



DRAGON

This is not a Curtiss XP-55,
but you may call it an ascender

By Alfred Neuhaus

When they see the Dragon for the first time, most people ask which direction it flies. Comments about this unusual model are enjoyable to listen to, but best of all is watching it perform in the air. If anyone wants to bet it won't fly, take them up on it as it does fly and very well at that.

The design credit really belongs to the early aviation pioneers who thought the birds were ignorant and believed that the proper place for the pitch control was at the front of the flying machine. If set up properly, this does afford some advantage, such as preventing violent stalls as we have come to know and love



DRAGON

Designed By : Alfred Neuhaus

TYPE AIRCRAFT

Sport

WINGSPAN

50 Inches

WING CHORD

10½ Inches

TOTAL WING AREA

525 Square Inches

WING LOCATION

Shoulder Wing

AIRFOIL

Symmetrical

WING PLANFORM

Double Taper Swept Back

DIHEDRAL, EACH TIP

None

OVERALL FUSELAGE LENGTH

42 Inches

RADIO COMPARTMENT AREA

(L) 16½" x (W) 2¼" x (H) 2½"

CANARD SPAN

24 Inches

CANARD CHORD (incl. elev.)

4¾ Inches

CANARD AREA

114 Square Inches

CANARD AIRFOIL SECTION

Flat

CANARD LOCATION

Front Of Fuselage

VERTICAL FIN HEIGHT

4¾ Inches

VERTICAL FIN WIDTH (incl. rud.)

11 Inches

REC. ENGINE SIZE

.35-.46 Cubic Inch

FUEL TANK SIZE

6 Ounce

LANDING GEAR

Tricycle

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., All.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Spruce
Empennage	Balsa
Wt. Ready-To-Fly	90 Ounces
Wing Loading	24.7 Oz./Sq. Ft.

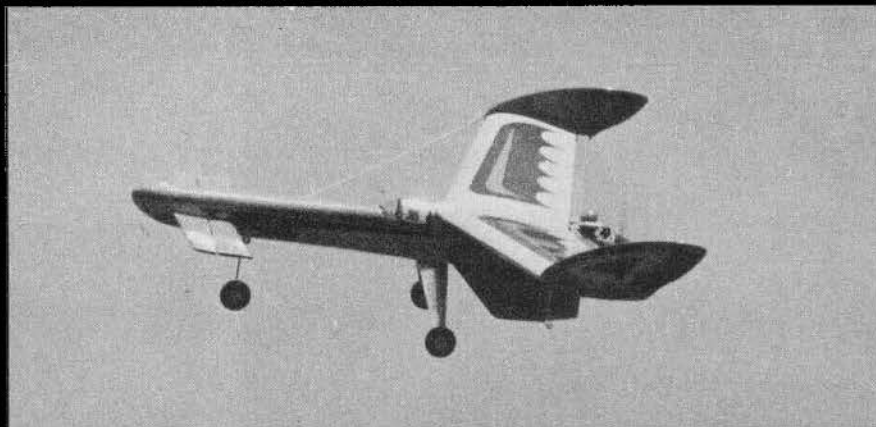
them as part of the tail aft type of configuration. With four degrees positive angle of attack of the canard surface, it will stall before the wing, and drops to a lesser angle and continues flying. Of course the wing will continue to provide lift through this cycle. If the aircraft is placed in a steep climb attitude it can be forced into a stalled condition, but makes a rapid recovery. In level flight with power off, if up elevator is fed in gradually, the attitude of the plane becomes alternating nose high, to level, in a gentle bobbing motion. Aileron and rudder controls remain effective.

Landings may be made with full back elevator and the descent rate adjusted with the throttle, causing the Dragon to appear like a Navy aircraft carrier coming home. If the speed is kept higher a more normal landing is easily done as the pitch and directional control is very positive.

Hanging the engine at the back end was done for several reasons, such as, the airplane stays clean --- after flying just wipe the prop off. Also the prop does not get broken or gets to eat things that you may taxi into.

Construction is conventional and either a foam or balsa built-up wing can be utilized. If your choice is foam, use the tip and root rib patterns for the core templates, and remember to set up for the proper sweepback angle. The wing is built with no wash-out.

