

# Pvt. Kool's Bipe

by Charles  
Mackey



**It's cute, isn't it? The rounded surfaces and the semiscale paint scheme give this foamie a great deal of character.**

**I AM HAVING** so much fun and am so excited about this new 3-D foamie that not to share it with you would almost be a sin. The new foam 3-D airplanes have been life-altering for me and they may be for you. At the very least they will improve your flying skills and be a great deal of fun.

Can a model-airplane experience really change your life? You bet! Following are instances when it has happened to me.

1) In 1945 a single loop could win any CL contest in the state of Illinois. I learned to fly consecutive loops and inverted at roughly the same time, and I was so elated that I became a modeler for life.

2) I attended the 1947 Nationals and was so impressed with J.C. Yates flying his Orwick-powered Madman that he became my lifelong hero and inspired me to later write the book *Pioneers of Control Line Flying* (available from AMA). That year I *had* to become a model-airplane designer.

3) My wife Phyllis and I attended the 1999 Tournament of Champions (TOC) in Las Vegas, Nevada. We were overwhelmed with emotion when we saw Christophe Paysant-Le Roux of France fly his Freestyle segment. It was perfectly timed to beautiful music, and the flying was slow and graceful. The airplane seemed to defy the laws of aerodynamics and gravity.

We didn't care if anyone saw the tears run down our cheeks. My life was changed when I saw 3-D flying.

I am often asked, "What is 3-D flying?" My response is that it is "flying on the prop" with the wing and tail in a stalled condition. This requires the static thrust to be approximately twice the weight of the airplane. Experienced pilots maintain control with the airflow from the propeller over the control surfaces.

However, there's a problem! TOC-type airplanes cost thousands—not hundreds—of dollars. They require special transportation, assembly and

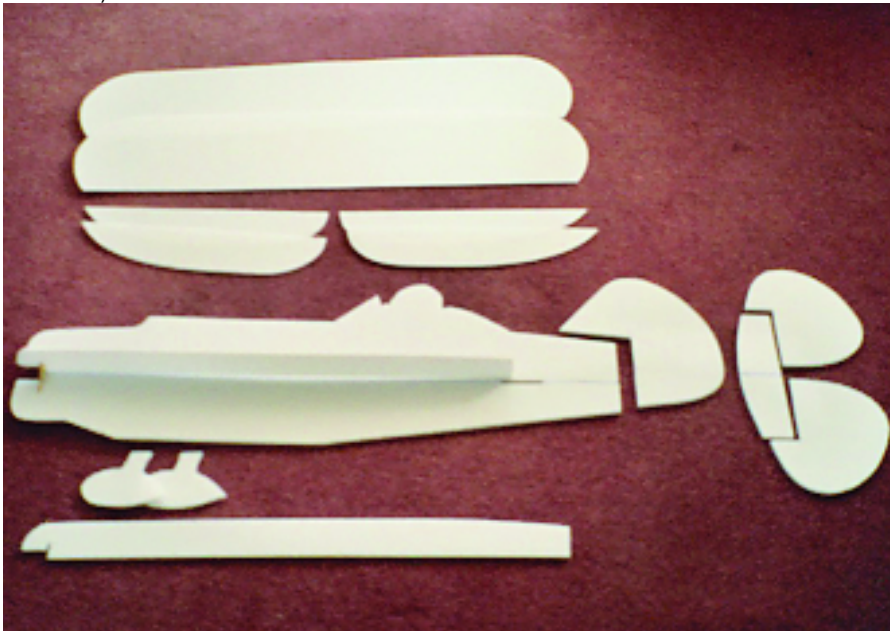
disassembly, a flying site with liberal regulations, and potential liability considerations.

The learning curve certainly requires the expense of a few airplanes. Smaller cu. in.-displacement 3-D airplanes alleviate the problem, but they don't come close to solving it. You can't pull one of these models out of your vehicle to fly a demonstration for your friends during your lunch hour. What do you do?

Help is here, and it comes in the form of brushless outrunner motors, Li-Poly batteries, foam, and carbon fiber. These items make 3-D flying available to everyone.

You may have seen a 3-D aircraft, and now I want you to try one. It can change your life. If you don't like to build from scratch, you can find many great airplanes at hobby shops, in magazines, or online.

Pvt. Kool's Bipe is a crowd pleaser. I have designed several hundred models in my life, but I have never experienced anything like the response to this airplane. Requests for plans come before



**Make paper patterns of all the airplane's Depron parts and transfer them to the foam. Cut the parts to shape using a #11 knife blade.**

modelers see it fly; after they see it fly their requests change to near demands.

