

PRANCER

The Prancer is a unique looking aircraft and will do all the good things you are looking for.



The countryside near Lexington, Kentucky, creates a pleasant setting for the Prancer, displayed by Cara Rogoyski.

By Francis R. Rogoyski

Lightweight, super sleek, economical, aerobatic — all these terms describe the Prancer, a five-foot low wing design that flies nicely on a .35. The Prancer floats like a sailplane and flies as well inverted as it does upright. The plane is designed for 5 channel operation, the fifth channel being used for flaperons.

Since the Prancer was my first low wing plane (my only other RC flight

experience was with a Falcon 56 Mark II) and I had no trouble handling it, I guess I could safely classify it as a low wing trainer. This was also my first attempt at design, so I played it safe by using a flat bottom wing, and by keeping the construction light. I flew the original version for a year before deciding to build another and write this article. Although the planes look alike, many subtle changes have been incorporated into the new model. Nothing major; just all the little things my 20/20 hindsight told me I should have done differently.

text to page 47



PRANCER

Designed By: Francis R. Rogoyski

TYPE AIRCRAFT

Sport/Trainer

WINGSPAN

59½ Inches

WING CHORD

11½ Inches

TOTAL WING AREA

675 Sq. In.

WING LOCATION

Low Wing

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord

Tapered Tips

DIHEDRAL EACH TIP

1¼ Inches

O.A. FUSELAGE LENGTH

49 Inches

RADIO COMPARTMENT SIZE

(L)12" x (W)3½" x (H)5½"

STABILIZER SPAN

23¼ Inches

STABILIZER CHORD (inc. elev.)

6" (Avg.)

STABILIZER AREA

148 Sq. In.

STAB. AIRFOIL SECTION

Semi-Symmetrical

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

6¼ Inches

VERTICAL FIN WIDTH (inc. rud.)

5¼" (Avg.)

REC. ENGINE SIZE

.35-.40 Cu. In.

