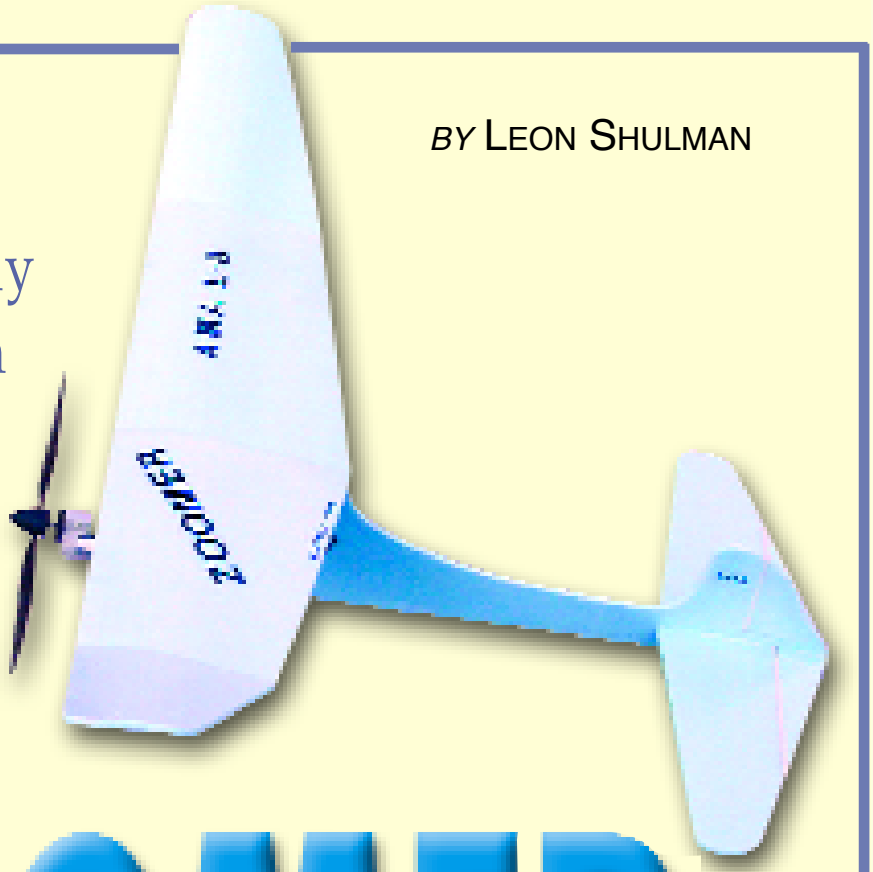
# A legendary modeler's equally legendary design translates into a peppy RC electric foam aircraft

*BY* LEON SHULMAN




# ZOOMER


**Leon looks happy with the results of the foam Zoomer's test flights.**

**"DESIGNED TO CLIMB"** was the title of an article that *Air Trails* magazine published in 1945. It introduced the Zoomer to the FF modeling community as an evolution of several FF designs of that era.

As an ardent FFer and designer I wanted to get the optimum performance from my models. As an active competitor I studied the competition and knew that besides consistent performance I needed a clean, aerodynamic design that would enable my aircraft to climb as quickly as possible with the allowable motor run.

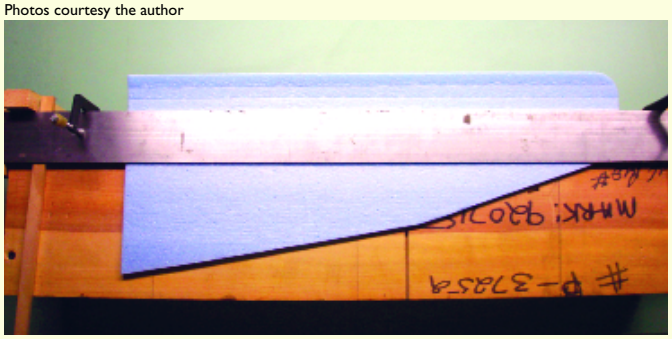
This model design embraced the minimum wing area allowed for the engine size that was used, with the lightest possible weight. I designed the Zoomer in two sizes: a 60-inch wingspan for class B and small class C engines (although several were flown with .60-size engines) and a 36-inch wingspan for the smaller .19 class A engines. Both sizes proved to be successful and won most of the contests in which they were entered.

