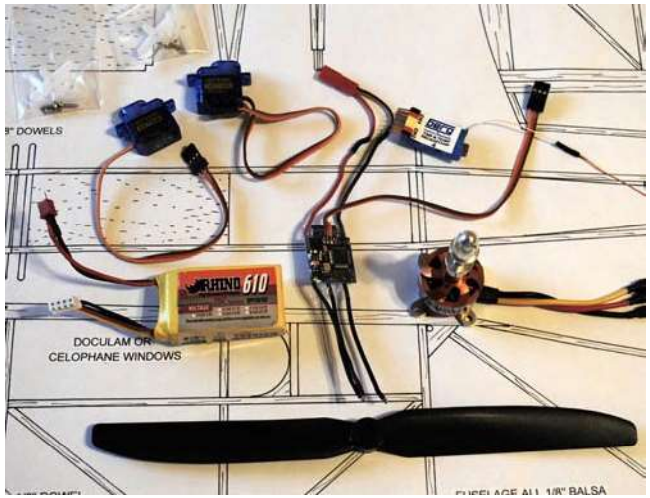
JUST RIGHT
by
Tom Binkley

Just Right, first published in November 1958 American Modeler magazine is simply too attractive to resist. No designer is named on the plans, but Just Right was an .020 powered free flight model that spanned 33" and featured a built up wing and an all balsa fuselage, fin and stab.

It seems an ideal choice for a 3 channel, electric R/C conversion and it seems "Just Right" for night flight. While the basic lines are true to the original, the fuselage presented here is stick framed and covered with semi-transparent film so that LED lights can be added for night flying.

With or without the added dimension of lighting, Just Right is a delightful, easy to build and easy to fly Parkflyer.

Readers of RCMW-FSP are likely familiar with the many LED lighting options available to model aviators, including the Flexible High Intensity LED Light Strips used here. We'll see how easy it is to add a new dimension to your flying.



You will need a brushless motor weighing under 50 grams, a 12A ESC, two 6 gram servos, a micro receiver and a 500 to 610 3S LiPoly battery. The lighting system uses all white LEDs, less than half of a strip and about 8' of light gauge wire. To get the red and green colors, transparent red and green SoLite is used on the respective wingtips. Transparent yellow was used on the rest of the model.

You will need 3/32" balsa for the wing parts and 1/8" balsa sticks for the fuselage and empennage. A pair of light 2" wheels, .062 and .032 music wire and a little 1/32" plywood complete the package.

Start construction by cutting 3/32" balsa ribs, spars, trailing edges, gussets and wing tip parts. Using a template made from a photo copy of the rib glued to 1/32" ply, or cereal box cardboard, cut 14 ribs slightly oversize. Stack and pin them together, and sand them to finished shape.

Cut the notches for spars and trailing edge with a razor saw or razor blade. Use a rat tail file to shape the leading edge notch. If you plan to install lighting, drill a 1/16" diameter hole in the ribs just behind the spar for the lighting wire.

Once the ribs are made, measure the space between the upper and lower spars notches and cut the shear webs out of 1/16" balsa to that dimension. Shear webs can be vertical grain or span wise grain. Trim 6 shear web ends to the dihedral angle.

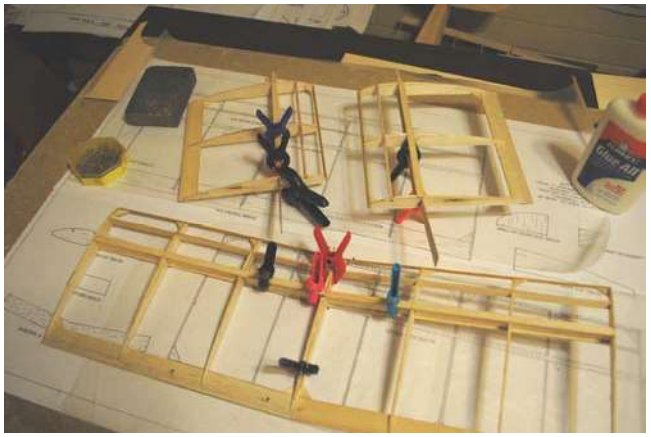
I use and recommend white glue for scratch building models. It is inexpensive, non toxic, strong and gap filling. It has adequate open time to move and place parts, but dries quickly enough.

