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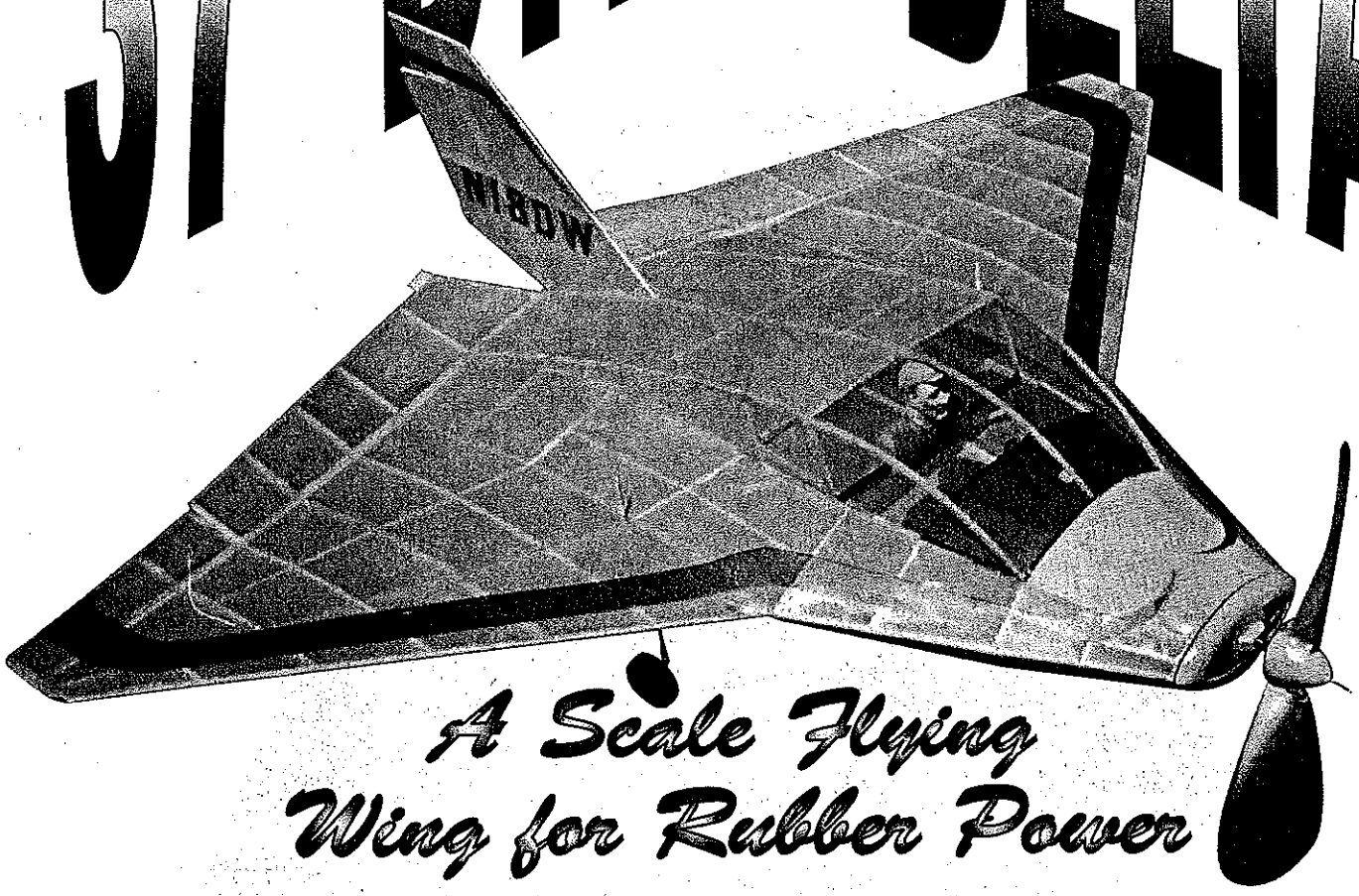
37" DYKE DELTA



A Scale Flying Wing for Rubber Power

■ Ken Johnson

My introduction to this aircraft was with the Burbank, California Indoor modelers about 1984. Barnaby Wainfan is known for his unusual model subjects, and often came to the gym with flying-wing models. One night, he flew a new model that intrigued me: a replica of a homebuilt called the Dyke Delta. I borrowed this plan and drew it up to my style of building for Indoor. It flew with very little trim adjustment. The model was quite light and won a contest in flying-wing Scale.

