

## CONSTRUCTION

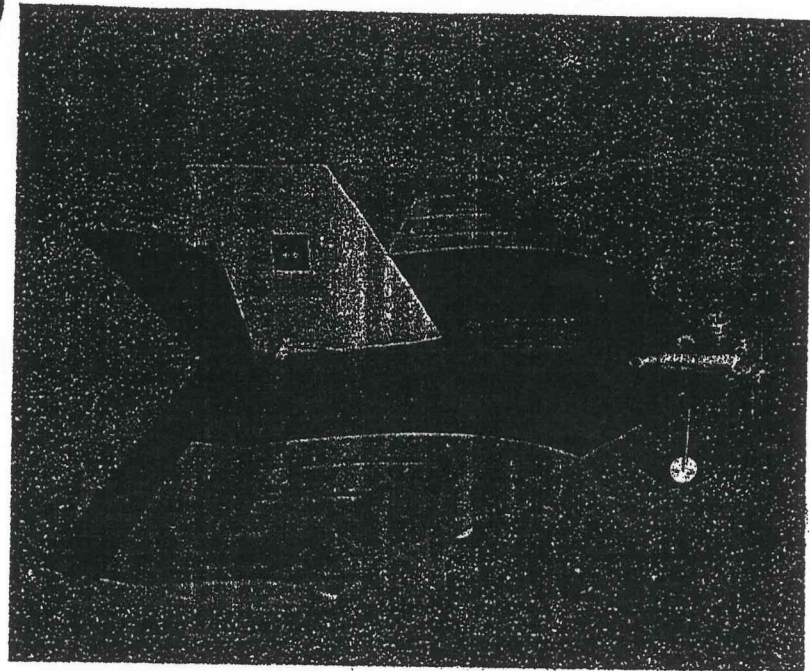
by STEVE GRAY

**D**ID YOU EVER want to build something unique, exciting, quick-building, fast and cheap? It sounds like there couldn't be such a combination of qualities in any model but, read on, the Stingray Delta is such a model.

The Stingray was actually designed by accident. While cutting foam cores for wings for a pattern plane, fellow clubmate Keith Wallace and I spied the remains of a 4-inch block of foam that seemed to be begging to be cut into a wing core. The tip template for the pattern plane was tacked onto one end of the block and a large root template was designed for the other end. In about 20 minutes we had a pair of foam cores for a delta flying-wing model. We figured we had something interesting, so we shelved the pattern plane and went full bore on our new design. That evening we had the sheeting on the wing and ready for joining. The design was in our heads and itching to materialize. We didn't quit and in less than a week the model was flying. It just goes to prove that sometimes these spur-of-the-moment thoughts should be acted upon, because they can pay off.

The Stingray Delta is a flying-wing design powered by a Como .40 R/C engine from Indy R/C\*. This is a super sport engine and is ample power for the Stingray Delta, however, any sport .40 will give the Stingray sizzling aerobatic performance and speed. You don't have to have an expensive piped engine to have a lot of fun with this plane.

The radio is an Ace\* Silver Seven with Atlas servos. The Ace radio was especially well suited to this model as it incorporated a bi-directional mixer to operate the elevator controls for the model. This type of radio is not necessary, however, as a simple mechanical mixer such as the Du-Bro unit could be used together with a normal three or more channel radio.



# Stingray Delta .40

A rugged and snappy fun design for .40 to .45 engines.

On-board electronic mixers are also available. Retractable landing gear is not incorporated but might clean things up a bit for even faster flight.

**CONSTRUCTION.** About the fuselage. There isn't one so let's proceed to the next step.

The wing is the whole airplane so this step is the longest. Begin by making two rib templates for the tip and cutting the cores. There is no wash-out or wash-in in the wing.

table, then simply sanding the root even with, and perpendicular to, the table will establish the correct angle. In other words, when the two panels are joined, the top of the wing is flat across at the thickest point and the bottom is at an angle upward toward the tips.

Once the correct angle is established, join the two panels with epoxy and allow the assembly to dry.

