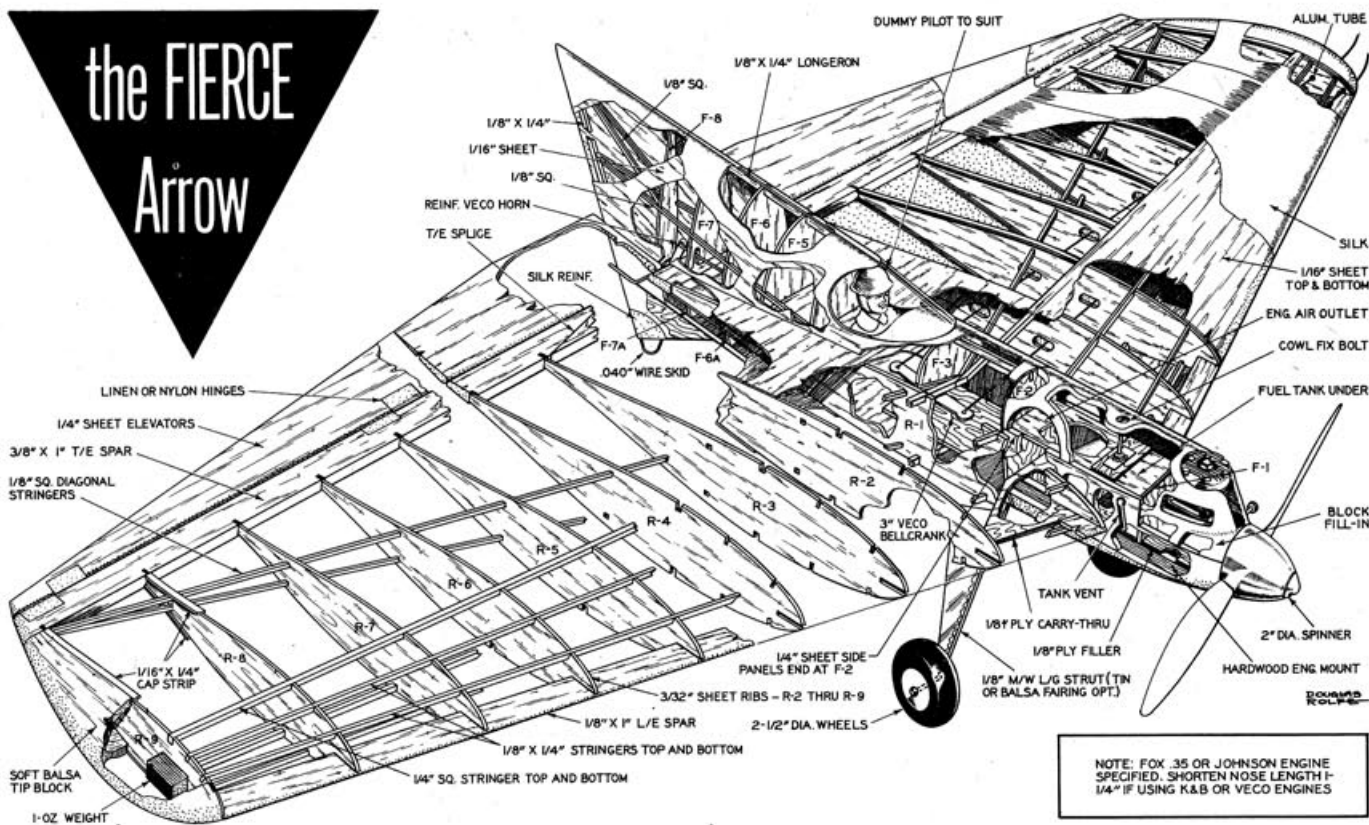


the FIERCE Arrow



NOTE: FOX .35 OR JOHNSON ENGINE SPECIFIED. SHORTEN NOSE LENGTH 1-1/4" IF USING K&B OR VECO ENGINES

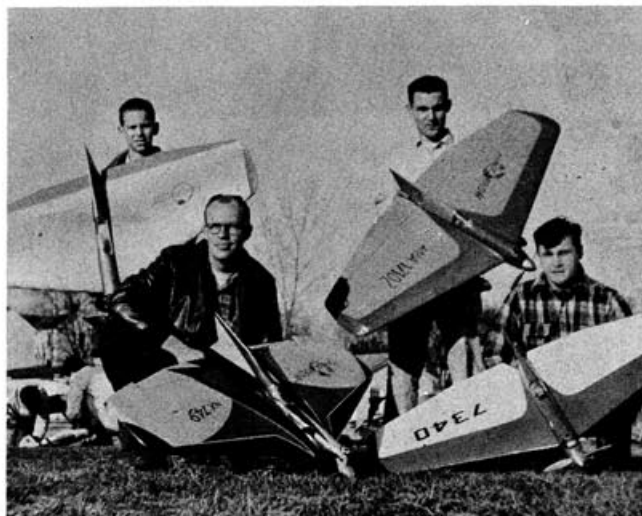
eights. Overheads, where it's up to the ship, are easy. Also, landing and take-off are automatically maximum points if you do not fight the ship. It flies slow enough that landing run is about one foot on concrete. Interested yet?

I have been fairly dissatisfied with ordinary stunt ships but I have been unable to find much wrong with the "Arrow," and I've tried, believe me! In any wind up to 25 mph, at least. At 30 she will do a pattern, but not too prettily.

After the usual study of the plans, pick out some good $\frac{3}{8}$ x 1" hard balsa for the trailing edge. Splice is noted on plans. Be very careful that this piece is straight or the whole deal will be off. While this splice is setting, lay out two pieces of $\frac{3}{8}$ x 1" for leading edges, marking rib locations and cutting them to exact shape. Cut carry-thru from $\frac{3}{8}$ " hard balsa, or ply if you prefer. Get it exact. These

pieces are the basis for construction and if accurate, little difficulty will be experienced. Cut out all ribs and lay aside. Using the plans, pin down leading edges and carry-thru to form a glued-up unit and let dry. Use the reference lines shown for this.

After leading and trailing edges are dried hard, assembly proceeds thusly. Cut 3/16" deep notches for ribs in the trailing edge and pin to straight work surface for vertical assembly. Root ribs are slipped onto carry-thru (no cement yet). Drop this assembly into notches in trailing edge and support with long pieces of wood in vertical position, squaring in both planes with triangles, etc. Slip tip ribs into position and check whole assembly carefully. This is the critical stage of assembly, so take your time. After you are satisfied it will line up, cement all the joints at root and tip, rechecking alinement. (Continued on page 45)



Four of the six FA's built to date. Minimum turn radius is 10.2 feet. No bobbed square corners. Margin of safety on the eights.