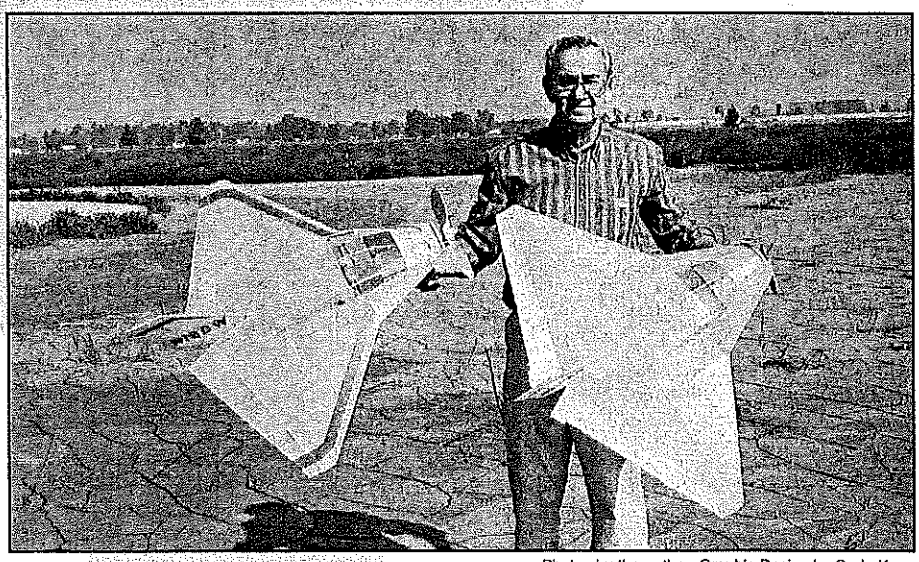
I flew the Dyke many times after that, both indoors and out. It flew better inside since it was very light (condenser-paper covered) and lacked the penetration needed for outdoor use. My son Chris also built this airplane and had good results.

Later I decided to try the Dyke in another size and built a 22-inch model. It was also fashioned to an eight-inch size for John Martin's Pistachio Proxy contest, held in Florida. Both models flew well, although the eight-inch version flew a bit fast for my liking.

The design is unique because of the double-delta wing shape. It is felt that the forward area of the wing acts as a stabilizer; hence the lifting surface is more efficient. The construction of the model is different because there is no separate fuselage. Much of the airplane is built in the modeler's hands. I think of it as being easier, because you don't have to build a separate stabilizer or a fuselage.

Being a guy who likes to build many sizes of a particular airplane to test for the best one, I decided to try the Dyke in a bigger model. The Dyke was constructed to 37 inches in span for the flying-wing contest held every year here in California. I have flown it for four seasons (having rebuilt it several times after untimely crashes) and it's flying better than ever. It has won the rubber-powered category of the above-mentioned contest for the last three years.

Author's son Chris has also built the Dyke Delta, and placed in the Northrop flying-wing contest with it.



The author's two 37-inch Dyke Deltas. Newer version is at left. Each weighs 100 grams without rubber.

Photos by the author Graphic Design by Carla Kunz

Scale supporting photos may be obtained from a full-scale Dyke in your area or checking early issues of *Air Progress* for articles. My first 37-inch model was white, like the original; the newest one is yellow with blue trim.

This design is a good, stable subject for free flight or even radio control, in whatever size you choose to build it.

CONSTRUCTION

As Sandy Peck of Peck-Polymers said, "It's mostly sticks," so there is not a lot of former-cutting to do. The "sticks" mentioned are mostly 3/32 square balsa.