The Zoomer's fuselage structure was radical and followed that of my previous design: the Banshee. It was simple, light, strong, and easy to assemble and repair when necessary. It allowed for easy covering with smooth, flowing lines.

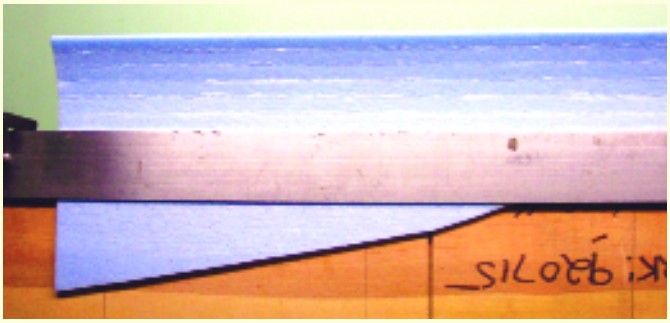
**The Zoomer climbs out after making a flyby for the camera. This model will be available as an RTF from Polk's Hobby.**

Incorporating a single-wheel landing gear with two subrudders on the horizontal stabilizer, the Zoomer allowed quick takeoffs and smooth landings with minimum drag. Quick access to the ignition units and batteries was designed into the

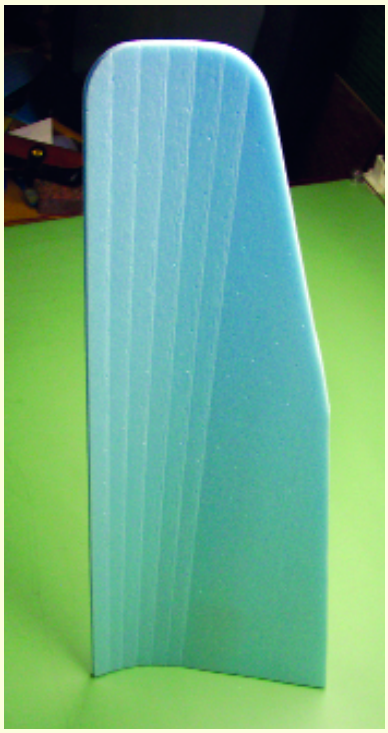
Photos courtesy the author



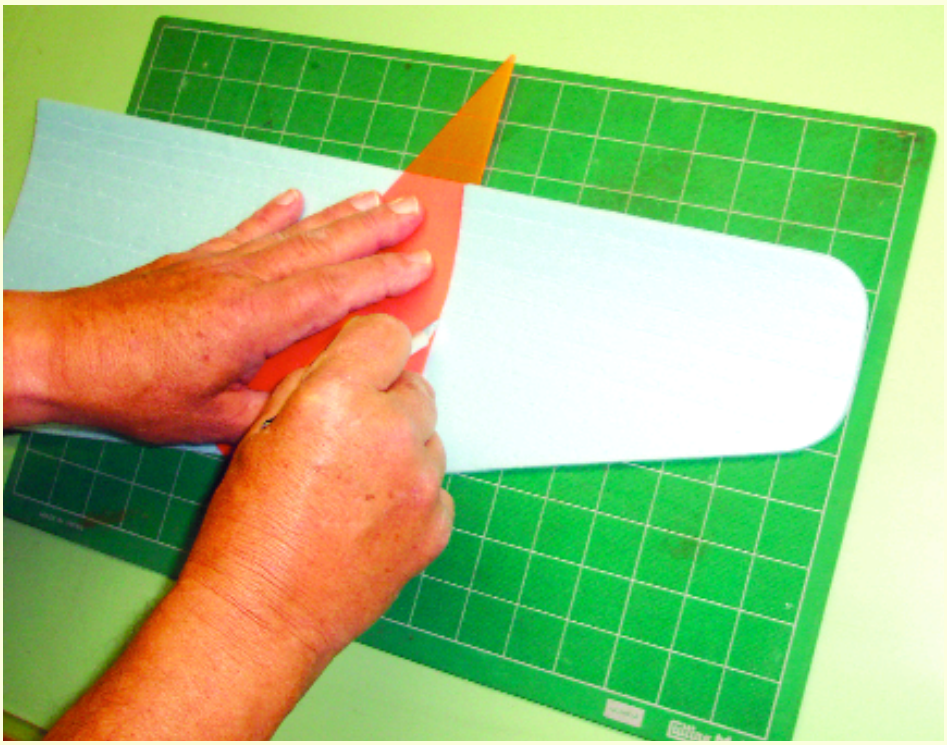
The process for producing the airfoil shape for the wing begins with making spanwise impressions using a straightedge.



