

OMAS Newsletter

October 2010 OMAS Newsletter

Date 10/2010 — Issue #4

Dear OMAS Club Members,

Issue number 4 is not on deck. Time sure flies during the summer and I expect our nice flying days are limited; the rain will start soon. When that happens our fly days will become build days. However, this will give us a chance to get some new planes ready for next spring.

We have a general club meeting at the field on Tuesday October 5th at 7 pm. The BBQ grill will fire up about 5 pm and Cliff and I will start cooking some hamburger and dogs. So come on out early do some flying, eat and attend the club meeting. We have a couple thank you cards for everyone to sign for Pat and Dick of RC Modeler Northwest and the Lewis family.

Best wishes,
Jay

In This Issue:

- **Feature Article: Misplaced Center of Gravity**
- **Tips & Tricks**
- **Up Coming Events**
- **Club Info/other news**
- **Quote of the Week**
- **Contact the Editor**

1. Feature Article: Misplaced Center of Gravity

From The Greater Detroit Soaring and Hiking Society

Misplaced Center of Gravity

Misplaced center of gravity (CG) is a perennial killer of newbies and old pros alike. Since it's almost building season, this is a good time to go over the basics. A new airplane with the wrong CG location is almost a guaranteed crash. (I can write authoritatively about this since I've screwed it up so often myself.) If you're an experienced builder/pilot please bear with me, I'll try to pass information to the newer guys without talking down to you.

The basic deal: any and all airfoils in any fluid—air, water, peanut oil, whatever—share this perverse characteristic: when they move through a fluid at a slight angle (the angle of attack), they experience lift forces that act “as if” they are ahead of the CG. This effect makes the foil want to tumble. We've all seen this since we were kids. When you toss a simple strip of wood or a wing-shaped piece of paper and expect it to fly, it won't! It starts tumbling right away.

To stabilize the main wing, most airplanes (and birds) use the same approach. The CG is placed a small distance forward of the center-of-lift of the wing. The slightly forward CG overcomes any natural pitching-up moment of the main airfoil and makes the “plane” want to pitch forward and down. This overall pitch-down tendency can then easily be controlled by a force (normally down) from a stabilizer/elevator mounted rearward of the main airfoil.

You might ask why the initial step of adjusting the CG ahead of the foil wasn't good enough to control the foil. Why do we need the additional step of adding a rear stabilizer? The answer is that the CG needs to be only a very small distance ahead of the center-of-lift and, if the wing has no other form of stabilization, its location is sensitive and difficult to maintain. On the other hand, a small stabilizer mounted some distance behind (or ahead of the wing as in the case of a canard) makes the job relatively easy. The farther away from the CG the stabilizer is located, the smaller it needs to be. At the extremes, planes with long fuselages like a Blaster hand launch or a super-ship can use what appears to be a relatively small stabilizer. Aircraft with very short distances from CG to stabilizer need relatively large stabilizer-elevators. Flying wings recurve the entire airfoil or use full-span elevons to act as stabilizers.

Let's go through some of the implications of CG location: The farther forward of the airfoil center of lift you put the CG, the more stabilizer down force you need. Generating lift, even in the down direction, generates drag. The more lift, the more drag. So, a plane with CG too far forward will need a stab set to a high-lift, high-drag condition in the down direction. Think of the center of lift of the main wing as kind of a fulcrum or pivot point. The farther forward the CG is from that point, the longer its effective moment arm becomes and the harder it is for the elevator at the other end of the "Teeter-Totter" to swing it around. This makes the model less responsive to elevator control and the airplane can feel sluggish. (This is only a partial reason for control insensitivity but I won't turn this article into a book.) Even though forward CG makes an airplane less sensitive and increases overall drag slightly, the slower response time can be a good thing for beginners if it isn't overdone.

Going the other way: as CG is moved rearward and closer to the center-of-lift, the required stabilizer down force will decrease and the airplane will become more sensitive to elevator, but eventually the model will get twitchy and hard to control. If the CG gets on top of the center of lift, the plane will become neutrally stable and won't automatically tend to pull out of a dive. It's for this reason that we use a "dive test" to help fine-tune the CG location. It's not a perfect test, but it is helpful. If you're not familiar with how to do it, ask one of the old dogs.