Your next task is to make the engine cutout. Using the drawings as a guide, cut

*Any sport .40 will give the Stingray sizzling aerobatic performance.*

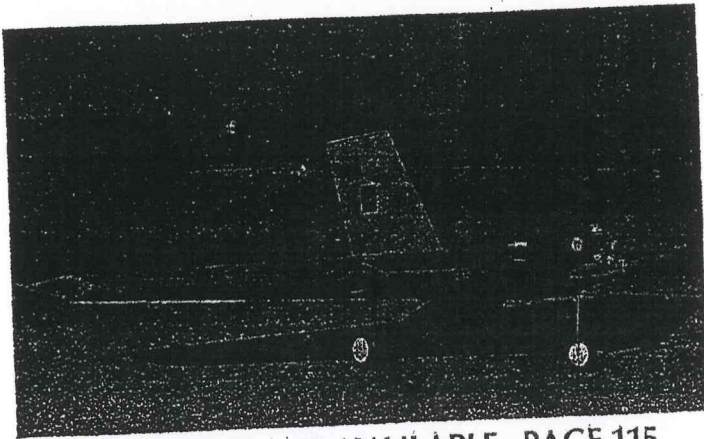
Next, using 3M Spray 77 or some similar contact cement for foam, attach the 1/4-inch balsa sub leading and trailing edges. When these are dry, sand them even with the foam and cover the cores with the 3/32-inch balsa sheeting and 3/32x1/2-inch cap strips. When these are dry, sand the wing tips and roots square. Just sand the tips flat with a sanding block. The wing roots, however, must be sanded for the correct dihedral angle. If you lay the wing panel on a table on its top surface with the root at the edge of the

into the wing at the center to create an inset area for the firewall. Spend enough time here to be sure that the firewall will be installed perpendicular to the chord line of the wing. That is to say, the thrustline must be 0° vertically and horizontally. Take care here to get this angle right.

Next cut out the firewall from 1/4-inch aircraft ply and install blind nuts for mounting your engine mount. Be sure to check that the engine's muffler will clear the top of the wing when the engine and



