The development of a flapped F1A model: Lord Flash 4

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A first flapper is built

Lord Flash 4 is my first flapper, for which I have built now the second pair of wings. The first pair, that I designed and made together with Evgeny Kantipaylo, were too heavy and had inadequate hinges for the flaps. On the updated new wing I used the D-box from the first prototype wing and I rebuilt the back part behind the D-box completely (Fig. 1). Learning my lessons from the first wing, I tried now to make everything as light as possible. On the first wing I also had big problems with the flaps being too flexible in torsion. I use flaps on the whole wing, both on the centre panels and on the tip panels. On the first wing it was difficult to control the tip panel flaps with the movement from the centre panel flaps, because, as I have already mentioned, the flaps were too flexible. To solve this problem, I had to recur to a complicated system with lines to the tip flaps, and this was heavy and not easy to set up on the field.

The initial flap set-up is improved-vastly

On the new wing the flaps are much stiffer and lighter - the diagonal ribs seem to have solved this problem. On the first prototype wing I had a hinge system that required quite big slots on the top and the bottom of the wing at the hinge location. I noticed that this alteration to the airfoil and the extra weight of the wing spoiled the gliding performance.

On the new wing I strived to keep the airfoil as perfect as I could when the airfoil was in gliding position. I used nylon radio control hinges, four on the centre panels and three on the tips. All along the flaps, over the hinges and also over those places that have no hinges I put a transparent plastic tape that works as an additional, continuous hinge. It is really lightweight, and I feared initially that perhaps it was not strong enough. I put the hinges on the top of the wing in order to avoid a slot on the airfoil at the hinge position when the model is gliding. With this system, I only have a small bump on the top of the wing, along the hinges, but otherwise the airfoil looks quite unchanged in the gliding position. Of course, there is a big gap on the bottom of the airfoil when the wing is flat, during towing and bunting, but my idea is that this is preferable to destroying the gliding performance.

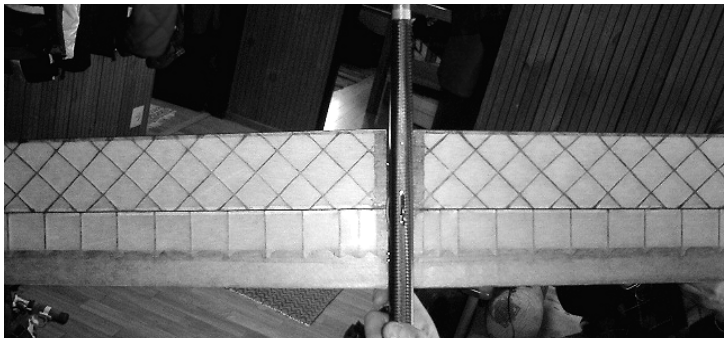


Fig. 1 The new flap structure, lighter and torsionally stiffer

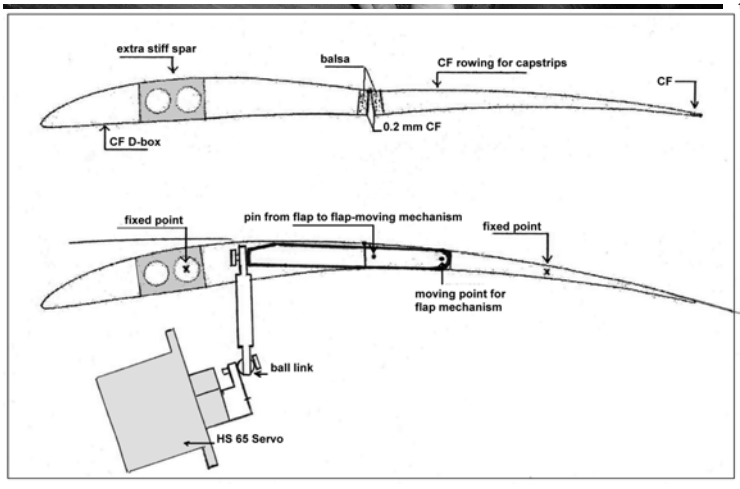


Fig. 2 The flap-actuation mechanism of Findahl

The flapper actuation arrangement

The flap mechanism on my model is really simple, see Fig. 2. (The servo head moves 180 degrees from flap down to flap up) The idea comes from Jes/Gerhard Aringer's flapper mechanism. It has worked fine while testing both sets of wings. The bad part is that I can't use a wing-wiggler at this point, but perhaps I can make this arrangement later on.