Fuselage construction can start by cutting the bulkheads and other pieces



first to make assembly proceed quickly. Select two medium hard 1/4" x 3" balsa sheets, true one edge, and trim to 2 1/4" wide and 32 5/8" long. Cut the lower edge fore and aft as shown by small black triangles on the side view. Shape and add the wing saddle parts, using Zap to attach them. Place the sides on top of each other and make sure they are alike, then mark the locations of the bulkheads across both at once to make sure they will assemble squarely.

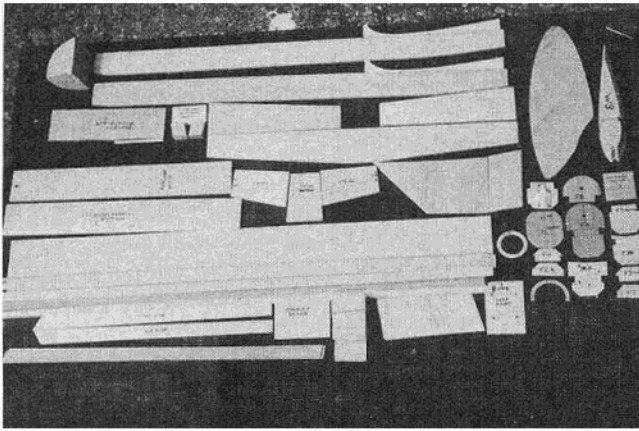
Using Titbond glue, pin the triangular stock and the 3/16" x 1/2" longerons to the sides. I hope you remembered to make one right and one left side. After the glue has dried you can glue bulkheads F10, F5, F2a and F2 in place on one side, using a small square to check that they are truly perpendicular to the side. When these are dry, glue the

other side to these bulkheads and set aside. Now grab the ply bulkheads and put the blind nuts in F11 and attach the nose gear bearing to F3. Place the ply bulkheads in the correct places and epoxy well. After installing the blind nuts in the landing gear plate it should be epoxied to the fuselage, and follow up by covering the rest of the bottom with 1/4" balsa as per the plans.

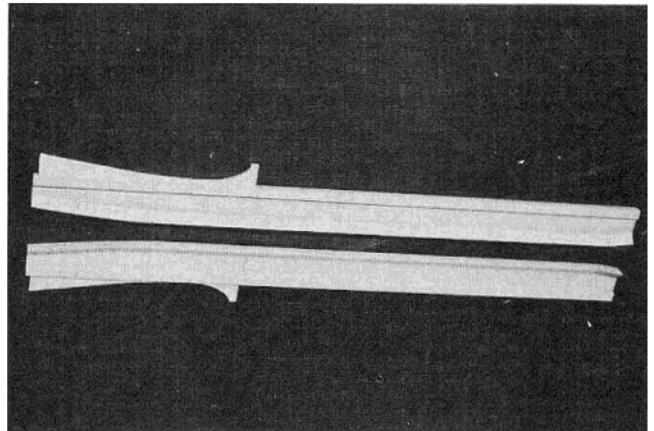
Note that where the curvature of the bottom is pronounced, a short section is covered with 1/4" sheet with the grain across the fuselage aft of F1. A series of kerfs (shallow cross-cuts made with a Zona saw) likewise help the 1/2" triangular stock corner pieces and the 1/4" bottom sheeting assume the proper curve between F10 and F11.