The whole family's proud, we'll have you know! Seriously, the first Fierce Arrow would do good pattern in 25 mph wind—not bad at 30.

the FIERCE Arrow

by W. F. Netzeband, JR.



Either the helpers are littler or ships bigger! With a gross weight of three pounds. More sweep in 810 sq. in., super wing does a 60-65 mph with outboard panel avoids unequal length panels.

For that new 1957 pattern, why not build and fly a real airplane. This .35-powered big wing won two firsts in its first two meets.

Exciting, eh! Thicker tip sections, equivalent tends to drop, instead, on any careless stalls. to washout, eliminate roll-in tendencies. Nose FA comes in slowly, runs one foot on concrete.



► The Fierce Arrow was conceived mainly to be different. Design analysis indicated possibilities of superior performance, in that high Reynolds Number (740,000) allowed a CL max of 1.3 or almost as good as flaps. Wing loading is actually less than the Half Fast or 7.63 oz. a square foot. Drag was the only thing that had us worried, but it has proved to be no more than a conventional 500 sq. in. job.

We see no reason for the flying wing to be maligned the way it is, except that its detractors have not achieved the proper balance. Also, the Half Fast and Arrow have a thicker tip than root (16% to 12%) giving the same stable stall characteristics as washout on conventional wings. Hence, no roll-in from stalled conditions, and a nose dropping affect to pull out of said stall. Tug is achieved from yaw which also removes the necessity of shortening the outboard panel. The outboard wing has more sweepback, hence is less effective—therefore, no engine offset. Area is 810 sq. inches while speed hovers between 60 and 65 MPH, weight around 3 lbs. Tug is generous, particularly overhead. The proof of the pudding is the way it eats up the pattern.

All the superlatives have been used up describing stunt ships, leaving little room for describing flight characteristics, which are superior. Suffice it to say, that out of two meets it has won two firsts, one of them at the King Orange meet on its 6th flight. Six of them have been built and more are in progress. By the way, that's a "35" in there!!

