Adjusting the CG so the plane flies easier

One of the first things I learned in competing in aerobatics is that the plane needs to be adjusted for the job. The worst thing for a pilot in a contest is to fight his plane. The pilot with the plane the better adjusted for his liking and skills will have an easier job. When he wants a straight line, the plane will do it without corrections. An inverted pass, a vertical up line or down line will be easy with a well adjusted plane.

An important part of the adjustments is the CG. Too forward (nose heavy) and the plane doesn't handle well. Too aft and the plane is unstable. We have to find the proper compromise. Start with the recommendation of the designer for the static location. The first method I use, once in the air, is very simple and applicable to any plane or glider. I set the plane at a good altitude with engine at idle and I adjust the elevator trim so it looses very little altitude. I then dive at 45 degrees from high altitude with engine still at idle and release elevator stick (the trim stay where it is). If the plane tries to go out of the dive by itself, it is nose heavy. If it increases the dive angle, it is tail heavy. I am looking for a smooth recovery. You could move the CG depending on the test result and do it again. This test is almost not affected by the engine side trust or down trust, neither by the propeller wash out.

What happens could be lengthily explained by an aerodynamic engineer, but I see it in a simple way. If the nose is heavy, the stab has to push down the tail in level flight at low speed. When the plane dives and speeds up, the stab gets stronger but not the nose weight. The tail goes down and the plane goes out of the dive. The opposite is true also.

The second test I use may not be done with all planes, since it needs to fly inverted. I look for a little touch of down elevator to keep level flight at normal speed. This allows for less use of elevator compensation in rolls for example. I also always check for the general behaviour of the plane so I feel confident with it.

I am sure you will enjoy your plane more once it is better adjusted. It is a lot more fun when it does what we ask for. Have a good season.

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Here is my new competition plane. It was built in 1995 by Jeff Stevens but still flies really well with retracts, JR servos, YS 1.20AC on pipe and APC 15-11. When you read this, I should be doing the first flights.