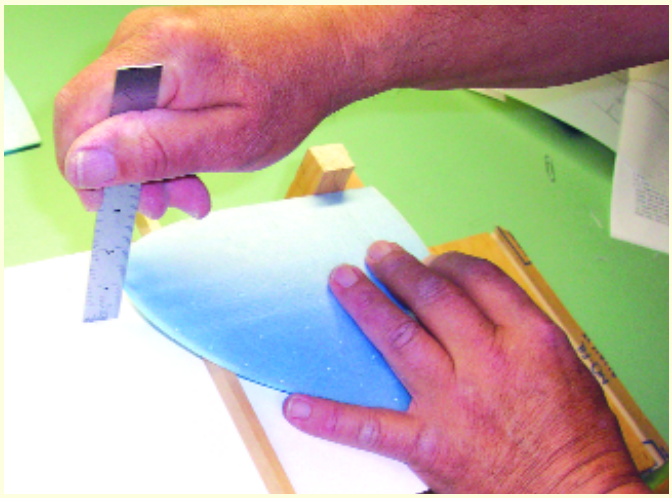
Six creases at 1/2-inch intervals complete the wing airfoil. This is a simple process to learn.



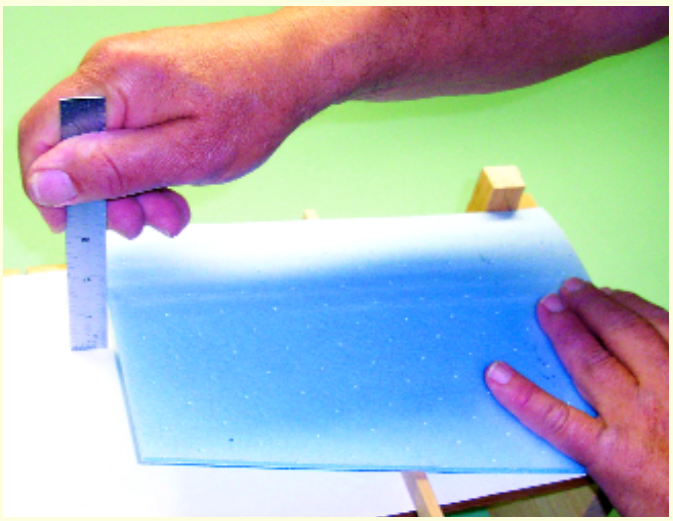
This view shows the creases and the resulting airfoil shape.