FUEL TANK SIZE

6 Oz.

LANDING GEAR

Tricycle

REC. NO. OF CHANNELS

5

CONTROL FUNCTIONS

Rud., Elev., All.,

Throt., Flaps

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa & Ply

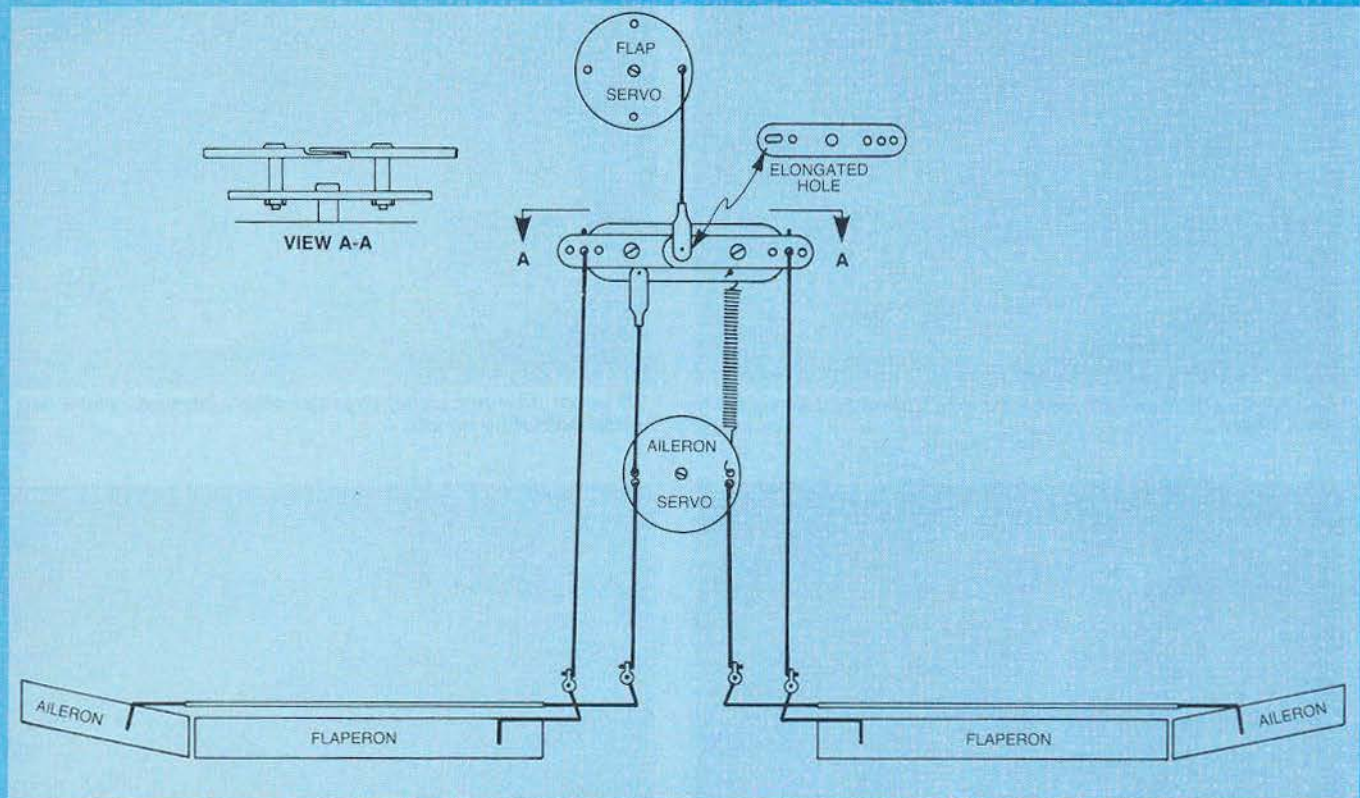
Wing Balsa, Spruce & Foam

Empennage Balsa, Foam

Wt. Ready To Fly 88 Oz.

Wing Loading 18.2 Oz./Sq. Ft.





Bill Of Materials

Fuselage

- 3 — 1/8 x 4 x 48 Side Panels
- 2 — 1/16 x 6 x 12 Plywood Doublers
- 1 — 1/8 x 4 x 36 Top Sheeting
- 1 — 1/8 x 4 x 24 Bottom Sheeting
- 1 — 1/4 x 1/4 x 28 Top Spar
- 1 — 1/8 x 6 x 12 Ply Formers & Dihedral Braces
- 1 — 1/8 x 6 x 12 Ply Formers (Lite Ply)
- 1 — 1/8 x 4 scraps Former "A" & Wing cut-out doublers

Wing

- 2 — 5/16 x 5/16 x 36 Leading Edge
- 2 — 1/4 x 1/4 x 11 Wing Tip Blocks
- 2 — 1/4 x 1/2 x 36 Forward Spar — Spruce
- 2 — 1/8 x 3/8 x 36 Rear Spar — Spruce
- 2 — 3/8 x 3/8 x 36 Trailing Edge
- 2 — 1/4 x 36 Tapered Stock
- 2 — 1/16 x 3 x 36 Top Leading Edge Sheeting
- 2 — 1/16 x 3 x 36 Bottom Leading Edge Sheeting
- 2 — 1/16 x 1 x 36 Bottom Trailing Edge Sheeting
- 1 — 1/16 x 4 x 36 Cap Strips (cut 3/8" wide strips)
- 1 — 1/16 x 4 x 24 Top & Bottom Center Sheeting
- 1 — 1/4 x 6 dowel for locator pegs

Foam meat trays, egg carton tops, or foam board for ribs

Stabilizer

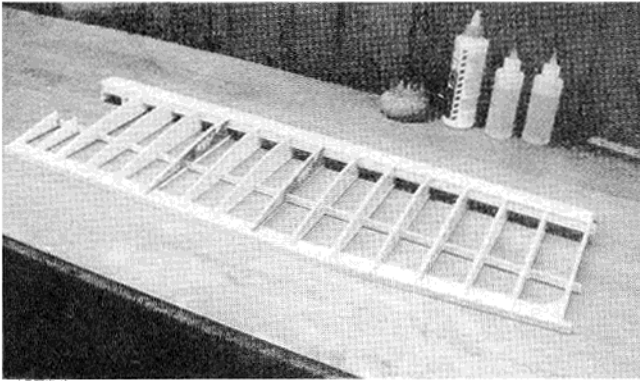
- 1 — 1/4 x 24 Tapered Stock
- 1 — 1/4 x 5/16 x 24 Trailing Edge
- 1 — 1/4 x 1/4 x 24 Leading Edge
- 1 — 1/2 x 1/2 x 8 Tip Blocks
- 1 — 1/8 x 5/16 x 24 Spar — Spruce
- 1 — 1/16 x 1 1/4 x 12 Top Sheeting
- 1 — 1/16 x 3 x 6 Bottom Sheeting
- 1 — 1/8 sheeting for center ribs

