SLEC Coyote

1320 mm glider kit

Last edit 4 July 2022

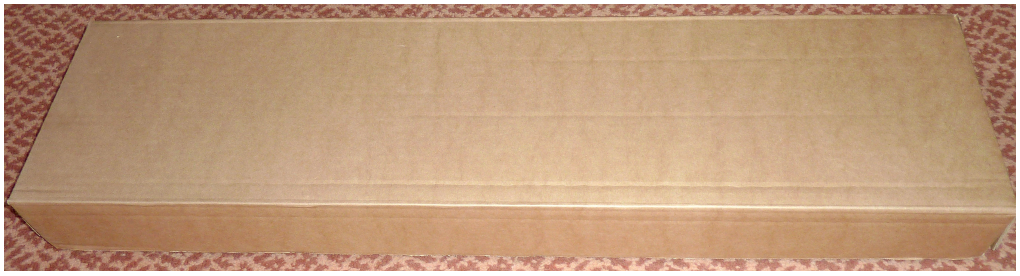
SLEC

For the few who haven't yet come across it, SLEC is a company in Watton in Norfolk, UK. https://www.slecuk.com/ It processes balsa for aeromodellers and just about everyone else, including film producers and makers of wind turbine blades. The website is well worth a look as they sell a wide range of hardwoods, glues, ply, plastic and metal parts and all the other bits and pieces that modellers need. The name derives from Sun Lane Engineering Company and was the brainchild of John and Kath Roper, who set it up in Kent in the 1970's, though they no longer own the company.

If like me you are fortunate enough to live not too far away, a visit is a treat. The conversation is always good. There is a small display area and a larger machine room where the main stocks of wood are. If you are a balsa user you can choose exactly the right density, stiffness and grain from a huge selection. Take a balance with you if you are very particular. There are also many mouldings such as dowels and leading and trailing edges and a range of hardwood ply and liteply. Be warned. I always spend exactly twice as much as I intended. Of particular note are small essentials like snakes, hinges, etc. They make them exactly as you would if you could. They will also laser cut or mill components if you provide them with a clear drawing or they will make the drawings for you. You will also find them in a large marquee at all the major UK model aircraft shows.