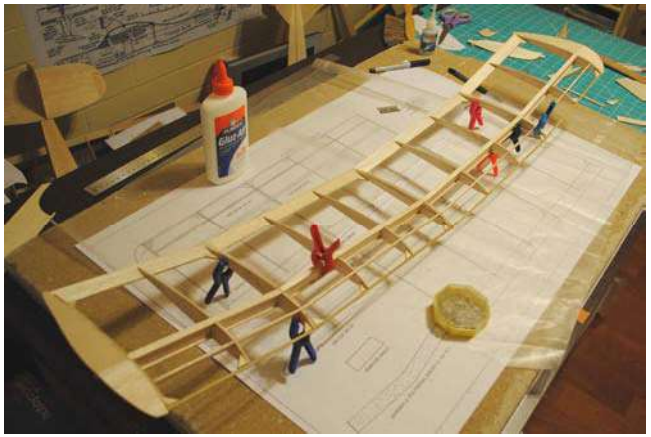
The wing is built in four panels. Pin the trailing edge and lower spar to wax paper covered plans. Glue the center rib and angled shear web in place, then the next rib, shear web, rib etc.

Glue the top spar, turbulator spar and leading edge dowel in place followed by the gussets. Using CA, glue the 1/8" balsa wing tip gusset in place, followed by the rear wing tip.

Note that the front and rear wing tip halves come together on the center of that gusset. Wet the top surface of the cross-grain front wing tip with a drop of water and CA its rear edge to the rear wing tip and the gusset, then bending it to the curve of the rib, CA to the rib.

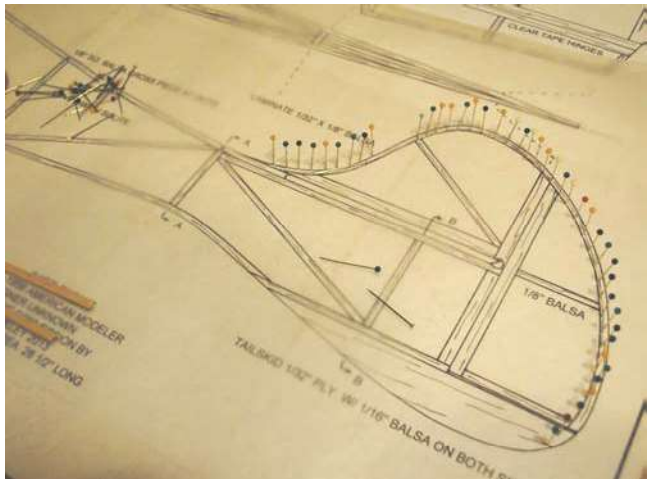
Dihedral and polyhedral angles are the same. With all four wing panels made and dry, cut vertical slots between the top and bottom spars, just behind the sheer web, in the respective center ribs, for the 1/32" ply dihedral and polyhedral braces. Trial fit, one at a time and glue and clamp each joint, aligning carefully. Finish sand the wing.

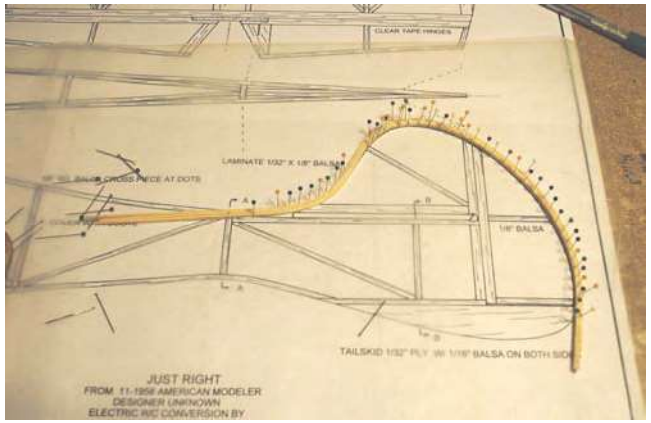




Build the rudder and fin next. Press straight pins, spaced 1/8" apart, into your plan on the inside curves of the rudder/fin as a form for laminating 4 1/32" balsa strips. It took me 2 minutes to install the pins. In a small dish, thin a little white glue with water, just enough to make it brushable.

