BY CLARK SALISBURY

SkyEye Pusher

A sport flyer with built-in First-Person View!

SPECIFICATIONS

Wingspan: 69 in.
Length: 53 in.
Wing area: 1,198.875 sq. in.
Weight: 4 lb., 5 oz.
Wing loading: 8.29 oz./sq. ft.
Power req'd: 25-size brushless motor
Radio req'd: 3-channel (rudder, elevator, Throttle)

GEAR USED

Radio: Spektrum DX6 w/ 4-channel reciever (spektrumrc.com); Hitec HS85BB servos (hitecrcd.com)
Motor: E-flite Power 25 (e-fliterc.com) w/ Castle Creations 52-amp speed control (castlecreations.com)
Battery: E-flite 2100mAh 11.1V LiPo
Propeller: Master Airscrew 11x5.5 2-blade (masterairscrew.com)

Fourteen years ago, my original SkyCrawler design was published in *Model Aviation*. At that time, neither LiPo batteries nor brushless outrunner motors were available, and video cameras were still pretty big and bulky. As these technologies developed and affordable versions became available, I decided to update my old SkyCrawler. With a name change and a switch to a pusher propeller configuration, the SkyEye was configured to accept a video camera in the nose. For the power system, I use a brushless outrunner motor and 3-cell LiPo battery pack. I also enlarged the original design 150 percent for two reasons. First, it would be easier to see from the ground, and second, it could carry the additional weight of two cameras. Even without cameras aboard, the SkyEye is a fun plane and can take off and land easily from any grass field.

LET'S GET STARTED

The first step is to cut out all of the pieces for the entire airplane. As noted on the plans, some of the parts require several of the same parts to be built and you can do this by stacking the balsa or light ply sheets together and then cutting them out as noted. The same goes for the light ply fuselage sides. Tack-glue the fuselage sides together (with the bowed sides of the pieces facing each other) so you can build a symmetrical fuselage. I use a glue stick to adhere the paper patterns from the plans to the wood.

The tail feathers are glued and pinned together while flat on the building board (I use a piece of drywall) and are then left to dry. Be sure to protect your plans with some wax paper so the pieces don't stick to the paper. When the pieces have dried, remove them from the building board and slot the edges for the hinges. I use a small cut-off wheel on my Dremel tool to do this. Test-fit the hinges into the slots but don't glue them in place until after covering.

WING HALVES

You can build both wing halves together, but I show one side being assembled at a time. Pin down the dowel leading edge, then carefully glue the front part of each rib to the leading edge. As you go along, be sure you glue in the plywood wing strut support plates. Next, glue the trailing edge in place. Now glue in the balsa gussets and the diagonal ribs in place. Note that the center rear section of the trailing edge has to be notched.

Glue the wingtips in place and then sand to match the profile of tip rib. If you want to install LED lights for night flying, install them with the balsa strips as shown. Solder the wires in place and hold them in with little dabs of epoxy, about every 6 inches. Let the epoxy dry. After the lights have been glued to all of the ribs, be sure to test the battery connection make sure that the LEDs do light up before installing them. Install the 4-40 blind nuts in the relief hole in the plywood strut support piece before you glue it in place as they will be impossible to install later.

The wing halves are glued together with the dihedral joiners. Note that on the trailing edge, a dihedral stiffener has also been added. Pin

one wing panel to the building board, and make sure both wing panels touch each other at the leading and trailing edges as well as the balsa LED light mount strips. Now, block up the other wing tip 5.5 inches for a total of 20 degrees dihedral. I did this with two old VHS tapes and allowed the glue to dry. Next, glue in the four plywood center mounting plates, the rear dihedral joiners, and the dihedral joiner doubler.