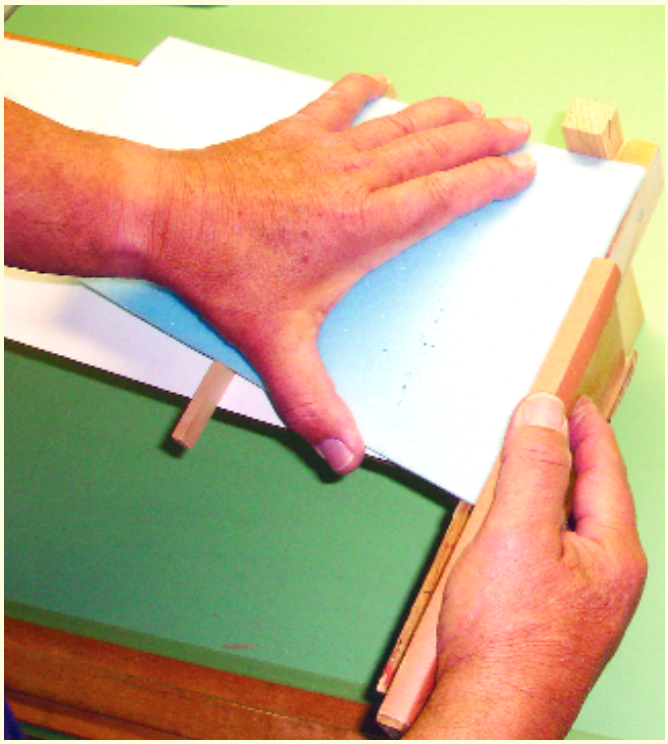
Leon uses a #11 X-Acto blade to cut each wing half for the polyhedral break.



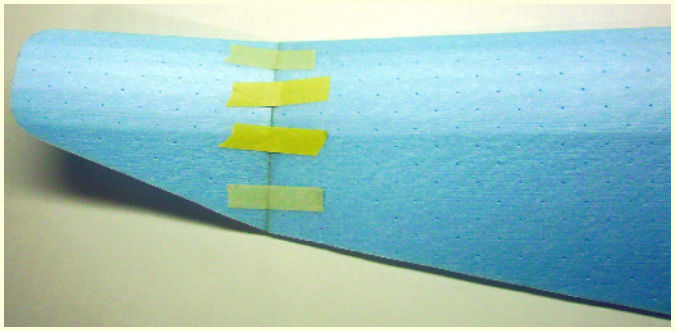
Measure, raise, and support the tip 1 5/8 inches above the table for proper wingtip polyhedral, and then sand the center joint using 320-grit sandpaper.



In a similar manner, raise and support the inner wing panel at the polyhedral joint 1 3/8 inches, and sand for proper angle.



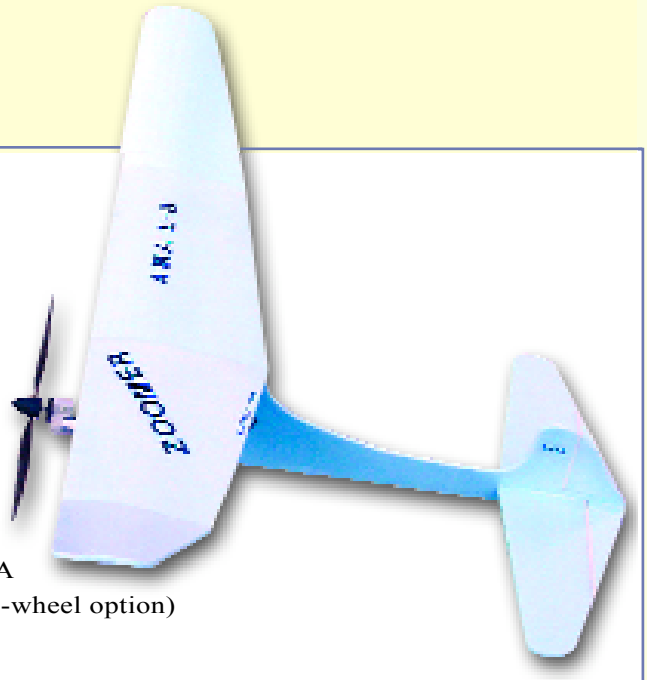
A detailed shot of typical sanding required for the wing dihedral angles.