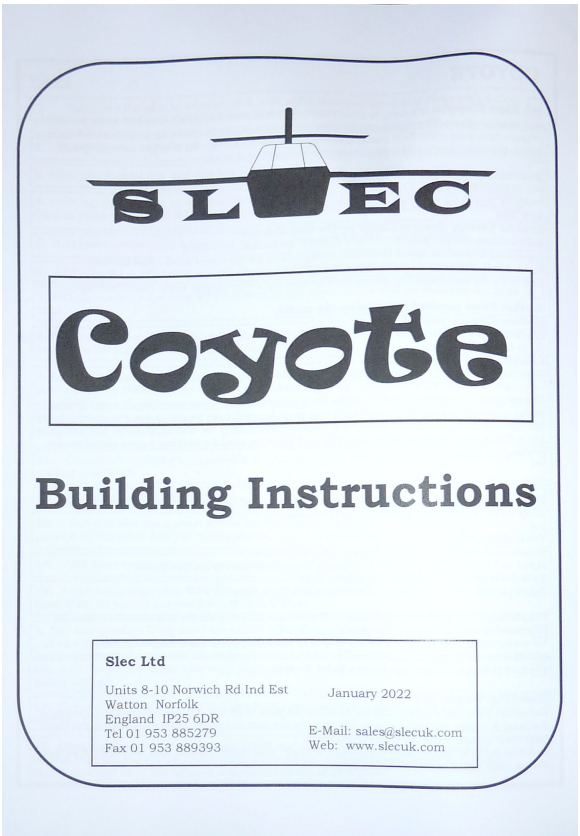
SLEC's picture

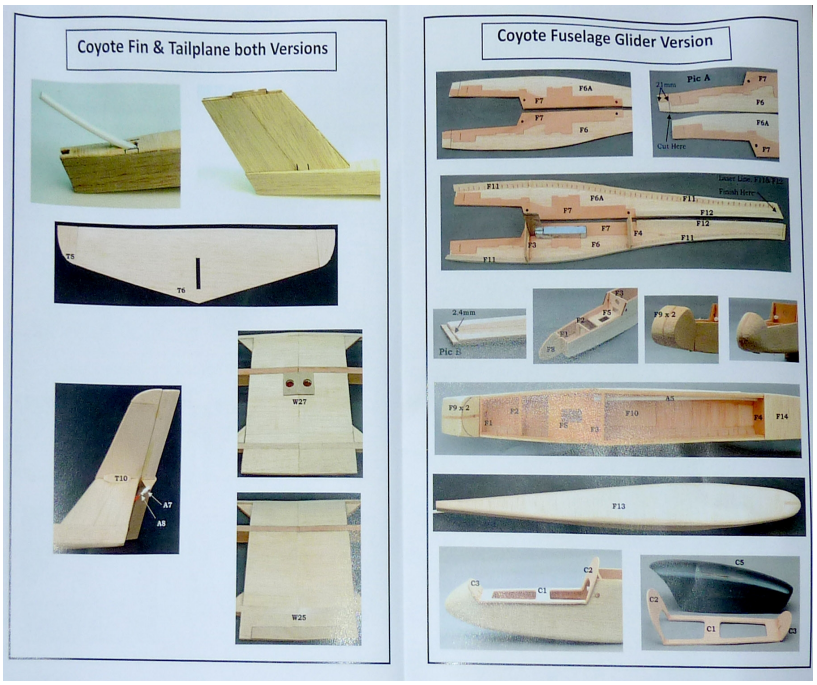
The kit comes in a plain box, which is very handy as you can say it is anything you like. Perhaps a component for the DIY job you have been putting off? No need to put on one of your 'Half-price sale' stickers. Save them for another time.



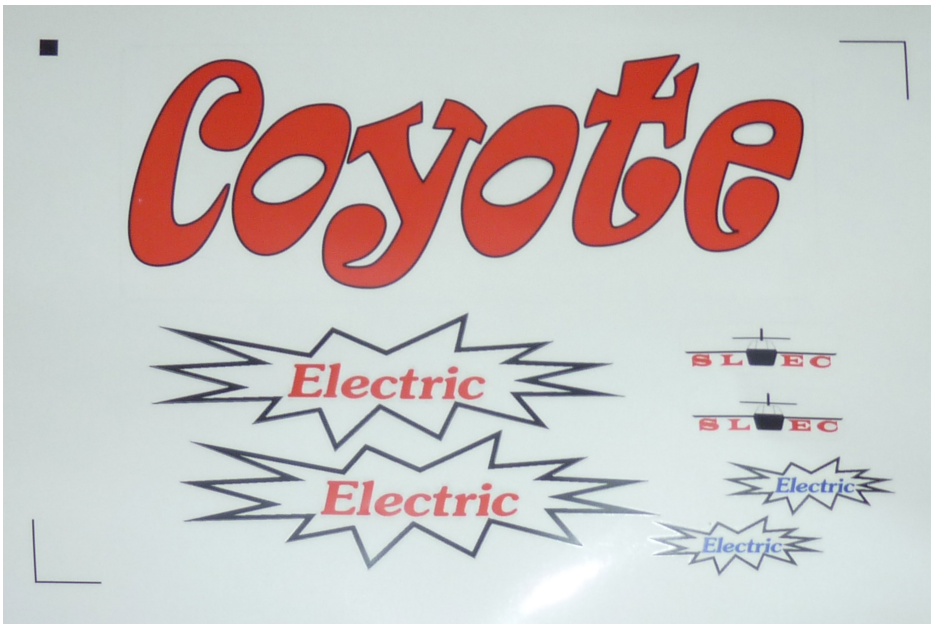
Everything is provided except the motor, propellor, covering, radio gear and servos. There are even rubber bands for the wings and a polythene cover for your plan on the building board. Look at all that lovely balsa. The various pieces of balsa show an excellent choice of grain, stiffness and weight for the different types of part.

The plan is very well printed and has both pure glider and electric powered variants included. There are text instructions, which refer to a booklet of photographs, a complete cutting list and a picture of each sheet of wood. If you have built at least one model to a plan you shouldn't go wrong. With some help the glider version fitted with a towhook could be a first real build for a child starting out in model building. It is simpler than the Keilkraft kits I started on. The electric conversion is more difficult and not for a newcomer.





And some restrained decals.