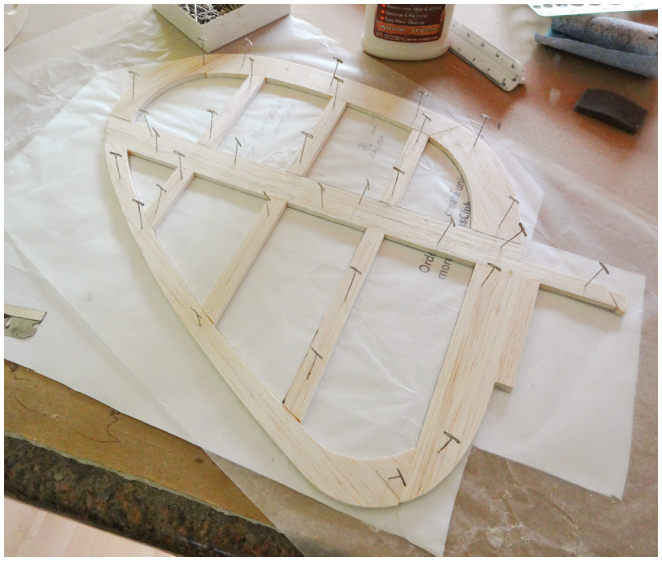
FUSELAGE

A couple of subassemblies should be glued together before starting the fuselage. The oak wing mounts should be glued to F2, and F3 and to F5. Note: They are slightly V-shaped as they come together. Now glue formers F2 and F3 to the fuselage side panels, then pin the fuselage side panels to the building board and tape the rear fuselage ends together to keep the entire assembly straight. Glue F4 in place as well as the battery mount. Find out which side of the wing is the heavy side, and glue in the battery mount so that the big battery will be on the opposite side of the fuselage. When the bottom pieces have dried, glue in place parts F5 and F6 at the rear of the fuselage.

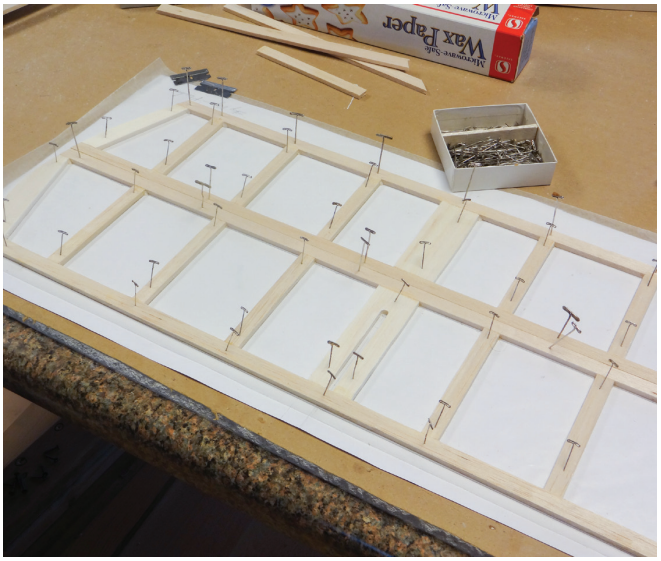
The tail skid is a 1/4-inch dowel glued in place with balsa blocks to support it. Part F7, made from 3/16-inch plywood, supports the horizontal stabilizer and the rudder servo. Be sure to add servo mount doublers for the servo screws. The oak landing gear supports can now be glued in place in the fuselage bottom. The front of these two mounts should be even with the front of former F2. The landing gear can now be formed out of the 3/16-inch steel wire at this point. Make sure to slip two of the wheel collars into place before bending, as shown on the front view on the plans. I formed the grooves in the gear mounts with a Dremel Moto-Tool while holding the oak in a vise. Trial-fit the gear in place. Once the oak landing gear supports are glued in place, install the 4-40 blind nuts in the plywood fuselage strut mounts and attach them to the top of the oak mounts.

COVERING AND FINAL ASSEMBLY

To cover the wing panels, I used the transparent Lite Red UltraCote from Hangar 9 to save weight. Do not cover the center section, however, between the center ribs. The transparent covering allows the lights to shine through very brightly for night flying. On the horizontal stabilizer and elevator, and vertical fin and rudder, cover both sides top and bottom. Now install the control surface hinges. To keep the hinges in place I drilled a 3/16 diameter hole through the balsa and just barely into the nylon hinges. I then fill the holes with epoxy to lock the hinges in place. Glue the horizontal stabilizer to the vertical fin first, then glue the tail assembly to the rear of the fuselage.

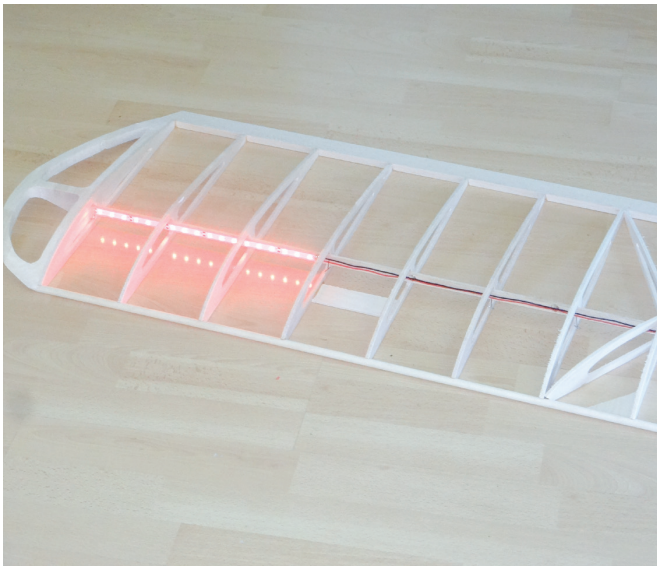


Here the vertical tail surfaces are being glued together, directly over the plans. Be sure to protect the plans with clear plastic or wax paper.