Each wing dihedral angle can be glued with epoxy and secured with masking tape until the glue cures.

Leon as a World War II pilot with his original Zoomer FF model.

# ZOOMER




**Type:** Foam RC (converted FF)
**Wingspan:** 38.5 inches
**Wing chord:** 7.5 inches
**Total wing area:** 223 square inches
**Dihedral, each tip:** 5.625 inches
**Overall fuselage length:** 25 inches
**Stabilizer span:** 19 inches
**Stabilizer chord (including elevator):** 5.75 inches
**Stabilizer area:** 72 square inches
**Motor:** AXI brushless 2208/34
**Battery requirement:** Li-Poly, two-cell, 700-1350 mA
**Landing gear:** 1/16-inch-diameter wire—single leg (two-wheel option)
**Recommended number of channels:** Three
**Control functions:** Rudder, elevator, throttle
**Elevator throws:** 1/2 inch up, 1/2 inch down
**Rudder throw:** 3/4 inch left and right
**Side thrust:** 0°
**Downthrust/Upthrust:** 0°
**Basic materials used in construction:** 1/4-inch Dow BlueCor fan-fold foam
**Ready-to-fly weight:** 9 ounces
**Wing loading:** 5.77 ounces per square foot

structure with a simple hatch on the bottom of the fuselage. The motor was faired into the fuselage, incorporating a spinner that smoothed the airflow around the nose of the aircraft and made for a clean appearance.

A two-blade folding propeller was used to reduce the frontal drag when the motor was shut down. The wing and tail used low-drag airfoils with simple straight tapered surfaces that gave a pleasing yet efficient outline.

To enable such an FF model to have a steep climbing attitude, most designs used downthrust, which, although effective, created extra drag. I built all this *into* the design by using a symmetrical airfoil on the horizontal stabilizer set at a *positive* angle, which equaled the necessary downthrust that would be used.

The wing incidence was also set at a positive angle so that the wing and stabilizer would work in unison to equal the usually needed downthrust. The engine was placed *straight in-line* within the nose, giving *no* downthrust appearance. The fuselage would travel at a more normal attitude with the airflow, thus reducing its drag.

I learned this firsthand when piloting the full-scale Martin B-26 Marauders. I had flown most versions of this tremendously powerful aircraft when the design change was made to improve its flight characteristics. Increasing the wingspan by 6 feet and adding slight dihedral made the airplane easier to fly and enabled it to fly at a more *horizontal* attitude. This allowed it to fly faster with the same power settings.

I also noticed that the B-26's fuselage (when observed by flying in formation with another aircraft) would be more *horizontal* than the earlier models with the smaller wing, instead of looking like it was always climbing with its nose high. This change in fuselage attitude (at cruising settings) *added* several miles per hour to its flight airspeed.

When translated into a model design, the same extra efficiency would enable the Zoomer to climb faster than most models—and it did!

At one event the Zoomer was calculated to have climbed 1,500 feet in 30 seconds, which translates to 3,000 feet per minute—a hefty performance! The model even incorporated a small trimmable rudder for easier flight trim.

The design was popular, and it was produced in kit form in both sizes. Tens of thousands were produced and sold.

With the advent of electricity—thanks to Benjamin Franklin with his kite, Guglielmo Marconi with his radio, and a great number of ingenious fellow modelers—we can now fly these FF designs with an added advantage of controlling their flight paths with radio control.

We went several steps further with the Zoomer and used the latest technology of Li-Poly batteries, rotary brushless motors with miniaturized receivers, and servos for controls. We even used the latest in sheet foam board technology in this design.

It has been developed to have a high level of efficiency, low cost, and an easy-to-assemble structure by my good friend Frank Pisano, who collaborated with me on this article.

## CONSTRUCTION

The construction is simple. We used 1/4-inch Dow BlueCor fan-fold foam, although any comparable material can be substituted. You can find the BlueCor at Lowe's home supply or similar stores.

