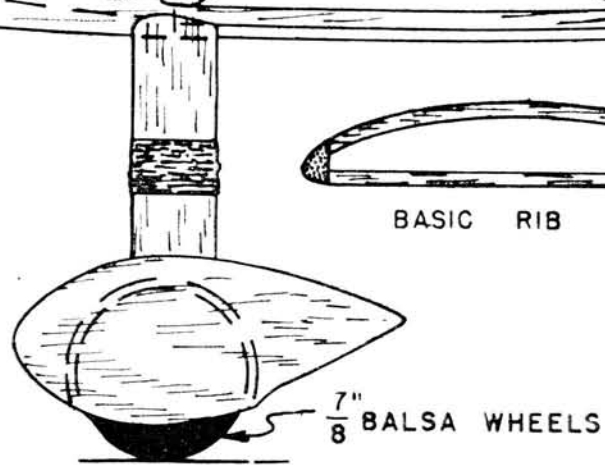
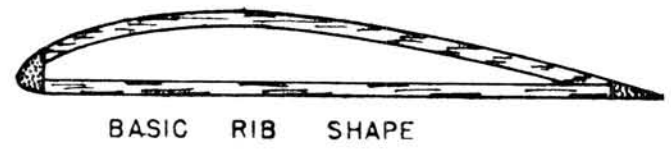
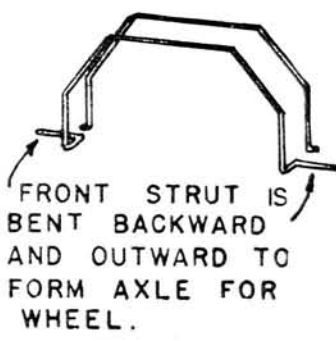