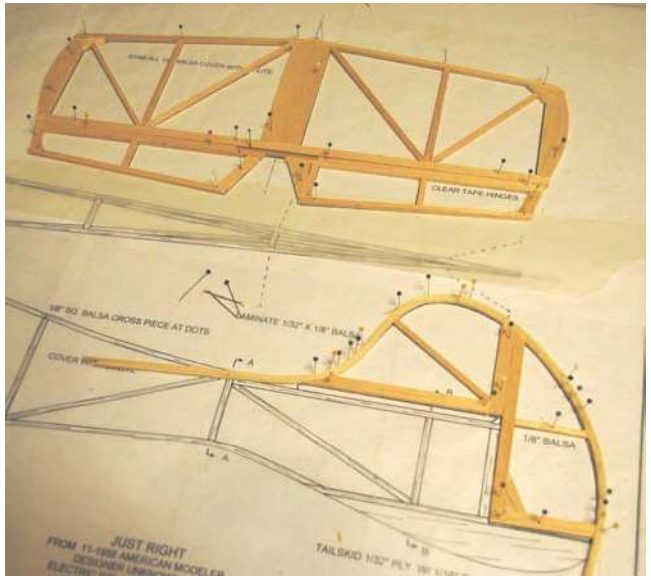
Coat the four 1/32" X 1/8" X 12" balsa strips with the thinned white glue, using an artist's brush. Quickly stack the four strips together and bend them around the pin form. Pin in place as needed, then press the balsa strips gently against the building board to align them evenly. Allow to dry for an hour.

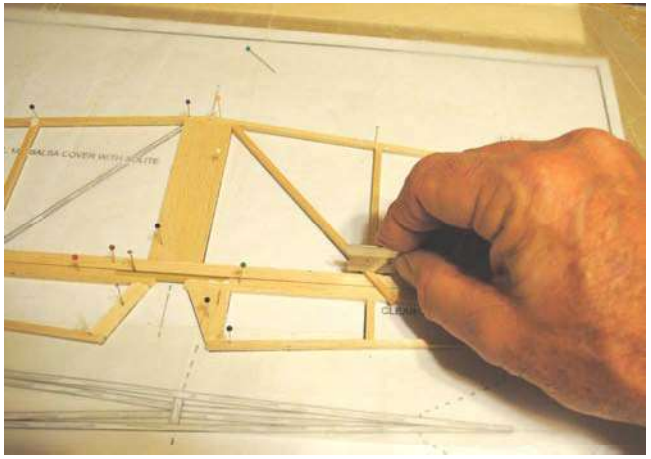




Remove pins, trim laminated piece as needed and complete construction of rudder/fin as a unit. When finished cut apart and finish sand.

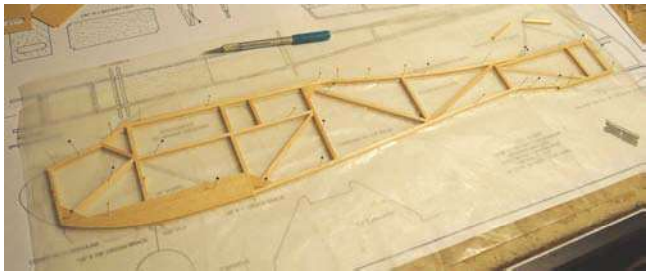
Cut elevator and stab parts out of 1/8" balsa and pin and glue in place. Use an 1/8" dowel for the elevator joiner. When dry, sand a bevel on the mating edges of the rudder and fin and the elevator and stab, for a hinge point.