We calculated the minimum turn radius at 10.2 feet, and the large area lets it go around square turns clean with no tendency to bobble. Nose-heavy trim brings it out clean and there's always a margin of safety on

The Fierce Arrow

(Continued from page 11)

All dry? Leave it jiggled and insert rest of ribs, cementing as you go along. Then slide the rear $\frac{1}{8}$ " sq. spars through ribs starting at root. Then come $\frac{1}{8}$ " sq. main spars and $\frac{1}{8} \times \frac{1}{8}$ " forward spars, cementing well. Again check alinement of section. Forwardmost spars do not carry through fuselage while rest are fitted and cemented into overlapping joints. Incidentally, double cement all joints.

Form engine bearers, landing gear, firewall, and $\frac{1}{4}$ " sheet for nose of fuselage. Bevel leading edge to receive planking. (Outlines shown on plan.) Install nose sides and firewall with gear attached; then the engine bearers, noting that $\frac{1}{8}$ " ply fillers are needed on top to place engine in line with tank. Now the bellcrank plate goes in. Bellcrank and leadouts should be installed next. Cable leadouts are recommended. Bend $3/32$ " diameter pushrod, noting only one slight offset. Elevator loads are high and a double offset tends to buckle. Beef up a horn and shape elevators—they go on next. Figure out where the planking goes. It's a little tricky. Top planking goes through fuselage only aft of cockpit bulkhead. Bottom goes through all the way up to the firewall.

Planking was applied with Goodyear Pliobond (contact cement) since there are large areas to work. Put on opposite pieces in order top and bottom working from spar forward. Do not use Pliobond on butt joints between planking pieces. It shows through paint. Ordinary cement will do fine. Use plenty of pins and get it stuck down good. Trim flush with inside of root ribs up to firewall. After planking, you can add $1/16 \times \frac{1}{8}$ " cap strips, noting that tip cap (9) is flush with outside of rib. Add and shape tip blocks, add the one-ounce tip weight and leadout tubes.

Rear end is slightly different in procedure. Bulkheads are cemented to planking except #8, using a center line to line them up. No offset is necessary *but* be darned sure it isn't turned in. Add the $\frac{1}{8} \times \frac{1}{8}$ " top longeron and sand it to shape for planking. Bottom is $\frac{1}{4}$ " sheet and should be fitted carefully so it lines up. Set #8 in and add trailing edge. Sight top longeron for offset now. Plank rear, starting with inside top piece and proceed from there. While this is drying, add #3 bulkhead, longeron, and plank. Planking fits down inside root ribs and butts at the center line of the airplane. Drill holes for engine and install blind nuts.

The nose needs some blocks to fill in around front so we can get down to a 2" dia. spinner. Bottom is a $\frac{1}{4}$ " piece of firm light wood shaped after installation. Top block is spot cemented and carved to shape. You can take the easy way and leave the engine uncowed if you like. Otherwise, hollow out and open outlets at rear for ventilation. Hold-down consists of a plate nut screwed to a piece of plywood and cemented to the tank cover. With proper keys one screw is sufficient to hold her down. Carve all to rough shape and start sanding.

We covered the entire ship with silk and finished with five coats of half-strength butyrate clear dope with elbow grease between coats. Color was four coats in three colors, but you're boss here. Go as far as you like. Conservative estimates allow you a total of 56 ounces. You should have enough experience to finish up details so we'll not waste your time. We cannot recommend this weight for beginners although flying exhibits no "nasty" characteristics.

We fly the ship on 65-foot lines. After a flight your arm knows you've been work-

ing. CG range indicates maximum rearward location. Don't go behind that. Now comes the sermon. We played with the CG and obtained a full range of characteristics from rock steady and sluggish to red hot pop corners. So, you can adjust response to suit your particular style by moving CG around. Move aft for quicker turns and forward for steady level. Optimum CG will give steady level and smooth response without abrupt changes. A good place for lead is the rear cover of the engine. We pour it in hot and a Fox will hold two ounces.

This here ship is a born winner and the mere sight of all that area with a li'l ole .35 scares most folks. The surprise is that it flies at all, much less 65 mph and it does a beautiful pattern. A final warning: Although wing loading is light like a combat ship, power loading is right on the borderline for the .35's. Therefore, beware of rough handling, particularly on wing-overs. Otherwise it's almost impossible to get into trouble and we'll guarantee a few thrills when you fly your Fierce Arrow.