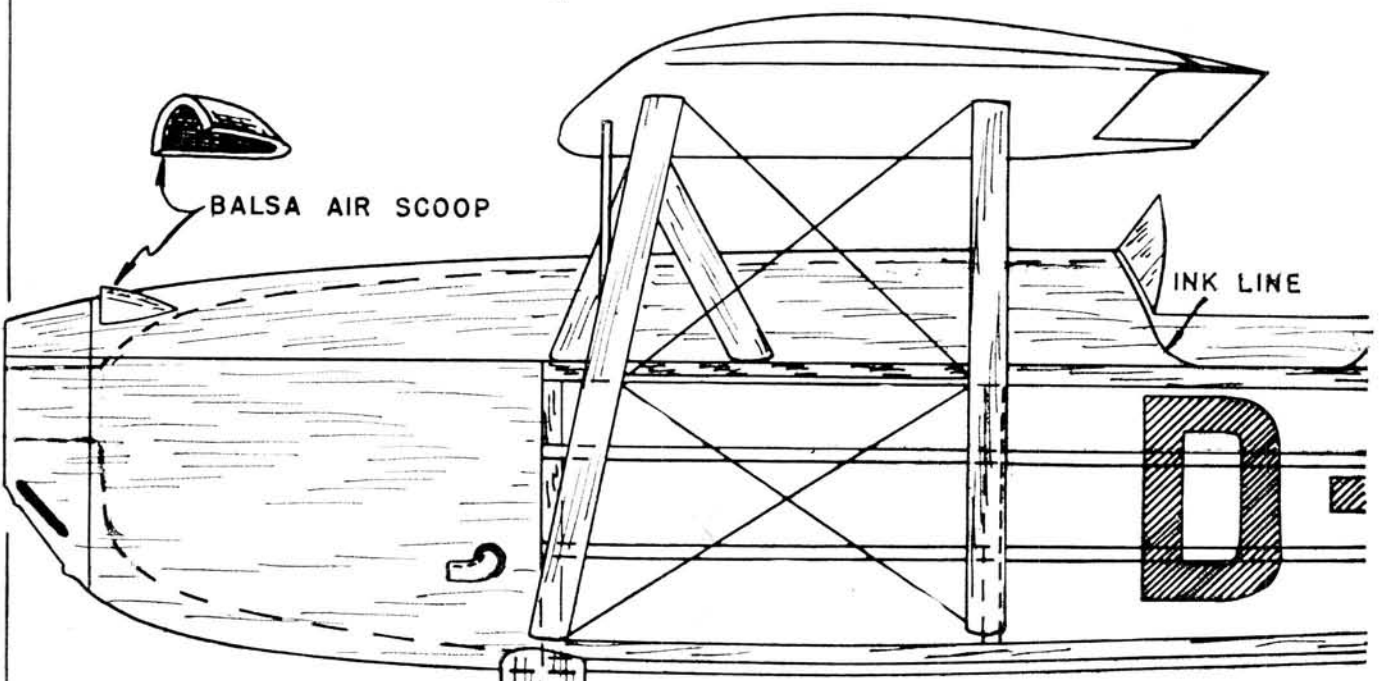
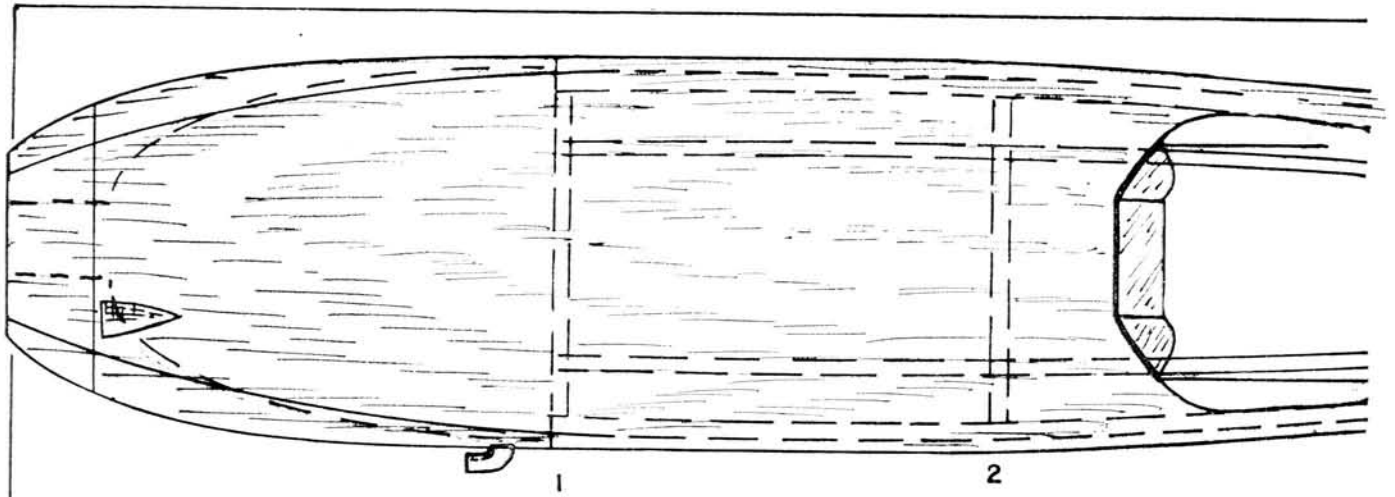
*(Continued on page 42)*