I do all my flying outdoors, so you don't have to worry about a little wind with this model. The wind must be considered when the airplane is on the ground. Use your high power-to-weight ratio to keep the nose into the wind on takeoff and landing. Don't try to taxi with a side wind!

### CONSTRUCTION

Make paper patterns of all the Depron parts and transfer them to the foam. Cut the parts to shape using a #11 knife blade.

Use epoxy or foam-safe cyanoacrylate glue to attach the 1mm x 3mm carbon-fiber strips to the LE and TE of both wings. Hold the carbon fiber in place with masking tape until the glue dries.

Hinge the flap/ailerons to the wings as

shown on the plans, and then seal the bottom side of the wing hinge joint with clear packing tape or colored trim tape. Glue the elevator sides to the carbon-fiber tube (or you may substitute a wooden dowel).

Attach the nylon pin hinges to the elevator and rudder. Put a drop of 3-in-One oil inside the pin-hinge area, cover the outside with a thin coat of Vaseline, and epoxy in place.

It is much easier to paint all the parts before final assembly. I use 4-ounce bottles of acrylic paint from Wal-Mart. I thin the paint with water and apply it with a soft watercolor brush. Experiment with paint mix on a scrap piece of Depron. Keep the finish as thin as possible to maintain the brightness of the white foam.

Do you want a 3-D paint job for your 3-D airplane? It is not necessary, but it is fun. A 3-D paint job makes a flat surface look like it has depth; it is achieved by lightening the surfaces exposed to light and darkening the bottom that receives less light.

Paint the entire fuselage with thinned blue acrylic paint and allow it to dry.

Lighten the top edges with white acrylic and fade it toward the bottom edge. The entire fade-in section should be no wider than 1/2 inch. You can blend it in with a brush or use your finger to rub the wet paint down. Practicing on a scrap piece of Depron will be a big help.

Paint the bottom edge black approximately one-quarter of the way up toward the top. You can fade it in with

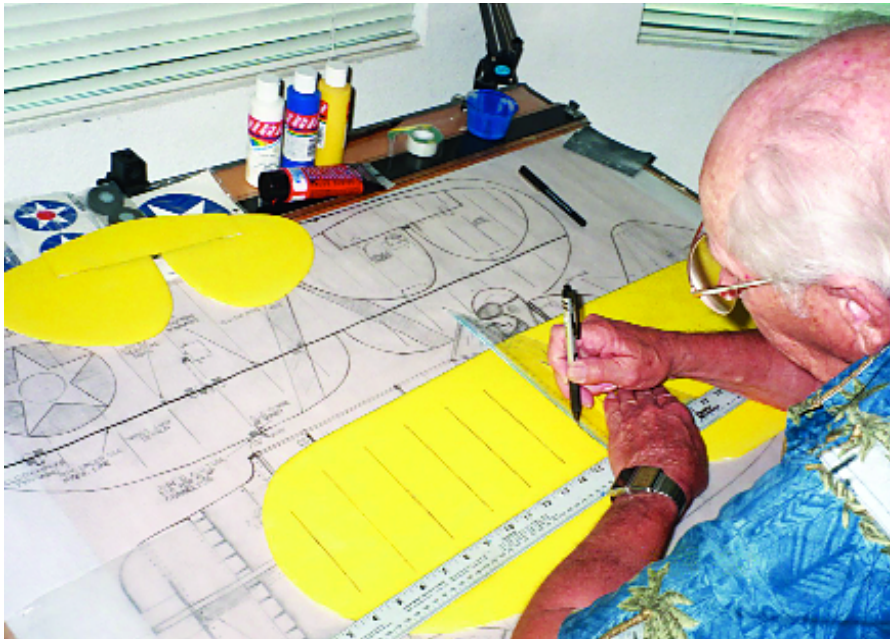


**Use epoxy or foam-safe cyanoacrylate to attach 1mm x 3mm carbon-fiber strips to both wings' LE and TE. Hold the carbon fiber in place with masking tape until the glue dries.**



**Paint all parts with acrylic paints (available at craft stores) before final assembly. Thin the paint with water and apply with a soft watercolor brush.**





The text outlines a method of applying paint and details that give your model a three-dimensional appearance without adding much weight.

your finger, or sometimes a wet brush will help. When the paint is dry, you can add the seam lines and rivets with a gel-type ballpoint pen—the kind that is recommended for writing checks.

