

Building a Lightweight Electric F3-RES

by Randy Reynolds

PPSS allows electric Launched two meters to fly in the F3-RES competitions. This expands the participation numbers and allows members with infirmities to join in as well. That said many of us have found that (sorry) electric launch provides much more reliable launches when the wind misbehaves. I do keep a HiStart launched sailplane in my fleet but for sport flying taking a fully assembled electric out to the flying field is too seductive. I do realize that this attitude isn't shared by everyone and that's Ok. PPSS has now reduced the CAM altitude allowed to 80 meters to match up with the typical altitude gained by a HiStart sailplane. You can order the "TALES" CAM from Soaring Circuits with 60/80/100 settings. Price is the same. <https://www.espritmodel.com/soaring-circuits-competition-altimeter-cam-ales.aspx>

The problem with electrics flying in competition with HiStart Launched sailplanes is primarily one of weight and drag. Electrics as typically built are 2-3 ounces heavier than a string launched version. Also it is generally accepted that electrics have more drag of up to 5% (Joe Wurts) during the glide phase. It is true that HiStarts often can give very low launches because of wind behavior while they can give stronger launches when the wind is high and right down the line. Regardless of all these in and outs, the purpose of this article is to list some suggestions on how to build your F3-RES electric to get into the same weight range as the line launched version. In this case we will use the popular Yellow Jacket from Sonoran Laser Arts by Corky Miller. <https://sonoranlaserart.com/>

Corky has two basic designs of the Yellow Jacket. One is for electric and is a fair amount bulkier being intended for fairly large components. I have built one of those and it is a reasonable performer. However this effort will use the string launched version sold separately and that design is slimmer and perhaps a bit less weighty as built. However we will make it even more slender and less weighty in our conversion. There is a GS version of the Yellow Jacket and it has a V-Tail. It can be converted in a similar fashion as detailed here.

First a few concepts:

We will specify smaller, lighter components such as motor, battery, servos, etc. and detail those components we used. The reader may of course find other components they prefer and that is encouraged.

This electric YJ will use a round firewall available from Corky and mount the Quadcopter motor on the front outside of the fuselage. Looks different but it is lighter and stronger at the risk of debris in the motor....so far not a problem. (see picture)

This particular motor is a Cobra 1960 kva item and has a 5mm prop shaft. It weighs 25 grams or ½ oz where most 22-28mm diameter small motors are going to weigh around 40 plus grams. The problem with most quad motors is that they are 2600-2800kva motors designed to spin very small 4" props at very high rpm. We would want 6-10" props that are more efficient to move our larger airframes through the air. <https://innov8tivedesigns.com/parts/brushless-motors/cobra-cm-2204-32-brushless-motor-kv-1960> (you may have to call)



Next is to find 30mm spinners so that the air will find that the motor and fuse will blend in a least drag conformation. As you can see above it should be practical. Also the prop will fold nicely against the fuse front end. This isn't easy to find as you have to shop around. The above picture shows an expensive GM spinner (Hyper Flight) and a 9x5" CAM prop. There are other inexpensive alternatives such as an aluminum 30mm spinner from Espirit and possibly Aloft as well. Since the motor has a 5mm" thick prop shaft you want to order that version of the spinner. from Espirit. This picture shows Jay Fullinwider's nicely built YJ. It flies very well on a 6x3"prop and a three cell battery. Propellers are available from Aloft or Espirit. Espirit has the best selection of prop sizes and also spinners.

<https://alofthobbies.com/>
<https://www.espritmodel.com/accessories.aspx>

You will make a choice which is to fly a less than 2000 kva motor on a two cell battery and larger prop (from 8" to 10") *or* a three cell battery on a 6-7" prop. The small prop 3 cell battery will go up more briskly and may be advantageous with ballast or in wind. The bigger prop, two cell battery will be slightly lighter and possibly have a lower drag prop fold.

The three cell battery with a bigger prop will kick out your ESC which doesn't like to be asked for more current than it is designed for in case you were wondering.

Ok, working backwards to the battery....We have used Tattu batteries from Aloft Hobbies, either 2 or 3 cells depending on your choices.

<https://alofthobbies.com/tattu-450-long-2s-75c-xt30.html>

Also the Nano" Bolt batteries from HobbyKing are good. All of these components are inexpensive relatively speaking. The motor on sale costs \$5.55! Yes, you want 65-70c batteries.

All of these prop/battery variations will need a 15-20 amp ESC (speed control) and since I have only ever used Castle Creations with their Castle Link set-up device that's what I use. It costs \$23 from Amazon. You can find cheaper stuff out there however I feel the ESC provides motor power and then drives your radio for the rest of the flight. It is the hardest working and most critical component in the airplane and I want to trust it without reservation. Allow your parsimonious self to tinker with other stuff than the ESC. I use the 15 amp Talon ESC. It is small and light.