Pre-shape the nose blocks and tack glue together, then glue them to the ply

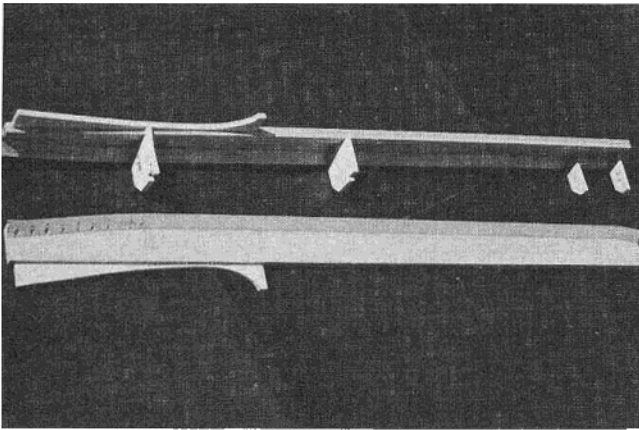




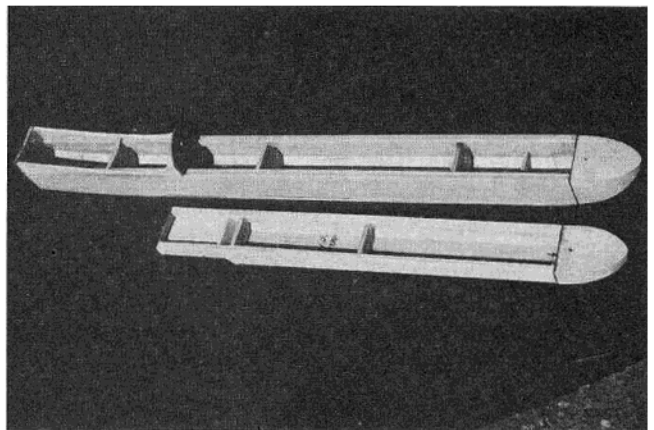
Excellent way to start – cut a complete parts kit and label parts.



Fuselage sides with top doubler and lower triangle stock glued in place – note reference lines for bulkheads.



Fuselage assembly is started by addition of four bulkheads.



Completed fuselage and top hatch in the rough stage.

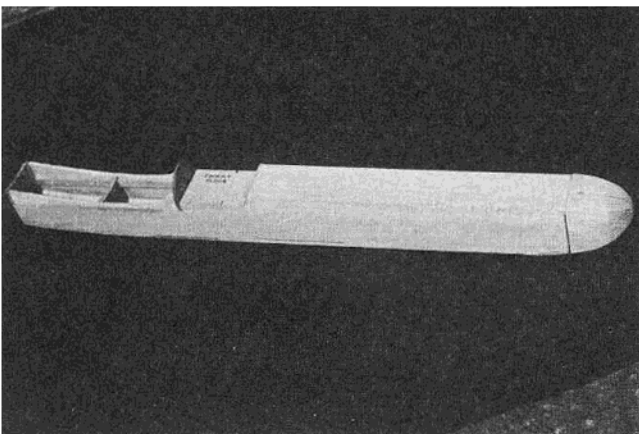
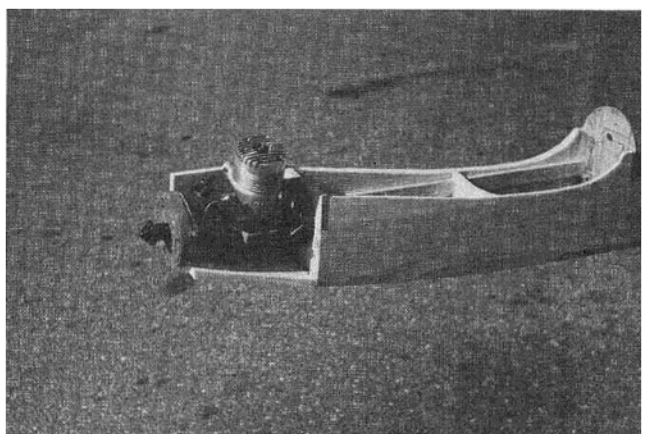


Photo shows fuselage with hatch in place.



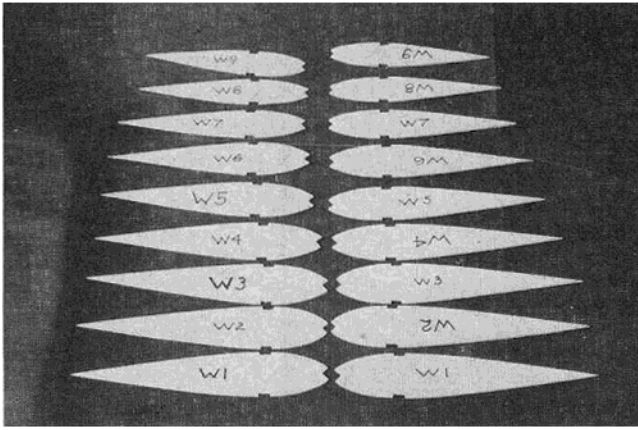
K & B .40 installed in tail of fuselage. Cowl blocks are being installed. Note rear portion of Goldberg spinner used for guide.

bulkhead F1. Hatch construction starts by pinning the top bulkheads in place and fitting the top sheet to them. Remove this sheet and attach the triangular stock in place, then glue this top sheet assembly to the bulkheads. When the top is dry, fit the side sheets (cut as per the small black diamonds). Attach the 3/16" x 1/2" longerons to the