To get a 3-D paint job on the wings, stabilizer, and elevator, start by lightly drawing the rib lines with a pencil. Don't use a gel pen; it will smear. Paint the top surface of both wings with thinned yellow acrylic and allow the paint to dry. You should be able to see the pencil lines through the paint.

Mix a bit of white with the base color, yellow in this case, and paint a line roughly  $\frac{3}{8}$  inch wide on the right side of the pencil line. While the paint is still wet, blend it in to the right with your finger. Do this to all the rib lines and allow the paint to dry.

Mix a tiny amount of black to a batch of yellow, and paint a line  $\frac{3}{8}$  inch wide on the left side of the rib line; blend it in to the left. Repeat on all the rib lines until you are finished.

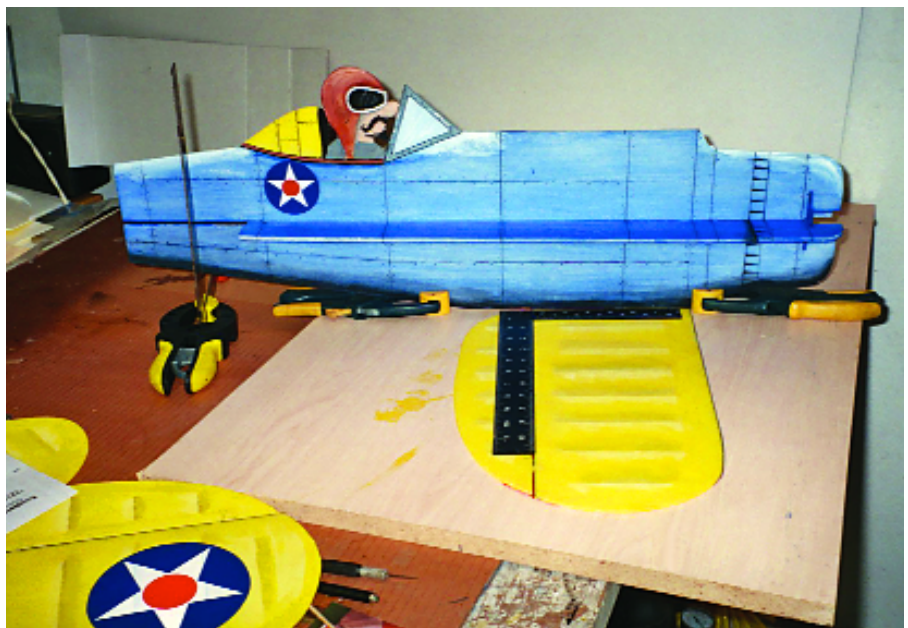
Don't be surprised if someone touches the rib line to see if the depth is there. I've had it happen with Pvt. Kool's Bipe.

**Final Assembly:** I normally use epoxy, but I have had good results with Gorilla Glue, white glue, and foam-safe cyanoacrylate. You will need a flat work surface for assembly.

Glue the fuselage to the wing. Check the alignment with a square and allow the glue to dry.

To position the top wing correctly you will need two cardboard spacers—cut to the same height as the fuselage at the wing joint approximately 11 inches long.

Place the spacers on the bottom wing 6 inches from the tips. Glue the top wing to the fuselage, add weights to the top wing, check alignment with a square, and allow the glue to dry. Hang the wing LE slightly over the flat surface and add the carbon-fiber braces to the wing LE. Bind the landing gear in place with soft wire or thread. Do the same on all carbon-fiber rods, epoxy, and allow the glue to dry. Turn the airplane upside down, hang the pilot over the edge of the flat surface,



Begin the bipe's assembly by gluing the lower wing to the fuselage and carefully checking the alignment with a square. Notice the fuselage supports.

replace your braces, check alignment, and add the carbon-fiber rods to the wing TE.

Complete the assembly by adding wheel pants and the tail section. The receiver, battery, and controller are held in place with Velcro.

The CG shown on the plans and the following control settings will give you enough control to turn the airplane in its own length or fly large Aerobatics-type maneuvers. Wait for a calm day or test-fly indoors.

**Controls:** Control horns are made from large plastic tie wraps or  $\frac{1}{16}$  plywood. The .032-inch-diameter pushrod for the elevator and rudder *require* bracing to get the full push effect. Remember to keep the hole in the control horns directly over the hinge pivot point.