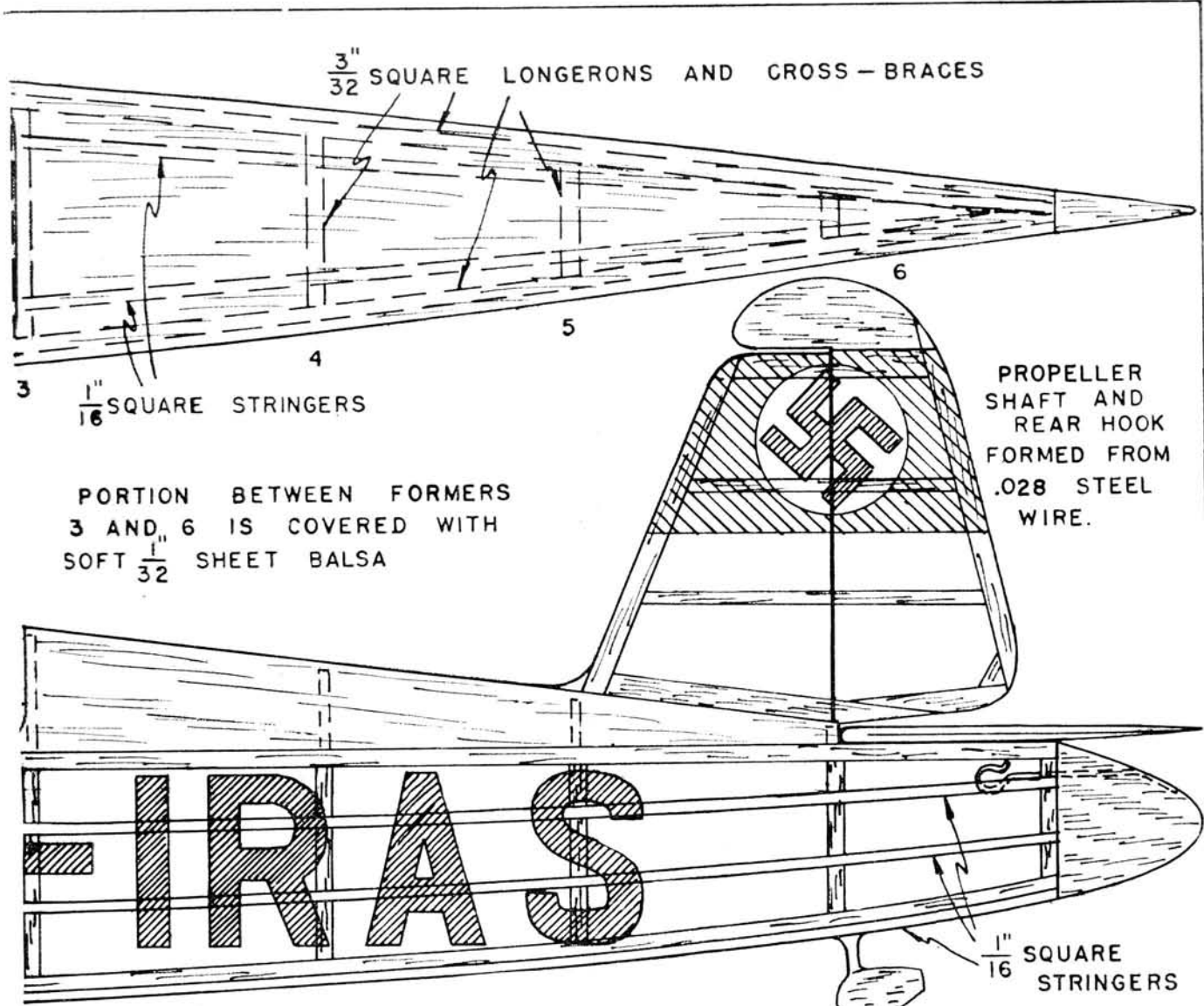


The uncovered frame work with flying prop.



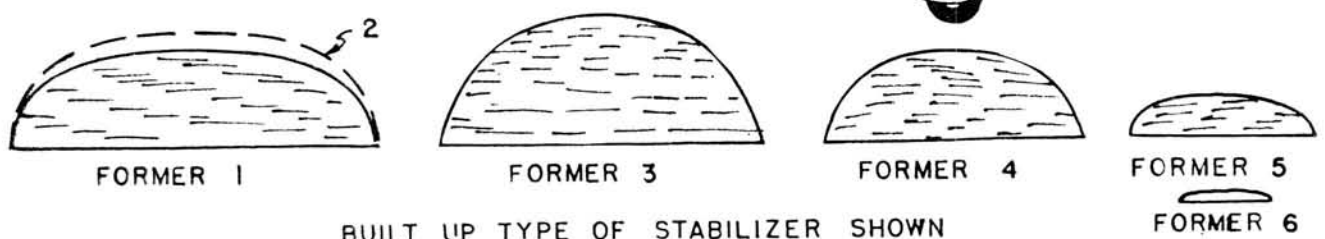
Here you see how the wings are built.