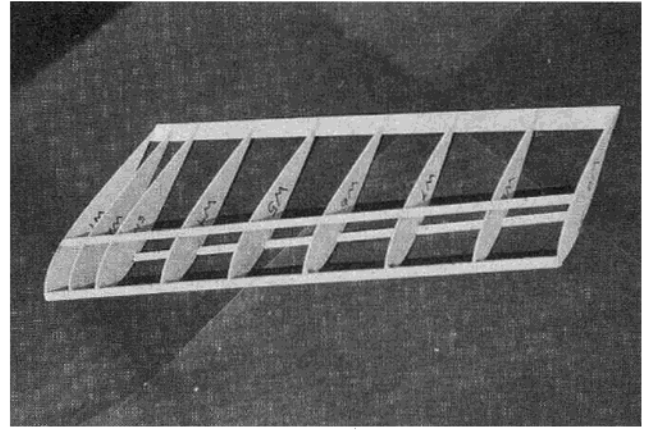
sides and then glue the sides to the top triangular stock and the bulkheads. Do not forget to plan ahead for removal of this top later. A little glue to hold things together now, and after it is apart more glue can be added as needed. Add the instrument panel after the cockpit floor has been glued in place.

Mount the engine either vertical or at

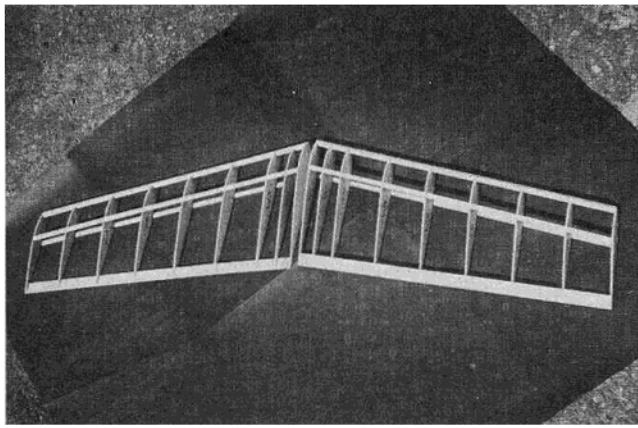
the angle shown if a muffler is to be used. Even if your flying site does not require a muffler, it would still be a good idea to use one as the trend toward keeping the noise down will help to retain the flying sites. With the engine temporarily in place, spot glue a 1/16" ply ship ring to the back of the spinner plate and tack glue ply bulkhead F12 to



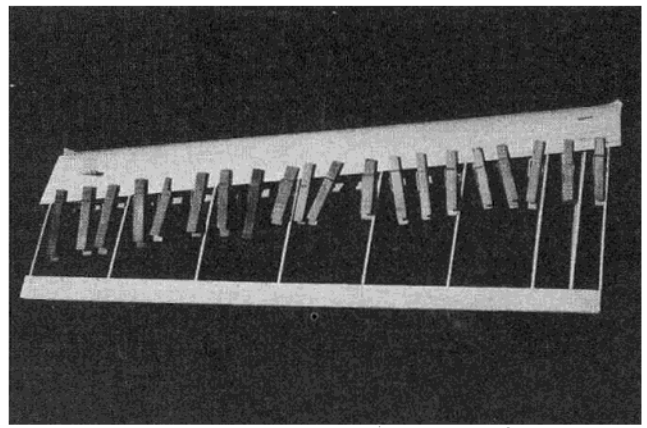
Complete set of wing ribs for both wing panels.



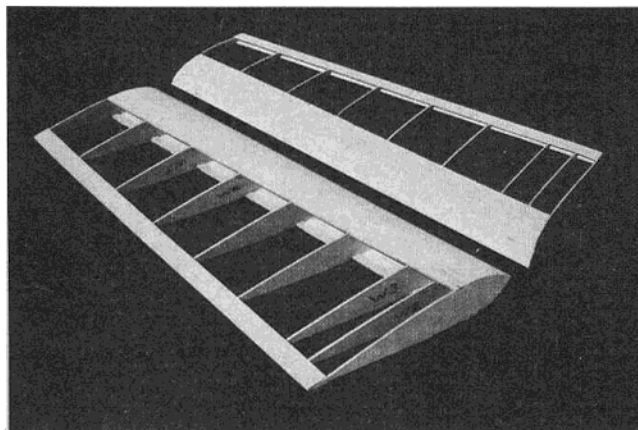
Initial wing panel construction. Panel is built flat on board with a 1/4" x 1/2" shim strip under trailing edge of ribs.