Choice of motor

The motor shown on the plan is 28 mm diameter and 12 mm long. The model is small and light so does not need a lot of power. The motor length can be extended perhaps 5 mm, or more if you front mount it. There is room for a 1.3 Ah 3S battery so a kV of about 1000 should be right. The flying weight is about 700 g so a sensible power to weight ratio of 200 W/kg gives about 150 W. At 11 V for a 3S that means a current of about 14 A.

The choice of motor is more about geometry than electricity. Assuming that you want to install the motor after all the building and finishing is done it needs to be pushed in from the front. The hole is not much bigger than 28 mm so a motor cross mount won't go through. This just leaves the type of motor that has a mounting plate on the back. SLEC

sells one with the part number SEP8. As one end of the lower two screws would be out of reach I still couldn't see how this could be fitted after sheeting. I dredged my box of small motors and found something labelled Turnigy Air 2210C with 1200 kV and 150 W. The case was actually 28 mm and the length fitted the space on the plan. I adapted F2 as described under **Fuselage**. If the motor proves to lack power I can swap it. We leccies love to have plenty of power.

Radio and servos

The plan assumes that you will use the standard small servos usually called something like '9 g micro'. They cost and weigh very little. There is no rudder so you only need three. For a pure glider you can get away with two channels with a Y-lead for the ailerons. I will use a standard FrSky X8R receiver as it weighs little and gives me telemetry.

Power and ESC

A FrSky Neuron 40S ESC fitted in. It is light and is little or no heavier than a standard ESC. I must have a reading of battery voltage and the Neuron means I don't need a separate voltage sensor. The funny thing is that the ESC cost as much as the whole kit.

Covering

Now that it looks like Hobby King has left the UK, and won't even supply the UK from Europe, I am pleased that I stocked up on its excellent film covering. I have a few years worth. Carriage, duty and value added tax (VAT) from Hong Kong rules out buying any more. I will use it in yellow for the wings but will probably use EzeKote as a sealer on the rest of the sheet airframe and airbrush it or film it. Perhaps we will have a tariff-free trade deal with China by the time my film stock is all used.

Design

The aerofoil is a flat bottomed section based on a 10% Clark-Y though with relatively little leading edge upcurl. There is no sheeting on the main part of the wing and there are near full span ailerons. The elevator snake is very neatly done, coming out at an angle half way up the fin. This gives a very sleek effect. I was relieved to see substantial wing joining as I think this could be quite a lively model with the slightly bigger motor than specified.

Preparation

SLEC helpfully supplied a polythene sheet to cover the plan on the board. On the plan are two dimensioned lines. Use the one labelled 1 metre to check that the plan has been printed to exact size. Mine was. I used one of SLEC's balsa building boards. The plan must be cut up. I labelled all of the laser cut and routed parts, following the numbers in the pictures in the manual.

Glues

As this model is all wood I mostly used white PVA glue. It is slower drying but is stronger than CA . To avoid putting on too much and having blobs that can't be sanded easily I use a 5 ml medical syringe. Bodies and Luer Lock blunt tips are very low cost on eBay. I find 14 gauge (olive green) or 15 gauge about right for PVA. I use balsa cement on the edges of sheeting as it is easier to sand, also available from SLEC.

Luer lock connection

Wing

I started with the wing. It's best to do that as you need the wing to shape the canopy when you make the fuselage.

The spruce spars were obvious, However the leading and 'false' trailing edges look similar but are different in size so check carefully.

Using a scalpel I cut the nibs to release the ribs from the sheets and lightly sanded the edges to get rid of the charring and to smooth where the nibs had been. I thought the holes for the servo wires were a bit too small so before fitting the ribs I made them larger and reinforced the ribs with 0.4 mm ply.

The wings went together as described in the manual and pictures. The parts were very accurately cut. I would have preferred at least top forward sheeting for warp resistance but then this is a simple model. I shall just have to be careful not to overdo the heat shrinking.

One thing I didn't like was the aileron servo mounting. I don't trust servo tape and, as designed, the servos couldn't be replaced without cutting the covering. I prefer servos to be screwed in place and removable if they fail. I trimmed the servo plate to size and then glued four small pieces of spruce to the ribs so the plate could be screwed down to them. I covered the plate with cling film to ensure it didn't get stuck as well. I added balsa strips to act as location pieces, then spruce blocks to the plate to which to fix the servo. The enlarged rib holes mean that a new servo lead could be drawn through more easily. To help that I also increased the size of the lead outlet holes under the wing.