I do not recommend building this airplane with the landing gear in the retracted position, since the front gear support is the handle used for launching the model. I haven't found another place to hold it to push it into flying speed.

I suppose you could fashion a small half-moon of balsa (not scale) to use for this purpose, cemented up under the belly of the airplane, but the bottom of the model will get scraped each time it lands.

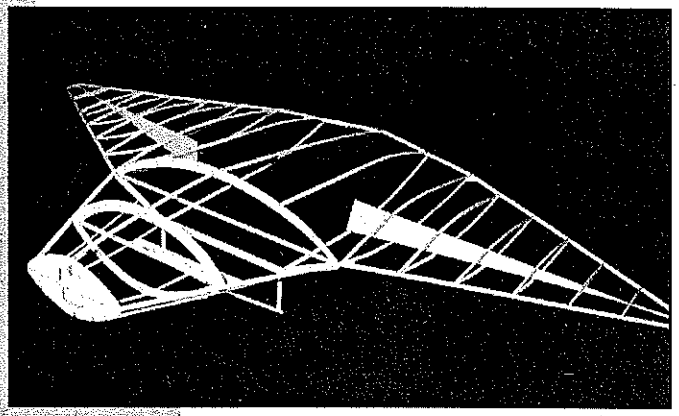
Begin construction using the top-view plan. The outlines are 1/8 straight medium-hard balsa. You will be building the top half of the model first.

Pinhole through the plan onto a sheet of art board to get the wing rib template shape. The #2 rib is the one to make the template shape from, since all the ribs can be cut from this curve. The #1 rib is the same shape with a straight piece of balsa patched into it at the front. After pinholing the art board, cut along the holes with a large pair of scissors for the correct curve.

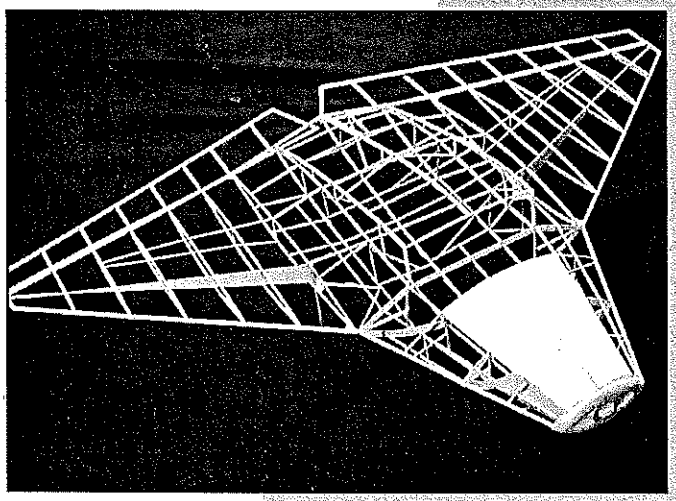
Sand the curve line with a medium-grade sanding block so that it is smooth and clean. You are now ready to cut the sliced ribs. I prefer them over solid ribs, since they are much lighter; I haven't built a model with solid ribs in years. For a rubber-powered model to fly well, it must be built as light as possible.

Place the template over a sheet of medium 3/32 balsa (four-inch width, if possible) and make a slow cut into the wood along the edge of the template. Don't try to cut all the way through

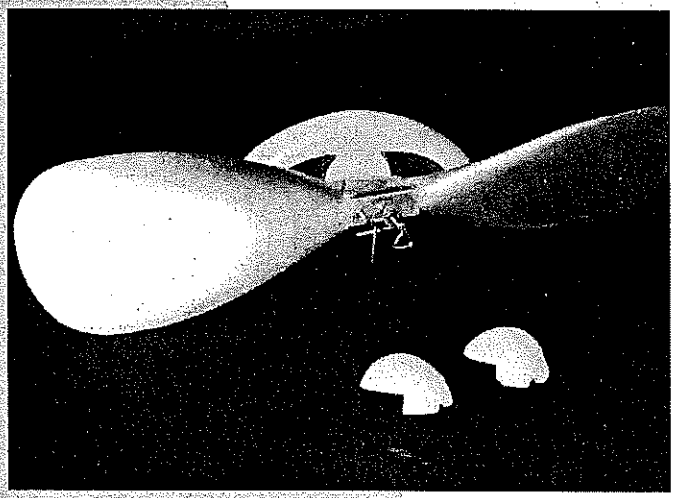
Carl Hatrak (left), longtime flying-wing contest director, awards the author first place at 1994 contest, Taft CA.