<https://www.amazon.com/Castle-Creations-Talon-Electronic-Controller/dp/B00HVMQZBI>

Arriving at the servo compartment, we found the Blue Bird Nano servos to have great specs although they are not experienced in our ships. They are 4.5 grams (!) with metal gears, digital or analog and one of them has a coreless motor. Three versions priced from \$14-17 available from FlightComp (USA)

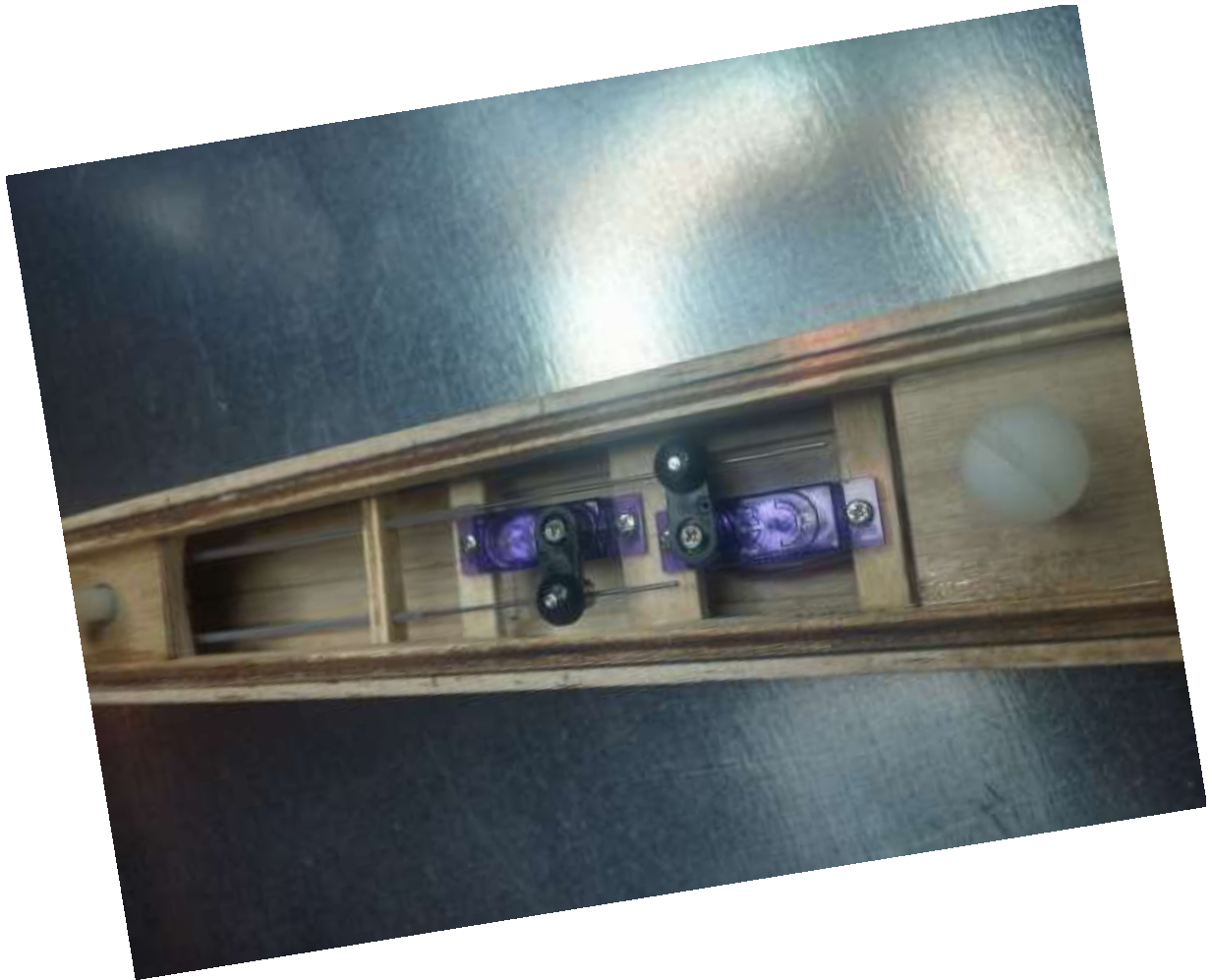
<https://flightcomp.com/collections/mini-micro-nano/products/copy-of-bms-101dmg-nano-digital-coreless>

and Hyperflight in the UK.

<https://www.hyperflight.co.uk/products.asp?cat=Servos&subcat=Blue+Bird+Servos>

Bob Radney buys similar servos for a lot less from Value Hobby

<http://www.valuehobby.com/radio-systems-servos/servos/power-hd-dsm-44-digital-micro-servo.html>



This picture is Jay's install showing the BlueBird servos. This is not a quarter scale fuselage! Jay did all the prototype work on this concept and did it well. If you build our modified version of the yellow Jacket you will need to taper the front part of the fuselage down to match the O.D. of the round firewall. Then cut about 1¼" off the supplied canopy and glue it permanently in place. Since we want to make the fuse as round as practical we glued in spruce tri-stock for the first three inches for good shock strength and to allow one to carve a more rounded fuselage to match the 30 mm spinner shape. You should be fairly aggressive doing this but it is hard to do so. I tack the ¼" balsa canopy in place with CA while I do the carving. It is easy to separate it after shaping with your shop knife. The round firewall comes with several lightening holes and you will need to enlarge one of them to allow the motor wires to enter the fuselage. Getting the mounting screws into the back of the motor is of course a fussy bit but it can be done although difficult.

After finishing the fuselage you can use your favorite covering technique. Keep in mind that although Ultra Cote is the most popular method you can just use a clear coat leaving bare balsa in place. Very popular with free flighters for a light choice.

The prototype weighed in at 15 ounces and flies very well. The three cell choice will add a bit more weight but not much. This is a fun project actually and not too much more work than building the excellent standard kit.

I realize these instructions are a bit sketchy so if you need to discuss things just let me know preferably by email: carranrey@gmail.com

Regards, Randy Reynolds

Here's a few more pictures



This is the 6x3"

Prop with a three cell battery. This is a high rpm version which Jay likes!



Here you can see why one needs to not make the cowl too big as you need to get in there to install the motor screws which come with the motor itself.



You want to make it round for streamlining from the spinner shape. Takes courage!