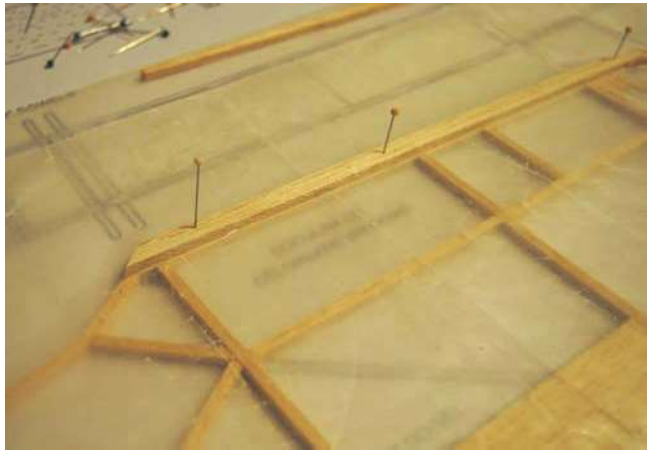


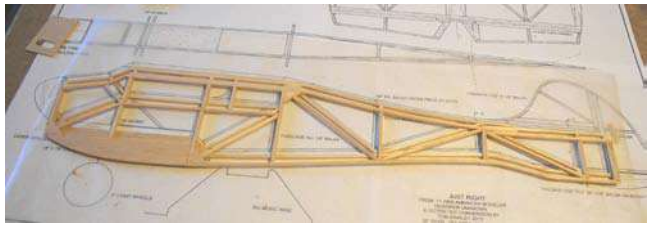


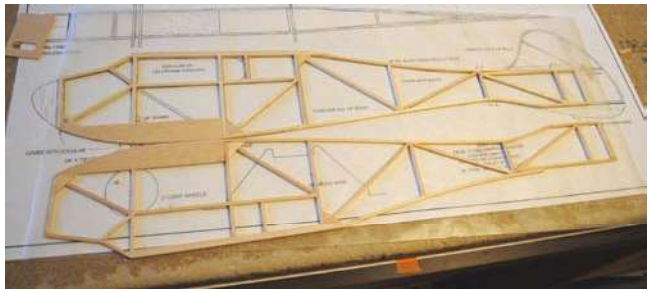
Cut the curved 1/8" balsa pieces at the base of the fuselage, and the 1/8" X 1/4" balsa wing saddle pieces. Pin them in place on the plans and then cut and glue 1/8" square balsa sticks and gussets to complete one fuselage side. When dry, remove straight pins and cover the completed side with wax paper and build the second side over the first to insure that both sides will be identical.

When dry remove sides from the plans and sand the rudder post and rear of the stringers to a thickness of 1/16", so that when joined together, the rear of the fuselage will be 1/8" wide where it joins the rudder.









Cut the battery tray and firewall from 1/32" ply. Glue the battery tray first to one side, then to the second side, keeping the fuselage straight and square. Glue the firewall in place. Glue the 1/8" cross braces in place from the nose rearward paying careful attention to alignment. Keep the fuselage straight and symmetrical. Finally glue the fuselage tail together.

Add the 1/8” sq. diagonal pieces that rest on the battery tray. When dry, sand a bevel for rudder hinge. Glue 1/8" balsa cowl cheeks to the firewall, and 1/32" ply landing gear strips to the fuselage bottom. When dry gently finish sand the fuselage.

Before we cover our model, lets talk about lighting systems. I first read about flying model airplanes in the dark, in an article by Ed Slobod in the January 1976 issue of Radio Control Modeler magazine. The model was the now well known Paragon glider. The idea of night flight was intriguing to say the least.

These days, night flying is pretty common. The trick is to be able, not only to see the model, but to maintain visual orientation in the dark. Generally, night flyers use colored lights that differentiate the right from the left side and the top from the bottom of the airplane.

Since Just Right is a gentle slowflyer, unlikely to be flown inverted, directional orientation is all that is needed. The fuselage has LEDs in the nose and mid cabin that light up the fuselage. The right wing tip has green lights and the left wing tip has red lights, following the pattern of full scale aircraft. There are "landing lights" on the bottom of the nose pointing forward. This lighting system has worked out very well.