Foam meat trays, egg carton tops, or form board for other ribs
1/16 x 3/16 cap strips

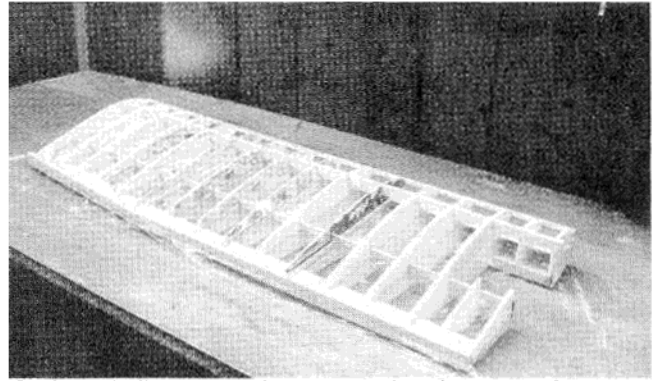
- 2 — 1 x 12 x 1/16 Top Leading Edge Sheeting

Fin & Rudder

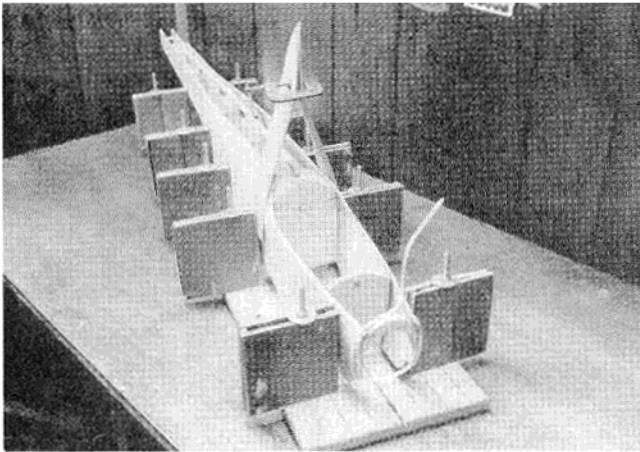
- 1 — 3/16 x 4 x 24 Sheet



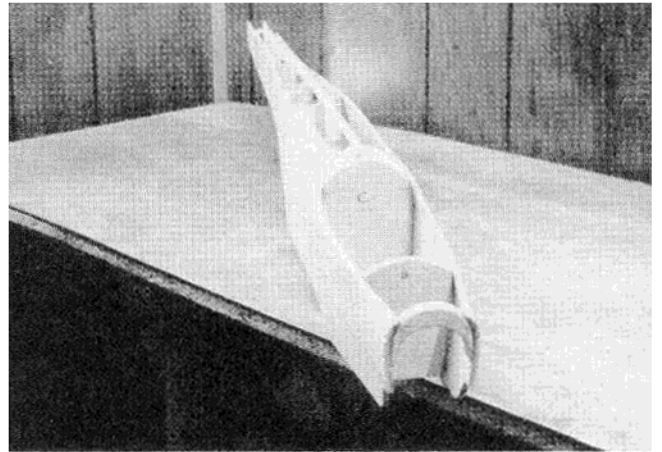
Right wing panel — note ribs cut from various egg cartons or meat trays.



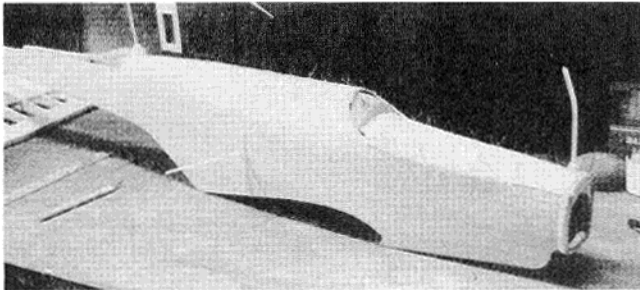
Designer built one panel over the other, however, plans now show both wing panels.



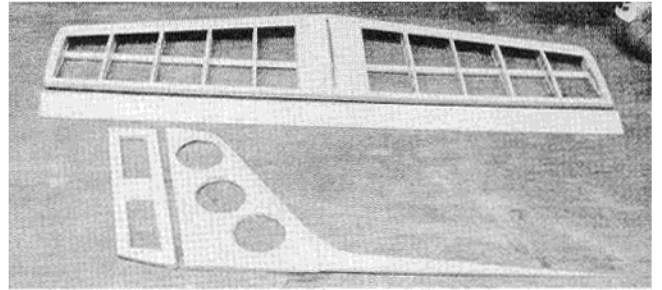
Fuselage being built in an RCM fuselage jig (Feb. 1972).