Inverted view with bottom formers in position, lower wing ribs attached, and spars ready to be positioned.



The completed framework is "mostly sticks" of 3/32 square balsa. Internal braces add considerable strength.



Completed nose assembly shows painted prop and figure-4 freewheeler. Spinner is notched to fit around hub.

the wood on the first cut; it should take a couple of passes with a small X-Acto knife to make each rib. The ribs should be 3/32 square in cross-section. Make a few more than the 14 ribs required so that you will have extras if you break any while attaching them with your favorite cement.

Attach the ribs to the leading and trailing edge of each wing, but do not glue in the wing spar yet. Pinhole through the plan to get the accurate shape of the bulkheads for the top fuselage formers A, B, and C. Bulkhead E is build flat on the plan. These bulkheads are cemented to the 1/8 square balsa crosspieces in the fuselage area of the wing.

The 3/32 square stringers are cemented in after placing the #1 rib in position. Put in two side stringers at the front and cement the instrument panel bulkhead C to the stringers (using triangular gussets for strength). Cement in the three remaining stringers to the front cowl area.

Another template must be cut for the three top cabin stringers, which are also 3/32 square balsa. These are attached to the top corners of former D and the trailing edge of the wing. Put in the 3/32 square crosspieces as shown.

Make the dihedral-break cuts where indicated and cement in, using one inch dihedral under each tip. Again use triangle gussets.

When dry, carefully lift the model from the plan. It will be very fragile at this point. Turn the model upside down and put in the remaining wing ribs. Slide the wing spars in between the upper and lower ribs and check for fit. Trim the spars slightly if the fit is too snug. Cement the spars to the ribs. The spar will only go out to the last rib. A length of 3/32 square balsa should be used to complete the spar to the wingtip.

Cement in the crosspieces of 3/32 square balsa from rib 1 to rib 2. Cut and cement in the bottom formers to the fuselage. The three long stringers that run along the belly of the model are cut from a template and are cemented in place.

All of the square crossmembers from rib 2 on the left to rib 2 on the right are cut in cemented in position. Put in all the square vertical pieces in the fuselage area.