The cost of the foam you actually need is approximately $2, for less than one of the 24 fan-fold sheets that come in the package. So please let this encourage you to make this enjoyable step and build and fly this Zoomer. You can make more than two dozen from one package of foam! (If you have some friends you want to fun-fly with, make several models at once.)

The plans show the wingspan to be 38.5 inches with a wing area of 223 square inches. This was scaled down from the original size so the complete model would weigh approximately 9 ounces with a two-cell, 700-1350 mA Li-Poly battery and a typical rotary brushless motor: a Hobby Lobby AXI 2208/34, Hacker A20-22L, or equivalent.

The wing loading comes out to 5.77 ounces per square foot, making for a sprightly performing model that will climb for high altitude yet glide graciously. We tried several models with different sizes and weights, and we found this to be optimum. With a 15-second motor run, this Zoomer will climb almost out of site.

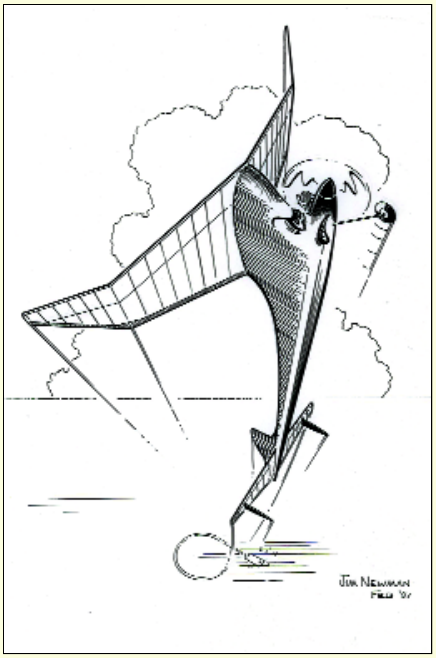
The Zoomer can be flown at any local field/park since it is quiet and can make tight turns to keep it within viewing distance. This is unlike the other foamies that hover around endlessly between crashes and have become almost indistinguishable.

The Zoomer will give you a thrill that will make your friends envious of its flight consistency and ease of control. Remember that this is basically an FF design, and *you* will be piloting it around the skies. It will *not* get you into trouble; it can fly itself!

We urge you to color the underside of your model's wingtips so you can see it easily when you are flying it in the "wild blue yonder." The bright-colored wing undersurface can save an airplane.

We suggest bright (neon or fluorescent) orange for excellent visibility. We use Fluorescent Orange Solartrim trim sheets since the material is self-adhesive, light, and easy to apply. Using it only on the bottom of the wingtips provides enough visibility. And don't forget to put your name and telephone number on your Zoomer—for when you may let it zoom up and out of sight.