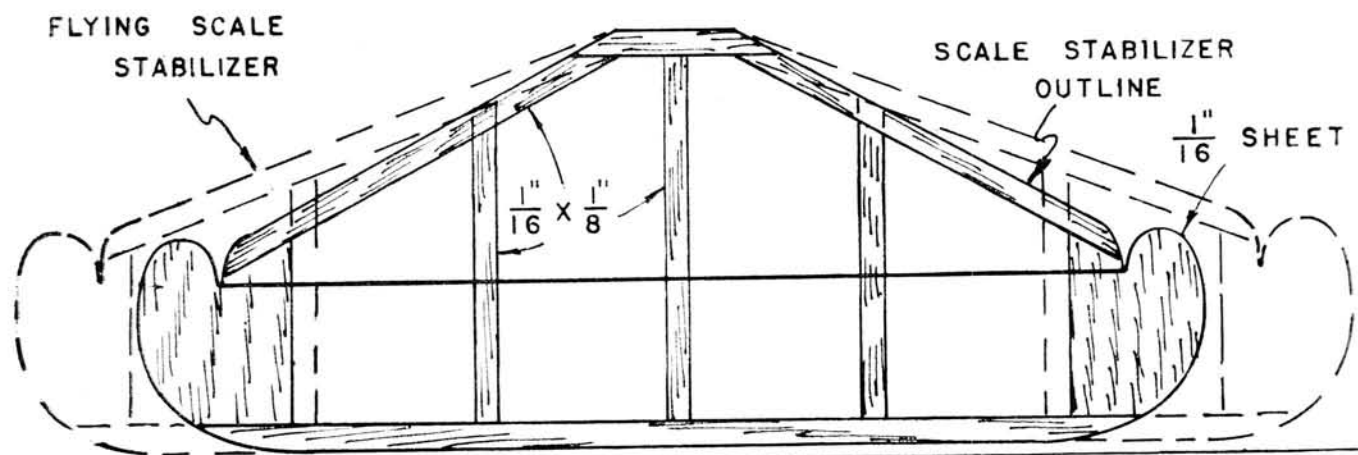


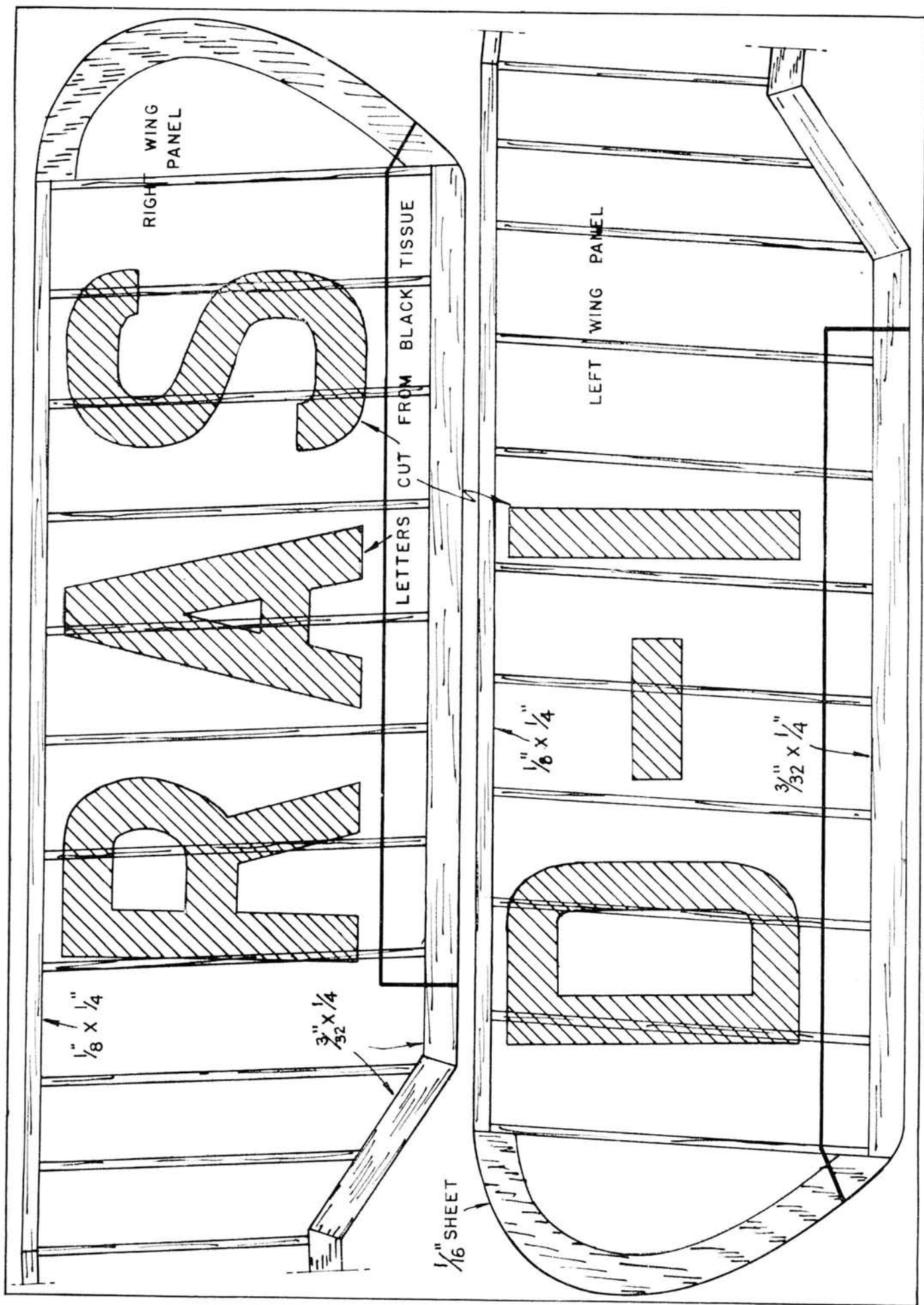
PORTION BETWEEN FORMERS 3 AND 6 IS COVERED WITH SOFT  $\frac{1}{32}$  SHEET Balsa