Dyke Delta

Type: FF Rubber Scale

Wingspan: 37 inches

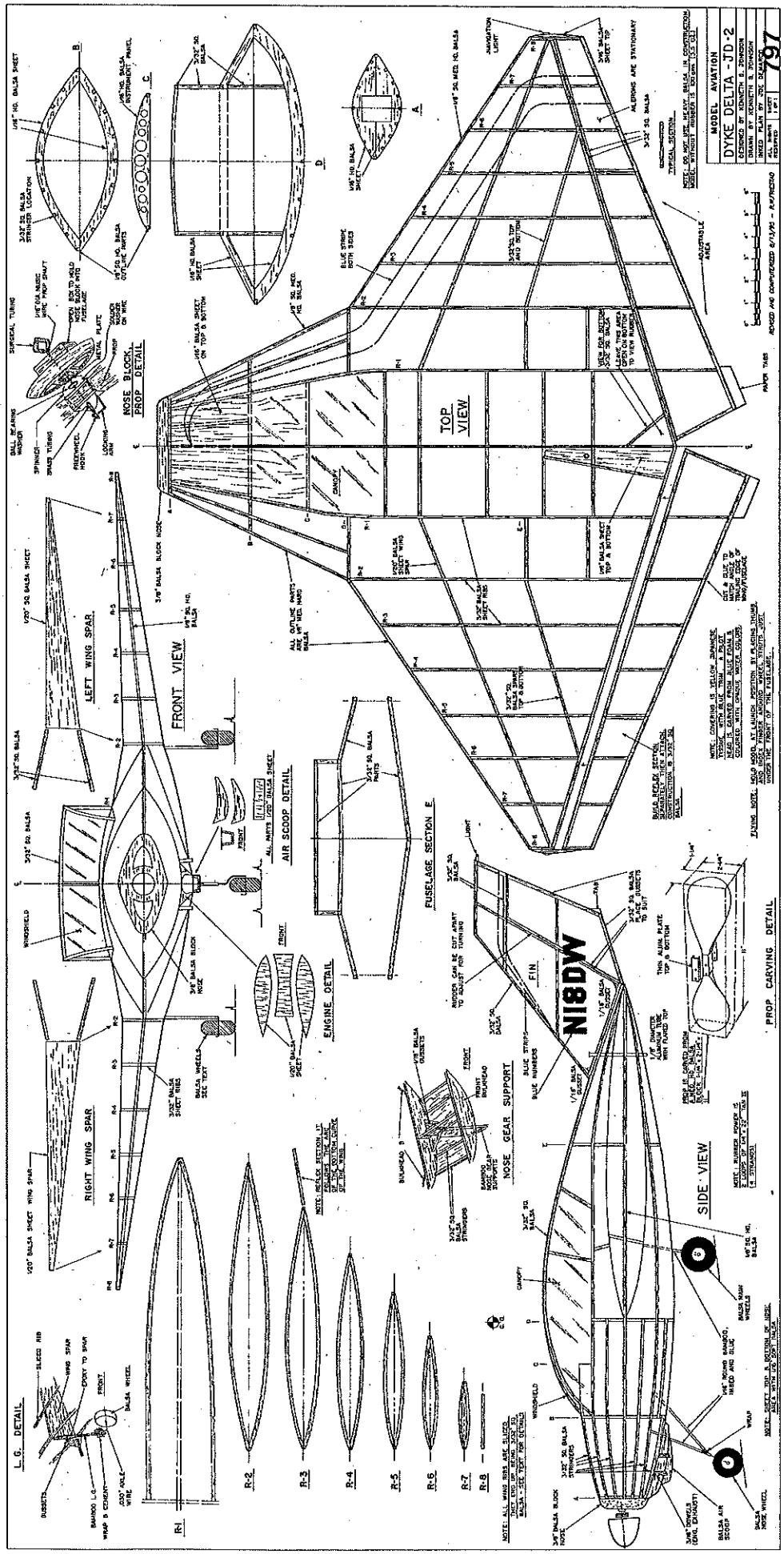
Rubber: Two 22-inch loops 1/4 Tan II

Flying weight (less rubber): 3.5 ounces

Construction: Built-up

Covering/finish: Japanese tissue/dope

Full-Size Plans Available—see page 189



It is necessary to strengthen the bottom area of the nose where the front wheel attaches to the fuselage. Cut a length of 3/32 x 1/2 and cement to the inside of the center stringer. Put in triangle gussets as shown and 3/32 square braces in this area.

Now you are ready to glue in the landing gear supports. Using a lot of wire in the gear of smaller rubber models is unnecessary; the two main wheel struts on my model were 1/16 round bamboo. I buy this at the local supermarket (barbecue skewers) and they work great for many modeling applications.

A small piece of .030 music wire is bent to shape, wrapped, and cemented to the bamboo for each wheel's axle. The area where the bamboo attaches to the wing spar is cemented with 5-minute epoxy. Note that the two rear landing gear supports are angled slightly forward at the bottom.

The nose wheel support is made from the same bamboo and is angled toward the front of the model. The under-the-nose air scoop is made from 1/20 balsa. The exhaust pipes are 3/16 square balsa sanded round. The .030 music wire is bent to shape and attached by wrapping with thread and cemented.