As mentioned, High Intensity LED strips are readily available from various suppliers. They come in several colors. Thus a model covered in white SoLite, for example, could use colored LEDs for traditional navigation lights. But, rather than buying several colors of LEDs, I chose to use all white LEDs and colored covering that I had on hand.

The light strips make for a simple, convenient "modular" lighting system, ideal for the night flying novice. The strip consists of segments of three LEDs each, which can be cut apart and mounted almost anywhere.

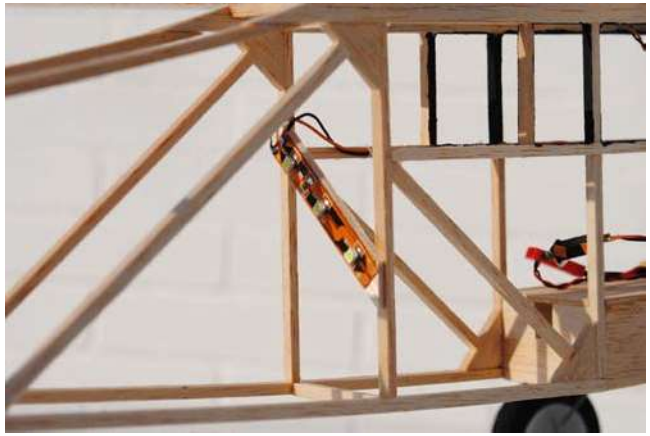
They have an adhesive back, and stick nicely to balsa and ply. Each segment has solder points on each end, clearly marked positive and negative, that can simply be connected to one another with fine wire.

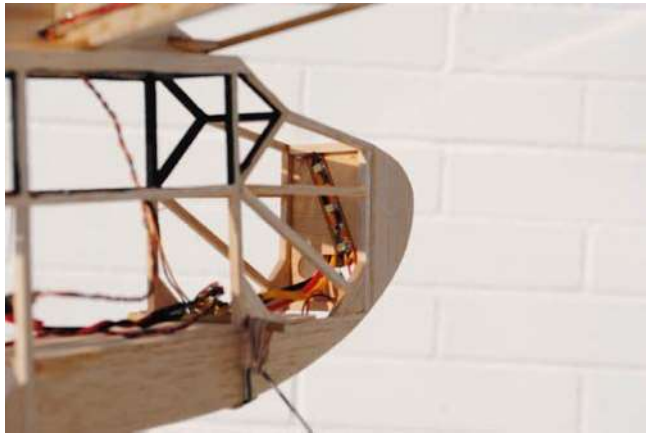
The LEDs are designed for 12 volt operation, perfect for 3S LiPoly batteries. As a side point, individual LEDs typically operate at approximately 4 volts. To use individual LEDs thus requires some means of regulating voltage when using batteries of more than 4 volts.

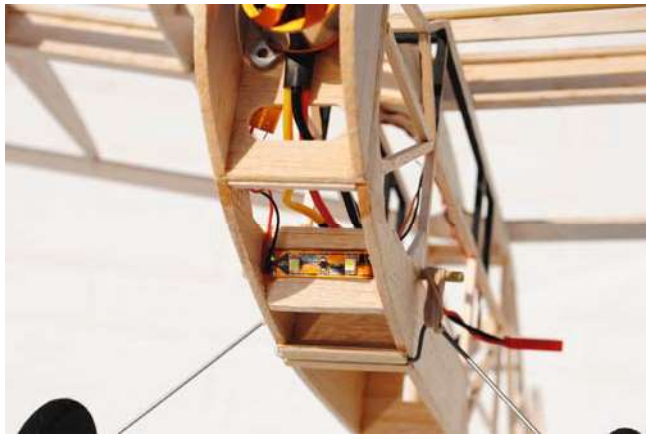
By including 3 LEDs per segment, the strips simplify installation, 3 LEDs times 4 volts equals 12 volts input, perfect for 3S LiPoly batteries. The system shown here operates on .14A at 11.4V which is a 1.5W draw, almost nothing.

You will need a soldering pencil, solder, scissors, and about 8 feet of light gauge hook-up wire. Some suppliers have super light weight Teflon coated wire, ideal for connecting LEDs. The Teflon coating simply burns away with the heat of soldering.