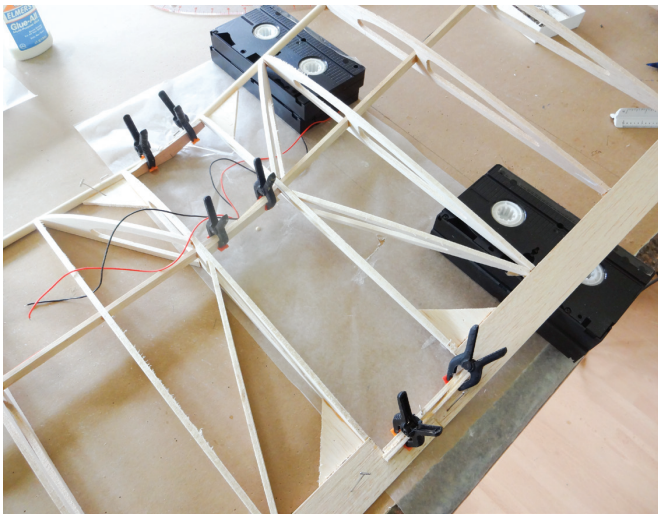


The horizontal tail surfaces are glued together in the same way as the vertical ones.

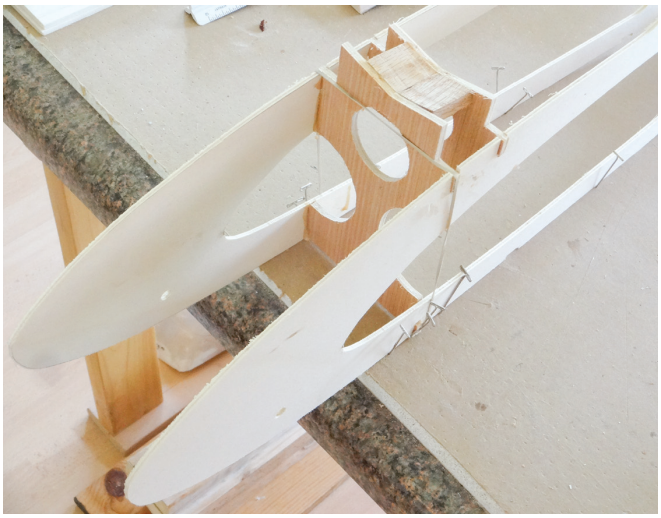
Here's a closeup of the wingtip structure being glued to the outer rib of the wing.



With some LEDs installed, the SkyEye can be easily flown at night.



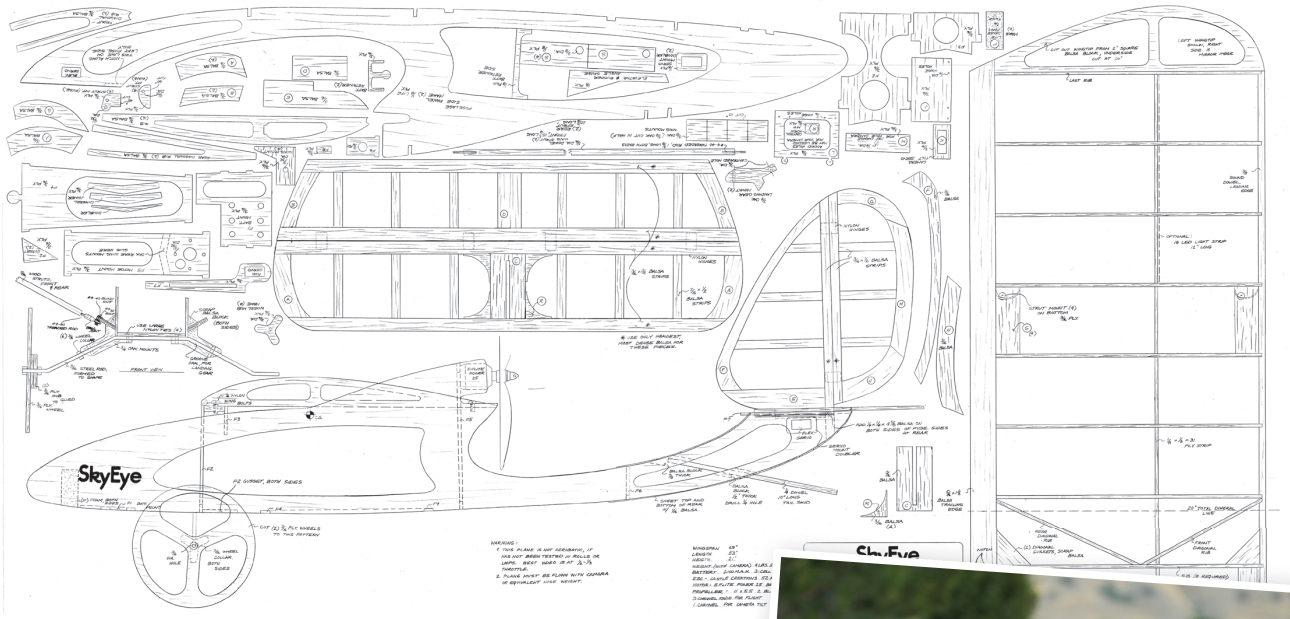
The wing panels are being glued together and the dihedral braces are glued into place.