The balsa wheels are turned out on a Dremel Moto-Tool. My standard (corded) Dremel was found to turn too fast (28,000 rpm) to make the wheels properly. After some searching, I came across a cordless, rechargeable Dremel called the Mini-Mite. It has speeds of 5,000 to 10,000 rpm and works much better. *(Editor's note: speed controls and variable-speed Dremel tools are also available.)*

Small circles are drawn on card stock and cut out for the wheel hubs. The tire part is presprayed with black auto primer. The center paper disc is painted to match the model colors. Note that the nose wheel is 1/4 inch smaller in diameter than the back wheels.

Many 3/32 square fuselage bracing sticks are internal. Refer to the construction photos to see where these are located. Of course, the crossmembers that are in the way of the rubber motor must be removed after the structure is built up.

The front of the fuselage is sheeted with 1/16 soft balsa top and bottom. The fin is 3/32 sq. balsa, using gussets where needed.

The elevons are built separately and attached before the model is covered. Note that the elevons are cut and glued to match the angle of the rear of the wing.

Don't forget to make an instrument panel and cement in position on the fuselage. Since the cabin of this aircraft is flat plastic, it is not necessary to form any type of bubble canopy. That's good news!

Be aware that a small length of 1/32 x 1/8 x 1 bamboo is cemented in vertically at the root of the wing on each side. This represents the long hinge that sticks up out of each wing. An interesting point about the Dyke Delta is that its wings fold across the top of the fuselage so that the airplane can be made more narrow. The airplane is then towed from home to the airport behind the pilot's automobile. The above-mentioned hinges support each wing in its folded position.

My model is covered with yellow Japanese tissue. The trim stripes and numbers are blue Japanese tissue. The windshield and side windows are attached after the model is covered. The windshield area wood is colored with yellow marker before covering with the thin plastic windshield material. Fletchtite arrow cement (made to attach plastic vanes to aluminum arrow shafts—from your local archery supply store or indoor range) works well to attach the windshield.

The noseblock is cut from ⅜ sheet balsa. The air scoops in the block are hollowed out with the Dremel using a small round ball-end bit. A ⅛ sheet block is cemented to the rear of the noseblock; a small platform is cemented around the sides and the top of the platform to insure that the noseblock does not fall out of the front of the model.

The propeller is carved from a medium hard balsa block measuring 11 x 2¼ x 1¼. After the prop is carved, sanded and balanced, spray a coat of auto gray primer on it. Sand lightly, then spray on one coat of silver paint.

The balsa spinner is turned on the Dremel tool using sandpaper. Notch out the back of the spinner to pass over the prop hub, then slice it down the middle and cut a groove to accommodate the prop shaft. Cement the spinner over the prop hub, making sure the shaft has free travel inside the spinner. The front of the spinner should come up to the end of the brass tubing.

Flying: Make up a four-strand (two loops) rubber motor of ¼ Tan 2, about 22 inches long. The center of gravity should be about where the leading edge of the wing changes angles (8¼ inches from the rear of the noseblock).

Put a few winds in the rubber and launch the model over tall grass. If it dives, lift the rear of the elevons slightly and cement. If it stalls, drop the elevons the same amount.

When the model is cruising in a rather straight line, add turns to the rubber until the models climbs nicely. Remember, the launch holding position is around the front gear supports up under the front of the fuselage.

Make sure your noseblock is a snug fit. A small amount of downthrust may be needed—perhaps 1/32 to 1/16 shim behind the noseblock.

Launch directly into the wind or slightly to the right, with the nose of the model elevated slightly. Good luck! I hope your Dyke flies as nicely as mine.

This article is dedicated to Carl Hatrak, contest director for the flying wing contest held each year in California. 1995 was the 29th consecutive year Carl has directed this meet, and he has at times funded the trophies himself.

The contest was originally sponsored by Northrop Aviation, then publisher William Northrop, and now by the Southern California Ignition Flyers (SCIF). Proxy entries are accepted for those who are interested.

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