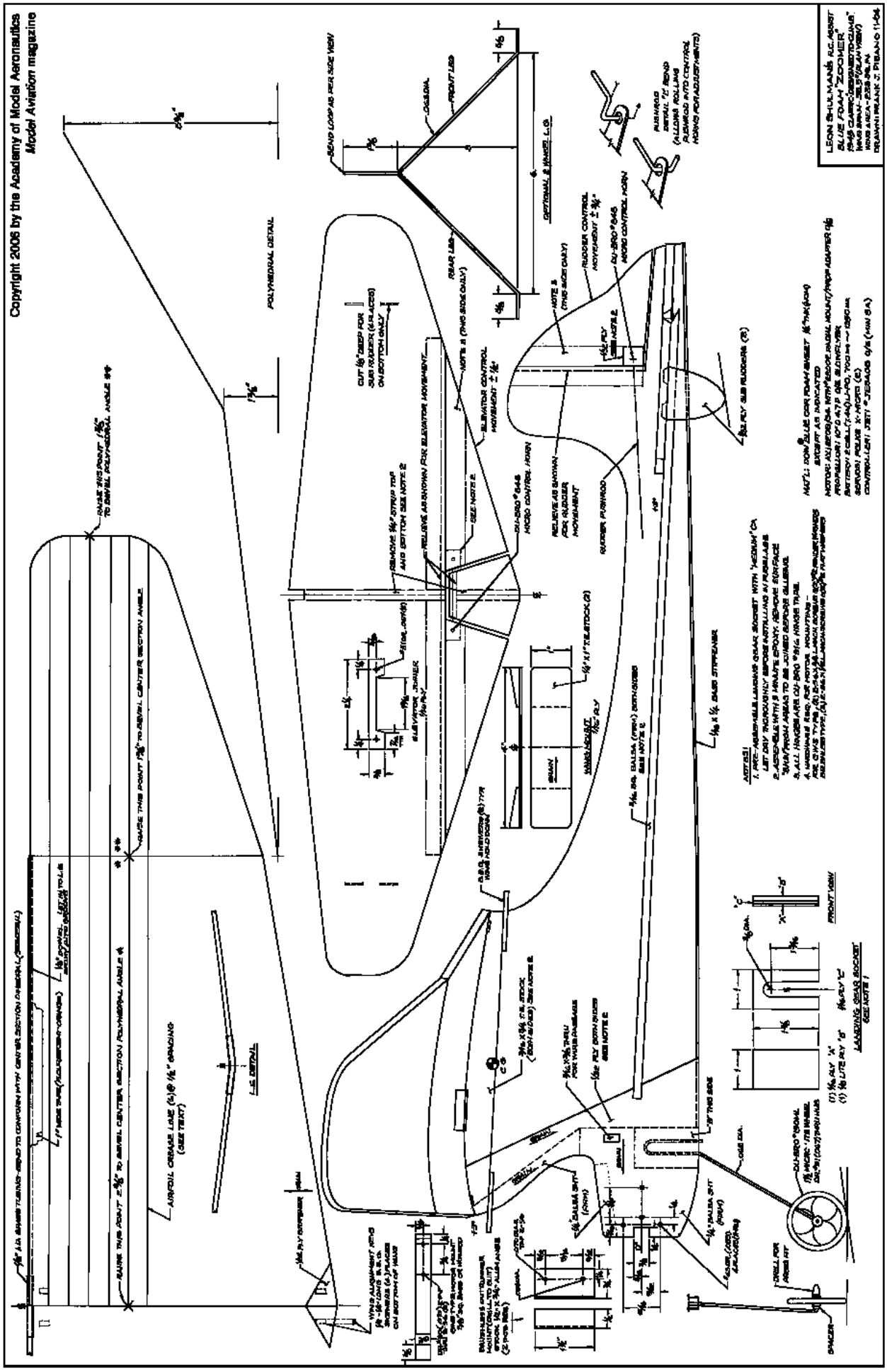
This model has been flown indoors several times, using low to medium throttle settings. It is stable and makes graceful




**These airplanes are RC foam replicas of models that Leon designed from 1936 through 1946. All are electric powered! They are similar in construction to the Zoomer.**

**Left: Famed aviation artist Jim Newman drew this caricature of Leon's original Zoomer on a paper napkin during a lunch break between flight sessions.**

See page 183 for Full-Size Plans listing



turns. This aircraft is *not* designed to loop or do rolls; enjoy the thrill of its spectacular climb and transition into a gentle flat glide, and then aim it to land right at your feet. The Zoomer will do it. Try this until you become proficient enough to enjoy doing it consistently.

Flights of 15-45 minutes are normal, and longer flights are possible when there is lift out there—even off of a treeline at your park. Be careful with warm air; the Zoomer really zooms.

This version of the model features a removable wing held in place with rubber bands for ease of transportation and damage resistance. The plans show the full-size model with notes on its construction.

Basic tools and materials to be used are a knife; a sandpaper block; cyanoacrylate; five-minute epoxy; masking tape; 1/32, 1/16, and 1/8 plywood; a couple strips of 1/16 x 1/4 basswood or hard balsa; and 1/16-inch-diameter wire for the landing gear. You can purchase strips of basswood at your local hobby shop or neighborhood art-and-craft store.