The fuselage structure is also very easy to build. Here some of the formers are glued in place between the two fuselage sides.

Center the wing on the fuselage and then drill through the wing mounts into the mounts in the fuselage. Tap the attachment mount holes for the 1/4-20 nylon wing bolts. Attach the wheels to the landing gear, with wheel collars on both sides of the wood wheels. Now install the motor but not the prop. You have to attach the pusher prop after the wing is bolted in place; it can't be done any other way.

Install all your radio gear, batteries and First-Person-View camera system (if used), and check the model's center of gravity. Adjust the placement of the gear so the model balances at the point shown on the plans. Use plenty of nylon ties to hold down your components and the servo wires. This is especially important for the tail servo wires so they don't get caught in the pusher propeller.

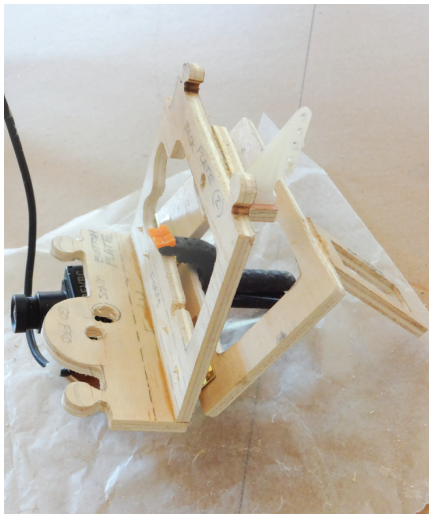


The SkyEye | K0315A

Designed by Clark Salisbury, the SkyEye is a mix of old and new. It is a lightweight, easy to build and fly 3-channel sport flyer specially designed to have an FPV video camera installed in its nose. The pusher propeller design makes a stable platform for shooting aerial photography with lightweight cameras setups. With typical balsa and plywood construction used throughout, it is also ideal for night-flying if you add LEDs in the wing panels.

Wingspan: 69 in.; Length: 53 in.; Power: 25-size brushless motor; LD: 2; 2 sheets; $23.95

To order the full-size plan, visit AirAgeStore.com



To add to the fun, I came up with this simple servo operated "Tilt" assembly to change the angle of the cameras.

IN THE AIR

The best thing about SkyEye is its flying qualities: flying is simply fun and relaxing. It will easily take off from any grassy or hard surface. Off of grass, the tail skid helps keep the plane straight without having to use much rudder. With the E-flite Power 25 motor, takeoffs at half-throttle are the norm. I fly around at 1/3 throttle and it is capable of loops from level flight. Since it only uses three channels (no ailerons), rolls are a bit difficult. When landing, cut throttle, and the plane will glide very nicely. As you get close to the ground, just feathering up with elevator will probably not be enough for a smooth landing. You will need to add just a touch of throttle to grease the landing. I promise you will have fun!

The GoPro Hero camera and the smaller black FPV camera are shown attached and ready to take aerial video and photos.

SAFE FPV VIDEO

I was inspired to carry a second camera because my friend Guy, from our local Ham Radio club, described his project for recovering model rockets using an RC plane and First-Person-View camera. The FPV systems transmit images from the plane to a monitor on the ground. Wow! I thought this would be a great way to improve my aerial video photography. SkyEye carries both a very small FPV camera and a GoPro Hero video camera recording at 1080P in high definition. Both cameras are mounted and tilt together. The photo shows my easy-to-make mechanism, which is servo-operated. You can custom-design a similar setup to suit whatever camera you decide to use.

While shooting FPV video, I have Guy monitor the flight with the small 7-inch screen that comes with the FPV setup. He tells me which direction to turn to get the best shots. This way I am always watching the plane itself. In general, for the best FPV views, you will want to tilt the camera down on takeoffs and tilt it up on landings.

Originally designed to easily carry the weight of two cameras, the SkyEye has since gone through a few updates. This is the original enlarged version. The plans show the newest version, which is stronger than the first.