This shows the servo plate supports

This shows the final installation. The green cord is glued there in case I need to pull a new servo lead through. It is quite long but pushed into the sheeted centre section.

Winglets

I am becoming keen on winglets. They give a larger effective wing area and aspect ratio and improve stalling. All of my newer gliders have simple curved ones. In the end I decided not to fit them this first time on the Coyote. I can always alter the tips later. Talking about tips, the construction of them seemed to me unnecessarily strong and heavy. It is a solid block of soft balsa on top of 2 mm liteply. It is true that you plane and sand a lot of it away but maybe a simple built up tip would have been better? It's a good idea to shape the tips before fitting them. You can then weigh them and check that they are the same. They are about 7 g when shaped.

With the two wing halves joined and sheeted I added a piece of 0.4 mm ply across the join in the ‘false trailing edge’ to strengthen what would otherwise be a butt joint. Another time I would make scarf joints front and rear. Enough wood is supplied for that.

I used a razor plane for rough shaping and then a sanding block to get the leading and trailing edges and the aileron moulding profiles correct. After a thorough sand and trim I coated the sheeted areas with EzeKote to smooth them for the film.

Fin

Just follow the instruction. Be sparing with the glue around the slot for the snake. The snake outer is quite large and if glue oozes into the slot it could stop the snake being pushed through. If that happens you could use a smaller diameter snake instead. Alternatively you could build the fin with the snake in place. The fin does seem a bit heavy but no doubt the motor and battery will balance it.

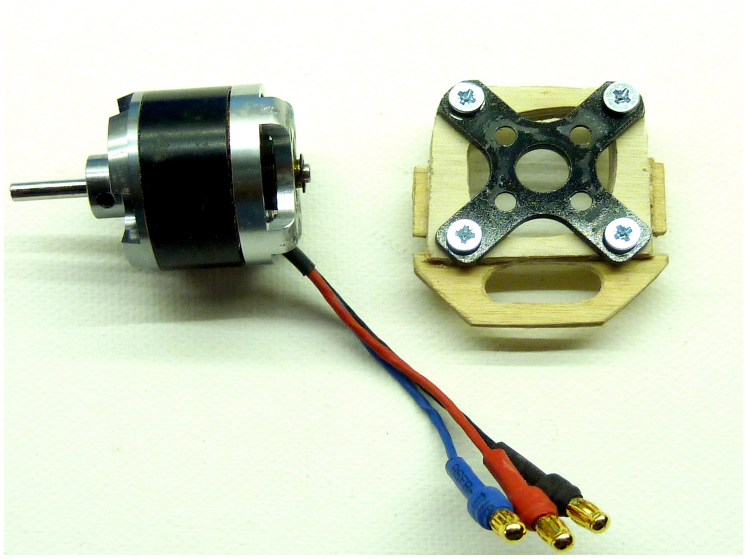
One change I made was to add a tab made from scrap liteply towards the front of the fin. This glued into the gap in the fuselage between the triangular fillets and locked the fin firmly. More later.

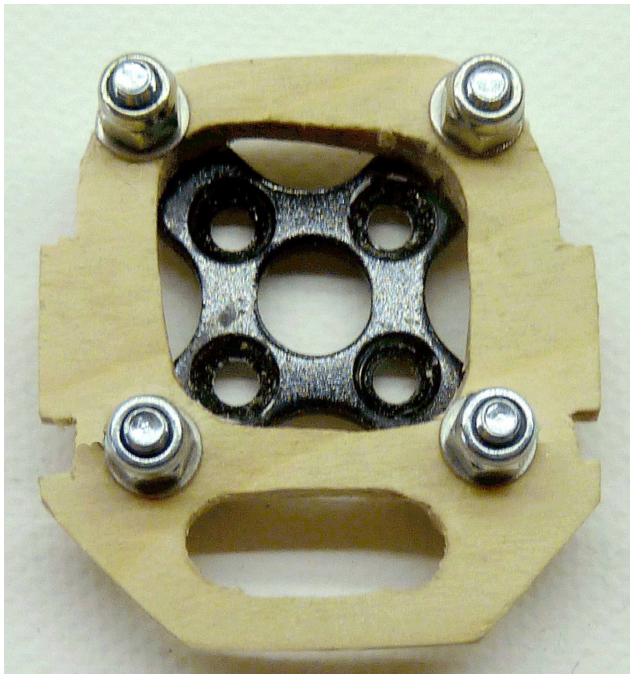
Fuselage

This all went together smoothly apart from the fiddly nose. I wasn’t keen on the motor mounting. On balance I think it would be better to have a substantial mounting plate at the very front, with the motor offered up from behind and screws put in from the front. However I did not make the change as I didn’t know what the thrust lines should be and so needed to stick with the existing motor bulkhead.