PROPELLER SHAFT AND REAR HOOK FORMED FROM .028 STEEL WIRE.



BUILT UP TYPE OF STABILIZER SHOWN  
ONE PIECE TYPE DESCRIBED IN TEXT





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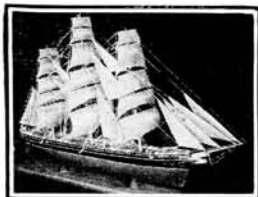
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At last the flagship of Admiral Farragut is yours to build. The kit for this 20" model contains: Balsa hull block, 3 sheets printed wood, cement, lacquer, shellac, piano wire, cast metal anchor, cast metal boats, steering wheel, funnel tubing, dowels, sandpaper, rigging thread, beads, and full size plan.

**\$1.00**

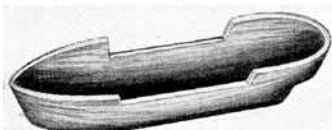
Complete



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The crane on the lighter first lifts the two bulky wings aboard while several mechanics are pulling the aileron case on. When it is time for the fuselage to be lifted aboard, the crane hooks up to it with the steel plates on the wing stubs. Four or five men hold guide ropes attached to different parts of the fuselage to keep it from swaying. In a high wind it is very difficult to do this. The wind seems to want to smash it against the crane base. To make it worse, sometimes the fuselage does not balance evenly.

When the plane is all aboard the squat tug slowly pulls the lighter to the steamer where the ship's huge crane lifts the parts of the plane aboard. Some of the crew then lash the plane to the deck and it is off on the second leg of its journey. The plane, capable of doing over two hundred miles per hour, plows across the Atlantic at fifteen knots!

Upon arrival at its destination it is a simple task to assemble the plane as most of the foreign airlines have American planes and their mechanics are thoroughly familiar with the construction. However, they will find that all parts are labeled to prevent any mistakes. We placed all the nuts, bolts, etc. in labeled containers. The flap rods, elevator balancers, etc. were also labeled.

After the plane leaves the factory it requires from two weeks to two months until it is in foreign service, depending upon the destination and the speed with which it is handled. One of the Grumman G-21's now going to Java will necessarily take nearer two months because of the poor steamship service and the round-about route.

A DC-3 or DST can be dismantled in three and a half days with twelve men working on it, including carpenters; a DC-2 in about three days and an Electra in about two. Lockheed construction requires a slightly different procedure from that used on the Douglas. The carpenters put plywood over the open end of the wing stub instead of steel plates as the Electras have wing hooks built into the wing stubs. The whole empennage is taken off the Lockheeds.

