RCRCM Airframes:

Flap/Aileron Installation notes by Mike Evans, UK

The master himself...

The text and pictures within this build detail the installation technique that I have used on my F3B and F3J sigma II airframes, but can be applied to any RCRCM or similar airframe with bottom hinged surfaces.

With a few detail changes as I was building two sets of wings each to have identical installs - It has worked so well that neither wing requires any sub trim over the other.

This text and pictures are based around my FS3 flap servo installation. (Crossover type installation for bottom hinged surfaces using flap offset mix)

I.E:

The servo will be fitted onto the top skin of the wing with the arm facing downwards and servo shaft closer to the wing spar than the TE.

The pushrod will cross bottom to top exiting through the top skin to meet the top mounted flap horn. The transmitter will be programmed to give a flap offset mix.

Before you start:

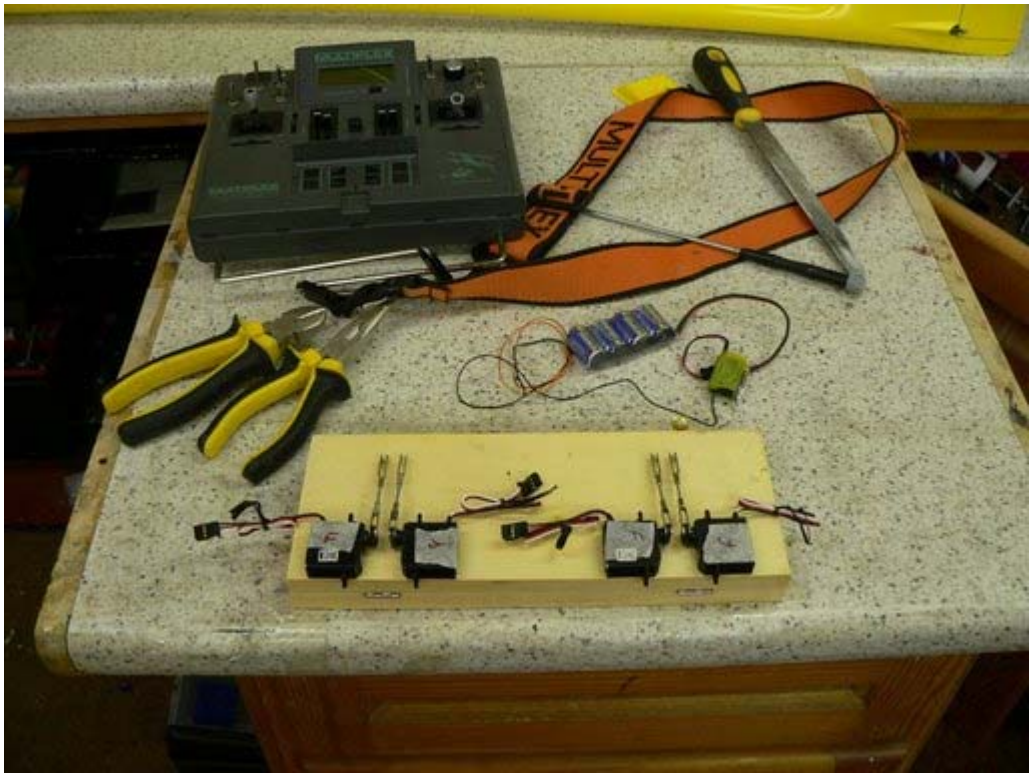
IMPORTANT - don't use this technique if you are unable to offset the servo centre position by approximately 25deg/95deg.

IMPORTANT – much of this technique can be used for aileron servos installation - **just without the offsets**.

Preparation:

- Calculate the length of push rod needed by rough placing the servos inside the wing and measuring with a ruler. It can be a best guess, and if you are out a few mm either way then it won't matter.

- Make up the rods so that a clevis is soldered to the servo end and short threads are left at the opposite end for the flap surface clevis.



On the bench:

- Plug the two servos into a receiver and move them both to maximum deflection in opposite directions. (Use a clean aileron input into each).

- Switch off the receiver to freeze the servo at that position.