I made a new E2 bulkhead out of 2 mm birch ply. I marked out and drilled the positions of the cross mount fixing holes and cut a suitable hole using a piercing saw at the centre to allow me to screw the M3 screws into the back of the motor. I then added two layers of cross laminated 0.8 mm birch ply to strengthen the bulkhead avoiding the the tabs that locate into the fuselage sides. When the glue was dry I redrilled the fixing holes, and then the centre cutout again using the piercing saw. By the way the hole is a funny shape because each pair of holes on the cross mount I initially used were a different distance apart. Does anyone know why they do that?

Here is the finished E2 bulkhead.





When bringing the two fuselage halves together the first step is to join them using F3 and F4. My fuselage jig was in use so I had to find another way to ensure the fuselage was true when the nose and tail were brought together. I marked the exact centres of F3 and F4 on the top sides and then turned the fuselage upside down onto an edge line on the plan after checking it was straight. I pinned through the triangular fillets into the building board and pinned scrap blocks to centralise the formers. Then I glued the tail sides exactly on the line using more pinned blocks and a clamp. I then tackled the nose in the same way. Before fitting them I sanded the plates for the receiver and battery then sealed them with EzeKote to ensure the velcro would stick.

To fit the E2 bulkhead I turned the fuselage right way up and again pinned and used location blocks.The righthand fuselage side at the front was bent in and locked in place

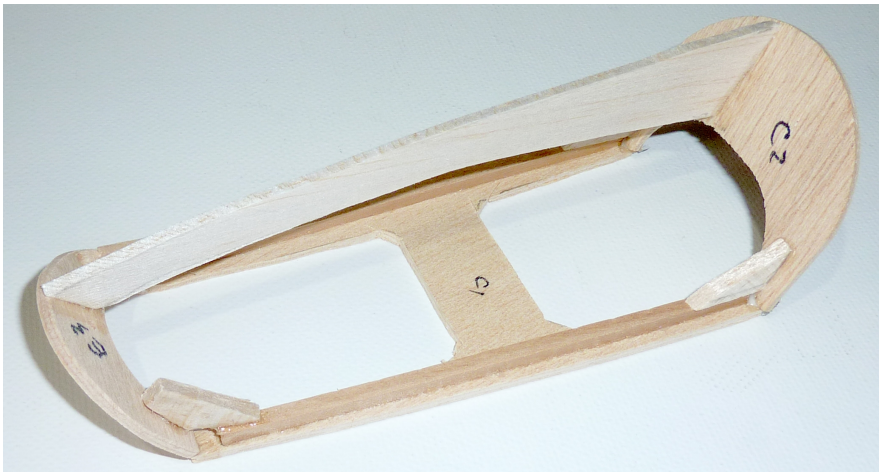
using blocks. After gluing up I inserted E2 and squeezed the left hand side in. I locked it with a block then used a clamp to pull the sides in firmly. I had marked the centre of E2 so I was able to check it was correctly on the centre line.

When all was dry I added the very front piece, E1. This proved tricky as it has to be glued all round in an octagonal hole. I used a rubber band to pull the eight sides together but that caused distortion so once dry I had to add fillets and sand everything smooth and true. Quite a lot of balsa and liteply must be sanded away to get the 40 mm diameter round nose. Then I filled any gaps with my EzeKote/balloons filler and coated with EzeKote.