# STINGRAY DELTA

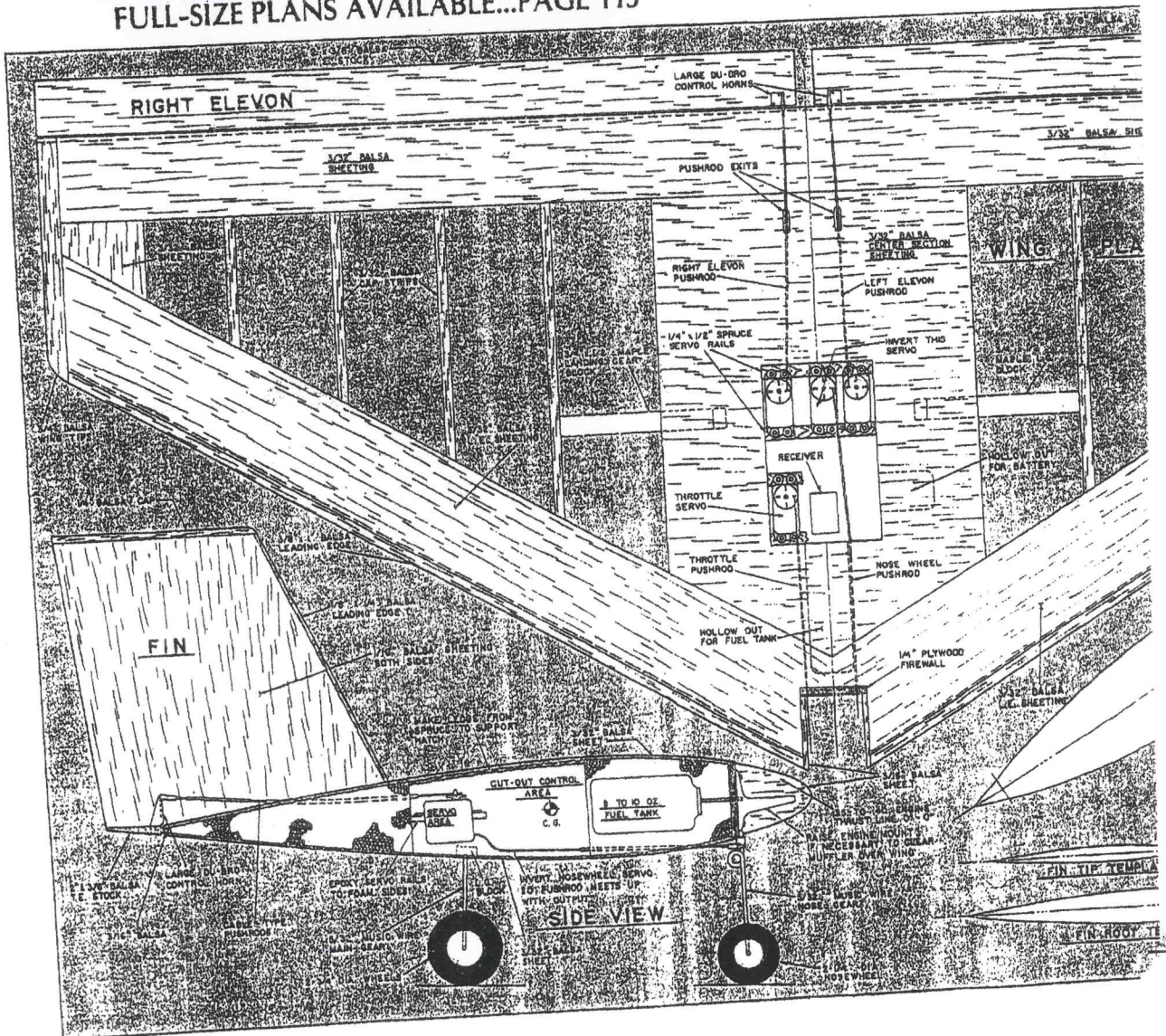


FULL-SIZE PLANS AVAILABLE...PAGE 115

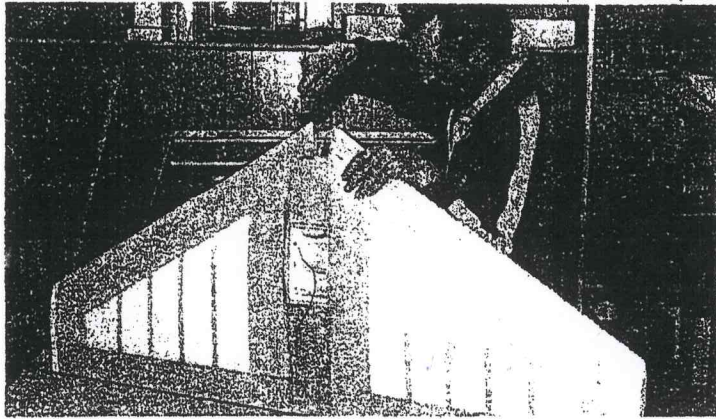
mount are installed. If necessary, the engine location may be raised or lowered a little. Also, at this time drill holes for the fuel lines and throttle cable. If you don't have an engine mount with a nose wheel bearing in it, then you must also drill holes to mount a steerable nose wheel.

When you're sure everything is correct, epoxy the firewall in place right onto the foam.

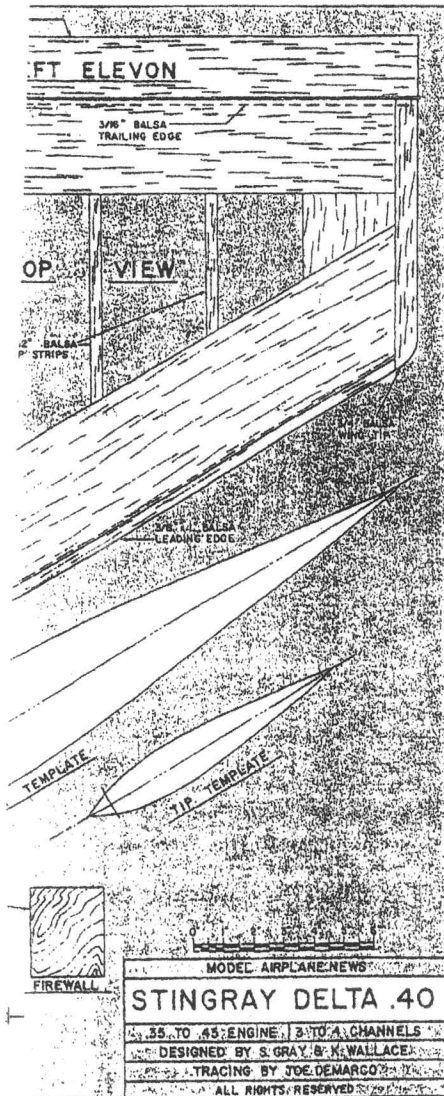
Next you must glue on the two wing leading edges and wing tip blocks, and sand them to shape. Then glue in place two 1/8-inch balsa sides to the insides of the engine cutout. Sand this area.