My control settings are: elevator high rates, + and  $-50^\circ$  with 75% expediential; elevator low rates, + and  $-22^\circ$  with 50% expediential; aileron high rates, + and  $-32^\circ$  with 75% expediential; aileron low rates, + and  $-25^\circ$  with 50% expediential; and rudder, + and  $-40^\circ$  with 50% expediential.

I use flaperons with high-rate elevators set at + and  $-38^\circ$ . On low rate elevator flaperons are set at + and  $-25^\circ$ . The extreme right aileron is coupled to  $10^\circ$  right rudder. The same is true of the left aileron setting.

This is to help the airplane fly normally, even with extreme amounts of side area. If you don't have coupling on your radio, be prepared to turn using the rudder.

**Motors:** The first power plant I tested was a PJS 550R with a 3S1P, 1500 mAh

Li-Poly pack, and it worked fine. To test the lower end on power I tried an AXI 2208/34 motor with a 3S1P, 820 mAh Li-Poly battery and was surprised to see it hover well with this smaller power plant.

The next motor I tested was a PJS 1000 with a 3S1P, 1500 mAh battery pack. It did fine. However, you must remember not to use full throttle and stick with a smaller propeller, such as a 10 x 4.7 APC Slow Flyer. The AXI 2212/34 or the Hacker A20-20L is perfect for this airplane.

**Caution to Experimenters** (My Kind of People): The new buzzword in 3-D flying is Side Force Generators, or SFG. My first experiments with SFG were in 1954 on a 1/2A CL Precision Aerobatics model. I wanted to keep the control lines tight on overhead maneuvers. It worked great, and I still have the photos.

Before the new trend of SFG started and even before the first Electric TOC, I had been experimenting with a 600-square-inch foam biplane that had a total side area of slightly more than 400 square inches. I almost lost it on a test flight. It would not turn with the ailerons and elevator the way you normally turn a model, but would flip on its side and ignore my control inputs. The only way to turn the airplane was with the rudder.

I began looking for the perfect amount of SFG and believed I had found it with a 40-inch-wingspan Scale profile Grumman Wildcat. I was elated with the newfound ability to perform knife-edge loops.

Then I discovered that all my airplanes would do knife-edge loops. I just needed more confidence and stick time. Be prepared to use the rudder if you experiment with SFG, or your airplane could be in the ground before you know what happened.

**When I was young** I could not have imagined shopping for an airplane and watching a flight demonstration on a computer screen. No way could I have dreamed of learning to fly on a computer. That tells me young people today are in for even greater things than they can imagine. What a wonderful time to be alive. Enjoy!

Following are outstanding sources I have found to be extremely customer friendly.

Charger RC  
Box 460144  
Escondido CA 92046  
(760) 749-0552  
[www.chargerrc.com](http://www.chargerrc.com)

Depron USA  
(206) 789-4800  
[www.depronusa.com](http://www.depronusa.com)

Hobby Lobby International, Inc.  
5614 Franklin Pike Cir.  
Brentwood TN 37027  
(615) 373-1444  
[www.hobby-lobby.com](http://www.hobby-lobby.com) **MA**

*Charles Mackey  
cpbmackey@aol.com*



**To correctly position the top wing, you need two cardboard spacers cut to the same height as the fuselage at the wing joint. Place the spacers on the bottom wing 6 inches from the tips.**



**The semielliptical wing shape and the rounded tail planform can easily be seen.**





Notice the 6mm Depron fuselage sidepieces that torsionally stiffen the assembly and add some shape.

## Pvt. Kool's BiPe

**Type:** 3-D indoor or outdoor flyer  
**Skill level:** Average to expert  
**Wingspan:** 31 inches  
**Wing area:** 560 square inches  
**Length:** 36 inches  
**Weight:** 14.5-17.0 ounces  
**Wing loading:** 3.7-4.4 ounces per square foot  
**Motor:** PJS 3-D 550R or Hacker A20-20L  
**Battery:** Tanic 3S1P, 1500 mAh Li-Poly  
**Duration:** Five minutes of hard 3-D flying; more than 15 minutes of slow flying  
**Controller:** Phoenix-25  
**Propeller:** APC 10 x 4.7 Slow Flyer  
**Radio:** Computer with flaperon mixing  
**Servos:** Four Hitec HS-55s  
**Receiver:** Hitec Electron 6  
**Construction material:** 6mm Depron, 3mm Depron, carbon fiber, aircraft plywood, .062 music wire  
**Paint:** Artist's acrylic from Wal-Mart



What's more fun than one Pvt. Kool's BiPe? Two! Can you imagine these models hovering or Torque Rolling in tight "military" formation?