So, what have I to say about flying the flapper so far? The good starts (zooming and bunting) are really good, it is possible to reach 90 meters. I have not yet tested it long enough to be able to say if my lightweight construction in the flaps and hinges is strong enough, but during the test flights so far, perhaps 60 flights, everything seems OK. I'm pleased with the weight of my second pair of wings - 204 grams is a good achievement. The first prototype wings weighed 240… The weight for the whole model came down from 456 gram to 418.

I can also say that the "not so good flights" are really bad. The speed is high and if something goes wrong, the model seems to come down really quickly. The margins are for sure smaller with this type of model. But I am still experimenting with the sequence of flap motion during the flight.

Flap sequence in flight

The way I'm doing it at the moment is this: the wing is flat (flaps up) during circling, and after the bunt the flaps come down, making the section undercambered. The optimal way would be to have the section undercambered during circling (Fig. 4) and only raise the flaps during zoom acceleration and during the bunt (high speed), (Fig. 5). But it seems difficult to achieve consistency in the flap position at every flight, when the wing and the flaps are bending under the high line tension during the acceleration. So, I think that a step in the right direction would be to have the flaps up (flat section) during straight tow, and then lowering them (undercambered airfoil section) during circling, but I have not tried this setting yet. The model is moving quicker on the line with the wing flat, and it is also a bit more difficult to control. It seems as if the rudder is not working well when the model is flying at some specific speeds and angles. Remember that the airfoil is very imperfect in this configuration! Perhaps it is necessary to change the fin area or/and rudder area to make the model more