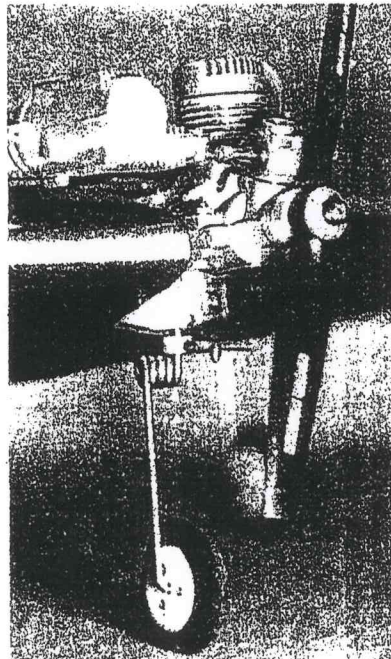
Left: Super simple to cover, the Stingray Delta .40 requires minimum effort. Above: In flight the model presents a unique silhouette.



You're now ready to cut out a hatch in the center section of the wing. Decide how large to make the hatch according to your R/C equipment and mark it out on the center section. Using a sharp knife, cut away the sheeting to expose the foam to the exact hatch dimension you've chosen. Using a soldering gun, hollow out the foam from this hatch area clear down to the bottom sheeting. Similarly, hollow out an area to accommodate the fuel tank under the wing sheeting ahead of the

hatch and cut out a small opening to one side of the hatch area to set in the battery pack.

Using a hot piece of 1/8-inch wire, form holes in the foam for the throttle pushrod, fuel lines, antenna, steerable nose gear, and control surface pushrods. (I just heated the wire with a burner on my electric stove.) Using spruce or similar wood, form a ledge inside the hatch area just under the balsa sheeting to support a hatch cover, which you should make from 3/32-inch ply with the grain running span-wise. Now install your cable sheaths for the elevons, steerable nose wheel, and throttle. Anchor each end of the sheaths with epoxy. Cable type pushrods work best.



No problem with accessibility here, as the engine and nose gear are out in the open.

At this time you may also choose to install your 1/4 x 1/2-inch spruce servo mounting rails. Also, install a plastic tube from the hatch compartment to the back of the wing, coming out the bottom for the antenna to trail out. If you prefer, the antenna could also be installed in one of the wing panels. (This might prevent you from stepping on it during launching as I always seem to do.)

Now turn the airplane over and cut out the sheeting for the maple landing gear blocks. We used 3/4 x 1/2-inch maple blocks. Using your soldering gun again, melt away the foam in these areas so that the blocks sit flush in the wing. Don't forget to install a supporting block at the inside end of each landing gear block so that the wire will be properly anchored. Epoxy these into the wing well. Now reinforce the wing joint with 3-inch wide fiberglass and polyester resin to make the joint

(Continued on page 76)

12842



# BALL LINKS

## THE MISSING LINK



HOLE .089"  
SELF THREAD #2-56  
Stock #12 - 2 pcs. \$1.00

## BALL LINK 3/16" H.D.



HOLE .089"  
TAPPED #4-40  
Stock #77 - 2 pcs. \$1.40



HOLE .078"  
SELF THREAD 2mm  
Stock #12C - 2 pcs. \$1.00  
Will handle 7 lb. Pull



HOLE .089"  
SELF THREAD #2-56  
Stock #77B - 2 pcs. \$1.20

## NEW

### BALL LINK 1/4" H.D.



HOLE .110"  
TAPPED #4-40  
Stock #87 - 2 pcs. \$1.70  
Will handle 30 lb. Pull



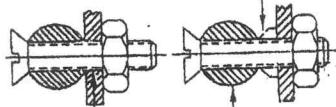
HOLE .078"  
SELF THREAD 2mm  
Stock #77D - 2 pcs. \$1.20  
Will handle 12 lb. Pull

PLASTIC SHANK ONLY  
#12A is for #12 2 pcs. .55°  
#12B is for #12C 2 pcs. .55°  
#77A is for #77 2 pcs. .95°  
#77C is for #77B 2 pcs. .75°  
#77E is for #77D 2 pcs. .75°  
#87A is for #87 2 pcs. 1.15°

Steel Balls are available for all of the ball links Directly only at 60° for two. Please specify ball diameter and hole size, 3/16" comes in .078" and .089" hole, 1/4" comes in .110" hole.

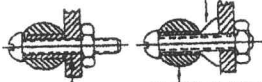
## MOUNTING HARDWARE

### #4 CONICAL STAND OFF



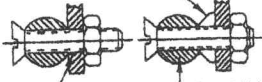
.110" HOLE .110" HOLE IN BALL  
Stock #88 4-40 Screws 2 Sets .50°

### #0 CONICAL STAND OFF



.062" HOLE .089" HOLE IN BALL  
Stock #88A 0-80 Screws 2 Sets .60°

### #2 CONICAL STAND OFF



.089" HOLE .089" HOLE IN BALL  
Stock #88B 2-56 Screws 2 Sets .50°

See your dealer or order direct. Add 50° for postage & handling on items. Catalog FREE.

