A common problem occurs when people set up their flaps on six servo gliders using Futaba transmitters. I don't have experience with other transmitter brands but I suspect the same thing happens with some other brands as well. If you follow your natural instincts when installing radio gear in the model, you will likely just set all servos to their normal center position (by making sure that all mixes are off and the transmitter trims and sub trims are centered) prior to installing the servos and making up the linkages. This is the correct thing to do with most of the servos since you want the servo centered when the control surface is at zero deflection. If you do this with the flap servos, though, you will create a problem. If you set the flaps at zero deflection (somewhere around cruise or speed camber, wherever you would naturally have them when setting up the linkages) with the servo centered in its range, then you will only leave yourself with half of the servo's maximum travel to deploy the flaps. At the same time, you will have the other half of the servo's travel available for up travel of the flap. Since up flap travel is very minimal (only used for reflex and/or some aileron to flap mix), you will be wasting most of that half of the servo's travel.

The symptom of this problem is that you will find it very hard to get 90 degree flap travel with only half of the servo's travel available to do the job. Many people, upon seeing this problem, will just put a long horn on the flap servo and a short horn on the flap itself. This can sometimes get the full 90 degree travel but at the cost of sloppy linkages. Tight linkages are obtained by using the shortest possible servo horn and/or the longest possible control surface horn that is consistent with getting the desired deflection. In other words; to get tight linkages, you want to get the desired flap travel using the greatest possible amount of flap servo rotation. Using only 50% of the servo's travel will magnify some types of servo and linkage slop into a sloppy flap position. The solution to this problem is a thing called "flap servo offset".

Flap servo offset is just what we call it when you move the flap servos off of their natural center prior to setting up the linkages. You need to do some programming in the transmitter that moves the servos off center (offsets the servos) such that they stay in that position when the flap control is set to the retracted position (usually, left stick forward). After many years of Futaba programming experience, I finally set up a little test rig to see what maximum flap servo rotation was available for flap deployment and how best to obtain that maximum rotation. I have attached a couple photos of my test rig. The test rig revealed a number of things:

1) Maximum servo travel with ATV (Adjustable Travel Volume) set to 100% is 80 degrees (40 degrees each way). With ATV set to 140%, you can get 110 degrees of servo rotation (55 degrees each way).

2) It was possible to get up to 104 degrees of rotation available for flap deployment. You generally wouldn't want that much rotation for flap deployment since you want to leave some rotation available for reflex, aileron to flap mix, etc. This 104 degrees compares to the 55 degrees that you will have available if you don't use servo offset and you leave ATV at only 100%.

I have not done an actual installation using this newfound knowledge yet so I don't know how much servo rotation should be reserved for up flap travel. The following example assumes that 90 degrees of servo rotation is used for down flap deployment and 20 degrees of servo rotation is reserved for up flap travel. Remember that you can get a total of 110 degreees servo rotation if you set ATV to 140%. Here is what you do:

1) Set ATV for both flaps at 140%. Set this for both sides of the flap travel.

2) Offset the flap servos by 50%.

3) Use 88% of flap stick travel for flap deployment. This is an arbitrarily chosen number but the amount of stick travel you choose will affect the total servo travel available for flap deployment. You set this amount within the butterfly mix menu. You would set this to less than 100% so that there is a small zone at the top of the stick travel where no flap deployment happens. That prevents accidental flap movement while working the rudder control.

How do I "offset" the flap servos?

There are at least three ways that work with an 8U transmitter:

1) Use two PMIXes. Set OFFSET as master and CH5 as slave. Set the offset amount (50% or -50% in this example). Leave LINK off. Select switch position "NULL" so that the mix is always on.

Repeat this with a second PMIX for channel 6.

That will offset both flap servos. You cannot use just one PMIX on CH6 with the LINK function on because that will offset the entire trailing edge. Using one PMIX on CH6 with LINK on is actually the way that you set up camber offsets that are switchable rather than variable.

2) You can use the FLAP TRIM mix in combination with FLAP to AILERON mix. Doing this would require that you set the channel six knob all the way to one extreme and leave it there forever. You would then enter 50% or -50% (for this example) in the FLAP TRIM mix. This will offset all four wing servos. You don't want to offset the aileron servos. Go to the FLAP to AILERON mixer and insert an offset in that mix to return the aileron servos to their original position. This is done by scrolling through the menu until the second percentage number flashes. Then press the two data input keys simultaneously. The aileron servos will return to their normal center and you will see either 50% or -50% on the display.

If that sounds confusing, I understand. I've done my best to explain it in words as clearly as I can but it still sounds confusing to me when I read it. The 8U instruction manual contains some information about how to do this (pages 73, 78) but it is quite clear that whoever wrote those instructions did not understand how this feature worked. Some of what is written is correct but some of it is just wrong or omitted.

The basic goal is to use the FLAP TRIM mix to offset the entire trailing edge but then to use the FLAP to AILERON mix to remove the offset from the aileron servos.

3) You can simply use subtrim to offset the flap servos. You would just run the subtrims to about 110% (max travel is 120%), leaving 10% of subtrim to use for trimming the flaps if needed. Doing this, along with using 140% ATV will give 70 degrees of travel for flap deployment. That's better than 55 degrees but not nearly as good as 90 degrees.

Flap servo Offset with a single PMIX

Tauno's post made me pull my 9C off the shelf and check to see if the flap servo offset methods worked the same as they do on the 8U. It is exactly the same on both transmitters. (***edit Oct. 11*** The 9C-Super transmitter has significant differences. See later posts in this thread)

I also discovered a way to offset both flap servos with a single PMIX without also offsetting the aileron servos, even when the flap->aileron mix is on. Its a bit hard to follow so you might want to fire up your 9C and follow it on the servo screen or follow it on the 8U by setting up a test rig like I did and also plugging in a servo to channel 1 (to see when the ailerons are centered).

Assuming a 50% flap servo offset, do the following. Where I indicate +/- 50% , I mean to choose either + or -, whichever achieves movement in the desired direction:

1) Activate the Flap->Aileron mix at 100%

2) Rotate the CH6 knob all the way to one of the stops.

3) Activate the Flap Trim mix and set it to +/-50%. Both flaps and both ailerons are now offset 50%.

4) Go back to the Flap->Aileron mix and scroll over to the second percentage number. Push both data input keys simultaneously (8U) or press the scroll wheel (9C). This will insert +/-50% for the second percentage and will remove the 50% offset from the ailerons, returning them to center.

5) Go back to the Flap Trim mix, leave it activated but reset the percentage to zero. This will offset all four wing servos again such that the flap servos are back to neutral but the aileron servos are now offset by +/-50%.

6) Set up a single PMIX as follows:

A) Set OFFSET as master and CH6 as slave.
B) Turn LINK ON
C) Set switch position NULL so it is always on.
D) Set the percetage to +/-50%

This will once again offset all four wing servos such that now the flap servos are offset again but the ailerons are back to neutral.

You are now finished. The net effect is that the flap servos are offset but the ailerons aren't. The Flap Trim mix is deactivated such that the CH 6 knob will not have any effect (as most people want it).

All you have really done is to offset the entire trailing edge with the single PMIX but you've removed the aileron offset using the offset mix that is internal to the FLAP->AILERON mix. The reason it takes so many steps is that you have to momentarily turn on the FLAP TRIM mix because the FLAP TRIM mix is used to set the offset percentage in FLAP->AILERON mix. It sounds screwy but that is the procedure for setting FLAP->AILERON offset within that mix. You likely won't understand this until you actually do it on your own transmitter and see it happen.

Last edited by Phil Barnes; Oct 11, 2007 at 05:42 PM.