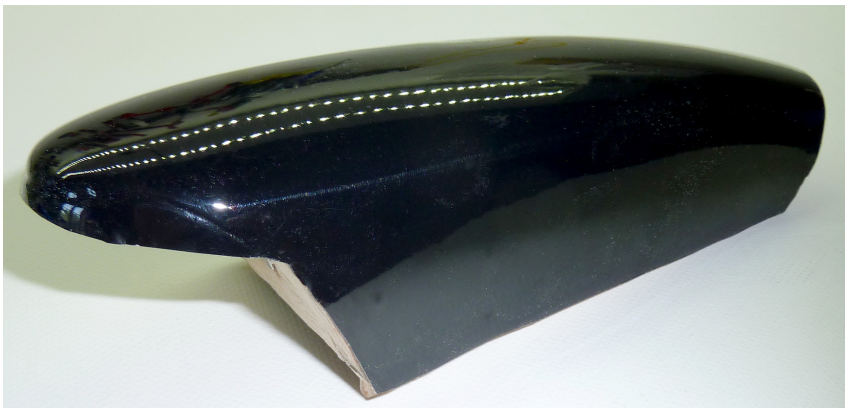
I decided to leave out F2 to make it easier to get the screws into the motor and I left off the tow hook.

Canopy

The canopy is a tricky thing to get right. Quite a bit of fiddling is needed by adding balsa to the fuselage then cutting and sanding it away. The base C1 for the canopy was a bit too thin and with the front removed for the electric version it would not lie flat. I cut an identical piece from some slightly thicker liteply and braced it with 3 mm square spruce. It was much stiffer for very little weight gain. I also added small pieces of wood to strengthen the joins with C2 and C3. I covered the canopy area with cling film while the glue was drying and then added an extra bracer. Here is how the final frame looked before adding the plastic. The front now has a 3 mm plastic dowel to lock it in place and a pair of magnets at the rear. I had to add a filler balsa piece by the wing band dowel into which to glue one magnet. I also added inside side cheeks to lock the rear of the canopy sideways.



I found it best to trim the plastic part of the canopy canopy roughly with large sharp scissors going gently to avoid splits. Then I glued it to the frame with epoxy. Final trimming was done with a scalpel with a new blade. This is when you need the wing to profile the canopy that overlaps the wing. You might well find as I did that you need to add more balsa to the nose to get the profile right.These pictures show the finished canopy from above and below.



Fin again

The fin mounting post proved not strong enough. While I pushed in the fin when gluing it in place I snapped it. Fortunately my additional tab held it correctly and then I cut away the old post and fitted a short spruce one as shown in the picture. The side pieces are just fillers and will be sanded flush. The new post is mostly inside the fin post slot in the fuselage.

Inverted

Tailplane

This is a simple sheet balsa affair. It is glued on top of the fin with some triangular fillets. The fin tab projected a bit so I cut it away with a slight vee and and filled with my filler. The horn is made from two layers of thin birch ply and is glued on. It is shaped to avoid too much assymetry due to the angle of the snake. All snake fittings and clevises were supplied.

Hinges

Flat plastic hinges were supplied, but I felt they were too thick for the elevator. I experimented on wood of a similar thickness with my usual hinge slot tool and found it very difficult not to break through or distort the wood. So I opted for some fluffy cloth hinges I already had. I made slots with a scalpel, working it back and forth till they were large enough. I covered the tailplane with film then cut through into the slots using the slots in the elevator hinges as a guide and pushed the hinges in. A drop or two of thin CA in each slot in the hinge from a narrow drawn spout secured it. I then dripped into the other side. When dry I opened up the slots in the elevator using the tailplane hinges as a guide, then pushed on the elevator and glued it. I normally don't use fluffy hinges, preferring pinned flat hinges, but they worked well here. The small resistance to bending won't matter

For the ailerons I also didn't use the supplied hinges. Instead I opted for small pinned flat hinges glued in with de Luxe Materials' 'Phatic. I dripped some 'dry' PTFE bike chain lubricant onto the pinned part to protect against glue. I had to be very careful opening up the slots in the ailerons to avoid breaking though the surface. I used the guide system as described for the tailplane.

Propellor, spinner and nose profile

I have a large plastic box full of folding prop spinners and prop hubs. Could I find the correct combination of 3 mm shaft and 40 mm spinner? You guessed it. So I bought a plastic 38 mm folding prop spinner from Aliexpress. It was the kind held on by two allen head grub screws and very light. These are best for models like this where you can't get to the motor body to hold it while you tighten a collet. I found some 7 x 4.5 folding blades which, given the 1200 kV of the motor, should give a high enough rotation speed of around 14 000 rpm to avoid motor overheating. The Neuron will tell me current and rpm so I can check.