Okay, but you've gotta get the plane set up initially before you can even go out and do a dive test ... how do you get close "on the bench?" Mother Nature helps us here, because the center of lift of almost all airfoils tends to act as if it's at a point about 25% from the leading edge of the wing. (To become more accurate, it's 25% of the "effective chord length" for the leading edge of the "effective chord.") A simple general rule is that the CG should initially be set at 23-25% of the average chord of the wing. (For a flying wing this should be 16-20% of the effective chord.) Most modern kits and plans show an initial CG location, but a surprising number of older kits don't. And, more troubling, even with modern kits, some of the locations shown are just plain wrong! If you don't know how to determine the effective chord for a given wing, I can quickly show you how.

I don't mean to belabor the moment-arm thing, but the longer the relative moment arm of an airplane (the longer the wing-stab distance of the "longer legged" plane is), the more tolerant it will be of CG location. A long-bodied glider with CG at 33% might fly beautifully while a short-bodied fun-fly plane or scale model with CG at 33% could be uncontrollable.

Be smart: make darn sure that the CG is at or slightly forward of the 25% point for your initial flight with a new plane! Don't bring it home in a garbage bag! After you know how the thing flies, you can adjust the CG rearward to suit your own nervous system.

Last year Wolfie talked me into buying one of the Great Planes balancing stands. If I recall it was about 19 bucks but it's been the best plane saver I've had for some time. When I started using it I was embarrassed to find that the CG locations of some of my planes weren't where I thought they were. I'd been careful balancing them with wing supports, string hangers and so on, but they were off enough to make the planes seem like poor flying machines. They weren't. They were just improperly balanced.

Have fun, lead a balanced life! →

Tips & Tricks:

Tips & Tricks

*From the newsletter of the Rocky Mountain Modelers,
Ft. Collins, Colorado*

Vinegar

To remove epoxy from yourself safely, use white vinegar. It's smelly, safe, and very cheap!

Flexible sanding block

A flexible sanding block can be made by contact cementing sandpaper to one side of a urethane sponge. Your sanding block can conform to any curve.

Handy soldering jig

Here's an easy way to solder a threaded coupler. Place the coupler in the jaw of a wire stripper and stretch a rubber band around the handle. This provides the needed tension to hold the coupler (or whatever else) in place while soldering.

—Mel Marcum, Eugene, Oregon

Installing landing gear

When installing landing gear onto the fuselage with plastic or nylon bolts, place a thin 1/16-thick sheet of light plywood or balsa between the aluminum gear and the bottom of the fuse. This way, if by chance you land hard and shear the plastic screws, you have a better chance of getting a grip on a section of the broken plastic for easier removal. [**Tech editor's note:** Possibly. But better would be to heat the tip of a screw driver in a butane touch and push the hot screwdriver into the broken bolt, it will make a very nice screwdriver slot.]

Wire bending

When bending identical parts from small gauge wire, tape the wires together and bend both simultaneously.

Radial engine cowling

Some two-liter soda bottles have a black plastic reinforcement on the bottom. This piece makes an excellent radial engine cowling for your next project. [**Tech editor's note:** The rest of the bottle can be used for canopies and emptying the bottle first can be fun, too.]

—Jim Trump, Corvallis, Oregon

Up Coming Events:

- October 5th 7 pm and club field: club meeting and BBQ
- October 12th 7 pm: board members meeting at Barlett Engineering
- October 17th, Sunday: Annual X games at OMAS club

Club Information:

- Check out the latest meeting minutes from our board meeting. We have many items we are ironing out to make our club more fun. Minutes sent out via email.
- Is your email and address correct in the club roster? Maybe your Verizon.net email is not frontier.com? Send Kelvin and email and let him know about the change.

Final Thoughts:

I hope you enjoyed this edition of the news letter? I included a couple of good articles with good information in this issue. In the past few weeks I see more people out on the weekend and even on Wednesdays at the field when I go out to fly. It is fun to fly and check out all the other planes on the tarmac but I believe the social aspect of the club is just as important.

Happy flyin',

Jay

2. Recommended Resources

Check out our local hobby shops and vendors to support our hobby.

- www.keleo-creations.com
- www.hillsborohobbyshop.com
- www.molrca.com
- www.tammieshobbies.com
- list of Oregon RC clubs:
 - a. <http://www.dustersrcclub.com/page9.html>

3. Quote of the Week

I wanted to go back for another 50 missions, but they ruled it out because I had a case of malaria that kept recurring. So I had to stay in the States and teach combat flying. I was shot down by a mosquito!

— *Frank Hurlbut, P-38 pilot.*

4. Contact the Editor

Copyright © 2010 by OMAS - All Rights Reserved.

Editor: Jay Fonville, OMAS President
Jerome.fonville@frontier.com

(503) 290-6362, cell

Visit us online at:
www.omas-rc.org