To connect the LEDs I used several one meter lengths of fine antenna wire removed from 72 MHz receivers (from when I installed micro antennas). The Just Right presented here uses 7 LED segments, 2 in each wing tip, 2 in the fuselage and 1 in the nose.

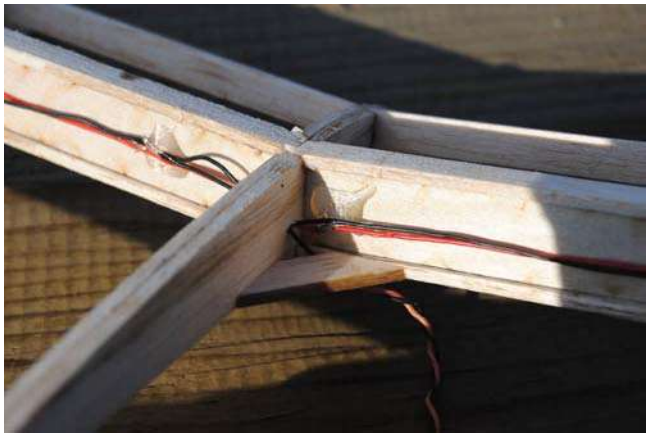






First cut 7 segments from the light strip, using scissors. Remove the backing and stick 2 of them to the rear of the shear webs in the two outer bays of the wing, facing rearward.

Then simply connect + to + and - to - by soldering the fine wire, connecting the four wing LED segments, passing the wire through the 1/16" holes in the ribs from wing tip to wing tip. Then solder a + lead and a - lead to the wires at the center of the wing, about 5" long with a connector to the fuselage lighting supply line. The wire will need an exit gusset of 3/32" balsa.



Next, attach an LED segment to the rear of the firewall, facing rearward. To attach an LED segment in the middle of the fuselage, make a 3/32" balsa diagonal "bracket". Make another 3/32" balsa LED mount for the forward facing landing lights in the lower nose.

The trick here is that the fuselage is not 3 LEDs wide, so notch the bracket, stick the segment on so that 2 LEDs are centered facing forward, and bend the 3rd LED into the space behind, to shine randomly. Solder the fine wire from the firewall + to the landing light + to the mid-fuselage+ and - to - to -.

To the landing light segment, solder an additional + and - wire. These will split, to have a wing light connector and a supply connector, to connect to your ESC's power input from the battery. Then splice a mating connector to the Battery lead of the ESC.

Make the leads long enough to be accessible from the opening on top of the fuselage. Everything is + to + and – to -. To operate the system, simply connect the wing wire to its plug, connect the power connector to the ESC connector, and connect your (3S) flight battery. See the wiring diagram.

Power up, and test your lighting system prior to covering the model. Remember that LEDs are diodes, so if connected with reverse polarity, they will simply not light up.

Cover the entire model except the left side of the fuselage, with SoLite. A seamstress cutting mat, several new razor blades , a steel straight edge with a cork back, and a dryer sheet to reduce static, make covering less stressful. Use Duculam or thin celluloid or black SoLite for the windows.

Cut and install, but do not glue, the wing and landing gear dowels. Attach the wing with 2 #33 or 4 #19 rubber bands.

Remove a strip of covering where the fin attaches to the stab and where the stab sits on the fuselage. Glue the stab to the fuselage, aligning carefully with the wing and the fuselage center line. Glue fin in place square to the stab and aligned with the center line. Attach the elevator and rudder with Scotch clear cellophane tape for hinges. Add the 1/32" ply horns.

Bend .062 music wire landing gear, mount light 2" wheels and install with 2 #19 rubber bands. I recommend a few degrees of toe-in to aid in tracking on take off and landing.

Mount the motor, prop and ESC and attach the battery to the bottom of the battery tray with Velcro.

After a trial balance, I mounted both servos to 1/16" balsa squares glued to the right fuselage framework just behind the window, using a dab of epoxy. I attached my receiver to the front window frame with Velcro.

