Gordy's Travels #1

"Gordy's Sailplane Balancing System"

In my travels I get to meet lots of RC Sailplanes.... and their owners. It amazes me how little we all know about trim and balance.

So often I see a plane flying that I know is way out of balance. It balloons, lands like a rocketing rock, and falls out of low speed, down wind turns, or just ends up a in a tree some where with its owner saying, "I don't get it, it just wouldn't turn!".

When I ask about how they balanced their sailplanes, they say, "Just where the plan said!".

Aside from the science involved in determining Center of Gravity, Center of Pressure and all those other cool terms, I find that to get a sailplane to fly at its optimum, you have to get the lead out.

After balancing one fella's plane, which moved its 'balance' point back about a full 1 1/2" from what the plan showed, I asked him a simple question.... You see that your plane flies the same at virtually any speed, it doesn't porpoise, and it lands as super slow. It turns on a dime and shows the smallest thermal...but its balanced way behind what the plan shows. Are you going to put the lead back in, so it balances where the plan showed, so it flies goofy again? He said yes he would because the designer must know the right spot to balance it at, since he designed it.
So he put all the lead back in and proceeded to put it in the top of a tree on the subsequent flight.
Go figure....

I hear guys say things like, "I like my plane a little nose heavy, it makes it more stable". Or, "If you get the balance point too far back, it gets too twitchy".

The first statement implies that 'more stable' is a good thing, so we should all fly an unbalanced plane. The second statement has a negative connotation, because of the word 'twitchy'.

The 'more stable' statement implies that the guy has through trial and error found the farthest balance point back behind or at the 'neutral' balance point, then added lead to the nose to get it just right. Which he didn't. Guys like this add lead to get the plane to balance slightly ahead of where the plan showed... really nose heavy. A plane balanced forward of the neutral point, takes more elevator to get the nose to raise, as in when you are low and slow, going down wind. That condition cause you to add more up to get that heavy nose to raise when there is very little air for your elevator to react against... causing you to pull even more

elevator. All that up causes the airflow to stop traveling over the surface, which causes a 'snap roll', what other guys would blame on a "tip stall".

The second statement has a negative connotation because of the word 'twitchy'. How about substituting a different word..and stating that a neutrally balanced sailplane is 'controllable'? Doesn't sound like a bad thing now does it? So if when the plane is 'balanced' it doesn't need much up elevator to raise the nose, you can reduce the travels or use dual rates to 'calm' the plane down at high speeds.

You've heard of the 'Dive Test'... probably the dumbest thing anyone ever came up with for checking balance. I hear modelers talk about it saying that when the plane is nose heavy, it will cause the model to pull up quickly and one that is neutrally balanced or tail heavy will 'tuck' or increase its dive angle as speed increases.

All probably true but goofy to be talking about in the context of Balance. A nose heavy plane has to fly with UP elevator trim, so naturally it will balloon with airspeed. More air passing over the elevator's surface gives it more authority. A tail heavy plane tucks because it has some down elevator, since a tail heavy plane flies a lot better backwards, that’s where the weight is!

But lots of things affect what a sailplane does at high speeds. Tail boom flex, causes a reaction on the pushrods, changing the position of the rudder. The shape of the stabs can put huge twisting down loads on its tips. Push rod flex can also create things like tuck.... but all this is still goofy to be used for determining optimum balance. Since when do we ever achieve and maintain those kinds of speeds when circling in a thermal?

There is never a good reason to have an unbalanced plane. Because the plan shows a CG, that doesn't ever mean it is the optimum balance point for the plane you built. (A lot of what we have done with CG comes from the Free Flight days, where planes were balanced forward so that if they got tipped into a dive they would pull up. We don't fly free flight, we pay big bucks for a Transmitter so that WE can decide when or if we want our plane to pull up.)

Here is a simple way to get your plane almost perfectly balanced before launching.
(Keep in mind that this system is easiest to use with a sailplane equipped with a full flying stabilizer, as fixed stabs bring decalage, or the alignment (usually mis-alignment) of the horizontal stabilizer to the wing, leaving the elevator to attempt to compensate for the two surfaces fighting each other.)

Its called " Gordy's Sailplane Balancing System", named after a brilliant, intuitive RC soaring legend.

On the bench, balance the plane on a couple of pencils, or your finger tips, at about 40% of the root chord, from the leading edge of the wing. (Root chord is the width of the wing panel at the center of the wing). (No I don't care what the plan says, unless it says 50%, then go ahead☺.)

Go do a few hand tosses to get the plane trim, so that hands off, it flies flat and level, not diving not ballooning…just a long flat glide. If your glide is heading downward, it's not a trimmed for a long flat glide!

Now, once trimmed as stated, give it a good toss, get it flying straight and keep your hands off of the elevator stick! The only important part of this system is the last 10' of its glide, so watch what the nose does very carefully. If at the end when the sailplane slows, the nose suddenly drops to the ground, GET THE LEAD OUT.

The nose dropped because the elevator ran out of power (air moving over it) to hold all that lead in the nose up. So start pulling lead. (Note! With each chunk of lead you pull out, you will need to take some up trim out, as the elevator is having to do less work.)

When finally your plane flies flat off the toss, and at the very end, the tow hook touches first, YOU ARE BALANCED, or at least as close as you can tell this close to the ground.

Next step, launch the plane and get it trimmed in the air for flat and level flight. Then flip it over inverted, your goal is to pull lead until almost no (that like almost NONE) down elevator is required to hold the plane inverted in level fight.

Now when your plane enters lift it will pop it's tail up like a dog in heat, as it is not being forced downward with compensating up elevator, trying to hold a lead laden nose from diving down. It will land like a feather, because it can be slowed to incredibly low flying speeds with out the nose dropping like a descending rock.

The bottom line is that it doesn't matter where the balance point of your sailplane measures, what matters is that your sailplane is optimized to be a 'clean' in the air as possible, that it reacts when told, and always maintains its attitude, regardless of air speed.

So get rid of that plan and get that plane balanced! Once balanced, you can reduce surface movement travel, use your dual rates or expo, and get that plane tuned up for attempts at the winner's circle!

Next trip is a flight! An electric flight at that. I'll be reviewing Hitec's new Sky Scooter Pro Version 2. An EPP speed 400 electric that has me grinning lately ☺. You can reach me for questions at GordySoar@aol.com