

Electric Control Line Combat Part 2

This is the second article about Electric Combat. To recap, electric powered control line combat could be a great addition to the existing UK classes because it has a number of benefits and could appeal to a wider audience. The Combat Flyers Association is a UK based BMFA specialist group that oversees Combat in the UK and organises all the competitions throughout the country. One of the Association's roles is to establish new classes of Combat to arrest and reverse the decline of Combat in the UK. I'm Secretary of the CFA. The specifics of this class have now been published on the CFA website [Control Line Combat](#). There is an introduction page and also a full set of rules with a detailed list of the equipment required

This article covers the equipment needed and the proposed rules.

Rules First. These are the main points. The full version is available on the CFA website

Equipment.	Everyone has exactly the same motor/battery/prop combo. See below.
Lines	14 m handle face to model centre, 10 kg test pull before every bout. lines must be 25 lb braid. Steel lines not allowed.
Motor control.	Transmitter and Receiver. Effective instant shutoff.
Models	No Restrictions on design, size or materials
Bout	4 minutes, if you crash your bout stops and your airtime stops.
Scoring	Airtime is 2 points a second, at 4 minutes you get a 100 point bonus
Cuts	First cut 100 points, 2nd cut 200 points, 3rd cut 250
Competition	Everyone flies the same number of bouts, highest total score wins the day
Safety	Site marking and procedures detailed in the full rules.

Here is some detail.

Motors. these must be Brushless Outrunner design size 2212, 1400 kv*. The brand is XXD but often appear unbranded and are freely available. They vary enormously in price but I get mine from Aliexpress at around £4.00 each. They come with a radial mount, all the screws and a spinner. They are easily identifiable gold coloured motors and work very well. See the pictures. Always buy with 3.5 mm bullet connectors to fit straight on the ESC

** 2212 is the physical size of the stator inside the motor, 22 mm by 12 mm, the motor itself is bigger and weighs 68 grams. The 1400 kv rating is measurement of how many revs it will do under no load per volt. The battery is 11.1 volt so 11.1 X 1400 is how fast it will spin. This suits the 8/4 prop perfectly.*

Prop. 8x4 electric motor prop. The ones I use are orange and cost around £2.75 for 10 props. You read that correctly. Perfectly suited to this motor/battery combination, they break easily but they're 27p each!

ESC Electric Speed Controller, A 30 amp ESC is ideal for our needs. The ones I use and recommend are also from Aliexpress, again unbranded, yellow in colour, make sure you buy the ones with Bullet connectors to fit the motor and an XT60 connector to fit your battery. This saves soldering connectors on to bare wires which is a chore. These are around £3 to £4.00.

Battery. These must be 3 Cell (3s) 11.1 volt Lipo batteries. I use Zeee "shorty" 1300 mah

batteries which are sold in pairs for £21 to £23 on Aliexpress, free delivery and they are delivered in a couple of days from a UK warehouse. Choose the XT connector to match the ESC. The same item is available from a host of other suppliers but at a higher price. There are thousands of batteries but these do exactly what is required and if everyone uses them it will ensure equal performance. Coupled with the little 2212 XXD motor the 1300 mah ones will fly for 4 minutes after a full charge and leave 28% charge in the battery, which is ideal. Running Lipo's flat is a bad idea. The Zeee battery is also quite small for its output, which is a help when trying to get all the electrics in one small compartment.

Transmitter. As I mentioned in my first article, I am sure some readers will expect us to use timers. A transmitter is a better idea. With a timer, if you crash, the motor/battery will try to keep running, which will result in damage, probably to the ESC. With a transmitter the pilot has full control, he can start the motor and stop it immediately if he crashes and he can stop it immediately and if we need to stop the bout for any reason both pilots can hit the stop button. I use a simple boat transmitter and I use channel 5, not the throttle channel. This gives me a push button stop/start. It also prevents me from throttling during a combat bout which is a really bad idea. Aliexpress again, I paid £16.00. including a receiver. As long as your transmitter can fulfil the requirements, then it's OK. Timers are not.

Spares, you'll need more props so be prepared to invest another 3 quid for another pack of 10 and you might want to get some spare shafts (£2.75 for 10) and 3 mm circlips, 60p for a pack.

Lines. 25 lb Braided fishing line, I use a make from Aliexpress (sorry) called Proberos and up to date it's been great, very low stretch and it comes on a 300 metre spool for about £4.50. Braid is compulsory, we can not mix steel lines and braid line because braid will cut steel. You can also buy ideal line reels on Aliexpress for less than £2. Handles are not so easily available but they are easy to make, I'll do a drawing of mine in the next instalment. I'll put a video on You tube how to tie the braid loops.

So far, the total cost, without the airframe for 2 motors, 2 ESC's, 2 Batteries, 10 props and a TX/RX and several sets of lines is around £60.00. You will also need a charger, I have a couple that cost about £3 each and take 4 or 5 hours to charge a battery, I'm not sure whether to buy another couple of batteries, which would give me 4 flights, or a field charger, which will cost more but be handy to have.

NB, no, I'm not on commission from Aliexpress, I just find it the cheapest place to get stuff. By all means support your local model shop if they stock the necessary equipment and materials. You'll need wood, glue and film to build your models so there's that.