Fuselage removed from jig and ready for additional planking.



Top sheeting being added to fuselage — note nylon ties along with pins used to secure balsa to basic frame.



Tail group completed — stab also uses foam ribs with balsa cap strips.

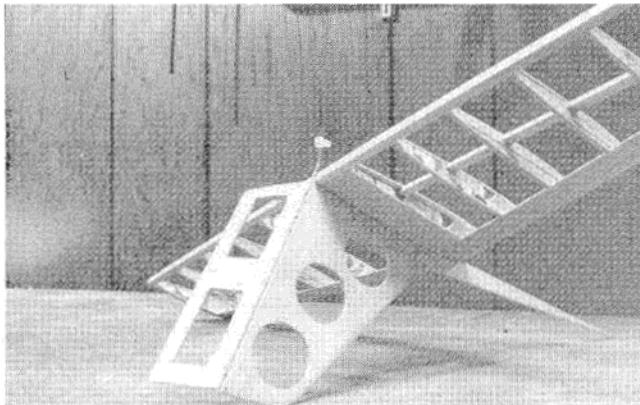
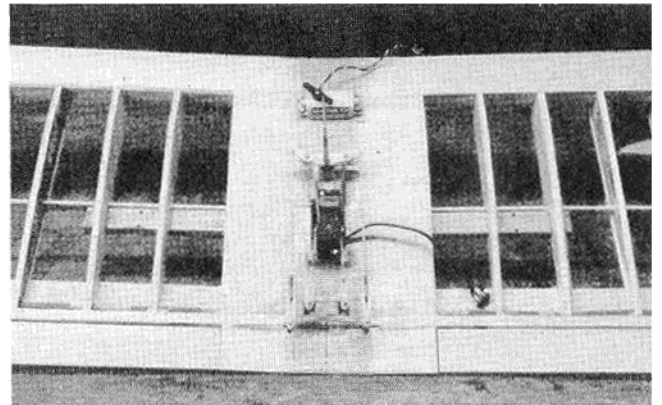
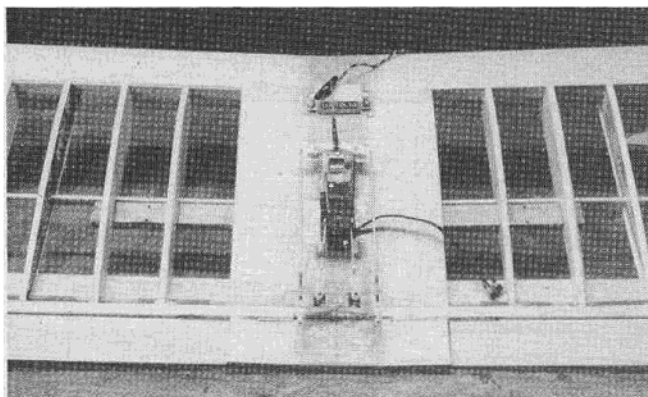


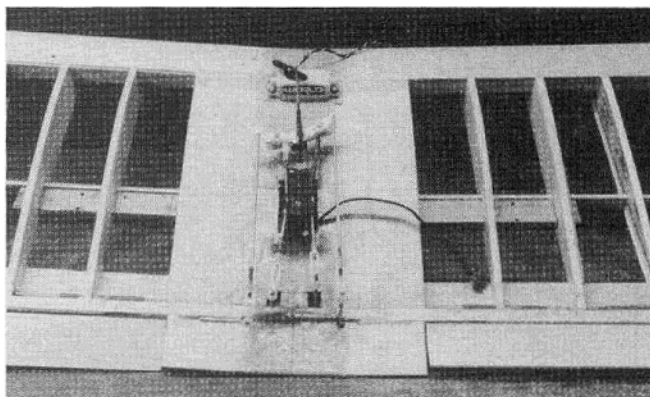
Photo shows rudder control horn.



This installation was on second version. This differs from plans. Sketch shown in text for this set up. Flaps are in up position.



This shows linkage position when flaps are down.



Linkage shown in right turn with right flaperon in up and left in down.