One time we dismantled an Electra in a great deal less than the usual time. A Czechoslovakian shoe manufacturer had purchased a Lockheed Electra and was flying it from the west coast to North Beach for shipment to his native country. However, while landing in a fog at Chicago it cracked up and was badly damaged. He could not wait to have it repaired and so he flew back to the factory and bought the next stock model off the assembly line, causing a delay of several days.

The Czeck headed his new ship eastward again and this time made a safe landing at Chicago. After taking a look at his wreck, he left for New York in the new ship, totally disgusted. The ship arrived at North Beach at 6:00 P.M. one evening last May. The Czeck said it had to be on the boat at noon the next day!

Could we do it? Two days work in twelve hours? We set to work immediately and worked until 5:00 the next morning. No expense was spared. The owner of the plane hired a shipping company and twenty-five carpenters to help make the crates

which four men normally make. They arrived in a huge truck, together with the needed lumber, a few hours after they were called.

We worked under the glare of bright lights, faster than we had ever worked before. There were three carpenters hammering each nail and nothing was ever built as rapidly as those crates. Even as we undid screws and bolts, we noticed those crates spring up in minutes. Everything went fine and the plane was on the boat the next day with several hours to spare.

The company that does all this work is American Bluefriesveem, Inc. of 44 Whitehall Street, New York City, more commonly known as Bluefries. Some weeks it exports five or six planes abroad, to China, Europe, Africa, or wherever the destination may be.

I have only touched very briefly the conditions of the present export market. There are other planes, small private craft and large ones also, that leave our shores in an ever increasing flow. As the export market becomes larger, more planes will naturally be shipped. The field offers enormous possibilities. In the future the export business will be a large enterprise of its own, provided that it keeps increasing at the present rate, and therefore one which will be of more interest to the aviation public than it is at present. Today few people realize the importance of exporting and how the planes are shipped.

## How to Build the Arado Trainer

(Continued from page 27)

cemented on. After cementing the landing gear struts in place securely, the 1/16" square stringers may be cemented to the sides of the fuselage, as shown on the plans. Cloth or masking tape may be used in covering the shock absorbing point in the landing gear, but the latter is preferable, since it can be removed for repairs on the landing gear in case of a dive or some other unexpected maneuver. If cloth is used, use cement to secure it in place; leaving it wrinkled a bit so it really looks like the leather "shoes" that are used on the original. The tail wheel does not have to revolve, so a dummy type carved from a hard piece of scrap balsa will do.

### Tail Surfaces

The tail surfaces may be built in the usual manner, employing 1/16" by 1/8" strips for leading edge, trailing edge and ribs. In making a flying scale stabilizer and rudder, it will be found that both are better suited for warping in adjusting the model if they are both cut from a sheet of 1/16" thick balsa. They should be made the same shape as the built-up type, but the grain in the ribs should run spanwise. (See sketch on front view plate.) The propeller may be carved now and the prop shaft cemented into it. For a better glide, a proven free-wheeling should be used. This will cut down the parasite drag by a wide margin.

After forming the rear hook, cement it in place and cut away one of the stringers so that an open space is left to get at the rear hook when installing or chang-

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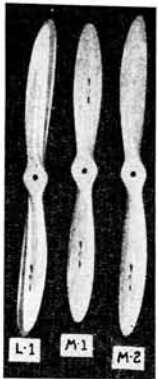


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Propeller Blanks for those who want to carve their own—correctly tapered and drilled.

<b>5 Ply Laminated</b>		<b>Mahogany</b>	
10 to 13"	50c each	10 to 13"	25c each
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Plus 5c for postage			

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ing the rubber motor. Do not forget to cut away the tissue at this point after the fuselage has been covered and doped.