For this class to work, it is important that we all use the same gear. Not just the same but identical. The Motor and Battery combination is vital. Electric motors of the same dimensions and KV from different manufacturers vary. The same spec and size motor from manufacturers such as Volantex, Xfly and Emax, all well know manufacturers will be more powerful than the unbranded ones I propose we all use. They will also cost more. If we all have the same motor/battery, then we can enjoy fair competitions, everyone will have very similar performance and the competitions will not be dominated by someone using better gear. Additionally, combat can be brutal on equipment. Electric motors are pretty fragile things, so if you crash them, it's possible you could bend the shaft, I have mentioned spare parts but even if you manage to write your motor off, then you just lost 4 quid. Not the end of the world is it?

One variable factor is the model, there are no restrictions so the the choice is yours. I will give some details on my balsa model designs next episode but at this point I don't actually know what will be the best design strategy. Remember, the bout starts and you and your opponent fly combat, you get a whole lot of points for simply completing your bout, 580 points, (4 minutes is 240 seconds, 2 seconds a point gives you 480 points, plus a bonus for getting to the 4 minute mark.) I would think, and I hope, that this would make competitors fly more strategically. Is it worth going for that risky cut if you might end up crashing, at which point your airtime ends and you lose your 100 point bonus? So model designs need to take this into account, they don't need to survive a ground hit, so building them really strong isn't necessary. I think simple profile designs that fly nicely and turn well could be a good alternative to the more usual flying wing models.

I'll explain how I see a competition working, let's say we get 10 entrants. One will need to be the CD or overall judge, normally this will be the organiser. A centre circle will need marking out, 2 metre radius, plastic sport cones are ideal. Then a scoring station and pit area with a table and 2 chairs, set up 23 metres from the centre, marked with barrier tape or more cones. A launch area should also be set up at 17 1/2, metres, in front of the scoring station, again, more detail in the rules. Required equipment is three stopwatches, one for each scorer and one for the judge, score sheets and results board. The draw should be done before the competition, the only proviso is that each flyer must fly a different opponent in each round. So if there are 10 entries, there will be 5 bouts a round, 4 rounds will give 20 bouts. At the end of the comp, the CD tots up the points and names the winner, runner up and third place. This format lends itself easily to a league which could be run annually. One important thing is scorers, scorers work in rotation, you launch and score the bout before your own. No exceptions. This is fair, there are no pit crews so there isn't much to do That is basically it. The full proposed rules are in the 'Electric' section of the CFA website [Control Line Combat](#)

Typical outcomes,

Flyer one flies the full bout but doesn't get any cuts, Flyer 2 gets one cut but crashes at 2 minutes and 23 seconds.

Scores First example

- Flyer one score 240 seconds airtime = 480 points plus 100 point Full Bout Bonus = 580 points total
 - Flyer 2 score 2 minutes 23 seconds airtime = 143 seconds = 286 points, plus 100 points for one cut so his total is 386
- Flyer one wins.

Another example

Flyer one takes one cut and crashes at 3 minutes 46 seconds, Flyer 2 takes 2 cuts and completes the bout.

- Flyer one score, 3 minutes 46 seconds is 226 seconds, so 452 points plus one cut at 100 points, total points is 552 points
- Flyer 2 score 2 cuts, cut 1 is 100 points, cut 2 is another 200 points, full airtime is 240 seconds or 480 points + Full Bout Bonus of 100 points, grand total is 880 points.
- Flyer 2 wins.

For those that know a little about control line, the performance of the setup that I have described is similar the old Half A combat we used to fly in the 1980's with PAW 1.5's and

film covered models, except the models are a bit bigger, the lines are a bit longer and the line tension is a bit better. It is fast enough to give decent line tension and slow enough to give pilots a chance to think. It isn't meant to replace any of the current classes but rather to fill a gap where nothing currently exists. If this class does generate support, I imagine it will come from club and sport flyers who dabble in control line. Maybe sport flyers who fancy a go, hopefully those control line flyers who take their youngsters flying would encourage them to have a go. I hope so because it has many attractive features:

- It's very, very cheap
- All the gear is easily available
- It's slower than the current classes which give everyone a little more time to think.
- There are no engines to start or set and no fuel tanks to make
- Simple, easy to build models
- Start/stop button to start the motor and stop it,
- It's fair, a totally level playing field.
- Competitions are easy to run
- It isn't a knockout so you get at least as many bouts as everyone else.
- You don't need a pit crew, turn up on your own.
- You don't need to pit other people, fly your bout, score a bout then relax
- I think, (and I could be wrong), that there will be much less carnage.
- Design your own stuff, which is interesting
- You could be the first flyer to achieve 1130 points!
- It's clean, you don't go home smelling of diesel.
- Combat is great fun.

At this point we have no idea how much interest this class will generate. If you are curious as to how this develops and would like to be kept up to date, please email Tim Hobbins at tim.hobbins@gmail.com and I will send email updates to begin with, this may develop into a newsletter if there is enough interest.

That's it for this issue, in the next instalment I will share my thoughts on model design and explore the possibilities of what materials and designs we could use. Also a little about making lines and some combat basics.