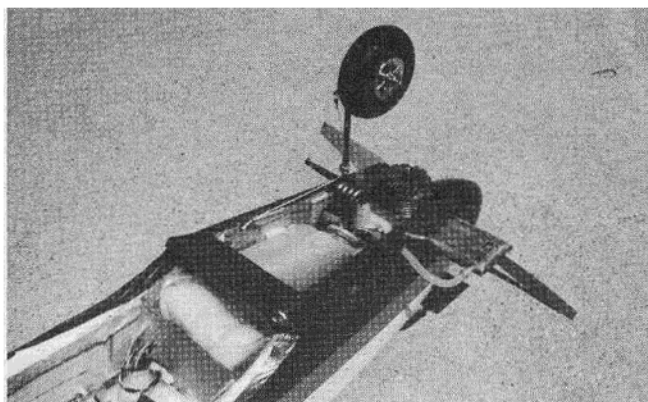
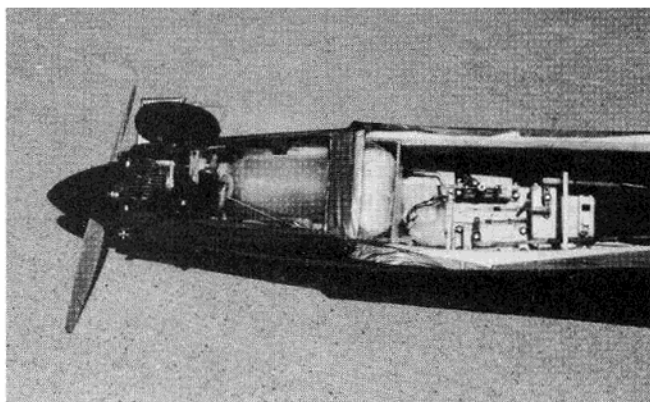


Photo showing tank hatch removed for easy access to tank and nose gear — note nose wheel brake cable.



Ample room for most any servos — designer did a very neat installation.

When I built the original version I owned only a 4 channel radio, so I tied down the rudder (which I had never learned to use anyway), and used the fourth channel for the flaperons. Nosewheel steering was accomplished via the aileron servo, with the nosegear mounted on a forward extension of the wing.

Construction

Build the wing panels over the plans and let the glue dry. Note that the center portions of ribs 1 and 2 have been cut out. These should be inserted after the wings have been joined and the dihedral braces are in place. Be sure to use 1/16" capstrips if you use foam ribs. These add strength and act as heat sinks, allowing the use of iron-on coverings. The ribs on the plans have been undercut for 1/16" wood all around.

Cut out the fuselage panels and 1/16" plywood doublers. The doublers go from the nose back (F1) to former F3. Score the insides of the doublers lengthwise, in the area from former F2 to former F1. The plywood must be able to follow the contour of the nose, which matches that of a 2½" spinner. Using contact cement, glue the fuselage doublers in place, remembering to make a left side and a

right side.

Make former F1 from three pieces of 1/8" balsa laminated together. This former will be slightly oversized, and must be tapered and custom fitted to the curve of the fuselage. Former F2, the firewall, is made from 1/4" plywood. The remaining formers are cut from 1/8" plywood, and 1/8" lite ply.

A fuselage jig comes in very handy when building this fuselage, because of the curves. Use 5-minute epoxy to glue the balsa sheeting to the formers. Start by gluing the bottom halves of formers F4 and F5 to the side panels. Formers F6 through F9 come next, followed by F1, F2, and F3. The fuselage side may split when you wrap it around former F1 but that's what plastic balsa and micro-balloons are for. I found that a plastic wire tie makes a perfect gluing clamp for former F1. Glue the top stringer in place. As you sheet the top and bottom of the fuselage, first soak each piece and form to the required shape. Again, plastic wire ties come in handy here. Incidentally, to remove the wire ties, grasp the clamp end near the clamp with long nose pliers and push toward the clamp. The top nose sheeting should be installed at this time. Use a

soft balsa block to form the front windshield. Make a hatch for the fuel tank area. Leave the rear end of the fuselage open. The elevator link can be routed straight out the back, and the receiver antenna can be threaded inside the fuselage and attached near the rear end.