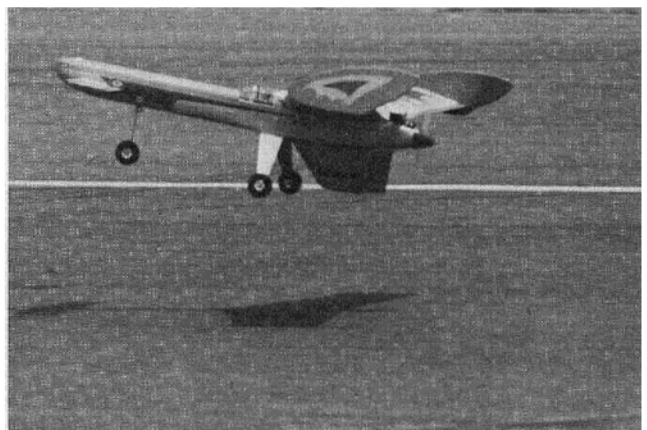
Basic wing panels completed prior to adding the leading edge sheeting.



Leading edge sheeting is taped at front and held down at spar with clothespins.



Leading and trailing edge sheeting completed. Next steps are joining panels and cap strips.



A very impressive sight as our "Dragon" lifts off headed for the open sky.

this, thus positioning F12 for constructing the engine cowling.

To build the cowling, start by fitting the bottom plate between F11 and F12, then the side pieces. Epoxy these parts to the bulkheads and each other. Pass a razor blade between the spinner backplate and F12 and remove the engine. Add the triangular stock to the lower corners

inside the cowl and give the area a coat of epoxy to seal it from engine oils. Carve and sand the fuselage assembly to the oval shape as shown in the cross section views. I found that a small wood plane made fast work of rounding off the corners.

Add the canopy frame F7 and the 3/32" dowel brace. Paint the inside of

the cockpit black, add a pilot figure, and some instrument panel detail if you are so inclined. Install the top glass, then the windshield, using Zap to hold the plastic in place. A bead of epoxy was used to neatly seal and secure the seams of the enclosure.

The fuel tank brass tubes should be

formed from soft stock with no kinks, and the complete tank fitted into the fuselage. Modify a large metal Fox bellcrank as shown and assemble it to the ply mount plate. Trim open the slots in the fuselage to allow the ears to protrude, and mount the bellcrank plate with epoxy. The slots should be trimmed later when it can be determined exactly how large they need to be as determined by the maximum control throws, including trim lever setting at the extremes.

Now for the canard, or if you wish, elevator. Cut the slot and trial fit the 1/4" sheet surface in place, making certain it is true with the fuselage both horizontally and at right angles when viewed from the top. Remove the surface, place the elevator control horn in the slot and place the canard back in the slot. Epoxy the canard in place by putting epoxy along the inner edges and forward edge. Do not worry about gluing the surface to the bulkheads underneath as it will be a simple matter to remove a damaged surface later, if needed, by using a hot soldering iron to remove the hardened epoxy and sliding out the broken part. Fit the elevators to the wire horn and hinges. Fit and epoxy the fin to the bottom of the fuselage, and assemble the rudder and rudder shaft with epoxy then fit this assembly to the fin.

Mount the servos and set up the pushrods, using the plans for the general arrangement. The receiver and the battery can be placed as shown, and ballast added later to bring the Center of Gravity to a spot 3/4" forward of bulkhead F9.

Wing construction can start with the left panel. If you have the room on your workbench to build the whole wing, do so. Pin a 1/4" x 1/2" spacer strip to the board at the trailing edge in the position shown on the plan, then pin the lower spar to the board. A 1/16" x 1" strip is pinned to the top of the trailing edge spacer, and the ribs fitted and pinned in place. Some trimming of the notches and front end of the ribs will be needed to match the sweep angle. Fit and pin the top spar and leading edge in position making sure the ribs are vertical except for the root rib which is tilted slightly toward the tip. The dihedral jig makes this easy to set up (the "V" cut is just to identify the top, so you won't use the jig upside down). Now open up the windows and start applying the Zap or Hot Stuff to all the joints. Once the framework has been firmed up, reinforce the joints further through the use of Titebond or similar glue. Use enough glue so that a small fillet shows at each joint, at least before it dries (and virtually disappears).

