

There Is No CG With A Tow Hook -- Hooked !

Too often I hear guys talking about how they changed their 'CG's and its affect on their launches....and of course it drives me crazy!

Let's engage those little grey cells for a minute, turn the lights on, and get out the magnifying glass to take a close examination of what is going on during launch.

Lets say (just to be crazy) that your plane has a bunch of useless lead in the nose (of course it ended up there because everyone knows that makes a plane more 'stable'). That means that in normal thermal duration flight mode, your model is flying around with a bunch of up elevator incidence in order to hold that nose lead from being pulled to earth in flight.

Since airspeed enables/empowers your elevator, on launch, your model will nose up hard on release. While that 'looks' really impressive it usually causes a model to end up healing over to one side or the other, generally crashing and being drug to the turnaround.

Proof positive that 'CG' has a LOT to do with launching...so then why the title "There is no CG with a tow hook, hooked"?

"CG" has to do with the balance point of the airframe...while flying. It is the teeter-totter point of the fuselage in the air. When a sailplane is on tow, that teeter-totter point is the tow hook that is hooked on to the line...extremely firmly. Regardless of where the model balances on your finger tips, during launch it's only pivot point IS the tow hook.

So WHY do guys talk about adjusting their balance point to improve launches? Simple because they haven't thought about what does what. I pointed out that a nose heavy model (one that needs a lot of down stick to fly level inverted), will balloon with high airspeed, but what about a sailplane that is 'balanced'. Its stab is set at zero, that sailplane flies flat and level at crawl speeds of landing and super sonic speeds at the zoom. On release that model rotates to vertical by properly placing the tow hook.

A forward tow hook causes a flat launch, the nose of the model being pulled down.

A properly placed tow hook allows the model to rotate with a clean aerodynamic profile. The wing can do its job that is to 'lift' the model away from the turnaround. You can tell a properly balanced and trimmed model with an optimized tow hook location by the sound of the winch motor lugging...and the incredible energy carried after the release.

A balanced sailplane with a mediocre tow hook location needs lots of flap to lug the winch motor and to get an optimized launch height. That's different than an optimized launch. Flap causes drag, and drag slows airspeed, and a slow airspeed means less forward energy that can be converted to altitude.

I get a kick out of axioms like "your tow hook should be just forward of your 'CG'." A model poorly balanced puts the tow hook in the wrong location. Proof positive of this is Euro-moldie tow hook locations.

Euro's would never consider moving their models balance point to anywhere but where the plan shows. That would be rude! And since they fly different than we do, their models are characteristically built with some up incidence in their elevator stabs (in the case of fixed stab V-tails) and show a 'CG' at about 40% of root chord (or less!). Those models are often flown at a single speed and their landings are never the trick tasks we have at our contests. So with lead in their noses, and tails tilted up, their tow hooks need to be forward to dampen the effects of that stab incidence to keep their sailplanes from over rotating on launch, going squirrely and crashing.

When we get those models we pull a bunch of lead out and find that we need to either fly them with about 1/8" down elevator trim or need to shim their tail mounts... in order to get them to fly level at all speeds.

But I digress... the proof positive about having their tow hooks in the wrong location, is that every one of them has an adjustable tow hook installed and you will always find it adjusted as far back as the adjustment allows!

So where should the tow hook be? Right on the 'balance..d' point of the sailplane. Balanced,,,,, not some theoretical measured point shown as the "CG".

If your sailplane is most efficient, has the least drag, indicates lift best, and flies level, regardless of airspeed, when 'balanced' then it only makes logical sense that is where you sailplane should be 'balanced' when hooked to the tow line.

Once balanced in flight, and when hooked to the tow line, LESS flap and camber are needed to generate lift. You don't need much, since the tow line is not pulling your sailplane's nose DOWN. Now that cleaner airframe can slip through the air faster, allow the airfoil and plan form to do the job someone spent a lot of time trying to optimize. Less trailing edge camber means less work for the servos and less drain on the battery, connectors, etc. Every component of the model is happier...and launches use all the power supplied by the winch and its battery, and zooms PING off to rocket upwards...as clean as a needle.

For issues and issues of RC Soaring Digest I have been ranting and explaining, re-explaining and discussing the importance of balancing a sailplane in the air...not on the bench. Why a full flying stab is so much easier for most of us to trim, why dive testing is goofy and why testing balance inverted makes sooo much sense. I touched on tow hook location in the way most have in the past..."set your tow hook so that you get a good by not too steep launch with out camber, then dial in camber to get the most out of the winch energy....but all that was out of context...it assumed that there was some knowledge... the knowledge about why you have to have your sailplane 'balanced' before any of the rest can work...now here is my confession about all the words I wrote....

Balancing your model to its optimum, trimming it to its tweaked perfection, getting the tow hook and camber so well coordinated will NOT get you a full minute more of airtime from the settings you have right now. Having digital servos that hold your edges within a thousandth of an inch of the airfoils profile, having the most sophisticated computer transmitter will not get you 10 more landing points from using a simple 4 channel radio with 'Y' connectors to work the wing servos.

Truth!

However, YOUR efforts to understand these extremely common sense concepts WILL get you another full minute of flight time and hundreds of landing points...because it will cause you to start THINKING for yourself. Then and only then will you be prepared to take advantage of a balanced, high performance sailplane and its computer radio's functions.

Those functions are simply to make your sailplane more predictable in various task components and to take advantage of various air conditions. BUT with out the understanding of the things I have been ranting about, you will never recognize what is what -- and when. Because your model will be ballooning at speeds higher than the single speed your tail has been tuned (up) to hold that nose lead level, and your model will be dropping its nose when the airspeed slows to other than that very specific airspeed your elevator has been tuned (up) to hold that nose lead up.

Gibberish about how a neutrally balanced sailplane is touchy or hard to fly is from guys who want everyone else to stay where they are in their progression of improvement in the hobby.

Neutrally balanced has been made out to be a negative thing...a scary thing, something only 'experts' can handle...well duh!!! You only become an expert by practicing and learning to control models BETTER. I agree, it doesn't take much skill to 'fly' a model with lots of nose lead and up elevator trim...that model is set up to fly 'uncontrolled'. Why bother with a mega Transmitter if that is your goal... to let the model go where it wants and do what it wants. Thermal Duration Contest flying is about TAKING control. The score sheet doesn't reflect how the model did; it reflects what the pilot did WITH the model.

There is no CG with the tow hook – hooked. And learning more about balance through experimenting and learning out trim, launching, approach regimes for landing, etc will get you hooked...and your contest scores will be a lot more 'balanced'!

See you on my next trip!

GordySoar@aol.com

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