**ROCKET CITY** R/C  
SPECIALTIES  
103 WHOLESALE AVE., N.E.  
HUNTSVILLE, AL. 35811  
Phone 205/539-8358

# STINGRAY DELTA

strong. The fiberglass can also be folded over the firewall to reinforce it and the firewall can be coated with resin for fuel-proofing.

Make elevons by tapering 3/8x2-inch balsa to a trailing edge section. Hinge them after covering to the trailing edge of the wing. Make the fin by cutting a foam core and covering it with 1/16-inch balsa. Glue a 1/4x1/8-inch balsa leading edge in place after covering and cap the end with 1/4-inch balsa. Sand this smooth and don't attach it to the wing until after covering.

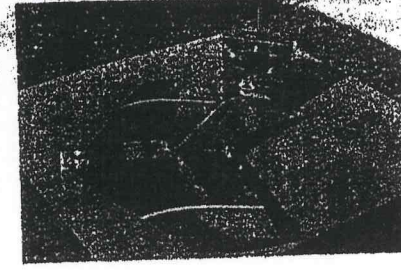
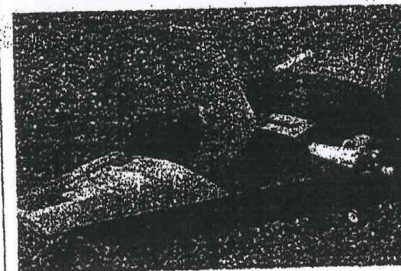
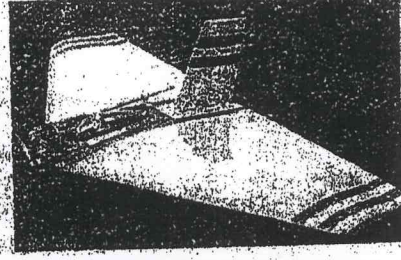
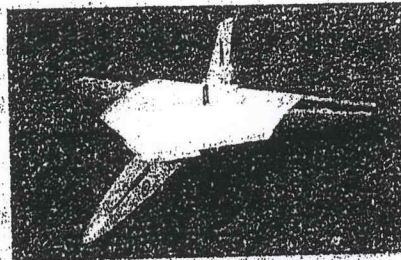
We covered our original Stingray with Solarfilm and trimmed it with MonoKote trim. After covering, epoxy the fin in place, taking care to line it up properly. Don't forget to trim away the covering material on the wing so that the fin is glued directly to the wood. Don't just glue it to the covering as it won't last too long. Hinge the elevons to the wing, taking care to keep the hinge gap to a minimum. Be sure that they move freely after hinging.

This will result in some up-elevator. Remember that a flying wing requires some reflex in the airfoil. This slight up-elevator provides the necessary reflex.

Set the throws so that with full up or down, the elevons move 3/8 inch from neutral. These are about right to start out with and can be increased after flying the model if you want more control. (Exponential control or dual rates can be useful on this type of model.)

Be sure to balance the model where shown on the drawing board or ahead of this point.

FLYING. This is the best part of all and is guaranteed to pleasantly surprise you. The model exhibits no bad tendencies and is as groovy as anything you've ever flown. It takes off quickly and is quite fast with the Como .40. The model basically will not stall and is very easy to fly. Landings are easy and our only suggestion is that they should be made at slightly higher than the minimum



We used Slo-Zap cyanoacrylate for the hinges, which proved to be a simple and strong method of attachment. This glue gives about 30 seconds of working time and then bonds permanently. Epoxy can also be used.

Finally, install your R/C gear, engine, and landing gear. Be sure that the landing gear length is correct so as to allow the plane to sit at the right angle of attack for takeoff and landing.

Set up the control surfaces so that when they are neutralized there is some up-elevator. Line up the bottom of the elevon so that it is in a straight line with the contour of the bottom of the wing.

speed of the model. This will eliminate the tendency for the model to bounce if you come in too slow and nose high.

Our model weighs 5 pounds ready to go and balanced right on with no ballast (what luck!).

Good luck with your Stingray Delta. It's a good fun flier and will wake up your fellow club members when you take it out to the field.

\*The following are the addresses of the companies mentioned in this article:

Indy R/C Sales, Inc., 10620 N. College, Indianapolis, IN 46280.

Ace R/C Inc., Box 511C, Higginsville, MO 64037.