Because the fuselage is a bit narrow, having both servos on the same side and having left off the covering, it is easy enough to make and install push rods from .032 music wire with a balsa guide at the halfway point. Make and install push rod exit guides where needed.

After testing everything, the lighting system and the R/C system, remove the dowels, landing gear and the wing and cover the fuselage side with SoLite. I thought the plain yellow covering was a little stark, so I added some white SoLite trim strips.

Reassemble the model. With the battery in place, your model should balance under the wing spar. Set rudder travel to 3/8" right and 3/8" left and elevator travel to 3/8" each direction and add some exponential. Arm your ESCs brake to maximize glide. Before you fly, take a picture and email it to RCMW-FSP.

Flying Just Right is really fun!!! Just Right is quite responsive to control input. It has enough power on 3S, to climb straight up out of sight.

It will easily loop repeatedly from level flight and it rolls quicker, tighter and better, with less altitude loss, than any rudder model I've flown to date!!

I expected the model to be responsive and agile, and I was not disappointed. It is ideal for gymnasium or cul de sac flying.

As you might expect it also has a wonderful, long, flat glide. And, it bobbles in delight when it encounters lift, making finding and staying in thermals really easy.

Just Right will handle a breeze better than expected for a model with such light wing loading, but it is a handful taking off or landing in a cross wind.

My plan was to fly during the daytime with the lighter weight 2S battery and only use 3S for night flying, when 12V is needed for the LED system.

Experience has shown that 45W of power is more than enough for this type and weight of model. That has proved true. It is delightful to fly on 2S and has plenty of power for loops, rolls and steep climbs. However, it is difficult to notice the weight difference, and Just Right minds her manners just fine at higher throttle settings, so that there seems little disadvantage to flying on 3S.

Whatever battery you choose, I suggest you make your first flights on a calm day. Make sure there are no warps in the wing. Do the usual range check. Because of the narrow track landing gear, high polyhedral wing and responsiveness to control input, I recommend getting it right off the ground with a good bit of throttle for the first few seconds.

Or, Just Right will fly out of your hand with a very gentle push, for hand launch, even with a 7.4V battery. Climb up to a few mistakes high to get your trims sorted out.

Every model builder and designer lets out a sigh of relief when everything turns out well. The down thrust and incidence angles worked out great on Just Right. Balanced on the spar it climbs at any angle, given enough power, even virtually straight up without the tendency to loop or fall onto its back. And it is as self righting and stable as a trainer, or, dare I say it? As stable and self righting as a free flight model!

I would not recommend Just Right for a beginner until he is past the crashing stage. It is rugged enough for handling and flight but it is not designed for impact. However, I would not hesitate climbing up to a safe altitude and handing the transmitter to a beginner. It is that easy to fly.

I decided on the color scheme presented here, primarily for night flying, but I have really enjoyed how it looks, day or night. In the sunlight it shines like a neon sign. It is easy to see against gray or white clouds or against a blue sky.

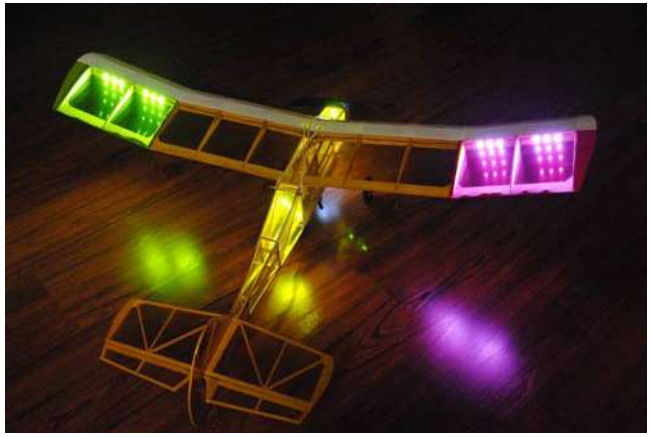
It reminds me of the 70s when we used several colors of transparent MonoKote on our gliders. But now, I can have the joy of thermalling without the inconvenience of the High Start! What a delight.

After you have flown in the daylight enough to feel confident, pick a calm time after dark, in a familiar, large, open area and power up the lighting system. Just Right is easy to see and maintain orientation in the dark. The red, green, yellow and white lights work well. Give it a try.