### Construction of the Wing

Cut both the right and left wing panels from the plans and cement together, so that the entire wing may be built in one unit. If you care to preserve the plans, trace the wing plan onto a separate sheet. The leading and trailing edges of the wing are held on the plans with the use of pins or drops of cement. Before cementing in the ribs, make sure that you understand how they are made. A look at the photographs of the uncovered model will show you. The bottom part of the rib is plain 1/16" square, but the top is cut from 1/16" sheet balsa, with the aid of a template. A cardboard template will serve the purpose, but a brass or aluminum one will be found to be more durable. 1/16" square reinforcements are used inside the wing where struts are cemented to it. These reinforcements will transmit the shock of landing or hitting on a wing-tip to other ribs, so it is best to include them in the model. Quarter-grained stock should be used for the wing tips, as it resists warping easily when the wing is covered and doped. Quarter-grained stock is easily recognized because of its speckled appearance. (You've surely noticed that some balsa sheets had that appearance, and probably wondered what it was due to.) Use it on parts of the model that are apt to warp, as it is stiff and retains its shape.

After the cemented joints of the wing have dried, crack the wing at the proper points for dihedral. Reinforce the break with a coat of cement. After covering the parts, assemble the model, taking care to see that the tail and wing are both at the right incidence. The rudder should be offset slightly for a right turn, so that the model will fly in right spirals. When assembling the wing onto the fuselage, cut a small jig from scrap sheet balsa so that it conforms with the space between the bottom of the wing and the top of the fuselage. Hold this jig in place on the fuselage with two pins, and pin the wing down to the top of the jig. With the wing so secured, fit the struts in by the "cut and try" method.

### Doping

After dopping the model with one coat of clear dope, sand all the parts with the finest sandpaper or emery cloth that you can obtain. Dope the whole model silver. After it has dried add the black details, such as motor exhaust port, wheels and air inlets on the air scoops. The control surfaces may be drawn in with a ruling pen, such as is used for drawing; or else strips of black tissue may be carefully doped or cemented on. The simplest way of making the insignia on the rudder is as follows: Dope the red band around the rudder, and while the dope is drying, cut a circle from white paper. On this circle, draw a black swastika in India ink. After it has dried, cement or dope the circle in the middle of the red band around the rudder. Letters cut from black tissue and

doped onto the wing complete the color scheme.

### Flying

The model flies well on two loops of 1/8" flat rubber, but as wood in various localities varies in weight, three loops might have to be used. Using lubricated rubber and a winder, 750 turns may be given the motor without fear of breakage. If you do not use "lube" and a winder, don't give the motor more than 500 turns; as a motor that is not lubricated cannot take very many turns. The duration of the original model was from 30 to 40 seconds, but much more time than this can be made as the author did not attempt to give the motor full winds. After finishing your model, take a picture of it and send it in to the "Air Ways" column, won't you? For the information of those interested, the action pictures of the model were taken with an ordinary folding camera with the shutter set at its largest opening and fastest speed (f 6.3—1/100th second).

### Frontiers of Aviation

(Continued from page 23)

of six of the boats during 1939, and in the recent expansion bill \$3,375,000 additional was appropriated for nine more of the huge four-engined patrol bombers. Of course Sikorsky may get some of this.

Douglas's giant, the DC-4, and the new Boeing flyingboat made more aviation history when they both took off on the same day for their maiden voyages. The Boeing had a little bad luck when it stove a hole in one of its sponsons by hitting a log in the water. The damage was only slight. Douglas had more success and the first flight lasted for over two hours, which is a surprisingly long time for a first test flight. Results of test flights since have been very satisfactory. The giant airliner has been going up almost daily to rush tests along so Douglas can get under way with production and cop that order for fifteen to twenty-five DC-4s that United Airlines is contemplating. It looks as though Boeing is not going to be so far ahead of Douglas in tooling up their plant for the production of their big airliners after all.

After taking off from Douglas' field at Santa Monica, California, the DC-4 landed at the Los Angeles Municipal Airport (Mines Field) and joined the host of other planes now undergoing tests for their ATCs. Paspard, Aeroncer and Max Harlow all have improved planes on test there for the observance of Bureau of Air Commerce officials. Max Harlow's all-metal sportplane that survived a flat, pilotless spin into the ground has added more area to the leading edge of the fin to insure no more of those flat spins.

Also on hand is Northrop's latest dive bomber for the navy... just like the BT-1 except for a landing gear similar to the retracting ones on the army's Northrop attacks. Vultee's latest attack, which incidentally is for our own air corps competitions, paid a visit over Mines Field on its first test flight. It has a twin-row radial engine in the nose and looks very fast.