

Spoiler Systems

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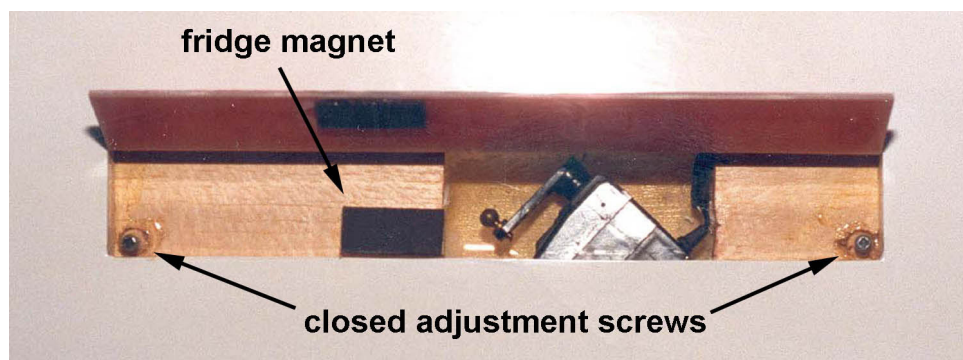
Working on the wing of a new 100-S thermal soarer recently, installing the spoiler system, it struck me that an article on the system I use might be of interest to others.

I can't claim to be the originator of this idea as I was originally shown this system by my friend Tom Preston, but I have been using it exclusively now for a number of years and have found it to be marvellously trouble free.

There are numerous systems available for the operation of spoilers and I have tried them all. Most kits and plans advocate the use of cords running through tubes in the wing to pull up the spoiler blades or torque rods running through the wings from levers in the fuselage. I have found these methods difficult to construct accurately and fiddly to adjust properly.

Tom's answer to this problem was to install a couple of micro servos in the wing to actuate the spoilers directly. Now you may say that there is nothing new in this concept, but it is was not so much what he did that was clever but how he did it.

As I said, it is not a new idea to place a servo under the spoiler blade so that when the servo arm rotates the spoiler blade is pushed open. The problem has always been getting enough movement from the arm to move the blade to a fully open position. There has also been the problem of the blade being blown back if the servo is not strong enough. Tom got round these problems by mounting the servo at 45° to the blade. The servo is mounted in the centre of the spoiler box, with the output shaft a little back from the blade hinge line. A long straight arm is mounted on the shaft and a ball fixing from a ball and socket linkage is mounted at the end of the arm. It should be noted that it is a good idea to centre the servos and fit the servo arms before they are finally glued into the wing. This saves a lot of fiddling about and swearing at a later stage when you find that you can't get access to fit the arms. It should also be noted that both servos are fitted in the same directional sense so that they both operate together to open and close.



As the servo arm rotates from the horizontal to the vertical it wipes at an angle across the underside of the spoiler blade. The way that the servo is now positioned allows the servo arm with the ball fixing to raise the spoiler blade vertical to the wing surface. Also, since the arm is at an angle to the blade when fully deployed there is less rotational force on the servo itself, meaning less chance of it being blown back.

It is very easy to build a servo into either a fully built up wing or a foam wing, the servo being glued permanently in place. I usually line the servo box in foam wings with 1/16 inch balsa. This keeps it nice and tidy and saves the foam inside of the box from eroding away. The leads from the two servos, one

under each blade, go to a "Y" lead in the fuselage where they are connected to the brake or throttle output of your receiver as normal.

The spoiler blades that I use are made from aluminium sheet or epoxy board (printed circuit board with the copper removed), my preference being for the latter. I find that epoxy board is easy to cut, won't warp and is available at "all good model shops".

You will notice from the photograph one or two other features. In each rear corner of the spoiler box a short section of dowel is glued vertically into a drilled hole. The dowel is in turn drilled and a short self-tapping screw is inserted. These screws form the seating for the spoiler blade when closed and are infinitely adjustable to get a flush fit with the upper surface of the wing.

The black rectangles, which you can see in the photograph, are short lengths of plastic magnets (fridge magnets *). These are glued, one to the spoiler blade and the other to the spoiler box, and keep the spoiler blades shut whilst in normal flight.

In practice I have found this system simple to build and to set up. I have never had a failure in flight or on the ground, nor have

I had to dig a servo out of the wing for stripped gears. Some of you may already be using a system like this, in which case you can sit smugly in your armchair and nod your head. To others it will be a revelation similar to my own all these years.

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(I don't know if they make fridge magnets differently in the UK, but ours are very strange. Placed face to face they repel each other! This baffled me for some time but eventually the scientist in me won through. For reasons known only to the manufacturers, our fridge magnet strips are magnetised across the length of the strip but, even more confusing, they are doubly magnetised so that, looking at a cross-section of a strip, **both outer edges are north** poles and the **centre of the strip is south**!*



This means that two pieces will only attract each other if offset 50% to one side.

It's also worth noting that for some reason, the back (grooved) face is less strongly magnetised than the front (flat) face.

All this means that magnetic spoiler-closers need to consist of one magnet and a small iron washer or piece of razor blade glued to the underside of the spoiler. JL)

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