Stabilizer construction is straightforward. Build it on the plans. I used foam ribs and capstrips here also, except the two center ribs which were made from 1/8" balsa. Cut the fin and rudder from 3/16" sheet balsa. Taper the leading edge of the fin and trailing edge of the rudder, then cut out the optional lightening holes as indicated if so desired. The circular holes in the fin can be made very easily with a hole saw of the variety that fits in an electric drill. First make a hole for the guide bit, then insert the hole saw and turn clockwise, by hand. The rudder linkage can be brought out under the elevator if desired. Use a threaded link bent like a strip aileron linkage.

Aileron — Flaperon Linkage:

The plane has been flying for over a year now and the aileron-flaperon linkage has proven itself; it has had no failures. I did make one mistake which I will warn you about. I used clevises

at the bellcranks. Don't do it! I banged the wing against my car door once and popped one of those clevises. That meant major surgery on my Coverite to reconnect the clevis.

The principle of operation is fairly simple: an aileron bellcrank is mounted on a flap bellcrank. When the flap bellcrank is operated as shown, the rest position of the flaperon changes. The aileron bellcrank will function normally regardless of the rest position of the flaperon. It is, however, easier said than done. The next few paragraphs describe some important points to consider when using this mechanism.

The flap servo should be put on an auxiliary channel that has a trim tab type actuator. Flap servo throw must be limited so that the additional motion transmitted to the flaperon by the aileron servo will not bind off the flaperon.

The position of the aileron linkage is important. The bellcrank end of the aileron servo link must be free to move laterally and should be positioned so that operation of the flap bellcrank causes the link to move through its "straight" position as indicated. This reduces any differential effects when the flap servo is operated.

Standard servo arms will work fine for strip ailerons. For the split aileron-flaperon arrangement shown here, a special hook-up is required to accept the extra links at the aileron servo. Trace the motion from the aileron servo to both ailerons and you will see that all links must be connected to the same side of the servo. I used a bi-level servo arm. An alternative is to make a special link.

The aileron/flaperon linkage shown on the plans works fine and was used in the original Prancer. I decided to use torque rods on a new model and came up with the linkage shown in the photos and accompanying diagram. Note the use of an extension spring from the mixer leverage to the aileron servo. This serves to bias out any sloppiness in the levers. The spring selected must be heavy enough to serve this purpose. The spring does not

have to be connected to the servo; this was merely a convenient place to hook it. The long torque rods to the outboard ailerons were made by cutting a strip aileron linkage and extending it by soldering the ends into a length of 1/8" brass tubing. Before soldering the aileron end of the linkage, insert the brass tubing into some scrap outer nyrod tubing and position the linkage in the wing. Although there is room for a bigger one, a 6 ounce tank is sufficient for a .35 engine. When the fuel tank is positioned correctly, it should be pretty close to the bottom of the fuselage. If you place the tank too high, fuel will siphon into the engine. Because the engine is inverted, a third tube is more convenient to vent the tank while filling. I ran this tube through the firewall and angled it down toward the bottom of the plane. The tube must be capped when flying, so make a cap out of a short length of fuel line tubing by closing one end. To fill the tank, I open the vent line (plane inverted for filling and starting) and fill through the line that attaches to the muffler fitting.

Note that the main landing gear is located about 3" behind the Center of Gravity. This is intentional, and causes no rotation problems. The location of the gear and the nose-down attitude assumed, due to the shorter nosegear, allows much smoother landings and controlled take-offs.

The flap action should be no more than 30°. This plane will fly very slowly without the flaps down and too much flap action could cause a stall on a slow approach. I suggest putting the flaps down as soon as you start your final approach. Don't wait until you are over the runway or you may get a surprise! If the plane is going too fast, flaps down will act exactly like up elevator.

The flying weight of the first model is 6 lbs. The plane is covered with Coverite and finished with K & B Super Pox. I finished the second plane with MonoKote, not so much to reduce weight, but to test the foam ribs with a lighter weight covering. I had the occasion to give the MonoKote wing a good test on my first day out. I lost the engine on a high approach and tried to go around again. Unfortunately, I had left the flaps down and the plane tip stalled on my final turn. My two-point landing (wing tip and nose cone) caused the wing to pop off intact, with the wing blocks. The flying weight of the MonoKote covered model was 5 lbs. and this proved to be too light. I have since added some lead for ballast because the plane bounced around too much in the wind. Be careful when

setting up the incidence of the stabilizer. The curves of the fuselage will deceive you. Both models flew straight from the start, but had a tendency to climb.

If you intend to use the rudder, make sure you have plenty of throw on it. It is quite inefficient due to its position out of the prop blast. It's great for flat turns, but will not roll the plane. □

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