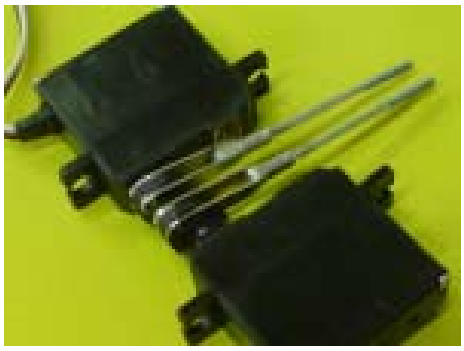
- Using the shortest servo arm available, usually around 7 to 8mm centers, fit the servo arms so that each of them is positioned at the maximum rearward position. This will be when the servo arm is pointing directly at the hole in the flap horn.

- Experiment with different arms until you find two that give very similar locations on the Splines. With Futaba 2, 4 or 6 splined arms each have a

slightly different angle from the centre so it's important to get a matched pair.

- Switch on the servo power again and check the alignment.

- Fit the two push rods onto the servo arms, then use the transmitter to move both servo to their maximum opposite direction and switch off.

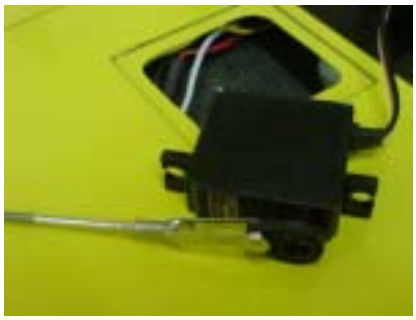


- With the servos sitting head to head on the bench the clevises will now be fouling the servo centre shaft and forcing the rods to be pointing 45deg up away from the bench.

- Grind the clevis keeper and also clean up the servo arm to allow the rods to almost touch the bench at the point where they start to foul. Make them both identical.

- Remember that when the flap clevis is attached they will be longer. You may not be able to achieve full forward deflection of the servo, so you will need to make a judgment call as to how much you are prepared to remove from the clevis compared to how much loss of rotation you can afford. You should be able to get somewhere around 110 deg total without too much trouble.

- With the servo arm as far forward as possible (transmitter driven) trial fit the servo into the wing. Screw on the second clevis and attach to the flap.



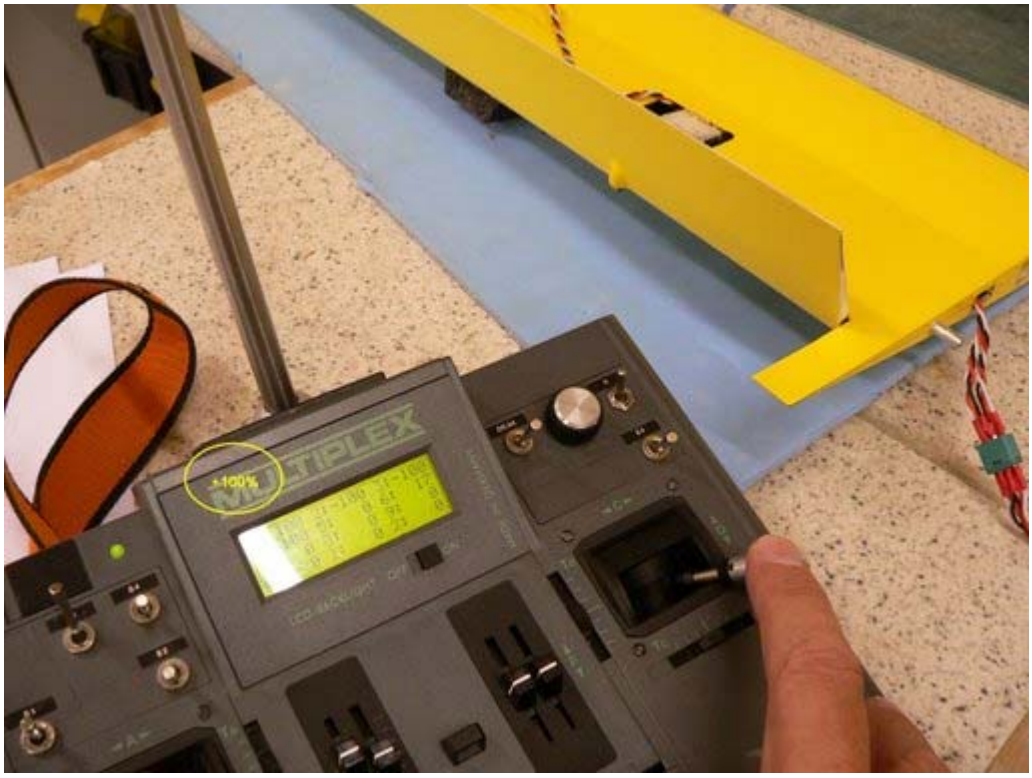
- With the servo arm at its furthest forward rotation and everything connected up hold the flap surface deflected by the maximum amount of up aileron you require. Now adjust the rod length to position the servo appropriately in the wing pocket. Don't be greedy with the amount of up flap; 5mm up at the root is about right. When you are happy, manually force the servo arm around slightly until the flap surface is level.