We show the original single-wheel landing gear and an optional two-wheel gear. All the parts are shown on the plans with necessary fittings and wheel(s).

We even show an optional simple motor beam mounting feature, which will enable you to substitute a lower-cost brushed motor and controller—at a small sacrifice of a minor weight increase. You can then enjoy comparable performance at a lower cost.

Start by cutting all parts to shape. Cut and assemble the landing-gear socket first using cyanoacrylate. *When employing epoxy to assemble any parts of the Zoomer, apply it sparingly to minimize weight.* Bevel 1/8 inch from the bottom edges of the horizontal stabilizer and one side of the vertical fin.

Add basswood stiffeners to each control surface with a light coat of epoxy. Use clear packing tape for the hinges, on both sides of the movable surfaces.

Place stabilizer and elevator surfaces flat on a bench (with the bevel gap on the bottom) with a 1/32 inch wire or dowel between surfaces to create a gap of 1/32 inch. Press hinge tape in place over both surfaces.

Remove the wire/dowel and then fold both surfaces in the *opposite* direction to apply a second piece of tape to complete the hinge. Press and rub the tape firmly to secure it. Use the same process for the vertical control surfaces before gluing the horizontal surfaces in place.

Cut the wing panels to size and make the wing halves, airfoil shape, and dihedral as shown in the accompanying photos. Crease the foam wing panels, as shown, in six 1/2-inch increments to make this novel airfoil. This process makes an efficient wing with light weight and tremendous strength. The photo sequence will walk you through the wing assembly.

The plans show a new feature that makes the wing stronger and less prone to minor scrapes with foliage and/or rough handling. A short piece of 1/8-inch-inside-diameter brass (or aluminum) tubing and two skewers imbedded and epoxied into the LE add considerable strength and airfoil efficiency to the Zoomer wing. Four keys locate the wing position for consistent performance settings.

You can use masking tape to hold all parts together while the epoxy sets. Do one assembly at a time as the epoxy dries. All incidence and motor-thrust settings are built in. The photographs show the location of the motor, controller, battery, servos, etc.

The receiver, motor controller, and battery are held to the fuselage with Du-Bro Hook and Loop Mounting Material (product 348). The servos are mounted with Du-Bro Double Sided Tape (product 634).

We used Du-Bro Micro Control Horns (product 848) and the Micro Push Rod System (product 847) to connect to our two Polk's Hobby small X-Micro servos. We used our Polk's Seeker 6 dual-conversion, 1/2-ounce receiver because of its light weight, small size, and phenomenal range.

This completes our installation. Servos should be set to allow 3/4-inch rudder throw and 1/2-inch elevator throw. Locate components as shown in the photos. The balance point, although noncritical, should be approximately 50% back from the wing LE.

The original model used the Hobby Lobby AXI 2208/34 motor and Jeti 8-amp


controller or Castle Creations Phoenix-10 controller with an APC 10 x 4.7 Slow Flyer propeller for amazing performance. Several newer motors have become available since then and can easily be adapted to the Zoomer because of the flexibility and simplicity of its design.

For a lower-cost power package we used a GWS 350C-C gearing brushed motor and Castle Creations Pixie-20 controller with the same APC 10 x 4.7 Slow Flyer propeller. We built and flew both versions. There isn't a great difference in performance between the two power units, but the brushless package is sprightlier with slightly less weight.

Bench-test everything before taking the model out to fly. Make sure the control surfaces are set properly and that the Zoomer balances at the suggested position.

This design has an "automatic pilot" designed into it and will fly by itself, but avoid severe gusts, which can cause damage because of the aircraft's light weight. Upon launching, the Zoomer will *zoom* up in a fast climb and rotate by itself as it spirals upward.

Use gentle control input under power since the Zoomer *really will fly by itself*. In a glide it can make tight turns because of its inherent stability, and landing at your feet will be a common happening!

**Keep 'em flying!** *MA*

*Leon Shulman*
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