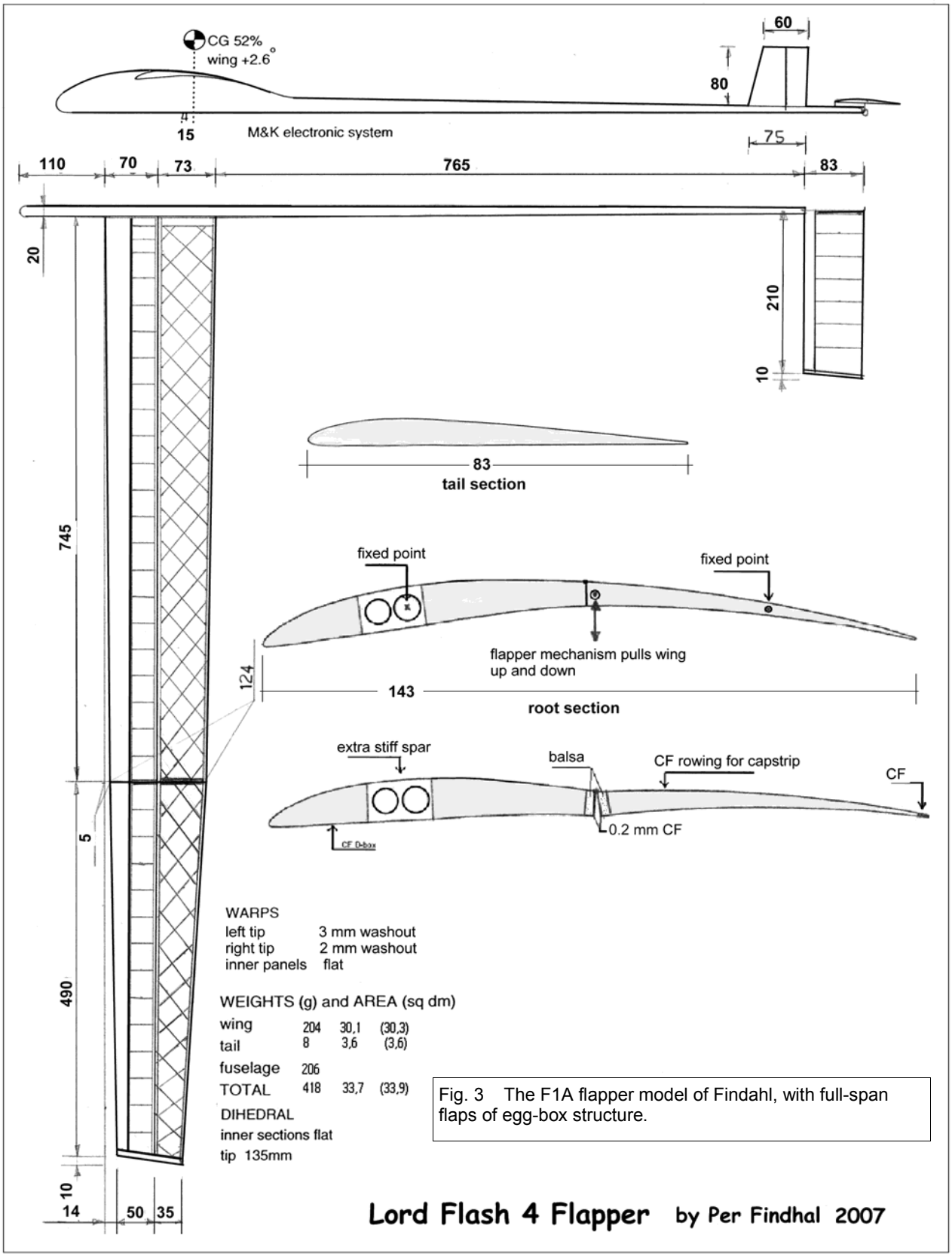


Fig. 3 The F1A flapper model of Findahl, with full-span flaps of egg-box structure.

responsive.

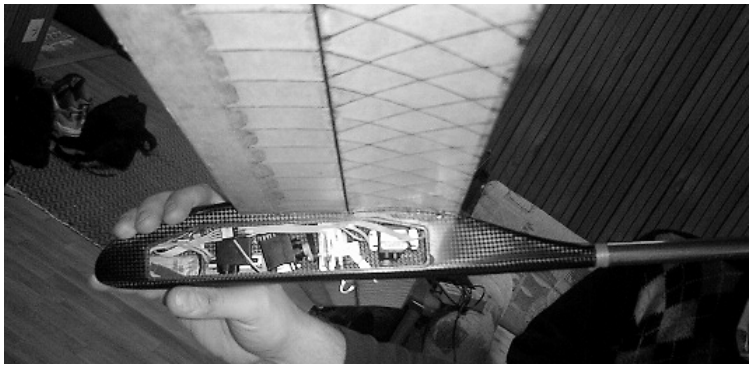
To flap or not to flap, that is the question….

Now a philosophical consideration on the issue of the flapper F1A model: is this really good for our sport? There are many pros on this question if flapper flying is going to work well, and I'm quite sure we will see good working flappers in a short while. The gain in altitude in the launch is impressive. It is spectacular to see, and, if the gliding airfoil is good, we will for sure see a gliding improvement of more than 1 minute. Personally, I can say that I also enjoy a lot developing this new kind of model; it feels like a natural step in the evolution of our models, it is great fun.

But there are also some cons... Our models will be more complicated, lots of new expensive technology. Perhaps the flapper will have the same negative influence for F1A as the folder has been having in F1C, scaring people away from our sport. The worst scenario I can think of is that the really keen, top flyers will buy or make flappers, thereby we will lose a lot of flyers who feel that this new technol-

Fig. 4 (top) Flaps have been lowered, conferring the airfoil an ample undercamber of 7.8% at 47% chord,

Fig. 5 (below) Flaps in the UP position. Note the HS 65 servo below the D-box. The airfoil section has an almost flat bottom in this position



ogy is too complicated and expensive. This scenario is not what I would like to see in our beautiful sport. So my question is: Do we really want flappers to be allowed in F1A?

I can see a lot of arguments in my discussion pointing towards forbidding flappers. There are also problems in smaller fields, when flying a flapper that flies much higher and longer than the conventional planes. There will be some guys, of course, making some money now if the flapper looks so great, selling new complicated and expensive models, but in the long run, business might not be so good if we lose flyers.

Are flappers to be forbidden?

OK, we have not yet seen a flapper winning any big contest, and perhaps it will be shown that my fears are perhaps premature, but I think it is time now to have this discussion. If we are to forbid flappers it will be much more complicated if we do it later, when a lot of flyers have already developed good working flappers. As much as I like the really open rules in our sport I also feel that we must protect the sport from losing too many flyers. So, perhaps it is time to set some regulations in place, so that people will not stop flying F1A. As much as I like to be the winner in a contest I like to be with a lot of "flying" friends around me, not almost alone on the field with only a few of my friends with flapper models.

In the end, most of the time the winner will be the person finding the best air, as can be seen today in the F1C category, with conventional models winning some contests, but the complicated technology might still scare people off♦.