- Now remove everything and solder the flap clevis onto the rod at that position. Make the second rod EXACTLY the same length and solder together.

- Position the second servo's rotation point by using the transmitter, to approximately match the one just removed. Take a reading off the transmitter as to its position. Set the first one, using the transmitter to the same position. This will be the rotation point where the surface is level. Aim for both to be identical.

- Now connect everything up, with the servo powered at the position that gives a straight flap surface. Make a transmitter output channel that has the appropriate offset so that the servo will stay put, it will be around 75% deflection

- Keep the servo powered up while you do this.



- Then add some glue to the servo pocket and tape the flap surface straight and check that the pushrod runs perpendicular to the surface hinge and runs through any exit holes cleanly.
- Now simply allow the servo to find its natural position in the wing and then squeeze it into the glue bed.

- Hold the servos in position while they dry by placing a weight on the servo. The addition of a small piece of blue foam sitting on the servo creates a

raised area for the pot to sit on.

- Don't use much weight - just enough to keep everything still, you don't want to deform your skins. Use 30 minute epoxy and a filler such as Micro Balloons.

- When everything is dry and the servo is switched on to a clean channel it will centre with the flap surface deflected down by around 30 degrees. You now need to apply a flap offset into the program to bring the surface back to level.

- Standard servo rotation is 120 deg (+- 60deg) Usable rotation with a crossover installation is probably closer to 110 deg. But by using flap offset this can be set up in the region of +20 -90deg.

NOTES:

1. Please do protect your servos with tape or cling film (saran) if you don't want them permanently bonded in!

2. With most modern moulded airframes, the angle and length of the wing control horns are predetermined and fixed so no adjustment is available.

3. The amount of down flap will be the maximum achievable with a short servo arm mounted inside the wing skin. More down flap can be added at the expense of up flap (aileron mix).
   So when deciding how much up flap you need – do not be greedy – take a realistic approach.

4. If you do want more of everything then you will need longer servo arms, which bring their own problems as they may or may not fit under the blisters of the servo covers.

5. The installation is not geometrically perfect for minimum slop at level; the servo position is not perfect for that but gives advantages at other points of deflection.

6. At maximum deflection the servo arm will be directly in line with the push rod – which will save the servo gears if you are prone to landing flaps down. It also gives the servo maximum torque just at the point where it is needed most.

Many thanks to Mike for this!

James D. Hammond, RCRCM Designer.

Are we having fun yet?

Now this is what it's really all about!

Pilot's control setting notes:

Ailerons	**+**	**-**	**Crow**	**+**	**-**
Flaps	**+**	**-**	**Crow**	**+**	**-**
Live	**+**	**-**	**Crow**	**+**	**-**
Elevator	**+**	**-**	**Crow**	**+**	**-**
Rudder	**+**	**-**			
Climb	**Ailerons**	**Flaps**	**Elevator**		
Dive	**Ailerons**	**Flaps**	**Elevator**		
Race	**Ailerons**	**Flaps**	**Elevator**		
Mix 1					
Mix 2					
CG					
Ballast					