Getting the fuselage nose profile correct was tricky. I think a 40 mm spinner would have been better as I had to prune away quite a bit of the nose balsa and I am not really happy with the profile. I faced the front with 0.4 mm birch ply.

Covering and finishing

In the end I decided to cover the whole model with Hobby King film, using yellow for the wings and tailplane and red for the fuselage and fin. On sheeted areas I have never been completely happy with the finish I have got in the past so I opted for edge tacking using an iron and then shrinking using an Evolution heat gun set at 130ºC. I needed to prick one or two bubbles with the tip of a scalpel and then flattened with the iron.

I decided to add the tailpane fillets to the fin and seal and cover them before gluing on the tailplane. It would have been very difficult to do it after. However I wasn't happy with the heat gun results. The cut edges of the film pulled away and showed white glue that had to be covered. Then I found my copy of Derek Hardman's DVD about using his product Solarfilm. I wish I had viewed it to start with and I would have done the fuselage better. Never mind, next time I'll stick to an iron or possibly airbrush with acrylic. I glued on the tailplane, then after filling the central slot in flush I covered the tailplane.

Wing covering was done using an iron taking care not to shrink more than needed as the structure is fairly light and flexible. I covered the undersides then, after thoroughly testing them, I fitted the servos and threaded the leads through. They were long enough to give a good tail out of the wing. Then I covered the upper surfaces. I glued the hinges into the wing then covered the ailerons and glued them in place onto the hinges.

My fears about the lightness of the wing structure proved correct. The wings did warp. Each had washout but one was 7 mm and the other 3 mm. I set about reducing the seven by twisting the wing so creases appeared in the film then ironing out the creases. I did this by clamping it down on packing pieces using rubber bands as shown in the picture then iron shrinking again. You can see some of the creases. I left the wing clamped overnight.

I realised that the technique is similar to the one I used in the middle ages for tissued and doped wings on my freeflight A/2 F1a gliders. Except that then I heated them with a steam jet from a kettle and suffered a few scalds.

The fix seems to have worked. I now have about 3 mm of washout on each tip. With a chord of 150 mm that gives just over 1º . So there's another technique for the tool locker.

Radio installation

The Neuron 40S ESC fitted in neatly and was as light as the other non-Neuron ESCs of about 20A that I had.

PIC of installation

Finished model **MAYBE NEW PICS**

Final weight

Including a 0.8 Ah 3S graphene battery it was 660 g, a little under the estimated weight of 700 g.

Balancing and flying

I started with the centre of gravity and low rate throws exactly as shown on the plan. The aileron throws looked rather large to me so I added 40 of expo. With a graphene 0.8 Ah 3S it just about balanced, perhaps slightly nose heavy. The graphene is a bit heavier than a standard lipo so maybe I'll try to get hold of one of those. In the mean time I'll try it as it is though I usually like a rearward CofG. I might need to add a 5 g weight on the tail.

Summary

Overall this is an excellent kit at a very good price. The parts were accurate and the plan and instructions very clear. The nose for the electric version is a fiddle but it came out fine in the end. I still think that the wing could do with some sheeting. The alterations I made were just for my preference and are no criticism of the design. As Walter Scott might have said in his poem,

‘Breathes there the man, with soul so dead,
Who never to himself hath said, “Let’s modify it!”’

Suggestions

Short spruce fin post instead of balsa and a ply location tab
Larger aileron lead holes in the wings
Slightly thicker C1 canopy base
Omit F2 on the electric version
Change E2 to suit easily fittable motors or use front mounting
Hold the wing on with plastic M4 screws instead of rubber bands
Use fluffy hinges for the tailplane and pinned ones for the ailerons
Sheet the upper surface wing back to the spar. 1 mm should be enough to stiffen it.

Equipment used

Servos	Tower Pro MG90S
Receiver	FrSky RX8R
ESC	FrSky Neuron 40S
Battery	0.8 mAh 3S graphene
Motor	Turnigy Air 2210C 150 W 1200 kV
Prop	7 x 4.5
Spinner	World Models 40 mm diameter from Steve Webb Models

Declaration of interests

I have no connection with SLEC except as a very satisfed customer.

Last edit 10 October 2022