Construction of the right wing panel is similar to that described above, except that when you are about to cement or

glue W1 in place, there won't be room for the dihedral jig this time. Leave a 1/16" gap between the tops of the W1 ribs. This is necessary so that in the final assembly stages you will be able to join the panels in a "zero dihedral" condition. (When viewed directly from the front or rear, no anhedral or dihedral should be apparent.) To put it another way, if you sight along the span, the leading edge or trailing edge should line up straight across the entire span. Early versions of the Dragon had 4° dihedral, but the new "flat" wing allows better inverted stability and improved axial rolls. The rate of climb has improved too.

When the wing panels are dry, pin the trailing edge to a flat surface and glue on the other side of the trailing edge 1/16" sheet. While the wing is pinned down, install the leading edge sheet by using masking tape to hold the sheet to the leading edge, then laying it back, applying Titebond at contact points and laying the sheet back on the ribs. Use clothespins to hold the sheet to the spar until the glue is dry. Be sure to mount and trim the filler blocks between the W1 and W2 ribs where the rear wing hold-down hole will be drilled later. After these blocks have been sanded flush with the ribs, the center section sheeting and the tip bays can be sheeted also. Allow sufficient time for the glue to dry, then turn the wing over and glue the spar webbing between the W1, W2, and W3 ribs. The remainder of sheeting can be glued on at this stage. When all is dry, trim the leading edge sheets flush with the aft edge of the spar and install the rest of the vertically grained webbing. Capstrip ribs W4 to W7.

Sand the panels to the proper contour. Cut out a groove to lay the 1/4" dowel into rib W1 so that the dowel lays half into each root rib, then epoxy the dowel to one rib. When this has set, check to see that the dowel keys the wing panels accurately, with no twist. If you are happy with the alignment, epoxy the panels together. Apply the 4" nylon tape with epoxy to strengthen the center section. Drill out the 1/4" hole for the wing mounting screw.

Cover the tip plates and mark them where they will be in contact with the wing, then carefully cut that covering away. Fit the ailerons but don't install them until the the wing and ailerons have been covered. Small vent holes should be drilled in each rib and closed section so that changes in air pressure will not cause the covering material to buldge and change the flight characteristics. Remember to make a vent hole in the underside of the center of the wing. Cover the wing and ailerons and install the ailerons, and tip plates.

Trial fit the completed wing to the fuselage and trim the wing saddle to align the wing horizontally, checking also to have an equal distance from a

point at the nose centerline to each wing tip. Secure the fitted wing in position with tape and drill through the mounting hole made earlier, using a #10 drill. Remove the wing and thread the maple hold-down block 1/4-20 for the nylon hold-down screw.

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The maple hold-down block should be secured with a liberal application of epoxy. Cover the fuselage and control surfaces and assemble. Put the wing on and, with the controls set in neutral, fabricate the aileron pushrods to fit from the bellcrank to the aileron horns, with the servo centered. Adjust the control throws as follows: Elevators; 3/4" up, 3/4" down. Rudder; 1/2" left, 1/2" right. Ailerons; 3/16" up, 3/16" down. Install the main and nose landing gear and wheels, and take some pictures.

Let's go fly it. Ground handling is similar to most trike gear airplanes. Taxi out, line up and apply throttle to the firewall. The take-off roll will be short and straight, using rudder to maintain track and a bit of back stick to rotate the nose up. After a comfortable amount of altitude has been gained, trim out the ship to fly hands off at reduced power. Try an aileron roll from a slightly nose up position, then use rudder and aileron together for a fast rate of roll. Loops, inverted flight, and the rest of the sport flying maneuvers are fun to do with this strange looking machine, while listening to the "I'll be darned, it flies!" comments in the back of you. In the air, the Dragon takes a little getting used to, as one's senses seem to say that it is going the wrong way. Try slow flight at altitude to get the feel for the descent rate at different power settings. The speed range is quite wide, in that at full power in level flight the Dragon moves across the sky like a UFO, which to many people it just might be, yet it will hang in the air like a kite when it is flown into a moderate headwind.

If something that looks different and flies different appeals to you, go ahead and have a Dragon for your personal pet. □

From RCModeler May 1979