I always recommend giving time and thought to model set-up. After flying a bit, decide if you might prefer more or less rudder throw or elevator travel or more or less expo. Is the model too responsive or too sluggish in some way? Does it need a thrust adjustment to correct some misalignment?

Set-up is important to your lasting enjoyment of any model. You won't fly it if it's not fun. Also, think about adding a name and address label in the battery area, just in case it gets lost, especially if you fly in your neighborhood like I do.

Whether you are thermal hunting, night flying, shooting touch and gos or just making lazy circuits around the patch, I hope you find this little gem to be Just Right! Enjoy!



Here's a short video of the JUST RIGHT in flight piloted by Tom Binkley with videography by chief photographer Dianna.

https://vimeo.com/62466974

To contact Tom Binkley use this email address --

binkhouse@gmail.com

My thanks to Dianna, my photographer, enabler and sidekick.

Here is a basic covering tutorial --
www.stevensaero.com/downloads.php?productid=18450&dlid=2

A very helpful SoLite covering video is here --
www.youtube.com/watch?v=M5ROBx3nzgw

SoLite is sold as Aero Lite by Stevens Aero Model. It is the same product. The motor used on this model is a Turnigy 2822-17 1100kV. It works fine, no problems. I used it because the motor I prefer was out of stock. I recommend the motor below. I am currently flying six of them. They are reliable, durable, compact, inexpensive, use standard size 3mm adapters, and they work well on 2S or 3S with a GWS 8060 sf prop.

Suppliers;
Wheels --
www.stevensaero.com/Du-Bro-RC-2.00-in.-Super-Lite-Wheels-2-DUB200SL-p-18945.html
SoLite --
www.stevensaero.com/AeroLITE-SOLITE-Transparent-Yellow-2M-Roll-SOLITE-TR-Y-p-16807.html
Balsa USA;
www.shop.balsausa.com/product_p/064.htm
The motor I recommend --
www.hobbyking.com/hobbyking/store/uh_viewItem.asp?idproduct=5354
Prop saver --
www.hobbyking.com/hobbyking/store/__8240__Prop_Saver_w_Band_3mm_10pcs_.html
Recommended motor works well on this prop --
www.hobbyking.com/hobbyking/store/__10054__GWS_EP_Propeller_RD_8060_203x152mm_6pcs_set_.html
ESC --
www.hobbyking.com/hobbyking/store/uh_viewItem.asp?idproduct=11429
ESC Programming card, to arm the brake --
www.hobbyking.com/hobbyking/store/__13431__HobbyKing_Programming_card_for_BlueSeries_Brushless_Speed_Controller.html
Servos --
www.hobbyking.com/hobbyking/store/__663__HXT500_5g_8kg_10sec_Micro_Servo.html
Battery --
www.hobbyking.com/hobbyking/store/uh_viewItem.asp?idproduct=7308
LEDs --
www.hobbyking.com/hobbyking/store/__14290__High_Density_Waterproof_LED_Flexible_Strip_White_1mtr_.html
Red wire --
www.hobbyking.com/hobbyking/store/uh_viewItem.asp?idproduct=11849
Black wire --
www.hobbyking.com/hobbyking/store/__11850__Turnigy_Teflon_Coated_Wire_36AWG_1mtr_Black.html

JUST RIGHT SPEC SHEET

Type	RET Parkflyer, Nightflyer
Construction	Balsa, Ply
Wing Span	38"
Wing Area	267 sq. in.
Weight - 3S - 274g, 9.6 oz. -	2S - 257g, 9 oz.
Length	28 1/2"
Wing Loading	4.9 to 5.2 Oz./Sq. Ft.
Motor	Turnigy 2822-17 1100kv
ESC	Mystery 12A
Prop	GWS HD 9075
Battery	Rhino 610 2S or 3S
Power	3S 9.7A 10.3V 100W 2S 6.4A 7.3V 47W
Radio	Hitec Eclipse 7, Corona
Servos	HXT 500 6g
Lighting	21 LED's